

IBM Application Delivery Intelligence for IBM
Z
V5.1.0.x

User Guide



Note

Before using this information and the product it supports, read the information in [Chapter 12, “Notices,”](#) on page 303.

December 2019 edition

This edition applies to V5.1.0 of IBM® Application Delivery Intelligence for IBM Z and to all subsequent releases and modifications until otherwise indicated in new editions. Make sure that you use the correct edition for the level of IBM Application Delivery Intelligence.

You can find out more about IBM Application Delivery Intelligence for IBM Z by visiting the IBM Marketplace site for IBM Application Delivery Intelligence for IBM Z at: <https://www.ibm.com/us-en/marketplace/application-delivery-intelligence>.

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Chapter 1. Product overview

From the product overview, you can learn the basic knowledge about IBM Application Delivery Intelligence for IBM Z (IBM ADI), its key benefits, and its new features.

Overview of IBM Application Delivery Intelligence for IBM Z

Throughout the DevOps lifecycle, a very large amount of data can be produced, including code, requirements, designs, test artifacts, and operational information about applications. ADI is a web-based tool that is built on the Jazz® framework to facilitate enterprise DevOps adoption and drive continuous improvement across the lifecycle of product development, delivery, and maintenance.

The vision of ADI is to provide an insight dashboard with actionable recommendations to enterprise by:

- Analyzing and visualizing historical trend information on application, usage, code coverage, complexity, quality, and performance
- Providing near real-time application and process health checks
- Analyzing code coverage data and recommending tests to run to achieve better tests and code coverage
- Monitoring previously hidden performance and resource data to make performance issues exposed before production time
- Showing the application inventory and quality trends to reduce development and maintenance costs
- Highlighting the artifacts that are related to the performance concerned areas and providing the call graph of the corresponding transaction that shows the artifact complexity metrics of risk assessment
- Facilitating the inventory creation of business and IT artifacts for future usage such as code refactoring and API discovery in order to modernize applications
- Making information accessible to stakeholders through a simple and intuitive interface

Key benefits of using ADI

ADI's cognitive capabilities allow users to analyze the correlated runtime performance data, with static code quality data, as well as the testing details over time. It pro-actively alerts users on early problem detection so that resources can be shifted to the areas that need attention. By working with ADI, the typical users, such as the enterprise architects, test teams, developer teams, and operation teams, can benefit from ADI's functions to improve their DevOps process.

By using ADI code coverage function, a tester can:

- See the current and previous test coverage status in a single dashboard view.
- Determine the test coverage of a build and identify the modules that need more testing for each build.
- Develop a test list that contains the minimum number of test cases to run for a regression for the next build.

By using ADI code coverage function, a test manager can:

- Receive recommendations for test case optimization.
- Identify testing coverage issues. With the help of test coverage trends to examine overall release quality, test managers can act sooner in the development cycle.

By leveraging OMEGAMON for CICS data or System Management Facility data, a developer can:

- Be alerted about potential performance problems before the code goes into production.
- Analyze transactions or jobs that have performance issues.

- See whether their code changes drive up response time that includes DB2 and file I/O percentage wait time with the performance information of transactions that they own and the associated trend data.

By monitoring the application inventory and quality trends, a developer can:

- Visualize whether their codes are becoming easier to maintain.
- Identify unreachable codes to further simplify the code base.

By monitoring and comparing maintainability trends, development and test managers can:

- Ensure accountability of outsourced projects and in-house projects alike.
- Enable quantifiable improvement objectives to be established by organization.

By correlating performance data from OMEGAMON for CICS and code quality data from Application Discovery, a developer can:

- Pinpoint the artifacts that are directly related to the performance problem.
- Assess the risk of changing those artifacts based on when the code was changed and the maintenance indexes.

By building an inventory of business and IT artifacts, an enterprise architect can:

- Quickly discover the business terms and implementation terms from both business artifacts and IT artifacts.
- Have a dictionary that maps the business terms to their implementation terms to make the business stakeholders and IT stakeholders understand the same language.
- Quickly see the scope of the IT artifacts that are impacted by the business terms.

What's new

ADI further integrates with IBM Application Discovery to provide the business rule discovery functionalities. The following features are added to facilitate the business rule discovery activities.

V5.1.0.5

The following fixes were made to IBM ADI V5.1.0.5:

- Defect fixes and improvements for all features
- Documentation fixes to migration instructions
- Accessibility and globalization fixes

V5.1.0.4

The following fixes and stability improvements were made to IBM ADI V5.1.0.4:

- Business Rule Discovery feature:
 - Fixes to enable saving multiple business terms that are associated with a snippet
 - User interface fixes for business term discovery details navigation
- Code Coverage feature:
 - Refreshed Code Coverage headless data collection to fix for missing test ID
 - Defect fixes and improvements
- APA/SMF feature:
 - Defect fixes and improvements
- Other fixes:
 - Fixes to the startup issues with ADI server
 - Accessibility and globalization fixes

New features and enhancements in ADI V5.1.0 and later

Keyword discovery through the static analysis of data usages in application artifacts

ADI provides a ranked list of keywords based on the usage analysis of the keywords within application artifacts such as source code. The usage information for analysis includes the usages in included files, usages in condition statements, usages in computation statements, file input/output usages, database input/output usages, and IBM MQ usages. With the usage information, you can quickly identify business terms and potential business rules from the keyword list and their usages.

Automated discovery of potential business terms from enterprise artifacts

Most of business terms and business rules are documented in enterprise artifacts as natural languages. ADI helps to expedite the business term discovery process by automatically discovering the potential business terms that use Natural Language Processing (NLP) method.

Team collaboration on managing the inventory of business terms and business rule packages

You can collaborate with your team members to build the inventory of business terms and business rule packages through the list of discovered keywords. While your team collaborates, business terms can be tracked and managed. You can identify the usages of business terms in the source code or enterprise artifacts and define them as snippets. The snippets typically contain business logic that is part of business rules. You can package business terms and snippets that are related based on their business logic as business rule packages.

In addition, ADI can leverage System Management Facility (SMF) and Application Performance Analyzer (APA) data to monitor and analyze the performance of applications.

For more information about the updates and fixed APARs of IBM ADI, see [Fix List for IBM Application Delivery Intelligence for IBM Z](#) page.

Chapter 2. Terminology overview

You can find the technical terms and abbreviations that are used in ADI in the terminology overview.

To view glossaries for other IBM products, go to www.ibm.com/software/globalization/terminology.

Application Discovery (AD) project

A project in AD is a user (typically an admin role) defined grouping of program artifacts (source codes), dependencies (copybooks or includes), build scripts (JCL) and so on, on which the static analysis is performed and analysis metrics are gathered.

build

The process of creating an executable to identify the user activities that an application intends to address.

For z Systems®:

- Only changed programs are built. If changes are made only in a sub program, only the subprogram is compiled and linked in with the UI module or main program.
- A build can consist of only one module, depending on the size of the application and the changes that are going in.
- The test team tests the whole application, which includes all the programs that constitute an application.

For example, getting an insurance quote consists of:

- A UI program to accept user input and display the insurance quote or errors.
- A main program that validates the user input.
- A sub program that is called by the main program to get or calculate the insurance quote and return the value or error to the main program.

All these programs, modules, or files need to be built together to verify the insurance quote application tasks.

business rule

Business rule describes a business policy, business operation or business procedure. For business applications or enterprise applications, business rules are commonly expressed in programming language statements with one or more business terms and condition logic.

business rule package

An ADDI term that represents the information of a business rule. It groups business terms and snippets that are related and represents business logic or a business rule.

business term

A terminology that is commonly used in business operations. It provides a definition of the key business information. The list of business terms are usually different by industry, for example, there are business terms for financial, banking, and healthcare industry. For business applications or enterprise applications, business terms are usually implemented in the system. Hence, there is traceability between the business terms and the IT artifacts.

code coverage

A measure of how much of code in a program or file is being executed as part of a test or test case. The result can contain coverage for one or more programs or files, depending on how the test is structured.

CICSplex

A CICSplex is an environment in which multiple and interconnected CICS regions operate. A CICSplex lets CICS and associated applications use the full capabilities of Parallel Sysplex® architecture.

data provider

Data source. A workbook can have multiple data providers that ideally cover the DevOps entry points.

Examples:

- Build
- Performance
- Static analysis of source code

file / program

A software artifact that contains the logic to perform one or more of the application's activities.

Examples:

- Updating a database record
- Calculating the insurance quote
- Calculating mortgage rate
- Validating UI fields
- Querying the account balance

implementation name

A name or term that represents the business term in the IT artifacts. It is the term by which the business term is implemented in the source code of business applications or enterprise applications. For example, in COBOL applications the implementation name can be the data-name; in Java applications the implementation name can be the variable name or class name.

keyword

A term that has potential to become a business term or an implementation name. The term is discovered by ADI from the AD static analysis or enterprise artifacts.

service class

IBM OMEGAMON® for CICS® allows users to define a service policy, that is, a set of categorized goals called service classes that define the targeted performance throughput and which transactions the goal applies to. And users can apply the service policy to the workload running in the environment. A default service policy and set of service classes is provided upon installation of IBM Tivoli® OMEGAMON XE for CICS. Users can customize the default service policy and service classes and also add additional service classes.

shared resources

Data sources that are used by multiple projects within the Application Discovery data provider. Data source types can be database table, IMS database, or data set.

snippet

A small part of source code or a small part of text from enterprise artifacts.

test / test case

A set of steps to verify a specific activity, a set of activities, or part of an activity that the application is intended to support.

For IBM Z:

- Tests are mostly manual tests.
- A test case might or might not contain a list of steps to go through.

Examples:

- Running a transaction.
- Submitting a batch job or jobs with different set of inputs.

workbook

ADI uses the concept of a workbook to define the scope of artifacts on which to perform analysis. You can group the related artifacts from different data providers in a workbook. One workbook can be associated with one or more data providers.

Chapter 3. Tutorials

Tutorials provide the step-by-step instructions with which you can explore the key capabilities of ADI.

ADI also provides tutorial videos that demonstrate how to work with ADI based on the scenarios designed in this Tutorial chapter. You can watch the videos that are included in the [IBM Application Delivery Intelligence Tutorial Series](#) playlist on YouTube.

Installing and setting up ADI

This tutorial guides you to install and set up ADI as an administrator.

Installing ADI and configuring JTS to be the foundation of ADI

This lab guides you through the installation of ADI and steps to configure IBM Jazz Team Server (JTS) as the foundation of ADI.

Before you begin the installation, you need to update the host file to understand the public URI you use for the setup. Complete the following steps to update the host file.

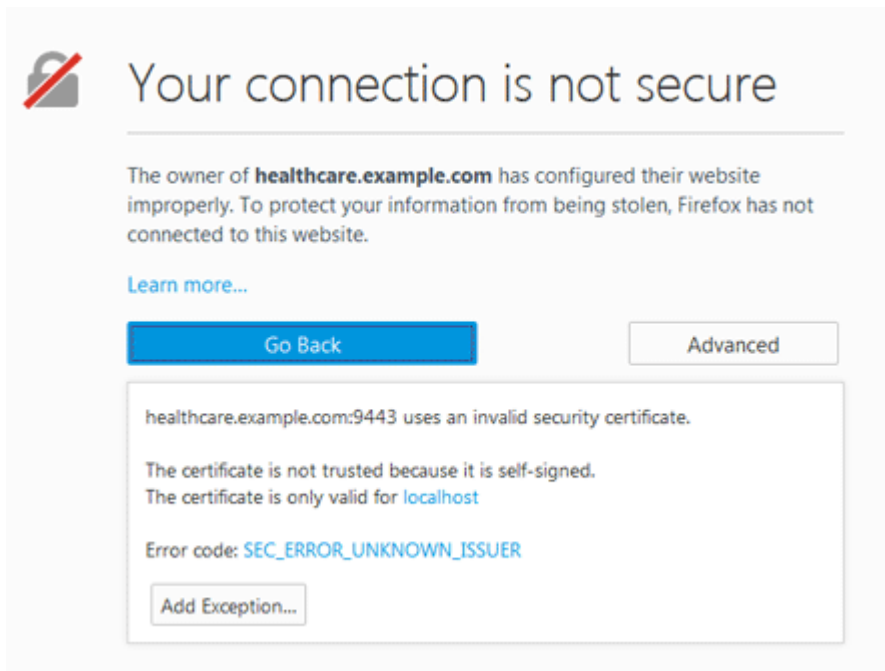
1. Go to **Start > All Programs > Accessories** and run Notepad as an administrator.
2. Open the host file to edit from `Windows > System32 > drivers > etc` directory.
3. Update the host file for the localhost as the following example.

```
# localhost name resolution is handled within DNS itself.  
127.0.0.1    localhost  
127.0.0.1    healthcare.example.com  
#           ::1      localhost
```

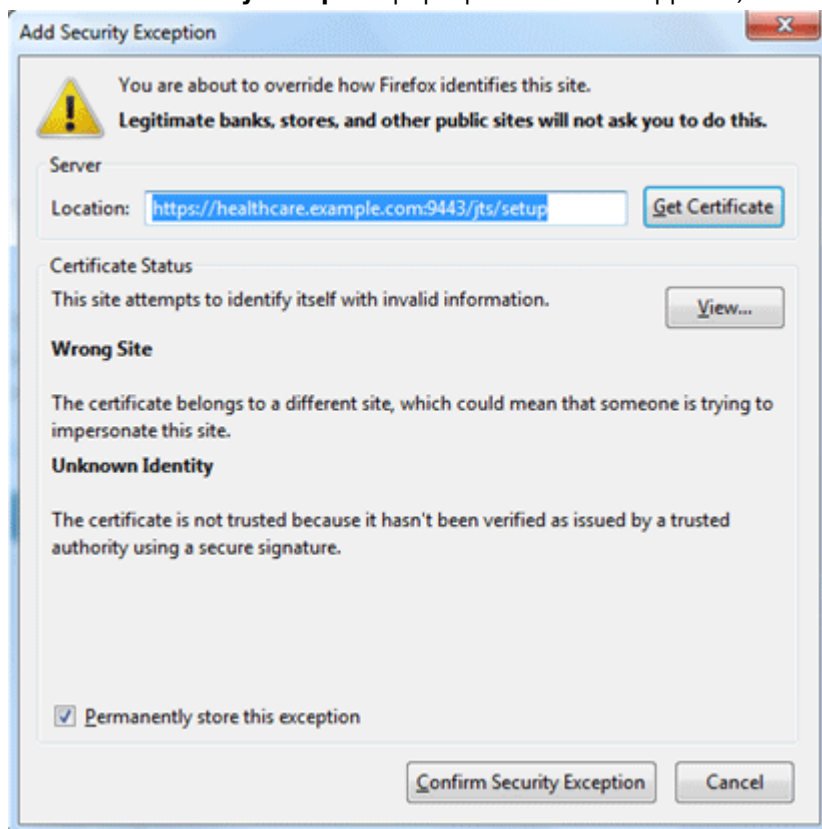
4. Save the host file.

Complete the following steps to install ADI.

1. Unzip the ADI installer that you obtained.
2. Browse to the location where you unzipped the ADI installer and navigate to the `\adi\server` directory.
3. Run `server.startup.bat` in a command window. Wait until the server starts up.
4. Start the Mozilla® Firefox® browser and go to `https://healthcare.example.com:9443/jts/setup`.
5. Optional: Allow the browser to connect to the website when a message warning that your connection is not secure appears.
 - a. Click **Add Exception**.



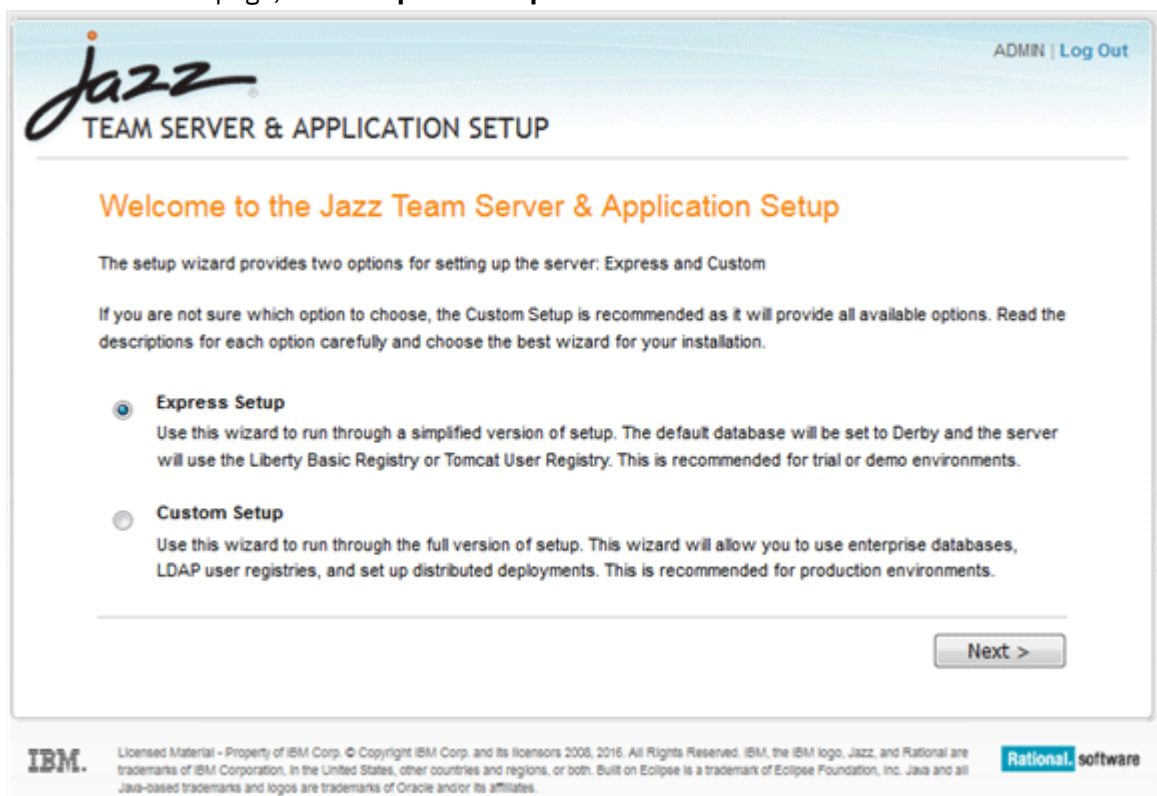
- b. On the **Add Security Exception** pop-up window that appears, click **Confirm Security Exception**.



6. On the Jazz Team Server login page that appears, log in with ADMIN as the user ID and ADMIN as the password (case sensitive).



7. Take the following steps when the JTS setup wizard appears.
 - a. On the **Welcome** page, select **Express Setup** and click **Next**.



- b. On the **Configure Public URI** page, complete the following steps.

- 1) **Step 1: Configure Public URI**

The default Public URI at this step is the `https://healthcare.example.com:9443/jts` that you've set previously. You can also use the `localhost` as the Public URI for evaluation purpose. However, for the production server, you need to update the Public URI to a valid one. When the Public URI is set, you are not able to modify it.


Step 1: Configure Public URI

Property	Current Value
Public URI	<input type="text" value="https://healthcare.example.com:9443/jts"/> <small>Example: https://host.my.company.net:9443/jts</small>

2) Step 2: Confirm Public URI

Check to confirm that you understand that when the Public URI is set, it cannot be modified.

Step 2: Confirm Public URI

 The Public URI (which includes the fully qualified hostname) **must be chosen carefully** because once it is set, it becomes integral to the data on the server and any data on any other server or application that references it. This is particularly important when configuring a production server. Please review the information on this page and refer to the [Planning your URLs](#) topic for guidance and recommendations on configuring the Public URI.


☐ I understand that once the Public URI is set, it cannot be modified except with additional administrative commands and in a limited set of scenarios, which can result in broken links from other applications that do not support changing URLs.

3) Click **Test Connection** to test the connection to the server.

4) If the test is successful, click **Next**.

c. Complete the **Create Administrative User** page with the following information and click **Next** to create an administrator user for setting up ADI server in later steps.

- **User ID:** AdiAdmin
- **Name:** Adi Admin
- **Password:** AdiAdmin
- **Re-type Password:** AdiAdmin
- **E-mail Address:** adiadmin@healthcare.com

ADMIN | [Log Out](#)

TEAM SERVER & APPLICATION EXPRESS SETUP

✓ Click Next to begin the Express Setup.

Create Administrative User

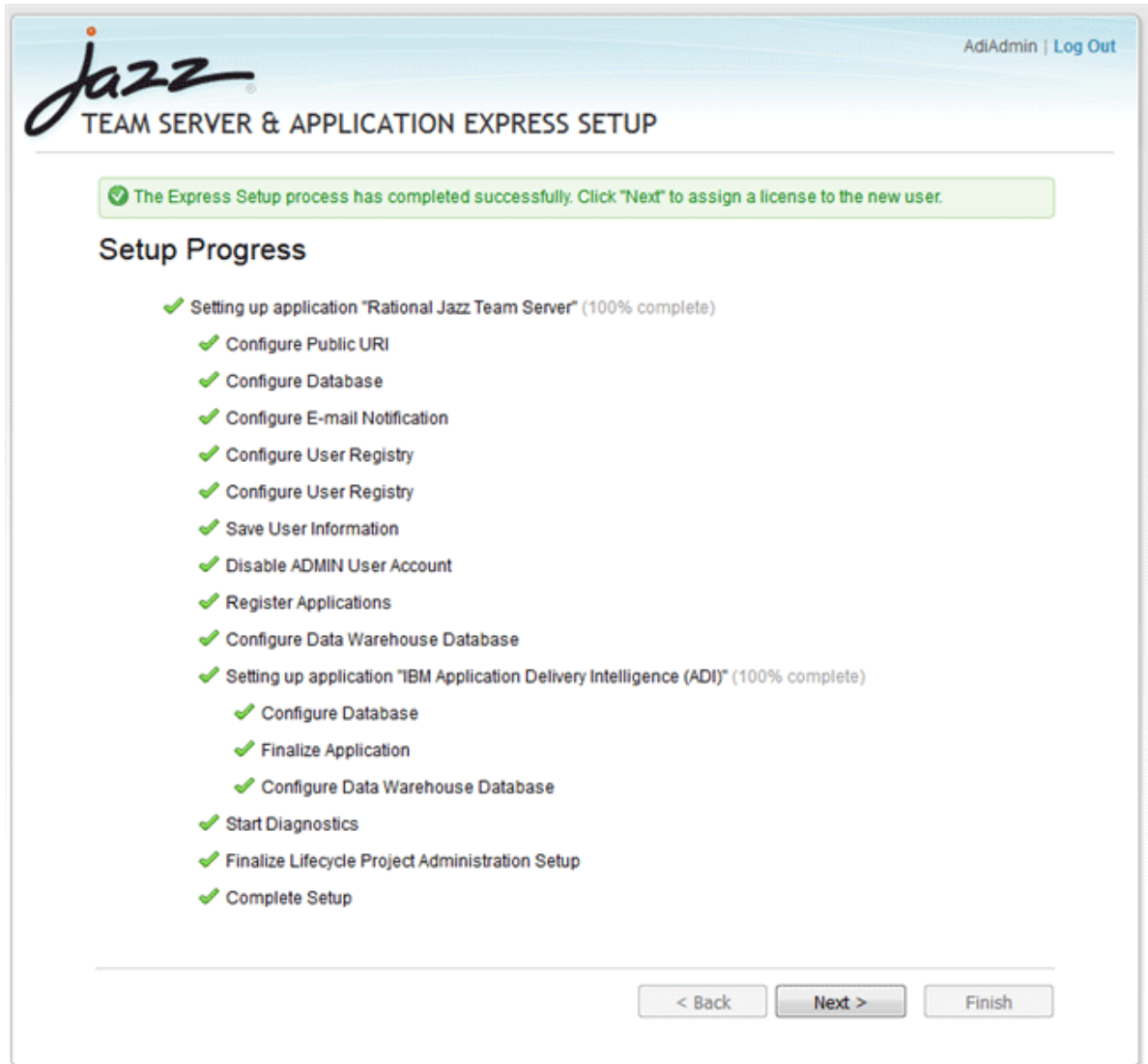
To begin, create an administrative user for yourself. Once you have completed the form, click "Next" to start the setup.

Create an administrative user for yourself in the Jazz Team Server:

Property	Value	Description
User ID	<input type="text" value="AdiAdmin"/>	Your user ID (e.g. 'jsmith')
Name	<input type="text" value="Adi Admin"/>	Your full name (e.g. 'John Smith')
Password	<input type="password" value="••••••"/>	Enter a secure password.
Re-type Password	<input type="password" value="••••••"/>	
E-mail Address	<input type="text" value="adiadmin@healthcare.com"/>	Your e-mail address (e.g. 'jsmith@example.com')

- d. Click **Next** to proceed. The **Setup Progress** page appears.
- e. Wait until the setup progress completes. Click **Next**.

Note: Now you are switched to AdiAdmin user.



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Rational. software

- f. On the **Assign License** page, select the **Activate Trial** link next to the license of **IBM Application Delivery Intelligence – User**.

AdiAdmin | Log Out

Jazz TEAM SERVER & APPLICATION EXPRESS SETUP

Assign Licenses

Step 3: Assign Client Access Licenses

① License assignment is not enabled at this time because there are no licenses available. Use the "Activate Trial" link(s) below to activate licenses. Once a license is activated, you will be able to assign it.

Available Licenses	Client Access License Type
IBM Application Delivery Intelligence	<input checked="" type="radio"/> None
Activate Trial (30 day trial)	<input type="radio"/> IBM Application Delivery Intelligence - User This is the IBM Application Delivery Intelligence (ADI) Trial License.

< Back Next > Finish

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- g. On the Client Access License Agreement dialog box that opens, select **I accept the terms in license agreement** and then click **Finish**.

Client Access License Agreement

IBM Application Delivery Intelligence User Client Access License Agreement

IMPORTANT: READ CAREFULLY

Two license agreements are presented below.

1. IBM International License Agreement for Evaluation of Programs
2. IBM International Program License Agreement

If Licensee is obtaining the Program for purposes of productive use (other than evaluation, testing, trial "try or buy," or demonstration): By clicking on the "Accept" button below, Licensee accepts the IBM International Program License Agreement, without modification.

If Licensee is obtaining the Program for the purpose of evaluation, testing, trial "try or buy," or demonstration (collectively, an "Evaluation"): By clicking on the "Accept" button below, Licensee accepts both (i) the IBM International License Agreement for Evaluation of Programs (the "Evaluation License"), without modification; and (ii) the IBM International Program License Agreement (the "IPLA"), without modification.

The Evaluation License will apply during the term of Licensee's Evaluation.

The IPLA will automatically apply if Licensee elects to retain the Program after the Evaluation (or obtain additional copies of the Program for use after the Evaluation) by entering into a procurement agreement (e.g., the IBM International Passport Advantage or the IBM Passport Advantage Express agreements).

The Evaluation License and the IPLA are not in effect concurrently; neither modifies the other; and each is independent of the other.

The complete text of each of these two license agreements follow.

☒ I accept the terms in the license agreement.
 ☐ I do not accept the terms in the license agreement.

Finish Cancel

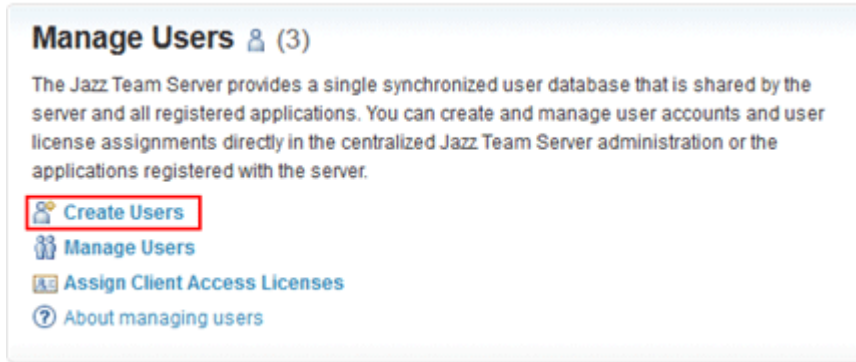
- h. Click **Finish** to complete the Express setup.

Setting up a project area to start applications to be analyzed

After you finish the Express setup for ADI, you need to create a project area for analysis.

Complete the following steps to set up a project area.

1. Open your Firefox browser and navigate to <https://healthcare.example.com:9443/jts/admin>. The JTS Administration home page appears.
2. Select the **Create Users** link in the **Manage Users** section.



3. Take the following steps to create users.

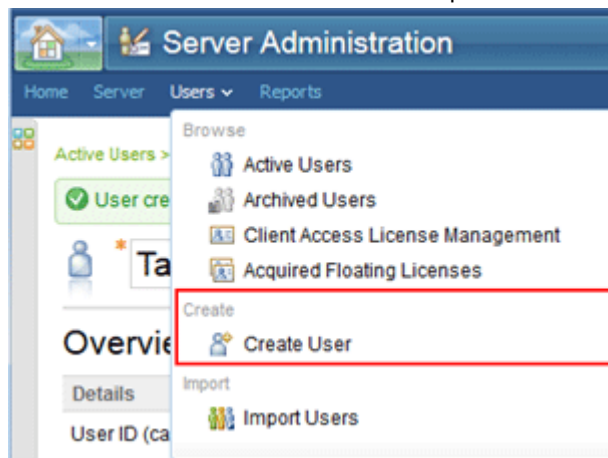
Note: In these tutorials, you need to create 3 users for use.

- Marco, a developer lead
- Tammy, a test manager
- Trish, a tester

- a. Complete the form for creating a user with the following information.

- **User Name:** Marco
- **User ID:** Marco
- **E-mail Address:** marco@healthcare.com
- In the **Client Access Licenses** section, select the checkbox in front of **IBM Application Delivery Intelligence – User**.
- Click **Save** to create this user.

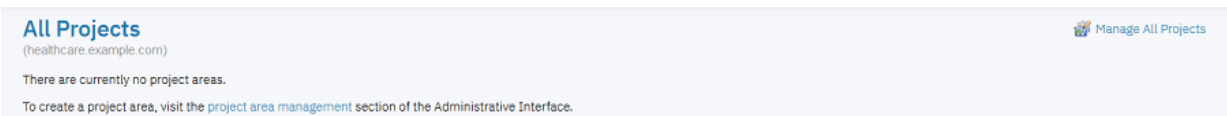
- b. Select **Users > Create User** on the top menu to create another user.



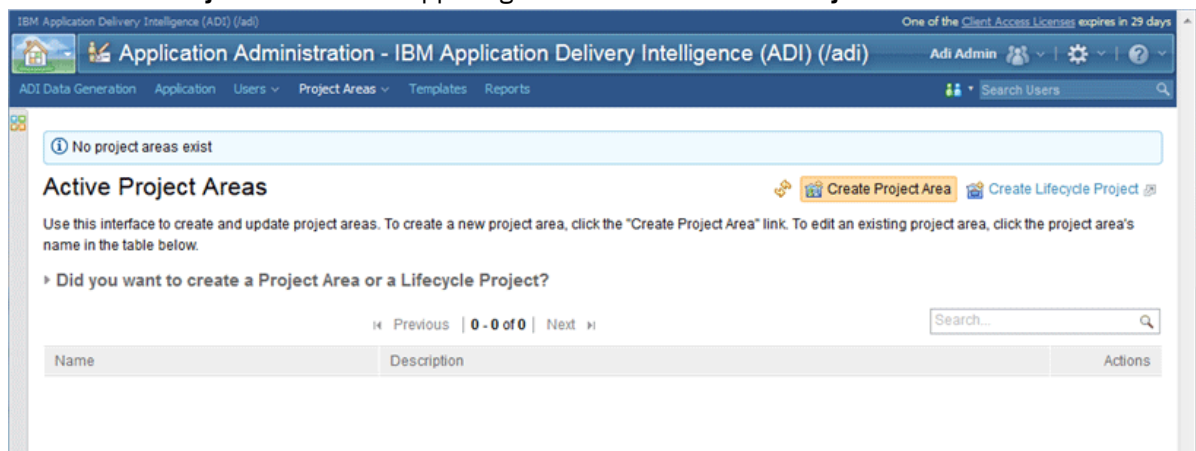
- c. Complete the form for creating a user with the following information.

- **User Name:** Tammy
- **User ID:** Tammy
- **E-mail Address:** tammy@healthcare.com

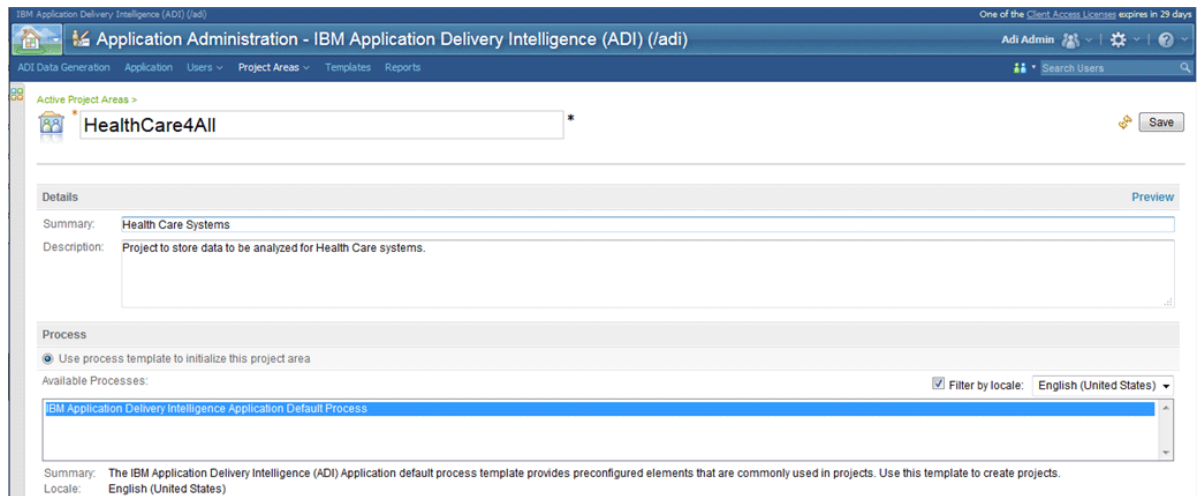
- In the **Client Access Licenses** section, select the checkbox in front of **IBM Application Delivery Intelligence – User**.
 - Click **Save** to create this user.
- d. Select **Users > Create User** on the top menu to create the third user.
- e. Complete the form for creating a user with the following information.
- **User Name:** Trish
 - **User ID:** Trish
 - **E-mail Address:** trish@healthcare.com
 - In the **Client Access Licenses** section, select the checkbox in front of **IBM Application Delivery Intelligence – User**.
 - Click **Save** to create this user.
4. Navigate your browser to ADI application from `https://healthcare.example.com:9443/adi/web` address.
- Note:** You may want to disable the pop-up blocker from this page before you start.
5. On the **All Projects** page that appears, click the **project area management** link to set up a project.
- Note:** For the first time user, no project is available.



6. The application navigates to the **Application Administration - IBM Application Delivery Intelligence (ADI)** page. Take the following steps to create a project area.
- a. Click **Create Project Area** on the upper right corner of the **Active Project Areas** section.

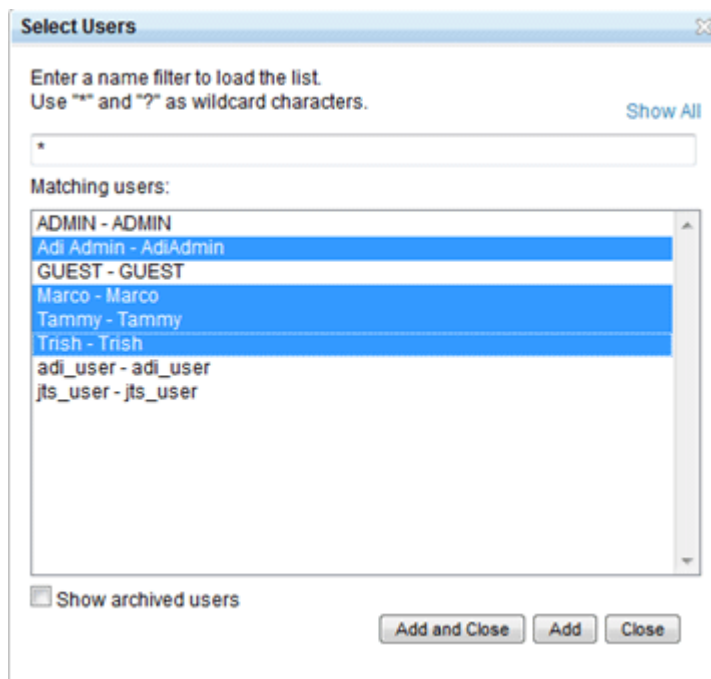


- b. Complete the **Create Project Area** form with the following information.
- **Project Area Name:** HealthCare4A11
 - **Summary:** Health Care Systems
 - **Description:** Project to store data to be analyzed for Health Care systems.
 - **Process:** Select **IBM Application Delivery Intelligence Application Default Process** if it is not yet selected.



c. In the **Members** section, assign members to the project area.

- 1) Click the **Add** link on the upper right corner of the **Members** section.
- 2) On the **Select Users** pop-up window, click **Show All** to see all active members.
- 3) Multi-select Adi Admin, Marco, Tammy, and Trish from the **Matching users** list.
- 4) Click **Add and Close**.



d. In the **Administrators** section, assign users as administrators of the project area.

- 1) Click the **Add** link on the upper right corner of the **Administrators** section.
- 2) On the **Select Users** pop-up window, type Ad on the search box.
- 3) Select **Adi Admin** from the **Matching users** list.
- 4) Click **Add and Close**.

- e. Click **Save** next to the project area name on the top to create the project area.

Note: Upon saving the project area, a warning message appears showing that some new members were added without process roles. Those members will have the permissions of the "Everyone" role. The role permissions will be set up later in the next 2 steps.

Active Project Areas >

⚠ Some new members were added without assigning process roles. Members with no assigned role will have the permissions of the "Everyone" role, which can be limited. It is good practice to assign a specific role to a member. To assign process roles, select the Process Roles action from the Actions column within the Members section of this editor. [show details](#)

- f. On the pop-up window that appears, select **Cancel** to cancel sending team invitations to the new members .

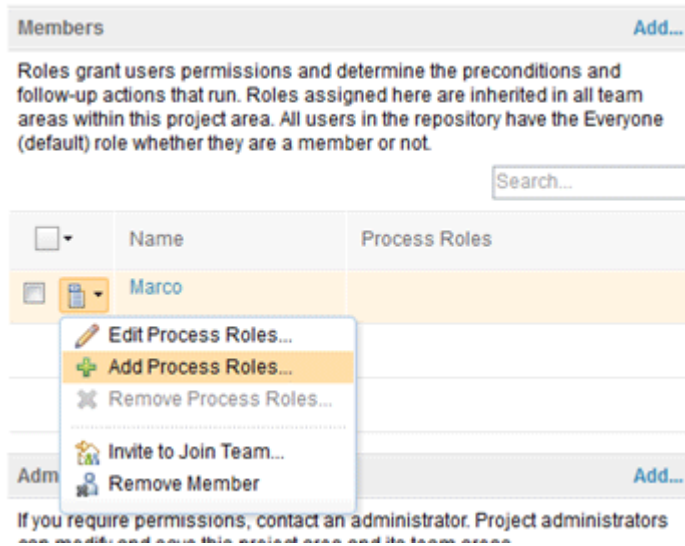
Note: If you are running the production server and you have set up the mail server, you can select the users which you would like to send team invitations to.

- g. Go to the **Members** section to add process roles for all members.

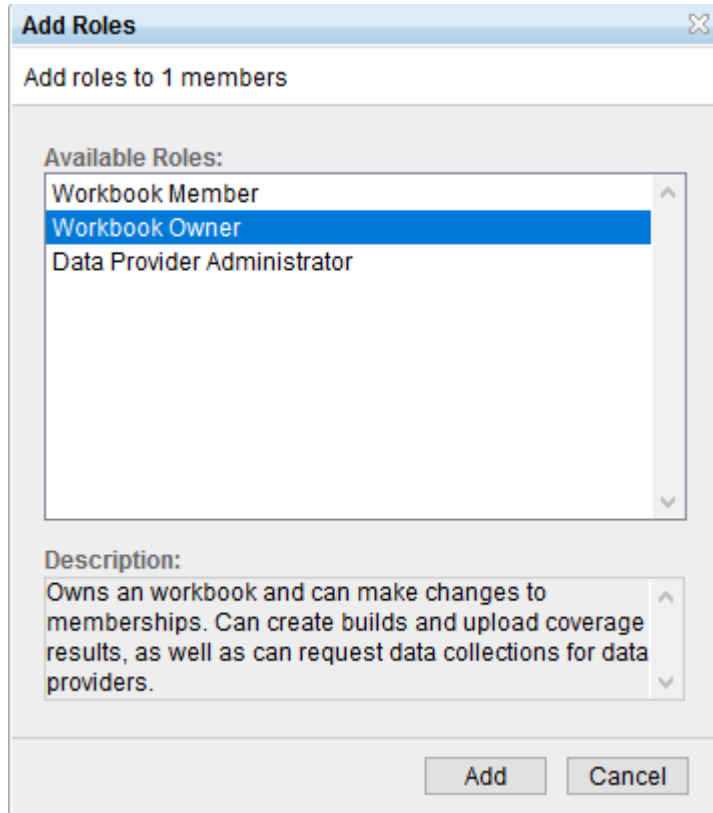
Note: Process roles are set in order to control the access for different users. The following three roles are available.

- **Data Provider Administrator:** As an administrator of this ADI project, you can create, modify, and delete data providers and workbooks.
- **Workbook Owner:** As a workbook owner, you can modify the memberships and settings of a workbook that you own. You can create builds and upload coverage results for Manual Builds data providers and Rational Team Concert Builds data providers. You can also request data collections for data providers and delete a workbook.
- **Workbook Member:** As a workbook member, you can review all data in a workbook and its data providers. You can modify only the settings of the workbook.

- 1) Hover over the name of Marco, the **Members** menu appears in front of the name.
- 2) Expand the **Members** menu and select **Add Process Roles**.



- 3) On the **Add Roles** pop-up window, select **Workbook Owner**.

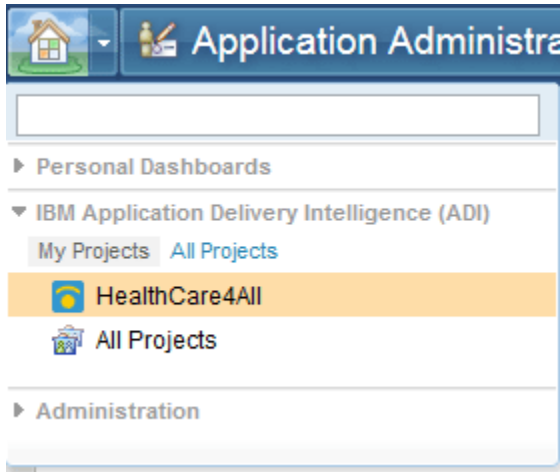


- 4) Click **Add** to add process role.

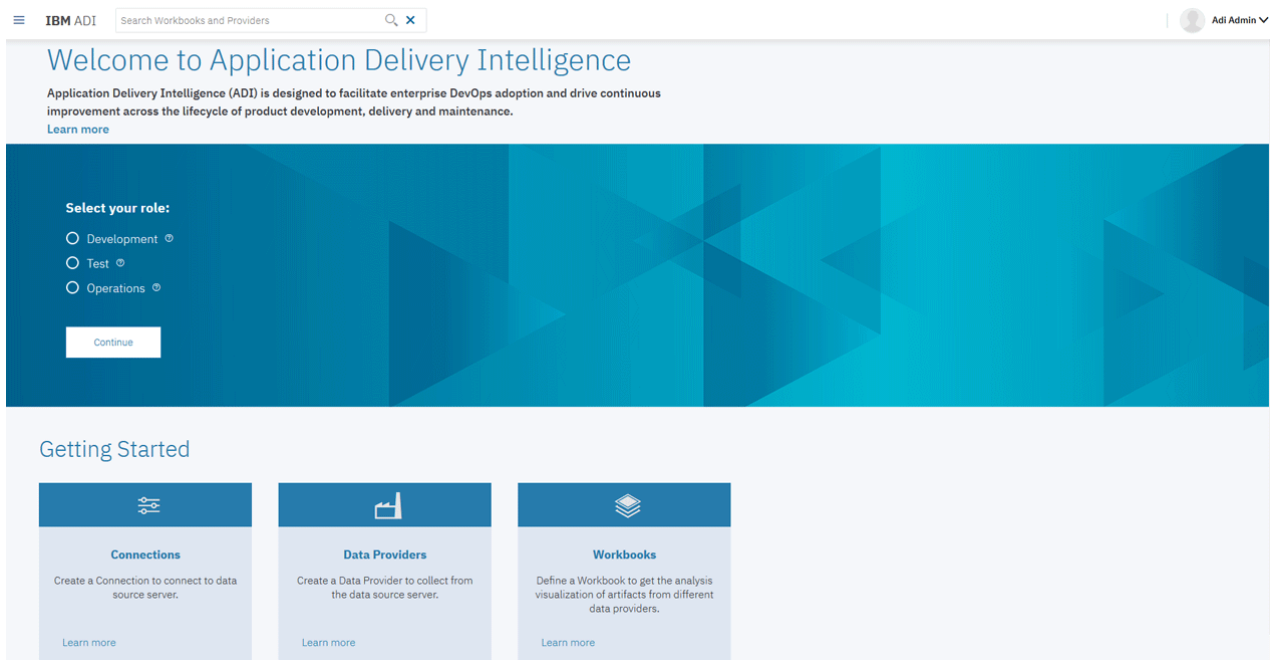
- 5) Repeat steps 1 - 4 to add process role for AdiAdmin, Tammy, and Trish. Assign the Data Provider Administrator role to AdiAdmin, the Workbook Owner role to Tammy, and the Workbook Member role to Trish.

h. Click **Save** on the upper right corner of window to save this project area.

You have now finished the setup of project area for the HealthCare4All project. You can navigate to HealthCare4All project on the ADI Application by clicking the **Home** icon on upper left corner of window and then select **IBM Application Delivery Intelligence (ADI) > HealthCare4All** from the drop-down menu that appears.



The following screen is the **Welcome** page of ADI application. ADI requires you to select a role before you can continue on the analysis.



Setting up Manual Builds for Code Coverage Analysis

In this tutorial, you play the role of Alvin, an ADI administrator who is also known as Adi Admin, to create a Manual Builds data provider as a data source for code coverage results of SAM application. Then you will switch the role to Tammy, a test manager. Tammy wants to use ADI to perform a code coverage analysis for a new application, SAM Application.

You will perform the following activities in this tutorial:

- Creating a Manual Builds data provider as a data source for code coverage results.
- Defining a new application as an Analysis workbook.
- Adding the code coverage files to the first build.
- Viewing the code coverage analysis results of the first build.

Later, when the new build is available for testing, you as Tammy will add a new build to the SAM Manual Builds data provider as a place to store code coverage results from her testers. Then, you will switch your role to Trish, a tester, to test a new build and upload the code coverage results to perform analysis as well as communicate the results to the rest of your test team. Therefore, you will further perform the following activities.

- Adding a new build as a test manager.
- Adding new code coverage results to the existing build.
- Performing the code coverage analysis as a tester.

Prerequisite

Before you begin this tutorial, you need to complete the following task.

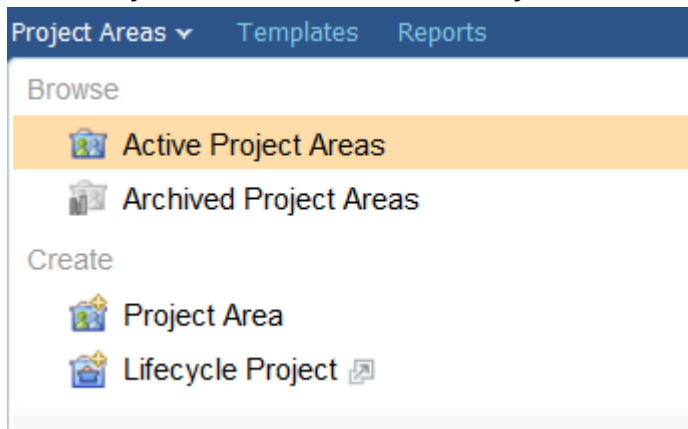
- [Installing and setting up ADI](#)

Setting permissions for the Workbook Member role

By default, a workbook member can only view the analysis results of data provider through the workbook. But in the case that your organization would like multiple testers which are workbook members to upload their code coverage results files, you need to grant this permission to them first.

Complete the following steps to grant the permission to add and delete data of a data provider to the workbook members so that they can upload the code coverage result files.

1. Navigate your browser to <https://healthcare.example.com:9443/adi/admin>.
2. Log in as the ADI administrator with AdiAdmin as the user ID and AdiAdmin as the password.
3. Select **Project Areas** > **Browse Active Project Areas** on the top menu.



4. On the **Active Project Areas** page that appears, select **HealthCare4All**.

Active Project Areas

 [Create Project Area](#)  [Create Lifecycle Project](#) 

Use this interface to create and update project areas. To create a new project area, click the "Create Project Area" link. To edit an existing project area, click the project area's name in the table below.

» Did you want to create a Project Area or a Lifecycle Project?

« Previous | 1 - 1 of 1 | Next »

Search... 

Name	Description	Actions
HealthCare4All	Health Care Systems Project to store data to be analyzed for Health Care systems.	

5. On the page for **HealthCare4All** project area that appears, select **Permissions** on the left menu.

Active Project Areas >



HealthCare4All

Overview

Timelines

Roles

Permissions

Iteration Types

Access Control

Process Description

History

▼ Team Invitation

Email Template

6. Select **Workbook Member** on the Permissions page.

Permissions

☒ Show by Role

☐ Show by Operation

Select a role:

Everyone (default)

Workbook Member

Workbook Owner

Data Provider Administrator

7. Expand the Data Provider row under the Operation on Permissions for Workbook Member.
8. Click **Grant Permission** action icon on the Add and delete data of a data provider row under the **Modify a data provider** section.

Permissions for Workbook Member:

Operation	Permission	Actions
Application Delivery Intelligence		
[-] Data Provider	[-]	
Create a data provider	[-]	
Delete a data provider	[-]	
[-] Modify a data provider	[-]	
Add and delete data of a data provider ⓘ	[-]	<div><div>✓</div><div>[-]</div></div>
Modify the data provider and connections	[-]	

9. Click **Save** on the upper right corner to your settings on role permissions of the Workbook Member.

Creating a Manual Builds data provider as a data source for code coverage results

A data provider is a source of data being analyzed. To add a new application, you need to start with adding a data provider. In this lab, you will play the role of ADI administrator to create a Manual Builds data provider.

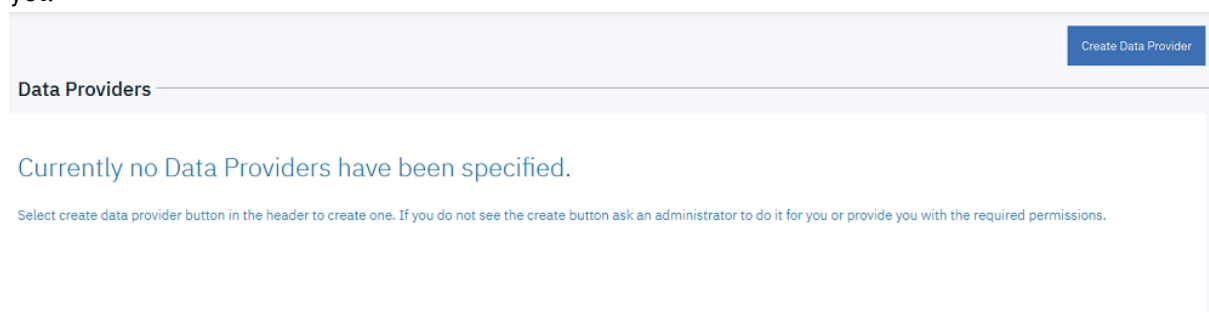
Complete the following steps to create a Manual Builds data provider to store code coverage results.

1. Navigate your browser to `https://healthcare.example.com:9443/adi/web/projects/HealthCare4All`.
2. Log in with AdiAdmin as the user ID and AdiAdmin as the password in the role of administrator Alvin. The Welcome page appears.

Note: As an administrator, you do not need to select any role on this page. The role selection is only required when you want to view the analysis dashboards and reports.

3. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
4. Click **Data Providers** to go to the **Data Providers** page.

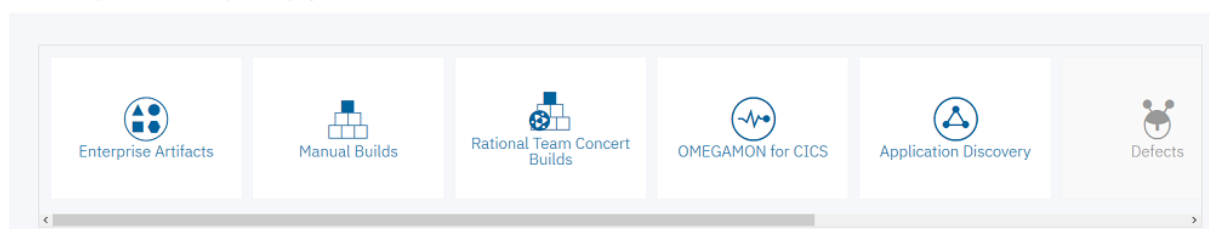
On the **Data Provider** page, a warning message shows that no data providers have been specified yet.



5. Click **Create Data Provider**. The **Add Data Provider** page loads with choices of available data providers.

< Add Data Provider

Select a data provider kind to define a new provider and specify data to collect.



6. Click the **Manual Builds** data provider card. A form for creating the Manual Builds data provider appears.
7. Complete the form with the following information.

- **First Build**

- **Build Name:** 2015Nov10Build
- **Date of Build:** 11/10/2015, 12:00 AM. You can select the date from the drop down calendar to complete the Date of Build field.
- **Description:** November 10, 2015 build for SAM application.

First Build

Build Name *
2015Nov10Build

Date Of Build *
11/10/2015, 12:00 AM

Description
November 10, 2015 build for SAM application.

- **Code Coverage Files:**

You don't need to upload code coverage files at this point. You will upload the code coverage files as Tammy in the [“Adding the code coverage files to the first build”](#) on page 29 section.

- **Data Provider Details**

- **Name:** SAM Manual Builds.
- **Description:** Manual builds for SAM application.
- **Enable headless collection support:** Make sure that the box is **unchecked**.
- Select **All Days** for the number of days to keep data in the data warehouse.

Data Provider Details

Name *
SAM Manual Builds

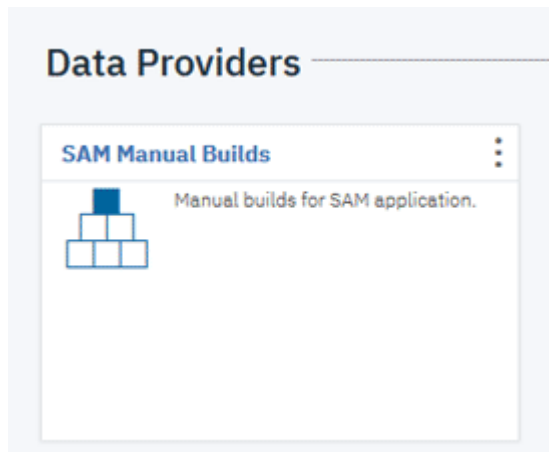
Description
Manual builds for SAM application.

☐ Enable headless collection support

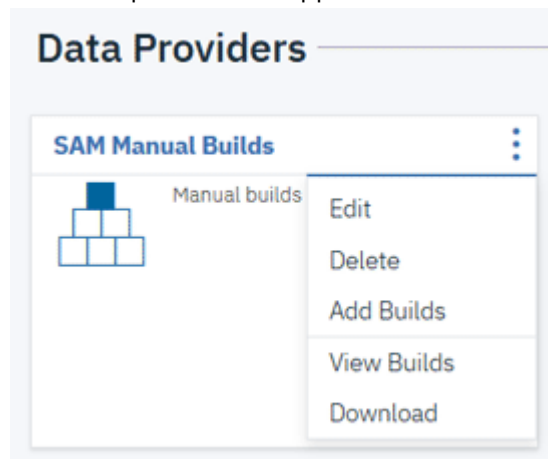
How many days' data do you want to keep in the data warehouse?
All Days

8. Click **Add** to create this data provider. The **Data Providers** page appears with the **SAM Manual Builds** data provider added.

Note: Now you have created a Manual Builds data provider for the SAM application.



9. Optional: If you want to edit the Manual Builds data provider you created, take the following steps to update the data provider details.
- Click the **Options Menu** icon on the upper right corner of the **SAM Manual Builds** data provider card. An options menu appears.



- Click **Edit** to edit the Manual Builds data provider information. The **Edit Data Provider** page loads.
- On the **Edit Data Provider** page, you can update the details of the Manual Builds data provider.

< Edit Data Provider

Update the provider details.

Data Provider Details

Name *

Description

☐ Enable headless collection support

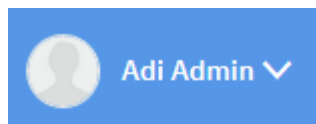
How many days' data do you want to keep in the data warehouse?

All Days

SaveCancel

d. Click **Save** to save your changes. You can also click **Cancel** to quite editing.

10. Click the User menu on the upper right corner of the view.



Welcome to ADI

My Profile

Logout

11. Select **Logout** to log out from ADI. The Login window appears. You are now logged out from ADI.

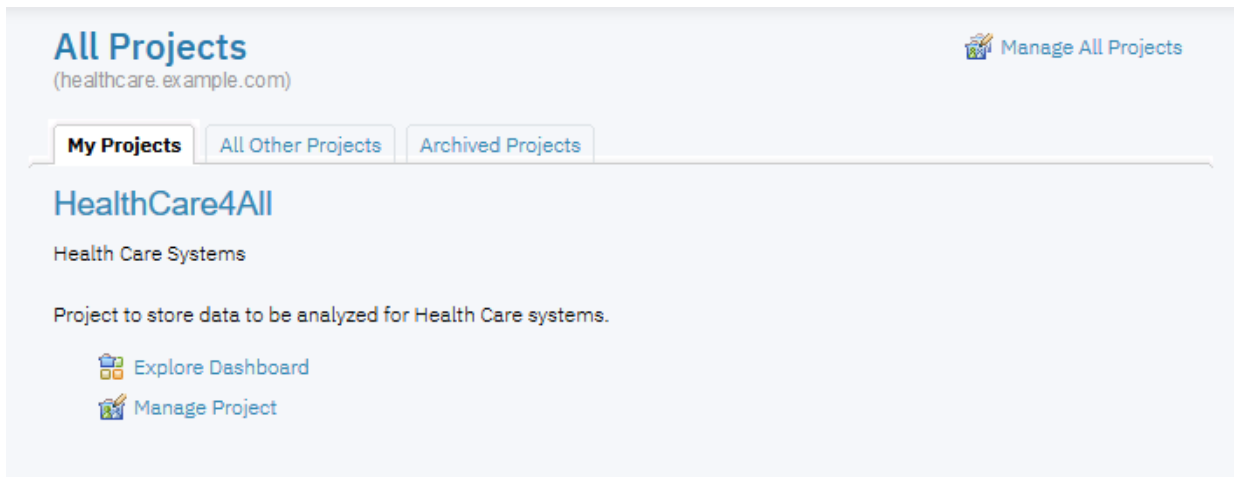
As the ADI administrator Alvin, you have now successfully created the **SAM Manual Builds** data provider. Next you will switch your role to Tammy, the test manager. You need to create a workbook to represent a new application that you want your team to use for code coverage analysis.

Defining a new application as an Analysis workbook

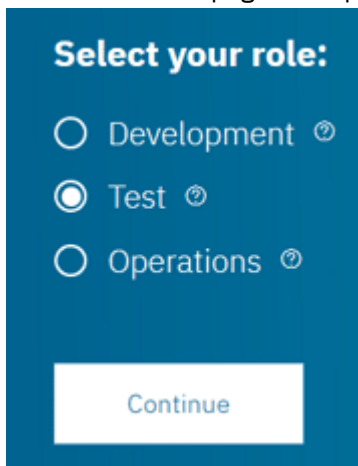
In ADI, a workbook is used for grouping the same or disparate artifacts for analysis. In this lab, the workbook is used to represent an application. You will play the role of Tammy to define a new application as a workbook and then associate the workbook with a Manual Builds data provider that stores the code coverage results of that application.

Complete the following steps to define a new application as a workbook.

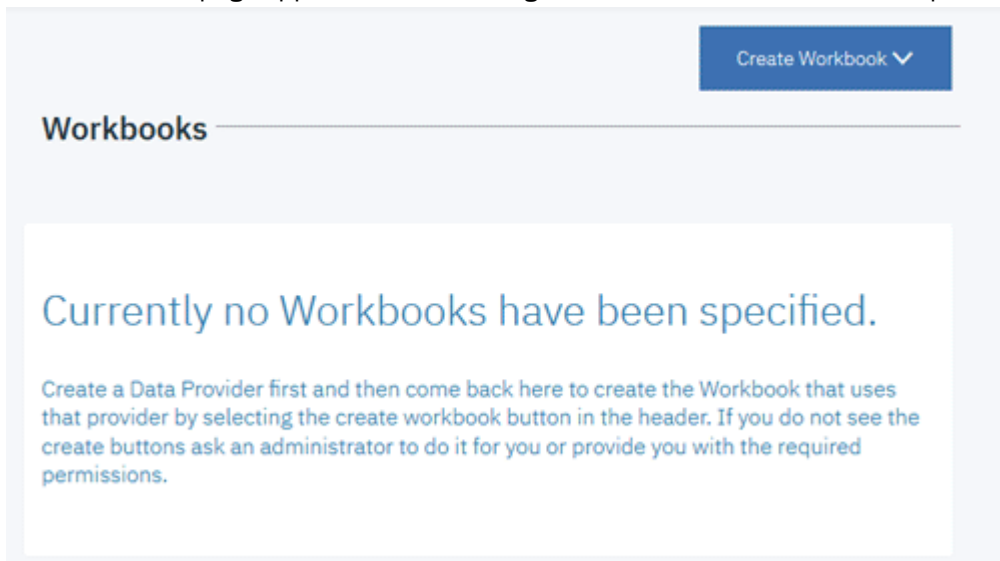
1. On the ADI Login window, log in as Tammy the test manager, with Tammy as the user ID and Tammy as the password.
2. On the **All Projects** page, select the **HealthCare4All** project.



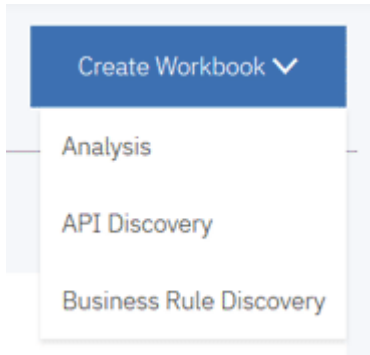
- On the Welcome page that appears, select the **Test** role and click **Continue**.



The Workbooks page appears with a message that no workbooks have been specified at this point.



- Click **Create Workbook** and then select **Analysis** from the drop-down list.



5. Complete the **Add Analysis Workbook** page that appears with the following information.

- **Name:** SAM Application
- **Description:** This is an analysis workbook for SAM application.
- **Contributors:** Select **Trish** as **Member**.
Note: By default, the user who creates an Analysis workbook will be automatically added as the owner of this Analysis workbook.
- **Providers:** Select **SAM Manual Builds**. The **Code Coverage Data Provider Settings** section appears.
 - **Code Coverage Threshold:** Slide the left slider to 50% and the right slider to 70%.
 - **Refine Custom Scope:** You will not see any files to select at this point because you have not yet loaded the code coverage results to SAM Manual Builds.

< Add Analysis Workbook

Define a Workbook that groups all data for one or more providers and defines which team members have access to this data.

Name*
SAM Application

Description
This is an analysis workbook for SAM Application.

Contributors

Search

Marco
Adi Admin

Search

Owner
Tammy
Member
Triah

Providers*

Search

SAM Manual Builds
Manual builds for SAM application.

Code Coverage Data Provider Settings

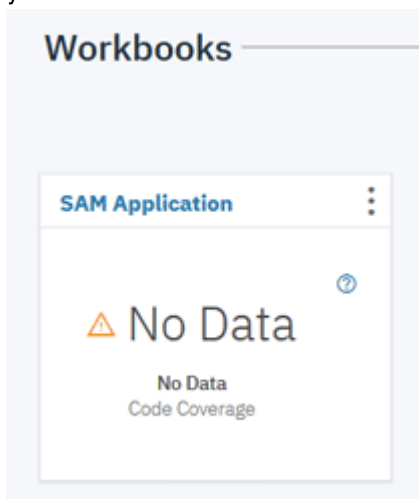
Code Coverage Threshold

50% 70%

Refine Custom Scope
> Expand and select specific files to include in this collection or skip this step to include all files.

Add Cancel

6. Click **Add** to add this Analysis workbook. The Workbooks page appears with the Analysis workbook you added.



Now you have created the Analysis workbook. Next, you will load the code coverage results into the first build of the SAM Manual Builds data provider to perform the code coverage analysis.

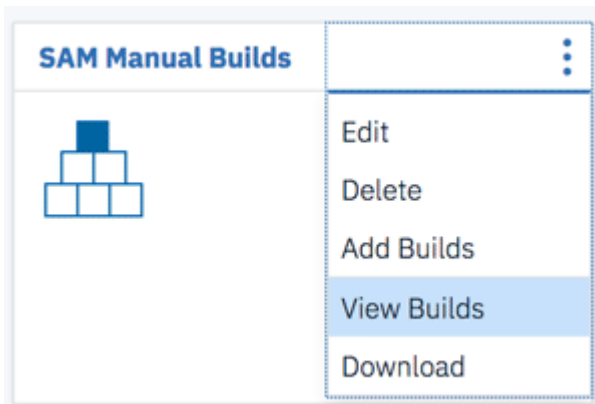
Adding the code coverage files to the first build


In this lab, you play the role of Tammy, the test manager, to add the code coverage files for analysis to the first build that is being created in the Manual Builds data provider.



Complete the following steps to add the code coverage files to the first build.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the **SAM Manual Builds** data provider card. An options menu appears.


Note: The options menu are different from what you have seen in the previous lab. This is because of the role permissions that are assigned to this user. Tammy has only the role permissions as a workbook owner. As a result, she can not edit nor delete a data provider. For more information about role permissions, see [“Assigning role-based permissions to ADI users” on page 151](#).





4. Select **View Builds** from the options menu that appears. The Builds page with all the builds in the data provider appears. Currently only one build is available, that is, **2015Nov10Build**.
5. Select the **Edit** icon () on the **2015Nov10Build** row.

 Builds 

SAM Manual Builds

Create and manage builds. Select  to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

Showing 1-1 First Page Previous Page Next Page			
Name	Date of Build	Code Coverage	Action
2015Nov10Build	Nov 10, 2015, 12:00:00 AM	N/A	 
Showing 1-1 First Page Previous Page Next Page			

The **Edit Build** page appears.

6. On the **Edit Build** page, click the **Add** icon () next to **Code Coverage Files** header section.

< Edit Build

SAM Manual Builds

Build Name *

2015Nov10Build

Date Of Build *

11/10/2015, 12:00 AM

Description

November 10, 2015 build for SAM application.

Code Coverage Files

Browse and select one or more code coverage zip files created by testing this build. You can add more files later.

No files have been uploaded

Save

Cancel

7. Select samt1.zip, samt2.zip, samt3.zip, samt4.zip, samt5.zip, samt6.zip, samt7.zip as the code coverage files.

Note: Browse to the sample data folder. Open the **Installed ADI folder > adi > examples > cobol-coverage > SAM App > November 10 2015**. Multi-select samt1.zip, samt2.zip, samt3.zip, samt4.zip, samt5.zip, samt6.zip, samt7.zip files.

Code Coverage Files

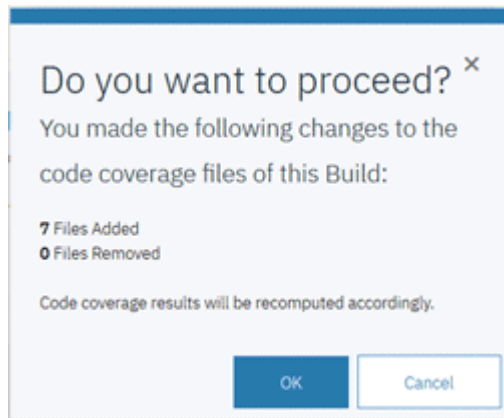
Browse and select one or more code coverage zip files created by testing this build. You can add more files later.

Filename	Upload Date	User	Description
samt1.zip			
samt2.zip			
samt3.zip			
samt4.zip			
samt5.zip			
samt6.zip			
samt7.zip			

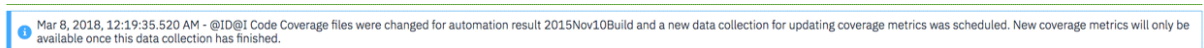
Save

Cancel

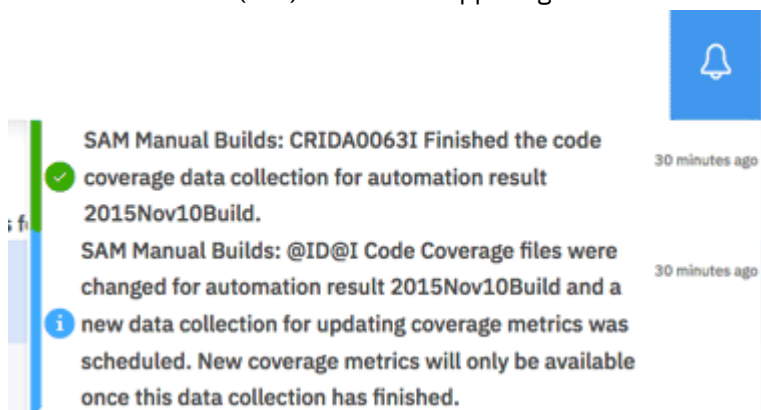
8. Click **Save** to upload the code coverage files. The confirm dialog appears.



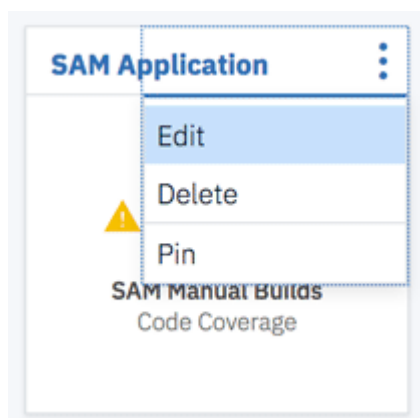
9. Click **OK** to confirm the files you upload. The Builds page appears with a message that shows the data collection is scheduled. You will be notified when the data collection is completed.



10. Click the **Back** icon on the Builds page header to go back to the **Data Providers** page.
11. Wait for a couple minutes till the data collection to complete. To view the status of data collection, click **Notifications** (bell) icon on the upper right corner of the window.




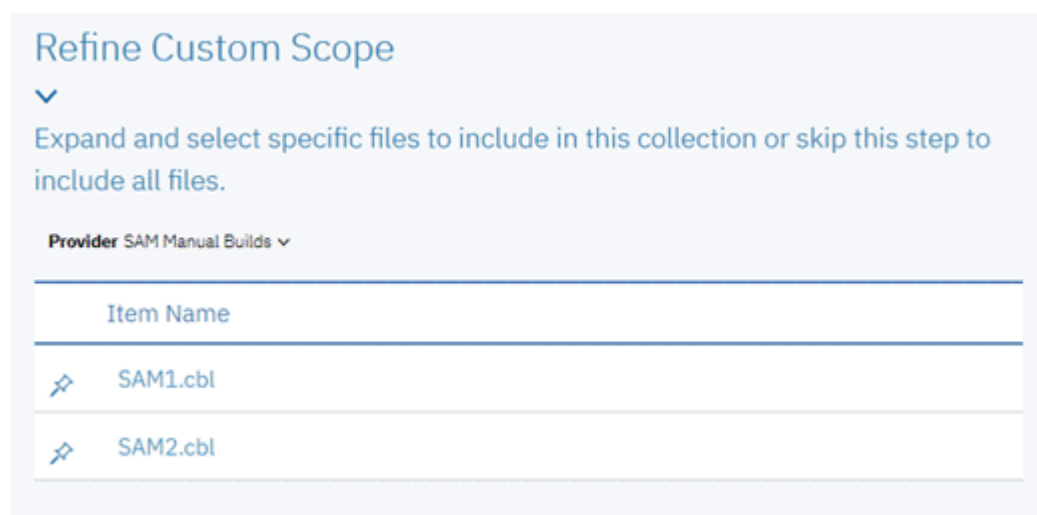
12. After the code coverage data collection is completed, you can go to the Analysis workbook to see which source files are tested based on the code coverage results that have been loaded. In real-life scenarios, there can be hundreds of source files for an application which makes it hard for the testers to focus the testing in different area. In this case, you can create multiple Analysis workbooks and define the focus area within each Analysis workbook by using the custom scope. You can complete the following steps to define the custom scope .
- Click the **Menu** icon next to the IBM ADI header to open the menu pane.
 - Click **Workbooks** to go to the Workbooks page.
 - Click the **Options Menu** icon on the header of the **SAM Application** card. An options menu appears.
 - Select **Edit** to edit the SAM Application information.



- e. On the **Edit Analysis Workbook** page that appears, scroll down to **Refine Custom Scope** section and click the **Expand** icon to view the source files that are loaded to the Manual Builds data provider. These source files, SAM1.cbl and SAM2.cbl in this case, are tested as part of the code coverage results.

Notes:

- By default, if you do not select any files, ADI considers all files for analysis.
- If you want to define your own scope for this Analysis workbook, select the **Pin** icon () in front of the item name to include the file in the scope.



For this tutorial, you will not define the custom scope for SAM Application. Click **Cancel** to cancel the changes.

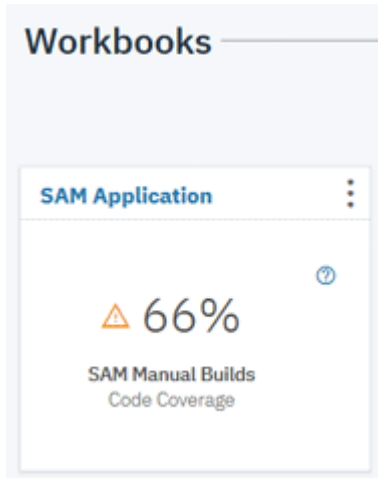
Now as Tammy you have added the code coverage files to the first build of the SAM Application Analysis workbook. You are now able to see the code coverage analysis results of the **2015Nov10Build** from the Workbooks page.

Viewing the code coverage analysis results of the first build

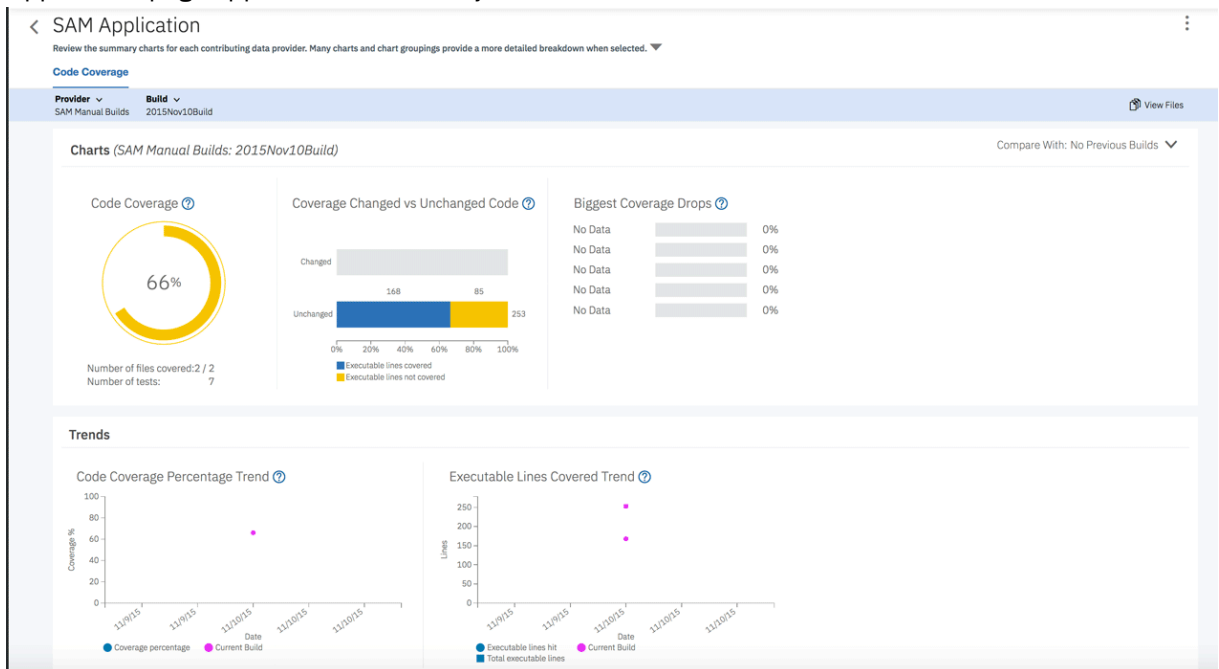
In this lab, you can view the analysis of code coverage results of the first build that you have loaded in the previous lab.

Complete the following steps to view the analysis of code coverage results for **2015Nov10Build** from the Workbooks page.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Workbooks** to go to the **Workbooks** page. On the **SAM Application** card, you can see that SAM Application has only 66% code coverage.



- Click the header name of **SAM Application** card to view the detailed code coverage reports. The SAM Application page appears with summary charts.



On the **SAM Application** page, you can see the analysis of **2015Nov10Build** in the **Charts** section. The first chart is the latest Code Coverage result of SAM Manual Builds that shows 66% Code Coverage. Next to the Code Coverage report are the comparison of code coverage for changed and unchanged executable lines of code and the files biggest code coverage drops. You can see no data for both reports since there is only one build for SAM application. For the same reason, you see no trend lines on the trends analysis reports in the **Trends** section.

For each report, you can hover over on the **Help** icon (?) to see the report information.

- Under the SAM Application page header, click the **Expand** icon to view the **Workbook Summary**. You can see the summary information of all the data providers for this Analysis workbook.

Workbook Summary

This workbook combines various metrics from...

Code Coverage

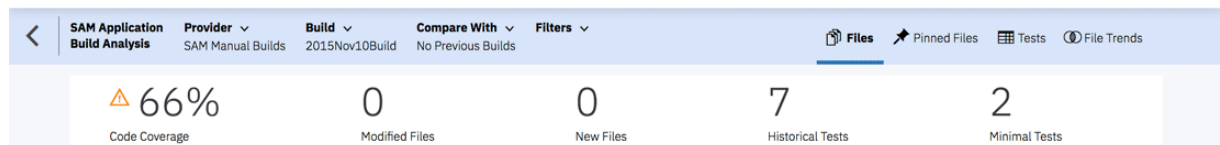
Provider	Type	Collection Interval	RTC Project Area	RTC Build Definition
SAM Manual Builds	Manual			

- Click the **Expand** icon to close the expanded section.

6. Select **View Files** icon on the upper right corner of the header to view detailed analysis.



7. Observe the **Build Analysis** page that appears. On the header section, you can see the summary for the entire build. The current build is in the yellow state with 66% code coverage. Next to the code coverage percentage is the percentage of code coverage changes comparing to the previous build. Since this is the first build, there is no percentage of code coverage changes yet. It is for the same reason that the number of modified files and new files are zero. For **2015Nov10Build**, you can see that 7 tests are tested against this build. ADI analyzes that you can run only two tests to get the same code coverage results.



On the table section, you can see the code coverage analysis details of all the files within the build. SAM2 . cbl has a red warning icon because SAM2 . cbl has only 40% code coverage, which is lower than 50% threshold that you set earlier in the lab of “[Defining a new application as an Analysis workbook](#)” on page 25.

			Executable Lines		Tests	
Item Name	Warnings	Code Coverage	Covered	Total	Historical	Minimal
SAM1.cbl		78%	137	176	7	2
SAM2.cbl		40%	31	77	3	1









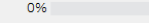


8. Click the name of SAM2 . cbl to view the list of Historical Tests to Run and Minimal Tests to Run. ADI recommends that for SAM2 . cbl you can just run SAMT4 test to get 40% code coverage instead of running all the historical tests.

SAM2.cbl	
Historical Tests to Run: 3	Minimal Tests to Run: 1
SAMT1	SAMT4
SAMT3	
SAMT4	

From the detailed code coverage analysis, you can see that only 31 executable lines are tested among the 77 executable lines. SAMT1, SAMT3, and SAMT4 are three test cases ran against SAM2 . cbl. ADI suggested SAMT4 test case as minimal tests to run. This means that your test cases are not effective. SAMT4 covers the same executable lines that are covered in SAMT1 and SAM3.

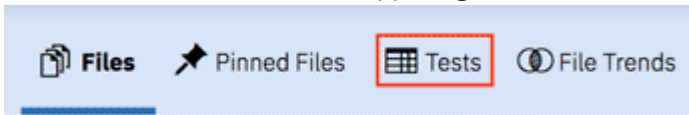
9. Click the name of SAM2 . cbl again to hide the information section.

10. Select the **Expand** icon () in front of SAM2 . cbl file to view the code coverage analysis result of the flowpoints within SAM2 . cbl. You can see that **100-VALIDAT-TRAN-ACTION** and **200-PROCESS-TRAN** are not properly tested. These two flowpoints cause insufficient code coverage for SAM2 . cbl.

 SAM2.cbl 	40% 	31	77	3	1
000-MAIN	75% 	6	8		
100-VALIDATE-TRAN 	28% 	7	25		
110-VALIDATE-TRAN-ACTION	88% 	7	8		
200-PROCESS-TRAN 	0% 	0	24		
300-PROCESS-CPU-CRUNCH	100% 	2	2		
310-CRUNCH-LOOP	88% 	7	8		
Show All 6 Flowpoints					

You can also notice that all three tests are testing exactly the same set of flowpoints, which means that the test cases are not all effective. As the test manager Tammy, you should pay attention to these test cases in the future tests.

- Click the **Expand** icon in front of SAM2 .cbl file again to close the flowpoint analysis section.
- Select the **Tests** menu on the upper right menu.



The Tests menu view loads. The view shows all the tests which are executed against the entire build and their code coverage details. You can notice the code coverage details of SAMT1, SAMT3 and SAMT4 which you observed in the previous steps. You can see that SAMT1, SAMT3, and SAMT4 have almost exactly the same detailed information, such as number of lines tested, flowpoints tested, and files tested. But SAMT1 has a slightly higher number of lines tested. As a result, SAMT3 and SAMT4 are candidates for retirement.

<

SAM Application Build Analysis

Provider

SAM Manual Builds

Build

2015Nov10Build

Compare With

No Previous Builds

Filters

Files

Pinned Files

Tests

File Trends

△

66%

Code Coverage

0

Modified Files

0

New Files

7

Historical Tests

2

Minimal Tests

Search

Item Name <div></div>	Code Coverage <div></div>	Executable Lines <div></div>		Flowpoints <div></div>		Files <div></div>		Elapsed Time <div></div>
		Covered <div></div>	Total <div></div>	Covered <div></div>	Total <div></div>	Tested <div></div>	Missing <div></div>	
SAMT1	66% <div></div>	168	253	21	23	2	0	4 sec.
SAMT2	55% <div></div>	97	176	12	17	1	0	4 sec.
SAMT3	65% <div></div>	165	253	21	23	2	0	4 sec.
SAMT4	65% <div></div>	165	253	21	23	2	0	4 sec.
SAMT5	68% <div></div>	120	176	15	17	1	0	4 sec.
SAMT6	62% <div></div>	109	176	14	17	1	0	4 sec.
SAMT7	60% <div></div>	106	176	14	17	1	0	4 sec.

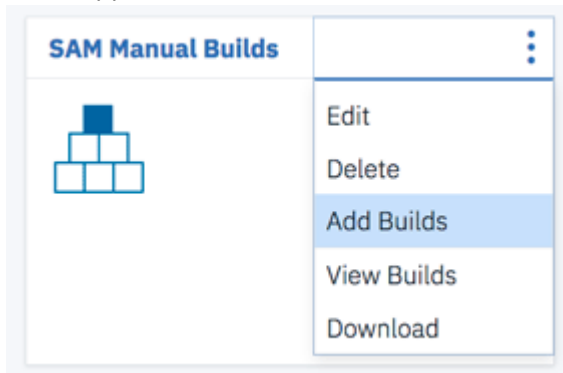
Now as Tammy you understand the quality issues of the **2015Nov10Build**. You communicate the results to your teams and ask them to do a better job of testing SAM2 .cbl for the future builds. Now you have seen how to set up an Analysis workbook to analyze code coverage results. Next, you are informed by the development team that there is a new build available for testing. You will add a new build to the SAM Manual Builds data provider.

Adding a new build as a test manager

In this lab, you will continue to play the role as the test manager Tammy to add a new build to the existing manual builds data provider.

The development team informs Tammy that the new build will be available for testing. As Tammy, you add a new build to the SAM Manual Build without code coverage results and inform your team that the build is available for testing. Take the following steps to complete this task.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the **SAM Manual Builds** data provider card. An options menu appears.



4. Select **Add Builds** from the options menu that appears. The **Add Build** page loads.
5. Complete the **Add Build** page with the following information.
 - **Build Name:** 2015Nov11Build
 - **Date of Build:** 11/11/2015, 12:00 AM. You can select the date from the drop-down calendar to complete the **Date of Build** field.
 - **Description:** November 11, 2015 build for SAM application.
 - **Code Coverage Files:** Do not enter anything at this point.

< Add Build

SAM Manual Builds

Build Name * 2015Nov11Build Date Of Build * 11/11/2015, 12:00 AM

Description
November 11, 2015 build for SAM application.

Code Coverage Files ⊕
Browse and select one or more code coverage zip files created by testing this build. You can add more files later.

No files have been uploaded






Add Cancel

6. Click **Add** to add the **2015Nov11Build**.

< Builds ⊕

SAM Manual Builds

Create and manage builds. Select ⊕ to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

Showing 1-2 First Page Previous Page Next Page			
Name	Date of Build	Code Coverage	Action
2015Nov11Build	Nov 11, 2015, 12:00:00 AM	N/A	 
2015Nov10Build	Nov 10, 2015, 12:00:00 AM	66%	  
✔ Nov 30, 2017, 11:26:29.234 PM - CRIDA0066I Added 32 new rows of data to the warehouse for automation result 2015Nov10Build.			
Showing 1-2 First Page Previous Page Next Page			

You have now added a new build to SAM Manual Build. The testers can add code coverage results to the build and perform the analysis of the results they upload.

Adding new code coverage results to the existing build

In this section, you play the role of Trish, the tester, to add the new code coverage results to the existing **2015Nov11Build** build and to perform the code coverage analysis.

Trish is testing the new build. She wants to use ADI to analyze the code coverage results of the build that she is testing. She goes to ADI to upload the code coverage results to the build created by Tammy. She then reviews the results of code coverage analysis to see if she has improved the code coverage for SAM2.cb1 as instructed by Tammy or if any other quality issues occurs. In the real-life scenario, you may have multiple testers testing the same files, each of the testers can come in to upload their own code coverage results of the builds.

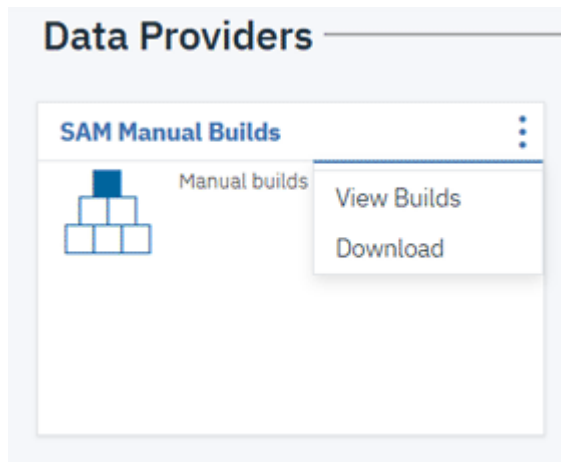
Complete the following steps to add new code coverage results to an existing build and perform the code coverage analysis as Trish.


1. On the Login page, log in as Trish, a tester, with Trish as the user ID and Trish as the password.
2. On the **All Projects** page, select **HealthCare4All**.




The Welcome page appears.


3. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
4. Click **Data Providers** to go to the **Data Providers** page.
5. Click the **Options Menu** icon on the header of the **SAM Manual Builds** data provider card. An options menu appears.








6. Select **View Builds**. The **Builds** page appears with a list of builds.
7. From the list of builds, click the **Edit** icon () on the **2015Nov11Build** to edit this build.


< Builds 


SAM Manual Builds

Create and manage builds. Select  to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

Showing 1-2 First Page | Previous Page | Next Page

Name	Date of Build	Code Coverage	Action
2015Nov11Build	Nov 11, 2015, 12:00:00 AM	N/A	 
2015Nov10Build	Nov 10, 2015, 12:00:00 AM	66%	  

 Nov 30, 2017, 11:26:29.234 PM - CRIDA0066I Added 32 new rows of data to the warehouse for automation result 2015Nov10Build.

8. On the **Edit Build** page that appears, click the **Add** icon () next to the **Code Coverage Files** header.
9. Select samt1.zip, samt2.zip, samt3.zip, samt4.zip, samt5.zip, samt6.zip, samt7.zip as the code coverage files.

Note: Browse to the sample data folder. Open the **Installed ADI folder > adi > examples > cobol-coverage > SAM App > November 11 2015**. Multi-select samt1.zip, samt2.zip, samt3.zip, samt4.zip, samt5.zip, samt6.zip, samt7.zip files.

Code Coverage Files ⊕

Browse and select one or more code coverage zip files created by testing this build. You can add more files later.

Filename	Upload Date	User	Description
samt1.zip			
samt2.zip			
samt3.zip			
samt4.zip			
samt5.zip			
samt6.zip			
samt7.zip			

Save
Cancel

- Click **Save** to upload the code coverage files. The confirm dialog appears.

Do you want to proceed? ×

You made the following changes to the code coverage files of this Build:

7 Files Added
0 Files Removed

Code coverage results will be recomputed accordingly.

OK
Cancel

- Click **OK** to confirm the files you upload. The **Builds** page appears with a message that shows the data collection is scheduled. You will be notified when the data collection is completed.
- Wait for a couple minutes till the data collection to complete. To view the status of data collection, click **Notifications** (bell) icon on the upper right corner of the window.

SAM Manual Builds: CRIDA0063I Finished the code coverage data collection for automation result 2015Nov11Build.

SAM Manual Builds: @ID@I Code Coverage files were changed for automation result 2015Nov11Build and a new data collection for updating coverage metrics was scheduled. New coverage metrics will only be available once this data collection has finished.

4 minutes ago
4 minutes ago

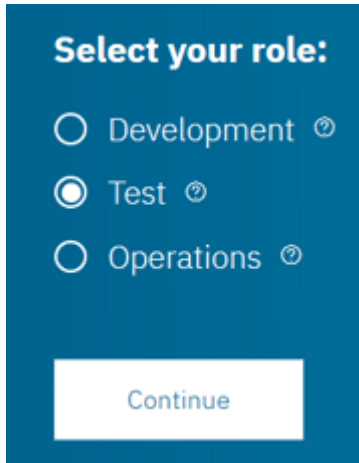
Now you have successfully added new code coverage results to the existing application. You can view the results of the code coverage analysis in the next lab.

Performing the code coverage analysis as a tester

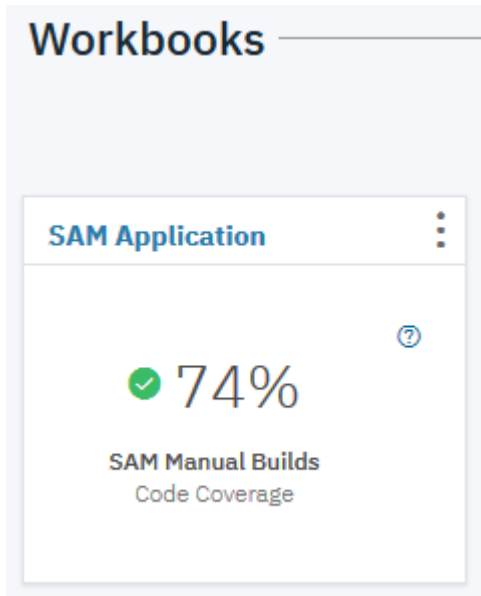
In this lab, you will continue with the role of Trish to review the code coverage analysis results of the new build that you added in the previous lab. You can pin the critical files which you need your team to pay attention to when they perform regression tests.

Complete the following steps to perform an analysis on the code coverage results of the new build.

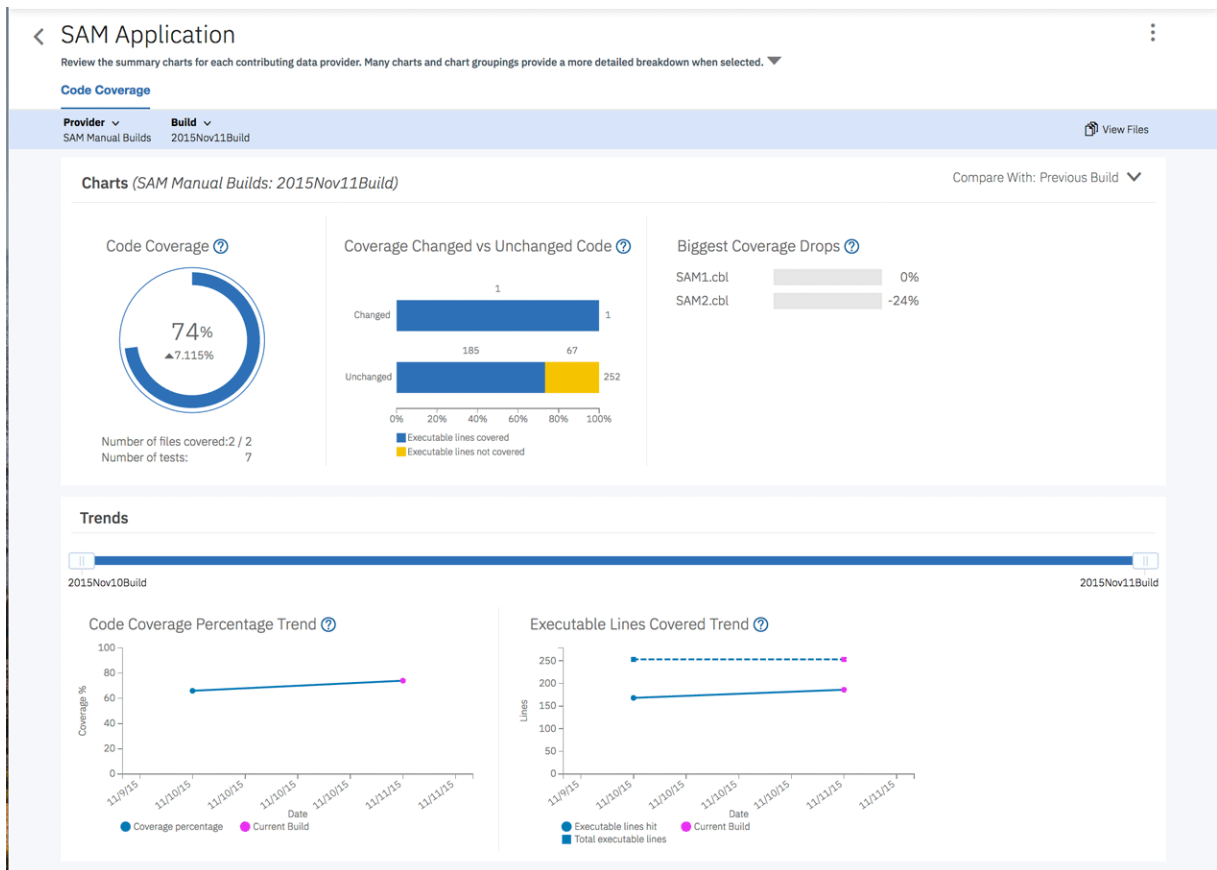
1. Click the IBM ADI header to go to the Welcome page.
2. Select the **Test** role and click **Continue**.



The Workbooks page appears. You can immediately see that the code coverage of the **SAM Application** is now improved to the acceptable area at 74% which is a good sign.



3. Click the header name of **SAM Application** card to view the detailed code coverage report. The SAM Application page appears with summary charts.



You can see that code coverage of SAM Application is now increased to 74%, up by 7.115%. The Code Coverage Percentage Trend and the Executable Lines Covered Trends are now updated with the data for Nov 10 and Nov 11 builds.

Note: From two builds, the total executable lines of two builds are the same but the executable lines hit are increased from 168 to 186. This is the reason that the overall code coverage for SAM Application is increased.

- Click **View Files** icon on the upper right to view detailed code coverage analysis of SAM Application. The **Build Analysis** page loads. You can immediately see that there is no file with a red warning.

<

SAM Application Build Analysis

Provider

SAM Manual Builds

Build

2015Nov11Build

Compare With

Previous Build

Filters

Files

Pinned Files

Tests

File Trends

74%

Code Coverage

1

Modified File

0

New Files

7

Historical Tests

3

Minimal Tests

Search

Item Name	Warnings	Code Coverage	Change %	Executable Lines					Tests		
				Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
> SAM1.cbl		78% <div></div>	<div>^0.159%</div>	137	176	0	1	<div>^0.568%</div>	0	7	2
> SAM2.cbl	<div></div>	64% <div></div>	<div>^23.740%</div>	49	77	0	0	0.000%	0	5	1

- Click the **Expand** icon in front of SAM2 . cbl to view the code coverage analysis for SAM2 . cbl at the flowpoint level in the expended section.

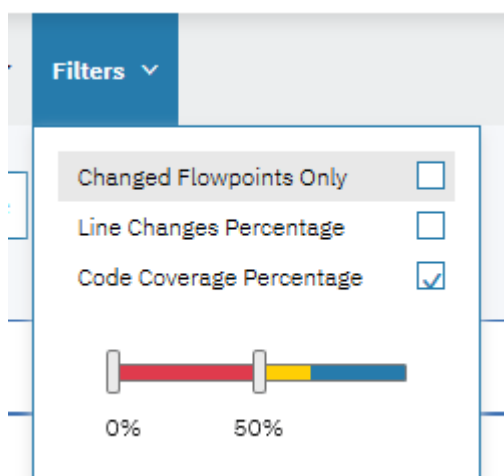
Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
> SAM1.cbl		78% <div><div></div></div>	0%	137	176	0	1	^ 1%	0	7	2
▼ SAM2.cbl	⚠	64% <div><div></div></div>	^ 24%	49	77	0	0	0%	0	5	1
000-MAIN		88% <div><div></div></div>	^ 13%	7	8	0	0	0%	0		
100-VALIDATE-TRAN	⚠	60% <div><div></div></div>	^ 32%	15	25	0	0	0%	0		
110-VALIDATE-TRAN-ACTION		100% <div><div></div></div>	^ 12%	8	8	0	0	0%	0		
200-PROCESS-TRAN	⚠	33% <div><div></div></div>	^ 33%	8	24	0	0	0%	0		
300-PROCESS-CPU-CRUNCH		100% <div><div></div></div>	0%	2	2	0	0	0%	0		
310-CRUNCH-LOOP		88% <div><div></div></div>	0%	7	8	0	0	0%	0		
Show All 6 Flowpoints											

6. Click **Show All 6 Flowpoints** to navigate to the **Flowpoints Analysis** view. On the **Flowpoints Analysis** view, you can see the code coverage analysis for each flowpoint. For example, Main is tested 88%, which is increased 13% from the previous run. You can also notice the two flowpoints that had issues previously. Although the code coverage percentages are increased, they are still in the poor and insufficient code coverage threshold.

Flowpoint Analysis File: SAM2.cbl Filters											
Item Name	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal	
000-MAIN	88% <div><div></div></div>	^ 13%	7	8	0	0	0%	0	5	1	
100-VALIDATE-TRAN	60% <div><div></div></div>	^ 32%	15	25	0	0	0%	0	5	1	
110-VALIDATE-TRAN-ACTION	100% <div><div></div></div>	^ 12%	8	8	0	0	0%	0	5	1	
200-PROCESS-TRAN	33% <div><div></div></div>	^ 33%	8	24	0	0	0%	0	5	1	
300-PROCESS-CPU-CRUNCH	100% <div><div></div></div>	0%	2	2	0	0	0%	0	5	1	
310-CRUNCH-LOOP	88% <div><div></div></div>	0%	7	8	0	0	0%	0	5	1	

Showing 1-6 First Page | Previous Page | Next Page

7. Click the **Filters** drop-down box on the top menu and check the **Code Coverage Percentage** box. The slider bars shows the threshold between 0 - 50% appears. This is by default the value of the insufficient code coverage threshold which has been set when you set up the workbook.



8. In the **Flowpoints Analysis** view, it now shows only the flowpoint where the code coverage is lower than 50%. You can move the right slider to 70%. The view is refreshed to show the flowpoints where the code coverage is lower than 70%.

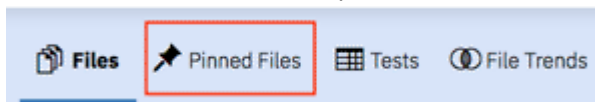
Item Name	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
100-VALIDATE-TRAN	60%	32%	15	25	0	0	0%	0	5	1
200-PROCESS-TRAN	33%	33%	8	24	0	0	0%	0	5	1

- Click the **Back** icon to go back to the Build Analysis view.
- Click the **Close** icon (X) in the filter dialog message box to clear the filter on the **Build Analysis** view. Both SAM1.cbl and SAM2.cbl are displayed.
- Click the **Pin** icon in front of SAM2.cbl name. As Trish, you decide to pin the SAM2.cbl file since this is the file which you would like your team and yourself to pay attention to for the next round of testing for this build.

Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
> SAM1.cbl		78%	0%	137	176	0	1	1%	0	7	2
> SAM2.cbl		64%	24%	49	77	0	0	0%	0	5	1

In the real-life situation, there would be hundreds of files within a build. It would be much more difficult for you to easily notice the problem areas. The filter function helps you to find these areas easier. The pin function allow you and your team to communicate on the files which need attention, such as the regression areas or the files that are more vulnerable than the others.

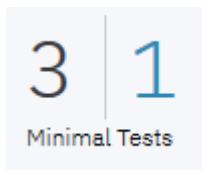
- Click **Pinned Files** on the top menu.



- The updated view shows only the code coverage information of the files that are pinned. The header section shows the code coverage summary of the pinned files along with the code coverage summary for the entire build.

Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
> SAM2.cbl		64%	23.740%	49	77	0	0	0.000%	0	5	1

- Under the **Summary** section, click on the right side number of the **Minimal Tests**.



The list of the minimal tests file which ADI recommends to run for the pinned files appears. This is the list of minimal tests that ADI analyzed based on code coverage results. They can yield the same code coverage percentage as if you run all tests. In the real life scenario, when you have many test files but have limited resources to perform the manual tests, ADI can help you to reduce time to run all these tests.

Minimal Tests For Pinned Files		Search						
		Executable Lines		Flowpoints		Files		
Item Name	Code Coverage	Covered	Total	Covered	Total	Tested	Missing	Elapsed Time
SAMT1	74% <div></div>	186	253	22	23	2	0	10 sec.

You have now explored how to upload the code coverage results to ADI for analysis and how to perform the code coverage analysis based on the code coverage results you uploaded.

Setting up automated code coverage data collections

This tutorial guides you through how to set up automated code coverage data collections.

ADI supports various automation scenarios for code coverage data collection as below.

- Automated code coverage data collection utilizing the headless code coverage collector daemon program of RDz (IBM Rational® Developer for z Systems, 9.5). ADI ships the headless collector and allows debuggers and code coverage engines to send code coverage data directly over the network so that ADI can collect the code coverage data automatically.
- Automated code coverage data collection from RTC (IBM Rational Team Concert 6.0 or higher) Build results. ADI supports connecting to RTC servers (6.0 or higher) and accessing RTC build results that have code coverage data attached. This capability allows you to download these coverage files and add them automatically to ADI.

In this tutorial, you can explore one of the automation scenarios that ADI supports. That is, the automated code coverage data collection utilizing the headless code coverage daemon program of RDz 9.5. You play the role as Tammy, the test manager, to add a new application in order to perform the code coverage analysis. This task is similar to [“Setting up Manual Builds for Code Coverage Analysis” on page 19](#). However, in this tutorial, while creating the data provider, as Tammy you enable the headless collector for ADI to automatically collect the code coverage data.

Prerequisites

Before you begin this tutorial, you should complete the following activities.

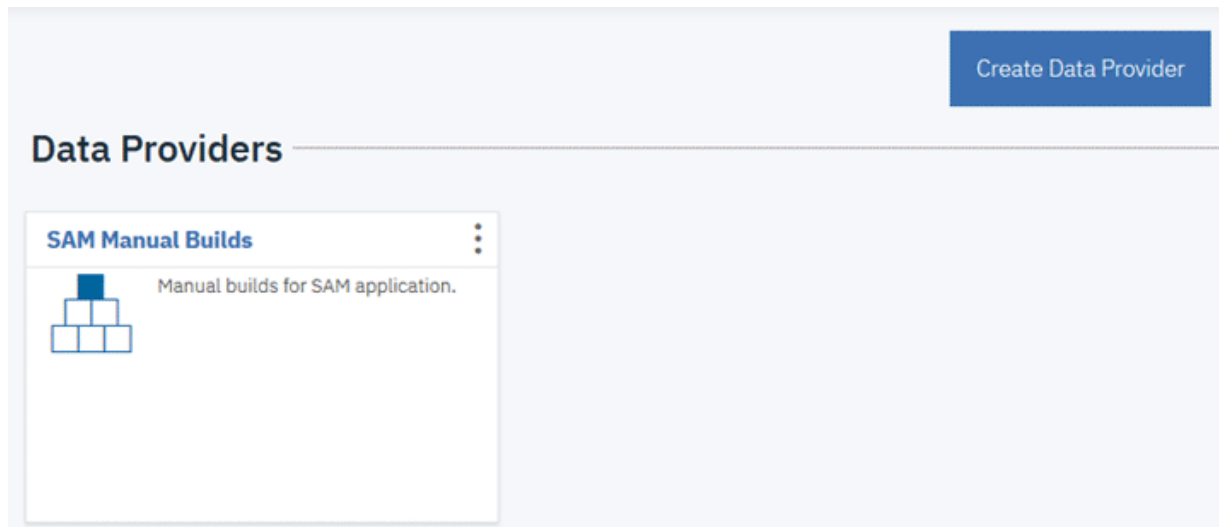
- [“Installing and setting up ADI” on page 7](#)
- [“Setting up Manual Builds for Code Coverage Analysis” on page 19](#)

Adding a Manual Builds data provider to collect code coverage data automatically

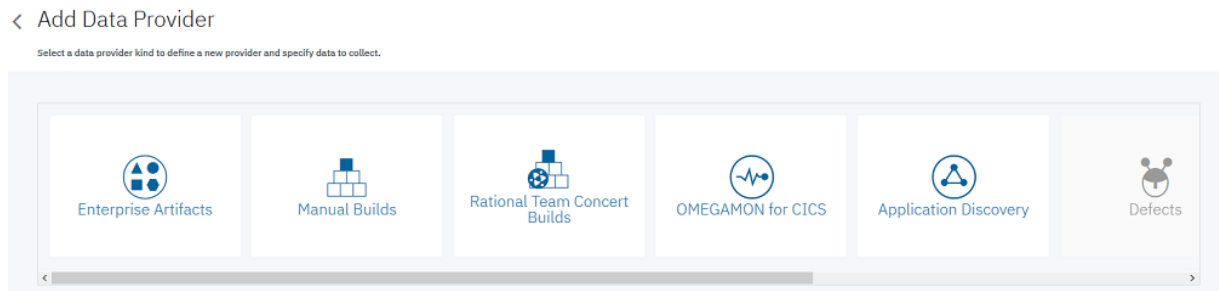
In this section, Tammy the test manager wants to start monitoring code coverage for a new application called Health Care application. She wants the code coverage data to be automatically collected by ADI. So she requests Alvin, the ADI administrator, to create a new data provider to collect the data for her Health Care application.

As Alvin, you need to complete the following steps to add a Manual Builds data provider to collect code coverage data automatically.

- Navigate your browser to `https://healthcare.example.com:9443/adi/web/projects/HealthCare4All`.
- Log in the ADI administrator with `AdiAdmin` as the user ID and `AdiAdmin` as the password.
- Click the **Menu** icon next to the IBM ADI header to open the menu pane.
- Click **Data Providers** to go to the **Data Providers** page. The **Data Providers** page loads with a Manual Builds data provider: **SAM Manual Builds**.



5. Click **Create Data Provider**. The **Add Data Provider** page loads with choices of available data providers.



6. Click the **Manual Builds** data provider card. A form for creating the Manual Builds data provider appears.

7. Complete the form with the following information.

a. **First Build**

- 1) **Build Name:** 2016Feb2Build
- 2) **Date of Build:** 2/2/2016, 12:00 AM. You can select the date from the drop-down calendar to fill in the **Date of Build** field.
- 3) **Description:** February 2, 2016 build for Health Care application.

First Build

Build Name *

Date Of Build *

Description

b. **Code Coverage Files**

You won't load any code coverage files at this moment.

c. **Data Provider Details**

- 1) **Name:** Health Care Manual Builds
- 2) **Description:** Manual build with automated data collection for Health Care application.
- 3) **Enable headless collection support:** Select the check box.
- 4) **Collection Trigger:** Select **Manual**.

Note: In the real-life scenarios, instead of manually triggering the data collection, you would set the interval time for ADI to collect data automatically.

This is to set how the code coverage data is to be collected. It can be on demand by selecting **Manual** or on schedule by selecting **Automatic** and specifying the collection interval in hours. For the objective of demonstration in this tutorial, you do on demand collection in order to see the code coverage data being loaded immediately.

- 5) Select **All Days** in number of days you want to keep data in the data warehouse. You can choose among **All Days** to keep the data forever, **90 Days**, **120 Days**, **180 Days**, and **360 Days**.

Data Provider Details

Name *

Description

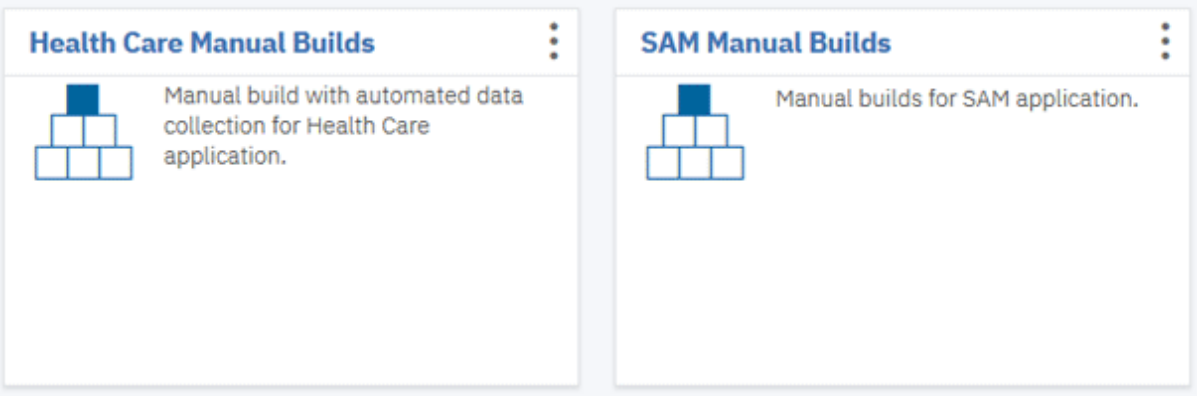
☒ Enable headless collection support

Collection Trigger

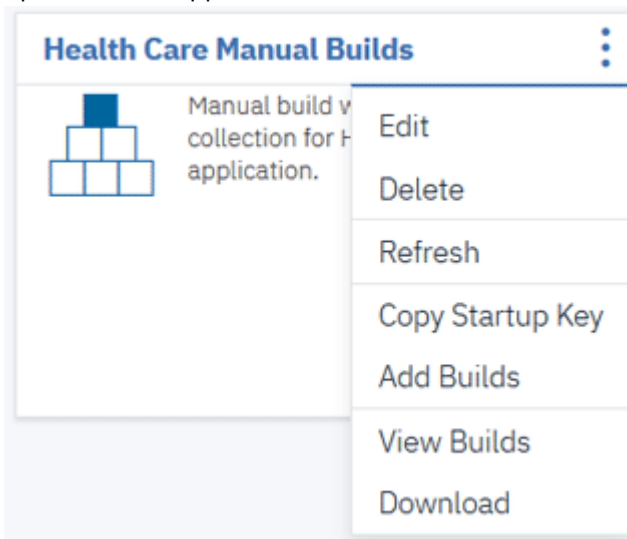
How many days' data do you want to keep in the data warehouse?

8. Click **Add** to add this provider. The **Data Providers** page appears with the **Health Care Manual Builds** added as the first card.

Data Providers



9. Click the **Options Menu** icon on the upper right corner of the **Health Care Manual Builds** card. An options menu appears.



10. Select **View Builds** to view all the builds of this Manual Builds data provider. The Builds page appears with one build available.



Note: The **Code Coverage** value indicates **N/A** at this point because ADI has not yet collected the code coverage data.

< Builds ⊕

Health Care Manual Builds

Create and manage builds. Select ⊕ to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

Showing 1-1 First Page | Previous Page | Next Page

Name	Date of Build	Code Coverage	Action
2016Feb2Build	Feb 2, 2016, 12:00:00 AM	N/A	 

Showing 1-1 First Page | Previous Page | Next Page

11. Select the **Back** icon next to the Builds page header to go back to the Data Providers page.

Alvin has now finished creating the data provider with automated data collection. Next he will create a workbook, associate the workbook with this data provider, and set up a build to collect code coverage data automatically for analysis.


Note: In the real-life scenario, Tammy, the test manager can create her own workbook and trigger the data provider to collect code coverage data. For the purpose of this demo, you will continue as ADI admin.

12. Click the IBM ADI header to go to the Welcome page.
13. Select the **Test** role and click **Continue**. The Workbooks page appears with one workbook available: **SAM Application**.

Create Workbook ▾

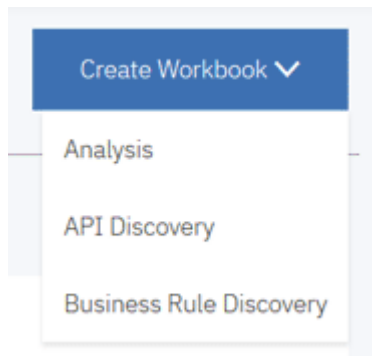
Workbooks

SAM Application

 **74%**

SAM Manual Builds
Code Coverage

14. Click **Create Workbook** and then select **Analysis** from the drop-down list.



The Add Analysis Workbook page appears.

15. On the Add Analysis Workbook page, fill in the following information.

- **Name:** zMobile Health Care.
- **Description:** This is an analysis workbook for the core Health Care application.
- **Contributor List:** Select **Tammy, Marco** as **Owner** and **Trish** as **Member**.
- **Provider:** Select **Health Care Manual Builds**. The **Code Coverage Data Provider Settings** section appears.
 - **Code Coverage Threshold:** Slide the left slider to 60% and the right slider to 80%.
 - **Refine Custom Scope:** You will not see any files to select at this point because you have not yet loaded the code coverage results to Health Care Manual Builds.

< Add Analysis Workbook

Define a Workbook that groups all data for one or more providers and defines which team members have access to this data.

Name*
zMobile Health Care

Description
This is an analysis workbook for the core Health Care application.

Contributors

Search
Trieh

Search
Owner
Tammy
Marco
Adi Admin
Member

Providers*

Health Care Manual Builds
Manual build with automated data collection for Health Care application.

SAM Manual Builds
Manual builds for SAM application.

Search

Code Coverage Data Provider Settings

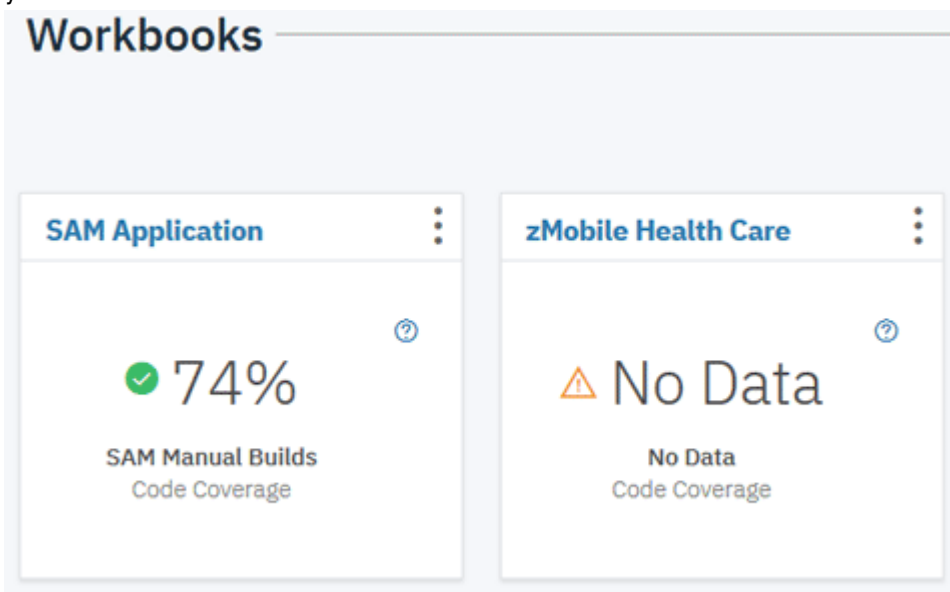
Code Coverage Threshold

60% 80%

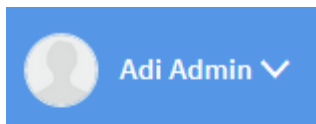
Refine Custom Scope
> Expand and select specific files to include in this collection or skip this step to include all files.

Add Cancel

16. Click **Add** to add this Analysis workbook. The Workbooks page appears with the Analysis workbook you added.



17. Click the User menu on the upper right corner of the view.



Welcome to ADI

My Profile

Logout

18. Select **Logout** to log out from ADI.

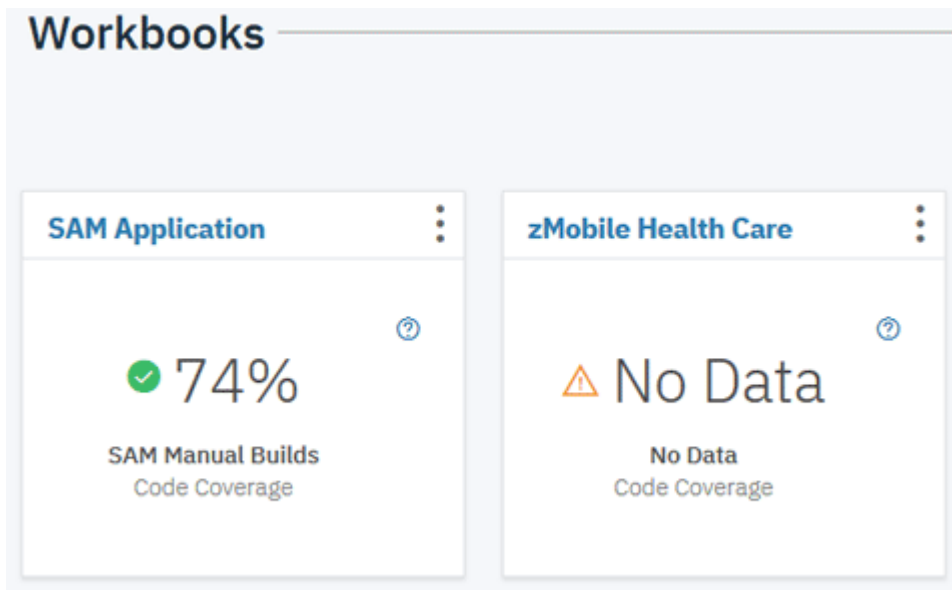
You have successfully created the Health Care workbook with the first build and set it up in the way that it can automatically collect the code coverage files. In the next section, you will play the role of Tammy, the test manager, to load the code coverage files into the location where ADI can collect them for analysis. In real practices, the step to prepare and load the code coverage files into an ADI location can be done automatically depending on the programming languages and tools you are using to generate code coverage data. For more information, see [Chapter 6, “Preparing external data sources,”](#) on page 163.

Loading the code coverage results and triggering the data collection from ADI

In this lab, you play the role of Tammy, the test manager, to load the code coverage results to the location where ADI can collect data automatically. Then you trigger the zMobile Health Care Manual Builds data provider to collect the code coverage results.

As Tammy you need complete the following steps.

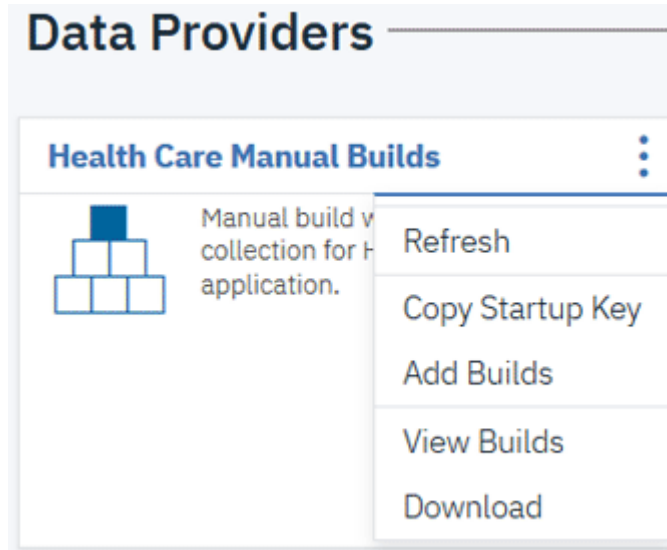
1. Log in as the test manager with Tammy as the user ID and Tammy as password. The All Projects page appears.
2. Click **HealthCare4All**. The Workbooks page loads with two workbooks: **SAM Application** and **zMobile Health Care**.



Note: At this point, no data is available for code coverage analysis report of **zMobile Health Care**. You need to load the code coverage files into the ADI location and trigger ADI to collect code coverage data.

3. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
4. Click **Data Providers** to go to the **Data Providers** page.

- On the Data Providers page, click the **Options Menu** icon on the upper right corner of the **Health Care Manual Builds** data provider card. An options menu appears.



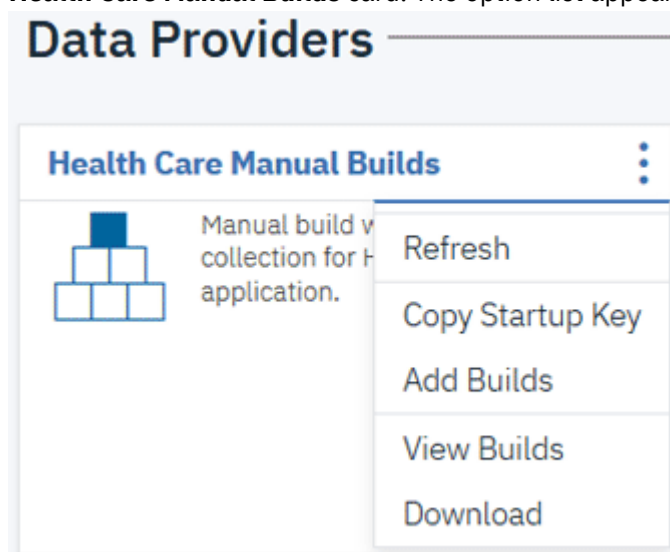
- Select the **Copy Startup Key** from the option list to copy the start up key to the clipboard.
- Open the Notepad program and paste the startup key to the Notepad. You will see the text similar to the following sample. Remember the provider ID. In this case the providerid is **LFB1QG**.

```
TEST(,,TCPIP&127.0.0.1%8005:*)
ENVAR("EQA_STARTUP_KEY=CC,,providerid=LFB1QG,testid=<fill in your test-id>")
```
- Browse to the sample data folder: Installed ADI folder > adi > examples> cobol-coverage > zMobile Health App > Build1. Select all the zip files under Build1 folder and copy them to the clipboard.
- Browse to the ADI location. Select **adi > server > conf > adi > headless-CC-files**.
- Open the folder that has the same name as providerid. From this example it is the **LFB1QG-files** folder. Paste all the zip files you copied to this folder.

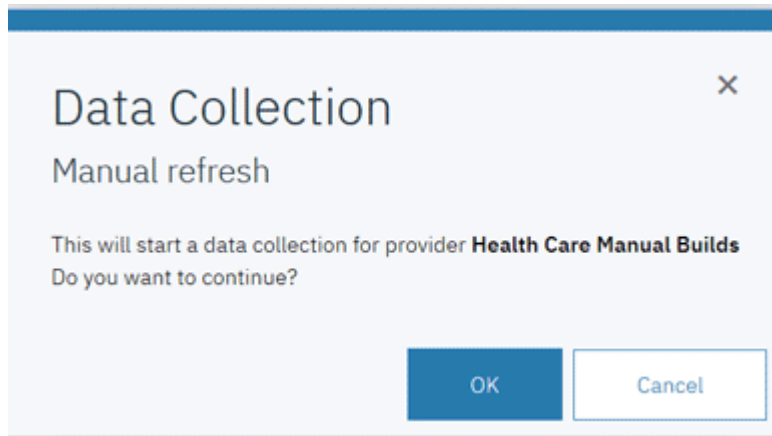
Name	Date modified	Type	Size
QueryVisit.zip	11/28/2017 11:10 ...	Compressed (zipp...	22 KB
QueryThreshold.zip	11/28/2017 11:10 ...	Compressed (zipp...	15 KB
QUERYPRI.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
QuerypatientErr2.zip	11/28/2017 11:10 ...	Compressed (zipp...	9 KB
QueryPatientErr1.zip	11/28/2017 11:10 ...	Compressed (zipp...	9 KB
QueryPatient.zip	11/28/2017 11:10 ...	Compressed (zipp...	9 KB
QueryNo.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
QueryMeds.zip	11/28/2017 11:10 ...	Compressed (zipp...	15 KB
QueryMedErr.zip	11/28/2017 11:10 ...	Compressed (zipp...	9 KB
QueryMD.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
QueryIn.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
QueryID.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
QueryDP.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
PrimaryMenu.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
ExitPrimMenu.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
ERRPRI.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
DELPRI.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
AddvisitErr.zip	11/28/2017 11:10 ...	Compressed (zipp...	10 KB
AddVisit.zip	11/28/2017 11:10 ...	Compressed (zipp...	22 KB
AddThreshold.zip	11/28/2017 11:10 ...	Compressed (zipp...	17 KB
ADDPRI.zip	11/28/2017 11:10 ...	Compressed (zipp...	6 KB
AddPatientErr2.zip	11/28/2017 11:10 ...	Compressed (zipp...	14 KB
AddPatientErr1.zip	11/28/2017 11:10 ...	Compressed (zipp...	7 KB
AddPatient.zip	11/28/2017 11:10 ...	Compressed (zipp...	16 KB
AddmedsErr.zip	11/28/2017 11:10 ...	Compressed (zipp...	14 KB
Addmeds.zip	11/28/2017 11:10 ...	Compressed (zipp...	17 KB

In your typical scenario, you want the code coverage results to be loaded into this location automatically, which depends on the programming languages and tools you are using to generate code coverage data. For more information, see [Chapter 6, “Preparing external data sources,” on page 163](#).

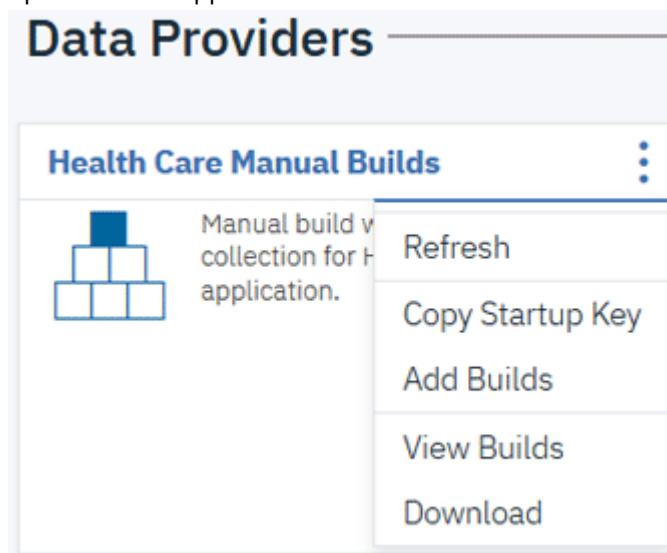
- Go back to the Data Providers page and click the **Options Menu** icon on the upper right corner of the **Health Care Manual Builds** card. The option list appears again.



- Select **Refresh** to trigger ADI to collect the code coverage data. The **Data Collection** window appears.



13. Click **OK** to start the data collection.
14. Click the **Options Menu** icon on the upper right corner of the **Health Care Manual Builds** card. An options menu appears.



15. Select **View Builds** to view the list of builds. You can now see the information bar indicates that data is loaded to the warehouse. Code Coverage for this build now shows that the code coverage percentage of this build is 66%.




< Builds ⊕

Health Care Manual Builds

Create and manage builds. Select ⊕ to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

✓ Dec 1, 2017, 12:37:26.220 PM - CRIDA0063I Finished the code coverage data collection for automation result 2016Feb2Build.

Showing 1-1 First Page | Previous Page | Next Page

Name	Date of Build	Code Coverage	Action
2016Feb2Build	Feb 2, 2016, 12:00:00 AM	66%	  
✓ Dec 1, 2017, 12:37:26.220 PM - CRIDA0063I Finished the code coverage data collection for automation result 2016Feb2Build.			
✓ Dec 1, 2017, 12:37:26.095 PM - CRIDA0066I Added 213 new rows of data to the warehouse for automation result 2016Feb2Build.			

16. Click the **Menu** icon next to the IBM ADI header to open the menu pane.

17. Click **Workbooks** to go to the Workbooks page.

On the Workbooks page, you can see the code coverage results for **zMobile Health Care** is 66%. You can click the name of the **zMobile Health Care** workbook card to view detailed analysis as you did in the [“Setting up Manual Builds for Code Coverage Analysis”](#) on page 19 tutorial.



You have now explored how to add a new Manual Builds data provider to collect the code coverage data automatically. This scenario reduces the manual steps you have to perform in order for ADI to perform analysis of code coverage data. As mentioned in the beginning of [“Setting up automated code coverage data collections”](#) on page 44, ADI also includes the capability of automated code coverage data collection from an RTC build. Due to the lack of RTC hosted environment, you are not able to explore this scenario in this tutorial for now. If you are interested in the ADI capability of automated data collection from an RTC build and already have an RTC server hosted with code coverage data, you can find more information in this online help in the Chapter of [Chapter 7, “Managing connections, data providers, workbooks, and notifications,”](#) on page 191.

Exercising setting up a Manual Builds for code coverage analysis

This is a required exercise as prerequisite for the Analyzing code coverage tutorial. You need to perform the set up of a Manual Builds data provider and an Analysis workbook to analyze code coverage for Perfect Calculator application.

Before you begin this tutorial, you need to complete the following task.

- [Installing and setting up ADI](#)

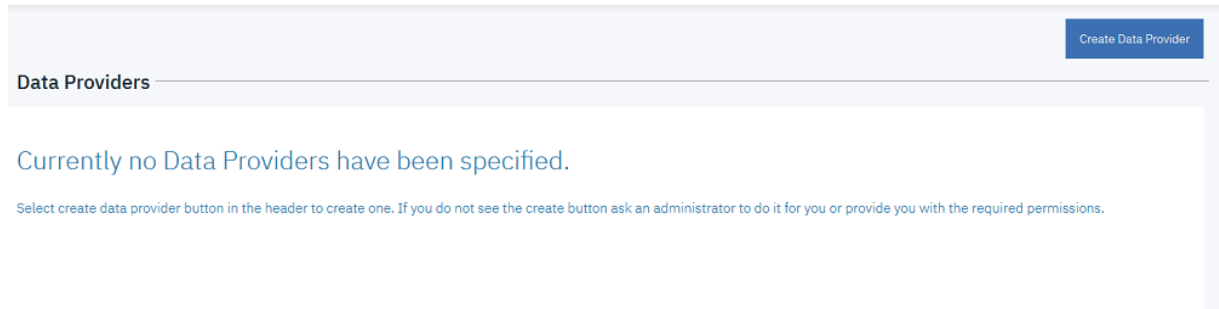
Setting up a Manual Builds data provider

This section guides you how to set up a Manual Builds data provider for code coverage analysis of Perfect Calculator application.

Complete the following steps to set up a Manual Builds data provider for Perfect Calculator application.

1. Navigate your browser to `https://healthcare.example.com:9443/adi/web/projects/HealthCare4A11`.
2. Log in as the ADI administrator with `AdiAdmin` as the user ID and `AdiAdmin` as the password. The Welcome page appears.
3. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
4. Click **Data Providers** to go to the **Data Providers** page.

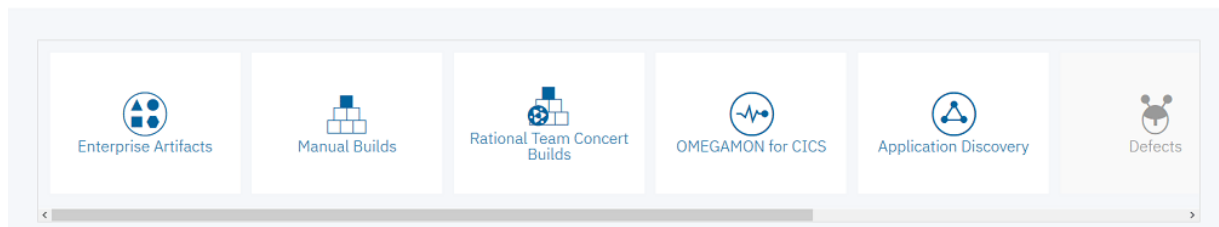
On the Data Provider page, a warning message shows that no data providers have been specified yet.



5. Click **Create Data Provider**. The Add Data Provider page loads with choices of available data providers.

< Add Data Provider

Select a data provider kind to define a new provider and specify data to collect.



6. Click the **Manual Builds** data provider card. A form for creating the Manual Builds data provider appears.

7. Complete the form with the following information.

a. First Build

- 1) **Build Name:** 2015Nov10Build
- 2) **Date of Build:** 11/10/2015, 12:00 AM . You can select the date from the drop-down calendar to fill in the Date of Build.
- 3) **Description:** November 10, 2015 build for Perfect Calculator application.

First Build

Build Name *

2015Nov10Build

Date Of Build *

11/10/2015, 12:00 AM

Description

November 10, 2015 build for Perfect Calculator application.

b. Code Coverage Files

- 1) Click the **Add** icon (+) next to the **Code Coverage Files** header.
- 2) Browse to the installed folder>adi>examples>cobol-coverage>Perfcalc App>November 10 2015 folder.
- 3) Select all the zip files in the **November 10 2015** folder, that is , Perfcalct1.zip, Perfcalct2.zip, Perfcalct3.zip, and Perfcalct4.zip.
- 4) Click the **Open** to add the files.

Code Coverage Files (+)

Browse and select one or more code coverage zip files created by testing this build. You can add more files later.

Filename	Description
----------	-------------

Perfcalct1.zip	
----------------	--

Perfcalct2.zip	
----------------	--

Perfcalct3.zip	
----------------	--

Perfcalct4.zip	
----------------	--

5) Data Provider Details

- a) **Name:** Perfect Calculator Manual Builds
- b) **Description:** Manual builds for Perfect Calculator application
- c) **Enable headless collection support:** Make sure that the box is unchecked.
- d) Select **All Days** for number of days to keep data in the data warehouse.

Data Provider Details

Name *

Perfect Calculator Manual Builds

Description

Manual builds for Perfect Calculator application.

☐ Enable headless collection support

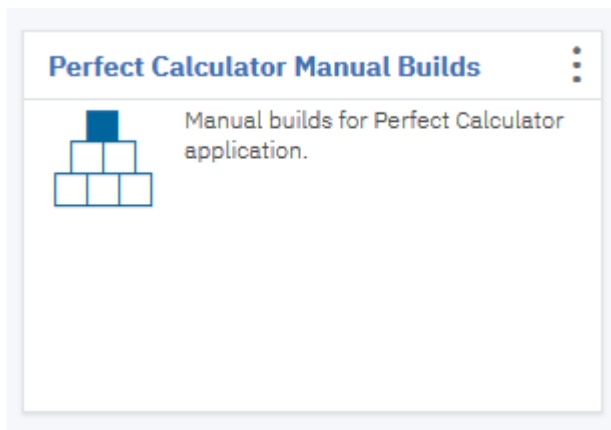
How many days' data do you want to keep in the data warehouse?

All Days

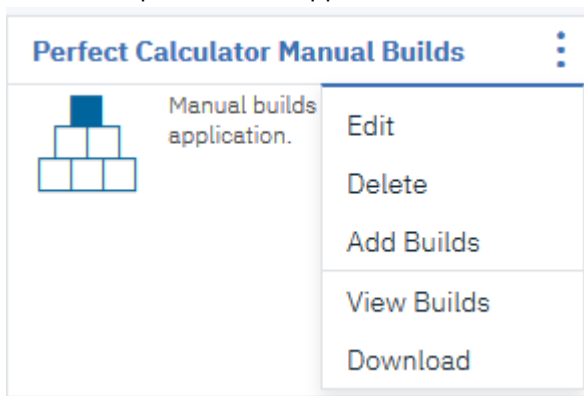
Add

Cancel






8. Click **Add** to create this data provider. The **Data Providers** page appears with the **Perfect Calculator Manual Builds** added.





9. Click the **Options Menu** icon on the upper right corner of the **Perfect Calculator Manual Builds** cards. An options menu appears.



















10. Select **Add Builds** to add another build. The Add Build form appears.
11. On the **Add Build** form, fill in the following information.
- a. **Build Name:** 2015Nov11Build
 - b. **Date of Build:** 11/11/2015, 12:00 AM. You can select the date from the drop down calendar to fill in the Date of Build.

- c. **Description:** November 11, 2015 build for Perfect Calculator application.
 - d. **Code Coverage Files:**
 - 1) Click the **Add** icon () next to the **Code Coverage Files** header.
 - 2) Browse to the installed folder>adi>examples>cobol-coverage>Perfcalc App>November 11 2015 folder.
 - 3) Select all the zip files in the November 11 2015 folder, that is, Perfcalct1.zip, Perfcalct2.zip, Perfcalct3.zip, and Perfcalct4.zip.
 - 4) Click **Open** to add the files.
 - e. Click **Add** to add this build.
12. The Builds page with the list of all builds appears. Click the **Add** icon () next to the Builds page header to add another build.
13. On the **Add Build** form, fill in the following information.
- a. **Build Name:** 2015Nov12Build
 - b. **Date of Build:** 11/12/2015, 12:00 AM. You can select the date from the drop down calendar to fill in the Date of Build.
 - c. **Description:** November 12, 2015 build for Perfect Calculator application.
 - d. **Code Coverage Files**
 - 1) Click the **Add** icon () next to **Code Coverage Files** header.
 - 2) Browse to the installed folder>adi>examples>cobol-coverage>Perfcalc App>November 12 2015 folder.
 - 3) Select all the zip files in the November 12 2015 folder, that is, Perfcalct1.zip, Perfcalct2.zip, Perfcalct3.zip, Perfcalct4.zip, Perfcalct5.zip, and Perfcalct6.zip.
 - 4) Click **Open** to add the files.
 - e. Click **Add** to add this build.
14. The page with the list of all builds appears. Click the **Add** icon () next to the Builds page header to add another build.
15. On the **Add Build** form, fill in the following information.
- a. **Build Name:** 2015Nov13Build
 - b. **Date of Build:** 11/13/2015, 12:00 AM. You can select the date from the drop down calendar to fill in the Date of Build.
 - c. **Description:** November 13, 2015 build for Perfect Calculator application.
 - d. **Code Coverage Files:**
 - 1) Click the **Add** icon () next to the **Code Coverage Files** header.
 - 2) Browse to the installed folder>adi>examples>cobol-coverage>Perfcalc App>November 13 2015 folder.
 - 3) Select all the zip files in the November 13 2015 folder, that is, that is, Perfcalct1.zip, Perfcalct2.zip, Perfcalct3.zip, Perfcalct4.zip, Perfcalct5.zip, and Perfcalct6.zip.
 - 4) Click **Open** to add the files.
 - e. Click **Add** to add this build.

16. The Builds page with the list of all builds appears. Click the **Add** icon () next to the Builds page header to add another build.
17. On the **Add Build** form, fill in the following information.
 - a. **Build Name:** 2015Nov17Build
 - b. **Date of Build:** 11/17/2015, 12:00 AM. You can select the date from the drop down calendar to fill in the Date of Build.
 - c. **Description:** November 17, 2015 build for Perfect Calculator application.
 - d. Code Coverage Files:
 - 1) Click the **Add** icon () next to the **Code Coverage Files** header section.
 - 2) Browse to the installed folder>adi>examples>cobol-coverage>Perfcalc App>November 17 2015 folder.
 - 3) Select all the zip files in the November 17 2015 folder, that is, Perfcalct1.zip, Perfcalct2.zip, Perfcalct3.zip, Perfcalct4.zip, Perfcalct5.zip, and Perfcalct6.zip
 - 4) Click **Open** to add the files.
 - e. Click **Add** to add this build.

After adding all the builds, you should see 5 builds on the Builds page.

Name	Date of Build	Code Coverage	Action
2015Nov17Build	Nov 17, 2015, 12:00:00 AM	75%	  
 Dec 1, 2017, 1:30:09.678 PM - CRIDA0066I Added 22 new rows of data to the warehouse for automation result 2015Nov17Build.			
2015Nov13Build	Nov 13, 2015, 12:00:00 AM	86%	  
2015Nov12Build	Nov 12, 2015, 12:00:00 AM	100%	  
2015Nov11Build	Nov 11, 2015, 12:00:00 AM	100%	  
2015Nov10Build	Nov 10, 2015, 12:00:00 AM	84%	  

18. Click the **Back** icon on the Builds page header to go back to the Data Providers page.

You have now finished setting up of the Perfect Calculator Manual Builds data provider. Next you will set up a workbook for the Perfect Calculator application.

Setting up a workbook

This lab guides you how to set up workbook for code coverage analysis of Perfect Calculator application.

Complete the following steps to set up a workbook for Perfect Calculator application.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Select the **Test** role and click **Continue**. The **Workbook** page appears.

Select your role:

☐ Development ?

☒ Test ?

☐ Operations ?

Continue

The Workbooks page appears with a message that no workbooks have been specified at this point.

Create Workbook ▼

Workbooks

Currently no Workbooks have been specified.

Create a Data Provider first and then come back here to create the Workbook that uses that provider by selecting the create workbook button in the header. If you do not see the create buttons ask an administrator to do it for you or provide you with the required permissions.

- Click **Create Workbook** and then select **Analysis** from the drop-down list.

Create Workbook ▼

- Analysis
- API Discovery
- Business Rule Discovery

The **Add Analysis Workbook** page appears.

- On the **Add Analysis Workbook** page, fill in the following information.
 - Name:** Perfect Calculator
 - Description:** This is an analysis workbook for Perfect Calculator application.
 - Contributor List:** Select **Tammy** as Owner and **Trish** as Member.

Note: By default, the user who is creating a workbook will be automatically added as the owner of the workbook.

d. **Provider:** Select Perfect Calculator Manual Builds. The **Code Coverage Data Provider Settings** section appears.

- **Code Coverage Threshold:** Slide the left slider to 50% and the right slider to 80%.

< Add Analysis Workbook

Define a Workbook that groups all data for one or more providers and defines which team members have access to this data.

Name*

Perfect Calculator

Description

This is an analysis collection for Perfect Calculator application.

Contributors

Search

Marco

Search

Owner

Tammy

Adi Admin

Member

Triah

Providers*

Search

Health Care Manual Builds

Manual build with automated data collection for Health Care application.

Perfect Calculator Manual Builds

Manual builds for Perfect Calculator application.

SAM Manual Builds

Manual builds for SAM application.

Code Coverage Data Provider Settings

Code Coverage Threshold

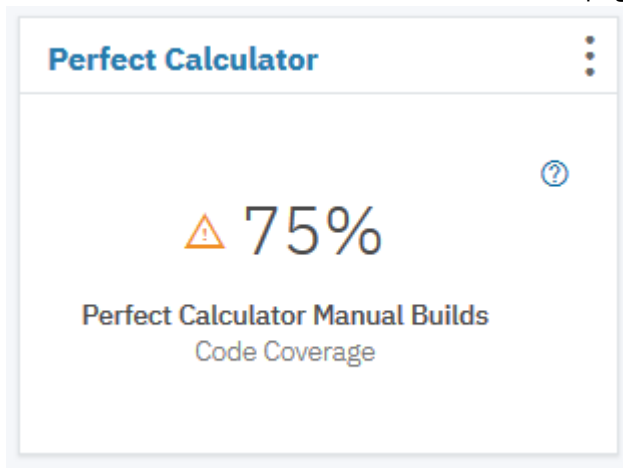
50% 80%

Refine Custom Scope

> Expand and select specific files to include in this collection or skip this step to include all files.

Add Cancel

5. Click **Add** to add this workbook. The Workbooks page loads with **Perfect Calculator** workbook added.



You have completed the setup of the Perfect Calculator Analysis workbook. You are now ready to analyze code coverage data for Perfect Calculator application. For more information, see [“Analyzing code coverage”](#) on page 63.

Analyzing code coverage

This tutorial guides you through how to analyze code coverage results with IBM ADI.

In this tutorial, you as Tammy, the test manager examines the code coverage analysis reports and dashboard provided in the ADI by performing the following activities.

- Reviewing the Workbooks page to see overall application code coverage status
- Deep driving to code coverage of application that having problem
- Comparing code coverage status of current build and previous build to identify the problem

Prerequisite

Before you begin this tutorial, you need to perform the following activities.

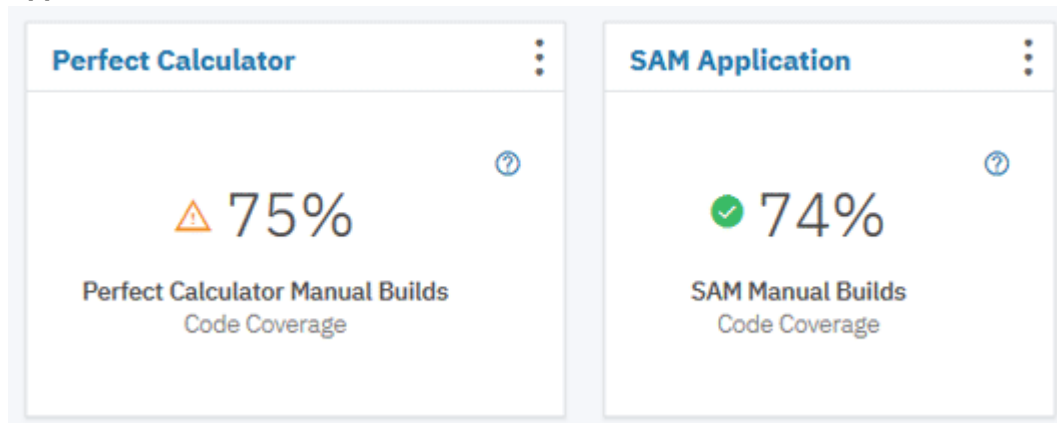
- [“Installing and setting up ADI” on page 7](#)
- [“Setting up Manual Builds for Code Coverage Analysis” on page 19](#)
- [“Exercising setting up a Manual Builds for code coverage analysis” on page 55](#)

Reviewing code coverage reports and dashboards

This lab guides you how to review code coverage reports and dashboards as Tammy, the test manager.

Complete the following steps to examine the code coverage reports and dashboards.

1. Navigate your browser to <https://healthcare.example.com:9443/adi/web/projects/HealthCare4A11>.
2. Log in as the tester manager with Tammy as the user ID and Tammy as the password. The Workbook page appears. For this tutorial, you will see the code coverage report for **Perfect Calculator** and **SAM Application**.

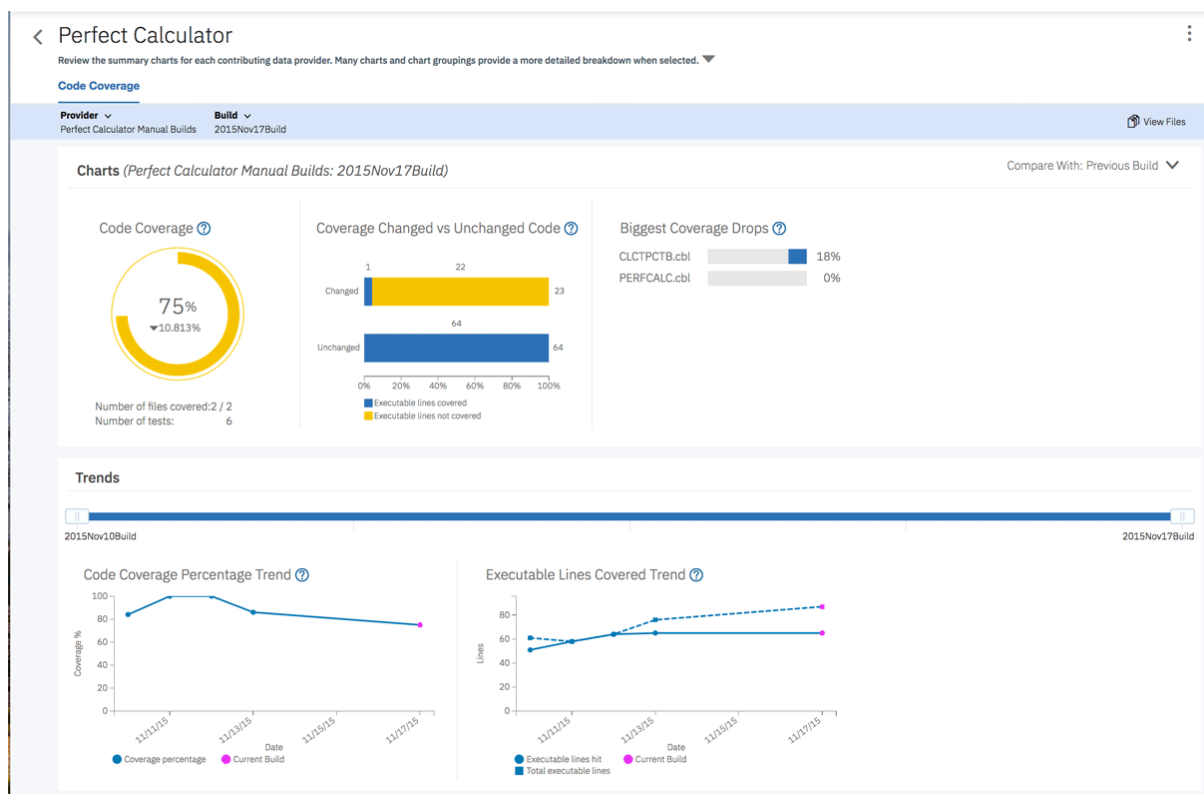


You can see that both applications have the **Aggregated Code Coverage** over 70% but Perfect Calculator is in warning state while SAM Application is in normal state. The code coverage report is a roll-up percentage of code coverage from all builds within one workbook. ADI allows users to define the code coverage threshold for a workbook to customize based on the quality level that application required.

For example in this lab, the code coverage for **Perfect Calculator** which is lower than 80% will be shown in yellow to indicate the warning status and the code coverage which is lower than 50% will be shown in red to indicate that it is not in acceptable number. For the **SAM Application**, the **Aggregated Code Coverage** which is lower than 70% will be shown in yellow.

These threshold values can be set when you create the workbook. See [“Setting up Manual Builds for Code Coverage Analysis” on page 19](#) how to set up the threshold values.

3. Click the name of **Perfect Calculator** card to deep dive to the code coverage reports of **Perfect Calculator** workbook. The summary charts for Perfect Calculator loads.



The reports show the code coverage analysis for the latest build of **Perfect Calculator Manual Builds**. The first report shows that the **Perfect Calculator** has 75% Code Coverage which is in the warning area. The code coverage is dropped from the previous build by 10.813%. From the next report, you can see that 23 executable lines of code are modified on this build but only 1 line is tested. There seems to be some issues here. The cause could be that the modified code has not been tested properly.

Under the **Trends** section, the **Code Coverage Percentage Trend** is starting to go down from Nov 12. On the next report, the number of total executable lines in the next report is going up from 64 to 76 on 11/13/2015 and then to 87 on 11/17/2015. However, the executable lines hit remains quite stable. The issue seems to happen since the previous build.

- Click **View Files** to drill down further.



- On the top row of the **Build Analysis** view that appears, you can see the summary of the entire build: code coverage percentage, number of modified files, number of new files, number of historical tests files ran against this build, and number of minimal tests to run. You can see the same information as in the **Workbook** view that the code coverage drops by almost 11%.

You can notice that CLCTPCTB .cbl status is in red warning and the percentage of code coverage change goes down by 18.286%. From the total of 39 executable lines, there are 11 executable lines added and 4 lines updated to the build. You suspect that these added and updated executable lines that didn't get tested causes the code coverage of the file to go down by 18.286%.

75%

▼-10.8%

Code Coverage

1

Modified File

0

New Files

6

Historical Tests

3

Minimal Tests

Search

Executable Lines										Tests	
Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
<div><div></div><div>></div><div>CLCTPCTB.cbl</div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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Note: The "Change%" of executable lines is the percentage of executable lines that are changed with in a build, which is calculated from the number of total executable lines within a build and the number of lines that are added and updated within a build. The executable lines represent the number of executable lines for a source file or program. The executable line is defined as the line of code that the compiler marks as executable. For COBOL, the executable line may not directly correspond to the exact source line, as COBOL is not debugged by using source but rather the expanded source.

- Click the **Expand** icon in front of CLCTPCTB.cb1 name to expand the flowpoints analysis section. The flowpoints analysis section displays 3 flowpoints but there are total of 5 flowpoints within the file.

Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
CLCTPCTB.cb1		46%	↓ 18%	18	39	11	4	↑ 38%	0	3	1
COMBINE-AND-WRITE		0%	0%	0	16	11	4	↑ 94%	0		
FT-100-CALCULATE-TOP-VALUES		0%	0%	0	0	0	0	0%	0		
P-OUTPUT-AZUE0000		0%	0%	0	5	0	0	0%	0		
Show All 5 Flowpoints											

- Click **Show All 5 Flowpoints** on the bottom of the expanded section to see the code coverage details of all flowpoints within the file. The **Flowpoints Analysis** view appears.

Flowpoint Analysis File: CLCTPCTB.cb1 Filters											
Item Name	Code Coverage	Change %	Executable Lines					Tests			
			Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal	
100-CALCULATE-TOP-VALUES	100%	0%	3	3	0	0	0%	0	3	1	
200-CALCULATE-LOW-SALES	100%	0%	3	3	0	0	0%	0	3	1	
COMBINE-AND-WRITE	0%	0%	0	16	11	4	↑ 94%	0	0	0	
FT-100-CALCULATE-TOP-VALUES	0%	0%	0	0	0	0	0%	0	0	0	
P-OUTPUT-AZUE0000	0%	0%	0	5	0	0	0%	0	0	0	

Similar to the **Files Analysis** view, this view shows the code coverage details for all flowpoints within a file. You can see that the code coverage of **COMBINE-AND-WRITE** is showing 0% and 15 executable lines from the total of 16 executable lines are either added or updated. This confirms Tammy suspicion that the executable lines that are modified within the CLCTPCTB.cb1 are not tested.

- Select the **Filters** dropdown list on the top menu and check **Changed Flowpoints Only** option to filter the view to show only the flowpoints that are modified.

Filters

Changed Flowpoints Only ☒

Line Changes Percentage ☐

Code Coverage Percentage ☐

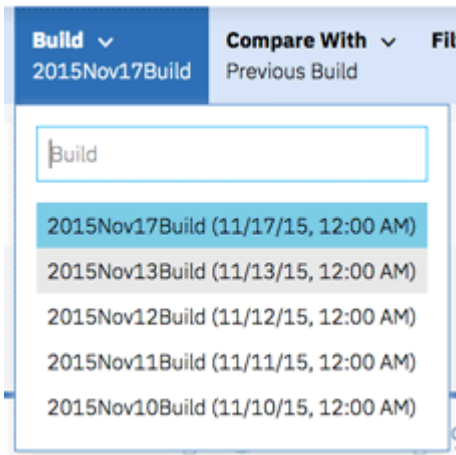
- The view updates with only **COMBINE-AND-WRITE** flowpoint which confirms that this is the only flowpoint that is modified and it has not yet been tested.

Flowpoint Analysis File: CLCTPCTB.cb1 Filters											
X Changed Flowpoints Only											
Item Name	Code Coverage	Change %	Executable Lines					Tests			
			Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal	
COMBINE-AND-WRITE	0%	0%	0	16	11	4	↑ 94%	0	0	0	

Showing 1-1 First Page | Previous Page | Next Page

- Click the **Back** icon on the top menu to go back to the **Build Analysis** view for **2015Nov17Build** page.

- Click the **Build** dropdown list on the top menu and select **2015Nov13Build** to go to the build on Nov 13, 2015. You suspect that the code coverage issue started from this build..



On the page for **2015Nov13Build**, you can see that the overall code coverage is dropped by 14.5% comparing with the previous build. For **2015Nov13Build**, the CLCTPCTB.cbl status is also in warning status for this build and the percentage of code coverage change goes down by 36% comparing with the previous build. 10 executable lines are added to be build. Again, you suspect that these 10 added lines probably weren't tested well.

Perfect Calculator Build Analysis

Provider

Perfect Calculator Manual Builds

Build

2015Nov13Build

Compare With

Previous Build

Filters

Files

Pinned Files

Tests

File Trends

86%

Code Coverage

2

Modified Files

0

New Files

6

Historical Tests

3

Minimal Tests

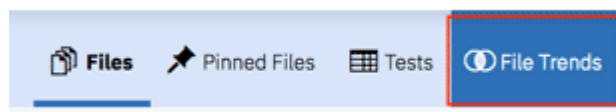
Search

Executable Lines										Tests	
Item Name	Warnings	Code Coverage	Change %	Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
CLCTPCTB.cbl	<div></div>	<div>64%</div>	<div>-36.000%</div>	18	28	10	0	<div>+35.714%</div>	0	3	1
PERFCALC.cbl		<div>98%</div>	<div>-2.000%</div>	47	48	2	0	<div>+4.167%</div>	0	6	3

- Click the **Build** dropdown list again and select **2015Nov12Build** to go to the build on Nov 12, 2015.

On the page for **2015Nov12Build**, the code coverage for overall build indicates 100% code coverage. This build has been fully tested. The issues seem to be arisen starting in **2015Nov13Build**. Tammy wants to compare the builds to get a better understanding of what has changed.

- Click the **File Trends** on the top menu.



The **File Trends** page appears. By default, **2015Nov12Build** is preselected.

- Select **2015Nov13Build** and **2015Nov17Build**.

File Trends		
Perfect Calculator Perfect Calculator Manual Builds		
Select between two and five builds for comparison		
		Compare Cancel
Build Name	Build Date	Tag
<input checked="" type="checkbox"/> 2015Nov17Build	Nov 17, 2015, 12:00:00 AM	
<input checked="" type="checkbox"/> 2015Nov13Build	Nov 13, 2015, 12:00:00 AM	
<input checked="" type="checkbox"/> 2015Nov12Build	Nov 12, 2015, 12:00:00 AM	
<input type="checkbox"/> 2015Nov11Build	Nov 11, 2015, 12:00:00 AM	
<input type="checkbox"/> 2015Nov10Build	Nov 10, 2015, 12:00:00 AM	

15. Click **Compare** to compare the three builds. The page of code coverage details for three builds appears.

On this page, you can compare the details of three builds in one view. This view helps confirm that your observation earlier that file CLCTPCTB.cbl has brought the code coverage percentage of the entire build down from 100% to 86% and 75%. The cause could be that the executable lines that are added to the **CLCTPCTB.cbl** in the past 2 builds have not been properly tested. You can also see that the code coverage percentage of PERFCALC.cbl also drops 2% on 2015Nov13Build. There are 2 execution lines added but it seems not tested either.

Perfect Calculator Build Analysis		Provider	Compare With	Filters	Files	Pinned Files	Tests	File Trends
		Perfect Calculator Manual Builds	Previous Build					
<input type="checkbox"/>	75% ▼ -25.3%	Code Coverage	2	0	6	3		
		Modified Files	New Files	Historical Tests	Minimal Tests			
<input type="checkbox"/>	86% ▼ -14.5%	Code Coverage	2	0	6	3		
		Modified Files	New Files	Historical Tests	Minimal Tests			
<input type="checkbox"/>	100% 0%	Code Coverage	2	0	6	3		
		Modified Files	New Files	Historical Tests	Minimal Tests			

		Executable Lines		Tests	
Item Name	Code Coverage	Covered	Total	Historical	Minimal
> CLCTPCTB.cbl	46% <div></div>	18	39	3	1
> CLCTPCTB.cbl	64% <div></div>	18	28	3	1
> CLCTPCTB.cbl	100% <div></div>	18	18	3	1
> PERFCALC.cbl	98% <div></div>	47	48	6	3
> PERFCALC.cbl	98% <div></div>	47	48	6	3
> PERFCALC.cbl	100% <div></div>	46	46	6	3

16. Click the **Expand** icon in front of CLCTPCTB.cbl from all three builds to show the flowpoints analysis.

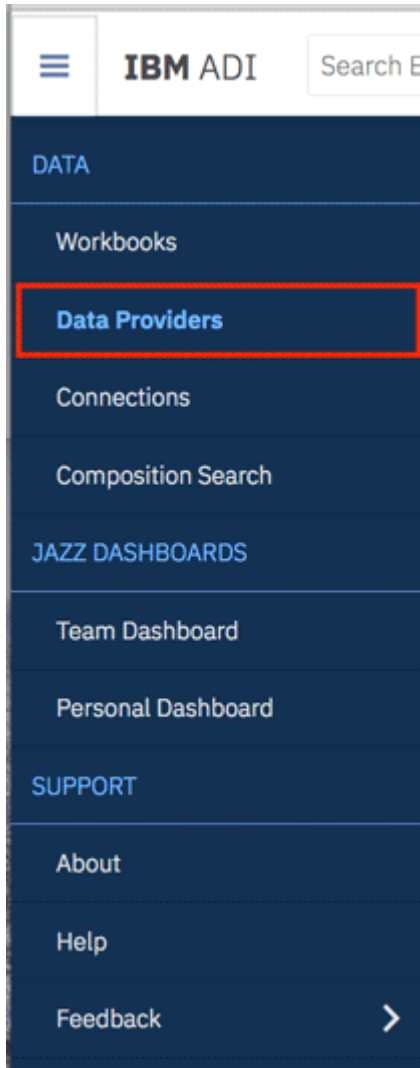
Item Name	Code Coverage	Covered	Total	Historical	Minimal
▼ CLCTPCTB.cbl	46% <div></div>	18	39	3	1
100-CALCULATE-TOP-VALUES	100% <div></div>	3	3	3	1
200-CALCULATE-LOW-SALES	100% <div></div>	3	3	3	1
COMBINE-AND-WRITE	0% <div></div>	0	16	0	0
FT-100-CALCULATE-TOP-VALUES	0% <div></div>	0	0	0	0
P-OUTPUT-AZUE0000	0% <div></div>	0	5	0	0
Show All 5 Flowpoints					
▼ CLCTPCTB.cbl	64% <div></div>	18	28	3	1
100-CALCULATE-TOP-VALUES	100% <div></div>	3	3	3	1
200-CALCULATE-LOW-SALES	100% <div></div>	3	3	3	1
FT-100-CALCULATE-TOP-VALUES	0% <div></div>	0	0	0	0
P-INPUT-AZUE0000	0% <div></div>	0	5	0	0
P-OUTPUT-AZUE0000	0% <div></div>	0	5	0	0
Show All 5 Flowpoints					
▼ CLCTPCTB.cbl	100% <div></div>	18	18	3	1
100-CALCULATE-TOP-VALUES	100% <div></div>	3	3	3	1
200-CALCULATE-LOW-SALES	100% <div></div>	3	3	3	1
FT-100-CALCULATE-TOP-VALUES	0% <div></div>	0	0	0	0
Show All 3 Flowpoints					

You can see that for 2015Nov13Build, P-INPUT-AZUE0000 and P-OUTPUT-AZUE0000 are newly added to the file but they have not been tested. P-INPUT-AZUE0000 is removed from 2015Nov17Build and COMBINE-AND-WRITE is added to the build. Again the new flowpoint has not been tested either. These 2 flowpoints are areas that require testing.

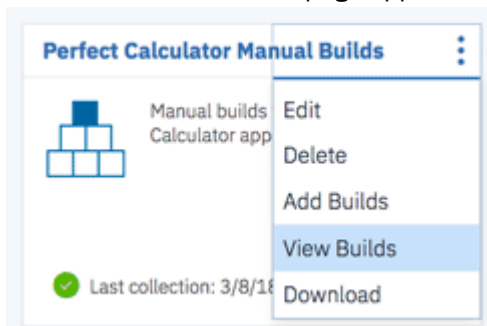
Now as Tammy, you are satisfied with your investigation on the code coverage issue for Perfect Calculator application. You communicates the results to your team and ask Trish to update the tests to cover P-OUT-AZUE0000 and COMBINE-AND-WRITE flowpoints.

Next, you learn that **2015Nov12Build** is one of the milestone builds and it is fully tested. You want to make sure that in the future your team can use this build as baseline for comparing the code coverage results of the next builds.



17. Open the menu pane and select **Data Providers** to go to **Data Providers** page.







18. On the Perfect Calculator Manual Builds data provider, click the **Options Menu** icon and then select **View Builds**. The **Builds** page appears.























19. Select the **Star** icon in front of the **2015Nov12Build**. The **Star** icon in front of a build name is the indication of a baseline build.

< Builds  Perfect Calculator Manual Builds Create and manage builds. Select  to create a new build or use the Actions menu on the right to edit an existing build as well as upload more coverage files for a specific build.

 Mar 8, 2018, 3:54:36.169 PM - CRIDA0063I Finished the code coverage data collection for automation result 2015Nov17Build. 

 Show only baseline builds  Start Data Collection


Showing 1-5 First Page | Previous Page | Next Page


Name	Date of Build	Code Coverage	Action
 2015Nov17Build	Nov 17, 2015, 12:00:00 AM	75%	  
 2015Nov13Build	Nov 13, 2015, 12:00:00 AM	86%	  
 2015Nov12Build	Nov 12, 2015, 12:00:00 AM	100%	  
 2015Nov11Build	Nov 11, 2015, 12:00:00 AM	100%	  
 2015Nov10Build	Nov 10, 2015, 12:00:00 AM	84%	  

Showing 1-5 First Page | Previous Page | Next Page


Save baseline builds **Cancel**


20. Click **Save baseline builds** to save your changes.
21. Click **Start data collection** on the window for ADI to perform the data collection of the latest build and generate the code coverage reports against the new baseline build. When the data collection is completed, you will see a new notification message on the **Notifications** icon.
22. Click **Notifications** icon to view the data collection status.



 **Perfect Calculator Manual Builds: CRIDA0063I**
Finished the code coverage data collection for automation result 2015Nov17Build. 3 minutes ago

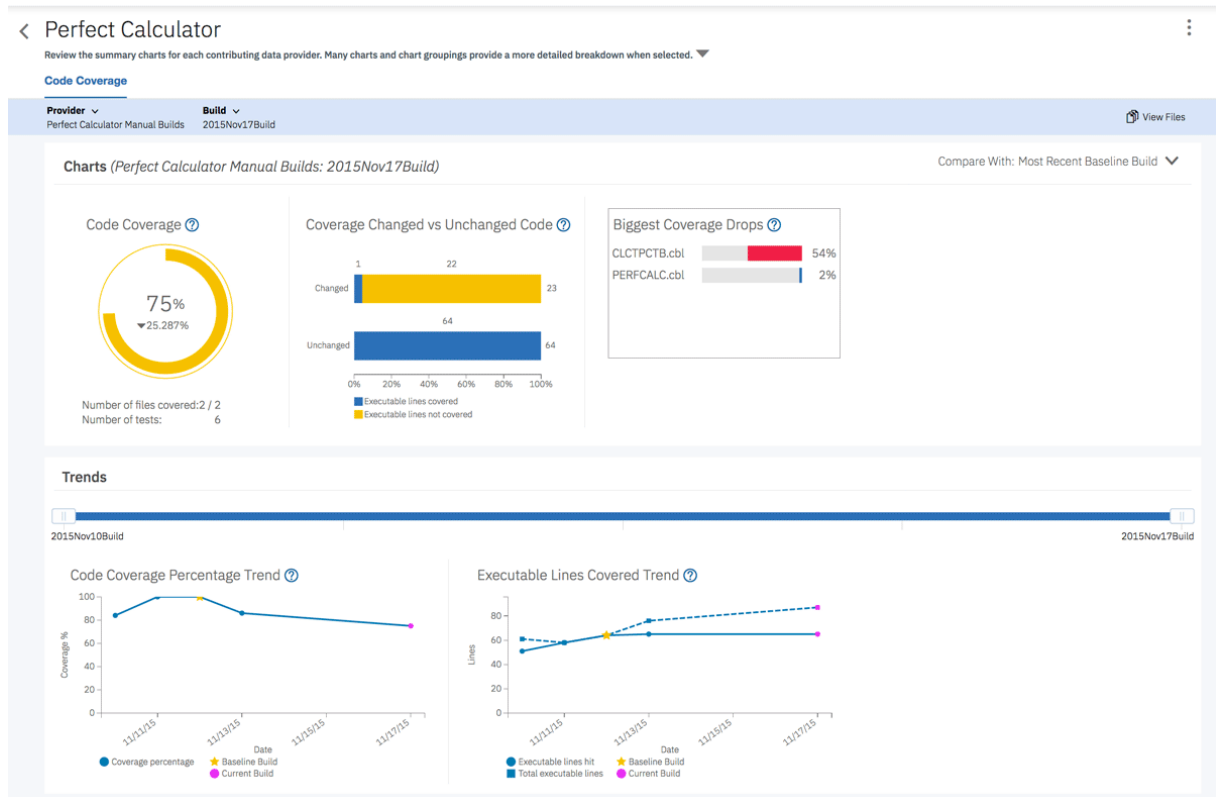
23. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
24. Select **Perfect Calculator** workbook to view the code coverage reports of Perfect Calculator.
25. On the header of the **Charts** section, select **Compare With** drop-down menu. By default, the code coverage information, such as the percentage of code coverage changes and the percentage of executable line changes, is calculated against the previous build. After you define one or more baseline builds, ADI also calculates these information against the baseline builds that you define.

Compare With: Previous Build 

-  Previous Build
- Most Recent Baseline Build
- 2015Nov12Build (11/12/15, 12:00 AM)

26. Select **Most Recent Baseline Build**. With the reports that load, you can see the updated information, such as the percentage of code coverage changes is updated from 10.81% to 25.287% and the code coverage of CLCTPCTB.cb1 is dropped by 54%.

Under the **Trends** section, you can see the baseline build is marked on the trends line as well.



27. Select **View Files** icon on the upper right to go to the **Build Analysis** view.

28. Observe the information against the most recent baseline build on the **Build Analysis** page.

Perfect Calculator Build Analysis Provider: Perfect Calculator Manual Builds Build: 2015Nov17Build Compare With: Most Recent Baseline Build Filters

Files Pinned Files Tests File Trends

75% ▼-25.3% 2 0 6 3

Code Coverage Modified Files New Files Historical Tests Minimal Tests

Search

Item Name	Warnings	Code Coverage	Change %	Executable Lines					Tests		
				Covered	Total	Added	Updated	Change %	Deleted	Historical	Minimal
> CLCTPCTB.cbl	⚠	46%	▼ 54.000%	18	39	21	0	▲ 53.846%	0	3	1
> PERFALC.cbl		98%	▼ 2.000%	47	48	2	0	▲ 4.167%	0	6	3

Now you are satisfied with your investigation. You suggest your team using ADI to always check the code coverage reports and check against the baseline build to ensure that the application is fully tested.

Now you have explored how you can use the test analysis results of the latest build to investigate the testing issues of your build. Typically you can use this information to perform the following analysis.

- Determine if the coverage has improved from the previous builds.
- Determine if the changed files were indeed covered during the testing.
- Compare the results of the current build with one or more older builds to see differences between coverage results of these builds.
- Determine how much the set of files have actually changed from build to build.
- Review the trends of changes and coverage over time to determine the quality of the tests performed.
- Set the baseline builds for code coverage analysis against major builds or milestone builds.

Generating sample data

In this tutorial, you perform the role of ADI admin, Alvin, to generate the sample data for the end-to-end root cause analysis tutorial by using data generation functionality.

The data generation functionality of ADI is useful when you do not have access to the instance of the OMEGAMON for CICS or Application Discovery. You can use the sample data that ADI generates to see how the data is being analyzed. After the data is generated, you can create and set up an analysis collection for users to view the analysis results.

Note: To make the sample data show effectively in the end-to-end root cause analysis tutorial that you will perform later, you need to generate OMEGAMON for CICS data and Application Discovery data continuously. You also need to complete the data generation right before you start on the end-to-end root cause analysis tutorial.

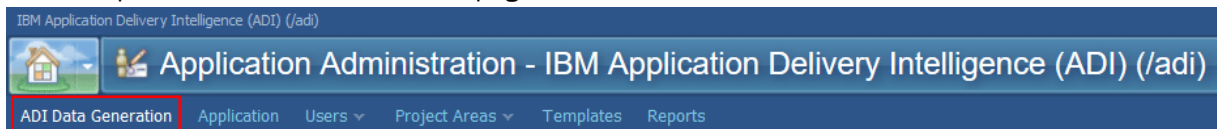
Prerequisite

Before you begin this tutorial, you need to perform the following activities.

- [“Installing and setting up ADI” on page 7](#)
- [“Setting up automated code coverage data collections” on page 44](#)

Complete the following steps to generate sample data for OMEGAMON for CICS and Application Discovery.

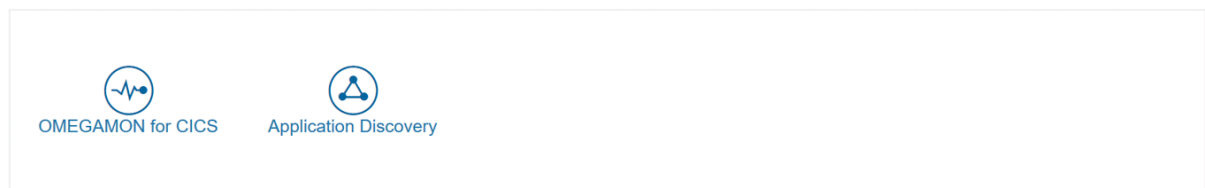
1. Navigate your browser to ADI administration page at `https://healthcare.example.com:9443/adi/admin`.
2. Log in as Alvin, the ADI administrator, with `AdiAdmin` as the user ID and `AdiAdmin` as the password. The ADI administration page appears.
3. On the top menu of ADI administration page, select **ADI Data Generation**.



The ADI Data Generation page loads with choices of data to be generated: **OMEGAMON for CICS** or **Application Discovery**.

ADI Data Generation

Generate random sample data for different Data Providers. The data generation service is not intended for use in a production environment, rather for demonstrating ADI capabilities. In addition to sample data, the generation process will create a sample Connection with the corresponding Data Provider in ADI. To see the data in the ADI Analysis pages, you must manually create a new Workbook that uses the generated Data Provider. Only one set of sample data for each ADI server should be generated. If generated sample data already exists, then it will be replaced by new sample data.



4. Select **OMEGAMON for CICS** card to generate system performance sample data for the OMEGAMON for CICS.

Note: You need to be an administrator for Jazz Team Server and ADI to generate the sample data.

The **Data Generation Settings** form appears.

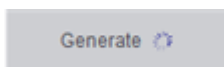
5. Leave all the fields in the Data Generation Settings form with default values. For more information, see [“Generating sample data for evaluation” on page 161](#).

Data Generation Settings



Plex	<input type="text" value="CICSPLX2::CICSgen"/>
Days	<input type="text" value="7"/>
Goal Response Time µs	<input type="text" value="1000000"/>
Project Areas	<input type="text" value="HealthCare4All"/>
Execute Warehouse RUNSTATS after data generation <input checked="" type="checkbox"/>	

<input type="button" value="Generate"/>	<input type="button" value="Cancel"/>
---	---------------------------------------

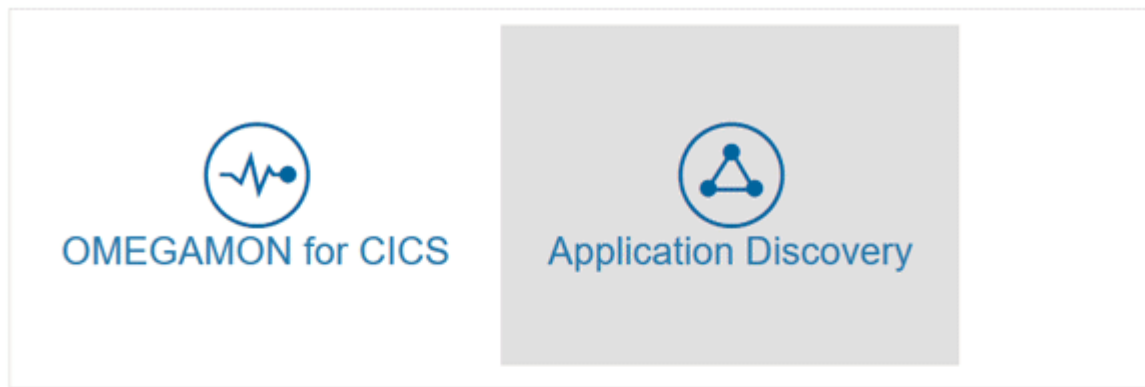
- Click **Generate** to generate for the OMEGAMON for CICS. You will see the spinning cycle to indicate that the data is being generated.



The spinning cycle will stop when the data generation is done. And there would be an information bar indicating that the data generation is completed.

 The OMEGAMON data generation has completed. Switch to the Workbooks page in the selected project area to create a new Workbook using the generated OMEGAMON Data Provider. Then switch to the Analysis page to view data generation results. 

- Select the **Application Discovery** card to generate system performance sample data for IBM Application Discovery. The **Data Generation Settings** form appears.



Data Generation Settings

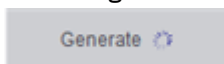
Data Points

Time Interval hrs

Project Areas

Execute Warehouse RUNSTATS after data generation ☒

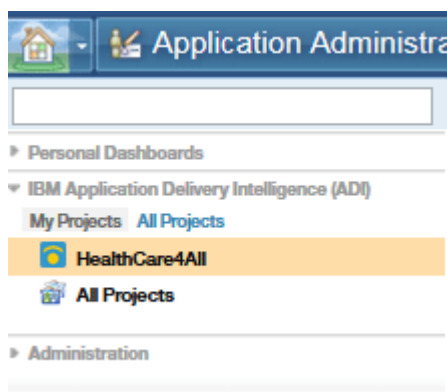
8. Leave all the fields as default values. For more information, see [“Generating sample data for evaluation”](#) on page 161.
9. Click **Generate** to generate sample data for Application Discovery. You will see the spinning cycle indicating that the data is being generated.



The spinning cycle will stop when the data generation is done. And there would be an information bar indicating that the data generation is completed.

The Application Discovery data generation has completed. Switch to the Workbooks page in the selected project area to create a new Workbook using the generated Application Discovery Data Provider. Then switch to the Analysis page to view data generation results.

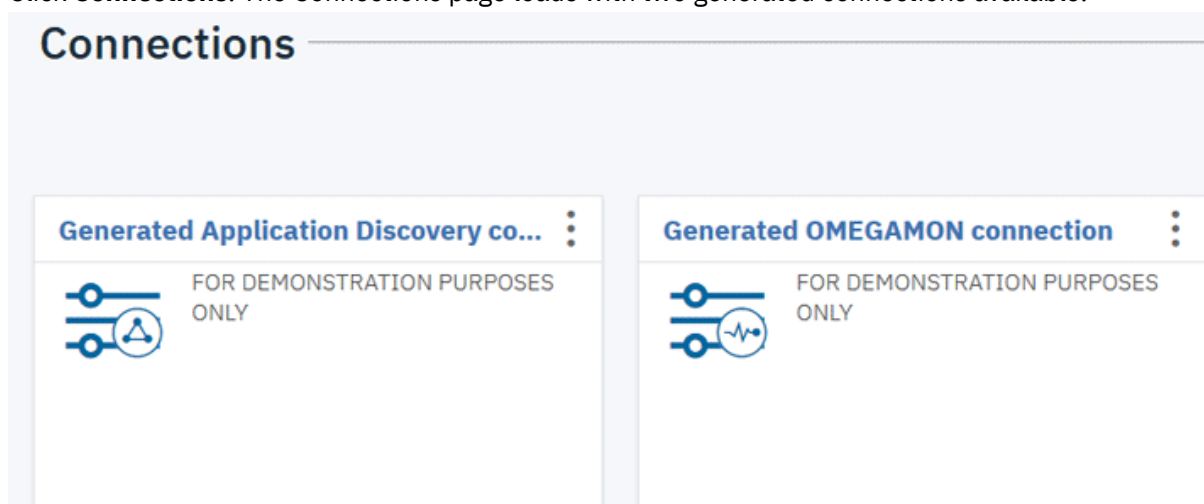
10. Expand the **Home** menu and select **HealthCare4All** under **IBM Application Delivery Intelligence (ADI)**.



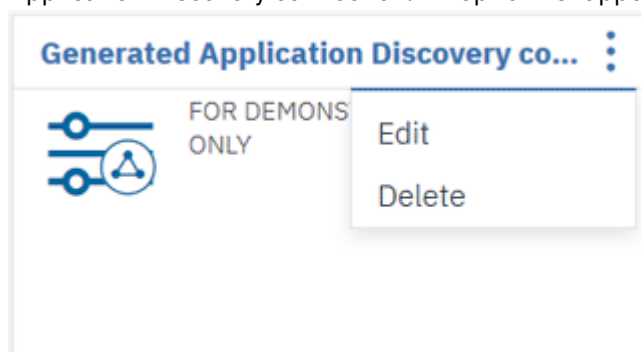
The browser navigates to ADI application where you can check if the data is generated successfully.

Typically to add a new workbook, you start with creating a connection to a server storing data to be analyzed and then specifying data source as a data provider. A workbook can have multiple data providers. However, for this tutorial, you use the sample data for evaluation instead of connecting to the OMEGAMON for CICS server. So you don't need to create any connections or data providers.

11. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
12. Click **Connections**. The Connections page loads with two generated connections available.

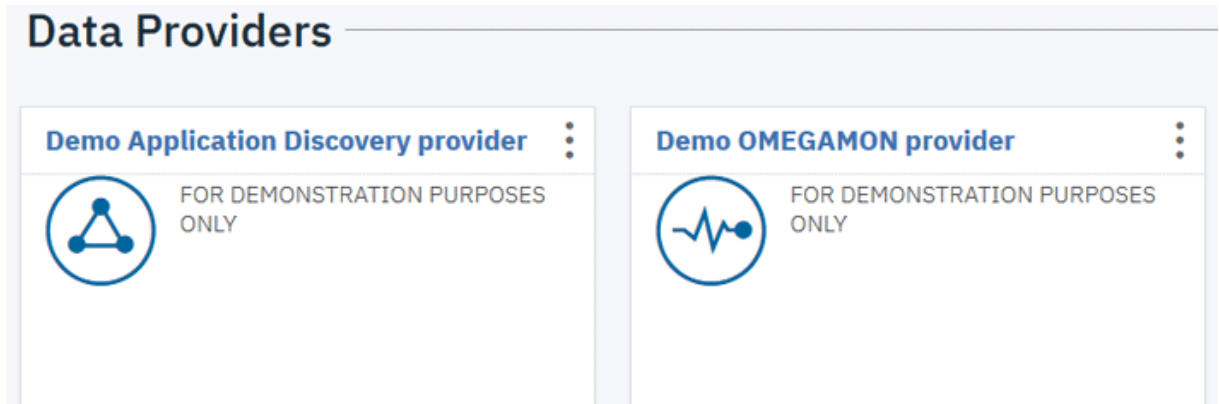


13. Click the option icon on the upper right corner of one of the connections, for example, the Generated Application Discovery connection. An option list appears.



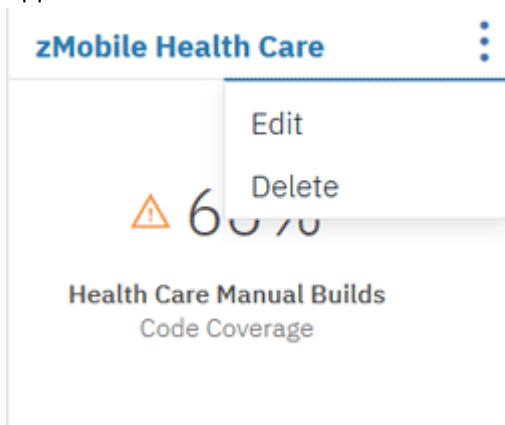
14. Select **Edit** from the option list to view the connection information. The **Edit Connection** form appears.
15. After viewing the information, click **Cancel**. Do not update anything on the **Edit Connection** form.
16. Click the **Menu** icon next to the IBM ADI header to open the menu pane.

17. Click **Data Providers**. Similar to the Connections page, the Data Providers page loads with two data providers created from ADI data generation: **Demo Application Discovery provider** and **Demo OMEGAMON provider**.



You can see that there are two connections and two data providers are generated. Typically, the next step is to generate a workbook and associate both data provider with this workbook to analyze both data provider together. For this exercise, you will use the existing workbook which you have created in the [“Setting up automated code coverage data collections”](#) on page 44 tutorial.

18. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
19. Click **Workbooks** to go to the Workbooks page.
20. Click the option icon on the upper right corner of the **zMobile Health Care** card. An option list appears.



21. Select **Edit** from the option list to view the Analysis workbook information. The Edit Analysis Workbook page appears.
Scroll down to the **Providers** section, you can see that **Health Care Manual Builds** is selected.
22. In the **Providers** section, select **Generated Application Discovery provider** and **Generated OMEGAMON provider** as additional data providers.

Providers*

Demo Application
Discovery provider
FOR DEMONSTRATION PURPOSES ONLY

Demo OMEGAMON
provider
FOR DEMONSTRATION PURPOSES ONLY

Health Care Manual Builds
Manual build with automated data
collection for Health Care application.

The **OMEGAMON for CICS Data Provider Settings** form and **Application Discovery Data Provider Settings** form appear under the **Code Coverage Data Provider Settings** from.

23. Fill in the following information in the **OMEGAMON for CICS Data Provider Settings** form.

- Service Classes: Select **HTRANS**.
- **Timeframe to view Dashboards's Metrics**: Leave as default value, that is, **Last Day**.

OMEGAMON for CICS Data Provider Settings
Select the service classes to analyze from the list below. Then choose the timeframe to consider for the analysis dashboard's metrics.

Service Classes Search

BTRANS	DTRANS	FTRANS
CTTRANS	ETTRANS	HTRANS

Timeframe to view Dashboard's Metrics
Last Day

24. Fill in the following information in the **Application Discovery Data Provider Settings** form.

- Select **zMobile** project.
- **Unreachable Code Threshold**: Leave as default value which are 10% and 20%.
- **Maintainability Index Threshold**: Move the lower slider to 50% and leave the upper slider at 85%.
- **Cyclomatic Complexity Threshold**: Leave as default value which are 10 and 50.
- **Source Changes Detection Interval in Days**: Leave as default value which is 7.

Application Discovery Data Provider Settings

Select one or more projects

Search



BBO4_maint

BBOI_maint

genericGraph

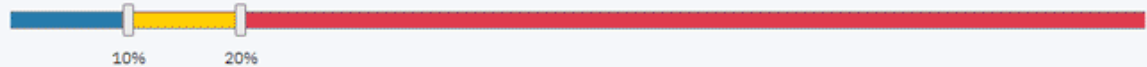
zMobile

BBO4_preprod

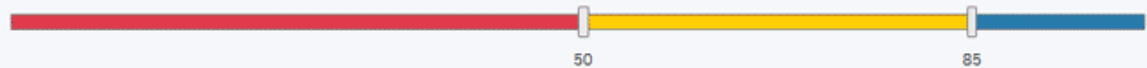
BBOI_preprod

graphSample

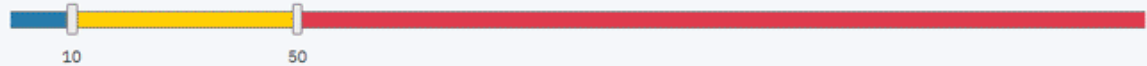
Unreachable Code Threshold



Maintainability Index Threshold



Cyclomatic Complexity Threshold



Source Changes Detection Interval in Days *

7

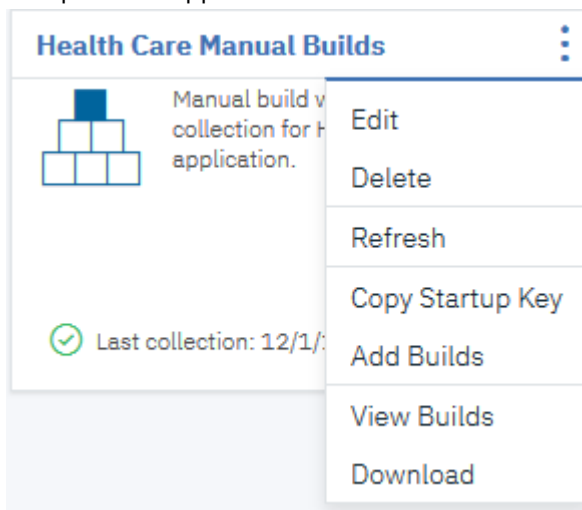
Save

Cancel

25. Click **Save** to save the changes to this workbook. The Workbooks page appears.

Now you have associated the **Demo Application Discovery** provider and **Demo OMEGAMON** provider with zMobile Health Care Analysis workbook. You are ready to perform analysis. However, for the demonstration objective, you want to add additional code coverage results to the **Health Care Manual Builds** data provider.

26. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
27. Click **Data Providers** to go to the Data Providers page.
28. Click the option icon on the upper right corner of the **Health Care Manual Builds** data provider card. An option list appears.



29. Select **Add Builds** from the option list. The **Add Build** form appears.

30. Fill in the following information on the **Add Build** form.

- **Build Name** and **Date of Build**: Set them to 2 weeks before the day you generate the sample data. For example, if you generate the sample data on December 8, 2017, you will update the **Build Name** to **2017Nov24Build** and the **Date of Build** to **11/24/2017, 12:00AM** as shown in the following screen shot.

< Add Build

Health Care Manual Builds

Build Name * 2017Nov24Build

Date Of Build * 11/24/2017, 12:00 AM

Description
November 24, 2017 build for Health Care application.

- **Code Coverage Files**: Browse to Installed ADI folder > adi > examples > cobol-coverage > zMobile Health App > Build2 folder. And then select all the zip files under Build2 folder.

31. Click **Add** to add the new build.

32. Click the Add icon next to the Builds page header to add another build. The **Add Build** form appears.

33. Fill in the following information on the **Add Build** form.

- **Build Name** and **Date of Build**: Set them to one week before the date that you generate the sample data. For example, if you generate the sample data on December 8, 2017, you will update the **Build Name** to **2017Dec1Build** and the **Date of Build** to **12/01/2017, 12:00AM** as shown in the following screen shot.

< Add Build

Health Care Manual Builds

Build Name * 2017Dec1Build

Date Of Build * 12/1/2017, 12:00 AM

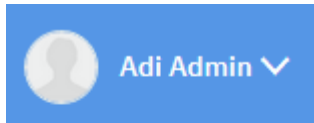
Description
December 1, 2017 build for Health Care application.

- **Code Coverage Files**: Browse to Installed ADI folder > adi > examples > cobol-coverage > zMobile Health App > Build3 folder. And then select all the zip files under Build3 folder.

34. Click **Add** to add the new build.

Now you have completed with updating the information on Health Care Manual Builds data provider.

35. Click the User menu on the upper right corner of the view.



Welcome to ADI

My Profile

Logout

36. Select **Logout** to log out from ADI.

You are now ready to perform the end-to-end analysis of performance issues. The next tutorial you play the role as Marco, a development manager, to analyze the potential cause of performance issues for this zMobile Health Care application.

End-to-end system performance root cause analysis

This tutorial guides you through the end-to-end scenario about how to perform root cause analysis by analyzing data from multiple data providers. In this tutorial, you play the role of Marco, the development lead of the zMobile Health Care application, to perform root cause analysis of a performance defect that is reported by Trish, a tester.

Prerequisite

Before you begin this tutorial, you need to perform the following activities.

- [“Installing and setting up ADI” on page 7](#)
- [“Setting up automated code coverage data collections” on page 44](#)
- [“Generating sample data” on page 71](#)

Note: Since the data in this tutorial is the generated sample data, you might not see the exact same data on your reports.

Trish is a test lead who is testing the response time of the Inquire Patient feature of the zMobile Health Care application. During the testing, Trish found that in the latest development build, the response time of the Inquire Patient feature increased to 2 minutes from less than a second in the previous build. She reported it to you, the development lead Marco. And you investigate the issues by consulting dashboards and reports in ADI.

As Marco, you need to complete the following steps to perform the root cause analysis for the performance issue:

1. Navigate your browser to `https://healthcare.example.com:9443/adi/web/projects/HealthCare4A11`.
2. Log in with Marco as the user ID and Marco as the password. The **Welcome** page appears.
3. Select the **Development** role and click **Continue**.

Select your role:

☒ Development ?

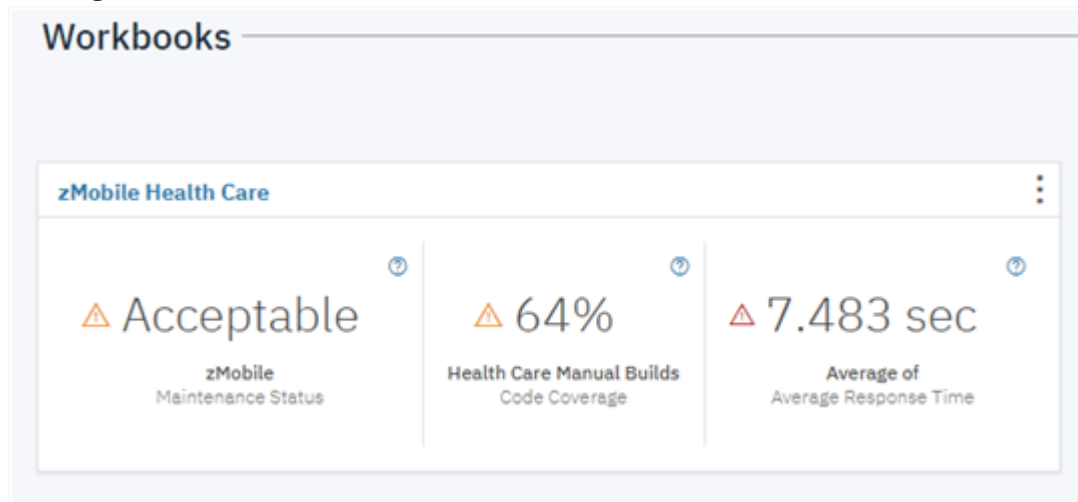
☐ Test ?

☐ Operations ?

[Continue](#)

Note: ADI requires you to select your role before you can start viewing dashboards and reports. The role that you select is used to organize the dashboards and reports that are displayed, which helps you view the dashboards and reports in your focus area first.

The **Workbooks** page is displayed with the dashboards that summarize the overall status of zMobile Health Care application. You can notice the problem that Trish reported right away. The average response time of zMobile Health application is over seven seconds. It is higher than the service level agreement for your company. And you can notice that the code coverage percentage is also in the warning area.



- Click the name of **zMobile Health Care** to view detailed analysis. The zMobile Health Care page loads with summary charts of the contributing providers.
- Click the **Expand** icon under the zMobile Health Care page header. The **Workbook Summary** section loads with three contributing data providers.

zMobile Health Care

Review the summary charts for each contributing data provider. Many charts and chart groupings provide a more detailed breakdown when selected.

Workbook Summary

This workbook combines various metrics from...

Code Coverage

Provider	Type	Collection Interval	RTC Project Area	RTC Build Definition
zMobile Health App Code Coverage	Manual			

OMEGAMON for CICS

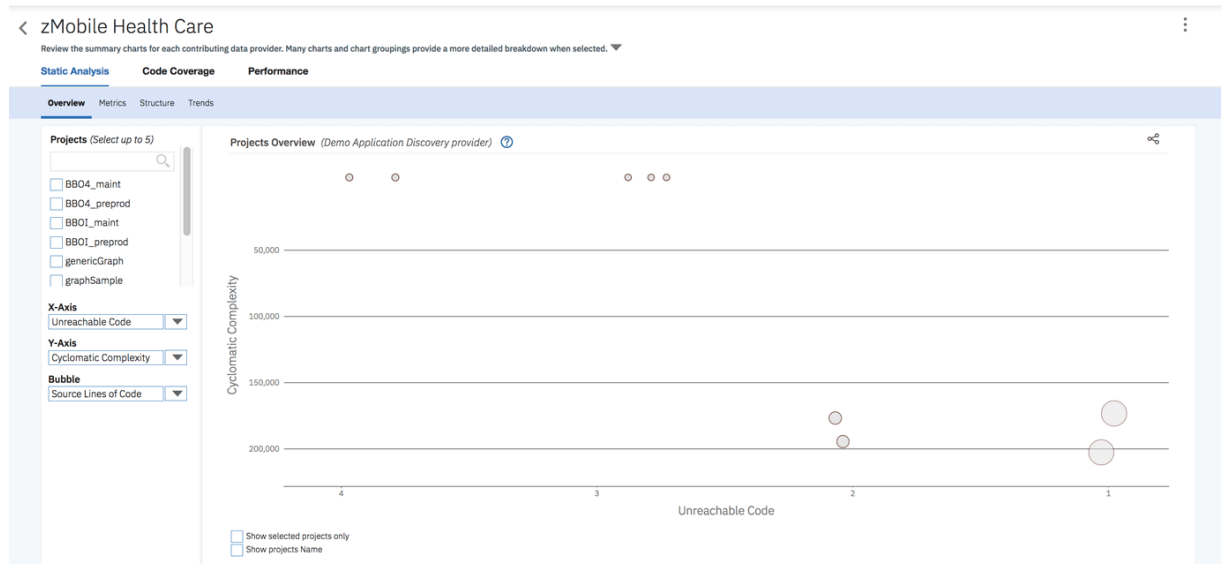
Provider	Averages Timeframe	Service Class
Demo OMEGAMON provider	Last Day	HTRANS

Application Discovery

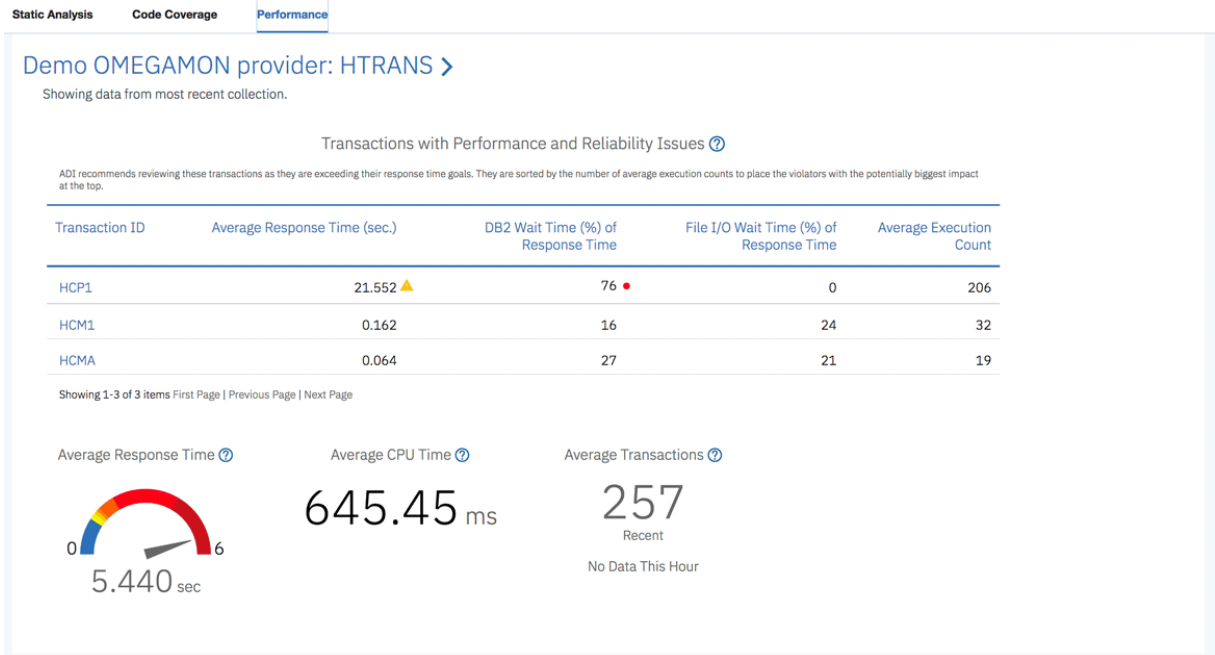
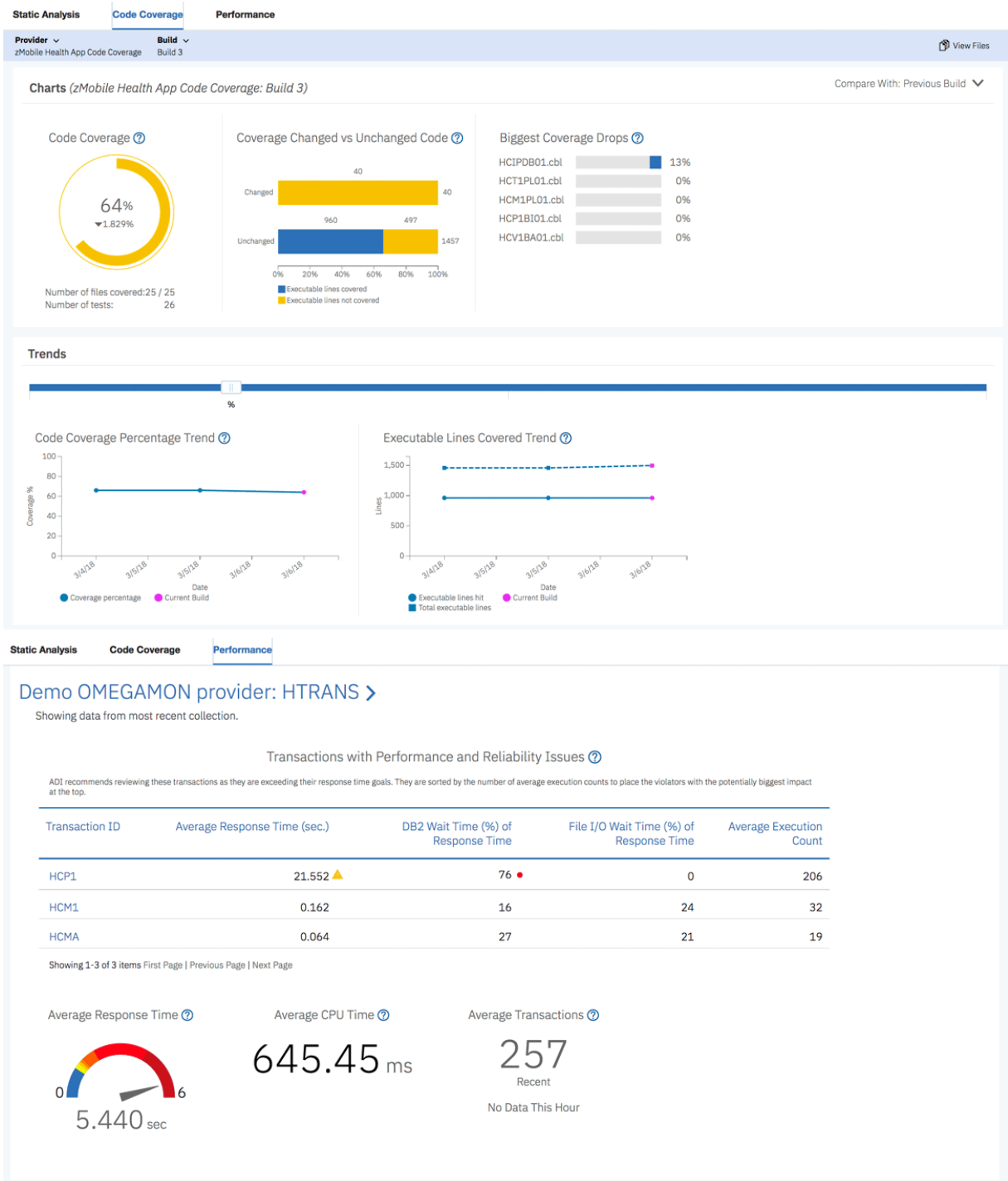
Provider	Project	Status
Demo Application Discovery provider	graphSample	Acceptable
	BBO4_maint	Acceptable
	BBO4_preprod	Acceptable
	BBO1_maint	Acceptable
	BBO1_preprod	Acceptable
	genericGraph	Acceptable
	sharedSample1	Acceptable
	sharedSample2	Acceptable
	zMobile	Acceptable

- Click the **Expand** icon again to close the **Workbook Summary** section.
- View the reports on the work book summary view of zMobile Health Care page. The reports are organized into 3 tabs: **Static Analysis**, **Code Coverage**, and **Performance**. All the reports are analyzed based on three data providers that are associated with this analysis workbook:
 - An Application Discovery data provider that collects static analysis data about transactions, programs, and project-level metrics in the zMobile Health Care application.
 - A Manual Builds data provider that collects the code coverage results.
 - An OMEGAMON for CICS data provider that monitors performance for CICS transactions of the zMobile Health Care application.

With reports from multiple providers in one workbook, you can correlate different data from different sources.



- Select **Code Coverage** tab and **Performance** tab to navigate to code coverage-related reports and performance-related reports respectively.



On the **Performance** tab, you can see the detailed analysis of program and transactions within the zMobile project that displays along with the performance reports of HTRANS.

HTRANS is a service class in OMEGAMON for CICS data provider. Service class is a concept that OMEGAMON for CICS uses to allow grouping related transactions together. If no service class is defined, OMEGAMON for CICS would define a default service class.

In the **Demo OMEGAMON provider: HTRANS** section, you can investigate the performance issue that Trish reported. Besides the average response time that is in the red zone, you notice that on the Transactions with Performance and Reliability Issues table, **HCP1** transaction that is run by the *Inquire Patient* feature is flagged as exceeding the goal response time threshold by more than 400%. Average execution count of HCP1 is also much higher than the other transactions. Then you think that this transaction probably causes the application to slow down.

Note: Goal response time threshold is the setting in OMEGAMON for CICS to indicate the severity of response time that exceeds the standard service level agreement that the company requires. The different warning icons on the Transactions with Performance and Reliability Issues table indicate different levels of severity. For example, the yellow warning icon indicates that the response time exceeds threshold by 400%, and the red warning icon indicates that the response time exceeds threshold by more than 400%.

- Click the **HCP1** transaction on the Transactions with Performance and Reliability Issues table to view the detailed transaction analysis. You now see the history of the average response time comparing to Average DB2 and File I/O wait time of response time, average CPU time, and execution count.

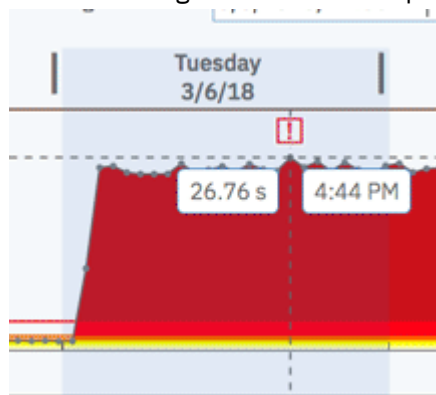
On the header of the report, the maximum number of the execution count, CPU time, and response time for a given timeframe display on this view.

From the chart, you notice that the average response time was constantly rising high for the past 3 days from 2 seconds to 26 seconds. The same pattern occurs to DB2 wait time. DB2 wait time went up from about 30% to over 70% which is higher than the suggested level 50% that is indicated by the red line on the Average DB2 and File I/O Wait Time of Response Time.

You notice that the execution is always at about almost 200 which means this transaction has been executed frequently. You suspect that there probably are some changes made to the program within this transaction 3 days ago.

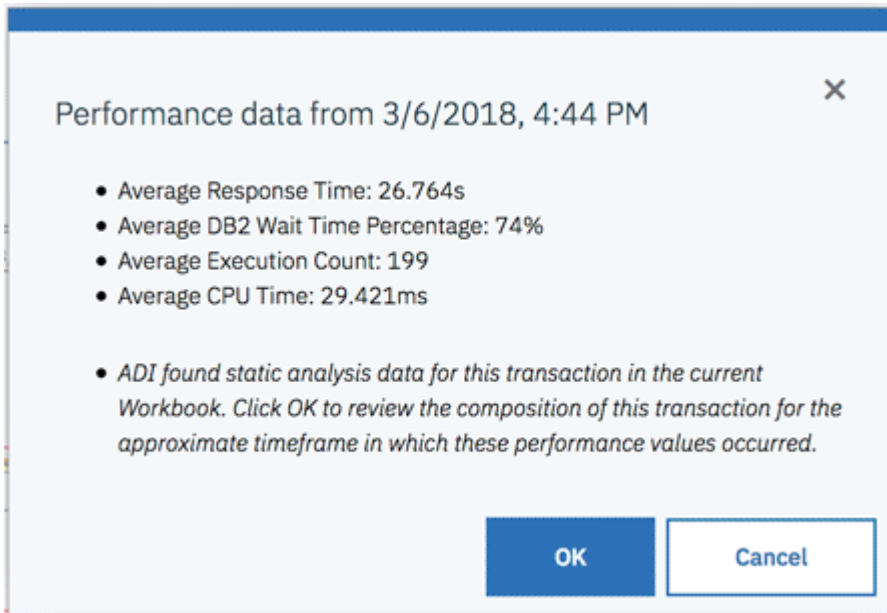


- Hover over the chart on the area where the response time exceeds the threshold and the average DB2 time is high. You can see response time value and percent DB2 wait time value.



11. Click the area where a warning icon shows on top.

Note: A warning icon indicates the maximum point of the response time. Performance data dialogue box appears. It shows the performance data at the point you selected.

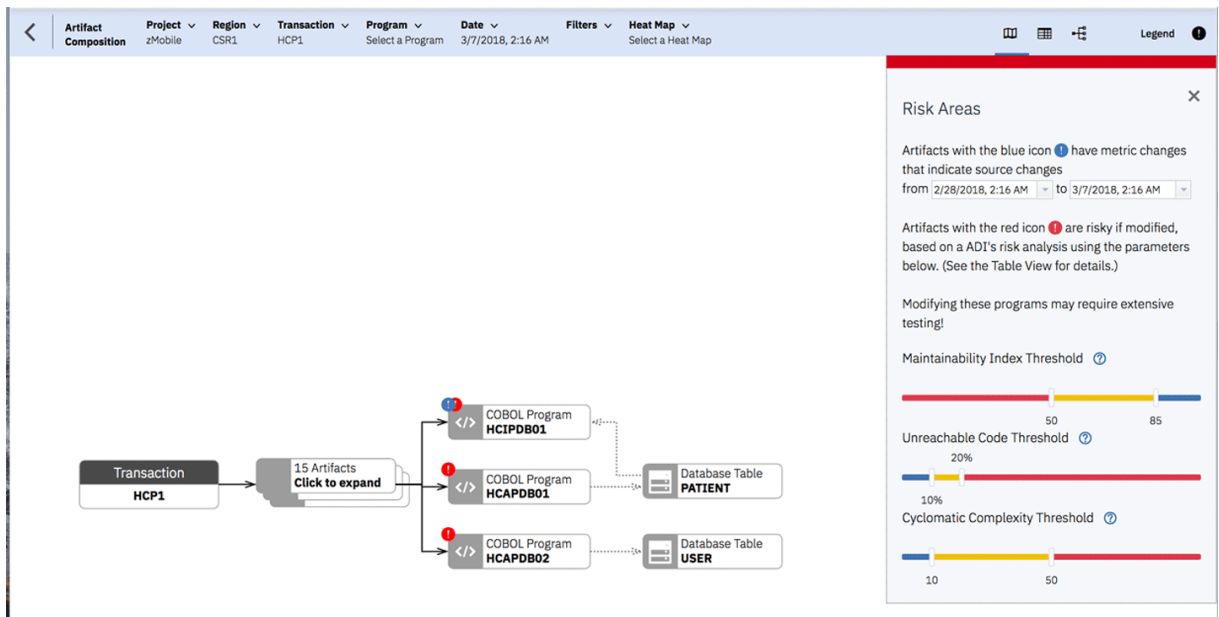


12. Click **OK** to do further analysis.

13. The **Artifact Composition** view loads. Artifact Composition analysis is the analysis of key program and transaction metrics collected from Application Discovery. This view shows Artifact Composition graph which is the connected graph of all artifacts (transactions, programs, and database tables) calling in a transaction. The arrow direction represents the calling direction. You notice the warning icons on top of the artifacts. The blue warning icon indicates that there could be some changes to the artifacts. Because there are changes to artifact metrics during the interval time that you have set when you set up an analysis collection in the previous tutorial. In this case, it is 7 days which is between February 28th and March 7, 2018. For ADI, the changed artifact is indicated by one of the following method.

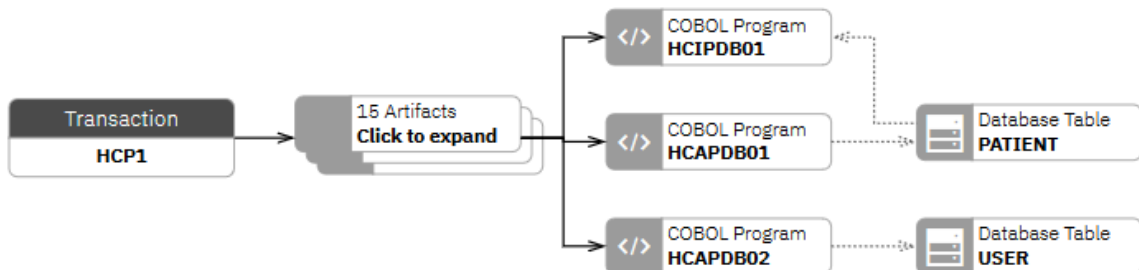
- Check if there is the LASTUPDATED metric that is collected from IBM Application Discovery.
- Check if the Maintainability Index and Number of Source Line of Code have been updated between the change interval time you have defined.

The red warning icon indicates that the artifact is risky to modify. The Risk Areas dialog box on top of the chart explains the meaning of blue and red icons with the threshold setting for key metrics.

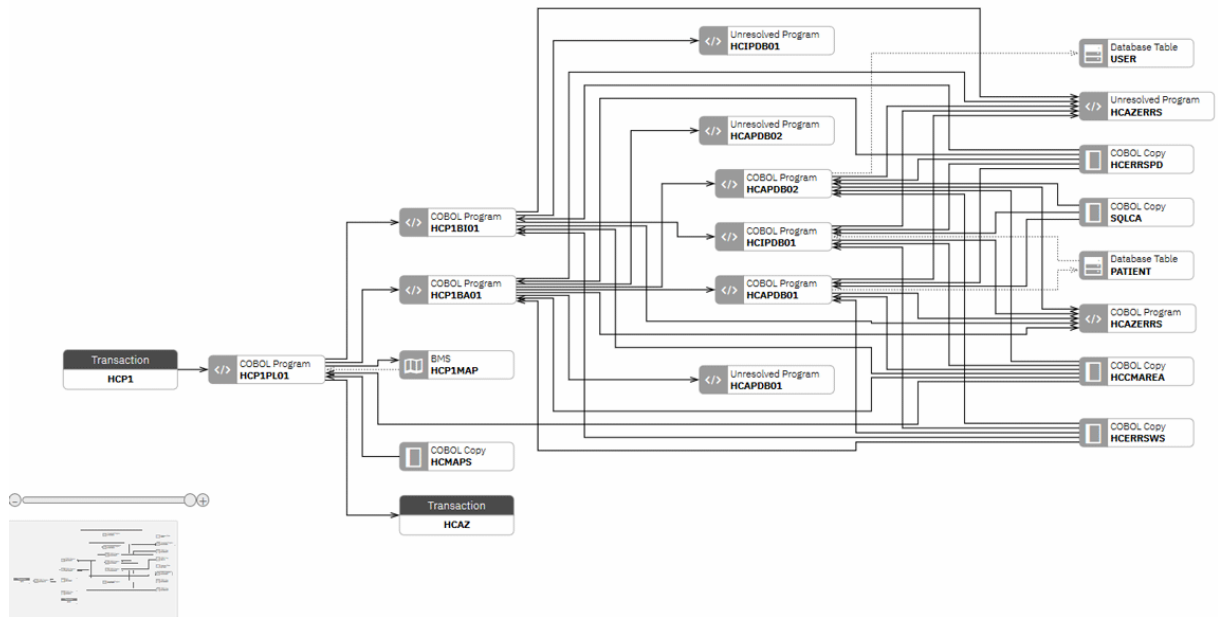


- Click **X** on top right of the Risk Areas dialog to close the dialog box. The Risk Areas dialog disappears along with the warning icons.

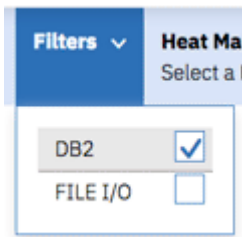
You notice that the graph is expandable. This is because when you navigate to the transaction composition analysis by clicking at the areas where there is a performance issue, ADI analyzes the cause of the issue and shows only the potential artifacts that could cause the issue. For example, in this case, ADI analyzed that the issue could be caused by DB2 wait time. It displays all the artifacts that are connected to DB table.




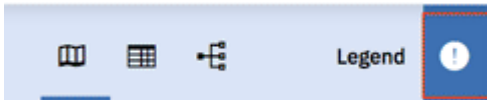
- Click the box that displays **Clicks to expand**. You can see the full view of the Artifact Composition graph. There is a dialog box indicating that **No metrics available**. Because you have not selected any of the artifact box.



16. Click the **Filters** drop-down list and select **DB2**. The Artifact Composition graph is updated to show only artifacts that are connected to DB2.



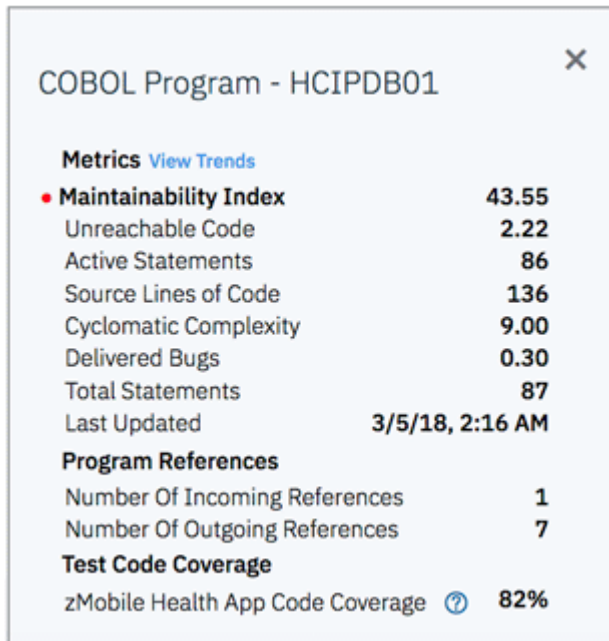
17. Click the **Risk Areas** icon () on the top menu. The **Risk Areas** dialogue displays with the warning icons on the Artifact Composition graph.



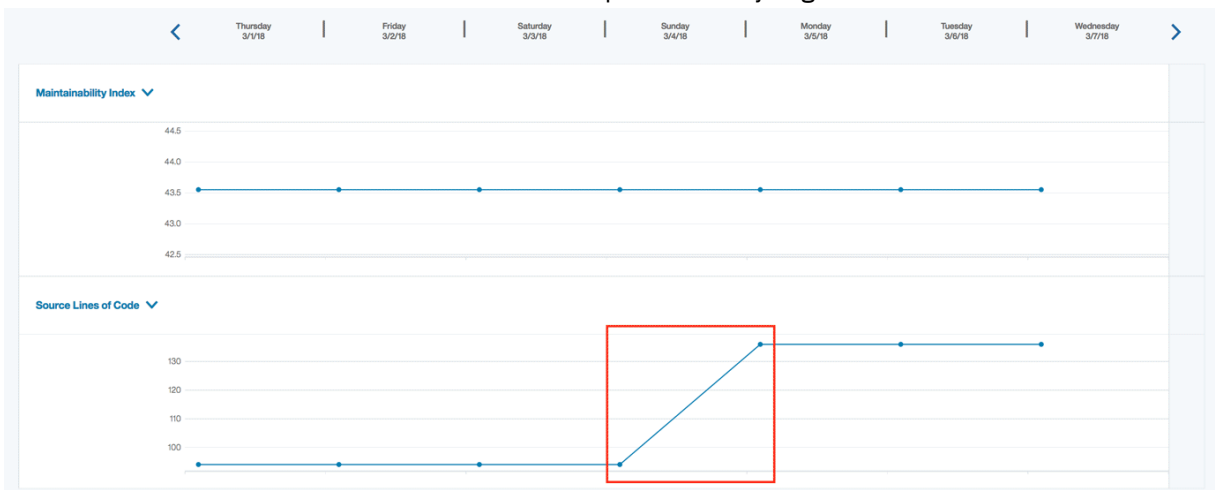
You can see the blue warning icon on **HCIPDB01**. This means that there could be some changes made to **HCIPDB01** in the past week.

18. Close the **Risk Areas** dialogue and click **HCIPDB01** box. The key metrics collected from Application Discovery for this artifact are displayed. You can see that the Maintainability Index is in red area but it is not your concern at this point.

You can notice that the code coverage is 82%. When you hover over the question mark on the Test Code Coverage metric for HCIPDB01, you see that the date of the last test code coverage data is a week from today, which is before the date when the program was changed last time. This means that it has not been properly tested.




- Click **View Trends** link next to the Metrics header. The **Trends** page for HCIPDB01.cb1 appears.
- Observe the **Trends** page that shows the trend lines of Maintainability Index and Source Lines of Code. You notice that Source Lines of Code went up about 4 days ago.

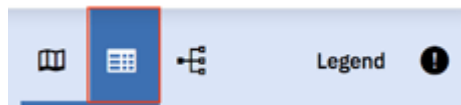


- Select the drop-down list of **Maintainability Index** and select **Total Statements**. You notice that both metrics have the same trending. About 40 statements are added to HCIPDB01.cb1.



Now you as Marco conclude that the **HCIPDB01** should be the area of concern. You discuss with Jane, the developer. You two investigate further into the code and find that an extra SQL Join statement contributes to the excessive wait time. Before making modifications, you and Jane go back to ADI.

22. Click the **Table** () icon to show the Artifact Composition table.




The Artifact Composition table shows the list of all program artifacts within a transaction. The table is sorted based on the analysis of high risk to modify. The rank of risk to modify is calculated based on combination of the following criteria:

- Whether the artifact is in risk areas: Risk areas are based on the thresholds setting.
- Whether the artifact is an outlier: Outlier artifacts are analyzed based on the outlier detection algorithm leveraging Mahalanobis distance of each artifact to the center of the distribution. Artifacts with large Mahalanobis distances mean that they are outlier or abnormal because they are very far away from majorities.
- Metrics values sorting: Given the same risk area and outlier status, artifacts are finally sorted by the values of Maintainability Index, Unreachable Code, and Cyclomatic Complexity.

23. On the Artifact Composition table, you and Jane notice that **HCIPDB01** is at medium risk to modify. Another program **HCAZERRS** is at high risk. Hence making another changes would not make much impact to the zMobile Health Care application.

Outlier Status	Artifact Type	Program Name	Maintainability Index	Unreachable Code	Cyclomatic Complexity	Number Of Incoming References	Number Of Outgoing References
Outlier	COBOL	HCAZERRS	5.721 ▲	38.696% ▲	24 ▲	5	0
	COBOL	HCP1PL01	33.892 ▲	7.447% ▲	11 ▲	1	7
	COBOL	HCIPDB01	43.553 ▲	2.222% ▲	9	1	7
	COBOL	HCAADB01	43.75 ▲	2.222% ▲	8	1	7
	COBOL	HCP1BA01	45.718 ▲	2.5% ▲	8	1	9
	COBOL	HCAADB02	44.853 ▲	2.326% ▲	7	1	7
	COBOL	HCP1BI01	47.16 ▲	2.778% ▲	6	1	7

You can click on the **Risk Areas** icon () to update the threshold settings and see the effect of the changes. For example, move the lower slider of Maintainability Index threshold to 40%. You now see that the warning icons of the programs with Maintainability Index higher than 40% are changed from red warning icons to transparent red warning icons.

Outlier Status	Artifact Type	Program Name	Maintainability Index	Unreachable Code	Cyclomatic Complexity	Number Of Incoming References
Outlier	COBOL	HCAZERRS	5.721 ▲	38.696% ▲	24 ▲	
	COBOL	HCP1PL01	33.892 ▲	7.447% ▲	11 ▲	
	COBOL	HCIPDB01	43.553 ▲	2.222% ▲	9	
	COBOL	HCAADB01	43.75 ▲	2.222% ▲	8	
	COBOL	HCP1BA01	45.718 ▲	2.5% ▲	8	
	COBOL	HCAADB02	44.853 ▲	2.326% ▲	7	
	COBOL	HCP1BI01	47.16 ▲	2.778% ▲	6	

Risk Areas

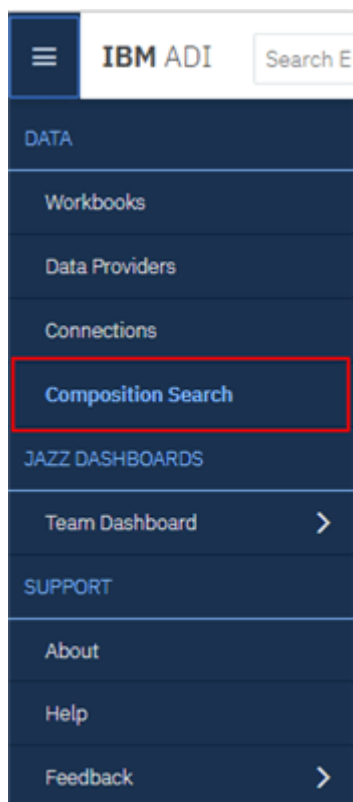
The combination of red ranges on the threshold setting slider bars below defines a risk area.

You can create different risk areas by sliding thumbnails for highlighting metric values and ranking artifacts by the risk to modify.

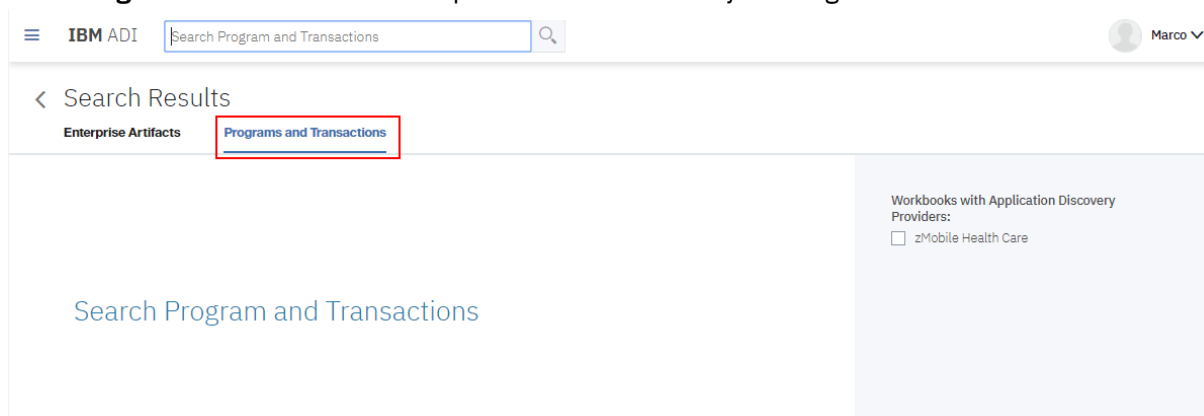
Maintainability Index Threshold

Unreachable Code Threshold

Cyclomatic Complexity Threshold



28. Click **Programs and Transactions** to perform the search only for Programs and Transactions.



29. Enter HCIPDB01 on the search text box. The list of all **HCIPDB01** artifact in different transaction and region appears. You can see that **HCIPDB01** is been executed in many transactions.

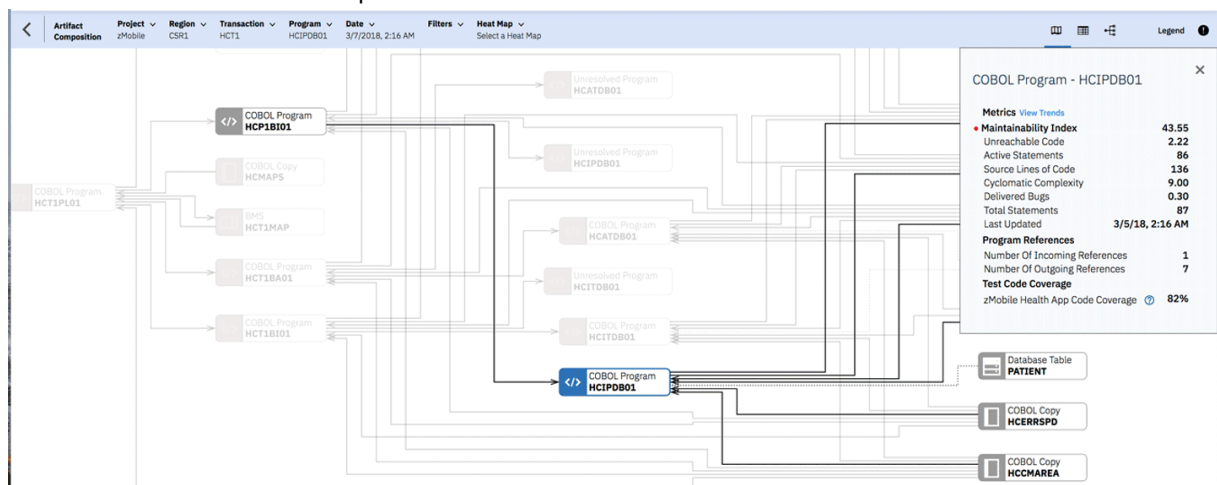
< Search Results

Enterprise Artifacts Programs and Transactions

Name ▲	Location	Project	Workbook	Type
HCIPDB01	Transaction: HCT1; Region: CSR1	zMobile	zMobile Health Care	COBOL Program
HCIPDB01	Transaction: HCT1; Region: CSR1	zMobile	zMobile Health Care	Unresolved Program
HCIPDB01	Transaction: HCP1; Region: CSR1	zMobile	zMobile Health Care	COBOL Program
HCIPDB01	Transaction: HCP1; Region: CSR1	zMobile	zMobile Health Care	Unresolved Program
HCIPDB01	Transaction: HCM1; Region: CSR1	zMobile	zMobile Health Care	COBOL Program
HCIPDB01	Transaction: HCM1; Region: CSR1	zMobile	zMobile Health Care	Unresolved Program
HCIPDB01	Transaction: HCVA; Region: CSR1	zMobile	zMobile Health Care	COBOL Program
HCIPDB01	Transaction: HCVA; Region: CSR1	zMobile	zMobile Health Care	Unresolved Program
HCIPDB01	Transaction: HCV1; Region: CSR1	zMobile	zMobile Health Care	COBOL Program
HCIPDB01	Transaction: HCV1; Region: CSR1	zMobile	zMobile Health Care	Unresolved Program

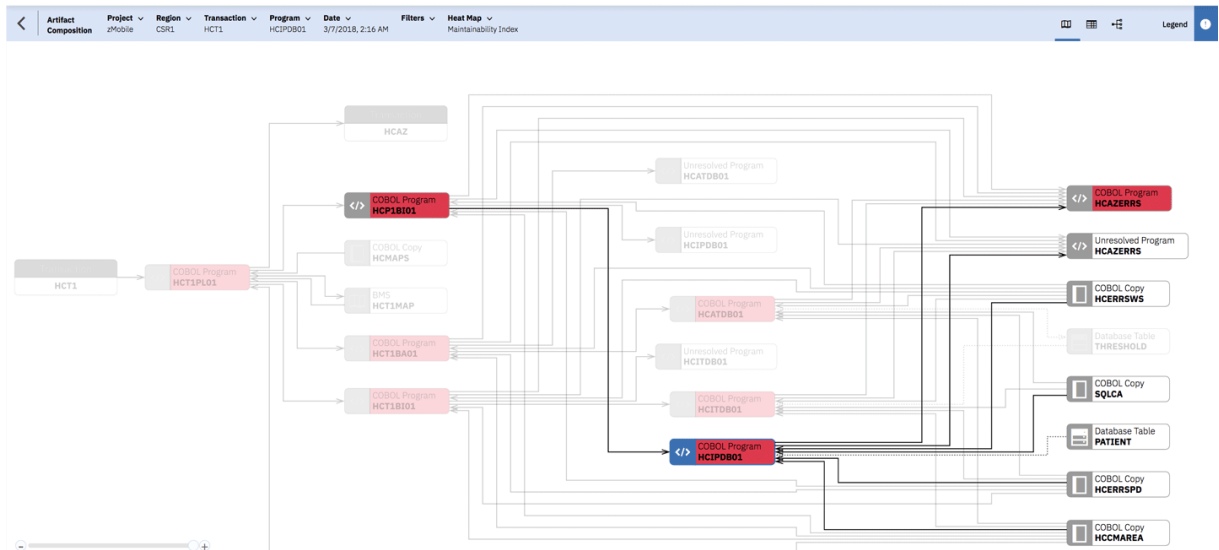
Showing 1-10 of 10 items First Page | Previous Page | Next Page

30. Select the first **HCIPDB01** item on the table. The Artifact Composition graph appears with highlighted **HCIPDB01** artifact and its dependencies.



31. Click the **Close (X)** icon on the metrics dialogue box to close metrics information.

32. Click on the **Risk Areas** icon (⚠️) to show the risk artifacts. You can now see that in this transaction **HCIPDB01** again has dependency with **HCAZERRS**. These two programs have a very strong impact. Jane needs to test both module very well to make sure that after fixing the SQL problems, her changes to **HCIPDB01** would not cause any regressions to **HCAZERRS**.



The graph updates with the colored nodes that indicate the code coverage status of each node in the graph. The nodes without color indicate that no metric data is associated with these nodes.

You can see that the code coverage status of multiple programs is in poor (yellow) and insufficient (red) areas. This means that after making changes, the development team needs to make sure that both programs are fully tested.

Jane then performs the fix as discussed with you. In the next build after the fixing, Trish reports that the problem with the "Inquire Patient" feature is fixed and it again takes only 2 seconds to respond.

You have seen how you can correlate performance data from OMEGAMON for CICS and static analysis data from Application Discovery to perform the root cause analysis of the performance issues. ADI facilitates you to identify the potential programs that cause the issues without going through the entire artifacts within transactions. With Application Discovery data, it also recommends the Risk Areas where you need to take extra care when you modify them. You can see the dependency of artifacts to ensure that there would be no regressions in the future builds.

Monitoring and analyzing code quality through Application Discovery data

This tutorial guides you through the static analysis of projects within the portfolio by analyzing project data from the Application Discovery data provider.

Prerequisite

Before you begin this tutorial, you need to perform the following activities.

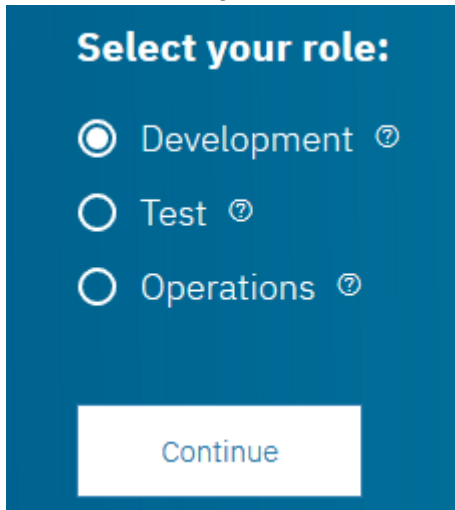
- [“Installing and setting up ADI” on page 7](#)
- [“Setting up automated code coverage data collections” on page 44](#)
- [“Generating sample data” on page 71](#)

Note: Since the data in this tutorial is the generated sample data, you might not see the exact same data on your reports.

In this tutorial, you play the role of Marco, the development lead of the zMobile Health Care application, to monitor and analyze various project metrics within your portfolio. zMobile Health Care application is the core application of your company. You and Scott, the enterprise architect, want to ensure that the zMobile Health Care application has a low maintainability because you expect that a number of changes are coming soon. To have a better understanding of the code quality of zMobile Health Care application, you need to gather the static analysis metrics data from the Application Discovery provider and use ADI as dashboards to monitor the code quality of all the projects within the application.

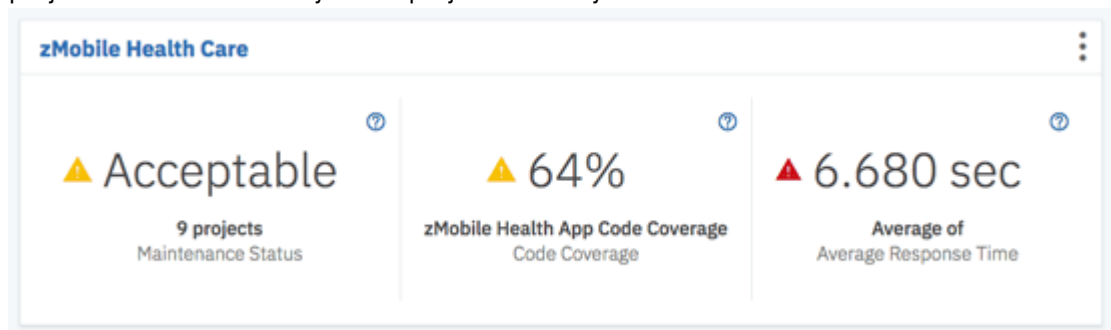
As Marco, you need to complete the following steps to analyze zMobile Health Care application:

1. Navigate your browser to `https://healthcare.example.com:9443/adi/web/projects/HealthCare4A11`.
2. Log in with Marco as the user ID and Marco as the password. The **Welcome** page appears.
3. Select the **Development** role and click **Continue** if you have not selected your role yet.

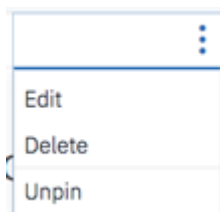


Note: ADI requires you to select your role before you can start viewing dashboards and reports. The role that you select is used to organize the dashboards and reports that are displayed, which helps you view the dashboards and reports in your focus area first.

The **Workbooks** page is displayed with the dashboards that summarize the overall status of zMobile Health Care application. You can see that the average maintenance status of all the projects within the zMobile Health Care application is in an acceptable level. But you want to review the individual project to see whether any of the projects needs your attention.



4. Click the **Options Menu** icon in the upper right corner of the zMobile Health Care card and select **Edit** to edit the workbook information.



5. Scroll down to the **Notification Rules** section and expand the section to see the existing notification rules. You can find the following three notification rules available. The notification rules are automatically created based on the threshold values that you defined when you created the workbook. With ADI, you can use the notification rules to specify violation conditions for the metrics you want to monitor.

Notification Rules

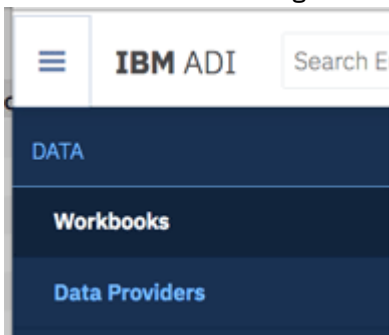
▼ Expand to set notification rules

This section allows you to define common notifications that will be sent to all members of this workbook. Individual members can choose to unsubscribe from them.

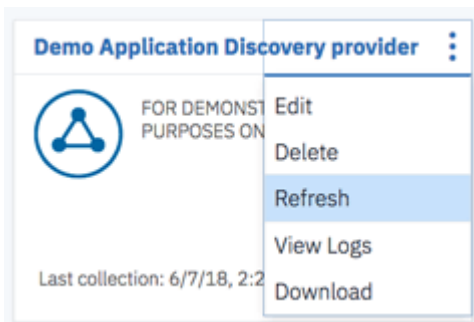
Notification Title	Custom Message	Action
<input checked="" type="checkbox"/> Cyclomatic Complexity is larger than 40 for at least one of the selected projects		
<input checked="" type="checkbox"/> Unreachable Code is larger than 20% for at least one of the selected projects		
<input checked="" type="checkbox"/> Maintainability Index is smaller than 50 for at least one of the selected projects		

For example, on the Maintainability Index notification rule, you can get notified when one of the projects within zMobile Health Care workbook has a value that is less than 50.

- Click **Cancel** to cancel editing.
- Click the **Menu** icon next to the IBM ADI header to open the menu pane.
- Click **Data Providers** to go to the **Data Providers** page.

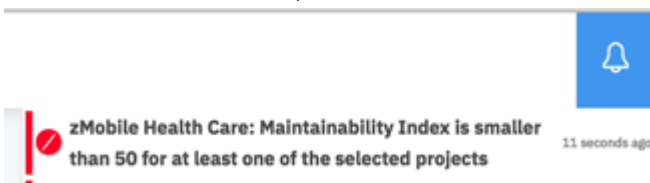


- Click the **Options Menu** icon on the upper right corner of the **Demo Application Discovery provider** card and select **Refresh** to make ADI recollect data from the selected data provider.



After the data collection, ADI checks the metrics data and determines whether the thresholds that you define are violated or not. Then, a new notification message is displayed.

- Click the **Notifications** icon to expand the list of notification messages. You can see a warning message that one or more projects within zMobile Health Care application have a *Maintainability Index* value less than 50, which violates the threshold that you defined.

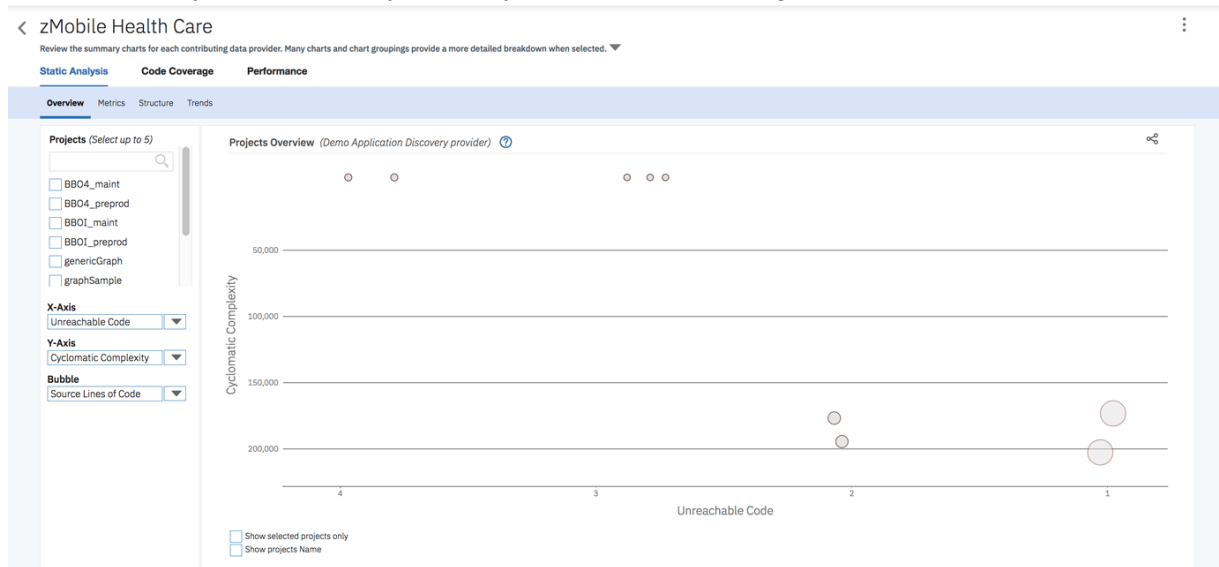


To further investigate, you can complete the following steps.

- Click the IBM ADI header to go to the **Workbooks** page.
- Click **zMobile Health Care** to view the detailed analysis. The **zMobile Health Care** page is displayed with the summary charts of the contributing providers.
- View the reports on the workbook summary view of the **zMobile Health Care** page. The reports are organized into three tabs: **Static Analysis**, **Code Coverage**, and **Performance**. All the reports are analyzed based on the three data providers that are associated with this Analysis workbook:

- An Application Discovery data provider that collects static analysis data about transactions, programs, and project-level metrics in the zMobile Health Care application
- A Manual Builds data provider that collects the code coverage results
- An OMEGAMON for CICS data provider that monitors the performance for the CICS transactions of zMobile Health Care application

In this tutorial, you focus on only the analysis for the **Static Analysis** tab.



On the **Static Analysis** tab, the information is organized into four subtabs: **Overview**, **Metrics**, **Structure**, and **Trends**.

- The **Overview** tab displays the bubble chart as the summary of the overall status for all projects within the scope of a workbook. You can select an individual bubble on the bubble chart to browse the detailed reports of that project.
- The **Metrics** tab displays the radar chart of different metrics you are interested in. You can compare up to five projects along with the metrics.
- The **Structure** tab displays the information about the shared resources for selected projects.
- The **Trends** tab displays the historical trends of different metrics that you are interested in. You can compare up to five projects for each of the historical trends chart.

In the **Project Overview** area on the **Overview** tab, you can see a group of bubbles on the upper left of the chart. The bubbles represent the projects that have a higher value of *Unreachable Code* than the rest of the projects. *Unreachable Code* is the percentage of statements within subroutines that cannot be reached by the control flow out of the total number of statements.

The bubbles on the lower right of the chart represent the projects with a higher *Cyclomatic Complexity*. These projects seem to be larger and more complex but with lower *Unreachable Code*.

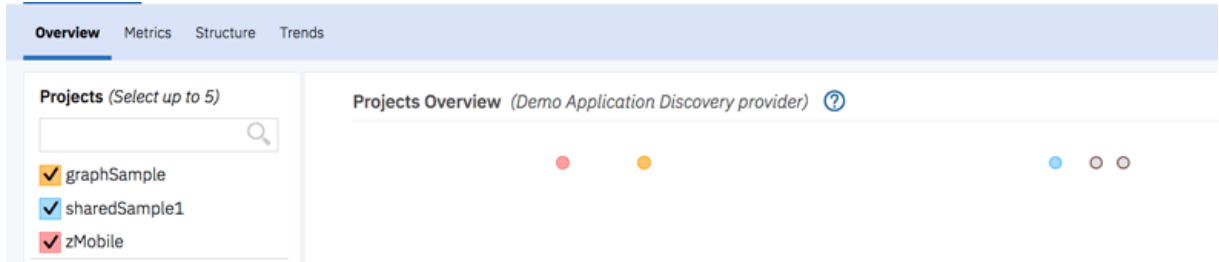
For this tutorial, you need to investigate the projects with a higher *Unreachable Code* because your organization goal is to have the *Unreachable Code* less than 2% in the entire application.

14. Hover over the bubbles on the upper left of the chart to see the project names.

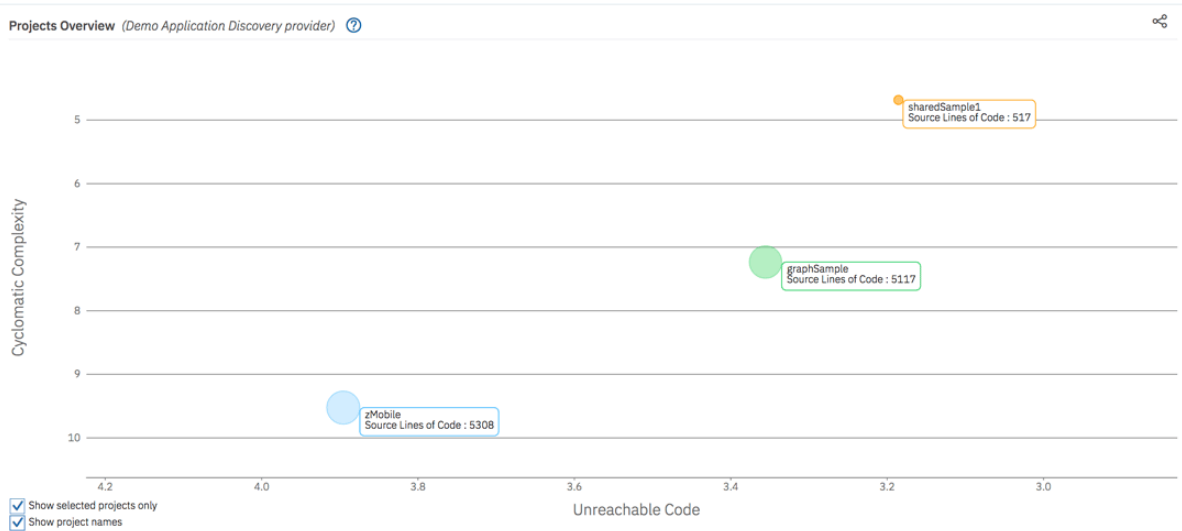
Projects Overview (Demo Application Discovery provider) ?

zMobile
Source Lines of Code : 5308

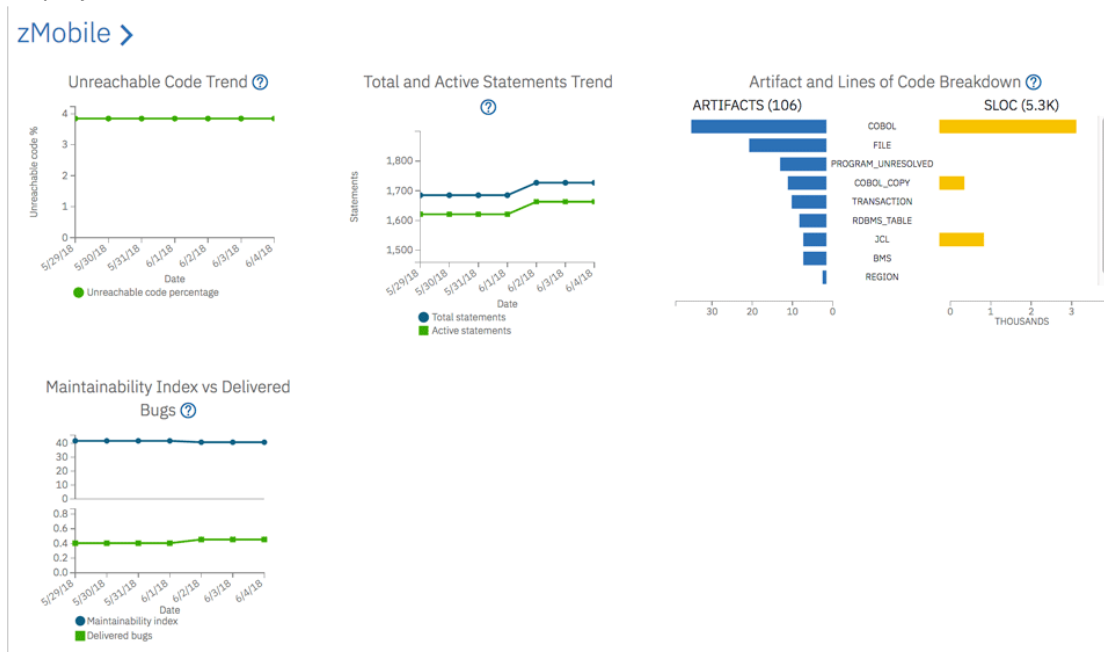
15. Select the **graphSample**, **sharedSample1**, and **zMobile** check boxes for projects on the left pane. The bubbles that represent the projects are highlighted in color.



16. Select the **Show selected projects only** and **Show project names** check boxes. The bubbles for the projects that are not selected disappear and the project names are displayed next to the bubbles.



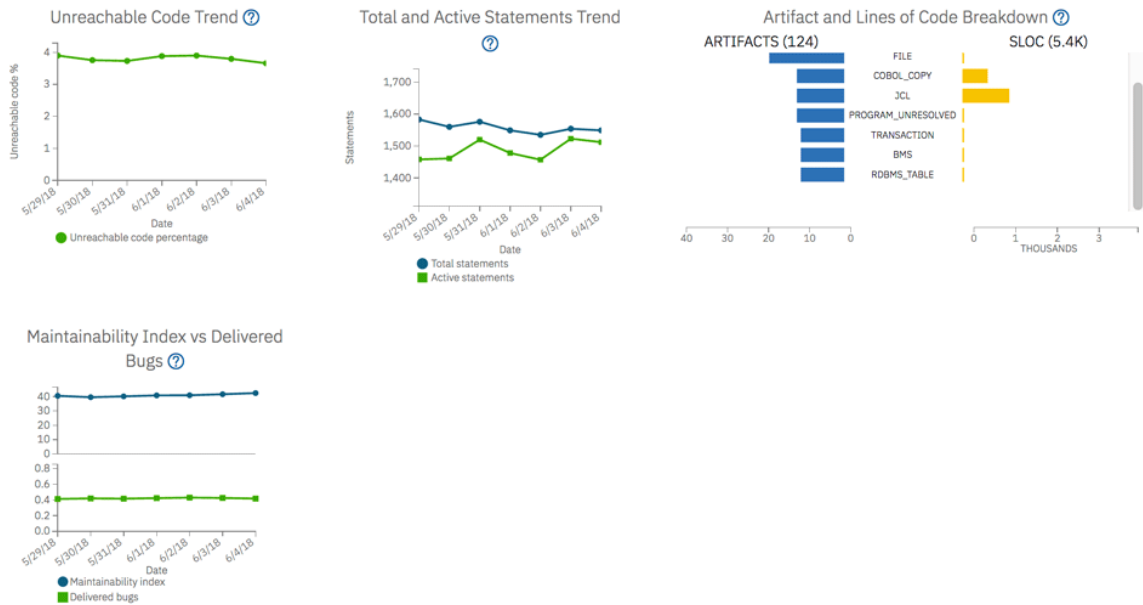
17. Click the bubble that represents the **zMobile** project. More static analysis reports for the project are displayed at the bottom.



When you review the reports, you notice that both total statements and active statements are added to the Total and Active Statements Trend chart on 2 June. However, the unreachable code percentage remains the same on the Unreachable Code Trend chart, which means that no new unreachable code is added to the **zMobile** project for the past week.

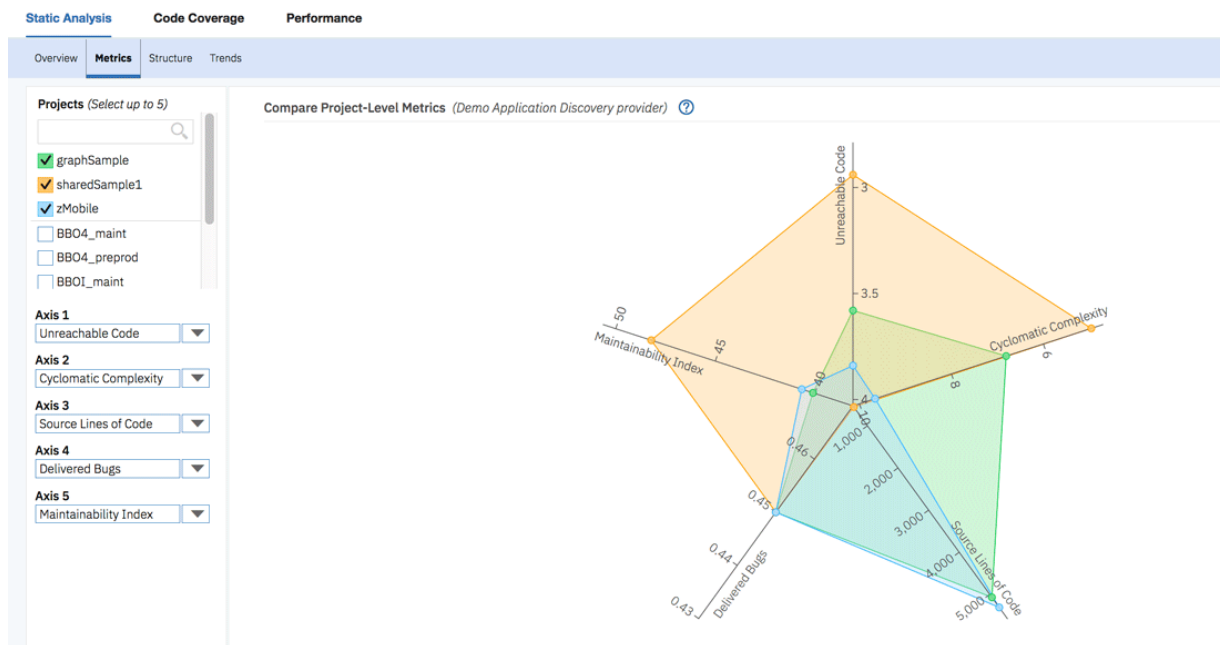
18. Scroll up to the Project Overview bubble chart and select the bubble that represents the **graphSample** project.

[graphSample >](#)



19. Scroll down to the more detailed reports for the **graphSample** project. The Unreachable Code Trend chart shows a decreasing trend, which means that the development team removes the unreachable code from their programs. This is a good sign for the **graphSample** project.

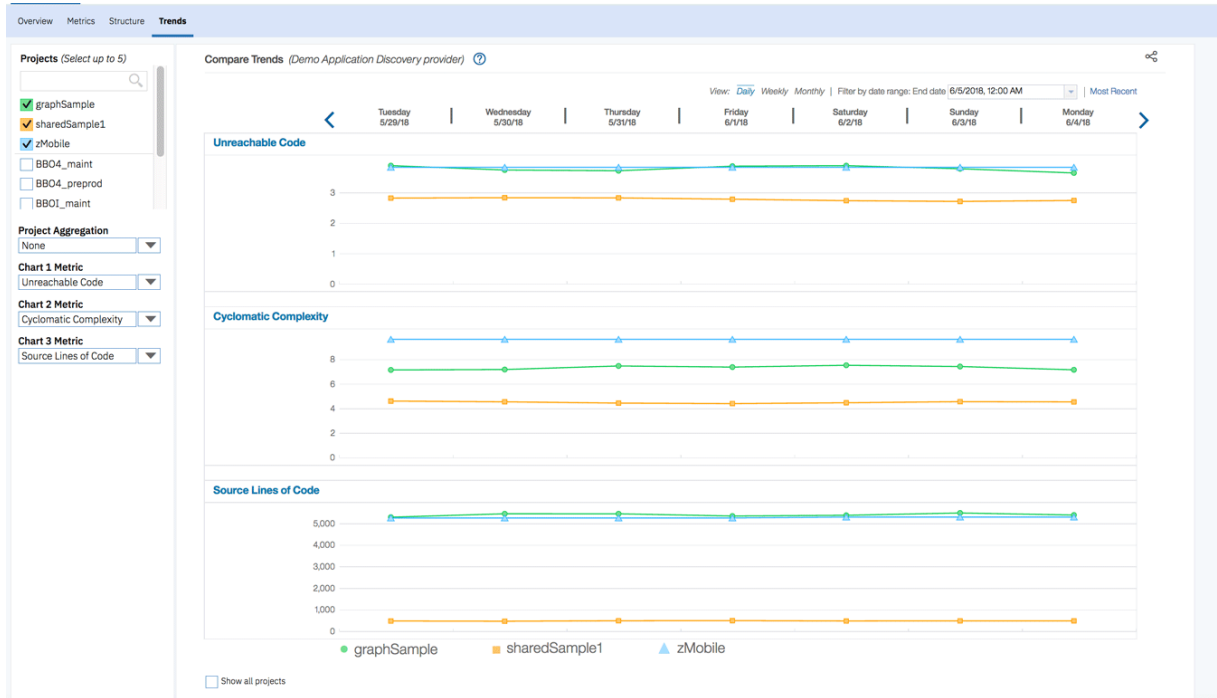
20. Select the **Metrics** tab to compare the project-level metrics of these selected projects.



On this tab, you can see the radar chart with five axes that represent *Unreachable Code*, *Cyclomatic Complexity*, *Source Lines of Code*, *Delivered Bugs*, and *Maintainability Index*.

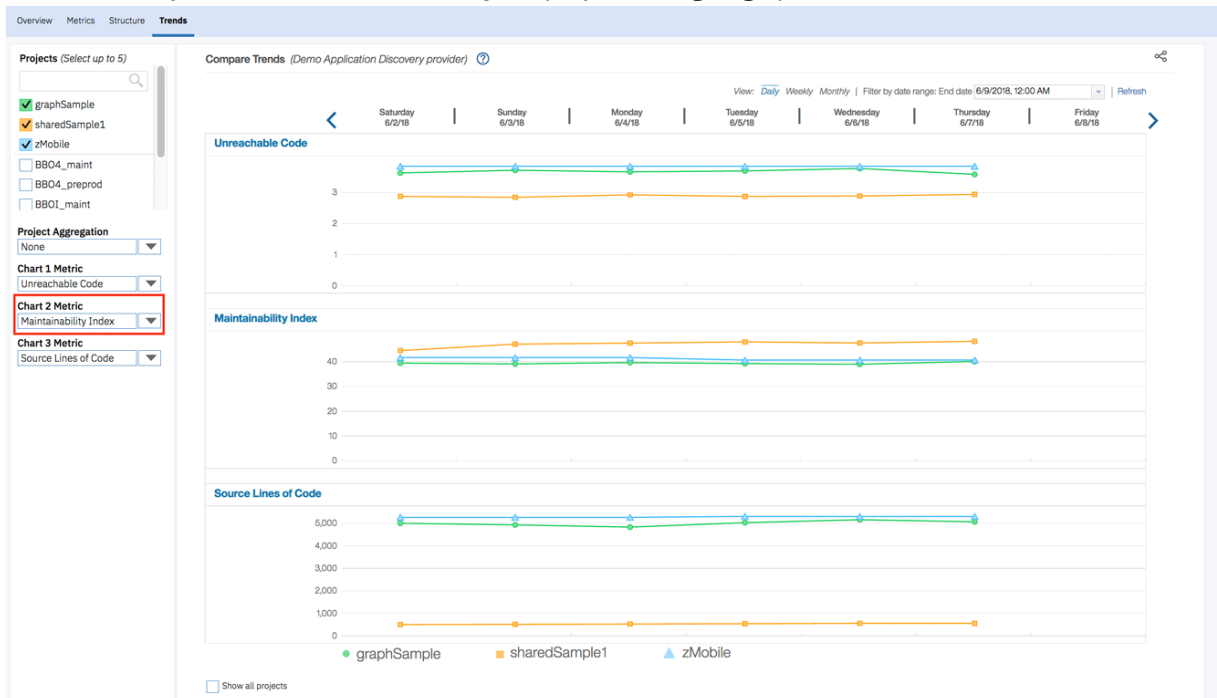
The radar chart shows that, for all three projects, the *Maintainability Index* is less than 50, which is under the organization goal. You need to investigate on all these three projects to improve the *Maintainability Index*. The **SharedSample1** project seems to be better than the other two projects in all dimensions. However, if you look at the *Source Lines of Code*, the size of this project is much smaller than the other two projects.

21. Select the **Trends** tab to view the historical data of project-level metrics. By default, the trends for *Unreachable Code*, *Cyclomatic Complexity*, and *Source Lines of Code* are displayed. From the left pane, you can choose different metrics to be displayed and select up to five projects to compare trends for different projects.



You can see that all trend metrics (*Unreachable Code*, *Cyclomatic Complexity*, and *Source Lines of Code*) for all selected projects do not have many changes except that the trends of *Unreachable Code* and *Cyclomatic Complexity* for the **graphSample** project are decreasing. This is a good sign for the **graphSample** project.

22. Select **Maintainability Index** from the **Chart 2 Metric** drop-down list. You can notice that the *Maintainability Index* of all three projects is under 50, which is lower than the organization goal. The **graphSample** project has the lowest *Maintainability Index* but the trend is slightly increasing. The *Maintainability Index* of the **sharedSample1** project also going upwards.



To increase the *Maintainability Index* of all three projects to be over 50, first you probably need to remove the unreachable code from these projects.

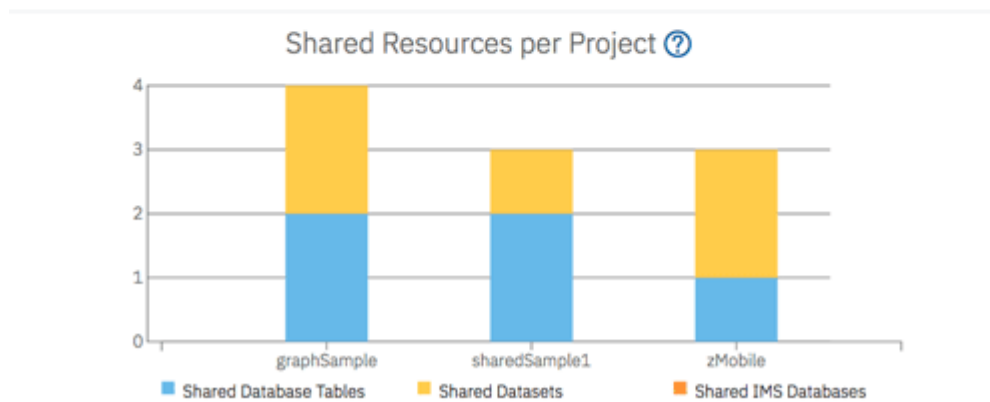
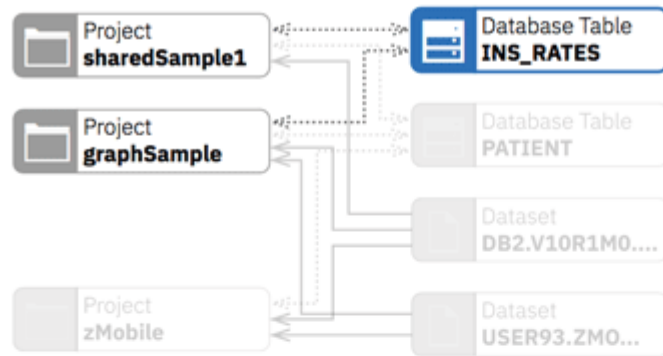
Before you remove the unreachable code, you need to consult with ADI on the data sources that are shared among these projects to make sure that they are consistent when you change the source code.

23. Select the **Structure** tab. The information of data sources that are used by multiple projects within the scope of workbook is displayed. ADI refers these shared data sources as *Shared Resources*.

Shared Resources (Demo Application Discovery provider) ?			
Find Shared Resources		Search	
	Name	Type	Number of Projects▼
<input checked="" type="checkbox"/>	DB2.V10R1M0.SDSNLOAD	Dataset	3
<input checked="" type="checkbox"/>	PATIENT	Database Table	3
<input checked="" type="checkbox"/>	INS_RATES	Database Table	2
<input checked="" type="checkbox"/>	USER93.ZMOBILE.COPYLIB	Dataset	2

Showing 1-4 of 4 items First Page | Previous Page | Next Page

24. Select all the shared resources from the Shared Resources list. You can notice that DB2.V10R1M0.SDSNLOAD and PATIENT are shared by the three projects. If you want to update the codes from one of the three projects that impact PATIENT database table, you need to consider the impact to the source codes of the other two projects.
25. Select the INS_RATES node from the network graph on the right. You can see that INS_RATES are shared by **sharedSample1** and **graphSample** projects.



26. Select **PATIENT** from the Shared Resources list. The list of all transactions and projects that use the PATIENT resource is displayed.

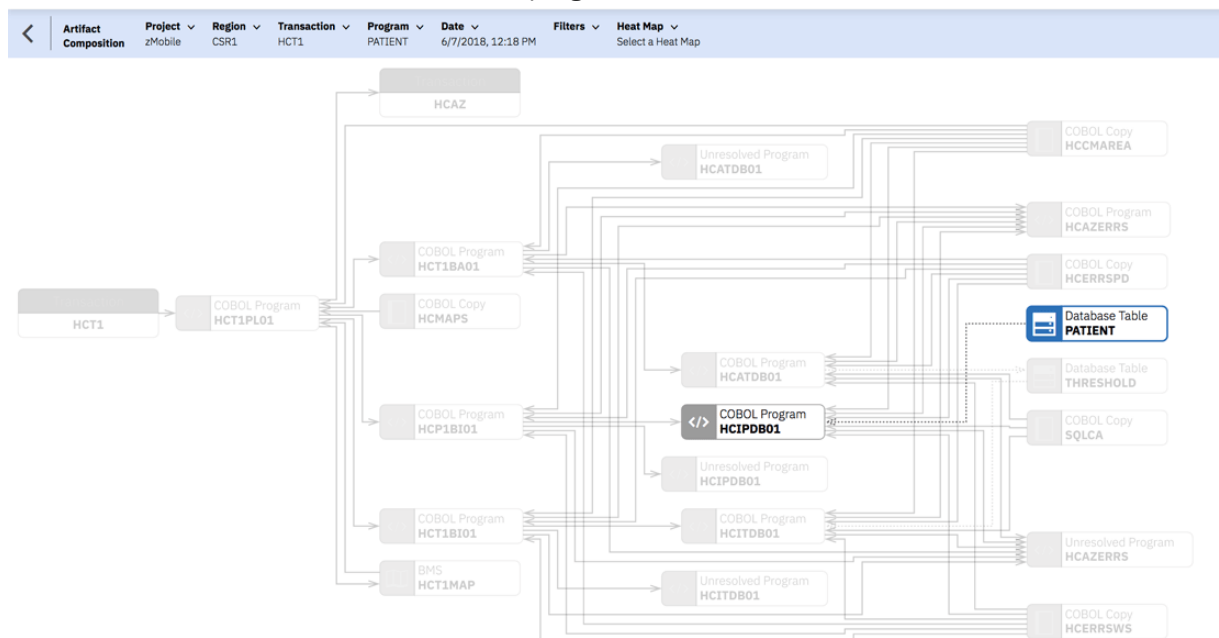
< Search Results

Enterprise Artifacts Application Discovery Artifacts

Name▲	Location	Project	Workbook	Type
PATIENT	Transaction: [NONE]; Region: [NONE]	sharedSample1	zMobile Health Care	Database Table
PATIENT	Transaction: [NONE]; Region: [NONE]	sharedSample2	zMobile Health Care	Database Table
PATIENT	Transaction: [NONE]; Region: [NONE]	genericGraph	zMobile Health Care	Database Table
PATIENT	Transaction: HCT1; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCP1; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCM1; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCVA; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCV1; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCTA; Region: CSR1	zMobile	zMobile Health Care	Database Table
PATIENT	Transaction: HCPA; Region: CSR1	zMobile	zMobile Health Care	Database Table

Showing 1-10 First Page | Previous Page | Next Page

27. Click one of the PATIENT names to see the program that uses this resource.



Now you have explored how you can use ADI to monitor the quality of source code by analyzing the static analysis metrics from IBM Application Discovery. You can get notified by ADI immediately when any value of the project-level metrics violates the metric notification rules. Hence, you can further investigate the problem and take the corrective actions. Through the shared resources, you can understand the dependencies between different Application Discovery projects better, which helps to ensure that the changes you make for one project are consistent with those of all the dependent projects.

Chapter 4. Installation and setup

Several ways are available to install and set up ADI. You can install and set up ADI by using web-based express setup, by using web-based custom setup, by using repotools command, or by using ADDI installer and adi-setup application. You can also install ADI into an existing IBM Rational Collaborative Lifecycle Management (CLM) solution. If you use a previous release of ADI and want to install a new version, you can migrate all the data from the old version to the new one.

Hardware and software requirements

Before installation, verify that your hardware and software meets the minimum requirements for installing and using ADI application.

A 64-bit operating system (Windows or Linux) and a minimum of 8 GB server memory provide the best environment for running the Jazz Team Server (JTS).

Note: When you IBM ADDI with both ADI and AD solutions, the minimum hardware and software requirements from both products need to be combined. For specific details about AD, see [AD Installation Prerequisites](#).

A complete list of system requirements is as follows.

System requirements for ADI server

Operating systems

- **Linux**

- Red Hat Enterprise Linux (RHEL) Server 8, IBM z Systems
- Red Hat Enterprise Linux (RHEL) Server 8, x86-64
- Red Hat Enterprise Linux (RHEL) Server 7, IBM z Systems
- Red Hat Enterprise Linux (RHEL) Server 7, x86-64
- SUSE Linux Enterprise Server (SLES) 12, IBM z Systems
- SUSE Linux Enterprise Server (SLES) 12, x86-64
- Ubuntu 16.04 LTS, IBM z Systems
- Ubuntu 16.04 LTS, x86-64
- Ubuntu 18.04 LTS, IBM z Systems
- Ubuntu 18.04 LTS, x86-64

- **Windows**

- Windows 10 Enterprise, x86-64
- Windows 10 Pro, x86-64
- Windows Server 2008 R2 Enterprise Edition, x86-64
- Windows Server 2008 R2 Standard Edition, x86-64
- Windows Server 2012 R2 Datacenter Edition, x86-64
- Windows Server 2012 R2 Standard Edition, x86-64
- Windows Server 2016 Datacenter Edition, x86-64
- Windows Server 2016 Standard Edition, x86-64

Application servers

- Embedded WebSphere® Application Server (Liberty Profile 8.5.5)

Databases

- Embedded Apache Derby 10.10 (limited to 10 end users)
- DB2® Workgroup Server Edition, 11.1.1.1 and later versions

Note: DB2 for z/OS® is not supported.

System requirements for ADI client

Browsers

- Mozilla Firefox ESR 65.0 and later versions
- Google Chrome 70 and later versions

For a complete list of system requirements for any particular version, see [JTS online help](#) or the [System requirements](#) section on the Jazz.net Deployment wiki. For ADI installation requirements on the Linux system, see [Planing to install on Linux systems](#) and ensure that your hardware and software meets all the requirements.

A list of software versions supported by ADI is as follows.

Code coverage analysis

- IBM Rational Developer for z Systems (RDz) 9.5.1 and IBM Developer for z Systems (IDz) 14.0.0
- IBM Rational Team Concert (RTC) 6.0 and later versions
- COBOL 4.x and later versions
- PL/I 4.2 and later versions
- IBM Debug Tool for z/OS 13.1 and later versions

OMEGAMON for CICS data provider

- IBM Tivoli OMEGAMON for CICS on z/OS 5.3.0

Note: It is required to configure ITM TEPS REST API in OMEGAMON for CICS to be a data provider for ADI. For more information, see [“Prerequisites for setting up OMEGAMON for CICS for ADI” on page 104.](#)

Application Discovery data provider

- IBM Application Discovery for IBM Z V5.0 and later versions. For instructions on how to install and configure IBM Application Discovery, see documents on [IBM Application Discovery and Delivery Intelligence Library](#).

Business Rule Discovery data provider

- IBM Application Discovery for IBM Z V5.1 and later versions.

To check the detailed system requirements for a specific version of ADI, visit the Software Product Compatibility Reports site at <https://www.ibm.com/software/reports/compatibility/clarity/index.html>

Prerequisites for setting up OMEGAMON for CICS for ADI

You can find the prerequisites and instructions on how to set up OMEGAMON for CICS for ADI.

Perform the following steps on all LPARs that participate in a CICSplex that you wish to monitor with ADI.

1. Install IBM Tivoli Monitoring 6.3.0 Fix Pack 6 or later versions. You can download it from [IBM Support](#).
2. Install OMEGAMON XE for CICS on z/OS 5.3.0 or later versions.

OMEGAMON XE for CICS on z/OS V5.3.0 must be installed with PTF UA80018 applied. If the self-describing agent (SDA) feature is enabled on the IBM Tivoli Monitoring components then the associated product support files for TEPS server will be installed automatically. For more information, see [Self-describing monitoring agents](#).

If SDA has been disabled, OMEGAMON XE for CICS on z/OS V5.3.0 must be installed on the TEPS server. You can access it from [IBM Support](#).

3. Enable the dashboard data provider configuration option for the Tivoli Enterprise Portal Server.

Verify that dashboard data provider configuration option for TEPS server has been enabled. This can be done by using Manage Tivoli Enterprise Monitoring Services utility or through command line. For more information, see [Verifying the dashboard data provider is enabled](#).

4. Get appropriate permissions.

You need to get permissions to see the data. Without permissions “/ibm/tivoli/rest/providers” will return empty.

5. If a firewall exists between the TEPS and the ADI server, you need to update the firewall settings appropriately.

If TEPS server is running behind a firewall, you need to open appropriate ports in the firewall or use proxy.

Security considerations

You can take actions to ensure your secure installation, customize security settings, and set up user access controls. You can also ensure that you know about any security limitations that you might encounter with this application.

Enabling security during the installation process

IBM Application Delivery Intelligence for IBM Z only support HTTPS connection. You should always use Secure Sockets Layer (SSL) HTTPS connections to browse to the application from browser. SSL encrypts all data that is passed over an HTTPS connection. During installation, ADI security is enabled by default and all security is provided through the Jazz Team Server.

Enabling secure communication between multiple applications

ADI supports HTTP/HTTPS connections for all data provider connections.

ADI is built on the Jazz Team Server and its users authentication and users management mechanism is provided via the Jazz Team Server. The Jazz Team Server manages an LDAP connection . For more information, see [Configure an LDAP or an LDAP/SDBM connection with the WebSphere Liberty server](#).

Ports, protocols, and services

The default port for ADI is 9443. If you do not want to use the default port numbers, see [Changing the port numbers for the application server](#).

Customizing your security settings

After the installation, you need to configure a certificate authority that is signed or self-signed certificate for your application server. You need to send instructions to your end users about how to import this certificate to avoid warnings of errors in their browsers.

- For instruction about configuring the certificates, see this topic in the Jazz online help: [Configuring security certificates](#).
- For instructions about configuring the certificate, you can follow the same instructions as described in [Configuring security certificates for Report Builder servers](#).
- For instructions about how to configure a browser for such self-signed certificates, follow the instructions in [Importing certificates and configuring browsers for Report Builder reports](#).

You're required to specify an administrative user ID during ADI installation and setup. You can use the Jazz Team Server administration pages to change user IDs and passwords.

Setting up user roles and access

ADI requires an user ID and password to access ADI services. For more information about creating and managing user accounts, see [“Creating and managing users” on page 150](#).

With the administrator permissions, you can manage users by using the Jazz Team Server administration or ADI administration pages. When a project area is created, users can be designated as members of that project and be assigned role permissions. Only members of project area can have access to that project area. The permission to perform the operations within the project area is controlled by the role permissions assigned to the users. For more information about permissions for each role, see [“Assigning role-based permissions to ADI users” on page 151](#).

Privacy policy considerations

This software offering does not use cookies or other technologies to collect personally identifiable information.

Installing ADI by using web-based express setup

The express setup is a simplified version of wizard setup. When you install and set up ADI by using this express setup, you use the Derby database by default and you're not allowed to use any other databases. It is recommended that you use this express setup in a demonstration or product trial but not for production. You can learn how to use this method to install and setup ADI in this topic.

For more information about the express setup, see [Jazz online help](#).

Information required before the installation

You need to get a fully qualified host name and a public URI before you can install ADI application by using the web-based express setup.

The following information is required before the installation:

- A fully qualified host name
- A public URI

Important: A *fully qualified host name* is the host name along with the DNS domain reference of the machine on which the Jazz Team Server (JTS) is installed.

- An example of a *fully qualified host name* is `clmwb.example.com`.
- Examples of an **invalid** *fully qualified host name* include `localhost` and an IP address.

For more information about how to plan the server URI, see [Planning your URIs](#)

Starting up the server

To install ADI by using web-based express setup, you need to start up the server first. Unzip the ADI installer package and run commands for the start.

Note: You need to disable the pop-up blocker and add security exceptions before you start the installation.

You need to take the following steps to start up the server.

1. Unzip the ADI installer package.
2. Open terminal/command prompt and navigate to the `unzipped-adi-installer/adi/server` directory by running the following command.

```
cd /unzipped-adi-installer/adi/server
```

3. In the current directory, start the server by running the following command.

```
server.startup
```


Note: By default when you start the server, the Jazz server is running in the background. You can check the console.log file to see if the server is running. If you want to start the server in the foreground, you can use "-run" option when you start the server.

```
server.startup -run
```

Configuring the server

After you start the server, you need to configure the public URI and set up your administrative user. This topic describes how you configure the server when you install ADI by using web-based express setup.

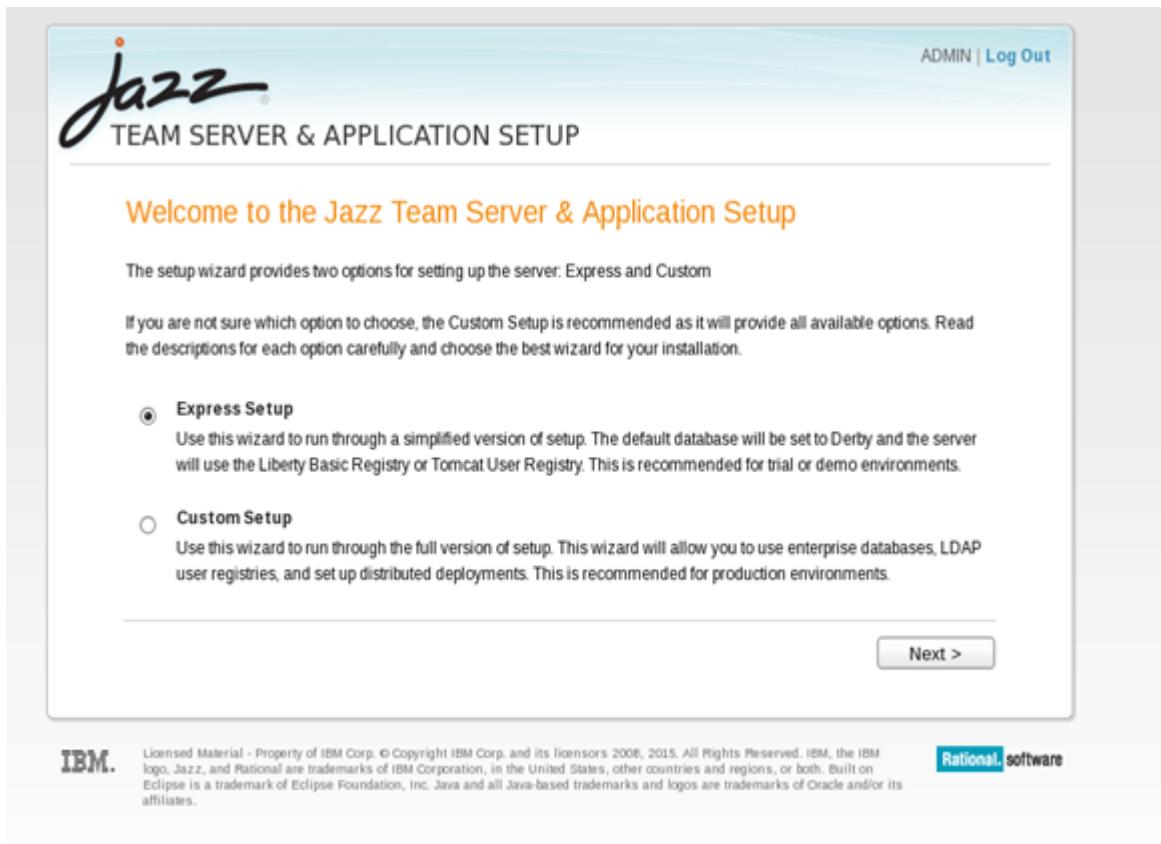
To configure the server, take the following steps:

1. Open a web browser, go to `https://fully_qualified_hostname:9443/jts/setup`, and log on using **ADMIN** as the user ID and **ADMIN** as the password.



The Jazz Team Server login screen features the "jazz TEAM SERVER" logo at the top. Below the logo, a message states: "The Jazz Team Server at localhost in Jazz requires a user ID and password:". To the left of the login fields is an illustration of three stylized human figures (blue, yellow, and green) with a large yellow key in front of them. The login fields include "User ID:" with a text box containing "ADMIN", "Password:" with a masked text box showing "*****", and a checkbox labeled "Remember my User ID". A "Log In" button is positioned below the password field. At the bottom, there is a copyright notice: "Licensed Material - Property of IBM Corp. © Copyright IBM Corp. and its licensors 2008, 2015. All Rights Reserved. IBM, the IBM logo, Jazz, and Rational are trademarks of IBM Corporation, in the United States, other countries and regions, or both. Built on Eclipse is a trademark of Eclipse Foundation, Inc. Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates in the United States, other countries and regions, or both." The IBM logo is on the bottom left, and the Rational software logo is on the bottom right.

2. On the welcome page, select **Express Setup** and click **Next**.



3. On the **Configure Public URI** page:

- Provide a public URI root that is of the form `https://fully_qualified_hostname:9443/jts/`. For example, you can provide `https://insurance.example.com:9443/jts/`.

Note: The repository might have an alternative host name through which it can be publicly accessed. When this property is set, this URL is used as the basis of absolute URIs that are made available outside of the client and server. When the URI is set, it cannot be modified.

- Check the box to confirm that when the public URI is set it cannot be modified.
- Click **Test Connection** to test the connection to the server. If the test is successful, click **Next**.
- For more information about URIs, see [Planning URIs](#).



TEAM SERVER & APPLICATION EXPRESS SETUP

ADMIN | Log Out

✓ The Public URI root has already been set for this server. Click "Next" to continue.

Configure Public URI

The Public URI is the root URL prefix for the URLs of all stored artifacts. This Jazz Team Server generates absolute URLs to resources used in stored artifacts, references between related artifacts, in mail notifications, feeds, for copying to the system clipboard, for Web access and for stable resource identification across all applications.

These generated URLs generally must be navigable from any network location from which a user or another application will be accessing the system. Once data is created and stored, these URLs will become persistent within the server. In a limited set of scenarios, the server URL can be changed later via administrative Server Rename commands which preserve internal consistency, but this is a potentially disruptive action given it may be difficult or impossible to correct the stored links into the server from all other applications and systems. Therefore it is important that you choose a public URI that is fully qualified, and likely to remain stable over time. For additional help, please see the [Planning your URIs](#) topic, contact IBM Support, or get help at the [Jazz.net](#) community site.

Configure this value in the following format: "https://<public_hostname>:<port>/<context>"

Step 1: Configure Public URI

Property	Current Value
Public URI	<input type="text" value="https://insurance.example.com:9443/jts"/> Example: https://host.my.company.net:9443/jts

Step 2: Confirm Public URI

☒ I understand that once the Public URI is set, it cannot be modified except with additional administrative commands and in a limited set of scenarios, which can result in broken links from other applications that do not support changing URLs.

✓ The Public URI root has already been set for this server. Click "Next" to continue.

Restore to Saved

Test Connection

< Back

Next >

Finish




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Rational software

4. On the **Create Administrative User** page:

- Provide information for the administrative user. This is an administrative users for both JTS and ADI application. The ADMIN user account will be automatically disabled after this step. You are required to use this administrative user for future setup. For more information, see [User management](#).
- Click **Next**.

Jazz
TEAM SERVER & APPLICATION EXPRESS SETUP

ADMIN | [Log Out](#)

✓ Click Next to begin the Express Setup.

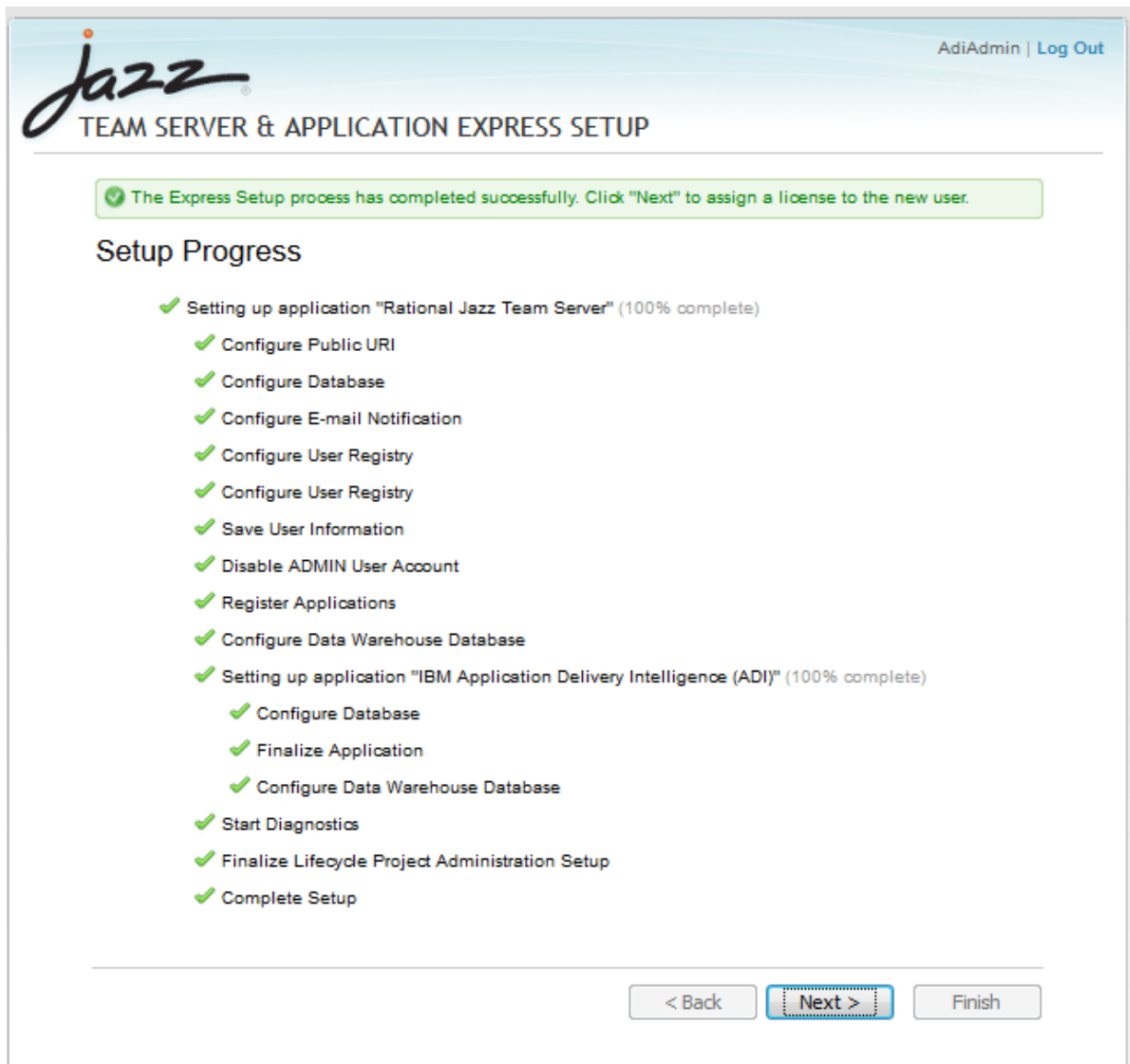
Create Administrative User

To begin, create an administrative user for yourself. Once you have completed the form, click "Next" to start the setup.

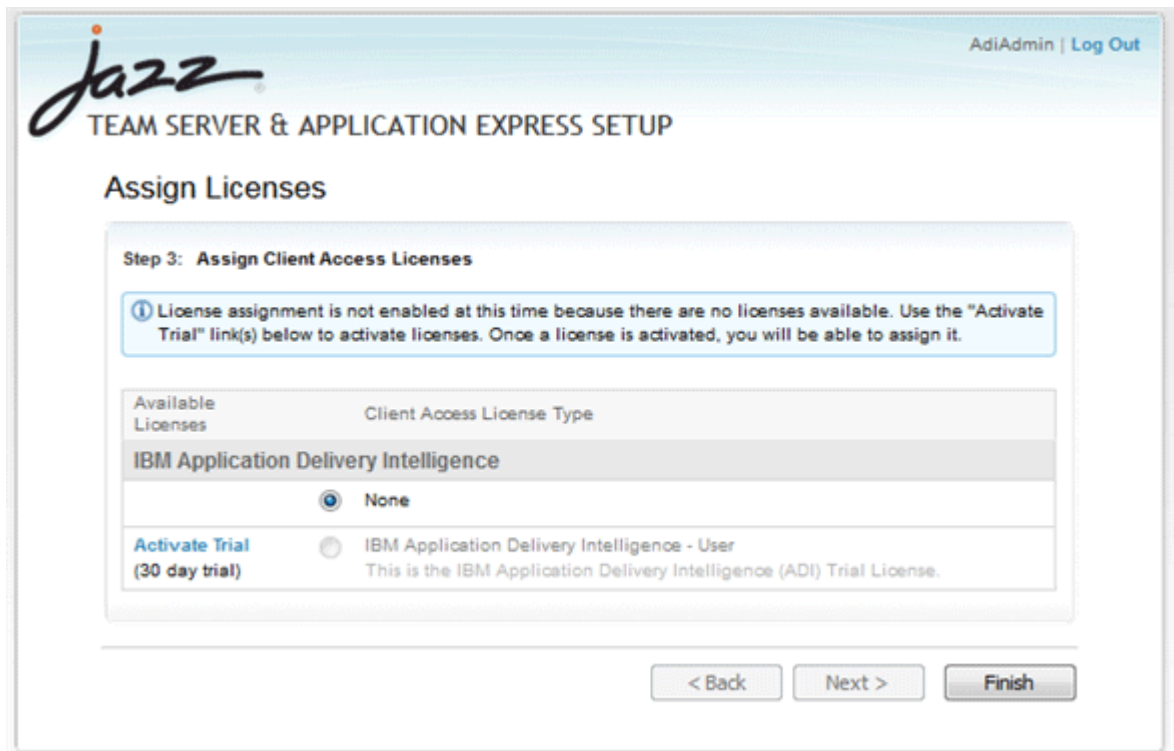
Create an administrative user for yourself in the Jazz Team Server:

Property	Value	Description
User ID	<input type="text" value="AdiAdmin"/>	Your user ID (e.g. 'jsmith')
Name	<input type="text" value="Adi Admin"/>	Your full name (e.g. 'John Smith')
Password	<input type="password" value="••••••••"/>	Enter a secure password.
Re-type Password	<input type="password" value="••••••••"/>	
E-mail Address	<input type="text" value="adiadmin@example.com"/>	Your e-mail address (e.g. 'jsmith@example.com')

- On the **Setup Progress** page, wait until the wizard finishes configuring the installation, and click **Next**.



6. On the **Assign Licenses** page, click **Activate Trial** and accept the **terms of the license**. After you activate the trial, a license will be automatically assigned to the administrator you created previously.



7. Click the **Finish** button to access the Jazz Team Server Administration page where you can perform administrative tasks such as managing the server, users, and licenses. For more information, see [Administering Rational solution for Collaborative Lifecycle Management servers](#).
8. Restart the server by completing the following steps:
 - a. “Shutting down the server” on page 113
 - b. “Starting up the server” on page 106

Note: The ADI license are *authorized licenses*, which are permanent licenses that are assigned to a single user. The ADI license is managed by the Jazz license server. If you purchase activation kits that contain the activation key file, you can import the activation key to the license server. For more information, see [Installing and managing client access license keys](#).

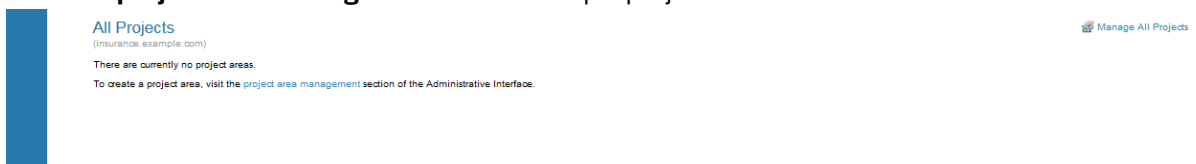
Setting up the ADI application

This topic describes how you set up the ADI after you install ADI by using the web-based express setup.

Before you begin, ensure that the pop-up blocker is disabled for `https://fully_qualified_hostname:9443/adi/web` page.

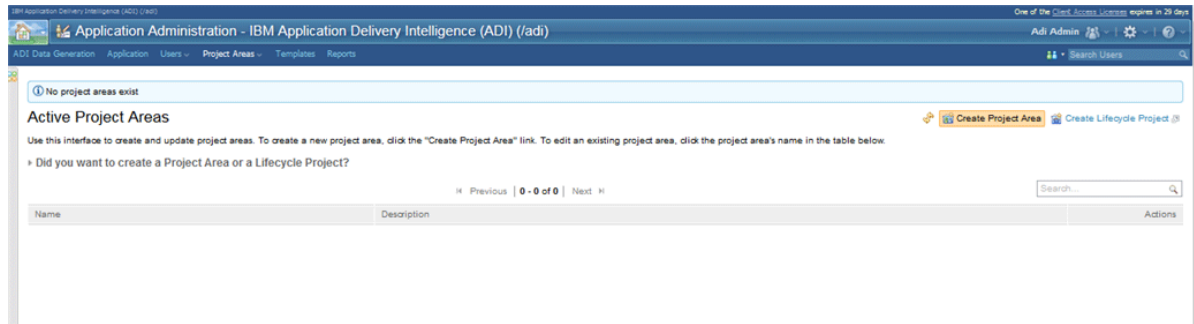
To set up the ADI application, take the following steps:

1. Browse to `https://fully_qualified_hostname:9443/adi/web` to open the ADI application.
2. Optional: Log on with the administrative user name and password that you created during the server configuration.
3. ADI application appears with the **All projects** page. For the first time user, there is no project area. Click the **project area management** link to set up a project area.



4. The application navigates to the **Application Administration - IBM Application Delivery Intelligence (ADI)** page. Use this page to create a project area.

- a. Click the **Create Project Area** link on the top right corner.



- b. Provide a **Name**, **Summary**, and **Description** for the project area.
- c. Select **IBM Application Delivery Intelligence Application Default Process** as process if it is not yet selected.
- d. Assign or create users as members of the project area. For more information, see [“Creating and managing users”](#) on page 150.
- e. Assign or create users as administrators for the project area.
- f. Click **Save** next to the project area name on the top to create the project area.

Note: After you save the project area, a message appears warning you about the members added without roles. You can ignore this warning message because currently no role to members is available.

5. On the upper left corner of window, click the **Home** icon to open the drop-down menu and select **IBM Application Delivery Intelligence (ADI) . My Projects** and **All Projects** appear.
6. Click **All projects**. The project area you previously created appears.
7. Click the project area to open it in your browser and then bookmark the page of your project area as the ADI home page.

Note: After you set up IBM ADDI, you need to restart the server. Otherwise, you will not be able to log in with the correct credentials and IBM ADDI will request you for a re-authentication. When you open the log file (<ADI installation folder>\adi\server\liberty\servers\clm\logs\addi-brd.log), you can see the warning of "Failed authentication with Jazz server".

To restart the server, complete the following steps:

1. Navigate to the <unzipped-adi-installer>/adi/server directory.
2. Shut down the server by running the `server.shutdown` script.
3. Restart the server after the you shut down the server successfully by running the `server.startup` script.

Shutting down the server

After you finish the installation and setup, you can shut down the server.

To shut down the server, complete the following steps:

1. Open terminal/command prompt and navigate to the `unzipped-adi-installer/adi/server` directory by running the following command:

```
cd /unzipped-adi-installer/adi/server
```

2. In the current directory, shut down the server by running the following command:

```
server.shutdown
```


Installing ADI by using web-based custom setup

You can learn how to install ADI by using web-based custom setup and set up the majority of the installation options. If you want to use DB2 database, you should use this method.

The custom setup is recommended for production environments. The wizard guides you through setting up your database, configuring email settings, configuring the user registry, and registering applications. The wizard detects and prompts you to set up the applications you installed.

For more information about the custom setup method, see [Jazz online help](#).

Information required before the installation

You need to get a fully qualified host name and a public URI before you install ADI by using web-based custom setup.

The following information is required before the installation:

- A fully qualified host name
- A public URI

Important: A *fully qualified host name* is the host name along with the DNS domain reference of the machine on which the Jazz Team Server is installed.

- An example of a *fully qualified host name* is `clmwb.example.com`.
- Examples of an **invalid** *fully qualified host name* include `localhost` and an IP address.

For more information about how to plan the server URI, see [Planning your URIs](#)

Creating databases

You need to create databases before you set up ADI application. You can learn more about the default Derby database and how to create DB2 database for use.

If you are running against a database other than the default Derby database, which is included in the installation, you need to create a database before you set up the application. Currently, ADI supports only DB2 database. For more information about setting up the database, see [Jazz online help](#).

To set up the ADI application, you need to create three databases for Jazz Team Server, ADI, and Data Warehouse (DW). Use the parameters that are provided in [Setting up the database](#) for Jazz Team Server and Data Warehouse. Use the same parameter values that are used for Jazz Team Server when you create database for the ADI application.

Derby database

By default, the builds use the Derby database included in the installation, so you do not need to create any database. This option is only available when you install ADI by using the web-based express setup installation.

DB2 database

Review [Prerequisites](#) and make sure that your DB2 database meets the requirements before you continue.

Before you create the DB2 databases for ADI, you must set the `DB2_COMPATIBILITY_VECTOR` registry variable with the following commands. Otherwise, ADI will not be able to perform paged queries correctly and will show error messages in various UI pages.

```
db2set DB2_COMPATIBILITY_VECTOR=MYS
db2stop
db2start
```

Then, you can create the required databases by using the following DB2 commands:


```
db2 create database JTS using codeset UTF-8 territory en PAGESIZE 16384
db2 create database ADI using codeset UTF-8 territory en PAGESIZE 16384
db2 create database DW using codeset UTF-8 territory en PAGESIZE 16384
```

Optional: Data Warehouse that is used for raw data storage can be large. If you plan to perform massive DB2 update transactions on the DW, it is recommended to increase the default sizes of DW transaction logs. You can use the following commands to increase the primary and secondary log sizes.

```
db2 get db cfg for DW
db2 update db cfg for DW using LOGPRIMARY 64

db2 update db cfg for DW using LOGSECOND 192
```

Note: The total number of primary logs plus secondary logs cannot exceed 256. It is also recommended to set larger secondary log sizes since they are constantly cleared by DB2.

For more information about DB2 installation, see [IBM DB2 10.5 for Linux, Unix and Windows documentation](#).

Starting up the server

To install ADI by using web-based custom setup, you need to start up the server first. Unzip the ADI installer package and run commands for the start.

You need to take the following steps to start up the server.

1. Unzip the ADI installer package.
2. Open terminal/command prompt and navigate to the *unzipped-adi-installer/adi/server* directory by running the following command:

```
cd /unzipped-adi-installer/adi/server
```

3. In the current directory, start the server by running the following command:

```
server.startup
```

Note: By default when you start the server, the Jazz server is running in the background. You can check the console.log file to see if the server is running. If you want to start the server in the foreground, you can use "-run" option when you start the server.

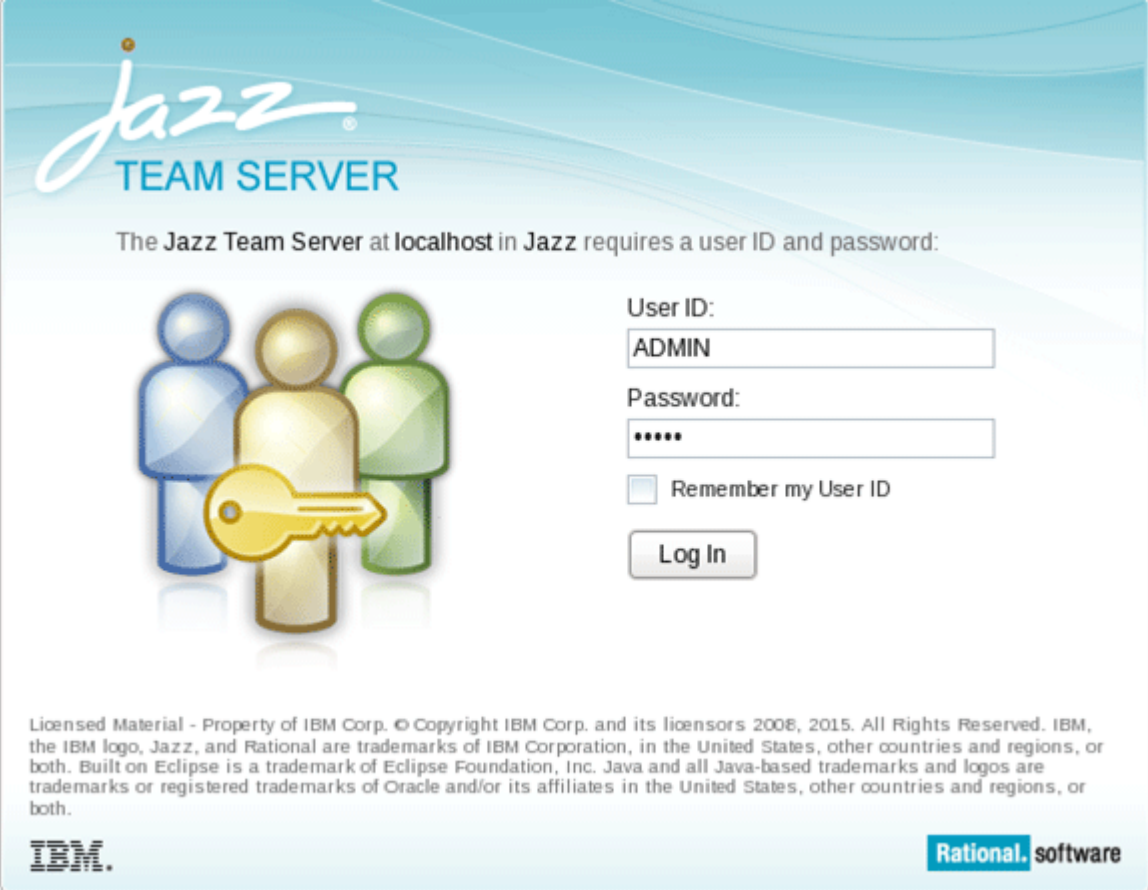
```
server.startup -run
```

Configuring the server

After you start the server, you need to configure the public URI and set up your administrative user. This topic describes how you configure the server when you install ADI by using web-based custom setup.

To configure the server, take the following steps:

1. Open a web browser, go to <https://localhost:9443/jts/setup>, and log on using **ADMIN** as the user ID and **ADMIN** as the password.



The Jazz Team Server login screen features a light blue background with wavy lines. At the top left is the 'jazz TEAM SERVER' logo. Below it, a message states: 'The Jazz Team Server at localhost in Jazz requires a user ID and password:'. To the left of the login fields is an illustration of three stylized human figures (blue, yellow, and green) with a large yellow key in front of them. The login fields include 'User ID:' with a text box containing 'ADMIN', 'Password:' with a masked text box showing six dots, a checkbox for 'Remember my User ID', and a 'Log In' button. At the bottom, there is a small copyright notice and the IBM and Rational software logos.

jazz
TEAM SERVER

The Jazz Team Server at localhost in Jazz requires a user ID and password:

User ID:
ADMIN

Password:
.....

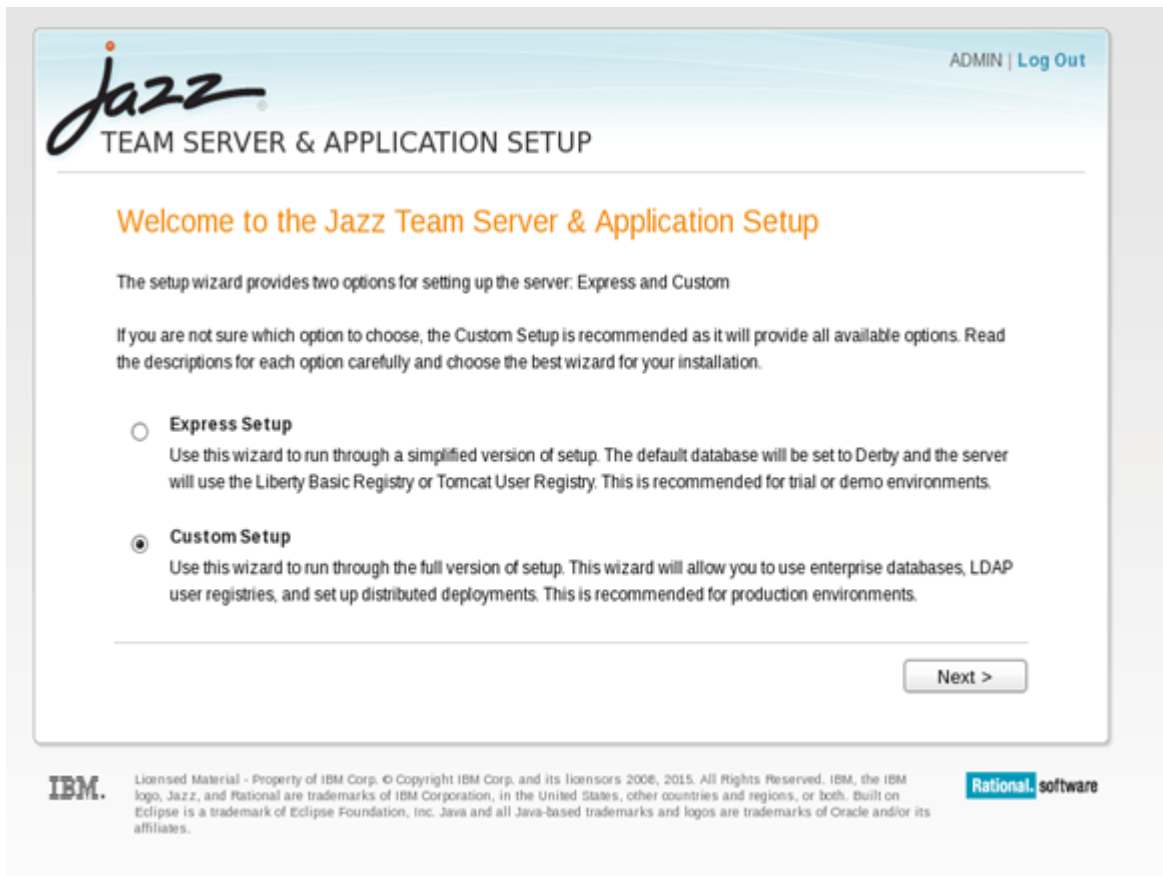
☐ Remember my User ID

Log In

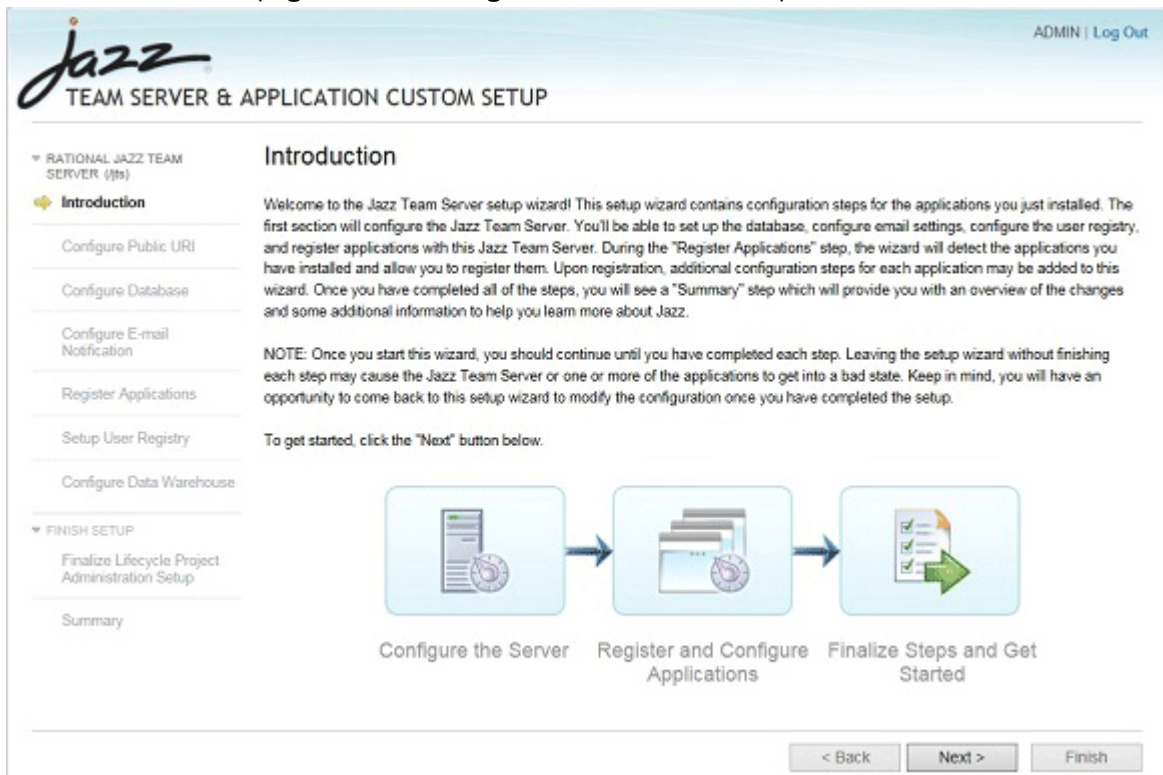
Licensed Material - Property of IBM Corp. © Copyright IBM Corp. and its licensors 2008, 2015. All Rights Reserved. IBM, the IBM logo, Jazz, and Rational are trademarks of IBM Corporation, in the United States, other countries and regions, or both. Built on Eclipse is a trademark of Eclipse Foundation, Inc. Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates in the United States, other countries and regions, or both.

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2. On the welcome page, select the **Custom Setup** option to customize the setup, and click **Next**.



3. On the **Introduction** page, click **Next** to get started with the setup wizard.



4. On the **Configure Public URI** page:

- a. Provide a Public URI in the format of `https://fully_qualified_hostname:9443/jts/`. For example, `https://example.com:9443/jts/`.
- b. Check to confirm that when the Public URI is set it cannot be modified.
- c. Click **Test Connection** to test the connection to the server. If the test is successful, click **Next**.

Note: For more information about URIs, see [Planning URIs](#).

JAZZ
TEAM SERVER & APPLICATION CUSTOM SETUP

ADMIN | Log Out

RATIONAL JAZZ TEAM SERVER (/jts)

Introduction

Configure Public URI

Configure Database

Configure E-mail Notification

Register Applications

Setup User Registry

Configure Data Warehouse

FINISH SETUP

The configuration test succeeded. Click Next to save the settings and continue.

Configure Public URI

The Public URI is the root URL prefix for the URLs of all stored artifacts. This Jazz Team Server generates absolute URLs to resources used in stored artifacts, references between related artifacts, in mail notifications, feeds, for copying to the system clipboard, for Web access and for stable resource identification across all applications.

These generated URIs generally must be navigable from any network location from which a user or another application will be accessing the system. Once data is created and stored, these URLs will become persistent within the server. In a limited set of scenarios, the server URL can be changed later via administrative Server Rename commands which preserve internal consistency, but this is a potentially disruptive action given it may be difficult or impossible to correct the stored links into the server from all other applications and systems. Therefore it is important that you choose a public URI that is fully qualified, and likely to remain stable over time. For additional help, please see the [Planning your URIs](#) topic, contact IBM Support, or get help at the [Jazz.net](#) community site.

Configure this value in the following format: "https://<public_hostname><port>/<context>"

Step 1: Configure Public URI

Property	Current Value
Public URI	https://example.com:9443/jts Example: https://host.my.company.net:9443/jts

Step 2: Confirm Public URI

☒ I understand that once the Public URI is set, it cannot be modified except with additional administrative commands and in a limited set of scenarios, which can result in broken links from other applications that do not support changing URLs.

The configuration test succeeded. Click Next to save the settings and continue.

Restore to Saved Test Connection

< Back Next > Finish

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5. On the **Configure Database** page, provide information to set up a connection to the Jazz Team Server database.
 - a. Select the database vendor and connection type. ADI currently supports only DB2 as a database vendor and JDBC as a connection type.
 - b. Configure the database connection properties.
 - 1) Insert the password of the JDBC database, that is, the password of your DB2 database.
 - 2) Provide the JDBC location in the following format.


```
//server where your DB2 is installed:50000/JTS:user=Your DB2 user;password={password};
```
 - c. Click the **Test Connection**. You receive a message that the database exists but is not configured to contain Jazz.
 - d. Click the **Create Tables**, and wait several minutes for the command processing. When the processing is complete, click **Next**.

Register Applications
Setup User Registry
Configure Data Warehouse
FINISH SETUP

Step 1: Configure Database Vendor and Connection Type

Database Vendor: DB2
Connection Type: JDBC

Step 2: Configure Database Connection Properties

Property	Current Value
JDBC Password The password of the JDBC database. This value will be substituted into the JDBC location value where {password} is found.	<input type="password"/> Default Value: none
JDBC Location The location of the JDBC database. If the location will contain the password, use the value {password} instead of the actual password.	<input type="text" value="jdbc:db2://localhost:50000;user=db2inst1;password={password}"/> Example: jdbc:db2://localhost:50000;user=db2inst1;password={password} Default Value: none

Step 3: Create Database Tables

The specified database exists but there are no Jazz tables present. Please click the "Create Tables" button below to create the required tables. Table creation may take a few minutes.

Create Tables

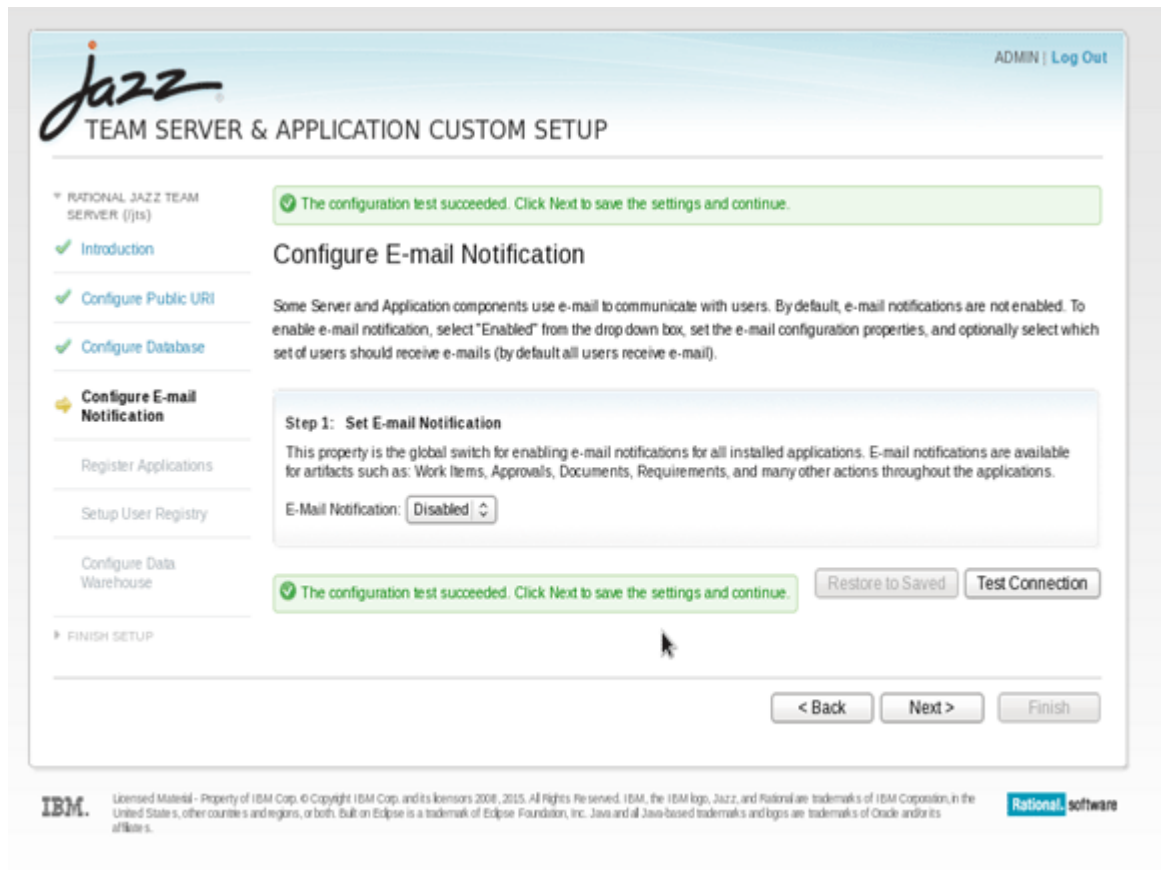
The database exists, but is not configured to contain Jazz. Use the "Create Tables" button in Step 3 to configure the database for Jazz. ID: CRJAZ15671

Restore to Saved Test Connection

< Back Next > Finish

6. On the **Enable E-mail Notification** page, disable email notifications and click **Next**.

Note: There is no email notification capabilities in the current version of ADI.



7. On the **Register Applications** page, the wizard detects the applications that were installed along with the Jazz Team Server. When the wizard detects the application, click **Register Applications**, and then click **Next**.

✓ Applications were successfully registered with this Jazz Team Server. Click Next to continue.

Register Applications

Use this step to register installed applications with the Jazz Team Server. For installations where all applications are on the same host, you can accept the defaults and continue.

Step 1: Verify and Update Discovered Applications

The following applications were detected on the local file system. The Application Instance name will appear in the user interface. An instance name proposal was generated based on the context root of the application. You can edit the proposal. The name should be unique on this Jazz Team Server and meaningful within your organization. The Discovery URL has been defaulted based on the public URI of this server and the context root of the application. A default functional user ID has been computed for each application. Associating a functional user ID allows applications to make requests within background activities, such as sending e-mail notifications, without user intervention. You can manually add a new application (for example, an application installed on a remote server), or choose not to register an application by clicking the "X" icon. To add a new application enter its Discovery URL, which is usually in the following form, `https://hostname.domain:port/contextRoot/scr`, for example `https://myserver.ibm.com:9443/qm/scr`.

Application Instance	Application Type	Discovery URL	Functional User ID
✓ /adi	IBM Application Delivery Intelligence (ADI)	<code>https://localhost:9443/adi/scr</code>	adi_user ✕

Add Application...

Step 2: Register Applications

Once you have verified the applications and their URLs in the previous step, you should register the applications with this Jazz Team Server. As part of the registration process, the server will attempt to contact each application and send configuration data to it. This operation may take a few minutes to complete.

Register Applications

✓ Registration Complete

8. On the **Create Administrative User** page:

- Choose one of the options for your user registry. Jazz Team Server relies on a user registry to provide basic information about users and groups. For more information, see [User management](#). Currently, ADI supports only IBM® WebSphere® Application Server Liberty Core. You can manage WebSphere Liberty server users by using the default basic user registry or Lightweight Directory Access Protocol (LDAP). If you need more information to create an LDAP connection, refer to this [guide](#).

Property	Value	Description
User ID	<input type="text" value="user"/>	Your user ID (e.g. 'jsmith')
Name	<input type="text" value="user"/>	Your full name (e.g. 'John Smith')
Password	<input type="password" value="...."/>	Enter a secure password.
Re-type Password	<input type="password" value="...."/>	Re-type your password to help prevent typos.
E-mail Address	<input type="text" value="user@mail.com"/>	Your e-mail address (e.g. 'jsmith@example.com')

The default ADMIN user is defined in Jazz to allow you to log into a new server, configure the server, and create an initial JazzAdmins user. For enhanced server security we recommend that you disable default ADMIN access at this time.

☒ Disable default ADMIN access

- Click **Activate Trial** and accept **the terms of the license**.
 - Click **Next**.
9. On the **Configure Data Warehouse** page, provide information to set up a connection to the Data Warehouse database. If you use Derby database, you do not need to change the default values, and you are not prompted to create database tables.
- Select the database vendor and connection type. ADI currently supports only DB2 as a database vendor and JDBC as a connection type.

- Insert the password of your DB2 database.
- Provide the JDBC location in the following format.

```
//server where your DB2 is installed:50000/DW:user=Your DB2 user;password={password};
```

Configure Data Warehouse

The data warehouse is a database used for reporting and analytics. By default, this is a pre-configured database using a JDBC connection. You can either keep this default or choose a different database vendor and/or connection type. If you change the default, you may need to configure some additional properties. Also if you change the default, use the "Test Connection" button to verify that the server can successfully communicate with the database using the connection information you provided. Cognos Business Intelligence does not support Derby, if you plan on using Cognos Business Intelligence for reporting, please select an enterprise database vendor.

☐ I do not wish to configure the data warehouse at this time.

Step 1: Configure Data Warehouse Database Vendor and Connection Type

Database Vendor:

Connection Type:

Step 2: Configure Data Warehouse Database Connection Properties

Property	Current Value	Default Value
JDBC Password The password of the JDBC database. This value will be substituted into the JDBC location value where {password} is found.	<input type="password" value=""/>	none
JDBC Location The location of the JDBC database. Use the value {password} instead of the actual password.	<input type="text" value="//localhost:50000/DW:user=db2inst1,password={password};"/> Example: //localhost:50000/JAZZ:user=db2inst1,password={password};	none
Temporary Table Space The name of the temporary table space. Keep blank for using the default name.	<input type="text" value=""/>	none
Database Table Space Folder The folder on the database.	<input type="text" value=""/>	

- Click **Test Connection**. You receive a message that the database exists but it's not configured to contain the data warehouse.
 - Click the **Create Tables**, and wait several minutes for the command processing. When the processing is complete, click **Next**.
10. On the **Configure Data Warehouse** page, provide information to set up a connection to the ADI Database. If you uses the Derby database, you do not need to change the default values, and you are not prompted to create database tables.
- Select the database vendor and connection type. ADI currently supports only DB2 as a database vendor and JDBC as a connection type.
 - Insert the password of your DB2 database.
 - Provide the JDBC location in the following format.

```
//server where your DB2 is installed:50000/ADI:user=Your DB2 user;password={password};
```


Database tables created successfully. Click Next to continue.

Configure Database

By default, this application includes a pre-configured database using a JDBC connection. You can either keep this default or choose a different database vendor and/or connection type. If you change the default, you may need to configure some additional properties. Also use the "Test Connection" button to verify that the application can successfully communicate with the database using the connection information you provided.

Step 1: Configure Database Vendor and Connection Type

Database Vendor:
 Connection Type:

Step 2: Configure Database Connection Properties

Property	Current Value
JDBC Password The password of the JDBC database. This value will be substituted into the JDBC location value where {password} is found.	<input type="password" value="*****"/> Default Value none
JDBC Location The location of the JDBC database. If the location will contain the password, use the value {password} instead of the actual password.	<input type="text" value="//localhost:50000/ADI:user=db2inst1,password={password}"/> Example: //localhost:50000/JTS:user=db2inst1,password={password} Default Value none

- Click **Test Connection**. You receive a message that the database exists, but it is not configured to contain Jazz.
 - Click **Create Tables**, and wait several minutes for the command to finish. When the command finishes, click **Next**.
 - On the **Finalize Application** page, click **Finalize Application Setup**.
 - When it finishes, click **Next**.
- On the **Configure Data Warehouse** page, the wizard remembers the configuration.
 - Provide the DB2 password that you use for the DW database.
 - Click **Test Connection**.
 - Ignore the warning that you receive and click **Next**.
 - On the **Finalize Lifecycle Project Administration Setup** page, click **Finalize Application Setup**.
 - When it finishes, click **Next**.
 - On the **Summary** page, view the summary of all your configurations. Click **Finish** to access the Jazz Team Server Administration page where you can perform administration tasks such as managing the server, users, and licenses. For more information, see [Administering Rational solution for Collaborative Lifecycle Management servers](#).
 - Restart the server by completing the following steps:
 - "Shutting down the server" on page 125
 - "Starting up the server" on page 115

Note: The ADI license are *authorized licenses*, which are permanent licenses that are assigned to a single user. The ADI license is managed by the Jazz license server. If you purchase activation kits that contain the activation key file, you can import the activation key to the license server. For more information, see [Installing and managing client access license keys](#).

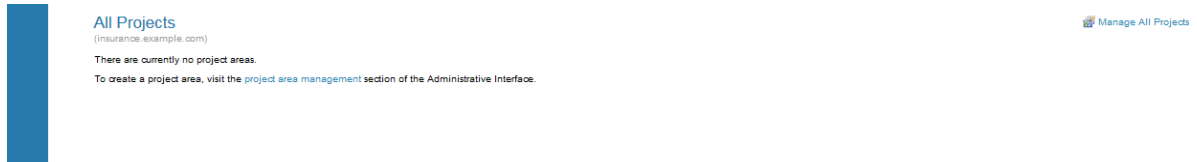
Setting up ADI application

This topic describes how you set up the IBM Application Delivery Intelligence for IBM Z (IBM ADI) application by using web-based custom setup.

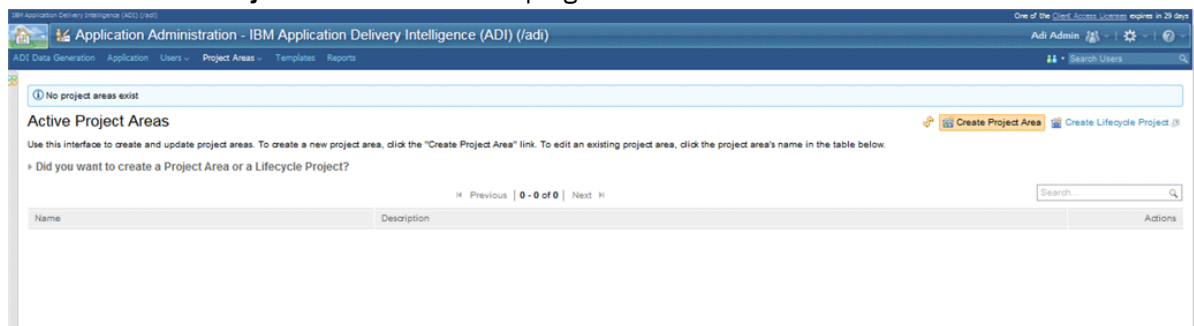
Before you begin, ensure that the pop-up blocker is disabled for `https://fully_qualified_hostname:9443/adi/web` page.

To set up ADI application, take the following steps:

1. Browse to `https://fully_qualified_hostname:9443/adi/web` to open the ADI application.
2. Optional: Log on with the administrative user name and password that you created during the server configuration.
3. ADI application appears with the **All projects** page. For the first time user, there is no project area. Click the **project area management** link to set up a project area.



4. The application navigates to the **Application Administration - IBM Application Delivery Intelligence (ADI)** page. Use this page to create a project area.
 - a. Click the **Create Project Area** link on the top right corner.



- b. Provide a **Name**, **Summary**, and **Description** for the project area.
- c. Select **IBM Application Delivery Intelligence Application Default Process** as process if it is not yet selected.
- d. Assign or create users as members of the project area. For more information, see [“Creating and managing users”](#) on page 150.
- e. Assign or create users as administrators for the project area.
- f. Click **Save** next to the project area name on the top to create the project area.

Note: After you save the project area, a message appears warning you about the members added without roles. You can ignore this warning message because currently no role to members is available.

5. On the upper left corner of window, click the **Home** icon to open the drop-down menu and select **IBM Application Delivery Intelligence (ADI) . My Projects** and **All Projects** appear.
6. Click **All projects**. The project area you previously created appears.
7. Click the project area to open it in your browser and then bookmark the page of your project area as the ADI home page.

Note: After you set up IBM ADDI, you need to restart the server. Otherwise, you will not be able to log in with the correct credentials and IBM ADDI will request you for a re-authentication. When you open the log file (`<ADI installation folder>\adi\server\liberty\servers\clm\logs\addi-brd.log`), you can see the warning of "Failed authentication with Jazz server".

To restart the server, complete the following steps:

1. Navigate to the `<unzipped-adi-installer>/adi/server` directory.
2. Shut down the server by running the `server.shutdown` script.
3. Restart the server after the you shut down the server successfully by running the `server.startup` script.

Shutting down the server

After you finish the installation and setup, you can shut down the server.

To shut down the server, complete the following steps:

1. Open terminal/command prompt and navigate to the `unzipped-adi-installer/adi/server` directory by running the following command:

```
cd /unzipped-adi-installer/adi/server
```

2. In the current directory, shut down the server by running the following command:

```
server.shutdown
```

Installing ADI by using the repotools command

You can learn how to install and set up ADI by using the repotools command. This method sets up the Derby database by default. In this case, you cannot use any other data bases. You can use a repotools command to play back setup options with a pre-packed response file which enables you to set up everything from the command shell. The information that you provide by using repotools command is the same as for the web-based express setup.

Starting up the server

To install ADI by using repotools command, you need to start up the server first. Unzip the ADI installer package and run commands for the start.

You need to take the following steps to start up the server.

1. Unzip the ADI installer package.
2. Open terminal/command prompt and navigate to the `unzipped-adi-installer/adi/server` directory by running the following command:

```
cd /unzipped-adi-installer/adi/server
```

3. In the current directory, start the server by running the following command:

```
server.startup
```

Note: By default when you start the server, the Jazz server is running in the background. You can check the `console.log` file to see if the server is running. If you want to start the server in the foreground, you can use `"-run"` option when you start the server.

```
server.startup -run
```

Running the response file

You need to run the response file before you can successfully install ADI by using repotools command.

To run the response file, take the following steps:

1. Use a command shell to change the directory to `unzipped-adi-installer/server` directory where you can find the response file.
2. Run the following command:

```
repotools-jts -setup repositoryURL=https://server-address:9443/jts adminUserID=ADMIN  
adminPassword=ADMIN parametersFile=./adi-response.properties prompt=missing
```

Note: Replace the *server-address* with a fully qualified server machine name.

3. To see the default values setting in the response file, you can find it in */unzipped-adi-installer/adi/server/adi-response.properties*.
4. During the setup, you are prompted to provide the following information.
 - The repository URL from above again. It might theoretically be different if you are using aliases or proxies.
 - The user name, password, and email address of the admin user you want to create.
 - The license. Select licence 2.
5. When you complete, the command line shows a message to indicate the successful installation.
6. Restart the server by completing the following steps:
 - a. [“Shutting down the server” on page 127](#)
 - b. [“Starting up the server” on page 125](#)

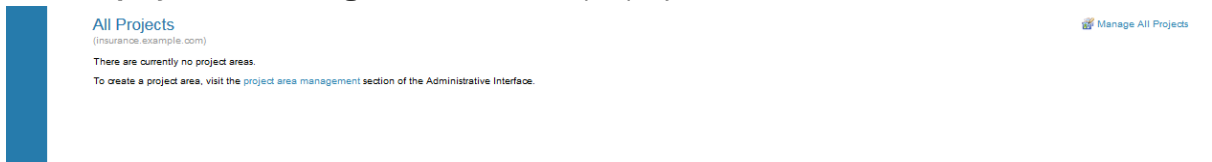
Setting up ADI application

This topic describes how you set up the IBM Application Delivery Intelligence for IBM Z (IBM ADI) application after you install ADI by using the repotools command.

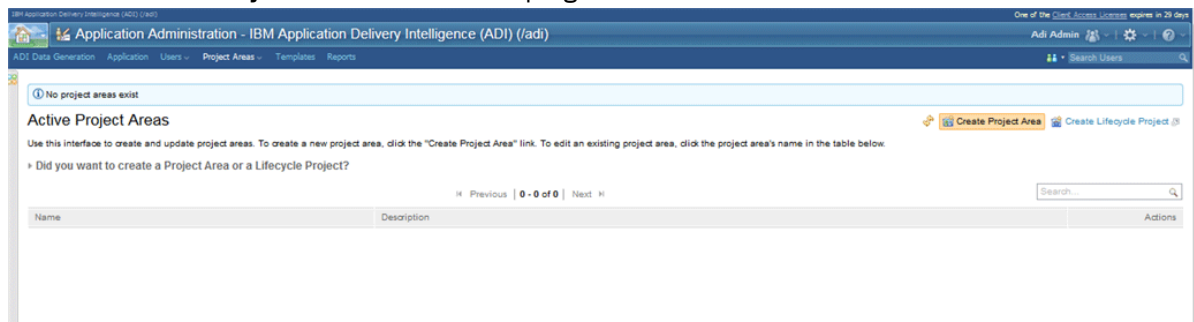
Before you begin, ensure that the pop-up blocker is disabled for https://fully_qualified_hostname:9443/adi/web page.

To set up the ADI application, take the following steps:

1. Browse to https://fully_qualified_hostname:9443/adi/web to open the ADI application.
2. Optional: Log on with the administrative user name and password that you created during the server configuration.
3. ADI application appears with the **All projects** page. For the first time user, there is no project area. Click the **project area management** link to set up a project area.



4. The application navigates to the **Application Administration - IBM Application Delivery Intelligence (ADI)** page. Use this page to create a project area.
 - a. Click the **Create Project Area** link on the top right corner.



- b. Provide a **Name**, **Summary**, and **Description** for the project area.
 - c. Select **IBM Application Delivery Intelligence Application Default Process** as process if it is not yet selected.

- d. Assign or create users as member of the project area. For more information, see [“Creating and managing users”](#) on page 150.
- e. Assign or create users as administrators for the project area.
- f. Click **Save** next to the project area name on the top to create the project area.

Note: After you save the project area, a message appears warning you about the members added without roles. You can ignore this warning message because currently no role to members is available.

5. On the upper left corner of window, click the **Home** icon to open the drop-down menu and select **IBM Application Delivery Intelligence (ADI)** . **My Projects** and **All Projects** appear.
6. Click **All projects**. The project area you previously created appears.
7. Click the project area to open it in your browser and then bookmark the page of your project area as the ADI home page.

Note: After you set up IBM ADDI, you need to restart the server. Otherwise, you will not be able to log in with the correct credentials and IBM ADDI will request you for a re-authentication. When you open the log file (*<ADI installation folder>\adi\server\liberty\servers\clm\logs\addi-brd.log*), you can see the warning of "Failed authentication with Jazz server".

To restart the server, complete the following steps:

1. Navigate to the *<unzipped-adi-installer>/adi/server* directory.
2. Shut down the server by running the `server.shutdown` script.
3. Restart the server after the you shut down the server successfully by running the `server.startup` script.

Shutting down the server

After you finish the installation and setup, you can shut down the server.

To shut down the server, complete the following steps:

1. Open terminal/command prompt and navigate to the *unzipped-adi-installer/adi/server* directory by running the following command:

```
cd /unzipped-adi-installer/adi/server
```

2. In the current directory, shut down the server by running the following command:

```
server.shutdown
```

Installing ADI into an existing CLM installation

You can find a roadmap for co-installing ADI with an existing IBM Rational Collaborative Lifecycle Management (CLM) solution, such as an existing Jazz Team Server (JTS) and IBM Rational Team Concert (RTC).

Before you begin

Check out the prerequisites before you install ADI into an existing CLM installation.

- ADI is implemented as a Jazz application so it can be co-installed in the same way as any other Jazz application, such as RTC or Doors Next Generation. For the Jazz Deployment guidelines and the proposed deployment topologies, see [Jazz Deployment Guide](#).
- Decide on the topology that you want to implement. The main decision is to co-install on the same server machine as the JTS or to install it on a separate server machine. The following instructions cover both scenarios.
- The versions of the CLM solution and ADI must match. ADI can be co-installed only with CLM 6.0.2 or later version.

- These instructions work only for a new installation of ADI. If you use a stand-alone version of ADI, you cannot currently move that into the configuration as described in the “Procedures” on page 128. Because the ADI application must remain with the JTS for which it was originally installed. However, those instructions work with an existing installation of CLM and a fresh install when the versions match as listed previously. Another possibility is to install CLM applications such as RTC into an existing ADI installation, that is, the JTS provided with ADI. In that case, review the CLM online help instructions about adding CLM applications to an existing JTS for more information.

Procedures

After you verify the prerequisites, you can complete steps to install ADI into a CLM installation depending on which application server you are using for your CLM environment.

Installing CLM

1. Use Installation Manager to install CLM 6.0.2 or a later version. If you have installed and set up CLM (perhaps it is a CLM already in use), jump ahead to following section of "Install the ADI application into IBM WebSphere Liberty Profile". and "Installing the ADI application into IBM WebSphere Application Server".
 - For details, see [Installing the Rational solution for Collaborative Lifecycle Management by using IBM Installation Manager](#) in the CLM Online help.
2. Run the setup for CLM installation.
 - For information on installing CLM, see [CLM Interactive Installation Guide](#).

Java Security Configuration for CLM version 6.0.4 or earlier

If you install a Java version after April 2017 and use it to run Jazz Team Server, then you must perform the following Java security configuration for CLM version 6.0.4 or earlier versions.

1. Open the `java.security` configuration file in a text editor. You can find the file in `JDK Installed Directory\jre\lib\security\java.security`.
2. Change the following line

```
jdk.jar.disabledAlgorithms=MD2, MD5, RSA keySize < 1024
```

to

```
jdk.jar.disabledAlgorithms=MD2, RSA keySize < 1024
```

3. Restart your Jazz Team Server.

Installing the ADI application into IBM WebSphere Liberty Profile

You can install ADI together with JTS installed on the same server machine and in the same installation directory. In this case, ADI runs on the same Liberty application server as CLM and has the same base URL as the JTS and the other locally running applications. As an alternative that offers more scalability, you can install ADI on a different server machine. In this case, ADI has a different base URL than the JTS. Other CLM applications will then most likely also be running on a different server. For details and how you can use a proxy server to unify URLs, see the CLM Online help and Deployment Guides mentioned previously.

Setting up a database

If you use DB2 for your CLM databases, then you need to create the ADI database in the existing DB2. You do not need to create JTS and DW database since they were created during the CLM's setup. For more information, see [Installing ADI by using web-based custom Setup](#).

Alternative 1: Installing ADI on the same server machine

Prerequisite: Assumption is that the CLM server is set up and fully functional. The installation machine has at least the JTS setup and zero or more applications such as RTC. The CLM installation directory is referred to as *clm_install*.

1. Stop the CLM server with the following commands.

```
cd clm_install/JazzTeamServer/server
server.shutdown
```

Note: If the Jazz server is running in the background, you can check the console.log file to see if the Jazz server is running.

2. Extract the ADI distribution in a temporary directory referred to as *adi_unzip* below.
3. Merge some of the ADI installation files into the JTS installation by copying (only) the following files and directories from the *adi_unzip* directory into the corresponding *clm_install* directory.

Table 1. Files and directories involved in merging ADI installation into JTS installation	
Copy from <i>adi_unzip/adi/</i>	To <i>clm_install/JazzTeamServer/</i>
cobol-coverage	(copy the entire folder into JazzTeamServer folder)
license/adi	license/
java-coverage	(copy the entire folder into JazzTeamServer folder)
repotools/adi	repotools
server/conf/adi	server/conf/
server/conf/jts/sites/ com.ibm.dimez.dashboard.activation.updatesite	server/conf/jts/sites
server/conf/jts/provision_profiles/dimez- product-activation.ini	server/conf/jts/provision_profiles/
server/headless-CC	server/
server/liberty/clmServerTemplate/apps/adi.war	server/liberty/servers/clm/apps/
server/liberty/clmServerTemplate/apps/ adihelp.war	server/liberty/servers/clm/apps/
server/liberty/clmServerTemplate/apps/ adi.war.zip	server/liberty/servers/clm/apps/
server/liberty/clmServerTemplate/apps/ adihelp.war.zip	server/liberty/servers/clm/apps/
server/codecov.shutdown.*	server/
server/codecov.startup.*	server/
server/repotools-adi.*	server/
server/server.shutdown.*	server/ (replacing the existing file; do file merge to be sure)
server/server.startup.*	server/ (replacing the existing file; do file merge to be sure)
swidtag/ ibm.com_IBM_Application_Delivery_Intelligence -5.0.3.swidtag	swidtag/

Note: If you are installing CLM and ADI at the same time and have not set it up yet, then the `clm_install/server/liberty/servers` directory does not exist, yet. In that case copy the files to `clm_install/server/liberty/clmServerTemplate`. Also, for the following step use the template path for editing the file. All template files will be copied to `liberty/server/clm` the first time the server starts.

4. Open the file `clm_install/server/liberty/servers/clm/conf/application.xml` in a text editor. Add the following lines at the end, but before this line: `</server>`

```
<application type="war" id="adi" name="adi" location="${server.config.dir}/apps/adi.war"></application>
<application type="war" id="adihelp" name="adihelp" location="${server.config.dir}/apps/adihelp.war"></application>
```

5. Start the CLM server again. Continue with the step of "Registering ADI with JTS".

Alternative 2: Installing ADI on a different server machine

Prerequisite: Assumption is that the CLM server is set up and fully functional. It is running on a different machine than where you want to install ADI. For this installation option, you don't need to shut down the JTS server.

1. Extract the ADI distribution into the directory where you want it installed (for example, `/opt/ibm/adi` on Linux or `C:\ibm\adi` on Windows). The location will be referred to as `adi_unzip` below.
2. Execute this command to deploy the Liberty server inside the installation directory:

```
cd adi_unzip/adi/server
server.startup -create
```

3. Delete the following files and directories in `adi_unzip/adi` to remove the JTS from this installation so that you can use the existing JTS running on that other machine:
 - `/server/conf/jts`
 - `/server/liberty/servers/clm/apps/clm*`
 - `/server/liberty/servers/clm/apps/jts*`
4. Start the ADI server with the following commands.

```
cd unzipped-adi-installer/server
server.startup
```

Note: By default when you start the server, the Jazz server is running in the background. You can check the `console.log` file to see if the server is running. If you want to start the server in the foreground, you can use `-run` option when you start the server.

```
server.startup -run
```

5. Continue with the following step of "Registering ADI with JTS".

Installing the ADI application into IBM WebSphere Application Server

By default, the CLM applications are pre-configured to use IBM WebSphere Liberty. If you have set up IBM WebSphere Application Server instead of using Liberty to deploy CLM web applications, follow the instructions in this section. You can install ADI together with JTS that is installed on the same WebSphere Application Server machine and in the same installation directory. In this case, ADI runs on the same WebSphere Application Server as CLM and has the same base URL as the JTS and the other locally running applications.

Setting up a database

If you use DB2 for your CLM databases, then you need to create the ADI database in the existing DB2. You do not need to create JTS and DW database since they were created during the CLM's setup. For more information, see [Installing ADI by using web-based custom Setup](#).

Installing ADI on WebSphere Application Server

Prerequisite:

- Assumption is that the WebSphere Application Server is installed and started. It has been set up appropriately to deploy CLM applications war files. For more information, see the instructions on CLM Online help: [Setting up WebSphere Application Server](#).
- You have the WebSphere administrative user name and password.
- Verify that JAZZ_HOME, a system property that specifies where to find certain configuration files has been added correctly to WebSphere Application Server. This property uses a URL rather than a simple path, so specify the value as a file-style URL: `file:///clm_install/JazzTeamServer/server/conf`. This can be verified under **Java Virtual Machine > Additional Properties**, click **Custom properties**. Ensure Jazz Team Server application is installed and started on the WebSphere Application Server.
- Jazz Team Server application has been updated to map security roles to users or repository groups.
- The database is created. If you use the default Derby database for evaluation purposes, ensure the location to the database in the `teamserver.properties` file is an absolute path.

The WebSphere Application Server profile directory into which the CLM applications (including JTS) are installed is referred to as *was_profiledir*. The CLM installation directory is referred to as *clm_install..*

1. Stop the WebSphere Application Server with the following commands.

```
cd was_profiledir/bin
stopServer
```

2. Extract the ADI distribution in a temporary directory referred to as *adi_unzip* below.
3. Merge some of the ADI installation files into the JTS installation by copying (only) the following files and directories from the *adi_unzip* directory into the corresponding *clm_install* directory.

Table 2. Files and directories involved in merging ADI installation into JTS installation	
Copy from <i>adi_unzip/adi/</i>	To <i>clm_install/JazzTeamServer/</i>
cobol-coverage	(copy the entire folder into JazzTeamServer folder)
license/adi	license/
java-coverage	(copy the entire folder into JazzTeamServer folder)
repotools/adi	repostools
server/conf/adi	server/conf/
server/conf/jts/sites/ com.ibm.dimez.dashboard.activation.updatesite	server/conf/jts/sites
server/conf/jts/provision_profiles/dimez- product-activation.ini	server/conf/jts/provision_profiles/
server/headless-CC	server/
server/liberty/clmServerTemplate/apps/ adi.war.zip	server/webapps/
server/liberty/clmServerTemplate/apps/ adihelp.war.zip	server/webapps/
server/codecov.shutdown.*	server/
server/codecov.startup.*	server/

Table 2. Files and directories involved in merging ADI installation into JTS installation (continued)	
Copy from <i>adi_unzip/adi/</i>	To <i>clm_install/JazzTeamServer/</i>
server/repotools-adi.*	server/
swidtag/ ibm.com_IBM_Application_Delivery_Intelligenc e-5.0.3.swidtag	swidtag/

4. Rename the ADI application zip files in *clm_install/JazzTeamServer/server/webapps/* from *adi.war.zip* and *adihelp.war.zip* to *adi.war* and *adihelp.war* respectively.
5. Start the WebSphere Application Server again by running the following commands.

```
cd was_profiledir/bin
startServer
```

6. Open a browser and log in to WebSphere Integrated Solutions Console at <https://hostname.example.com:9043/ibm/console/logon.jsp>.
7. Click **Applications > New Application > New Enterprise Application**.
8. On the **Path to the new application** page, select **Remote file system**.
9. Browse the *adi.war* file in *clm_install* directory and click **Next**.
10. Select **Fast Path** and click **Next**.
11. Click **Next** to accept all default options until you reach the **Map context roots for web modules** page.
12. In the Map context roots for web modules, set **Context Root** to */adi*.
13. Click **Finish**.
14. Verify that your application was installed correctly and then click **Save** directly to the master configuration.
15. In WebSphere Integrated Solutions Console, click **Applications > Application Types > WebSphere enterprise applications**.
16. Select the check box next to *adi_war*, and then click **Start**. A green arrow appears that indicates the application is successfully started.
17. Repeat the preceding steps to deploy and start *adihelp.war* application. Note, in the Map context roots for web modules, set **Context Root** to */adihelp*.
18. Continue with the step of "Registering ADI with JTS".

Registering ADI with JTS

After you install ADI, you still need to register it with the JTS. If you install CLM and ADI fresh together at the same time, then the registration step will be part of the regular *jts/setup*. In the following, it is assumed that CLM was already set up and you are adding ADI to that setup after the fact.

1. As a Jazz administrator, navigate to the JTS home page either through the Home menu of any application or by going to the URL: <https://server:port/jts/admin>.
2. Click the **Server** tab and select the **Registered Application** menu. A list of applications that are already registered with this JTS appears, among which ADI hasn't included yet.
3. Determine the root services URL for your ADI application:
 - a. In case that you co-installed ADI on the same server machine and directory as you do with JTS, the URLs will have the same machine name and port as the JTS URL. For example, if your JTS URL is <https://server.sample.org:9443/jts> then the ADI root services URL will be <https://server.sample.org:9443/adi/scr>.
 - b. In case you installed ADI on another machine, then the URL will be based on that other machine's hostname. For example, the JTS URL could be <https://server01.sample.org:9443/jts> then the ADI root services URL could be <https://server02.sample.org:9443/adi/scr>.

4. In the **Registered Application** admin page, click **Add**.
5. Under **Discovery URL**, fill in the URL you specified in Step 3 and click **Tab** on your keyboard. The dialog immediately tells you that it is verifying the URL you type, which can take a moment. If the verification succeeds, the dialog updates. If you received an error message, you most likely typed the URL wrong or you installed ADI on another machine.
6. Fill in the application name, for example, /adi to be consistent with the other apps. Fill in a Consumer Secret twice to confirm the password that applications use to authenticate their communications with each other. Keep all other fields as suggested by the dialog.
7. Click **Finish**. When the dialog closes, you see a green status message at the top. Click **Application Setup Wizard** in that message to continue. This leads you to the page `https://server:port/adi/customSetup`.
8. Walk through the setup wizard as instructed.
 - a. If you configured a DB2 database for ADI then specify its details in the **Configure Database** step.
 - b. In the **Configure Data Warehouse** step, you must configure the same warehouse database as the JTS. If you do not have the connection details and password, you must contact the JTS administrator who set it up. Because ADI will work only when you configure the warehouse correctly.
 - c. Click **Finish** to complete the application setup.
9. Again log in to the administration page of the Jazz Team Server. Navigate your browser to `https://server:port/jts/admin`.
10. On the Administration page, click the **Server** tab.
11. In the **Licensing** pane, click **License Key Management**.

Note: You must install entitled client access license before you can access ADI and assign it to all your users as described in [“Managing client access licenses”](#) on page 149.
12. Optional: Activate a trial license for evaluation purposes.
 - a. In the **Client Access License Types** area, look for IBM Application Delivery Intelligence Product and click **Activate Trial**.
 - b. In the **Client Access License Agreement** window, review the terms for the license and then click **I accept the terms in the license agreement**.
 - c. Click **Finish** to make the trial license active.
 - d. Assign it to all your users as described in [“Managing client access licenses”](#) on page 149.

What to do next

After you install ADI into an existing CLM, you can find the next steps to perform more operations.

After you set up the application, you can follow the steps for creating a project area as described in [Creating and managing users](#) and assign your existing CLM user base as ADI users of that project area. You must also install and assign ADI Client Access Licenses to all your users as described in [Managing Client Access Licenses](#).

Installing ADI with the ADDI installer

IBM Application Discovery and Delivery Intelligence (ADDI) provides an ADDI installer with which you can install AD components and ADI.

Complete the following steps to install ADI with ADDI installer:

1. Use ADDI installer wizard to install ADI component that is applicable for your current system such as Windows, Linux, or zLinux. For more information, see [IBM AD Installation and Configuration Guide](#).

Note: When you select ADI component to install, the wizard will simply download and unzip ADI build into the default installation path (C:\ibm) or the path that you specified.

2. Run adi-setup application to complete ADI installation and setup. For more information, see [“Using ADDI Configuration Server and adi-setup application to set up ADI”](#) on page 134.

Note: After you set up IBM ADDI, you need to restart the server. Otherwise, you will not be able to log in with the correct credentials and IBM ADDI will request you for a re-authentication. When you open the log file (<ADI installation folder>\adi\server\liberty\servers\clm\logs\addi-brd.log), you can see the warning of "Failed authentication with Jazz server".

To restart the server, complete the following steps:

1. Navigate to the <unzipped-adi-installer>/adi/server directory.
2. Shut down the server by running the server.shutdown script.
3. Restart the server after the you shut down the server successfully by running the server.startup script.

Setting up ADI with adi-setup application

The adi-setup application automates various setups that had to be executed manually in the past.

The adi-setup application is a command line program that is provided in the installation folder: /adi/server/adi-setup (adi-setup.bat on Windows). With the adi-setup application, users can perform the following operations:

- Use ADDI Configuration Server to centrally configure all ADDI applications and then run adi-setup application locally.
- Create an ADI evaluation installation on a local machine with one simple command line.
- Migrate ADI from a previous release with one simple command line.
- Execute scripts that are provided by technical support for analyzing and fixing problems.

Reviewing the command line options for adi-setup application

To review all the options available in the adi-setup application, run the following command.

```
> adi-setup help
```

Using ADDI Configuration Server and adi-setup application to set up ADI

When you install ADI with ADDI installer, you can specify properties for ADI in IBM AD Configuration Server and then run adi-setup application to set up ADI.

The IBM ADDI Configuration Server provides one central place for entering and storing the configuration data for all ADDI server applications. It's shipped along with the ADDI installation suite but it's not available for an ADI standalone installation. For more information, see [IBM Application Discovery Configuration Server User Guide](#).

When you create an ADI install configuration in the ADDI Configuration Server, the adi-setup application can connect to this Configuration Server, read all the configuration data that is provided there, and then fully automatically run the ADI application setup with that data. In the following table, you can find the properties that need to be specified for ADI in the Configuration Server Web UI. For more information, see [Creating an IBM Application Delivery Intelligence Install Configuration](#).

Table 3. Properties to be specified for ADI in the Configuration Sever Web UI

Tab	Name	Description
Web and Application Server	Base URL	The base url of the ADI server without any path information. For example, if you want to reach ADI with a url such as <code>https://adi.mycompany.com:9443/adi/web</code> in the future, enter <code>https://adi.mycompany.com:9443</code> here. Make sure that the ADI server machine is configured with this name and that the fully qualified name is configured in your DNS so that it can be reached inside your organization like that. For more information, see Planning your URIs .
	Name	The name of the admin user who continues configuring the ADI server, such as adding users or creating data providers.
	User ID	The user id of the admin user. Note: The password for this user is not specified here. It needs to be provided when you start the adi-setup application.
	Email	The email address of the admin user.
	Accept License Agreement	Review the license agreement and check this box to accept it.
	Trial License	Check this box if you want to start using ADI with a 30 day trial license. Don't check it if you want to start importing purchased license keys directly after finishing the setup.

Table 3. Properties to be specified for ADI in the Configuration Sever Web UI (continued)

Tab	Name	Description
Database	Jazz Team Server database Application Delivery Intelligence database Data Warehouse	You need to create three databases when you set up ADI. The adi-setup application currently will not create DB2 databases for you. You need to create the databases manually on the DB2 server first (for more information, see “Creating databases” on page 114). For an evaluation setup, you can also use the Derby database instead of DB2 database. If you set up ADI with DB2, select the check box and provide details for each database as described below.
	DB2: Host	This is the IP or fully qualified network name of your DB2 database server.
	DB2: Port	This is the port where DB2 can be reached on the DB2 server. The default port for DB2 is 50000. (Note: Make sure that you fill in the port if you use the default.)
	DB2: Database name	The name of the database. It is recommended that you use the name JTS, ADI, and DW for the three databases to be created.
	DB2: Database Tablespace Folder	A folder that has been created on the DB2 server machine in which table spaces can be created during the setup. The DB2 admin user must have full write access to this folder.
	DB2: Username	The username of the DB2 admin user that was created on the DB2 server machine. Note: The password for this user is not specified here. It needs to be provided when you start the adi-setup application.
Application Discovery Webservice	Host	To automatically connect ADI with an AD server, you need to specify the fully qualified hostname or IP address of the AD graph database server.
	Port	The port that is used for the AD server.

Table 3. Properties to be specified for ADI in the Configuration Sever Web UI (continued)		
Tab	Name	Description
	HTTP protocol	The protocol that is configured for this server: HTTP or HTTPS.
	Authentication	The type of authentication to be used: None or Basic.
	Username	<p>The user name for basic authentication as configured on this server.</p> <p>Note: The password for this user is not specified here. It needs to be provided when you start the adi-setup application.</p>

Before you can run the following command, you need to start the server first. For more information, see [“Starting up the server” on page 115](#).

To run the adi-setup application with data from a configuration server, you need to know the URL of this server. In the ADI installation directory, navigate in a command window to the adi/setup directory and execute the adi-setup command by using the following options:

```
adi-setup addiConfigurationServer -- Run automated setup using an ADDI Configuration Server
[-url https://server.org:8080] -- Url to the ADDI Configuration Server. If not provided it
will assume http://localhost:8080.
[-database.password password] -- Instead of a password file password can be provided
directly.
[-admin.password password] -- The password of the admin user to be created.
[-ad.password password] -- The password for the IBM Application Discovery server.
```

After you run the adi-setup command, restart the server by completing the following steps:

1. [“Shutting down the server” on page 125](#)
2. [“Starting up the server” on page 115](#)

Creating an ADI evaluation installation with adi-setup application

You can use the adi-setup application to quickly set up ADI for evaluation purposes either on a local laptop or an evaluation sever. The idea is that you download the ADI zip file, unzip it, run the adi-setup command, and you are done.

Before you can run the following command, you need to start the server first. For more information, see [“Starting up the server” on page 115](#).

Run the command with the following options:

```
adi-setup adiEvaluationSetup -- Creates an evaluation installation using all the defaults.
[-baseUrl https://server.org:9443] -- Base URL without a path that should be used for this
server. If not provided it will assume http://localhost:9443, but then the server cannot be
used over the network.
[-user.name username] -- user name of the admin user to be created. If you skip this option
the name "eg" will be used.
[-user.password password] -- password of the admin user to be created. If you skip this
option the password "eg" will be used.
```

All options after adiEvaluationSetup are optional and the server uses defaults. If you skip them, it will create a server at localhost: 9443, that is, the server cannot be reached from another machine, with "eg" as both username and password. If the server is configured with a fully qualified DNS name, it is recommended that you use that in the -baseUrl parameter.

After you run the adi-setup command, restart the server by completing the following steps:

1. [“Shutting down the server” on page 125](#)

2. [“Starting up the server” on page 115](#)

Migrating from a previous release

If you use a previous release of ADI and want to migrate all of its data, you must follow the migration steps described in this section instead of the other installation scenarios.

Notes:

1. The following instructions assume that you had either installed a previous version in either of the following locations. If you installed in different locations, you can substitute the path when necessary.
Linux: `/opt/ibm/adi/`
Windows: `C:\IBM\adi\`
2. The following instructions use *adi_previous* and *adi_new* as the installation directory names to differentiate the previous version from the new version. You can replace the names based on your migration scenarios. For example, if you migrate from ADI V5.0.5 to ADI V5.1.0, replace the corresponding names to `adi505` and `adi510`.

Manually migrating from a previous release

For ADI migration, you can manually migrate the data files from a previous release into the new directory where you install the new release.

Note: Before migration, you need to remove all the Enterprise Artifact workbooks and Enterprise Artifact data providers. To save the business terms in the Enterprise Artifact workbooks, you can export the business terms from the workbooks before deletion and import them after migration.

Installing the new release into a new directory

You install every new release into a new installation directory parallel to the previous version's installation. You do not install releases on top of each other to upgrade.

Take the following steps to install the new release of ADI into a new directory.

1. Stop the current release of ADI using the following commands.

Linux:

```
cd /opt/ibm/adi/server
./server.shutdown
```

Windows:

```
cd C:\IBM\adi\server
server.shutdown
```

2. Rename the installation directory to make sure that you can identify where the previous version is installed.

Linux:

```
cd /opt/ibm
mv adi adi_previous
```

Windows:

```
cd C:\IBM
ren adi adi_previous
```

3. Download the new release of ADI and extract it into the same location as you did with the previous release. Rename the new release in the same way so that you can differentiate it from the previous one. For example, rename it to *adi_new*. Then you have the *adi_previous* and *adi_new* next to each other in the same installation location.

Backing up database files

If you use an enterprise database, such as DB2, you can make backups of your data to be able to repeat the migration in case of errors. In case of Derby, you copy your databases to the new location. Complete the steps in this topic to back up the database files.

If you are using DB2, make sure that you follow the instructions of [Backing up your data](#) to back up your three databases: JTS, ADI, DW.

If you are using Derby, no backup is required as you will have copies of these databases in your previous installation directory. You must copy them to the new installation location with the following steps.

Notes:

- Make sure you adjust the path to your installation directory if necessary.
- Do not perform these steps if you are using DB2.

1. Create the Liberty application directory to copy the files to.

Linux:

```
cd /opt/ibm/adi_new/server
./server.startup -create
```

Windows:

```
cd C:\IBM\adi_new\server
server.startup -create
```

2. Delete the default Derby databases to replace them with the databases from the previous release:

Linux:

```
rm -rf /opt/ibm/adi_new/server/conf/jts/derby/repositoryDB
rm -rf /opt/ibm/adi_new/server/conf/adi/derby/repositoryDB
```

Windows:

```
rd /s/q C:\IBM\adi_new\server\conf\jts\derby\repositoryDB
rd /s/q C:\IBM\adi_new\server\conf\adi\derby\repositoryDB
```

3. Copy the Derby databases from the previous release to the new release.

Note: The second command points to a path inside the Liberty application sever directory. That is where the Derby warehouse is located currently because a defect in the JTS.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/jts/derby/repositoryDB /opt/ibm/adi_new/server/
conf/jts/derby/repositoryDB
cp -R /opt/ibm/adi_previous/server/liberty/servers/clm/conf/jts /opt/ibm/adi_new/server/
liberty/servers/clm/conf/jts
cp -R /opt/ibm/adi_previous/server/conf/adi/derby/repositoryDB /opt/ibm/adi_new/server/
conf/adi/derby/repositoryDB
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\jts\derby\repositoryDB C:\IBM\adi_new\server\conf
\jts\derby\repositoryDB
xcopy /s/i C:\IBM\adi_previous\server\liberty\servers\clm\conf\jts\derby\warehouseDB C:\IBM
\adi_new\server\liberty\servers\clm\conf\jts\derby\warehouseDB
xcopy /s/i C:\IBM\adi_previous\server\conf\adi\derby\repositoryDB C:\IBM\adi_new\server\conf
\adi\derby\repositoryDB
```

Copying key configuration and data files from the previous installation to the new one

You can run various commands to copy configuration files from the previous location to the new one. In some cases, you need to update the files to accommodate new settings.

You need to copy the key configuration files from the previous installation location to the new one.

1. Copy RDF index files for ADI.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/adi/indices /opt/ibm/adi_new/server/conf/adi/indices
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\adi\indices C:\IBM\adi_new\server\conf\adi\indices
```

2. Copy the uploaded code coverage files for ADI.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/adi/coverageFileStorage /opt/ibm/adi_new/server/conf/adi/coverageFileStorage
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\adi\coverageFileStorage C:\IBM\adi_new\server\conf\adi\coverageFileStorage
```

3. Copy the headless-CC-files for ADI.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/adi/headless-CC-files /opt/ibm/adi_new/server/conf/adi/headless-CC-files
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\adi\headless-CC-files C:\IBM\adi_new\server\conf\adi\headless-CC-files
```

4. Copy the uploaded enterprise artifacts under the businessRuleDiscovery directory for ADI.

Note: You need to take this step only when you migrate from ADI V5.1.0 or its later fix packs.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/adi/businessRuleDiscovery /opt/ibm/adi_new/server/conf/adi/businessRuleDiscovery
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\adi\businessRuleDiscovery C:\IBM\adi_new\server\conf\adi\businessRuleDiscovery
```

5. Copy the ADI application's setting file. If a prompt to overwrite the existing files occurs, confirm it.

Linux:

```
cp /opt/ibm/adi_previous/server/conf/adi/teamserver.properties /opt/ibm/adi_new/server/conf/adi/
```

Windows:

```
copy /y C:\IBM\adi_previous\server\conf\adi\teamserver.properties C:\IBM\adi_new\server\conf\adi\
```

6. Copy the RDF index for JTS.

Linux:

```
cp -R /opt/ibm/adi_previous/server/conf/jts/indices /opt/ibm/adi_new/server/conf/jts/indices
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\server\conf\jts\indices C:\IBM\adi_new\server\conf\jts\indices
```

7. Copy the JTS settings file. If a prompt to overwrite the existing files occurs, confirm it.

Linux:

```
cp /opt/ibm/adi_previous/server/conf/jts/teamserver.properties /opt/ibm/adi_new/server/conf/jts/
```

Windows:

```
copy /y C:\IBM\adi_previous\server\conf\jts\teamserver.properties C:\IBM\adi_new\server\conf\jts\
```

8. Choose one of the following options to continue:

- If you migrate from a version earlier than ADI V5.1.0, skip this step.
- If you migrate from ADI V5.1.0 or later versions, copy the Elasticsearch indexes that are created.

Linux:

```
cp -R /opt/ibm/adi_previous/elasticsearch/data /opt/ibm/adi_new/elasticsearch/data
```

Windows:

```
xcopy /s/i C:\IBM\adi_previous\elasticsearch\data C:\IBM\adi_new\elasticsearch\data
```

9. Create the Liberty application directory to copy files to.

Note:

If you are using Derby, you can skip the following step as you've executed it in the previous step [Backing up database files](#).

If you are using DB2, you need to complete the following step.

Linux:

```
cd /opt/ibm/adi_new/server  
./server.startup -create
```

Windows:

```
cd C:\IBM\adi_new\server  
server.startup -create
```

10. Copy Liberty setting files. If a prompt to overwrite the existing files occurs, confirm it.

Linux:

```
cp /opt/ibm/adi_previous/server/liberty/servers/clm/server.xml /opt/ibm/adi_new/server/liberty/servers/clm/  
cp /opt/ibm/adi_previous/server/liberty/servers/clm/conf/basicUserRegistry.xml /opt/ibm/adi_new/server/liberty/servers/clm/conf/  
cp /opt/ibm/adi_previous/server/liberty/servers/clm/conf/ldapUserRegistry.xml /opt/ibm/adi_new/server/liberty/servers/clm/conf/
```

Windows:

```
copy /y C:\IBM\adi_previous\server\liberty\servers\clm\server.xml C:\IBM\adi_new\server\liberty\servers\clm\  
copy /y C:\IBM\adi_previous\server\liberty\servers\clm\conf\basicUserRegistry.xml C:\IBM\adi_new\server\liberty\servers\clm\conf\  
copy /y C:\IBM\adi_previous\server\liberty\servers\clm\conf\ldapUserRegistry.xml C:\IBM\adi_new\server\liberty\servers\clm\conf\
```

After you copy all the key configuration files to the new installation location, choose one of the following options to continue.

- If you migrate from ADI V5.1.0 or its later fix packs, skip this step.
- If you migrate from a version earlier than ADI V5.1.0, complete the following steps to update `server.xml` file to configure Lightweight Third Party Authentication (LTPA) in Liberty.

1. Open the `server.xml` file.

Linux:

```
/opt/ibm/adi_new/server/liberty/servers/clm/server.xml
```

Windows:

```
C:\IBM\adi_new\server\liberty\servers\clm\server.xml
```

2. Update the version numbers for the following two feature attributes.

```
<feature>jsp-2.3</feature>
<feature>servlet-3.1</feature>
```

3. Add the following line after `<webAppSecurity ssoRequiresSSL="true"/>`.

```
<ltpa expiration="12h"/>
```

4. Save your changes to the `server.xml` file.

Make sure that WebSphere Liberty knows about the newly added applications. Choose one of the following options to continue.

- If you migrate from a version earlier than ADI V5.1.0, update the `application.xml` file to let the WebSphere Liberty know about the newly added applications in the new release.

1. Open the `application.xml` file.

Linux:

```
/opt/ibm/adi_new/server/liberty/servers/clm/conf/application.xml
```

Windows:

```
C:\IBM\adi_new\server\liberty\servers\clm\conf\application.xml
```

2. Add new `<application>` lines in the `<server>` element.

```
<application type="war" id="addi-web-brd" name="addi-web-brd" location="$
{server.config.dir}/apps/addi-web-brd.war">
</application>
```

```
<application type="war" id="addi-web-es" name="addi-web-es" location="$
{server.config.dir}/apps/addi-web-es.war">
</application>
```

```
<application type="war" id="addi-web-metrics" name="addi-web-metrics" location="$
{server.config.dir}/apps/addi-web-metrics.war">
</application>
```

3. Save your changes to the `application.xml` file.

- If you migrate from ADI V5.1.0 or its later fix packs, open the `application.xml` file and verify that the following new applications are listed in it. If you find any missing applications, add them to the `application.xml` file.

```
<application type="war" id="addi-web-brd" name="addi-web-brd" location="$
{server.config.dir}/apps/addi-web-brd.war">
</application>
```

```
<application type="war" id="addi-web-es" name="addi-web-es" location="${server.config.dir}/
apps/addi-web-es.war">
</application>
```

```
<application type="war" id="addi-web-metrics" name="addi-web-metrics" location="${
server.config.dir}/apps/addi-web-metrics.war">
</application>
```

Migrating the JTS data

You can execute an interactive command to migrate the JTS configuration files, the data repository, and the warehouse databases to the latest version.

Run the following command to migrate the JTS data:

Linux:

```
cd /opt/ibm/adi_new/server
upgrade/jts/jts_upgrade.sh -oldJTSHome /opt/ibm/adi_previous/server/conf -noPrompt -
noStepPrompt -noEditor
```

Windows:

```
cd C:\IBM\adi_new\server
upgrade\jts\jts_upgrade.bat -oldJTSHome C:\IBM\adi_previous\server\conf -noPrompt -noStepPrompt
-noEditor
```

If you configured your server with nondefault options or you want more control over all the steps that this migration script perform, you can see [Jazz Online Help](#) for more information.

Migrating the ADI application data

You can execute a command to update the data repository that stores ADI data.

Run the following command to migrate the repository database of ADI application.

Linux:

```
cd /opt/ibm/adi_new/server
./repotools-adi.sh -addTables noPrompt
```

Windows:

```
cd C:\IBM\adi_new\server
repotools-adi.bat -addTables noPrompt
```

Now the server has all the data of your previous server. However, you might still want to add other configuration options, for example, renewing server certificates. For more information, see [Jazz Online Help](#).

Starting the server and waiting for additional migration to finish

After all the files are migrated, you can start the server. It executes additional migration tasks that the admin user can review for success.

When you start the server, it executes more migration operations automatically. An administrator can review the progress of these operations in the log files that get generated on the server machine.

1. Start the new ADI server.

Linux:

```
cd /opt/ibm/adi_new/server
./server.startup
```

Windows:

```
cd C:\IBM\adi_new\server
server.startup
```

2. Use a browser to navigate to the applications main page: `https://fully_qualified_hostname:9443/adi/web`
3. Observe the progress of the migration in the log file located in `adi_new/server/logs/adi.log`. For example, you can observe it by opening it in a text editor and frequently reloading it or using the `tail` command on Linux.
4. Wait for these two lines to be shown in the log.

```
CRIDA0059I The DIMEZ warehouse schema validation has completed.
```

and

```
CRIDA0052I Completed checking the ADI data migration status.
```

Also review previous lines shown for status messages and warnings about the migration. If there are errors, review the error message to understand the nature of the problem. You can also start over by redoing the steps described in this guide with a new fresh installation. Contact technical support to get help with any migration error messages.

5. When the migration is shown as successful in the log, you can notify your users that the new server is available for use.

Migrating from a previous release with adi-setup application

For ADI V5.0.4 and later versions, you can run `adi-setup` application to automate the steps for migrating ADI from a previous release.

To migrate ADI from a previous release, you can perform manual steps as described in “Migrating from a previous release” on page 138. Alternatively, you can run `adi-setup` application command by using the following options, which automates all these steps for migration.

Notes:

- It is recommended that you manually back up the existing ADI database before you start the migration process.
- For the migration of Business Rule Discovery data providers, check the following instructions.

– Migration from V5.0.5 to V5.1.0

Before migration, you need to remove all the Enterprise Artifact workbooks and Enterprise Artifact data providers. To save the business terms in the Enterprise Artifact workbooks, you can export the business terms from the workbooks before deletion and import them after migration.

– Migration from V5.1.0 to V5.1.0.x

The statuses of business terms in V5.1.0 are not preserved after you migrate from ADI V5.1.0 to ADI V5.1.0.x. You need to manually correct the statuses based on the following mapping.

Table 4. The status mapping between V5.1.0 and V5.1.0.x	
V5.1.0 Status	V5.1.0.x Status
New	Waiting For Approval
In Progress	New
Waiting For Approval	Rejected
Approved	In Progress
Rejected	Approved

Important:

1. The following instructions assume that you had either installed a previous version in either of the following locations. If you installed in different locations, you can substitute the path when necessary.

Linux: /opt/ibm/adi/

Windows: C:\IBM\adi\

2. The following instructions use *adi_previous* and *adi_new* as the installation directory names to differentiate the previous version from the new version. You can replace the names based on your migration scenarios. For example, if you migrate from ADI V5.0.5 to ADI V5.1.0, replace the corresponding names to *adi505* and *adi510*.

Complete the following steps to migrate ADI from a previous release by using the *adi-setup* application.

1. Stop the current release of ADI using the following commands.

Linux:

```
cd /opt/ibm/adi/server
./server.shutdown
```

Windows:

```
cd C:\IBM\adi\server
server.shutdown
```

2. Rename the installation directory to make sure that you can identify where the previous version is installed.

Linux:

```
cd /opt/ibm
mv adi adi_previous
```

Windows:

```
cd C:\IBM
ren adi adi_previous
```

3. Download the new release of ADI and extract it into the same location as you did with the previous release. Rename the new release in the same way so that you can differentiate it from the previous one. For example, rename it to *adi_new*. Then you have the *adi_previous* and *adi_new* next to each other in the same installation location.
4. Use a command window to navigate to the new installation directory.

Linux:

```
/opt/ibm/adi_new/server
```

Windows:

```
C:\IBM\adi_new\server
```

Note: You must open the command window as the administrator. Right-click the **Command Window** icon and select **Run as administrator** option. The header of the command window shows as "Administrator".

5. Run one of the following commands and wait for the command to complete.

- If you migrate to a major new version, such as migrating from ADI V5.0.4 to ADI V5.0.5, run the following command:

Linux:

```
adi-setup migration -fromDir /opt/ibm/adi_previous
```

Windows:

```
adi-setup migration -fromDir C:\IBM\adi_previous
```

- If you migrate within the ADI V5.1.0.x versions, such as migrating from ADI V5.1.0 to ADI V5.1.0.x, run the following command:

Linux:

```
adi-setup migration -fromDir /opt/ibm/adi_previous -skipJazzUpdate true
```

Windows:

```
adi-setup migration -fromDir C:\IBM\adi_previous -skipJazzUpdate true
```

6. Choose one of the following options to continue.

- If you migrate from ADI V5.1.0 or its later fix packs, skip this step.
- If you migrate from a version earlier than ADI V5.1.0, complete the following steps to update `server.xml` file to configure Lightweight Third Party Authentication (LTPA) in Liberty.
 - a. Open the `server.xml` file under the new installation directory.

Linux:

```
/opt/ibm/adi_new/server/liberty/servers/clm/server.xml
```

Windows:

```
C:\IBM\adi_new\server\liberty\servers\clm\server.xml
```

b. Update the version numbers for the following two feature attributes.

```
<feature>jsp-2.3</feature>  
<feature>servlet-3.1</feature>
```

c. Add the following line after `<webAppSecurity ssoRequiresSSL="true"/>`.

```
<ltpa expiration="12h"/>
```

d. Save your changes to the `server.xml` file.

7. Choose one of the following options to continue.

- If you migrate from a version earlier than ADI V5.1.0, update the `application.xml` file to let the WebSphere Liberty know about the newly added applications in the new release.
 - a. Open the `application.xml` file.

Linux:

```
/opt/ibm/adi_new/server/liberty/servers/clm/conf/application.xml
```

Windows:

```
C:\IBM\adi_new\server\liberty\servers\clm\conf\application.xml
```

b. Add new `<application>` lines in the `<server>` element.

```
<application type="war" id="addi-web-brd" name="addi-web-brd" location="$  
{server.config.dir}/apps/addi-web-brd.war">  
</application>
```

```
<application type="war" id="addi-web-es" name="addi-web-es" location="$  
{server.config.dir}/apps/addi-web-es.war">  
</application>
```



```
<application type="war" id="addi-web-metrics" name="addi-web-metrics" location="$
{server.config.dir}/apps/addi-web-metrics.war">
</application>
```

c. Save your changes to the `application.xml` file.

- If you migrate from ADI V5.1.0 or its later fix packs, open the `application.xml` file and verify that the following new applications are listed in it. If you find any missing applications, add them to the `application.xml` file.

```
<application type="war" id="addi-web-brd" name="addi-web-brd" location="$
{server.config.dir}/apps/addi-web-brd.war">
</application>
```

```
<application type="war" id="addi-web-es" name="addi-web-es" location="${server.config.dir}/
apps/addi-web-es.war">
</application>
```

```
<application type="war" id="addi-web-metrics" name="addi-web-metrics" location="$
{server.config.dir}/apps/addi-web-metrics.war">
</application>
```

8. Start the new server as described in [“Starting up the server” on page 115](#).

Integration with IBM License Metric Tool

IBM Application Delivery Intelligence for IBM Z generates IBM Software License Metric Tag (SLMT) files. The versions of IBM License Metric Tool that support IBM Software License Metric Tag can generate License Consumption Reports.

Each instance of a running environment generates an IBM Software License Metric Tag file. The USER metrics are monitored. The values are refreshed every 15 minutes.

IBM Application Delivery Intelligence for IBM Z generates an SLMT tag file that records license usage at 15 minutes interval in which users logged on and used the application. When the application was not used, no activities will be logged. The recorded information is:

AUTHORIZED_USER: containing the name of the authorized account that logged on ADI.

IBM SLM tag files are automatically updated and stored in the server folder `adi/server/conf/adi/`. The file name will use a random identifier such as `538b3879154264d5ec0e606276ee98fb.slmtag`.

Following is an example of the content of an SLM tag file:

```
<SchemaVersion>2.1.1</SchemaVersion>
  <SoftwareIdentity>
    <PersistentId>a09471a5d2b04cf48d14b5a7d6287aa0</PersistentId>
    <Name>IBM Application Delivery Intelligence</Name>
    <InstanceId>/home/ibmadmin/ADI/adi5.0.5/server/conf/adi</InstanceId>
  </SoftwareIdentity>

  <Metric logTime="2561-06-04T14:42:53+07:00">
    <Type>AUTHORIZED_USER</Type>
    <SubType></SubType>
    <Value>2</Value>
    <Period>
      <StartTime>2561-06-04T14:27:53+07:00</StartTime>
      <EndTime>2561-06-04T14:42:53+07:00</EndTime>
    </Period>
  </Metric>

  <Metric logTime="2561-06-04T14:57:53+07:00">
    <Type>AUTHORIZED_USER</Type>
    <SubType></SubType>
    <Value>2</Value>
    <Period>
      <StartTime>2561-06-04T14:27:53+07:00</StartTime>
      <EndTime>2561-06-04T14:57:53+07:00</EndTime>
    </Period>
  </Metric>
```

Chapter 5. Administration

As an administrator for ADI, you can learn what administration tasks you can do and how to do them.

Logging in to administer the server

`/jts/admin` and `/adi/admin` are two admin pages available that you can log in to administer the server. One is for administering the Jazz Team Server (JTS), and the other is for the ADI application. Users can be created and managed in either of them. Licenses need to be managed in the `jts/admin`.

The following example demonstrates the steps to log in to a JTS. For more information, see [Logging in to administer the server](#).

1. Go to `https://localhost:9443/jts/admin`.
2. Log in with the administrative user name and password that you created during the Jazz Team Server setting up.

Administration tasks for user management

For user management, you can manage client access licenses, create and manage users, and change password.

When you add users to ADI, you need to perform the following workflow:

1. Activate the trial or import the purchased ADI client access licenses into the Jazz Team Server.
Note: The ADI license are *authorized licenses*, which are permanent licenses that are assigned to a single user. The ADI license is managed by the Jazz license server. If you purchase activation kits that contain the activation key file, you can import the activation key to the license server. For more information, see [Installing and managing client access license keys](#).
2. Create new users or import users in the Jazz Team Server.
3. Assign licenses to the users.
4. Create one or more ADI project areas in the ADI admin UI.
5. Assign users to the project area.

For more instructions on those steps, see the following topics.

Managing client access licenses

To access ADI, you must have a valid user access license and import the activation key to the license server.

Administrators can import the license key in the administrative web UI of that Jazz Team Server (`/jts/admin`).

Note: The ADI license are *authorized licenses*, which are permanent licenses that are assigned to a single user. The ADI license is managed by the Jazz license server. If you purchase activation kits that contain the activation key file, you can import the activation key to the license server. For more information, see [Installing and managing client access license keys](#).

If you do not have the activation key, ADI ships with trial licenses that you can enable during setup or within that same administrative UI for importing licenses. Administrators can import and configure the purchased user access license keys to replace the trial licenses anytime after or during the trial period.

After you import and configure the user access licenses, you can create users and then assign the client access license to users. For more information, see ["Creating and managing users" on page 150](#) and ["Assigning client access licenses to users"](#) topics.

Creating and managing users

As administrators, you can learn how to create or import users, assign licenses to users, grant users as members of project areas, and assign role-based permissions to users.

To add a user to ADI, you need to complete the following procedures.

- Create a user or import it from an external user management service.
- Assign client access licenses to the new user.
- Create a project area or use an existing one.
- Assign the user to that project area.
- Assign role-based permissions to ADI users.

Creating and managing user accounts

Currently ADI supports user management by the embedded Websphere Liberty Profile application server and LDAP user registries. You can learn more about how to create and manage user accounts as administrators.

For configuring either option, see [Installing ADI by using web-based custom setup page](#) for references.

The Jazz Online Help describes all the details for creating new users locally in Liberty and how to import from LDAP. All these operations are performed in the JTS administrative web UI (`/jts/admin`):

- For the general overview to user management, see [Managing users](#).
- For information about how to create users locally, see [Creating users](#).
- For information about how to import users from LDAP if it was configured during setup: [Importing users from an external user registry](#).
- For information about how to assign user client access licenses, see [Assigning client access licenses to users](#).
- For information about how to assign user roles and permissions, see [Assigning roles to a member](#).
- For information about how to modify the user permissions, see [Modifying role-based permissions](#).

Note: When you use a local user registry in Liberty and create new users, the password of this new user is the same as the user id specified. The new user can then log on with that temporary password and use the user profile page to change it. For more details, see [Users changing their password](#).

Creating and managing project areas

After you create users in the JTS and assign them client access licenses, the user accounts will be replicated and made available to the ADI application. They will also be visible in the ADI administrative Web UI (`/adi/admin`). You as an administrator can then assign users to one or more ADI project areas. Project areas partition all data managed in ADI and provide access to user to that data. They can be used to organize the content of different teams that do not want the others to have access to their data.

- To learn more about project areas, see the Jazz Online help: [Project area](#).

Note: The current release of ADI does not support all the capabilities described here. In particular, it doesn't yet support Behavior and Timelines.

- After the setup, the administrator must create at least one ADI project area and assign each user to at least one of these project areas.
 - Procedures:
 1. To create a project area, you need to navigate to the ADI Administrative Web UI located at URL: `https://fully_qualified_hostname:9443/adi/admin`.
 2. Select **Project Areas > Active Project Areas** from the menu.
 3. Select the **Create Project Area** operation.
 4. Complete the form by providing at least a value for the Project Area Name.
 5. Select the default ADI Process.

6. Click **Add** in the **Members** section to add one or more users as team members. Only the users who are listed here are able to access the data for this project area.
7. Click **Add** in the **Administrators** section to add one or more administrative users as administrators of this project area. Only the administrators of the project area can modify the information of the project area such as adding a member to the project area.
8. Click **Save** to start the creation.

Note: After you click **Save**, a warning about missing user roles appears.
9. Assign the user roles and permissions to each user. For more information about ADI role-based permissions, refer to the table of [“Assigning role-based permissions to ADI users”](#) on page 151.
 - To learn more about creating Project Areas, see the Jazz Online Help: [Creating a project area](#).
- Once the project area is created users that are listed as members are able to access it from this URL: `https://fully_qualified_hostname:9443/adi/web`.
- At any time, the administrator can add more users to the project area. To learn more about managing user for a project area, see the Jazz Online Help: [Adding and modifying users as members of project areas](#).

Notes:

- Any other user that you add to the **Administrators** section is able to follow the previous steps to manage membership of that project area.
- Jazz Online Help also shares information about Team Areas. ADI also uses team areas, but they should be created as part of the main ADI Web UI by creating workbooks. Workbooks map one-to-one to a Jazz Team Area. For more details, see [“Managing workbooks”](#) on page 214.

Assigning role-based permissions to ADI users

ADI 5.0.2 and later versions leverages Jazz Team Server (JTS) role-based permissions in order to manage operations that the users can perform within workbooks. From this topic, you can find more information about roles and permissions in ADI.

The table below shows the list of user roles and permissions set by default. You can edit the following permissions based on your needs.

Note: A user can be assigned to more than one user roles.

<i>Table 5. User roles and permissions for ADI</i>		
User Roles	ADI View	Operations
Data Provider Administrator	Connections	Create, modify, and delete connections.
	Data Providers	Create, modify, and delete data providers
	Workbooks	Create, modify, and delete workbooks. View analysis reports of workbooks of which they are members.

Table 5. User roles and permissions for ADI (continued)

User Roles	ADI View	Operations
Workbook Owner	Data Providers	View data providers information and modify part of information. Such as adding new builds, uploading coverage results, refreshing build data, deleting builds from an existing Manual Builds data provider or downloading data from data providers.
	Workbooks	Create and modify workbooks. Such as making changes to memberships and setting thresholds. View analysis reports of workbooks of which they are owners.
Workbook Member	Data Providers	View build information, view data collection logs, and download data from data providers. For Manual Builds data providers, the members can upload code coverage results to the existing builds.
	Workbooks	View workbooks. View analysis reports of workbooks of which they are members.

Users changing their password

If you are using the local user management facilities provided by ADI (and not, for example, an LDAP server), users need to change their password in their user profile. You can learn how to manage user accounts from user profiles.

ADI end users can use their account profile to manage their user accounts. Primarily, they can use this profile page to change their passwords in cases a local user directory, that is, not an LDAP user directory, is used.

Procedure:

1. To access user profile page from the ADI Web UI, select the small triangle in the left navigation bar with the **User** icon.
2. In the pop-up menu that opens, select **My Profile**. The Jazz Team Server administration page appears. Log in with your username and password if you are required to do so.
3. To change your password, select the **Change Password..** button on your profile page.

Note: In the case that your server uses a third party user directory, such as LDAP, this button will be disabled.

For more information about changing password, see [Changing your password](#) in the Jazz Online Help.

Backing up your data

You can learn the process on how to back up your data.

To back up your data, follow the instructions described on [Backing up and restoring Rational solution for Collaborative Lifecycle Management applications](#).

- If you configured a Derby database, you can find all the process on [Backing up and restoring the Derby database](#).
- If you configured a DB2 database, you can find all the process on [Backing up and restoring other supported databases](#).

Note: You also need to back up the directory of *adi-install-directory/server/conf/adi/coverageFileStorage* that stores all the uploaded coverage compressed files.

Server configuration settings

As an administrator, you can learn how to use various settings for controlling the ADI server.

This documentation only focuses on ADI-specific settings. For more information about the other options that are offered by the Jazz framework, see [Jazz Online Help](#) .

Settings that determine the behavior of startup scripts

You can learn about those startup scripts and how their behaviors are defined by variables.

The following table outlines the variables that define the behavior of those startup scripts. For example, they determine what processes should be started and on which port they operate.

Table 6. Variables defined in startup scripts

Script File Name	Property Name / Parameter Option	Default Value	Description
adi/server/ server.startup	HEADLESSCC / -noheadlesscc	true	<p>Determines if the headless code coverage daemon process should be started when the ADI server starts. The default is true, that is, the daemon is always started.</p> <p>Change the default in the script or start ADI with -noheadlesscc to prevent starting the coverage daemon.</p> <p>Example: server.startup -noheadlesscc</p>
	-Xmx	4G	<p>Determines the maximum memory allocated to ADI.</p> <p>Note: When you set up ADI on a machine with inadequate resources for evaluation, you can set the maximum memory allocation to 2G.</p>
	-Xms	4G	<p>Determines the initial memory allocated to ADI.</p> <p>Note: When you set up ADI on a machine with inadequate resources for evaluation, you can set the maximum memory allocation to 2G.</p>
	-Xmn	1G	<p>Determines the minimum memory allocated to ADI.</p>

Table 6. Variables defined in startup scripts (continued)

Script File Name	Property Name / Parameter Option	Default Value	Description
adi/server/ codecov.startup	CODECOV_PORT	8005	Defines the port on which the headless code coverage collection daemon should listen for incoming coverage data. If you change the value, you also need to change it in the <code>codecov.shutdown</code> script and the <code>teamserver.properties</code> variable <code>com.ibm.dimez.dashboard.coverageHeadlessCC.port</code> . For more details, see “Server settings that need to be defined in <code>teamserver.properties</code> before the server starts” on page 156.
adi/server/ codecov.shutdown	CODECOV_PORT	8005	Defines the port on which the headless code coverage collection daemon listens for incoming coverage data. If you change the value, you also need to change it in the <code>codecov.startup</code> script and the <code>teamserver.properties</code> variable <code>com.ibm.dimez.dashboard.coverageHeadlessCC.port</code> . For more details, see “Server settings that need to be defined in <code>teamserver.properties</code> before the server starts” on page 156.
adi/elasticsearch/ config/jvm.options	-Xmx	2G	Determines the maximum memory allocated to elasticsearch.
	-Xms	2G	Determines the initial memory allocated to elasticsearch.

Server settings that need to be defined in teamserver.properties before the server starts

Before the server starts, you must set several settings that define the behavior and storage locations of the ADI server. For example, the location of the databases or the location of the code coverage resource files. Those settings are provided through a properties file in the installation location: `adi/server/conf/adi/teamserver.properties`. You can learn more about the server settings that need to be defined in `teamserver.properties`.

Many settings have defaults. If you don't define them in the property file, those settings use the default values automatically. Therefore, if you want to change such a setting and you do not see it in the current file on your server, add the property with that new value. Make sure that you always stop the server first before you make any changes to the property file as some settings can also be set through the Administrative UI.

The following list provides the ADI-specific settings. For other settings in the file that is defined by the Jazz framework that ADI uses, see [Jazz Online Help](#).

Table 7. Server settings that need to be defined in teamserver.properties before the server starts		
Property Name	Default Value	Description
<code>com.ibm.dimez.dashboard.coverageFileStoragePath</code>	<code>adi/server/conf/adi/coverageFileStorage</code>	<p>The location in which uploaded code coverage files will be managed. You need to back up the location together with the databases.</p> <p>If you change this value after the initial setup, make sure that you move all directories available in the old location to the new one to avoid breaking ADI's consistency.</p>
<code>com.ibm.dimez.dashboard.coverageFileStorageCheckoutTimeout</code>	60000	<p>For two server threads try to checkout the same coverage file directory at the same time for update, the property defines the amount of time the second threads waits to receive a file lock until it throws a timeout exception. If you see timeout errors frequently when you collect coverage files, increase this value.</p>

Table 7. Server settings that need to be defined in teamserver.properties before the server starts (continued)

Property Name	Default Value	Description
com.ibm.dimez.dashboard.coverageHeadlessCCFilePath	adi/server/conf/adi/headless-CC-files	<p>The base-directory in which the headless code coverage collector demon is placing code coverage files received by the collector. A subdirectory is available for every data provider. ADI collects files from there and move them into the coverageFileStorage location.</p> <p>If you change this value, you currently have to also change the same path in a second location: in adi/server/codecov.startup. [bat sh] change the value of the PROVIDERIDDIR variable. This operation configures the headless collection daemon process responsible for receiving coverage data from coverage engine over the net.</p>
com.ibm.dimez.dashboard.coverageHeadlessCC.port	8005	<p>The port of the headless collection daemon process under which code coverage data can be received. This value is only used for creating the Startup Key examples in the ADI UI.</p> <p>To change it, you must also change the value of the CODECOV_PORT variable in adi/server/codecov.startup.[bat sh].</p>

Server settings that can be defined at runtime in the /adi/admin user interface

When you navigate to the /adi/admin pages of your application, you find an **Advanced Properties** section. It defines variables that can change the ADI server's runtime behavior. Check for more information about variables defined in the /adi/admin from this topic.

An example for a direct URL to the /adi/admin page is <https://adi.example.com:9444/adi/admin?action=com.ibm.team.repository.admin.configureAdvanced>.

Table 8. Variables Defined in the /adi/admin Page

ADI Component Name	Task Name	Property Name	Default Value	Description
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.AuditScheduledTask	ADI Audit Log Writing Interval (seconds)	900	Defines the interval time logging the information to log files for auditing. Reduce this value if you want the log file to be recorded more often.

Table 8. Variables Defined in the /adi/admin Page (continued)

ADI Component Name	Task Name	Property Name	Default Value	Description
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.AuditService	ADI Service - Cache Size	100	Defines the maximum size of the cache for log files. Increase this value if your log records are run out of memory.
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.DataCollectionService	Data Collection Data Provider - IBM Code Coverage Data - Heap Memory	512M	Defines the maximum heap memory size (by using the -Xmx JVM parameter) to be defined for the data collection jobs that collect code coverage data. Change this value if your data collections report out of memory errors.
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.DataCollectionService	Data Collection Data Provider - Operations Data from OMEGAMON for CICS - Heap Memory	512M	Defines the maximum heap memory size (by using the -Xmx JVM parameter) to be defined for the data collection jobs that collect operations data from IBM OMEGAMON for CICS. Change this value if your data collections report out of memory errors.

Table 8. Variables Defined in the /adi/admin Page (continued)

ADI Component Name	Task Name	Property Name	Default Value	Description
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.DataCollectionService	Data Collection Data Provider - Static Analysis Data from IBM Application Discovery - Heap Memory	512M	Defines the maximum heap memory size (by using the -Xmx JVM parameter) to be defined for the data collection jobs that collect static analysis data from IBM Application Discovery. Change this value if your data collections report out of memory errors.
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.DataCollectionService	Data Collection Data Provider - Data Scrub Interval (hours)	24	The time interval in hours between executions of the scheduled data scrubbing background task.
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.DimezAutoCollectionScheduleTask	ADI Data Collection Schedules Task Fixed Delay (seconds)	900	The time interval in seconds at which ADI checks whether to perform another data collection or not from code coverage or IBM Application Discovery data providers. By default, ADI checks every fifteen minutes. Each scheduled code coverage or IBM Application Discovery data provider checks whether the specified amount of time has passed or not. And if yes, ADI runs a new collection.

Table 8. Variables Defined in the /adi/admin Page (continued)

ADI Component Name	Task Name	Property Name	Default Value	Description
ADI Warehouse Collections and Access	com.ibm.dimez.dashboard.service.internal.OmDataAutoCollectionScheduleTask	ADI Operations Data Collection Schedules Task Fixed Delay (seconds)	300	The time interval in seconds at which ADI checks whether to perform another data collection or not from the OMEGAMON for CICS data provider. By default ADI checks every five minutes. Each scheduled OMEGAMON for CICS data provider checks whether the specified amount of time has passed or not. And if yes, ADI runs a new collection. If you want ADI to check more frequently, you can change the value. However, currently, changing the value is not recommended to ensure that you collect for each 5-minute slot. However, if your IBM OMEGAMON for CICS server is not able to provide all of its data within a 5-minute timeframe, you need to set this value to a larger value that reflects your IBM OMEGAMON for CICS performance.

Generating sample data for evaluation

For ADI, you can generate two types of sample data in order to evaluate the ADI functionality, that is, OMEGAMON for CICS data and Application Discovery data.

Generating OMEGAMON for CICS data

You can learn how to generate OMEGAMON for CICS data as sample data to evaluate the ADI functionality.

Complete the following steps to generate OMEGAMON for CICS data.

1. Navigate your browser to ADI admin page `https://<fully qualified hostname>:9443/adi/admin`.
2. Log on with Jazz administrator user ID and password. **Application Administration** page appears.
3. Click **ADI Data Generation** to go to the data generation page.
4. Select **OMEGAMON for CICS** card. The form of **Data Generation Settings** for OMEGAMON for CICS appears.
5. Fill in the following information in **Data Generation Settings**. For more information about terms, see Chapter 2, “Terminology overview,” on page 5

Note: For evaluation purpose, you can leave all the default values in the **Data Generation Settings** form.

- **Plex:** Name of a CICS plex that you want to generate data.
 - **Days:** Number of days to create the data.
 - **Goal Response Time:** Goal response time that you want to set as threshold in microseconds.
 - **Project Areas:** Select the project area where you want the data generator to store. By default, it is your current project area.
6. Click **Generate** to generate OMEGAMON for CICS data as sample. Upon finish, you will see the message showing the data generation has completed. The OMEGAMON for CICS data provider with sample data appears in the list of data providers on the **Providers** page. You can then go to the **Workbooks** page to create an Analysis workbook by using the generated OMEGAMON for CICS data provider.

Generating Application Discovery data

You can learn how to generate Application Discovery data as sample data to evaluate the ADI functionality.

Complete the following steps to generate Application Discovery data.

1. Navigate your browser to ADI admin page `https://fully qualified hostname:9443/adi/admin`.
2. Log on with ADI administrator user ID and password. **Application Administration** page appears.
3. Click **ADI Data Generation** to go to the data generation page.
4. Select **Application Discovery** card. The form of **Data Generation Settings** for Application Discovery appears.
5. Fill in the following information in **Data Generation Settings**. For more information about terms, see Chapter 2, “Terminology overview,” on page 5.

Note: For evaluation purpose, you can leave all the default values in the **Data Generation Settings** form except the data points. If you use Derby as database for evaluation, you may want to reduce number of data points to be generated.

- **Data Points:** Number of data points that you want to generate. One data point represents one data set that ADI collected from Application Discovery.
 - **Time Interval:** Time interval in hours that you want to simulate the data collection.
 - **Project Areas:** Select project area where you want the data generator to store. By default, it is your current project area.
6. Click **Generate** to generate Application Discovery data as sample. Upon finish, you will see the message showing the data generation has completed. The Application Discovery data provider with sample data appears in the list of data providers on the **Providers** page. You can then go to the **Workbooks** page to create an Analysis workbook by using the generated Application Discovery data provider.

Business Rule Discovery API

Starting from V5.1.0, IBM ADDI provides Business Rule Discovery APIs that allow users to access Business Rule Discovery repository through REST services. You can use the REST services to read, write, and manage Business Rule Discovery data directly through Swagger UI or connect to other third-party tools without using Swagger UI.

The Business Rule Discovery REST APIs are documented within IBM ADDI build by Swagger UI. To find the API documentation after you install ADI, open your browser and go to `https://<ADI_HOSTNAME>:<ADI_PORT>/addi-brd/swagger-ui.html`, for example, `https://localhost:9443/addi-brd/swagger-ui.html`.

You can find the following APIs available.

- **bt-folder-storage-resource:** Services to add, update, delete, and query the contents of business term hierarchy folders.
- **business-term-storage-resource:** Services to add, update, delete or get business terms and their information.
- **implementation-name-storage-resource:** Services to add, update, delete or get implementation names.
- **metric-storage-resource:** Services to get keywords paging information.
- **project-storage-resource:** Services to manage information for IBM Application Discovery (IBM AD) projects.
- **relationship-storage-resource:** Services to manage relationship of business terms information.
- **snippet-storage-resource:** Services to add, update, delete or get snippets and their information.
- **user-resource:** Service to indicate user for API calls.
- **workbook-storage-resource:** Services to manage workbook setting information.

Using APIs out of Swagger UI

You can use API out of Swagger UI, for example, using API in another REST client tool or making your own REST calls through programs. In addition to the REST service URL and the API definition, you need username, password, and CSRF token. The CSRF token is a must-have header (X-XSRF-TOKEN) if you are making a **POST/PUT/DELETE** request.

To get your CSRF token, you have to make a **GET** call to `https://<ADI_HOSTNAME>:<ADI_PORT>/addi-brd/api/csrf`. You can find this REST service in **project-storage-resource**.

Using XML instead of JSON

By default, API returns results in JSON. If you need XML as responses, you need to set request header "Accept" with value "application/xml".

Note: For V5.0.5, the online documentation will use JSON and nothing is changed to be XML. It will be fixed in future releases.

Chapter 6. Preparing external data sources

You can learn how to prepare code coverage results for batch applications, CICS, COBOL, PL/I and Java.

Preparing code coverage results for COBOL and PL/I

You can learn how to prepare code coverage results for batch applications, CICS, COBOL, and PL/I.

There are four scenarios for ADI headless code coverage collection:

1. RDz v901x - no headless CC - client UI required.
Integrated Debugger (DIRECT) and Debug Tool (TCPIP) are both supported.
2. RDz v91x, v95x - headless on client (Windows, Linux)
Integrated Debugger (DIRECT) and Debug Tool (TCPIP) are both supported.
Headless on z/OS Debug Tool (TCPIP) only (not relevant for ADI).
3. IBM Debug for z Systems v14
Headless on client (Windows, Linux) in Debug Tool Compatibility Mode (TCPIP)
No headless in Standard Mode (DIRECT with UI running)
Headless on z/OS, Debug Tool Compatibility Mode (TCPIP) only (not relevant for ADI)
4. IBM Developer for z Systems v14, IBM Developer for z Systems v14 Enterprise Edition
Headless on client (Windows, Linux) in Debug Tool Compatibility Mode (TCPIP)
No headless in Standard Mode (DIRECT with UI running)
Headless on z/OS, Debug Tool Compatibility Mode (TCPIP) only (not relevant for ADI)

Preparing code coverage results for batch applications

If you use IBM Developer for z Systems (IDz), you can learn how to generate the code coverage results for batch applications either by using the IDz client or by using the IDz headless mode.

Generating code coverage results by using the IDz client

You can learn how to generate code coverage results by using the IDz client.

Assumptions

Verify the assumptions before you prepare code coverage results by using IDz client.

- The tester or developer uses the IDz client to run the test.
- The program or a set of programs, such as LIST, MAP, XREF, and SOURCE, for which the code coverage results are being gathered should be compiled for debugging.
- The tester or developer starts the IDz with a new or existing workspace, defines a connection to the remote system if necessary, and connects to the remote system.
- The JCL for testing the batch application resides in a set of data sets.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results for batch applications by using IDz client.

1. Navigate to a JCL data set, for example, VENKATU.INS.QUOTE.JCL.
2. Open a batch JCL member file to test the Insurance quote batch application, example: INSQTE1.jcl.
3. Add a set of statements in the JCL RUN or GO step to execute the batch program in the code coverage mode, for example:

```
//CEE0PTS DO *  
TEST(,,DBM%VENKATU)  
ENVAR("EQA_STARTUP_KEY=CC,,testid=INSQTE1")  
/*
```

Note:

- a. The above set of statements are additional directives to run or execute the batch program in code coverage mode.
 - b. VENKATU is the user id, which is optional.
 - c. EQA_STARTUP_KEY=CC indicates that the code coverage mode and the testid parameter, INSQTE1, are to pass in the name of the test case or a unique ID to be associated with the generated code coverage results.
4. Save the JCL by right clicking in the Editor or the JCL member and click **Submit**.
 5. Click any of the buttons on the dialog that pops up after the submission:
 - Click **Locate Job** to go to the node where the job status can be viewed.
 - Click **Notify** to update the status bar when the job finishes execution.
 - Click **OK** to close the dialog.

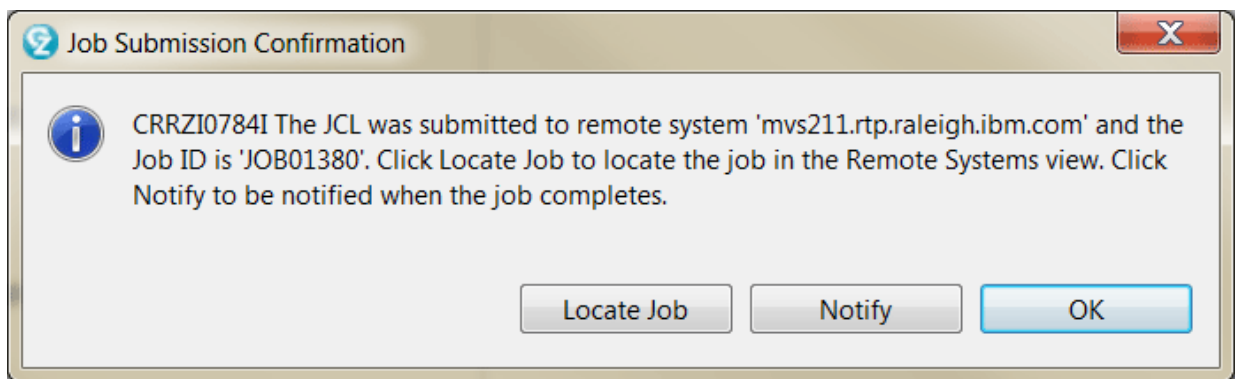


Figure 1. Dialog showing the successful submission of the job

6. On successful execution, view the code coverage results from the current run in the Code Coverage Report.

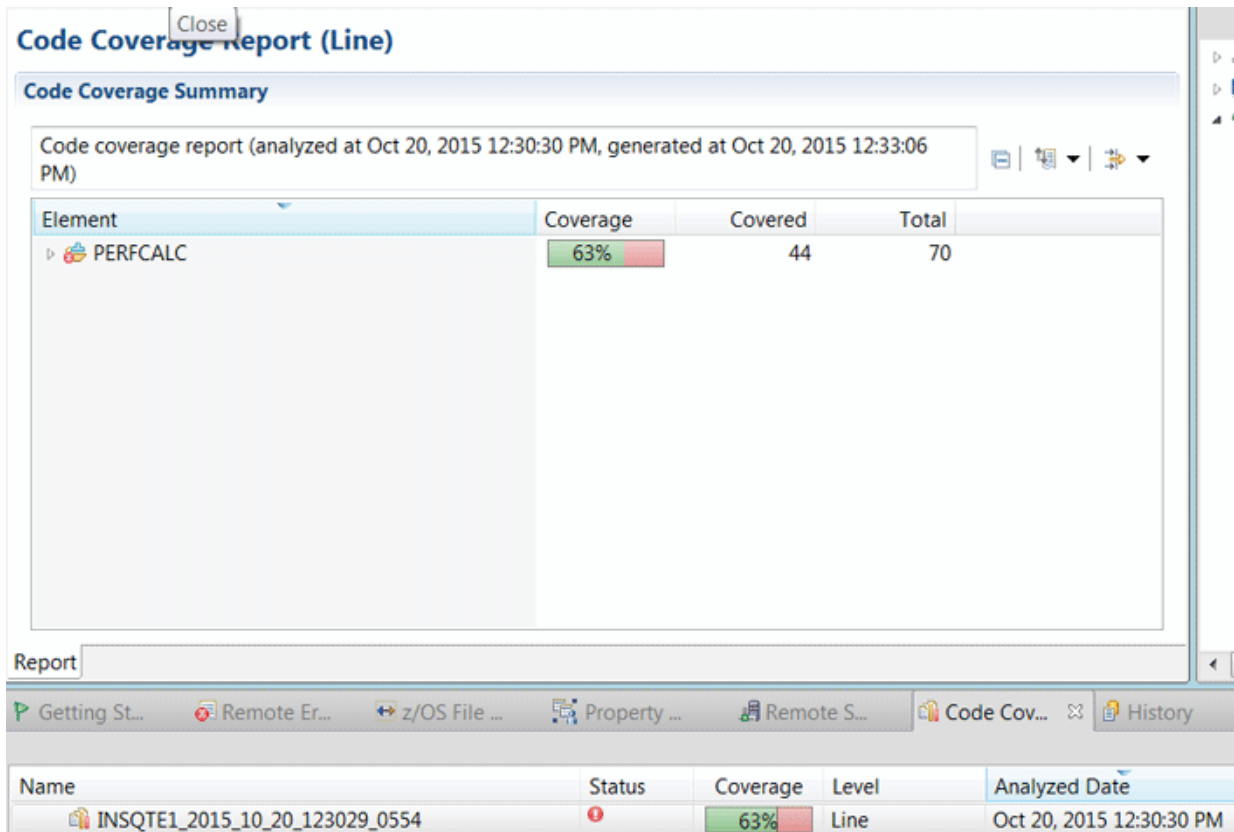


Figure 2. Sample showing the Code coverage result displayed in Code Coverage results view

7. Right click the code coverage result and select **Export**.

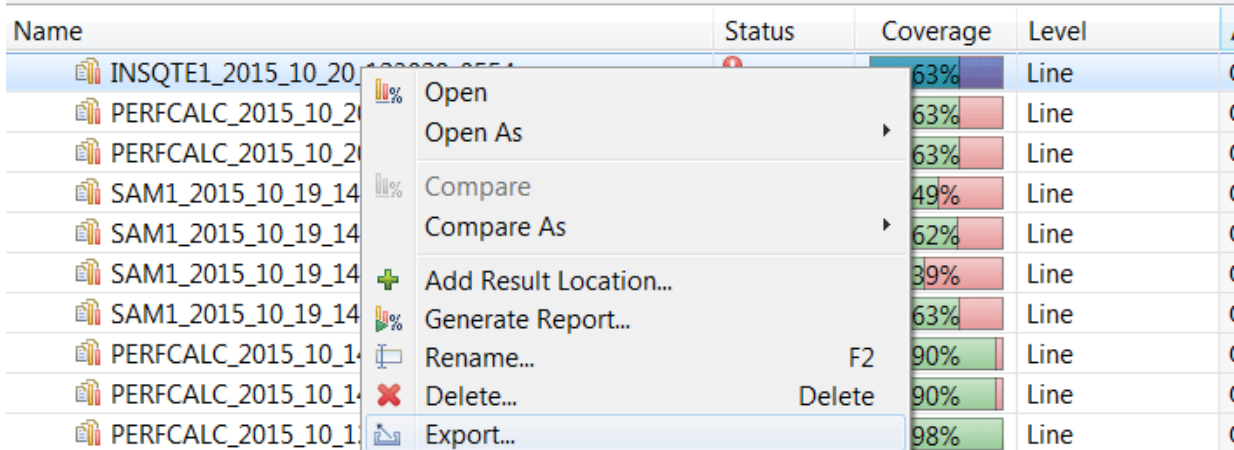


Figure 3. Sample showing the Export menu in Code coverage results view

8. In the dialog that pops up, browse to the location on the file system to where the result is exported to, and specify a name for the output file. This will create a compressed file with the code coverage results from the test run.

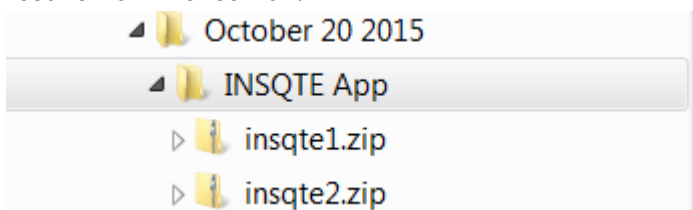


Figure 4. Sample showing file system organization of code coverage results

- Repeat steps 1 - 8 for running the other JCL scripts that are intended to test the same build of the same application and export the code coverage results to the same location. .

Generating code coverage results by using the headless collector running on ADI server

You can learn how to generate code coverage results by using the headless collector running on ADI server. Verify the assumptions before you perform this activity.

Assumption

Verify the assumption before you prepare code coverage results by using the headless code coverage collector.

The ADI server is started and running. As a part of the ADI startup, the headless code coverage collector daemon is started.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results by using the headless code coverage collector.

- Create the data provider by following the instructions in [“Adding a Manual Builds data provider to collect data automatically”](#) on page 200.
- On the **Data Providers** page, click the **Options Menu** icon on the data provider card you created. The options menu appears.
- Select **Copy Startup Key** from the options menu to copy the startup key to clipboard.
- To see the startup key example, select **Edit** from the options menu. On the **Edit Data Provider** page that appears, you can see a **Startup key example** section similar to the following snippet.

Startup key example

```
TEST(,,TCPIP&insurance.example.com%8005:*)
ENVAR("EQA_STARTUP_KEY=CC,,providerid=BGMT7L,testid=<fill in your test-id>")
```

- Provide the startup key example on your screen to the test team to insert it into the JCL. In this case, take the one with providerid=BGMT7L for example.

```
//CEE0PTS DD *
TEST(,,TCPIP<adi server tcpip address>%8005:*)
ENVAR("EQA_STARTUP_KEY=CC,,providerid=BGMT7L,testid=<your test-id>")
/*
```

Notes:

- The providerid is unique and case-sensitive. Make sure that you copy exactly the same providerid on your screen.
- The testid that you specify for a test is also case-sensitive and needs to be unique within a provider to distinguish it from other tests. If you specify a test into two locations (for example, because the test is split into two parts), enter the testid with same spelling and casing. To specify a testid that has either blanks or commas, you must enclose it in paired single quotation marks, for example, testid='a test id'.

The IP address is the IP address of the ADI server machine where the code coverage collector daemon is running. It can be the IP address or the DNS name of the server. Submitting this JCL results in the code coverage for the test case with test case id HDLS6 to be generated to the ADI server for automatic collection. The providerid parameter ensures that the results are grouped to the appropriate data provider. Code coverage files are saved to the directory **adi-server location \adi\conf \headless-CC-files\providerid-file\program_datetime_id.cczip**. When you refresh the data provider, these code coverage files are deleted.

Preparing code coverage results for CICS transactions by using the debug tool backend and IDz client

By using the debug tool backend and IDz client, you can prepare code coverage results for CICS transactions.

Assumptions

Verify the assumptions before you prepare code coverage results for CICS transactions by using the debug tool backend and IDz client.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results for CICS transactions.

Complete the following steps to generate code coverage results for CICS transactions by using Debug Tool backend and IDz client.

1. Create a DTCN profile to collect the code coverage results for a transaction.

```
DTCN                      Debug Tool CICS Control - Primary Menu                      S11CICP6
                          * TSQ storage method *
Select the combination of resources to debug (see Help for more information)
Terminal Id              ==> 1056
Transaction Id           ==>
LoadMod::>CU(s)         ==>           ::>           ==>           ::>
                        ==>           ::>           ==>           ::>
                        ==>           ::>           ==>           ::>
                        ==>           ::>           ==>           ::>
User Id                  ==> VENKATU
NetName                  ==>
IP Name/Address          ==>
Select type and ID of debug display device
Session Type             ==> TCP                      MFI, TCP
Port Number              ==>                      TCP Port
Display Id               ==> 9.55.148.44
```

Figure 5. Screen showing the DTCN profile creation primary menu

2. Specify User Id, Session Type to be TCP, and IP Address pointing to the IDz instance where the code coverage results would be displayed. Specify the port on which the debug daemon on the client runs. The default port is 8001.

Press **PF9** and enter the following ENVAR ("EQA_STARTUP_KEY=CC,,testid=seps4") as shown in Figure 2 below.

```
DTCN                      Debug Tool CICS Control - Menu 2                      S11CICP6
Select Debug Tool options
Test Option              ==> TEST                      Test/Notest
Test Level               ==> ERROR                     All/Error/None
Commands File            ==> *
Prompt Level             ==> PROMPT
Preference File          ==> *
EQAOPTS File             ==>
Any other valid Language Environment options
==> ENVAR("EQA_STARTUP_KEY=CC,,testid=seps4")
```

Figure 6. Screen showing DTCN secondary menu to specify the Code coverage invocation environment variable

The ENVAR is the directive to capture code coverage and the testid parameter is for passing in the test case id. Press **PF3** and then **PF4** to save the profile.

On the IDz client, click Window > Open Perspective > Debug to switch to the debug perspective and check the daemon which is listening on the specified port as shown in Figure 3 below. The default port is 8001.

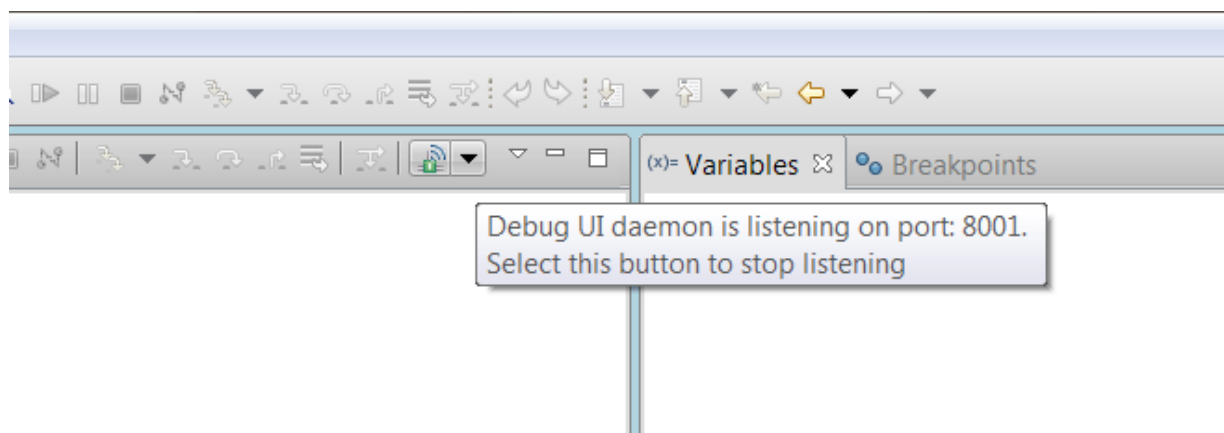


Figure 7. Screen shot showing the verification of debug daemon running

3. Run the transaction, for example, SEPS.
4. Get the code coverage results in the IDz code coverage view.

Name	Status	Coverage	Level	Analyzed Date	Addition
Compiled Code Coverage Workspace Results					
SEPS100_2015_10_23_144214_0503		46%	Line	Oct 23, 2015 2:42:23 PM	
SEPS100_2015_10_23_143901_0295		57%	Line	Oct 23, 2015 2:39:15 PM	
SEPS100_2015_10_23_142307_0419		22%	Line	Oct 23, 2015 2:23:15 PM	
SEPS100_2015_10_23_141709_0763		53%	Line	Oct 23, 2015 2:17:21 PM	
SEPS100_2015_10_23_140340_0168		48%	Line	Oct 23, 2015 2:03:50 PM	

Figure 8. Screen showing the Code Coverage result in the Code Coverage results view

5. Right-click each of the results and export the results into a compressed file.

Preparing code coverage results for COBOL and PL/I by using RTC

You can generate code coverage results for COBOL and PL/I by using automated builds provided by IBM Rational Team Concert Enterprise Extensions (RTC EE). Also, you can connect ADI to this RTC EE server to collect the code coverage data automatically.

Take the following procedures to set up RTC builds to generate the coverage data. For details about how to configure ADI to connect to RTC and retrieve the data, see [Adding a Rational Team Concert builds provider](#).

Assumptions

Verify the assumptions before you prepare code coverage for COBOL and PL/I by using RTC.

- The development team uses RTC EE for z Systems Build component to build their COBOL and PL/I artifacts and run either automated or manual tests as part of that build process.
- A set of build definitions are created for the COBOL and PL/I applications being managed by RTC EE. For more information, see [Setting up Enterprise Extension builds](#).
- RDz provided *Host Utilities (GI13-2864)* that offers the headless Code coverage support, which is installed and configured on the z/OS machine. For more information, see Chapter 6 in [IBM Rational Developer for z Systems: Configuration Guide](#).
- The test team uses the RDz provided [headless Code Coverage](#) setup to automatically generate code coverage results files when you run a build.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage for COBOL and PL/I by using RTC.

Extend the existing build definition to submit a set of JCL that triggers a manual or automated test after a successful build.

1. Use the Eclipse RTC client and select the project for which you would want to run the tests and capture code coverage results as part of the build process.
2. Make sure that you installed all the binaries required by the build engine, that is, the correct version of Ant or Maven that your build scripts would be using.
3. In other RAD online help pages, there are steps for installing additional binaries on the build engine such as the Eclipse Birt libraries. This is not required for use with ADI, as ADI provides its own presentation of the code coverage results and does not require the Birt-based processing of the data described there.

On your Eclipse RTC rich client.

Create an Ant post build script

1. Start your Eclipse RTC rich client and select the project or application for which you want to run the tests and gather code coverage results as part of the Build process. If no projects are loaded, follow the standard RTC flow to load the project(s).
2. Refer to the following postbuild.xml sample to create an Ant script. You can start with the provided sample and modify as appropriate.

```
<?xml version="1.0" encoding="UTF-8"?>
<!--=====
This Ant script calls the code coverage headless script
using the properties defined in the build definition.
=====-->
<project name="Code Coverage" default="all"
xmlns:jazz="antlib:com.ibm.team.enterprise.anttasks"
xmlns:ac="antlib:net.sf.antcontrib" >
  <taskdef resource="net/sf/antcontrib/antcontrib.properties"/>

  <description>
    This Ant file is used to run the Code Review and Code Coverage
    applications. It publishes the results to the RTC repository.
  </description>

  <taskdef classname="com.ibm.team.build.ant.task.ArtifactFilePublisherTask"
name="artifactFilePublisher"/>
  <taskdef name="junitLogPublisher"
classname="com.ibm.team.build.ant.task.JUnitLogPublisherTask" />
  <taskdef name="nunitLogPublisher"
classname="com.ibm.team.build.ant.task.NUnitLogPublisherTask" />

  <target name="main">
    <property name="temp.dir" value="${team.enterprise.scm.fetchDestination}/tmp"/>
    <mkdir dir="${temp.dir}"/>
    <property name="rexx.dir" value="${jcl.dir}"/>

    <!-- Convert and add execute permission -->
    <exec executable="iconv" output="${rexx.dir}/getJobRC.rexx"><arg line="-f UTF-8 -
t IBM-1047 ${rexx.dir}/getJobRC.rexx"/></exec>
    <chmod perm="755" file="${rexx.dir}/getJobRC.rexx"/>

    <!-- Convert and add execute permission -->
    <exec executable="iconv" output="${jcl.dir}/renameZipFile.sh">
      <arg line="-f UTF-8 -t IBM-1047 ${jcl.dir}/renameZipFile.sh"/>
    </exec>
    <fixcrlf srcdir="${jcl.dir}" includes="renameZipFile.sh" cr="remove" />
    <chmod perm="755" file="${jcl.dir}/renameZipFile.sh" verbose="true"/>

    <ac:for list="${jcl.list}" param="jobname" >

      <sequential>

        <echo message="*** Job to be executed @${jobname}" />
        <property name="job" value="@${jobname}" />
        <echo message="job property = ${job}" />

        <antcall target="startCodeCoverageDaemon" />

        <!-- Wait until the debug daemons are available for running code
coverage sessions -->
        <waitfor maxwait="3" maxwaitunit="minute" checkevery="5000">
          <and>
            <socket server="${IP}" port="${CC.PORT_1}"/>
          </and>
        </waitfor>
      </sequential>
    </ac:for>
  </target>
</project>
```

```

        </waitfor>

        <echo message="Submit ${job} job" />
        <submitJCL src="&quot;/'${resourceTeamPrefix}.JCL(${job})'&quot;"/>

        <!-- Stop the code coverage debug daemon that is listening -->

        <exec executable="${RDZ_UTIL_BIN}/ccstop" dir="$
{team.enterprise.scm.fetchDestination}" spawn="true">
            <env key="JAVA_HOME" value="${JAVA_HOME}"/>
            <arg line = "${CC.PORT_1}"/>
        </exec>

        <waitfor maxwait="3" maxwaitunit="minute" checkevery="5000">
            <and>
                <available file="${team.enterprise.scm.fetchDestination}/cc/
results_${buildLabel}/cc_done" />
            </and>
        </waitfor>

        <delete file="${team.enterprise.scm.fetchDestination}/cc/results_$
{buildLabel}/cc_done" />

        <exec executable="${jcl.dir}/renameZipFile.sh" dir="${jcl.dir}">
            <arg line = "${team.enterprise.scm.fetchDestination}/cc/results_$
{buildLabel}"/>
            <arg line = "HospitalApplication-CC-${buildLabel}-${job}.cczip"/>
        </exec>

        <!-- Publish Code Coverage Results -->

        <antcall target = "publishResults"/>

        <var name="job" unset="true"/>

    </sequential>

</ac:for>

</target>

<!--=====
Start the daemon listener for code coverage. This task is run as
a daemon because the end of it will never be reached (gets stuck in the
exec task)
=====-->

<target name="startCodeCoverageDaemon">

    <exec executable="${RDZ_UTIL_BIN}/ccstop" dir="$
{team.enterprise.scm.fetchDestination}" spawn="true">
        <env key="JAVA_HOME" value="${JAVA_HOME}"/>
        <arg line = "${CC.PORT_1}"/>
    </exec>

    <waitfor maxwait="3" maxwaitunit="minute" checkevery="5000">
        <and>
            <available file="${team.enterprise.scm.fetchDestination}/cc/results_$
{buildLabel}/cc_done" />
        </and>
    </waitfor>

    <delete file="${team.enterprise.scm.fetchDestination}/cc/results_${buildLabel}/
cc_done" />

    <property environment="env"/>

    <mkdir dir = "${team.enterprise.scm.fetchDestination}/cc/results_${buildLabel}"/>

    <mkdir dir = "${team.enterprise.scm.fetchDestination}/cc_1/workspace"/>

    <!-- Invoke the headless code coverage using the ccstart command, the required
parms are passed in via the arg line -->

    <exec executable="${RDZ_UTIL_BIN}/ccstart" dir="$
{team.enterprise.scm.fetchDestination}" spawn="true">
        <env key="JAVA_HOME" value="${JAVA_HOME}"/>
        <arg line = "-port=${CC.PORT_1}"/>
        <arg line = "-zipresult"/>

```



```

        <arg line = "-output=${team.enterprise.scm.fetchDestination}/cc/results_${buildLabel}"/>
        <arg line = "-prevresultpath=PREV"/>
        <arg line = "-reportformat=HTML"/>
        <arg line = "-data ${team.enterprise.scm.fetchDestination}/cc_1/workspace"/>
        <arg line = "-savesource"/>
    </exec>

    <!-- Nothing else in this task can be reached! This task gets stuck in the exec
because the program is a daemon-->

    <touch file="${team.enterprise.scm.fetchDestination}/cc/results_${buildLabel}/cc_done" />

</target>

    <!-- Submits the JCL -->
    <macrodef name="submitJCL">
        <attribute name="src"/>
        <attribute name="sleepInterval" default="5"/>
        <attribute name="ignoreRC" default="0"/>
        <sequential>
            <antcall target="doJCLSubmission">
                <param name="src" value="@{src}"/>
                <param name="sleepInterval" value="@{sleepInterval}"/>
                <param name="ignoreRC" value="@{ignoreRC}"/>
            </antcall>
        </sequential>
    </macrodef>

    <target name="doJCLSubmission">
        <property name="output.file" value="${temp.dir}/getJobRC.out"/>
        <property name="result.file" value="${temp.dir}/getJobRC.result"/>
        <delete file="${result.file}"/>
        <exec executable="submit" outputproperty="job.id"><arg line="-j ${src}"/></exec>
        <echo message="Submitted JCL from ${src}. Job ID: ${job.id}"/>
        <exec executable="${rexx.dir}/getJobRC.rexx" output="${output.file}"
append="false">
            <arg value="${job.id}"/>
            <arg value="${result.file}"/>
            <arg value="${sleepInterval}"/>
        </exec>
        <echo message="*** REXX output ***"/>
        <exec executable="cat"><arg value="${output.file}"/></exec>
        <echo message="*** End REXX output ***"/>
        <exec executable="cat" outputproperty="job.maxRC">
            <arg value="${result.file}"/>
        </exec>
        <fail message="Mac RC from ${src} was: ${job.maxRC}">
            <condition>
                <and>
                    <not><equals arg1="${job.maxRC}" arg2="0"/></not>
                    <not><equals arg1="${job.maxRC}" arg2="${ignoreRC}"/></not>
                    <not>
                        <and>
                            <isset property="shouldIgnoreWarnings"/>
                            <or>
                                <equals arg1="${job.maxRC}" arg2="1"/>
                                <equals arg1="${job.maxRC}" arg2="4"/>
                            </or>
                        </and>
                    </not>
                </and>
            </condition>
        </fail>
    </target>

    <!--=====
Execute an additional artifactFilePublisher command to upload the coverage result zip
file to that it appears in the downloadable artifacts section of a build result, i.e. the
Downloads section of a build result editor in the RTC rich client. The extension of the file
should be .cczip and .zip so that ADI easily can find and download the file when
communicating with the RTC server. =====-->
    <target name="publishResults">

        <artifactFilePublisher repositoryAddress="${repositoryAddress}"
            userId="${userId}" passwordFile = "${passwordFile}"
buildResultUUID="${buildResultUUID}"
            filePath="${team.enterprise.scm.fetchDestination}/cc/results_${buildLabel}/HospitalApplication-CC-${buildLabel}-${job}.cczip"
            label="${job} Code Coverage Results for batch COBOL source for SaylesDemo - Hospital Application"
            verbose="YES">

```

```

        </artifactFilePublisher>

        <delete dir="${team.enterprise.scm.fetchDestination}/cc/results_${
{buildLabel}}" />

        </target>
        <target name="all" depends="main" />

    </project>

```

- The `{jcl.dir}` and `{jcl.list}` parameters in the previous ANT script define the location of the set of JCL to be submitted and the list of JCL to be submitted. This information is conveyed to the build definition by using the Properties tab of the Build definition. See the following example.

Build Definition

ID: Hospital Application build Project or Team Area: SaylesDemo

Properties

Name	Value	Description
base_dir	/usr/lpp/rdutil/cr	
CC-PORT_1	17351	
cr.pds	MERRILLHOSPITALCOBOL	
DB2Subsys	DSNB	
debug	TEST,ADATA,EXIT(ADEXIT(ELAXMGUX))	
JP	mvs255.rtp.raleigh.ibm.com	
JAVA_HOME	/var/java1701_64/j7.1_64	
jcl.dir	\${team.enterprise.scm.fetchDestination}/HospitalDemo	location of source project
jcl.list	TRTMNT1,TRTMNT2,TRTMNT3	List of jcl members to be executed (** DO NOT INCLUDE THE 'jcl' exte...

- Then specify the ANT script as a "post build script" as part of the RTC EE build definition. Select the associated build definition for the project from the Work Items perspective, open the build definition, navigate to the z/OS Dependency Build tab, and add the location of the created ANT script as shown below:

Build Definition

ID: Hospital Application build Project or Team Area:

General | Dependency Options | Request Options

Build File and Targets

☒ Generate a build file from these language definitions

REXX exec (Scrum Demo Project)
Text Files (Scrum Demo Project)
Plan Bind (Scrum Demo Project)
COBOL compilation (DB2) and link-edit and Bind (Scrum Demo Project)

Add...
Remove
Move Up
Move Down

☐ Use an existing build file

Specify a custom build file and the targets to be invoked. Properties can be referenced using `${propertyName}`.

Build file:*

Build targets:

☐ Trust build outputs

☐ Delete obsolete outputs

☐ Publish build map links

☐ Reuse ISPF Session

Frequency of updates to the number of buildable files pre-processed in the build report contribution summary:

BPXWDYN Options:

Pre-build script:

Post-build script:

☒ Always run post-build script

5. Now you can run your build. When you finish, verify in IDz Eclipse client by opening the build result editor that you have coverage results available in a Coverage tab. Check the Downloads tab that for a coverage .cczip file available for downloads.
6. You are now ready to consume these build results with ADI.
 - a. For information about setting up an ADI data provider that connects to your RTC server and build definition, see [“Adding a Rational Team Concert Builds data provider”](#) on page 207.
 - b. For how to collect the coverage from the latest build available in ADI, see [“Refreshing the builds and code coverage data”](#) on page 209.

Preparing code coverage results for Java

You can learn how to prepare code coverage results for Java by using IBM Rational Application Developer for WebSphere Software (RAD) v9.5.0.1, v9.6, or v9.6.1 or newer.

Preparing code coverage results by using the RAD code coverage solutions

You can choose to generate code coverage results either by using IBM Rational Application Developer (RAD) client or IBM Rational Team Concert (RTC) with RAD Quality Extensions.

Preparing code coverage results for Java by using the RAD client

You can generate code coverage results for Java by using the IBM Rational Application Developer for WebSphere Software (RAD) version 9.5.0.1, 9.6, or 9.6.1.

Assumptions

Verify the assumptions before you prepare code coverage results by using RAD client.

- The developer has written JUnit tests for his Java classes.
- The tester or developer uses the RAD environment to run individual JUnit tests manually.
- The tester has the optional Code Coverage capability that is installed in their RAD environment. And the tester uses the latest version 9.5.0.1, 9.6, or 9.6.1 that provides the Enhance Code Coverage capability.
- The tester uses only the Enhanced Code Coverage Test Runner to receive JUnit test-specific coverage results and exports each result as it owns results file for ADI.
- The tester runs all tests for each of new build of his code base again.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results for Java by using RAD client.

In RAD:

1. Review the details for "Determining Code Coverage" in either the [RAD 9.5 Online Help](#) or the [RAD 9.6.1 Online Help](#). Familiarize yourself with the options available to generate code coverage results. A main difference of RAD 9.6 and 9.6.1 is the ability to include the source code files into the exported code coverage files, which will enable many additional source code change-based analytical capabilities in ADI. For example, only with the sources included can ADI compute metrics of line changes and changed lines covered.
2. Set up a Java project in RAD with the code base of the current build under test.
3. Follow the steps described in "Configuring the JUnit test runner for enhanced code coverage" in the [RAD 9.5 Online Help](#) and the [RAD 9.6.1 Online Help](#) respectively to enable the enhanced coverage runner for a specific test.
 - Switch on Code Coverage in the Project Properties dialog. For RAD 9.6 or newer version, make sure you select the "Save source" check box as it will enable change-based metrics in ADI.
 - Create a new Run Configuration for each test so that you can run each test individually or an entire Test Suite. Make sure you select the "JUnit 4 with Enhanced Code Coverage" JUnit runner in each of your configurations.

- You can decide on the granularity of the test that ADI will recognize by defining the Run Configuration to compose of just one JUnit test class or even one test method; or even a whole set of test classes by grouping them into a JUnit test suite and defining a Run Configuration for that suite.
4. Execute the Run Configuration created in Step 3.
 5. The code coverage results for the executed configuration will appear at the top of the Code Coverage Results view in RAD. See [Accessing the code coverage results view](#) in the RAD online help.
 6. Right-click the new result and select **Export...** from the context menu. Also, see [Import and export results](#) in the RAD online help for more information.

In RAD 9.6 or newer version, you can simply specify the location folder to export the cczip file that ADI can read.

In RAD 9.5.0.1, you need to export two files and zip them up yourself.

- a. In the dialog, select **Coverage Data** and **Project Baseline** as the artifacts to export.
 - b. Specify a destination folder where to export.
 - c. Click **Finish**.
 - d. Navigate to the destination folder you specified in Windows Explorer. Then you see exported files.
 - e. Select the two files and create a zip file. Do not select the parent folder as the zip file must not contain any folders.
7. Rename the zip file to the name of your test.
 - This step is important as the name of the zip file will determine the name of the test as it appears in ADI.
 - If you ran this test before for an earlier build of your code base you must make sure that the name is exactly the same as before so that ADI can map the test and compare its current results against it earlier results.
 - For example, if you ran a JUnit test called com.example.app1.ExampleTest then you want to name the zip file com.example.app1.ExampleTest.zip and upload it with that name to ADI. When you create a new build of your code base and rerun the test to find regression, you want to again export the coverage results after the test completed, export the files and zip them and then call the zip file exactly the same as before so that ADI can compare the result of the first with the second test.

In ADI:

1. Log on to ADI.
2. If you did not do so already, create a new Data Provider for your Java project. See [Adding a manual build provider](#) to collect data manually for details.
3. If you or another tester did not do so already, create a new Build that reflects your current code base under test. Note, that when multiple testers submit their results against the same build the assumption ADI makes is that they all used the exact same code base. See [Adding a build to a manual build provider when collecting data manually](#) for details.
4. Open the build information page and add the exported, zipped, and renamed code coverage files created in Steps 6 to 10. See [Updating an existing build](#) for details.
5. Review the results for this build in the Workbooks pages to confirm that the tests were correctly imported and that the coverage percentage is the same as seen in the RAD Coverage Results view. See [Code Coverage Reports and Information](#) for details.

Preparing code coverage results for Java by using RTC with RAD Quality Extensions

You can generate code coverage results for Java by using automated builds that are provided by IBM Rational Team Concert (RTC) and connect ADI to this RTC server to collect the code coverage data automatically.

Assumptions

Verify the assumptions before you prepare code coverage results by using RTC with RAD Quality Extensions.

- The development team uses RTC's Build component to build their Java project and run JUnit tests as part of that build.
- The development team uses the RAD Code Coverage Extension for RTC to automatically generate code coverage results files when running a build.
- The automated creation of code coverage files is limited to a coarse-grained definition of ADI test cases. In fact, the most common case is that the execution of all JUnit tests during a build results into one code coverage file, which is mapped to only one test in ADI, that is, all JUnit tests executed map to one ADI test. To achieve a lower level of granularity, you can break your build into smaller groups of test execution. Each execution would generate a code coverage file that covers the JUnit test executed in that unit to be mapped to one ADI test case. And each group results into a separate ADI test.

Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results by using RTC with RAD Quality Extensions.

On your RTC build engine machine:

1. Ensure that RAD Code Coverage Extensions are installed on the RTC build engine. For more information, see [Installing the Build System Toolkit](#) in the Jazz online help and [Installing code quality extension for continuous integration for Rational Team Concert builds feature using Installation Manager](#) in the RAD online help.
2. Also make sure that you installed all the binaries that are required by the build engine, for example, the correct version of Ant or Maven that your build scripts would be using.
3. In other RAD online help pages (referenced below), there are steps for installing additional binaries on the build engine such as the Eclipse Birt libraries. This is not required for use with ADI, as ADI provides its own presentation of the code coverage results and does not require the Birt-based processing of the data described there.

On your Eclipse RTC rich client.

Alternative 1: create an ANT build script

1. Start your Eclipse RTC rich client and follow the steps described in [Configuring a build definition in Rational Team Concert](#) in the RAD online help for creating a new build definition that use Ant on the build engine.
2. Follow Steps 1 to 3 and 5 of [Creating an Ant build script to generate code coverage statistics in remote build environments](#) in the RAD online help to create an Ant script that compiles and tests your code.
 - It is recommended that you start with the sample Ant script provided in [Sample Ant script \(build.xml\)](#) files for remote build environments and update/refine the script for your needs.
 - Step 5 described in [Publishing results to the Rational Team Concert server](#) in the RAD online help uses the `filePublisher` command to publish the coverage result and baseline files to the RTC server so that special RTC client extensions for Eclipse that are shipping with RAD and Rational Software Architect can show the results in a special Eclipse UI of the rich client. For ADI, you need to type a second command described in the next step.
3. In the Ant script, you need to execute an additional `artifactFilePublisher` command to upload the coverage result compressed file to that it appears in the downloadable artifacts section of a build result, that is, the **Downloads** section of a build result editor in the RTC rich client. It is strongly recommended that you rename the file before uploading for two reasons:

- a. The name of the zip file determines the name of the test in ADI under which the coverage results will be listed.
 - b. The extension of the file should be .cczip and .zip so that ADI can find and download the file when communicating with the RTC server. For more details, see [“Adding a Rational Team Concert Builds data provider”](#) on page 207.
4. Example for renaming and uploading the .cczip file:
- ```
<move file="${resultsDir}\Coveragedata-${buildLabel}.zip"
 tofile="${resultsDir}\Coveragedata-${buildLabel}.cczip" />

<artifactFilePublisher buildResultUUID="${buildResultUUID}"
 repositoryAddress="${repositoryAddress}" userId="${userId}"
 passwordFile="${passwordFile}" verbose="true"
 filePath="${resultsDir}\Coveragedata-${buildLabel}.cczip"
 label="Code coverage data file for ADI." />
```
5. Now you can run your build. When you finish, verify in the RSA or RAD Eclipse client by opening the build result editor that you have coverage results available in a Coverage tab. Check the Downloads tab for a coverage .cczip file available for downloads.
  6. You are now ready to consume these build results with ADI.
    - a. For setting up an ADI data provider that connects to your RTC server and build definition, see [“Adding a Rational Team Concert Builds data provider”](#) on page 207
    - b. For how to collect the coverage from the latest build available in ADI, see [“Refreshing the builds and code coverage data”](#) on page 209

#### *Alternative 2: create one or more Maven build scripts*

As an alternative to Ant, you can also use Maven to run your JUnit tests and collect code coverage data. The advantage of Maven is that, it organizes JUnit tests in the same Eclipse projects as the code under test and you could create an individual code coverage result easily for each project. Therefore, you can have a more fine-grained representation of tests in ADI, that is, one test for each Maven project.

1. To learn more about getting started with building with Maven, start from this topic on jazz.net: [A Jazz-based Maven build](#). You can learn the main idea for working with RTC from Maven to call the same Ant commands using Maven's ability to execute Ant commands.
2. When you create your RTC Build Definition for Maven, the key thing is that you provide all Ant properties to Maven as JVM arguments following a simple schema as in this example (just an example and not all the variables you might need):

```
-DbuildLabel=${buildLabel} -DrepositoryAddress=${repositoryAddress} -DbuildResultUUID=${buildResultUUID}
```

**Tip:** As the RTC Build Definition editor only provides a single line editor, it is better if you maintain the list of variable declarations in a text editor of your choice and then paste it into RTC when ready.

3. It is recommended that you add in each Maven project's POM file a profile that is only executed when running on a build engine to generate coverage data. In this way, you can still run Maven builds in your IDE without the need to generate code coverage data and update RTC build requests. For example, you can add a profile as follows.

```
<profiles>
 <profile>
 <id>build-engine</id>
 <activation>
 <property>
 <name>buildLabel</name>
 </property>
 </activation>
 <build>
 <plugins>
```

This profile checks for the existence of the buildLabel variable, which is defined by the RTC build engine. Therefore, it would only be executed when you run on a build engine and not during development when you run in your Eclipse IDE.

4. The following example now is one possible end-to-end way of defining the Maven profile. You can define this profile in each of your POM file or if you use a hierarchical POM file in your base pom file.

- The example uses the following variable that should be declared in the JVM variable section of the Maven RTC Build Definition. For more details of these variables listed, see last bullet point.

```
-DbuildLabel=${buildLabel} -DBuild_System_HOME=${Build_System_HOME} -DrepositoryAddress=${repositoryAddress} -DUserId=${UserId} -DPasswordFile=${PasswordFile} -DbuildResultUUID=${buildResultUUID} -Dllc-engine-plugin=${llc-engine-plugin} -Declipse-jdt-core-plugin=${eclipse-jdt-core-plugin} -Declipse-equinox-common-plugin=${eclipse-equinox-common-plugin} -Dllc-common-plugin=${llc-common-plugin} -Dllc-jvmti-library=${llc-jvmti-library}
```

- You can see the comments inside the following sample example. They map to the steps of the Ant sample script shown in the RAD Online help that was referenced previously.

```
<profile>
 <id>build-engine</id>
 <activation>
 <property>
 <name>buildLabel</name>
 </property>
 </activation>
 <build>
 <plugins>
 <plugin>
 <groupId>org.apache.maven.plugins</groupId>
 <artifactId>maven-antrun-plugin</artifactId>
 <version>1.8</version>
 <executions>
 <execution>
 <id>code-analysis</id>
 <phase>compile</phase>
 <configuration>
 <target>
 <!-- Analyze compiled src code:
Generating .probescript and .baseline -->
 <taskdef name="code-coverage-app-analyzer"

 <classpath>
 <fileset dir="${Build_System_HOME}/

codecoverage">
 <include name="${llc-engine-plugin}" />
 <include name="plugins/${eclipse-jdt-

core-plugin}" />
 <include name="plugins/${eclipse-

equinox-common-plugin}" />
 <include name="plugins/${llc-common-

plugin}" />
 </fileset>
 </classpath>
 </taskdef>
 <code-coverage-app-analyzer
 projectDir="${project.basedir}/target"
 probescript="${project.basedir}/$
{project.groupId}.${project.artifactId}.probescript"
 baseline="${project.basedir}/$
{project.groupId}.${project.artifactId}.baseline" />
 <taskdef name="startBuildActivity"

 <classpath>
 <fileset dir="${Build_System_HOME}/

buildtoolkit">
 <include name="*.jar" />
 </fileset>
 </classpath>
 </taskdef>
 <startBuildActivity buildResultUUID="$
{buildResultUUID}"
 repositoryAddress="${repositoryAddress}"
 userId="${UserId}"
 passwordFile="${PasswordFile}" verbose="true"
 autoComplete="true"
 label="Building and testing $
{project.groupId}.${project.artifactId}." />
 </target>
 </configuration>
 </plugin>
 </plugins>
 </build>
</profile>
```

```

 <goals>
 <goal>run</goal>
 </goals>
 </execution>
 <execution>
 <id>publish-cc-file</id>
 <phase>package</phase>
 <configuration>
 <target>
 <zip
 destfile="${project.basedir}/$
{project.groupId}.${project.artifactId}.zip"
 basedir="${project.basedir}"
 includes="${project.groupId}.${
{project.artifactId}.coveragedata"
 encoding="UTF-8" />
 <!-- Publish the code coverage results as RTC
contributions -->
 <taskdef name="filePublisher"

 classname="com.ibm.team.build.ant.task.FilePublisherTask">
 <classpath>
 <fileset dir="${Build_System_HOME}/
 <include name="*.jar" />
 </fileset>
 </classpath>
 </taskdef>
 <filePublisher buildResultUUID="${buildResultUUID}"
 repositoryAddress="${repositoryAddress}"

 passwordFile="${PasswordFile}"
 contributionTypeId="com.ibm.rational.llc.build.coverage"
 verbose="true"
 filePath="${project.basedir}/$
{project.groupId}.${project.artifactId}.zip"
 label="Coveragedata File for $
{project.groupId}.${project.artifactId}"
 failOnError="false" />
 <zip
 destfile="${project.basedir}/$
{project.groupId}.${project.artifactId}-baseline.zip"
 basedir="${project.basedir}" includes="$
{project.groupId}.${project.artifactId}.baseline"
 encoding="UTF-8" />
 <filePublisher buildResultUUID="${buildResultUUID}"
 repositoryAddress="${repositoryAddress}"

 passwordFile="${PasswordFile}"
 contributionTypeId="com.ibm.rational.llc.build.baseline"
 verbose="true"
 filePath="${project.basedir}/$
{project.groupId}.${project.artifactId}-baseline.zip"
 label="Baseline file for ${project.groupId}.${
{project.artifactId}"
 failOnError="false" />

 <!-- Publish the code coverage results to the
downloads -->
 <move
 file="${project.basedir}/${project.groupId}.${
{project.artifactId}.zip"
 tofile="${project.basedir}/${project.groupId}.${
{project.artifactId}.cczip" />
 <taskdef name="artifactFilePublisher"

 classname="com.ibm.team.build.ant.task.ArtifactFilePublisherTask">
 <classpath>
 <fileset dir="${Build_System_HOME}/
 <include name="*.jar" />
 </fileset>
 </classpath>
 </taskdef>
 <artifactFilePublisher buildResultUUID="$
{buildResultUUID}"

 repositoryAddress="${repositoryAddress}"

 passwordFile="${PasswordFile}" verbose="true"
 filePath="${project.basedir}/$
{project.groupId}.${project.artifactId}.cczip"

```



```

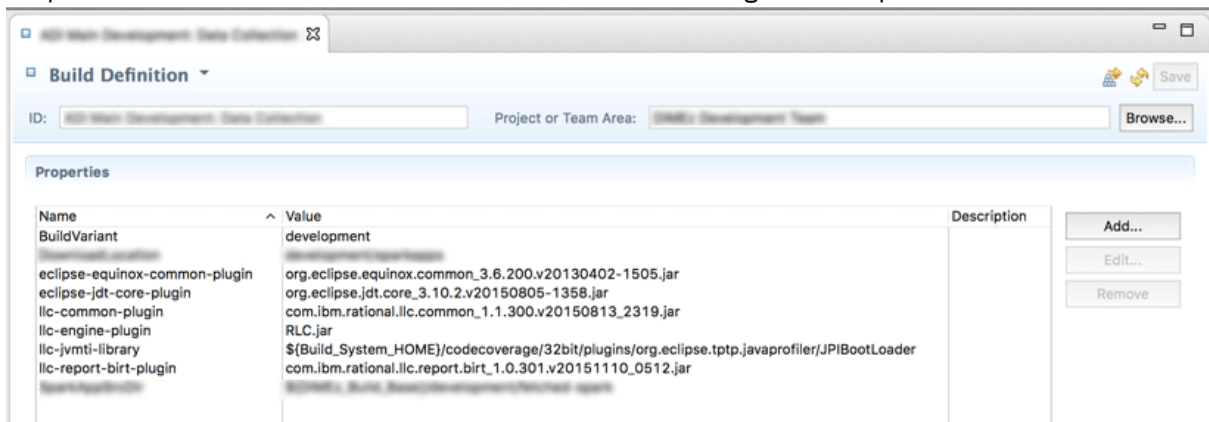
 label="Code coverage data for $
{project.groupId}.${project.artifactId}" />
 </target>
 </configuration>
 <goals>
 <goal>run</goal>
 </goals>
 </execution>
</executions>
</plugin>
<plugin>
 <groupId>org.apache.maven.plugins</groupId>
 <artifactId>maven-surefire-plugin</artifactId>
 <version>2.9</version>
 <!-- Execute tests with code coverage: .coveragedata -->
 <configuration>
 <argLine>-Dcoverage.out.file=${project.basedir}/${
{project.groupId}.${project.artifactId}.coveragedata
-Xbootclasspath/a:${Build_System_HOME}/codecoverage/${llc-
engine-plugin}
-agentpath:${llc-jvmti-
library}=JPIAgent:server=standalone,file=;ProbekitAgent:ext-pk-
BCILibraryName=BCIEngProbe,ext-pk-probescript=${project.basedir}/${project.groupId}.${
{project.artifactId}.probescript</argLine>
 </configuration>
</plugin>
</plugins>
</build>
</profile>

```

- You can see in the previous example that the code coverage file is uploaded as a .cczip with the same name as the Maven artifact name defined in this project. This ensures that ADI will load these results as a test with that name. If you prefer a different name, ensure that the .cczip file is named accordingly.
- If you are running multiple POM files of this build, you need to have a parent POM that is executed by the Build Definition, which then defines each other POM as a module running each project's build and tests and upload the results for each project using the artifact name.
- The last part of this sample script that defines the argLine for running a JUnit test is slightly more complicated as in the Ant example. Because the Ant configuration of the RAD code coverage toolkit defines those in macros that are not available to Maven. Therefore, you must define these variable either as part of the Build Definition or part of the Maven POM file. The values to be used for your current version of the RAD coverage toolkit is available in this file on the build engine:

```
<rtc-build-install-dir>/buildsystem/codecoverage/CodeCoverageProperties.xml
```

You would copy each value from that file and define the variables listed in the example. For defining them as part of your RTC Build Definition, you would enter the variables and values in the Properties tab of the build definitions as shown in the following screen capture.



- Now you can run your build. When you finish, verify in RSA or RAD Eclipse client by opening the build result editor that you have coverage results available in a Coverage tab. Check the Downloads tab for a coverage .cczip file available for downloads.
- You are now ready to consume these build results with ADI.

- a. For setting up an ADI data provider that connects to your RTC server and build definition, see [“Adding a Rational Team Concert Builds data provider” on page 207](#)
- b. For how to collect the coverage from the latest build available in ADI, see [“Refreshing the builds and code coverage data” on page 209](#)

## Preparing code coverage results by using the ADI code coverage generator

You can learn how to use the code coverage generator that ships with ADI to prepare code coverage results for Java.

The ADI code coverage generator provides the following enhanced capabilities over the IBM Rational Application Developer (RAD) 9.5 generator.

1. It includes the source code into the code coverage results, which allows ADI to analyze and relate code changes to code coverage results.
2. It generates test result on the JUnit test method level, which gives ADI a much finer granularity of the results for analysis and results presentation.

### Preparing code coverage results by using Apache Ant build scripts

By using an Apache Ant build script template that you can adopt for your own Java projects, you can execute the code coverage generator that is shipped with ADI to prepare code coverage results.

#### Assumptions

Verify the assumptions before you prepare code coverage results for Java by using Apache Ant script.

- Apache Ant, JUnit jar, and Hamcrest jar are available as part of the prerequisites for running code coverage results in headless mode by using Ant build scripts.
- The code coverage generator works on Windows and Linux platforms. And the Java Runtime Environment is limited to IBM 64-bit Java 7 or 8 Runtime only.

#### Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results for Java by using Apache Ant script.

### Generating code coverage results

Complete the following steps to generate code coverage results:

1. Go to your installed ADI folder and navigate to `install-dir/adi/java-coverage` directory.
2. Copy all the content in the `build-junit-coverage` folder to your build or development machine.
3. Run `generatePropertyFileForADI.bat` for the Windows platform and `generatePropertyFileForADI.sh` for the Linux platform to generate `CodeCoverageProperties64.properties` file. You can find this properties file in the copy of the `build-junit-coverage` directory you created in Step 2.
4. Specify properties for `build.properties` file, such as the location of Jars to run JUnit test, directories that contain source code, compiled class files, testcases to run, and storage location of code coverage results and so on. For a complete list of all the properties, see [“Reference for build.properties and build.xml” on page 181](#).
5. Run `build.xml` in command line. For example, run **cd** to change the directory in which `build.xml` is located and execute:

```
ant
```

The generation of code coverage results initiates.

6. Find the code coverage results in the specified result directory. The file with the `cczip` extension includes all complete code coverage results and source as shown in the following example.

```
CCtest_2016xxxx_xxxxxx.cczip
```

Unzip the zip file to find the following files:

- `/src/` - `src` directory contains all source files

- ccdata - ccdata file contains code coverage statistics data

### Generating code coverage results for the Example application

ADI includes a simple Java program with JUnit tests that you can use to quickly generate code coverage results for learning and experimentation. You can then upload those results to ADI to review them in the application.

1. Copy the entire /adi/java-coverage/build-junit-coverage directory to a new location.
2. In the copied directory, find and unzip the sample "VehicleExample.zip".
3. Open the file build.properties in an editor and modify it to configure the correct path for homeDir and resultsDir corresponding to the current location (that is, where you copied the directory in Step 1).
4. Execute **generatePropertyFileForADI** to set other location specific variables.
5. Run **ant** to execute the build.xml which compiles the project and executes various JUnit tests.
6. Find the result files in the resultsDir location that you specified in Step 3.

### Reference for build.properties and build.xml

Find the complete reference of all the properties that you can modify in build.properties.

### Reference of properties in build.properties

Table 9. Reference of properties in build.properties		
Attribute	Description	Required
analyzeArchive	Specify whether to analyze internal archive file (jar, war, zip) within the target project directory. If this value is true, all Java classes inside archive file will be analyzed.  <b>Note:</b> This property applies to only the build.properties file in the JavaProjectAnalyzer directory.	No. The default value is true.  To avoid analyzing classes inside internal archive, set this value to False.  <b>Note:</b> For classes inside internal archive, the source might not be available.
binDir	Specify the paths or directories where to store the compiled java .class files that you would like to analyze code coverage statistics.  For multiple paths/directories: <ul style="list-style-type: none"> <li>• Split by ";" for the Windows platform</li> <li>• Split by ":" for the Linux platform</li> </ul>	Yes
ccZipName	Specify the full name of the zip file containing the resulting code coverage data. The ".cczip" extension will be added automatically to the name. If you don't set ccZipName, it defaults to the value of resultName.	No

Table 9. Reference of properties in build.properties (continued)

Attribute	Description	Required
excludefilter	Specify the full package name and class that you would like to exclude in collecting code coverage data. You can use regular expressions to specify the classes. You can also specify the path which contains the file that listed multiple package and class name that would like to exclude. For more information, see <a href="#">Granular filter support for code coverage enabled from command line and an Ant script</a> .	No. Default is empty. For multiple filters, each separated by a space.  For example: excludefilter=com.ibm.vehicles.tests.TestCar com.ibm.vehicles.tests.TestCarImproved
exporterType	Specify the export format for code coverage data. You can specify multiple exporter types by using a comma to separate: <ul style="list-style-type: none"> <li>• CCRESULT produces the compressed format with the .cczip extension.</li> <li>• CCSONARQUBE produces the SonarQube format with the .xml extension.</li> <li>• If exporter type is not specified, it will be set to CCRESULT by default.</li> </ul>	No. Default is CCRESULT.
haltonfailure	To stop the build process if a test fails set on (errors are considered failures as well).	No. The default value is off.
hamcrestJar	Specify the path of Hamcrest jar.	Yes
homeDir	Specify the location or directory where the java project is located.	Yes
includefilter	Specify the full package name and class that you would like to include in collecting code coverage data. You can use regular expressions to specify the classes. You can also specify the path which contains the file that listed multiple package and class name that would like to include. For more information, see <a href="#">Granular filter support for code coverage enabled from command line and an Ant script</a> .	No. Default is empty. For multiple filters, each separated by a space.  For example: includefilter=com.ibm.vehicles.tests.TestCar com.ibm.vehicles.tests.TestCarImproved

Table 9. Reference of properties in build.properties (continued)

Attribute	Description	Required
inputDir	Specify the paths or directories where to store the java source files that you would like to analyze code coverage statistics.  For multiple paths/directories: <ul style="list-style-type: none"> <li>• Split by ";" for the Windows platform</li> <li>• Split by ":" for the Linux platform</li> </ul>	Yes
junitJar	Specify the path of JUnit jar.	Yes
junitPath	Specify the classpath for the JUnit classes.  For multiple paths/directories: <ul style="list-style-type: none"> <li>• Split by ";" for Windows platform</li> <li>• Split by ":" for Linux platform</li> </ul>	Yes
jvmargs	Specify extra JVM arguments, split by a space.	No. This is optional. It can be used for specify extra memory. For example: jvmargs=-Xmx200m
methodLevelCapture	Specify whether to capture JUnit method level or not.	No. The default value is true. If it's not set yet or set to true, it captures the JUnit method level. If it is set to false, it doesn't capture JUnit method level (captures only JUnit class level).
projectAnalysisResultZip	Specify a zip file path to write out the project analysis result. The result zip will contain: <ul style="list-style-type: none"> <li>• .metadata</li> <li>• .probescript source (if available)</li> </ul> <b>Note:</b> This property applies to only the build.properties file in the JavaProjectAnalyzer directory.	No. This value is empty by default.  If projectAnalysisResultZip is empty or is not a valid file path, no output zip file will be generated.
resultsDir	Specify the path or directory where you would like to store all the result files.	Yes
resultName	Specify the name to use for result files.	Yes

Table 9. Reference of properties in build.properties (continued)

Attribute	Description	Required
serverURL	<p>Specify the host name and port of the running application server with the <b>javacc</b> WAR deployed. The project analysis result zip will be uploaded to the server's current code coverage result location.</p> <p>For more information about starting the application server, see <a href="#">“Generating Java code coverage by using the ADI code coverage on server generator”</a> on page 187.</p> <p>An ServerURL example: http://localhost:9080.</p> <p><b>Note:</b> This property applies to only the build.properties file in the JavaProjectAnalyzer directory.</p>	<p>No. This value is empty by default.</p> <p>If either serverURL or projectAnalysisResultZip is empty or not valid, no project analysis result artifacts will be uploaded to server.</p>
serverAppNames	<p>Specify a list of applications to configure WAS/Liberty server to collect code coverage exclusively for these applications.</p> <p><b>Note:</b> This property applies to only the build.properties file in the JavaProjectAnalyzer directory.</p>	<p>No. This value is empty by default.</p> <p>If serverURL or projectAnalysisResultZip is empty or not valid, no project analysis result artifacts will be uploaded to server and serverAppNames will have no effects.</p>
testCase	<p>Specify the test case/class that you would like to run and get code coverage statistics results split by a space between test cases/classes for multiple test cases/classes.</p>	<p>Yes</p>

#### Reference for publish-result task in the build.xml

Use the **publish-result** task in the build.xml file in the JavaProjectAnalyzer directory to publish a metadata artifacts zip to a running application server with the **javacc** WAR deployed. The content of the zip will be sent to server's current code coverage result location for further analysis. For more information, see [Generating Java code coverage by using the ADI code coverage on server generator](#).

**Note:** If the javacc service is not available on the specify server, no operations will be performed.

Table 10. Reference for publish-result task in the build.xml

Attribute	Description	Required
zipLocation	Specify the file path to the target zip artifact for upload.  If zipLocation is empty or the zip file does not exists. No operations will be performed.	Yes.
serverURL	Specify the domain of a server with javacc service available to upload metadata artifact zip.  An serverURL Example: http://localhost:9080.	Yes.
serverAppNames	Specify the names for analyzed server applications.	No.

### Next steps

After you generate the code coverage results, you can find the next steps to perform more operations.

After you generate the code coverage results, create a manual data provider in ADI with a first build. Then add the cczip file of code coverage results that you generated to that build to upload those results.

For more information about how to create a manual data provider, see [Adding a manual build provider to collect data manually](#) and its peer sections.

### Preparing code coverage results by using Rational Team Concert Build and Apache Ant

You can use the ADI Apache Ant build script template as part of your Ant or Maven build scripts that you execute from a build automation system. You can prepare code coverage results by using IBM Rational Team Concert Build (RTC Build) and Apache Ant.

You can use the Apache Ant build script template that is described in the previous topic as a starting point for the Apache Ant script for your build automation. You can also call this ADI Apache Ant build script from a Maven or other build technology that supports calling Apache Ant scripts. Another option is to reverse engineer the script and implement it with another technology that you would like to use. It requires that you execute the JUnit Runner that is provided with ADI and used in the Apache Ant build script example to execute all tests and make sure the JUnit Runner is not from a third-party. The following example assumes that you are using IBM Rational Team Concert with Apache Ant.

### Assumptions

Verify the assumptions before you prepare code coverage results for Java by using RTC Build and Ant.

- The development team uses RTC Build version 6.0 or later to build their application.
- The development team uses Ant to execute its RTC builds.
- The RTC build engine is set up and configured already. For details, see the Rational Team Concert Online Help. Make sure that you have write access to the build engine server machine and the RTC Build installation directory.
- ADI is installed as described in [Installation and setup](#). You are granted with read access to the ADI server machine and the ADI installation directory.
- RTC Build and ADI could be installed on the same server machine or two different ones. Make sure that you are granted with permissions to copy some files from ADI to the RTC installation directories. For example, you need to have permissions to execute SSH copy (scp) operations, to transfer files via FTP, or to copy files through a USB stick.

## Procedures

After you verify the assumptions, you can complete steps to prepare code coverage results for Java by using RTC Build and Ant.

Complete the following steps to prepare the code coverage results by using RTC Build and Apache Ant.

1. On the ADI server machine, find the ADI installation directory such as `/opt/ibm/adi/`.
2. On the RTC server machine, find the RTC Build installation directory. For example, `/opt/ibm/rtcbuild/`.
3. Copy the entire directory `/adi/java-coverage/` from the ADI installation directory to RTC Build installation directory under the subdirectory `rtcbuild/buildsystem`.
  - The resulting directory would look like this: `/opt/ibm/rtcbuild/buildsystem/java-coverage`. Inside that directory, you find another directory that is called `plugins` and other files. For details about the files included, see the previous topic [Generating code coverage results](#).
4. On the RTC Build engine, run **cd** to change directory to `/buildsystem/java-coverage`.
5. Execute `generatePropertyFileForADI.bat` on Windows and `generatePropertyFileForADI.sh` on Linux to generate a new file called `CodeCoverageProperties64.xml`.
6. In RTC, create a Build Engine and Build Definition for your build.
7. Create your RTC Build Ant build script.
  - If you are not familiar with RTC Build, you can check [Tutorial in the Team Concert Online Help](#) for an introduction. For more information about the Ant build script file itself, see [Getting Started with Ant scripts and RTC Build Ant Tasks](#).
  - If you do not have an Ant build script, copy the files `/buildsystem/java-coverage/build.xml` and `build.properties` to your development project. These files need to be delivered to the RTC source control management system so that they can be found when you build your application.
  - If you already have an Ant build script for your RTC Build, integrate the contents of the `/buildsystem/java-coverage/build.xml` and `build.properties`.
8. Complete the `build.xml` to build your project and then use the `gen-result` target to run all JUnit tests and generate the code coverage files.
9. Check [Reference of properties in build.properties](#) for more details about properties to configure.
10. Configure the `resultsDir` property that defines the path where the resulting code coverage result file (`.cczip`) is written when JUnit tests get executed. This result file needs to be uploaded to RTC server so that they appear in the **Downloads** tab of the build results record, where ADI downloads them from. To achieve this, augment your `build.xml` file with additional Jazz Ant task calls that will upload the code coverage files to the RTC build result record.
  - The [Rational Team Concert Online Help](#) provides a reference for the Ant tasks available.
  - The task to use for uploading the code coverage files is called [artifactFilePublisher](#).
  - An example for such a call in your `build.xml` Ant script would be:

```
<artifactFilePublisher buildResultUUID="${buildResultUUID}"
 repositoryAddress="${repositoryAddress}" userId="${UserId}"
 passwordFile="${PasswordFile}" verbose="true"
 filePath="${resultsDir}/${resultFileName}"
 label="Code coverage data for my project." />
```
11. Execute your RTC builds. The result should be build records that include generated `cczip` file with the code coverage results available in the **Download** section.



### **Next steps**

After you generate the code coverage results, you can find the next steps to perform more operations.

In ADI, create a connection and an automated data provider that connects to your RTC Build Engine and Build Definition to collect the coverage result cczip files automatically. For more details, see [Managing connections, providers, and applications](#).

## **Preparing code coverage results by using the ADI code coverage on server generator**

You can learn how to use the ADI code coverage on server generator to generate Java code coverage and project metadata.

### **Generating Java code coverage by using the ADI code coverage on server generator**

You can use the ADI code coverage on server generator to capture Java code coverage on IBM WebSphere Application Server Traditional or Liberty at an individual test level. The generated code coverage results can be downloaded from the application server as a cczip file and then uploaded to ADI for further analysis.

### **Assumptions**

Verify the assumptions before you generate Java code coverage by using the ADI code coverage on server generator.

Make sure that the ADI code coverage on server generator is supported on:

- IBM WebSphere Application Server Traditional v8.5.5.x or v9.0.0.x running Java EE 7.
- IBM WebSphere Liberty 17.0.0.x server running Java EE 7. Make sure the Liberty server has the **jaxrs-2.0** feature or the other features containing the **jaxrs-2.0** feature, such as the **webProfile-7.0** feature.
- Windows and Linux 64-bit platforms
- IBM 64-bit Java 7 or 8 Runtime Environment

### **Procedures**

After you verify the assumptions, you can use the ADI code coverage on server generator to generate Java code coverage.

Complete the following steps to prepare Java code coverage by using the ADI code coverage on server generator.

1. Under the `install-dir/adi/java-coverage` directory, copy the folder named **websphere-coverage** to the machine with the IBM WebSphere server installed.
2. Change to the `/adi/java-coverage/webshpere-coverage/scripts` directory. If you are using IBM WebSphere Application Server Liberty, run **createCCOptionsLiberty.bat** on Windows platform or run **createCCOptionsLiberty.sh** on Linux platform. If you are using IBM WebSphere Application Server Traditional, run the **createCCOptionsWAS.py** jython script using **wsadmin** on a running server. The createCCOptions scripts generate the required JVM arguments for Java code coverage and/or start the application server with the required Java code coverage parameters. For more information about how to run the scripts and the parameters that are required, see the README file in the scripts directory.
3. Restart the server with the new JVM arguments from the previous step.
4. Publish the user application you want to collect code coverage for.
5. Publish the **javacc** WAR file in the `websphere-coverage/webapp` directory to the application server to deploy the REST services that enable users to collect code coverage, save the coverage for specific set of tests, and download the code coverage result.

**Note:** By default, the code coverage collector on server does not target any specific application to for collecting coverage information. Interacting with applications on server will not trigger code coverage.

To enable code coverage for a specific application, you need to complete the following steps.

- a. Analyze the application through [“Generating project metadata by using the ADI code coverage generator”](#) on page 189. The generated output is a zip file.
- b. Call `uploadProjectMetadata` with parameter `zipFileContent` to upload the result to server if it has not yet been uploaded. After you upload the application analysis result, server is now configured to collect code coverage for the analyzed project.

Now you can deploy the application to the server to perform tests with code coverage. If the application is already running, you need to restart the application to obtain complete and accurate code coverage result. To restart the application, you can either restart manually, or alternatively, call `restartApplication` with `appID`.

6. To illustrate how to call the Java code coverage REST API, a sample Code Coverage Control Panel is available on the context root of `/javacc` when `javacc` WAR is deployed. Use the action on that Control Panel to invoke the REST APIs.

You can invoke the REST APIs directly as indicated below or use similarly named buttons in the sample Code Coverage Control Panel to invoke the REST APIs.

- a. Before running the test, use `getCoverageCollectionStatus` to confirm that the code coverage collection is running.
- b. Run tests against the user application that is deployed on the application server and call `saveAndResetCoverage` to assign a test ID to the tests.
- c. Repeat running tests and calling `saveAndResetCoverage` to assign test ID to the individual tests.
- d. Optional: The coverage results for all the tests run will be stored in a default result location with timestamp. You can optionally organize your tests into different sets by calling `setResultLocation` before running the tests. Calling it with a location will result in using that result location. Calling it without providing a location will result in using a new default result location with the current timestamp.
- e. Call `uploadProjectMetadata` to upload metadata and source to the current result location for the user application that you want to collect code coverage for. For more information about how to generate the project metadata, see [“Generating project metadata by using the ADI code coverage generator”](#) on page 189.
- f. Call `downloadCoverageResult` with no parameters to download the code coverage result zip (cczip) for the current result location or provide the specific result location to download.
- g. Optional: Use the following APIs to control code coverage on the server:

- `pauseCollection`: Pause code coverage collection.
- `resumeCollection`: Resume paused code coverage collection.
- `resetCoverage`: Reset the current code coverage statistics.

**Note:** Invoking `resetCoverage` will not affect the saved code coverage result.

- `saveAndSetCoverage`: Save a copy of current code coverage result, and then reset the current code coverage statistics.

7. After you finish the tests, you can call `downloadCodeCoverage` to download a complete collection of code coverage results. Optionally, you can invoke `clearCoedCoverage` to clear all the saved code coverage results on the server.

**Note:** Invoking `clearCoedCoverage` will permanently delete all the existing code coverage results on the server. Make sure you have downloaded the code coverage results before invoking this API.

To learn the REST APIs for collecting Java code coverage on IBM WebSphere servers, see the documentation of [Java Code Coverage API](#).

For more information about how to invoke the APIs, see [“Java code coverage REST API”](#) on page 189.

### **Next steps**

After you generate the code coverage results, you can find the next steps to perform more operations.

The downloaded code coverage result zip contains the source and metadata for the user application and the code coverage statistics for that application that is covered by specific tests.

After you generate the code coverage results, create a Manual Builds data provider in ADI. Then add the cczip file of code coverage results that you generated to that build to upload those results.

For more information about how to create a Manual Builds data provider, see [“Adding a Manual Builds data provider to collect data manually”](#) on page 199 and its peer sections.

### **Java code coverage REST API**

For more information about the REST APIs for collecting Java code coverage on IBM WebSphere servers, see the documentation of [Java Code Coverage API](#). You can also display the documentation for Java Code Coverage API on the application server by clicking the **Java code coverage REST API documentation** link on the Code Coverage Control Panel after you publish the javacc WAR on the application server.

Alternatively, to explore the Java Code Coverage REST API live on the server, you can add the application discovery capability to the server and then go to the API Explorer or the API documentation URL on the server.

- On the Liberty server, complete the following steps to explore the Java Code Coverage REST API:
  1. Add the **apiDiscovery-1.0** feature to the server.
  2. Go to *server context root/api/explorer/*, for example, <http://localhost:9080/api/explorer/>.
  3. Click **Java Code Coverage API** to explore the API.
  4. To see the API doc, go to *server context root/api/docs/*, for example, <http://localhost:9080/api/docs/>.
- On WebSphere Application Server, complete the following steps to explore the Java Code Coverage REST API:
  1. Open the WebSphere Application Server Administrative Console.
  2. Select **Enable API discovery service** in **Web Container Settings**.
  3. Go to *server context root/ibm/api/explorer/*, for example, <http://localhost:9080/ibm/api/explorer/>.
  4. Click **Java Code Coverage API** to explore the API.
  5. To see the API documentation, go to *server context root/ibm/api/docs/*, for example, <http://localhost:9080/ibm/api/docs/>.

### **Generating project metadata by using the ADI code coverage generator**

#### **Assumption**

Verify the assumption before you generate project metadata by using the ADI code coverage generator.

Apache Ant is available as part of the prerequisites for running the Java project analyzer.

#### **Procedures**

After you verify the assumption, you can complete steps to generate project metadata by using the ADI code coverage generator.

Complete the following steps to generate project metadata.

1. Under the `install-dir/adi/java-coverage` directory, copy the `build-junit-coverage` folder to the build or development machine.
2. Run `generatePropertyFileForADI` script under `install-dir/adi/java-coverage/build-junit-coverage` to generate `CodeCoverageProperties64.properties`.

3. Navigate to the `install-dir/adi/java-coverage/build-junit-coverage/JavaProjectAnalyzer` directory and update `build.properties` with the appropriate values specific to your project.
4. Run Ant in the command line to run the `build.xml` file to generate metadata and to upload the metadata and source to the application server with the javacc WAR deployed. This metadata and source will be included in the cczip that can be downloaded from the application server together with the code coverage results.
5. If the application server is not running when you run the `build.xml` to generate metadata, you can upload metadata at a later time when the server is running by using the **publish-result** task in the `build.xml`.

For more information about how to set up build properties to generate project metadata and upload to the application server, see [“Reference for build.properties and build.xml” on page 181](#).

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## Chapter 7. Managing connections, data providers, workbooks, and notifications

You can learn how to manage connections, data providers, workbooks, and notifications.

For the terminology of data providers and workbooks, see [Terminology Overview](#) page.

### Managing connections

---

For a data provider that stores data on the server, you must manage connections associated with the data provider in order to connect the server for data collection. By default, the users with data provider administrator role can add, edit, and delete connections from the system.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

#### Adding a connection

For a data provider that stores data on the server, before adding a data provider to the system, you must make sure that you created at least one connection for the data provider. Check for the steps to add a connection.

Go to the Connections page and create a connection to connect the data provider server. Currently, ADI offers three types of connections, including IBM Rational Team Concert, IBM OMEGAMON for CICS, and IBM Application Discovery.

**Note:** You need a data provider administrator role permission in order to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to create a connection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Connections** to go to the Connections page.

**Note:** You can add a connection when you create the data provider. If you want to add a connection as part of creating a data provider, go to step 3 to provide connection information in the **Add Connection** form.

3. Click **Create Connection**. The Add Connection page appears.
4. Provide the following information in the **Add Connection** form.

- **Connection type:** Select type of connection you want to create. Currently, IBM Rational Team Concert, IBM OMEGAMON for CICS, and IBM Application Discovery are three types of connections that ADI offers.
- **Name:** Provide a unique name of the connection.
- **Description:** Provide short description of the connection.
- **Connection URL:** Provide the URL address of the location you want to connect to. For IBM Rational Team Concert, you need to provide the address of root service.

Examples of URL addresses for different data providers:

- IBM Rational Team Concert - `https://hostname:9443/jazz`
- IBM OMEGAMON for CICS - `http://hostname:15200`
- IBM Application Discovery - `http://hostname:9091`
- Business Rule Discovery - `http://hostname:9443`

**Note:** The connection to the Application Discovery (AD) data and the Business Rule Discovery (BRD) data are on different ports. You need to create different connections to connect to the AD data or BRD data separately.

- **Username and Password:** Provide username and password of the person who has access to the server you want to connect to. If it is available, you can use the username and password of function users.

5. Click **Test** to test the connection.
6. If the connection is a success, click **Add** to create the connection.

## Editing a connection

You can edit the information of a connection after you create at least one connection. Check for the steps to edit a connection.

**Note:** You need a data provider administrator role permission in order to edit the connection information. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to edit the connection information:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Connections** to go to the **Connections** page.
3. Click the **Menu** icon on the header of the provider card you want to edit. You can search the connection card by typing part of the connection name in the search box on the upper right corner. The connection cards with corresponding name appear.
4. Click **Edit**.
5. Edit the information such as name, description, connection URL, username, and password or all the information. If you update connection URL, you are required to retest the connection before you save the changes.
6. Click **Save** to update the changes or click **Cancel** to cancel the changes.

## Deleting a connection

Check for the steps to delete a connection from the system. When you delete a connection, you cannot undo the deletion or restore the connection. You cannot delete a connection when it is being used by data providers. Before you delete a connection, you need to make sure that you deleted the data providers that use the connection.

**Note:** You need a data provider administrator role permission in order to delete a connection. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to delete a connection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Connections** to go to the Connections page.
3. Click the **Menu** icon on the header of the provider card you want to delete. You can search the connection card by typing part of the connection name in the search box on the upper right corner. The connection cards with corresponding name appear.
4. Click **Delete**. The dialog box to confirm that the connection deletion opens.
5. Click **OK** to confirm the deletion or **Cancel** to cancel the deletion.

## Managing data providers

---

The data provider is the data source for analysis. By default, only the users with a data provider administrator role can create, modify, and delete data providers.

The following types of data sources are available for ADI:

- Manual Builds data providers
- Rational Team Concert Builds data providers
- OMEGAMON for CICS data providers
- Application Discovery data providers
- Business Rule Discovery data providers

**Note:** The Enterprise Artifact data provider, which is available as a technical preview feature, is deprecated in ADI V5.1.0 and later versions. The enterprise artifacts data can be collected through Business Rule Discovery data providers instead. If you have one or more Enterprise Artifact data providers that are created, you need to back up your enterprise artifacts from the location that is specified in the Enterprise Artifact data providers and delete these data providers before you upgrade to ADI V5.1.0.

To manage data providers, you need to have specific role-permissions. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

In addition to the role-based permissions, there is an access control for a workbook in which only the members of a workbook can view the analysis data of the data providers that are associated with a workbook.

To improve the efficiency and performance of data collection, ADI automatically scrubs historical data at certain intervals (for example, every 24 hours) in your data warehouse. There are two aspects of data scrub configuration:

- Specify the number of days that you want to keep data in the data warehouse for analysis in the data provider setting. You need to have a data provider administrator role permission to perform this task.
- Configure the interval time for the data scrub task to run automatically in the ADI administration page. The default value is 24 hours for ADI to run the data scrub task in the background every 24 hours. You need to be an ADI administrator to perform this task. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface”](#) on page 157.

### Data providers

To get started with ADI, first you need to define the data providers to collect data from the data sources for analysis. Currently, ADI offers several types of data providers, that is, Application Discovery data providers, Business Rule Discovery data providers, Manual Builds data providers, OMEGAMON for CICS data providers, Rational Team Concert Builds data providers, and System Management Facility data providers.

#### Application Discovery data providers

An Application Discovery data provider connects to an IBM Application Discovery (AD) server instance and collects the inventory, code complexity, and code quality metrics for the AD projects. As part of the data provider creation, you can select one project or a set of projects for which you want to perform analysis. For more information on IBM Application Discovery, see [IBM Application Discovery product page](#).

#### Business Rule Discovery data providers

Business Rule Discovery data providers collect data from two sources to perform analysis of business rules: IBM Application Discovery (AD) server and the enterprise artifacts location to be scanned. When it scans the artifacts within a provider, ADI indexes all the content within artifacts for future analysis. By default, the scan takes place every 24 hours. But you can also invoke the scan at any time.

**Note:** The Enterprise Artifact data provider, which is available as a technical preview feature, is deprecated in ADI V5.1.0 and later versions. The enterprise artifacts data can be collected through Business Rule Discovery data providers instead. If you have one or more Enterprise Artifact data providers that are created, you need to back up your enterprise artifacts from the location that is specified in the Enterprise Artifact data providers and delete these data providers before you upgrade to ADI V5.1.0.

### Manual Builds data providers

You can define a Manual Builds data provider that is defined by a baseline of the code that you run coverage tests against. You can run many tests against that build and upload coverage result compressed files for a build in which each compressed file represents the results of exactly one test. When you change your code or your tests, you must create a new build for that data provider by using the **Add Build** dialog. The assumption is that all test that ran against a particular build used the exact same version of all the code files tested. For more information, see [“Preparing code coverage results for batch applications” on page 163](#).

### OMEGAMON for CICS data providers

An OMEGAMON for CICS data provider connects to an IBM OMEGAMON for CICS instance based on one or more connections defined to collect the operations-related data, including response time, CPU time, and usage frequency for CICS transactions running in a CICSplex®. As part of the data provider creation, you can choose one or more transaction service classes for which you want ADI to gather and present the data. For more information on IBM OMEGAMON for CICS, see [IBM Tivoli OMEGAMON XE for CICS on z/OS product page](#).

### Rational Team Concert Builds data providers

An Rational Team Concert Builds data provider connects to an RTC instance based on one or more connections defined, queries the builds, and gathers any code coverage data included in the RTC builds for the selected project area and build definition. As part of the data provider creation, you can specify a build tag or more to match one or more tags for the RTC builds to identify the set of builds that you want ADI to query and inspect for code coverage data.

### System Management Facility data providers

You can upload the System Management Facility files or the Application Performance Analyzer files to ADI for performance analysis such as CPU time, Execute Channel Program time, Service units, and Elapsed time.

## Managing Application Discovery data providers

You can add and modify Application Discovery data providers on the **Data Providers** page.

Only the users with data provider administrator can add and edit the Application Discovery data provider. Any of the role permissions can refresh the Application Discovery data, view data collection logs and download Application Discovery data. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

### Adding an Application Discovery data provider

You can create an Application Discovery data provider on the Data Providers page to collect the data from the Application Discovery server for analysis.

**Note:** You need a data provider administrator role permission in order to perform this task.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to add an Application Discovery data provider for data collection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.



2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the Data Providers page.
4. Select the **Application Discovery** card from the Add Data Provider page that appears.
5. Select **Connection** to connect to AD server where the data is stored. You can search for the connection by typing part of the connection name in the search box on the right corner of **Connection** section. If the Connection to AD server has not been created, you can create the connection by clicking the **Add** icon next to the Connection header. See [Adding connections](#) for more detail how to create a connection.

**Note:** You can also edit connection information or delete connection by clicking the **Options Menu** icon on the header of the connection card that you want to edit or delete. Then select **Edit** or **Delete** from the option list that appears.

6. Provide the following information in the **Provider Settings** forms.
  - **Name:** Provide a unique name for the data provider you create.
  - **Description:** Provide a short description of the data provider.
  - **Collection Trigger:** Specify whether you want data to be collected manually or automatically. If you choose to select data automatically, specify the interval time of data to be collected in hours.
  - Specify number of days you want to keep the data in the data warehouse. By default, the value is set to **All Data**. All the data is kept in the data warehouse. You can set the value to 90 days, 180 days, or 360 days. The data that is older than the selected value will be cleaned out.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface” on page 157.](#)

7. Click **Add** to create the Application Discovery data provider.

### **Modifying an Application Discovery data provider**

After you add an Application Discovery data provider, you can edit the data provider information, refresh the data, view the data collection logs and download Application Discovery data. ADI prevents the data provider updates by multiple users. The page rejects all but one of many parallel updates by multiple users.

Only the users with a data provider administrator role can edit the data provider information. Any of the role permissions can refresh the data and view the data collection logs for an Application Discovery data provider.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

### **Editing the Application Discovery data provider information**

For an Application Discovery data provider, you can edit the data provider details, such as name, description, collection trigger, or number of days you want to keep the data in the data warehouse.

Complete the following steps to edit the Application Discovery data provider information.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Application Discovery data provider card that you want to edit.
4. Select **Edit** from the options menu that appears. The Edit Data Provider form appears.
5. Modify the name, description, or collection trigger, number of days you want to keep the data in the data warehouse or all information of the provider detailed information.

**Note:** The **Connection** for the data provider cannot be modified.

6. Click **Save** to update the changes or **Cancel** to quit editing.

### ***Refreshing the data collected from Application Discovery server***

You can refresh the Application Discovery data provider to manually retrieve more data from AD server.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to refresh the data from Application Discovery server.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Application Discovery data provider card that you want to refresh data.
4. Select **Refresh** from the options menu that appears. The Data Collection dialog box opens.
5. Click **OK** to perform a manual refresh or **Cancel** to cancel the operation.

### ***Viewing the Application Discovery data collection logs***

You can view the status of Application Discovery data collection.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to view the Application Discovery data collection logs.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Application Discovery data provider card that you want to view the data collection logs.
4. Select **View Logs** from the options menu that appears. The list of the date and time data that are collected appear along with the data collection status.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface” on page 157](#).

### ***Downloading the Application Discovery data***

You can download the Application Discovery data to a .csv file or .json file to be used by external analytics tools.

**Note:** Any of the role permissions can perform this task. See ADI role-based permissions for more information. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to download the Application Discovery data to a .csv file or .json file.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Application Discovery data provider card that you want to download data.
4. Select **Download** from the options menu that appears. The Download Data page appears.
5. Specify the following information to scope the data to be downloaded.
  - **Date Range:** Specify the start date and end date of the code coverage results to be exported.
  - **Included Data:** Select the projects to be packaged in the download.
  - **Export Details:**
    - **File Name:** Specify the name of the file to download to.
    - **File Format:** Specify the type of file to be downloaded. .csv and .json are the two types of files available. By default the data will be downloaded in .csv file.

6. Click **Download** to download or **Cancel** to cancel the export option. When you click **Download**, the download box appears.
7. Select the **Save File** option and click **OK**.
8. Click **Save** to download the file.

**Note:** The downloaded file contains multiple files of the file type that you select.

## Managing Business Rule Discovery data providers

You can manage Business Rule Discovery data providers on the **Data Providers** page. Only the users with a data provider administrator role can add and edit the Business Rule Discovery data provider. Any of the role permissions can refresh the Application Discovery data, view data collection logs, and download Application Discovery data.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

### Adding a Business Rule Discovery data provider

You can create a Business Rule Discovery data provider on the **Data Providers** page to collect data from the Application Discovery server for analysis.

**Note:** You need a data provider administrator role permission in order to perform this task.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to add a Business Rule Discovery data provider for data collection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
  2. Click **Data Providers** to go to the **Data Providers** page.
  3. Click **Create Data Provider** on the upper right of the **Data Providers** page.
  4. Select the **Business Rule Discovery** card from the **Add Data Provider** page that appears.
  5. Select **Connection** to connect to the AD server where the data is stored. You can search for the connection by typing part of the connection name in the search box on the right corner of **Connection** section. If the connection to AD server has not been created, you can create the connection by clicking the **Add** icon next to the **Connection** header. For more information about how to create a connection, see [“Adding a connection” on page 191](#).
- Note:** You can also edit the connection information or delete the connection. Click the **Options Menu** icon on the header of the connection card that you want to edit or delete. Then select **Edit** or **Delete** from the option list that appears.
6. Optional: Add all the artifacts that you want to perform the business rule discovery to ADI location by either one of the following method.
    - Manually copy all the artifacts to the directory that is specified as the **Artifacts Location** under **Artifacts Detail** section.
    - Upload a zip file that contains all the artifacts by clicking **Browse** and select a zip file you want to upload.
  7. Enter ADI user credentials to be used for authenticating distributed data collection of the provider.
  8. Provide the following information in the **Data Provider Details** section.
    - **Name:** Provide a unique name for the data provider you create.
    - **Description:** Provide a short description of the data provider.
    - **Collection Trigger:** Specify whether you want data to be collected manually or automatically. If you choose to select data automatically, specify the interval time of data to be collected in hours.
  9. Click **Add** to create the Business Rule Discovery data provider.

### **Modifying a Business Rule Discovery data provider**

After you add a Business Rule Discovery data provider, you can modify the Business Rule Discovery data provider by editing the data provider information, refreshing the data, or viewing the collection logs. ADI prevents the data provider updates by multiple users. The page rejects all but one of many parallel updates by multiple users.

Only the users with a data provider administrator role can edit the data provider information. Any of the role permissions can refresh the data and view the data collection logs for a Business Rule Discovery data provider.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

### **Editing the Business Rule Discovery data provider information**

For a Business Rule Discovery data provider, you can edit the Business Rule Discovery data provider information, such as security setting, name, description, or collection trigger.

Complete the following steps to edit the Business Rule Discovery data provider information.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Business Rule Discovery data provider card that you want to edit.
4. Select **Edit** from the options menu that appears. The **Edit Data Provider** form appears.
5. Modify the security setting, name, description, collection trigger or all information of the provider.
6. Click **Save** to update the data provider information or click **Cancel** to quit editing.

### **Refreshing the Business Rule Discovery data provider**

You can refresh a Business Rule Discovery data provider to manually scan all artifacts stored in the Business Rule Discovery data provider.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to refresh the data from the Application Discovery server and enterprise artifacts location.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Business Rule Discovery data provider card that you want to refresh data.
4. Select **Refresh** from the options menu that appears. The Data Collection dialog box opens.
5. Click **OK** to perform a manual refresh or click **Cancel** to cancel the operation.

### **Viewing the Business Rule Discovery data collection logs**

You can view the status of Business Rule Discovery data collection.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to view the Business Rule Discovery data collection logs.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Business Rule Discovery data provider card that you want to view the data collection logs.
4. Select **View Logs** from the options menu that appears. The list of the date and time data that are collected appear along with the data collection status and the number of enterprise artifacts that are collected.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface”](#) on page 157.

## Managing Manual Builds data providers

You can add Manual Builds data providers and modify the Manual Builds data provider information on the Data Providers page. You can specify the Manual Builds data provider to collect data manually or automatically.

Only the users with the data provider administrator role permission can add and modify the Manual Builds data provider. The users with the workbook owner role permission can only modify the Manual Builds data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

### Adding a Manual Builds data provider

For Manual Builds data providers, you can create a Manual Builds data provider to collect data manually or automatically.

#### *Adding a Manual Builds data provider to collect data manually*

You can create a Manual Builds data provider on the Data Providers page to manually collect the data from the data sources for analysis.

**Note:** You need a data provider administrator role permission in order to add a Manual Builds data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to add a Manual Builds data provider for manual data collection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the Data Providers page.
4. Select the **Manual Builds** card from the Add Data Provider page that appears.
5. Provide the following information in the **First Build**, **Code Coverage Files**, and **Data Provider Details** forms.
  - **First Build** form. Provide the information of the first build you have for code coverage analysis. If you have more than one build, the later build can be added to the data provider when you modify the Manual Builds data provider.
    - **Build Name:** Provide a unique name for the build.
    - **Date of Build:** Specify the date and time when the build is created.
    - **Description:** Provide a short description of the build.
  - **Code Coverage Files** form. Click the **Add** icon to browse to the code coverage result files. Select one or more files of code coverage results for this build. The list of the selected code coverage files appears along with the name of users who upload the file and the description. You can add a description to each of the file. This is an optional step. You can skip this step if you do not have code coverage results for this build. For more information about how to prepare the code coverage results, see [“Preparing code coverage results for batch applications”](#) on page 163 and [“Preparing code coverage results for CICS transactions by using the debug tool backend and IDz client”](#) on page 167.
  - **Data Provider Details** form.
    - **Name:** Provide a unique name for the data provider you create.
    - **Description:** Provide a short description of the data provider.
    - **Enable headless collection support:** Make sure the checkbox is unchecked.

- Select the number of days you want to keep data in the data warehouse. By default, the value is set to **All Data**. All the data is kept in the data warehouse. You can set the value to 90 days, 180 days, or 360 days. The data that is older than the selected value will be cleaned out.

6. Click **Add** to create the Manual Builds data provider.

### ***Adding a Manual Builds data provider to collect data automatically***

You can create a Manual Builds data provider on the Data Providers page to automatically collect the data from the data sources for analysis.

#### **Notes:**

1. Before you can add a Manual Builds data provider to collect data automatically, you need to make sure that the code coverage results are stored in the headless-cc-file directory.
2. You need a data provider administrator role permission in order to add a Manual Builds data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to add a Manual Builds data provider for automated data collection:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the Data Providers page.
4. Select the **Manual Builds** card from the Add Data Provider page that appears.
5. Provide the following information in the **First Build**, **Code Coverage Files**, and **Data Provider Details** forms.
  - **First Build** form. Provide the information of the first build you have for code coverage analysis. If you have more than one build, the later build can be added to the data provider when you modify the Manual Builds data provider.
    - **Build Name:** Provide a unique name for the build.
    - **Date of Build:** Specify the date and time when the build is created.
    - **Description:** Provide a short description of the build.
  - **Code Coverage Files** form.
    - For automated data collection, no zip files to be added here. For procedure to set up the automated data collection, see [“Generating code coverage results by using the headless collector running on ADI server”](#) on page 166.
  - **Data Provider Details** form.
    - **Name:** Provide a unique name for the data provider you create.
    - **Description:** Provide a short description of the data provider.
    - **Enable headless collection support:** Check to enable headless collection support. A dropdown menu of **Collection Trigger** appears.
      - Select **Manual** to allow users to manually trigger the data collection.
      - Select **Automatic** and fill in the collection interval in hours to schedule the interval time for data collection.
    - Select the number of days you want to keep data in the data warehouse. By default, the value is set to **All Data**. All the data is kept in the data warehouse. You can set the value to 90 days, 180 days, or 360 days. The data that is older than the selected value will be cleaned out.

6. Click **Add** to create the Manual Builds data provider.

There will be no code coverage data loaded to the build after the Manual Builds data provider is created.

- If you have put the code coverage data into the headless-cc-file directory as described in [Chapter 6, “Preparing external data sources,”](#) on page 163, you need to refresh the data provider in order to collect

data from the headless-cc-file directory. For more information, see [“Refreshing the code coverage results for automatically data collection” on page 202.](#)

- If you have not put the code coverage data collection in the headless-cc-file directory, follow the steps described [Chapter 6, “Preparing external data sources,” on page 163](#) to put the code coverage data collection in the headless-cc-file directory.

### **Modifying a Manual Builds data provider**

After you add a Manual Builds data provider, you can modify the Manual Builds data provider on **Data Provider** page. ADI prevents the provider update by multiple users. The page rejects all but one of many parallel updates by multiple users.

By default, the users with data provider administrator role permission modify the Manual Builds data provider. The users with the workbook owner role can add and modify builds information. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

### ***Editing the Manual Builds data provider information***

You can edit name, description, or both of the data provider.

**Note:** By default, you need a data provider administrator role permission to edit the data provider information. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

Complete the following steps to edit the data provider information:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to edit.
4. Select **Edit** from the options menu that appears. The Edit Data Provider form appears.
5. Modify the data provider details, such as name, description, connection and so on.
6. Enable or disable headless collection support to switch between automatic data collection and manual data collection by selecting or clearing the headless collection support check box.
7. Modify number of days you want to keep data in the data warehouse.
8. Click **Save** to update the changes or click **Cancel** to quit editing.

### ***Adding a build to a Manual Builds data provider when collecting data manually***

When a new build with code coverage results is available, you can add a build to the existing Manual Builds data provider which collects data manually.

**Note:** By default, you need either a data provider administrator role or a workbook owner role to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

Complete the following steps to add a build to a Manual Builds data provider which collects data manually.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to add a build to.
4. Select **Add Builds** from the options menu that appears. The Add Build page appears.
5. Provide the following build information on the **Add Build** page.
  - **Build Name:** Provide a unique name for the build.
  - **Date of Build:** Specify the date and time when the build is created.
  - **Description:** Provide a short description of the build.



- **Code Coverage Files:** Click **Add** icon to browse and select one or more zip files of code coverage results created by testing this build. The list of the selected code coverage files appear along with the **Filename** and **Description**. You can add a description to each of the file.

6. Click **Add** to associate the new build with the data provider.

**Note:** If two users upload files at the same time to the same build, the upload is strictly sequential. You can adjust this timeouts in /Users/everardo/Downloads/adi/server/conf/adi/teamserver.properties and the value is coverageFileStorageCheckoutTimeout.

### ***Adding a build to a Manual Builds data provider when collecting data automatically***

When a new build with code coverage results is available, you can add a build to the existing Manual Builds data provider which collects data automatically.

**Note:** You need either a data provider administrator role or a workbook owner role to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to add a build to a data provider which collects data automatically.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to add a build to.
4. Select **Add Builds** from the options menu that appears. The Add Build page appears.
5. Provide the following build information on the **Add Build** page.
  - **Build Name:** Provide a unique name for the build.
  - **Date of Build:** Specify the date and time when the build is created.
  - **Description:** Provide a short description of the build.
  - **Code Coverage Files:** No code coverage zip files to be added here. You need to make sure that the code coverage results for a new build are stored in the headless-CC-file directory for ADI to collect data automatically. See [“Generating code coverage results by using the headless collector running on ADI server”](#) on page 166 for more information.
6. Click **Add** to associate the new build with the data provider.

There will be no code coverage data loaded to the build after adding a build to an existing Manual Builds data provider. Next step, you need to refresh the data provider in order to collect data from the headless-cc-file directory. For more information, see [“Refreshing the builds and code coverage data”](#) on page 209.

### ***Refreshing the code coverage results for automatically data collection***

When the code coverage results are available in headless-cc-file folder of ADI, you can manually refresh the data collection.

For more information how the code coverage results are prepared for automatically data collection, see [“Generating code coverage results by using the headless collector running on ADI server”](#) on page 166.

**Note:** You need either a data provider administrator role or a workbook owner role to refresh the code coverage results for automatically data collection. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to refresh the code coverage results for collect code coverage data from headless-cc-file folder.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to refresh the code coverage results.
4. Select **Refresh** from the options menu that appears. The Data Collection dialog box opens.
5. Click **OK** to perform data collection or **Cancel** to cancel the operation.



### **Updating an existing build**

You can update an existing build by modifying the build information.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to update an existing build associated with the data provider:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to update the build information.
4. Select **View Builds** from the options menu that appears. The Builds page with a list of all builds associated with the data provider card appears.
5. On the row which displays a build that you want to modify, click the **Edit** icon.
6. Modify the build information. You can perform the following activities to modify build information.
  - Modify build name, date of build, and description.
  - Add extra code coverage files to the build.
    - Click the **Add** icon to browse to the code coverage files.
    - Select one or more code coverage results to associate the files with the build. When you add existing code coverage files, the files replace the files that you added previously.
    - The list of the selected code coverage files appear along with the name of users who upload the file and description. You can add description next to each of the file.
  - Update comments for code coverage files.
  - Delete a code coverage file from the build.
    - Move the mouse pointer over the code coverage file you want to delete. The **Delete** icon appears on the right.
    - Select the **Delete** icon to delete the code coverage file from the build.
7. Click **Save** to update the changes.

### **Defining baseline builds for a Manual Builds data provider**

From all the builds that are associated with a Manual Builds data provider, you can define one or more builds as baseline builds. The baseline builds can be used as major builds for code coverage comparison.

Complete the following steps to define builds as baseline builds.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to define baseline builds.
4. Select **View Builds** from the options menu that appears. The **Builds** page that lists all builds that are associated with the Manual Builds data provider card appears.
5. On the row, which displays a build that you want to define baseline builds, click the **Star** icon in front of the build name.

**Note:** You can select up to 10 baseline builds.

6. Click **Save baselines builds**. The dialog box to confirm the save operation opens.
7. Click **Start Data Collection** for ADI to perform the data collection of the Manual Builds data provider and the calculation of any baseline metrics.

**Note:** Depending on the size of your data, the data collection and the calculation might take time. ADI will send you a notification when data is ready to use.

- Optional: Click **Close** to wait for the calculation of any baseline metrics to be triggered for the next data collection of this Manual Builds data provider.

#### ***Deleting a build from the Manual Builds data provider***

On the Data Providers page, you can remove a build from the Manual Builds data provider.

**Note:** By default, you need either a data provider administrator role or workbook owner role to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to delete a build from its associated Manual Builds data provider.

- Click the **Menu** icon next to the IBM ADI header to open the menu pane.
- Click **Data Providers** to go to the **Data Providers** page.
- Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to delete a build from.
- Select **View Builds** from the options menu that appears. The Builds page that lists all builds that are associated with the Manual Builds data provider card appears.
- On the row which displays a build that you want to delete, click the **Remove** icon. The dialog box to confirm that the build deletion opens.
- Click **OK** to confirm the deletion or **Cancel** to cancel the deletion.

#### ***Downloading the code coverage data associated with build***

You can download the code coverage data that is associated with build to a .csv file or .json file to be used by external analytics tools.

**Note:** By default, the users with any role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to download the code coverage data to a .csv file or .JSON file.

- Click the **Menu** icon next to the IBM ADI header to open the menu pane.
- Click **Data Providers** to go to the **Data Providers** page.
- Click the **Options Menu** icon on the header of the Manual Builds data provider card that you want to download the code coverage data.
- Select **Download** from the options menu that appears. The Download Data page appears.
- Specify the following information to scope the code coverage results to be downloaded.
  - **Date Range:** Specify the start date and end date of the code coverage results to be downloaded.
  - **Included Code Coverage Data:** Specify the information to be downloaded by selecting the following options.
    - **Build Definitions:** Select this option to download code coverage data from all build definitions.
    - **Build Results:** Select this option to include build results with the code coverage data.
    - **Test Results:** Select this option to include test results with the code coverage data.
    - **File Test Results:** Select this option to include file test results with the code coverage data.
  - **Export Details:** Specify the file name and file format to be downloaded.
    - **File Name:** Fill in the name of the file in which you want data to be downloaded.
    - **File Download Type:** Specify the type of file to be downloaded. 2 types of files, .csv and .json are available. By default the data will be downloaded in .csv file.
- Click **Download** to download or **Cancel** to cancel the download action. When you click **Download**, the download box appears.
- Select the **Save File** option and click **OK**.
- Select **Save** to download the file.

**Note:** The downloaded file is a zip file that contains multiple files of the file type that you select. You can find the following list of files in the zip file.

Table 11. The list of files in the downloaded zip file	
Information selected to download	File name included
Build Definition	BuildDefinitions.csv
Build Results	BuildResults.csv
Test Results	TestResults.csv
	TestResultsFilesTested.csv
	TestResultsHistoricalFilesTested.csv
	TestResultsMinimalFileTests.csv
File Test Results	FileTestResults.csv
	FileTestResultsFilesTested.csv
	FileTestResultsHistoricalFilesTested.csv

## Managing OMEGAMON for CICS data providers

You can add and modify OMEGAMON for CICS data providers on the Data Providers page.

Only the users with data provider administrator can add and edit the OMEGAMON for CICS data provider. Any of the role permissions can view data collection logs and download OMEGAMON for CICS data. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

### Adding an OMEGAMON for CICS data provider

You can create an OMEGAMON for CICS data provider on the Data Providers page to collect data from the data sources for analysis. Before you can add an OMEGAMON for CICS data provider, you must create at least one connection that connects the data provider to OMEGAMON for CICS server.

**Note:** You need a data provider administrator role permission in order to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to add an OMEGAMON for CICS data provider for data collection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the Data Providers page. The Add Data Provider page appears.
4. Select the **OMEGAMON for CICS** card.
5. Select the **Connection** to connect to OMEGAMON for CICS server where the data is stored. If the Connection to OMEGAMON for CICS server has not been created, you can create the connection by clicking the **Add** icon next to the Connection header. For more information about how to create a connection, see [“Adding a connection”](#) on page 191.

**Note:** You can also edit connection information or delete connection from here by clicking the **Options Menu** icon on the connection card that you want to edit or delete. Then select **Edit** or **Delete**.

6. Click **Connect** to fetch data from OMEGAMON for CICS server. Provider and Plexes data appear.
7. Select **Provider** and **Plexes** from which you want the data provider to collect the data. You can search for the Plexes by typing part of the Plexes name in the search box on the right corner of **Plexes** section.

**Note:** A plex can be used by only one OMEGAMON for CICS data provider.

8. Provide the following information in the **Data Provider Details** section.

- **Name:** Provide a unique name for the data provider you create.
- **Description:** Provide a short description of the data provider.
- **Data collection:** Specify whether you want data to be collected manually or automatically. If you choose to select data automatically, specify the interval time of data to be collected in hours.
- Specify number of days you want to keep the data in the data warehouse. By default, the value is set to **All Data**. All the data is kept in the data warehouse. You can set the value to 90 days, 180 days, or 360 days. The data that is older than the selected value will be cleaned out.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface” on page 157.](#)

9. Click **Add** to create the OMEGAMON for CICS data provider.

### **Modifying an OMEGAMON for CICS data provider**

After you add an OMEGAMON for CICS data provider, you can modify the OMEGAMON for CICS data provider information, view the data collection logs and download the OMEGAMON for CICS data. ADI prevents the data provider update by multiple users. The page rejects all but one of many parallel updates by multiple users.

Only the users with a data provider administrator role can edit the data provider information. Any of the role permissions can view the data collection logs for OMEGAMON for CICS data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

### **Editing the OMEGAMON for CICS data provider information**

You can edit name, description, or both of the OMEGAMON for CICS data provider. Only the data provider details such as name, description, and data collection and number of days to keep data in the data warehouse can be edited. ADI prevents the provider to be updated by multiple users. The page rejects all but one of many parallel updates by multiple users.

**Note:** You need a data provider administrator role permission in order to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

Complete the following steps to edit the OMEGAMON for CICS data provider information.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the OMEGAMON for CICS data provider card that you want to edit.
4. Select **Edit** from the options menu that appears. The Edit Data Provider form appears.
5. Modify the name, description, data collection, or all information of the data provider details.

**Note:** The Connection for the data provider cannot be modified.

6. Click **Save** to update the changes or click **Cancel** to quit editing.

### **Viewing OMEGAMON for CICS data collection logs**

You can view the status of OMEGAMON for CICS data collection.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

Complete the following steps to view OMEGAMON for CICS data collection.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.

3. Click the **Options Menu** icon on the header of the OMEGAMON for CICS data provider card that you want to view the data collection logs.
4. Select **View Logs** from the options menu that appears. The list of the date and time data appears. The logs are group by the hours when they are collected.
5. Select the date and time you want to view the data collection logs. Logs of the data collection status appear.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface” on page 157.](#)

### **Downloading the OMEGAMON for CICS data**

You can download the OMEGAMON for CICS data to a .csv file or .json file to be used by external analytics tools.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

Complete the following steps to download the OMEGAMON for CICS data to a .csv file or .json file.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the OMEGAMON for CICS data provider card that you want to download data.
4. Select **Download** from the options menu that appears. The **Download Data** page appears.
5. Specify the following information to scope the data to be downloaded.
  - **Date Range:** Specify the start date and end date of the code coverage results to be exported.
  - **Included Data:** Select the projects to be packaged in the download.
  - **Export Details:**
    - **File Name:** Specify the name of the file to download to.
    - **File Format:** Specify the type of file to be downloaded. CSV and JSON are 2 types of files available. By default the data will be downloaded in .csv file.
6. Click **Download** to download or **Cancel** to cancel the export option. When you click **Download**, the download box appears.
7. Select the **Save File** option and click **OK**.
8. Click **Save** to download the file.

**Note:** The downloaded file contains multiple files of the file type that you select.

## **Managing Rational Team Concert Builds data providers**

You can add and modify Rational Team Concert Builds data providers on Data Providers page. By default, only the users with data provider administrator can add and edit Rational Team Concert Builds data provider. The users with a workbook owner role can add, edit, refresh, and delete builds data. Any of the role permissions can view and export builds data.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

### **Adding a Rational Team Concert Builds data provider**

Go to the Data Providers page and create a Rational Team Concert Builds data provider to collect the data from the Rational Team Concert for analysis.

**Note:** You need a data provider administrator role permission to add a Rational Team Concert Builds data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151.](#)

## Assumptions

You have setup your Rational Team Concert build engine and build definition as documented in [Preparing code coverage results for Java using Rational Team Concert with RAD Quality Extensions](#) or [Preparing code coverage results for COBOL and PL/I by using RTC](#) on page 168.

## Procedures

Take the following steps to add a Rational Team Concert Builds data provider.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the Data Providers page.
4. Select the **Rational Team Concert Builds** card from the Add Data Provider page that appears.
5. Select the **Connection** to connect to RTC server where the data is stored. If the connection to RTC server has not yet created, you can click the **Add** icon next to the Connection header to add a connection. For more information, see [“Adding a connection”](#) on page 191.

**Note:** You can also edit connection information or delete connection from here by clicking the **Options Menu** icon on the connection card header that you want to edit or delete. Then select **Edit** or **Delete** from the options menu.

6. Click **Connect** to fetch build and code coverage data from RTC server.
7. When the **Project Area** appears, select **Project Area** you want the data provider to collect the data from the drop down list.
8. **Build Definitions** associated with selected Project Area are displayed. Select a **Build Definition** you want to perform code coverage analysis. You can search for the build definition by typing part of the build definition name in the **Search** box on the right corner of **Build Definitions** section.
9. Optional, specify **Build Tags** to filter only the builds you want to analyze code coverage. In other words, only builds that have one of the tags listed assigned will be considered.
10. By default all files available for Download in an RTC build result that end with .cczip will be downloaded and analyzed by ADI. If your build results do not use .cczip extensions or you want to define a custom filter for which files to download and use then you select the check box of **Use alternative regular file name expression to override**. When you select the box, a text field appears that allows to specify a regular expression that follows [the pattern language defined](#).
11. Provide the following information in the **Data Provider Details** forms.
  - **Name:** Provide a unique name for the data provider you create.
  - **Description:** Provide a short description of the data provider.
  - **Collection Trigger:** Specify whether you want data to be collected manually or automatically. If you choose to select data automatically, specify the interval time of data to be collected in hours.
  - Specify number of days you want to keep the data in the data warehouse. By default, the value is set to **All Data**. All the data is kept in the data warehouse. You can set the value to 90 days, 180 days, or 360 days. The data that is older than the selected value will be cleaned out.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server configuration settings”](#) on page 153.

12. Click **Add** to create the Rational Team Concert Builds data provider.

**Note:** Once the project area and build definition is selected, you cannot modify them.

### Modifying a Rational Team Concert Builds data provider

After you add a Rational Team Concert Builds data provider, you can modify the Rational Team Concert Builds data provider, edit the data provider information, refresh the build data, delete a build from an existing data provider, and download code coverage data associated with build. ADI prevents the data

provider update by multiple users. The page rejects all but one of many parallel updates by multiple users.

To edit or delete the Rational Team Concert builds provider, you need to have a data provider administrator role permission.

To refresh the builds data, you need to have either a data provider administrator role permission or a workbook owner role permission.

Any of the role permissions can view the builds data and download the code coverage data.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

### ***Editing the Rational Team Concert Builds data provider information***

You can edit the Rational Team Concert Builds data provider information such as name, description, or update RTC settings including build tags and alternative regular file name expression.

**Note:** You need a data provider administrator role permissions to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to edit the Rational Team Concert Builds data provider information:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to edit.
4. Select **Edit** icon from the options menu that appears. The Edit Data Provider page appears.
5. Modify one or all of the following RTC setting information.

**Note:** The project area and build definition cannot be modified once they are selected.

- Build Tags
  - Alternative regular file name expression to override
6. Modify the name, description, collection trigger, number of days you want to keep data in the data warehouse or all information of the data provider.

**Note:** The Connection for the data provider cannot be modified.

7. Click **Save** to update the changes or click **Cancel** to quit editing.

### ***Refreshing the builds and code coverage data***

You can refresh the data provider to manually retrieve more build data.

The builds and code coverage data that is associated with the builds can be refreshed manually from the RTC server.

**Note:** You need either a data provider administrator or a workbook owner role to perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to refresh the builds and code coverage data.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to refresh builds and code coverage data.
4. Select **Refresh** from the options menu that appears. The Data Collection dialog box opens.
5. Click **OK** to perform manual refresh or **Cancel** to cancel the operation.



### ***Viewing builds data of the Rational Team Concert Builds data provider***

You can view the builds data and status of their data collection of the Rational Team Concert Builds data provider.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to view builds data.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to view builds data.
4. Select **View Builds** from the options menu that appears. The Builds page that lists all builds that are associated with the data provider card appears.
5. Select the **Check** icon on the right side to view the log information that indicates the status of data collection.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface”](#) on page 157.

### ***Defining baseline builds for a Rational Team Concert Builds data provider***

From all the builds that are associated with a Rational Team Concert Builds data provider, you can define one or more builds as baseline builds. The baseline builds can be used as major builds for code coverage comparison.

Complete the following steps to define builds as baseline builds.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to define baseline builds.
4. Select **View Builds** from the options menu that appears. The **Builds** page that lists all builds that are associated with the Rational Team Concert Builds data provider card appears.
5. On the row, which displays a build that you want to define baseline builds, click the **Star** icon in front of the build name.

**Note:** You can select up to 10 baseline builds.

6. Click **Save baselines builds**. The dialog box to confirm the save operation opens.
7. Click **Start Data Collection** for ADI to perform the data collection of the Rational Team Concert Builds data provider and the calculation of any baseline metrics.

**Note:** Depending on the size of your data, the data collection and the calculation might take time. ADI will send you a notification when data is ready to use.

8. Optional: Click **Close** to wait for the calculation of any baseline metrics to be triggered for the next data collection of this Rational Team Concert Builds data provider.

### ***Deleting a build from the Rational Team Concert Builds data provider***

For an existing Rational Team Concert Builds provider, you can remove a build from the Rational Team Concert Builds data provider.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to delete a build from its associated data provider.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.



3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to delete a build from.
4. Select **View Builds** from the options menu that appears. The Builds page that lists all builds that are associated with the data provider card appears.
5. On the row that displays a build that you want to delete, click the **Remove** icon. The dialog box to confirm that the build deletion opens.
6. Click **OK** to confirm the deletion or **Cancel** to cancel the deletion.

#### **Downloading the code coverage data associated with build**

You can download the code coverage data that is associated with build to a .csv or .json file to be used by external analytics tools.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to download the code coverage data to a .csv file or .json file.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the Rational Team Concert Builds data provider card that you want to download.
4. Select **Download** from the options menu that appears. The **Download Data** page appears.
5. Specify the following information to scope the code coverage results to be downloaded.
  - **Date Range:** Specify the start date and end date of the code coverage results to be downloaded.
  - **Included Data:** Specify the information to be downloaded by selecting the following options.
    - **Build Definitions:** Select this option to download code coverage data from all build definitions.
    - **Build Results:** Select this option to include build results with the code coverage data.
    - **Test Results:** Select this option to include test results with the code coverage data.
    - **File Test Results:** Select this option to include file test results with the code coverage data.
  - **Export Details:** Specify the name and the file format of the file to download.
    - **File Name:** Specify the name of the file to download to.
    - **File Format:** Specify the type of file to be downloaded. CSV and JSON are two types of files available. By default the data will be downloaded in .csv file.
6. Click **Download** to export or **Cancel** to cancel the export option. When you click **Download**, the download box appears.
7. Select the **Save File** option and click **OK**.
8. Click **Save** to download the file.

**Note:** The downloaded file is a zip file that contains multiple files of the file type that you select. You can find the following list of files in the zip file.

<i>Table 12. The list of files in the downloaded zip file</i>	
<b>Information selected to download</b>	<b>File name included</b>
Build Definition	BuildDefinitions.csv
Build Results	BuildResults.csv
Test Results	TestResults.csv
	TestResultsFilesTested.csv
	TestResultsHistoricalFilesTested.csv
	TestResultsMinimalFileTests.csv

Table 12. The list of files in the downloaded zip file (continued)

Information selected to download	File name included
File Test Results	FileTestResults.csv
	FileTestResultsFilesTested.csv
	FileTestResultsHistoricalFilesTested.csv

## Managing System Management Facility data providers

You can manage System Management Facility data providers on the **Data Providers** page. Only the users with a data provider administrator role can add and edit the System Management Facility data provider. Any of the role permissions can refresh the Application Discovery data, view data collection logs, and download Application Discovery data.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

### Adding a System Management Facility data provider

You can create a System Management Facility data provider on the **Data Providers** page to upload System Management Facility and Application Performance Analyzer files for analysis.

**Note:** You need a data provider administrator role permission to add a System Management Facility data provider.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to add a System Management Facility data provider for performance analysis.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click **Create Data Provider** on the upper right of the **Data Providers** page.
4. Select the **System Management Facility** card from the **Add Data Provider** page that appears.
5. Enter ADI user credentials to be used for authenticating distributed data collection of the provider.
6. Provide the following information in the **Data Provider Details** section.
  - **Name:** Provide a unique name for the data provider you create.
  - **Description:** Provide a short description of the data provider.
7. Click **Add** to create the System Management Facility data provider.
8. Import the System Management Facility and Application Performance Analyzer files in the **Import Data** form.
  - **System Management Facility (SMF) files:**
    - Click the **Browse** button to browse to the System Management Facility files.
    - Select one or more files to import. You can click the **Download a sample file** link to view the format of SMF file to be imported.

**Note:** For SMF, ADI only uses SMF record type 30 for analysis.

  - **Application Performance Analyzer (APA) files:**
    - Click the **Browse** button to browse to the Application Performance Analyzer files.
    - Select one or more files to import.
9. Click **Import** to import the data or click **Cancel** to cancel the import.

### **Modifying a System Management Facility data provider**

After you add a System Management Facility data provider, you can modify the System Management Facility data provider information and view the data collection logs. ADI prevents the data provider from updating by multiple users. The page rejects all but one of many parallel updates by multiple users.

Only the users with a data provider administrator role can edit the data provider information. The data provider administrator or the workbook owner can import SMF and APA data.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

### **Editing the System Management Facility data provider information**

For a System Management Facility data provider, you can edit the System Management Facility data provider information.

**Note:** You need a data provider administrator role permission to edit a System Management Facility data provider. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to edit the System Management Facility data provider information.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the System Management Facility data provider card that you want to edit.
4. Select **Edit** from the options menu that appears. The **Edit Data Provider** form appears.
5. Update the data provider setting information such as the name or the description.
6. Click **Save** to update the data provider information or click **Cancel** to quit editing.

### **Viewing the System Management Facility data collection logs**

You can view the status of the System Management Facility data collection.

**Note:** Any of the role permissions can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to view the System Management Facility data collection logs.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the System Management Facility data provider card that you want to view the data collection logs.
4. Select **View Logs** from the options menu that appears. The list of the date and time data that are collected appears. The logs are grouped by the hours when they are collected.

**Note:** If the data collection fails due to memory issues, the administrator can set the memory parameters to be used during data collection. For more information, see [“Server settings that can be defined at runtime in the /adi/admin user interface”](#) on page 157.

### **Importing the SMF and APA data**

After you add a System Management Facility data provider, you can import the System Management Facility (SMF) and Application Performance Analyzer (APA) data. ADI prevents the provider to be uploaded by multiple users. The page rejects all but one of many parallel uploaded by multiple users.

**Note:** You need a data provider administrator role or workbook owner permission to import the SMF and APA data. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users”](#) on page 151.

Complete the following steps to import the SMF and APA data:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.

3. Click the **Options Menu** icon on the header of the System Management Facility data provider card that you want to import the SMF and APA data.
4. Select **Import** from the options menu that appears. The Import Data dialog box opens.
5. Upload the SMF and APA files.

**Note:** When you upload a new set of files, the new files will be appended to the existing files. For the same name files, the new files will replace the existing files.

- **System Management Facility (SMF) files:**

- Click the **Browse** button to browse to the System Management Facility files.
- Select one or more files to import. You can click the **Download a sample file** link to view the format of SMF file to be imported.

**Note:** For SMF, ADI only uses SMF record type 30 for analysis.

- **Application Performance Analyzer (APA) files:**

- Click the **Browse** button to browse to the Application Performance Analyzer files.
- Select one or more files to import.

6. Click **Import** to import the files or click **Cancel** to quit the import.

## Deleting a data provider

When you delete a data provider, you delete all the collected data and analytics results for the workbooks that are associated with this data provider.

**Note:** You need a data provider administrator role permission in order to perform this task.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to delete a data provider.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Data Providers** to go to the **Data Providers** page.
3. Click the **Options Menu** icon on the header of the data provider card that you want to delete.
4. Select **Delete** from the options menu that appears. The dialog box to confirm the data provider deletion opens.
5. Click **OK** to confirm the deletion or **Cancel** to cancel the deletion.

## Managing workbooks

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To perform data analysis, you can associate data providers with a workbook in the **Workbooks** view. By default, the users with a data provider administrator role or a workbook owner role can add workbooks to the system. To edit information of a workbook or delete a workbook, the users need to be a workbook owner. As the members of the workbook, users can only view the reports and dashboards of that workbook.

For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

## Workbooks

ADI uses the concept of a workbook to define the scope of artifacts on which to perform analysis. You can group related artifacts from different data providers in a workbook. Analysis workbook, API Discovery workbook, and Business Rule Discovery workbook are three types of workbooks in ADI.

**Note:** ADI introduced two types of workbooks: API Discovery workbook and Business Rule Discovery workbook in ADI V5.0.5 as part of the technical preview for Business Rule Mining functionalities. These types of workbook are dropped in ADI V5.1.0 and later versions. Hence, all the API Discovery workbook

and Business Rule Discovery workbook that are created must be removed before you upgrade to ADI V5.1.0. To save the work that has been done, you can export the workbooks before you delete them for the upgrade.

## Adding a workbook

Before you create a workbook to the system, you must make sure that you created at least one appropriate data provider for the workbook.

**Note:** By default, only the users with the data provider administrator or workbook owner role permission can perform this task. For more information about roles and permissions for ADI, see [“Assigning role-based permissions to ADI users” on page 151](#).

Complete the following steps to add a workbook.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Workbooks** to go to the Workbooks page.
3. Click **Create Workbook** on the upper right of the **Workbooks** page.
4. Provide the following information on the **Add Workbook** page.
  - **Name:** The workbook name.
  - **Description:** A brief description of the workbook.
  - **Contributors:** Only the contributors of the workbook can modify, view, and analyze the Analysis workbook. You can find the list of all members that are associated with the project area in the left box. For information about how to set up project area, see [Installation and Set-up page](#).
    - Set owners of the workbook: A workbook owner can modify and delete the workbook. By default, the user who creates a workbook will be assigned as an owner of that workbook. There can be more than one owner for a workbook.
      - a. Select one or more names of the workbook owners from the left box.
      - b. Select the **Owner** role from the right box.
      - c. Click > icon to add owners to the contributor list.
    - Set members of the workbook: A member of the workbook can view and analyze the workbook.
      - a. Select one or more names of the workbook members from the left box.
      - b. Select **Member** role from the right box.
      - c. Click > icon to add members to the contributor list.
  - **Data Providers:** The list of all data providers in the system appears. Select one or more data providers you want to associate with the workbook. Then one or more sections of data providers settings for each of the data providers you selected appear.
  - **Data Providers Setting:** Provide the following information for each of the data provider added.

**Note:** For a System Management Facility data provider, no additional settings is required.

    - **Manual Builds Data Provider and Rational Team Concert Builds Data Provider**
      - **Code Coverage Threshold:** Set the code coverage threshold for the code coverage analysis by using the slide bar. Slide the left and right bars to indicate the lower and upper threshold level.
      - **Refine Custom Scope:** Select files to include in the Analysis workbook. The custom scope helps you to focus only on the files that you are interested in. By default all the files within a build will be selected.
    - **OMEGAMON for CICS Data Provider**
      - Select one or more service classes you want to perform analysis.
      - **Timeframe to view Dashboard's Metrics:** Set the timeframe you want the analysis report to display on the dashboard. There are 5 choices: **Last Month, Last Week, Last Day, Last Hour**, and **Most Recent**. ADI uses the selected timeframe to analyze and display the information on all

the data analysis views associated with OMEGAMON for CICS data providers. For example, if you select **Last Week**, ADI takes all the data collected during past week to calculate the information that displays on the OMEGAMON for CICS analysis views. The default timeframe is **Last Day**.

– **Application Discovery Data Provider**

- Select one or more projects you want to perform analysis.
- **Thresholds:** Expand to set the threshold values for the following metrics:
  - **Unreachable Code Threshold:** Set the unreachable code threshold for the unreachable code analysis by using the slide bar. Slide the left and right bars to indicate the acceptable, poor and unacceptable level. For more information of Unreachable Code metric, see [“Project data from Application Discovery reports and information”](#) on page 273.
  - **Maintainability Index Threshold:** Set the maintainability index threshold for the maintainability index analysis by using the slide bar. Slide the left and right bars to indicate the acceptable, poor and unacceptable level. For more information of maintainability index, see [“Project data from Application Discovery reports and information”](#) on page 273.
  - **Cyclomatic Complexity Threshold:** Set the Cyclomatic Complexity threshold for the complexity analysis by using the slide bar. Slide the right and left bars to indicate the acceptable, poor and unacceptable level. For more information of Cyclomatic Complexity metric, see [“Project data from Application Discovery reports and information”](#) on page 273.
- **Notification Rules:** Use this section to configure your notification rules. For more information, see [“Managing notification rules”](#) on page 216. By default, when you create a workbook, three notification rules are created. Each rule defines that you can get notified when the value of each metric under thresholds setup exceeds the defined threshold value. If you change the threshold value under the thresholds setup, you might also need to change the default notification rules.

**Note:** If you migrate from a previous version of ADI to version 5.0.5, the default rules are not automatically created. You need to manually add the rules to the existing workbooks.
- **Visualization Options:** Use this section to configure the charts that are displayed on the Static Analysis dashboard. For more information, see [“Configuring static analysis reports”](#) on page 218.
- **Source Changes Detection Interval in Days:** Enter the interval in days that you want ADI to check and notify if any of the artifacts within the data warehouse has been modified.

– **Business Rule Discovery Data Provider**

- Select an Application Discovery project that you want to perform analysis.

**Note:** You cannot change the selected project after the workbook is created.
- Set the sliders to configure the weights to be used for discovering keywords from the Application Discovery server. By default, all the weights are set in the middle. You can slide a slider to the left if you want to lower the weight of a specific condition.
- Update the maximum number of keywords to request from Application Discovery server. This is the number of unique keywords that Application Discovery server returns to ADI based on the weights configuration.

5. Click **Add** to add the workbook or **Cancel** to cancel adding the workbook.

### Managing notification rules

For the Application Discovery data provider, you can specify the way you get informed about the changes of the metric values for a workbook through notification rules. You can add, update, and delete the notification rules on the Workbook information page.

By default, when you create a workbook, the following notification rules are created.

- Notify when Unreachable Code is larger than the defined threshold since the last snapshot for any selected projects.

- Notify when Maintainability Index is lower than the defined threshold since the last snapshot for any selected projects.
- Notify when Cyclomatic Complexity is larger than the defined threshold since the last snapshot for any selected projects.

You can also add new rules, update existing rules, or delete existing rules for the Application Discovery data provider.

**Note:** If you migrate from a previous version of ADI to version 5.0.5, the default rules are not automatically created. You need to manually add the rules to the existing workbooks.

### Adding notification rules

Complete the following steps to add notification rules.

1. On the **Add Workbook** or **Edit Workbook** page, scroll down to the **Notification Rules** section under the **Application Discovery Data Provider Setting** area.
2. Click the **Add** icon next to the **Notification Rules** section header.
3. Complete the following information on **Add Notification Rule** window.
  - **Condition:** Provide the following information.
    - Select a metric that you want to get notified , and set conditions and metric values on which the notification will be triggered. The following metrics are available. For more information, see [“Project data from Application Discovery reports and information” on page 273.](#)
      - Active Statement
      - Artifacts
      - Cyclomatic Complexity
      - Delivered Bugs
      - Maintainability Index
      - Source Lines of Code
      - Total Statements
      - Unreachable Code
    - Select the condition and metric value that will trigger the notification. The following conditions are available.
      - **is larger than:** Select this condition to notify when the metric value is larger than the specified value.
      - **is lower than:** Select this condition to notify when the metric value is lower than the specified value.
      - **changed by:** Select this condition to notify when the metric value is changed by the specified value.
    - Select the time frame in which the condition will be applied. The following time frames are available.
      - since last snapshot
      - in the last day
      - in the last week
      - in the last month
      - in the last 6 months
  - **Scope:** Provide the scope that the notification is applied. The following scopes are available.
    - "for all of the selected projects": Select this scope to notify if the metric value of all of the selected projects in scope for a workbook matches the selected condition.

- "for any selected projects": Select this scope to notify if the metric value of any selected projects in scope for a workbook matches the selected condition.
  - "as an average of all selected projects": Select this scope to notify if an average value of the metric value of all the selected projects in scope for a workbook matches the selected condition.
  - **Custom Message:** Provide the notification message to be displayed. If you leave this field empty, the default notification message is used.
4. Click **Add** to create a notification rule or **Cancel** to cancel the add operation.

### Updating notification rules

Complete the following steps to update notification rules:

1. On the **Edit Workbook** page, scroll down to the **Notification Rules** section under the **Application Discovery Data Provider Setting** area.
2. Expand the **Notification Rules** section.
3. Click the title of notification rule that you want to edit. The **Edit Notification Rule** window opens.
4. Update the information within the window.
5. Click **Save** to save the changes or **Cancel** to cancel the changes.

### Deleting notification rules

Complete the following steps to delete notification rules.

1. On the **Edit Workbook** page, scroll down to the **Notification Rules** section under the **Application Discovery Data Provider Setting** area.
2. Expand the **Notification Rules** section.
3. Click the **Delete** icon on the action column of the notification rule to be deleted. The **Confirm Delete Notification Rule** window opens.
4. Click **OK** to delete the notification rule or **Cancel** to cancel the deletion.

### Configuring static analysis reports

Static analysis data from Application Discovery data providers is analyzed and displayed on the **Analysis Workbook** page as charts and reports. With ADI, you can choose the metrics to be displayed on the bubble chart on the **Overview** tab and the radar chart on the **Metrics** tab. You can select the type of data sources to be included in the shared resources analysis.

Complete the following steps to configure the data and information that is displayed on the static analysis reports.

1. On the **Add Analysis Workbook** or **Edit Analysis Workbook** page, scroll down to the **Visualization Options** section under the **Application Discovery Data Provider Setting** area.
2. To configure the metrics that are displayed on the bubble chart or radar chart, expand the **Expand to select metrics** section and complete the following steps.
  - a. Under the **Projects Overview** section, select a metric you want to be displayed as "X-Axis", "Y-Axis" or "Bubble" size from metric drop-down lists. By default, the bubble chart is displayed as:
    - Unreachable code as X-Axis
    - Cyclomatic complexity as Y-Axis
    - Source Lines of Code as Bubble size
  - b. Under the **Project-level Metrics**, select a metric you want to display for each axis on the radar chart from metric drop-down lists. The radar chart can display three metrics to five metrics. By default, the radar chart is displayed as follows:
    - Unreachable Code as Axis 1
    - Cyclometric complexity as Axis 2



- Source Lines of Code as Axis 3
  - Delivered Bugs as Axis 4
  - Maintainability Index as Axis 5
- c. To configure the data sources that are included in the analysis of shared resources, complete the following steps.
- 1) Click the **Expand** icon in front of the **Expand to select resource types for shared resource analysis** section. A list of checkbox appears.
  - 2) Check each of the boxes to include the resource types in the analysis of shared resources.

## Modifying a workbook

You can edit the workbook information, update contributors, and update data providers of the workbook.

**Note:** You need to be assigned as an owner of the workbook to modify that workbook.

### Modifying a workbook

Complete the following steps to modify a workbook:

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
  2. Click **Workbooks** to go to the Workbooks page.
  3. Click the **Options Menu** icon on the header of the Analysis workbook you want to modify information.
  4. Select **Edit** from the options menu that appears. The Edit Analysis Workbooks page appears.
  5. Modify the workbook information. You can perform one or more of the following activities.
    - Modify name, description, or both of the workbook from the **Name** and **Description** field.
    - Add owners of the workbook.
      - a. Select one or more names of the workbook owners from the left box.
      - b. Select **Owner** role from the right box.
      - c. Click > icon to add owners to the contributor list.
    - Remove owners of the workbook.
      - a. Select one or more names of the workbook owners from the right box.
      - b. Click < icon to remove owners from the contributor list.
    - Add members of the workbook.
      - a. Select one or more names of the workbook members from the left box.
      - b. Select **Member** role from the right box.
      - c. Click > icon to add members to the contributor list.
    - Remove members of the workbook.
      - a. Select one or more names of the workbook members from the right box.
      - b. Click < icon to remove members from the contributor list.
    - Update the threshold.
      - Slide the right and left bars to change the threshold level.
    - Update data providers.
      - Select or deselect the data providers from the data provider list.
- Note:** You cannot change the Business Rule Discovery data provider that has already been selected.
- Update the data provider settings for each of the data provider.
    - **Manual Builds data provider and Rational Team Concert Builds data provider**

- **Code Coverage Threshold:** Slide the right and left bars to change the threshold level.
  - **Refine Custom Scope:** Select or unselect files to update files you want to include in the workbook.
  - **OMEGAMON for CICS data provider**
    - Select or deselect the service classes from the list.
    - **Timeframe to view Dashboard's Metrics:** select the timeframe from the list.
  - **Application Discovery data provider**
    - Select or deselect the projects from the list.
    - **Unreachable Code Threshold:** Slide the right and left bars to change the threshold level.
    - **Maintainability Index Threshold :** Slide the right and left bars to change the threshold level.
    - **Cyclomatic Complexity Threshold:** Slide the right and left bars to change the threshold level.
    - **Source Changes Detection Interval in Days:** Update number of days you want ADI to check and notify if any of the artifacts within the data warehouse have been modified.
  - **Business Rule Discovery data provider**
    - Slide any of the sliders to update the keyword discovery weights.
    - Update the maximum number of keywords to requests from Application Discovery server.

**Note:** You cannot change the selected Application Discovery project and the Business Rule Discovery data provider after the workbook is created.
6. Click **Save** to save changes or click **Cancel** to quit editing.

## Pinning a workbook

When you work with multiple workbooks, you can pin some of the workbooks which you are interested in or often work with.

Complete the following steps to pin a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Click **Options Menu** icon on the header of workbook you want to pin.
3. Select **Pin** from the drop-down list that appears. The Workbooks view reloads with the pinned workbook under the **Pinned Workbook** section.

**Note:** To unpin the workbook, click **Options Menu** icon and select **Unpin**.

## Deleting a workbook

You can delete a workbook from the system. If you remove a workbook, you cannot undo or restore the action. When you delete a workbook, you don't delete the data providers associated with that workbook.

**Note:** You need to be assigned as an owner of the workbook to be able to delete the workbook.

Complete the following steps to delete a workbook.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Click **Workbooks** to go to the Workbooks page.
3. Click the **Options Menu** icon on the header of the workbook you want to delete.
4. Select **Delete** from the options menu that appears. A confirmation dialog appears.
5. Click **OK** to delete the workbook or **Cancel** to cancel the deletion.

## Preserving user settings

When you work with ADI, you can preserve user settings as an individual user.

For more information about the user settings you can preserve, see the following list:

- Selection of the user role on the Welcome page
- Pinned workbook by a user
- The log messages and notifications that are read by a user
- The order of workbook listed on the **Workbooks** page

**Note:** A user can select how the workbook is sorted on the Workbooks page by selecting the **Sort By** drop-down list on this page. The last used sorting option is saved for that user.

- The last used filters for Code Coverage analysis views
- The seen status of discover business terms tutorial on the discover business terms page

## Managing notifications

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Notifications are messages that inform users about the data collection status or metrics violation.

For the notifications about data collection status, ADI displays the following log messages of data collection activities for all the data providers within your ADI.

- Manual Builds data providers: All log messages from data collection.
- Rational Team Concert data providers: All log messages from scheduled data collection.
- OMEGAMON for CICS data providers: Only warnings and errors messages of data collection.
- Application Discovery data providers: All log messages from data collection.
- Enterprise Artifact data providers: All log messages from data collection.

**Note:** This type of notifications cannot be turned off.

For the notifications about metrics violation, ADI displays the notifications when one of the notification rules is violated. For more information about how to add, update or delete notification rules, see [“Managing notification rules” on page 216](#).

**Note:** You can choose to turn on or turn off this type of notifications. For more information, see [“Subscribing to notification rules” on page 221](#).

## Subscribing to notification rules

By default, after a workbook owner creates a notification rule, all the contributors of the workbook are automatically subscribed to the notification rule. Individual users can go to the **Subscriptions** page to turn on or turn off the notification rules.

Complete the following steps to subscribe or unsubscribe to the notification rules for any workbook of which you are a contributor.

1. Click the **User** icon in the upper right corner of the screen. A drop-down menu appears.
2. Select **Subscriptions** from the drop-down menu to go to the **Subscriptions** page. All notification rules for the workbooks of which you are a contributor are listed by workbook.
3. Click the **Notifications** (bell) icon in front of notification rule that you want to subscribe or unsubscribe. A filled icon means that you are subscribed to the notification rule; conversely, an unfilled one indicates that you are unsubscribed.

## Viewing notifications

You can view the details for notifications of data collection status and metric violation.

To view notifications, complete the following steps:

1. Log in to ADI. After you log in to ADI, you can see the **Notifications** (bell) icon on the upper right of the page next to your **Profile** icon. The **Notifications** icon is displayed along with the number of new notifications since you check notifications last time.
2. Select the **Notifications** icon to view the list of ten latest notifications. From the notifications list, the latest notifications are highlighted.
3. Click any of the notifications to go to the detailed information.
  - For notification of data collection status, the Logs message page of that data provider is displayed.
  - For notification of metric violation, the trend line of the metric that is violated is displayed.
4. Select **View all notifications** on the bottom to go to the **Notifications** page. The **Notifications** page appears with all notifications that are grouped by hours they occur.

For notification of data collection status, most of the notifications are the same as the log messages. However, some of the messages on the **Logs** page are too long to be displayed on the notification list. ADI displays short forms of these messages as follows.

Notification messages	Log messages
CRIDA0344E Error in the data collection for automation result %s.	CRIDA0062E There was an error in the code coverage data collection process automation result %s. Error message returned: %s. Contact your administrator to check the log file on the server at /server/conf/adi/logs/adi-collections.log for details.
CRIDA0351W Ended with a warning for the last data collection.	CRIDA0095W The last data collection ended with a warning: %s. Contact your administrator to check the log file on the server at /server/conf/adi/logs/adi-collections.log for details.
CRIDA0350E Ended with an error for all the automation results in last data collection.	CRIDA0094E The last data collection ended with an error for all the automation results in this data provider. Contact your administrator to check the log file on the server at /server/conf/adi/logs/adi-collections.log for details.
CRIDA0353E No valid regular expression for the code coverage data files.	CRIDA0068E The automated data provider %s does not specify a valid regular expression for the code coverage data files. Please correct the problem, delete this automation result, and run the collection again.
CRIDA0352E No code coverage file was found for automation result %s.	CRIDA0067E No code coverage file was found for automation result %s. Please verify that this build contains such files in the build record and that it matches the regular expression specified for the provider.
CRIDA0349W Data Collection was skipped.	CRIDA0093W The data received from IBM OMEGAMON for CICS was older or the same as the latest data already available in the warehouse. Data Collection was skipped.

Notification messages	Log messages
CRIDA0348W Data maybe missed because last data collection took too long.	CRIDA0102W The last data collection took more time than the time interval between two collections, which can result in data being missed during an auto collection. The recommendation is to either increase the fixed delay between two collections in the ADI Administration page or collect data for smaller number of plexes.
CRIDA0347W Finished data collection with warnings. %s out of %s documents were indexed.	CRIDA0294W Finished Enterprise Artifacts data collection with warnings. See messages below for details. %sout of %s documents were indexed.
CRIDA0345W Error when inserting the document %s.	CRIDA0253W Inserting the document %s failed with this error %s.
CRIDA0346E Keyword discovery failed with error.	CRIDA0314E Keyword discovery failed with error: %s.
CRIDA0340E The last data collection ended with an error.	CRIDA0082E The last data collection ended with this error: %s.

**Note:** %s in the table represents the message strings that ADI generates based on different message types. For example, %s could be the name of a build or a data provider.

For notifications of metric violation, the notification message is displayed in the following pattern unless you create your own custom message when you create the notification rule.

Workbook: Notification Rule

**Note:** Workbook is the workbook that the violated metric belongs to. Notification Rule is the rule that is being violated.

For example, the following notification informs you that the Maintainability Index value of any project within the ABC workbook is less than 55.

ABC workbook: Maintainability Index is smaller than 55 for any selected project.



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## Chapter 8. Analyzing workbooks

You can access the analysis dashboards and reports from the **Workbooks** view on ADI home page. The **Workbooks** view is the view that shows the status of all the workbooks within the system that the user has access to.

For each workbook, it shows its latest data analysis results from their associated data provider. For example, for the workbooks associated with Application Discovery data provider, the view displays the summary report of maintenance status of all projects within the workbook.

You can click the name of a workbook to navigate to the detailed analysis dashboards and reports for all data providers that are associated with the workbook.

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### Role-based dashboards and reports for a workbook

Before you can view the analysis results of the static analysis, the code coverage, and the performance that only applies to OMEGAMON data of a workbook, ADI requires you to select your role to start the analysis. Three roles are available: Development, Test, and Operations. The order of dashboards reports displays differently based on the role you select.

**Note:** You don't need to select your role to start the analysis for business rule discovery. You can perform the discovery of business rule after the workbook creation.

#### Development role

This role is for people whose focus is on software implementation. You can find the order of tabs on the dashboard and reports that are displayed within a tab for the development role in the following list.

- The order of tabs that are displayed on the dashboard is as follows.

- **Static Analysis**
- **Code Coverage**
- **Performance**

- The order of reports within a tab is as follows.

- **Static Analysis:**

The reports on the overview page for a selected project are in the following order.

- Unreachable Code Trend
- Total and Active Statements Trend
- Artifact and Lines of Code Breakdown
- Maintainability Index vs Delivered Bugs

For report details, see [“Project data from Application Discovery reports and information” on page 273.](#)

- **Code Coverage:**

The code coverage reports are displayed in the same order for all roles.

For report details, see [“Code coverage reports and information” on page 251.](#)

- **Performance:**

The reports within the **Performance** tab are in the following order.

- Transactions with Performance and Reliability Issues
- Average Response Time
- Average CPU Time

- Average Transactions

For report details, see [“OMEGAMON for CICS related reports and information” on page 266.](#)

## Test role

This role is for people whose focus is on software testing. You can find the orders of tabs on the dashboard and reports that are displayed within a tab for the test role in the following list.

- The order of tabs that are displayed on the dashboard is as follows.

- **Code Coverage**
- **Performance**
- **Static Analysis**

- The order of reports within a tab is as follows.

- **Code Coverage:**

The code coverage reports are displayed in the same order for all roles.

For report details, see [“Code coverage reports and information” on page 251.](#)

- **Performance:**

The reports within the **Performance** tab are in the following order.

- Transactions with Performance and Reliability Issues
- Average Response Time
- Average CPU Time
- Average Transactions

For report details, see [“OMEGAMON for CICS related reports and information” on page 266.](#)

- **Static Analysis:**

The reports within the **Static Analysis** tab are in the following order.

- Maintainability Index vs Delivered Bugs
- Artifact and Lines of Code Breakdown
- Unreachable Code Trend
- Total and Active Statements Trend

For report details, see [“Project data from Application Discovery reports and information” on page 273.](#)

## Operations role

This role is for people whose focus is on monitoring the performance of the operation server. You can find the order of tabs on the dashboard and reports that are displayed within a tab for the operations role in the following list.

- The order of tabs that are displayed on the dashboard is as follows.

- **Performance**
- **Static Analysis**
- **Code Coverage**

- The order of reports within a tab is as follows.

- **Performance:**

The reports within the **Performance** tab are in the following order.

- Average Response Time
- Average CPU Time



- Average Transactions
- Transactions with Performance and Reliability Issues

For report details, see [“OMEGAMON for CICS related reports and information”](#) on page 266.

– **Static Analysis:**

The reports within the **Static Analysis** tab are in the following order.

- Artifact and Lines of Code Breakdown
- Unreachable Code Trend
- Total and Active Statements Trend
- Maintainability Index vs Delivered Bugs

For report details, see [“Project data from Application Discovery reports and information”](#) on page 273.

– **Code Coverage:**

The code coverage reports are displayed in the same order for all roles.

For report details, see [“Code coverage reports and information”](#) on page 251.

**Note:** The tabs and reports that are related to a data provider are displayed only when you associate that type of data provider with the workbook that is analyzed. For example, if you do not associate the OMEGAMON for CICS data provider with a workbook that is analyzed, the **Performance** tab and reports within the **Performance** tab will not be displayed.

## Performing Business Rule Discovery

For a workbook that is associated with a Business Rule Discovery data provider, you can use this workbook to discover candidate business terms and track in which application artifacts or enterprise artifacts these business terms appear. You can also use the workbook to manage status of business terms in order to collaborate with your peers.

To manage a workbook, you need to be the workbook owner or member.

### Business Rule Discovery workbook reports and information

You can find the details of reports and information that are displayed for the Business Rule Discovery workbook.

Table 13. Business Rule Discovery workbook reports and information		
Displayed Location	Report/Information	Description
Workbooks view	Business Terms	The number of all business terms within a workbook. If you create a workbook by importing the business terms, ADI calculates the number from counting all the imported terms.
	Business Rule Packages	The number of all business rule packages that are defined within a workbook.

Table 13. Business Rule Discovery workbook reports and information (continued)

Displayed Location	Report/Information	Description
<b>Keywords Exploration</b> tab > <b>Summary</b> header	Keywords associated with Business Terms	The bar chart shows the number of keywords that either are promoted as business term or associated with one or more business terms.
	Keywords from Source Code (AD)	The number of all the keywords that are discovered from source code by analyzing the keyword usages based on the weights configuration in workbook setting through Application Discovery.
	Keywords from Enterprise Artifacts	The number of all the keywords that are discovered from enterprise artifacts.
	Associated Snippets	The number of all the snippets that are defined and associated with business terms within a workbook.
	Business Terms	The number of all the business terms that are defined within a workbook. If you create a workbook by importing the business terms, ADI calculates the number from counting all the imported terms as well as those terms that are created from the discovery by users.

Table 13. Business Rule Discovery workbook reports and information (continued)

Displayed Location	Report/Information	Description
<b>Keywords Exploration</b> tab > <b>Application Discovery</b> tab	Keywords	The name of discovered keywords.
	Usage In Conditions	The number of keywords occurrences in condition statements such as IF statement within source files in scope for a workbook.
	Computations	The number of keywords occurrences in computation statements such as COMPUTE within source files in scope for a workbook.
	Map	The number of keywords occurrences that are used for screen display statement.
	Usage in File	The number of keywords occurrences in read or write file statements within source files in scope for a workbook.
	DB	The number of keywords occurrences in read or write to database within source files in scope for a workbook.
	MQ	The number of keywords occurrences in MQ statements.
	Programs Involved	The number of keywords occurrences that program call within source files in scope for a workbook.
	Usage in Enterprise Artifacts	The number of keywords occurrences in enterprise artifacts in scope for a workbook .
	Business Terms Associated	The number of business terms that are associated with the keyword. The association can be through the promotion of keyword as a business term or the association with a business term.

Table 13. Business Rule Discovery workbook reports and information (continued)

Displayed Location	Report/Information	Description
<b>Keywords Exploration</b> tab > <b>Enterprise Artifacts</b> tab	Usage in Artifacts	The number of keywords occurrences in enterprise artifacts in scope for a workbook.
	Number of Artifacts	The number of enterprise artifacts containing the keyword.
	Business Terms Associated	The number of business terms that are associated with the keyword. The association can be through the promotion of keyword as a business term or the association with a business term.
	Associated in Application Discovery	Check mark displayed when the keyword is also discovered by the analysis of Application Discovery through the usages in source file.
<b>Business Terms</b> tab > <b>Summary</b> header	Business Term Summary	The percentage of approved business terms form total number of business terms that are defined.
	Total	The number of all business terms that are defined within a workbook. If you create a workbook by importing the business terms, ADI calculates the number from counting all the imported terms as well as those created from the discovery by users.
	With Artifacts Relationship	The number of business terms that have relationship to one or more artifacts in the enterprise artifacts that is associated with the workbook.
	Without Artifacts Relationship	The number and list of business terms that have no relationship to artifacts in the enterprise artifacts that are associated with the workbook.
	With Associated Snippets	The number of business terms that have snippets associated with.
<b>Business Terms</b> tab > <b>Business Terms</b> table	Business Terms	The name of a business term.
	Definition	The description of a business term.

Table 13. Business Rule Discovery workbook reports and information (continued)

Displayed Location	Report/Information	Description
	No. of Artifacts Relationship	The number of artifacts that have relationship with a business term.
	No. of Snippets Associated	The number of snippets that are associated with a business term.
	Implementation Names	The list of implementation names that are identified for a business term.
	Status	The status of a business term. Five statuses are available: New, In Progress, Waiting For Approval, Approved, and Rejected.
<b>Business Rule Packages</b> tab > <b>Summary</b> header	Business Rule Packages	The percentage of approved business rule packages form total number of business rule packages that are defined.
	Total	The number of all business rule packages that are defined within a workbook.
	With Business Terms associated	The number of business rule packages that have business terms associated with.
	With Snippets associated	The number of business rule packages that have snippets associated with.
<b>Business Rule Packages</b> tab > <b>Business Rule Packages</b> table	Business Rule Packages	The name or short description or identifier of a business rule package.
	Description	The description of a business rule package.
	Tags	The list of tags that are assigned to a business rule package.
	Associated Business Terms	The list of business terms that are associated with a business rule package.
	No. of Snippets Associated	The number of snippets that are associated with a business rule package.
	Status	The status of a business rule package. Five statuses are available: New, In Progress, Waiting For Approval, Approved, and Rejected.

## Working with keywords

A keyword is a term that ADI discovers and recommends as a potential business term or implementation name. ADI analyzes the usages of keywords in the source code or the enterprise artifacts to discover keywords.

The analysis of source code is done through Application Discovery (AD) by analyzing the usages of all possible data names or variables within the source files in the scope for a workbook. AD takes the following types of usages into the analysis:

- Usage in included files
- Usage in conditions
- Usage in computations
- Usage in map
- Usage in file input/output
- Usage in database input/output
- Usage in MQ

The number of usages for each type is calculated with the usage weights that are set in the workbook to decide the ranking of the discovered keywords.

The keyword analysis of enterprise artifacts is performed when ADI scans the files in the Enterprise Artifact data provider. ADI automatically discovers the keywords and groups them based on the likelihood that the keywords can be the same term. For more information, see [“Enterprise artifacts keywords discovery process”](#) on page 234.

### Exploring keywords

Complete the following steps to explore keywords:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Click the name of the workbook that contains business terms to explore keywords.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Select the **Keywords Exploration** tab. A list of keywords appears on the left with the usages information.

**Note:** The keywords found in Application Discovery are listed under the **Application Discovery** tab and the keywords found in enterprise artifacts are listed under the **Enterprise Artifacts** tab. Select the tab name to switch between two tabs.

5. View the information of keyword usages to help decide if a discovered keyword is a business term or an implementation name of a business term. Optionally, you can perform the following actions.
  - Promoting a discovered keyword to a business term
    - a. Click the **Options Menu** icon on the right of the discovered keyword.
    - b. Select **Promote to Business Term** from the options menu. The discovered keyword is created as a business term.
  - Associating a discovered keyword to the implementation name list of one or more business terms
    - a. Click the **Options Menu** icon on the right of a discovered keyword.
    - b. Select **Associate to Business Term** from the options menu.
    - c. Select one or more business terms that you want to associate the keyword with. The discovered keyword becomes the implementation name of the selected business term.
  - Viewing the affinities keywords.
    - a. Click the **Options Menu** icon on the right of the discovered keyword.

- b. Select **View Affinities** from the options menu. The **Affinities** page appears with the list of keywords that are used with the selected keyword and the usages information.

**Note:**

- The same keyword might be defined multiple times in the application. Keyword usages are grouped and displayed by variable definition location: included files and programs.
- To expedite the discovery process, you can search for a specific keyword that you know or scope the list of keywords that you want to explore based on where they are defined. For more information, see [“Searching and scoping the list of keywords”](#) on page 233.

6. Select the name of keyword to view detailed usages of a keyword.

**Note:** The usages that are displayed on this page can either be the direct usages or indirect usages. The indirect usage is the usage which refers to variable that keyword is part of. For example the record in which that keyword is one attribute of that record.

7. Expand and select an item on the left panel to view the usage statement of a keyword. The usage statement of a keyword is highlighted on the middle panel.

**Notes:**

- The keywords found in Application Discovery are listed under **Application Discovery** tab and the keywords found in enterprise artifacts are listed under **Enterprise Artifacts** tab. Select the tab name to switch between two tabs.
- For the Application Discovery keywords, the same keyword might be defined multiple times in the application. Keyword usages are grouped and displayed by variable definition location: included files and programs.

After reviewing the details of keyword usages, you may decide to perform one of the following actions.

- [“Defining snippets and associating them with business terms”](#) on page 234
- [“Viewing affinity keywords and their mutual statement”](#) on page 235

### ***Searching and scoping the list of keywords***

Large applications or projects can have thousands of keywords, which makes the keyword exploration activities exhaustive and time-consuming. To help expedite the process, you can search for a specific keyword that you know or scope the list of keywords that you want to explore based on where they are defined.

Perform the following actions to search or scope the list of keywords to explore.

1. If not yet selected, select the **Keywords Exploration** tab. A list of keywords appears on the left with the usages information.

**Note:** The keywords that are found in Application Discovery are listed under the **Application Discovery** tab and the keywords that are found in Enterprise Artifacts are listed under **Enterprise Artifacts** tab. Select the tab names to switch between two tabs.

2. To search for a specific keyword, enter the keyword name or part of the keyword name in the **Search** box on the top of the keywords list. ADI returns all the keywords that have part of the search string that you enter. For example, the string `record` returns all the keywords that contain the `record` string, such as `record`, `ws-records`, `record-id`, `record-name`, `recordA`.

**Note:** For Application Discovery keywords, you can use the following wildcard characters to search for the keywords. Wildcard search is not accepted for the Enterprise Artifacts keywords.

- `"* "` matches none or more non-space characters and the other text is exactly match the search string. For example, `record*` returns all the list of keyword that begin with `record` such as `record`, `record-id`, `record-name`, `record-type`, and `recordA`.
- `"_ "` matches one or more non-space character and the other text has part of the search string. The behavior of `"_ "` is similar to that of adding `"* "` before and after the search string. For example, `record_` is same as `*record_*`, which returns all the list of keywords that contain the search string

and are followed by at least one character such as `ws-record-id`, `in-record-id`, `record-id`, `record-name`, `record-type`, and `recordA`.

- `"_ "` with spacebar matches exactly one non-space character. For example, `record_` (blank) returns the keywords that are started with `record` and followed by one character (`recordA`) or `record__` (blank) returns the keywords that are started with `record` and followed by two characters (`recordAB`).

3. To filter the list of keywords that are displayed or filter the search scope:

- a. Select the **Options Menu** icon next to the **Search** box on the top of the keywords list.
- b. Select one of the options in the dialogue that opens.
  - Select **Defined in Copybook** to search for the keywords that are defined in a specified copybook.
  - Select **Defined in Program** to search for the keywords that are defined in a specified program.
  - Select **Defined in Record** to search for the keywords that are defined in a specified record.
- c. Enter the name of a copybook, a program, or a record next to the option that you select to scope the search results.

**Note:** You can use wildcard characters as what you do while searching for the keywords.

- d. Click **Apply** to apply the filter or click **Clear** to clear the filter selection.

**Note:** When you view the keyword details page, define snippets, and associate them with business terms from the filtered results, the filter is saved for the next time you review the implementation of the business terms.

### ***Enterprise artifacts keywords discovery process***

Automated keywords discovery is one of the key cognitive features of ADI that help identify potential important terms within both business artifacts and IT artifacts. In the business artifacts, the important terms are potential business terms while in the IT artifacts the important terms are mainly implementation names of these business terms. The process to identify these terms is usually labor intensive and time-consuming. ADI provides the automation of this process by using Natural Language Processing (NLP) method. The output of the automated keywords discovery is the list of keywords and their potential implementation names that are sorted by the confidence score. The confidence score is a likelihood score that indicates whether a keyword is an important term or not. The higher score means that the term has higher potential to be a business term. Likelihood score is calculated from the training of machine learning based classification model which considers two main attributes:

- **Keyword features:** The important properties of the term which help indicate that whether a term is a keyword or not. The properties could be, for example, the appearances of the terms in the artifacts, term length or location of its first appearance. These features can be either programming language dependent or programming language independent.
- **Known business terms:** When there is an imported list of business terms or a list of business terms in a workbook, these terms providing a higher weight to the confidence scores of discovering keywords.

### **Defining snippets and associating them with business terms**

A snippet is the statements within artifacts which contain one or more business terms. You can highlight one or more lines of statements within an artifact and save as a snippet. You can associate a snippet with business terms or business rule packages in that artifact when you explore the keyword details.

Complete the following steps to take an artifact snippet:

1. Go to the **Keyword** details page by exploring keywords as described in [“Exploring keywords” on page 232](#).
2. On the Keyword details page, expand and select the keyword usage from the left panel. ADI highlights the statement usage of a keyword on the middle panel.

**Note:** For one keyword usage occurrence, ADI only allow one snippet to be defined and associated with business terms. You can associate this statement with one or more business term as a snippet or define a new snippet to associate with one or more business term as described in the following steps.



3. Optional: Highlight one or more line within the artifact and select **Redefine snippet** from the pop-up menu to define a new snippet.
4. Optional: Provide a short description of the snippet on the right panel under the **Snippet Description** field.
5. Perform either one or both of the following actions:
  - Check one or more boxes in front of the business terms to associate with the snippet from the **Business Terms** tab on the right pane.
  - Check one or more boxes in front of the business rule packages to associate with the snippet from the **Business Rule Packages** tab on the right pane.

**Note:** When you perform both actions at the same time, the snippet is associated with selected business terms and business rule packages independently.
6. If not yet selected, select one or more business terms that you want to associate with the snippet.
7. Click **Save** to save the snippet and its associations or click **Cancel** to cancel the changes you made.
8. Optional: Click **Restore to the original state** to discard the new snippet that you redefined, to display the original usage statement, and to remove the association to the selected business term.

### Viewing affinity keywords and their mutual statement

Affinity keywords are the keywords that are used together in one or more statements in the source files. A mutual statement is the statement that contains affinity keywords in the scope for analysis.

For example, the following statement is mutual statement of A, B, and C, which are affinity keywords because they are used together in the same condition statement.

```
IF (A > 3) and (B > 3) and (C = 5)
THEN do something
ELSE do something else
```

ADI analyzes the affinity keywords based on the usage of the following criteria:

- Usage in condition statements
- Usage in computation statements
- Usage in assignment statements
- Usage in program

ADI helps you discover additional business terms by viewing affinity keywords and their usage information along with the mutual statement.

Complete the following steps to view affinity keywords and their mutual statements:

1. Go to the **Keyword** details page by exploring keywords as described in [“Exploring keywords” on page 232](#).
2. On the **Keyword** details page, select the **View Affinity** button on the right of header area. The **Affinity Keywords** page appears. You can see a list of affinity keywords and usage information are listed in the table.
3. You can perform one of the following activities.
  - To promote a keyword to a business term, complete the following steps.
    - a. Click the **Options Menu** icon under the **Actions** column of a keyword that you want to promote to a business term.
    - b. Select **Promote to Business Term** from the options menu. The keyword is created as a business term.
  - To associate a keyword to a business term, complete the following steps:
    - a. Click the **Options Menu** icon under the **Actions** column of a keyword that you want to associate to a business term.
    - b. Select **Associate to Business Term** from the options menu.

- c. Select a business term that you want to associate the keyword with. The keyword becomes the implementation name of the selected business term.
- To view the mutual statements of one or more keywords, complete the following steps.
  - a. Select one or more keywords that you want to view mutual statements.
  - b. View the header area to see if any mutual usages of the selected keywords are available.
  - c. If mutual usages are available, select the **Show Mutual Statements** button to view mutual statements of all selected keywords.
- Note:** If no mutual usages are available, the **Show Mutual Statements** button is disabled.
- d.
- 4. Select to view mutual statements from the list on the left pane. You can associate the statement as a snippet to business terms or redefine new snippets before you associate them to a business term from this page. For more information, see [“Defining snippets and associating them with business terms” on page 234.](#)

## Managing a business term

### Importing business terms

You can import the list of business terms in the .csv file to ADI.

The first column in the .csv file is the name of business terms. The second column is the implementation names. Multiple implementation names can be separated by semicolon ';'. The third column is the description, which uses comma ',' as the column separator.

Example:

```
Business Terms, Implementation Name1; Implementation Name2; Implementation Name3, Description
```

Complete the following steps to import the list of business terms.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Click the name of the workbook that you want to import the list of business terms.
3. Optional: Click **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is what associated with a workbook, no other tabs will be displayed.
4. Click **Business Terms** tab under **Business Rules Discovery** tab.
5. Click **Import Business Terms** on the right of the header section. The Import Business Terms dialog box opens.
6. Click **Browse** and select the .csv file to be imported.
7. Click **Import** to import the business terms or **Cancel** to cancel the operation.

### Adding a business term

You can add a business term from the **Business Terms** tab of a workbook.

Complete the following steps to add a business term from the **Business Terms** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Click the name of the workbook that contains the business term to add.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms in the workbook appears in the table.
5. Click the **Options Menu** icon on the right of the header section.

6. Select **Add Business Term** from the drop-down list that appears. The Add Business Terms dialog box opens.
7. In the Add Business Terms dialog box, provide the following information:
  - **Business Term:** Provide a name for the business term.  
**Note:** The name with the plus (+) sign can be used but it will not work well when you search for the business term.
  - **Definition:** Provide the definition of the business term.
  - **Location:** (Optional) Select a folder of the business term. If no folder is selected, the business term is located in the root folder.
  - **Status:** Select one of the choices from the drop-down list to specify the status of the business term. Five statuses are available for business terms: New, In Progress, Waiting For Approval, Approved, and Rejected. By default, the "New" status is selected when you create a business term.
8. Click **Add** to add the business term or **Cancel** to cancel the operation.

### ***Managing a business term folder***

You can create a folder to organize business terms that are related. After you create a folder, you can edit and delete the folder as needed. You can also move business terms and folders to a new folder location.

#### ***Adding a business term folder***

Complete the following steps to add a business term folder from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of workbook that contains the business term folder to add.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms and their folders in the workbook appears in the table.
5. Click the **Option Menu** icon on the right of the Business Term header section.
6. Select **Add Folder** from the drop-down list that appears. The Add Business Term Folder dialog box opens.
7. Enter a unique name in the **Business Term Folder** field.
8. Select the folder location in the **Location** section. By default, the root folder is selected.
9. Click **Save** to add the folder or click **Cancel** to cancel the operation.

#### ***Editing a business term folder***

Complete the following steps to edit a business term folder from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of workbook that contains the business term folder to edit.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms and their folders in the workbook appears in the table.
5. Move the mouse pointer over the business term folder to edit.
6. Click **Action Menu** icon on the right of the business term folder.
7. Select **Edit** from the drop-down list that appears. The Edit Business Term Folder dialog box opens.

8. Enter the name of the business term folder.
9. Click **Save** to update the business folder or click **Cancel** to cancel the changes.

#### *Deleting a business term folder*

Complete the following steps to delete a business term folder from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of workbook that contains the business term folder to delete.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms and their folders in the workbook appears in the table.
5. Move the mouse pointer over the business term folder to delete.
6. Click **Action Menu** icon on the right of the business term folder.
7. Select **Delete** from the drop-down list that appears. The Delete Business Term Folder dialog box opens.
8. Click **Delete** to delete the business term folder or click **Cancel** to cancel the deletion.

**Note:** When you delete a business term folder, all the folders and business terms within that folder will be deleted.

#### *Deleting multiple business term folders*

Complete the following steps to delete more than one business term folder from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of workbook that contains the business term folders to delete.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms and their folders in the workbook appears in the table.
5. Select the check boxes in front of the folders and sub-folders that you want to delete.
6. Click **Trash** icon on the Business Term header section. The Delete Business Term Folder dialog box opens.
7. Click **Delete** to delete the business term folders or click **Cancel** to cancel the deletion.

**Note:** When you delete a business term folder, all the folders and business terms within that folder will be deleted.

#### *Moving business terms and business term folders*

Complete the following steps to move the location of one or more business terms and business folders from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of workbook that contains the business terms and business term folders that you want to move.

3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Terms** tab. A list of all defined business terms and their folders in the workbook appears in the table.
5. Select the check boxes in front of the folders and sub-folders that you want to move.
6. Click **Move** button on the Business Term header section. The Move Business Terms and Folders dialog box opens.
7. Select a folder as the new location for the business terms and folders. You can use the search box to search for folders.
8. Click **Move** button to move the selected business terms and folders or click **Cancel** to cancel the move.

### Editing a business term

You can edit a business term directly from the **Business Terms** tab of a workbook or from the list of Business Terms in **Keywords Exploration** tab of a workbook.

Complete the following steps to edit a business term from the **Business Terms** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business term that you want to edit.
3. Optional: Select **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Select the **Business Terms** tab. A list of all business terms in the workbook appears in the table.
5. Click the **Edit** icon on the right under the **Action** column of the business term that you want to edit. The **Edit Business Term** page appears.
6. Edit one or more of the following information.
  - **Business Term:** Update the name for the business term.
  - **Definition:** Update the definition of the business term.
  - **Status:** Select one of the choices from the drop-down list to update the status of the business term. Five statuses are available for business terms: New, In Progress, Waiting For Approval, Approved, and Rejected.

**Note:** Only the owner of a workbook can approve a business term.
7. Click **Save** to save changes or click **Cancel** to cancel the changes.

Complete the following steps to edit a business term from the list of Business Terms in the **Keywords Exploration** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business term that you want to edit.
3. Optional: Select **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Select the **Keywords Exploration** tab. A list of all defined business terms in the workbook appears on the right.
5. Click the **Options Menu** icon on the right of the business term that you want to edit.
6. Select **Edit** from the options menu that appears. The **Edit Business Term** page appears.
7. Edit one or more of the following information.
  - **Business Term:** Update the name for the business term.
  - **Definition:** Update the definition of the business term.

- **Status:** Select one of the choices from the drop-down list to update the status of the business term. Five statuses are available for business terms: New, In Progress, Waiting For Approval, Approved, and Rejected.

**Note:** Only the owner of a workbook can approve a business term.

8. Click **Save** to save changes or click **Cancel** to cancel the changes.

### Viewing the details of a business term

After you create business terms and associate them with snippets and keywords, you can view details of the business terms from the **Business Terms** tab of a workbook.

Complete the following steps to view the details of a business term.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains business terms that you want to view.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is what is associated with a workbook, no other tabs will be displayed.
4. Select the **Business Terms** tab. A list of business terms that are defined in the workbook appears in the table. You can find the summary information for the business terms such as definition, the number of artifacts relationship, the number of snippets associated, the list of implementation names (keyword associated), and the statuses of business terms.
5. Click the name of a business term that you want to view detailed information. A list of all implementation names that are associated to this business term appears on the left pane.
6. Click an implementation name to expand and view all the associated snippets that are defined by members of the workbook.

#### Notes:

- For an implementation name that is discovered from source files, you need to expand program name in order to view snippets.
  - You can also select the **Options Menu** icon next to the implementation name and select **View Exploration Details** to go to the keyword exploration details page. The keyword exploration details page is filtered with the results down to the associations that were previously made when you defined the snippets and associated them with business terms.
7. Select a snippet item to view the snippet content.
    - For implementation names that are discovered from source files, the snippet content shows the program name and line numbers.
    - For implementation names that are discovered from enterprise artifacts, the snippet content shows the artifact name and line numbers.

You can find the snippet that is highlighted in the middle pane with artifact content and the snippet information that is shown on the right pane.

You can perform the following actions on the business term details page.

- [“Associating or disassociating with business rule packages” on page 240](#)
- [“Deleting the association between a snippet and a business term” on page 241](#)

### **Associating or disassociating with business rule packages**

You can associate or disassociate a business term and its snippets with one or more business rule packages when you view the details of a business term.

To associate a business term and its snippets with one or more business rule packages, complete the following steps:

1. On the details page of a business term, expand and select the keyword usage from the left pane. ADI highlights the statement usage of a keyword on the middle pane.

**Note:** You can only associate a business term with business rule packages when one or more snippets are associated with that business term.

2. Optional: Complete the **Snippet Description** field on the right pane.
3. Select one or more check boxes in front of the business rule packages to associate the business term and snippets with business rule packages. Or clear one or more check boxes in front of the business rule packages to remove the association of business term and its snippet with business rule packages.
4. Click **Save** to save the change or click **Cancel** to discard the change.

#### ***Deleting the association between a snippet and a business term***

On the details page of a business term, you can delete the association between a snippet and the business term.

To delete a snippet that is associated with a business term, complete the following steps:

1. On the details page of a business term, expand and select the keyword usage from the left pane. ADI highlights the statement usage of a keyword on the middle pane.
2. Select the options menu next to the snippet item on the left pane.
3. Select **Delete Association** to remove the association between the selected snippet and the business term.
4. Click **OK** on the confirmation dialog that appears to confirm the deletion or click **Cancel** to discard the change.

#### **Deleting a business term**

You can delete a business term directly from the **Business Terms** tab of a workbook or from the list of Business Terms in the **Keywords Exploration** tab of a workbook.

Complete the following steps to delete a business term from the **Business Terms** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business term you want to delete.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tab will be displayed.
4. Select the **Business Terms** tab. A list of all business terms in the workbook appears in the table.
5. Select the **Delete** icon on the right under the **Action** column of the business term you want to remove from the workbook. The Confirm Delete Business Term dialog box opens.
6. Click **OK** to delete the business term or click **Cancel** to cancel the deletion.

Complete the following steps to delete a business term from the list of Business Terms in the **Keywords Exploration** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business term you want to delete.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tab will be displayed.
4. Select the **Keywords Exploration** tab. A list of all defined business terms in the workbook appears on the right.
5. Click the **Options Menu** icon on the right of the business terms you want to delete.
6. Select **Delete** from the drop-down list that appears. The Confirm Delete Business Term dialog box opens.
7. Click **OK** to delete the business term or click **Cancel** to cancel the deletion.

### Approving or rejecting a business term

As a member of a workbook, you can approve or reject the business terms from the **Business Terms** tab in order to track the progress of business term discovery process.

Complete the following steps to approve or reject a business term from the **Business Terms** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business term to approve or reject.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tab will be displayed.
4. Select the **Business Terms** tab. A list of all defined business terms in the workbook appears in the table.
5. Click the **Options Menu** icon on the right of the business term that you want to approve or reject and select **Edit** from the drop-down list. The Edit Business Term dialog box opens.
6. From the **Status** drop-down list, select **Approved** to approve the business term or select **Rejected** to reject the business term.

### Exporting business terms through Business Rule Discovery APIs

IBM ADDI provides Business Rule Discovery (BRD) APIs that allow you to access Business Rule Discovery repository through REST services. You can export business terms by using those APIs.

You can complete the following steps to retrieve the list of business terms through BRD APIs:

1. Browse to `https://<ADI_HOSTNAME>:<ADI_PORT>/addi-brd/swagger-ui.html`, for example, to go to the Swagger UI for BRD APIs documentation. For example, `https://localhost:9443/addi-brd/swagger-ui.html`.
2. Click **business-term-storage-resource** to expand the details of business term storage resource APIs.
3. Click **GET /api/workbook/{workbook\_uuid}/business\_term** to expand the API details.
4. Click the **Try it out** button next to the Parameters header.
5. Enter the following parameter information:
  - **page**: Enter the page number that you want to retrieve the business terms data. The first page starts with 0.
  - **size**: Enter the number of business terms that you want to retrieve in one page. The maximum size is 2,000.
  - **sort**: By default, the business terms are sorted in ascending order. You can change the order to descending order.
  - **workbook\_uuid**: Enter the UUID of the workbook. You can get the UUID of a workbook from the URL of the workbook summary page.



**GET** /api/workbook/{workbook\_uuid}/business\_term Retrieve pages of business terms for a specific workbook.

**Parameters** Cancel

Name	Description
page integer(\$int32) (query)	The page you want to retrieve. The first page number is 0. <input type="text" value="0"/>
size integer(\$int32) (query)	The size of each page. It should be larger than 0. <input type="text" value="20"/>
sort array[string] (query)	Sort setting in the format of: property(asc desc). Default sort order is ascending. Multiple sort settings are supported. <input type="button" value="Add Item"/>
workbook_uuid string (path)	The uuid of the owning workbook. Must be provided. <input type="text" value="_1RpI4PiWEiyrIKFZt1PeQ"/>

6. Click the **Execute** button below the Parameters section. Business terms and their details are returned as JSON under the Responses section.

**Code** **Details**

200

**Response body**

```
{
 "content": [
 {
 "id": 84,
 "uuid": "72fe51de-4b7f-4f11-90a9-266700925beb",
 "created": "2018-12-05T14:06:49.076+0000",
 "updated": "2018-01-03T16:06:42.720+0000",
 "workbookUuid": "_1RpI4PiWEiyrIKFZt1PeQ",
 "name": "Patient ID",
 "nameLower": "patient id",
 "description": "Patient ID",
 "status": "IN_PROGRESS",
 "lookups": [
 {
 "id": 111,
 "uuid": "137cf834-2183-4777-86bf-2e0a6034b5a6",
 "created": "2018-12-05T23:43:41.643+0000",
 "updated": "2018-12-05T23:43:41.643+0000",
 "implementationName": {
 "id": 104,
 "uuid": "495c8853-9348-471e-a02a-3053feb9bcf0",
 "created": "2018-12-05T23:43:41.636+0000",
 "updated": "2018-12-05T23:43:41.636+0000",
 "name": "patmstr",
 "nameLower": "patmstr"
 }
 }
]
 }
]
}
```

**BusinessTerm** {

- description: Represents a Business Terms, which a real world object that may be subject for a business rule or API.
- description: string  
Additional documentation for the Business Term, its usage, and meaning.
- lookups: > [...]
- name: string  
The name of the Business Term. Must be provided and unique within the workbook.
- snippets: > [...]
- status: string  
The status of Business Term.  
Enum:
- uuid: > Array [ 7 ]  
string  
minLength: 0  
maxLength: 36  
The uuid that uniquely identifies the entity. Cannot be omitted.
- workbookUuid: string  
minLength: 1  
maxLength: 36  
The uuid of the owning workbook. Must be provided.

}

## Managing business rule packages

### Adding a business rule package

You can add a business rule package from the **Business Rule Packages** tab of a workbook.

Complete the following steps to add a business rule package from the **Business Rule Packages** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.

2. Select the name of the workbook that contains the business rule package to add.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Rule Packages** tab. A list of all the business rule packages in the workbook appears in the table.
5. Click the **Add (+)** icon on the right of the header section. The Add Business Rule Package dialog box opens.
6. In the Add Business Rule Package dialog box, provide the following information:
  - **Business Rule Package:** Provide a name or a short introduction of the business rule package.  
**Note:** The name with the plus (+) sign can be used but it will not work well when you search for the business term.
  - **Description:** Provide a description of the business rule package.
  - **Tags:** Provide one or more tags for the business rule package.
  - **Status:** Select one of the choices from the drop-down list to specify the status of the business rule package. Five statuses are available for business terms: New, In Progress, Waiting For Approval, Approved, and Rejected. By default, the "New" status is selected when you create a business term.
7. Click **Save** to add the business rule package or click **Cancel** the operation.

### Editing a business rule package

You can edit a business rule package directly from the **Business Rule Packages** tab of a workbook.

Complete the following steps to edit a business rule package from the **Business Rule Packages** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business rule package to edit.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Rule Packages** tab. A list of all the business rule packages in the workbook appears in the table.
5. Click the **Edit** icon on the right under the **Action** column of the business rule package. The Edit Business Rule Package dialog box opens.
6. Edit one or more of the following information:
  - **Business Rule Package:** Update the name or the short introduction of the business rule package.
  - **Description:** Update the description of the business rule package.
  - **Tags:** Update the tags of the business rule package.
  - **Status:** Select one of the choices from the drop-down list to update the status of the business rule package. Five statuses are available for business terms: New, In Progress, Waiting For Approval, Approved, and Rejected.  
**Note:** Only the owner of a workbook can approve a business rule package.
7. Click **Save** to save changes or click **Cancel** to cancel changes.

### Viewing the details of a business rule package

After you create a business rule package and associate them with snippets and business terms, you can view the details of the business rule packages from the **Business Rule Packages** tab of a workbook.

Complete the following steps to view the details of a business rule package:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business rule package that you want to view.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is what is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Rule Packages** tab. A list of all the business rule packages in the workbook appears in the table. You can find the summary information for the business rule packages such as description, tags, associated business terms, the number of snippets associated, and the statuses of business terms.
5. Click the business rule package that you want to view detailed information. A list of all business terms and snippets associated to this business rule package appears on the left pane.
6. Expand the list of business terms on the left to view all the associated snippets that are defined by members of the workbook.

**Note:** For the implementation name under each business term, you can select the **Options Menu** icon next to the implementation name and select **View Exploration Details** to go to the keyword exploration details page. The keyword exploration details page is filtered with the results down to the associations that were previously made when you defined the snippets and associated them with business terms and (or) business rule packages.

7. Select a snippet item to view the snippet content. You can find the snippet that is highlighted in the middle pane with artifact content and the snippet information that is shown on the right pane.

**Note:** For each snippet, you can select the **Options Menu** icon next to the snippet and select **View Snippet** to view the snippet on the keyword exploration details page.

You can perform the following tasks on this page:

- [“Deleting the association of a business term with a business rule package” on page 245](#)
- [“Managing the snippet execution order” on page 246](#)

### ***Deleting the association of a business term with a business rule package***

To delete the association of a business term with a business rule package, complete the following steps:

1. On the details page of a business rule package, expand and select the business term from the left pane.
2. Select the option menu next to the business term item on the left pane.
3. Select **Delete Association** to remove the association between the selected business term and the business rule package.

**Note:** If there is one or more snippets under the business term, the relationship between snippets and business rule package is preserved after you remove the association between business term and business rule package. For more information about removing the association between snippets and business rule package, see [“Deleting the association of a snippet from keyword with a business rule package” on page 245](#).

4. Click **OK** on the confirmation dialog window to confirm the deletion or click **Cancel** to discard the change.

### ***Deleting the association of a snippet from keyword with a business rule package***

Complete the following steps to delete the association of a snippet from keyword with a business rule package:

1. On the details page of a business rule package, expand **Snippet from Keywords** and select a snippet from the left pane.
2. Select the option menu next to the snippet item on the left panel.

3. Select **Delete Association** to remove the association between the selected snippet and the business rule package.
4. Click **OK** on the confirmation dialog window to confirm the deletion or click **Cancel** to discard the change.

### Managing the snippet execution order

Snippets that are associated with a business rule package represent sets of business logic that are implemented in the source code. These snippets can be executed in a sequential order based on the business logic that they represent.

Complete the following steps to manage the execution order of snippets.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business rule package that you want to manage the snippet execution order.
3. Optional: Click the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Rule Packages** tab. A list of all the business rule packages in the workbook appears in the table.
5. Click the business rule package to go to the detailed page. Snippets are listed on the right pane and grouped into two groups: **Unordered** and **Ordered**.
6. Perform one or more of the following tasks.

**Note:** When you select the snippet from the list, the source code content of the snippet is displayed in the middle.

- Move the unordered snippets to **Ordered** group.
  - a. Select the snippet that you want to move from the **Unordered** group.
  - b. Click the down arrow next to the group header to move the snippets to the **Ordered** group.
- Order the sequence of the snippets in the **Ordered** group.
  - a. Click on the snippet which you want to move the order.
  - b. Click up or down blue arrow next to the group header to move the order of the snippet.
- Move the ordered snippets to unordered snippets.
  - a. Select the snippet that you want to move from the **Ordered** group.
  - b. Click the up arrow on the most right of the group header to move the snippets to the **Unordered** group.

### Approving or rejecting a business rule package

As a member of a workbook, you can approve or reject the business rule packages from the **Business Rule Packages** tab to track the progress of business rule discovery process.

Complete the following steps to approve or reject a business rule package from the **Business Rule Packages** tab of a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business rule package to approve or reject.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is what is associated with a workbook, no other tabs will be displayed.
4. Click the **Business Rule Packages** tab. A list of all the business rule packages in the workbook appears in the table.

5. Click the **Options Menu** icon on the right of the business rule package that you want to approve or reject and select **Edit** from the drop-down list. The Edit Business Rule Package dialog box opens.
6. From the **Status** drop-down list, select **Approved** to approve the business rule package or select **Rejected** to reject the business rule package.

### Deleting a business rule package

You can delete a business rule package directly from the **Business Rule Packages** tab of a workbook.

Complete the following steps to delete a business rule package from the **Business Rule Packages** tab of a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that contains the business rule package you want to delete.
3. Optional: Select the **Business Rules Discovery** tab. If only the Business Rule Discovery data provider is associated with a workbook, no other tab will be displayed.
4. Select the **Business Rule Packages** tab. A list of all business rule packages in the workbook appears in the table.
5. Select the **Delete** icon on the left of the business rule package you want to remove from the workbook. The Confirm Delete Business Rule Package dialog box opens.
6. Click **OK** to delete the business rule package or click **Cancel** to cancel the deletion.

### Exporting business rule packages through Business Rule Discovery APIs

IBM ADDI provides Business Rule Discovery (BRD) APIs that allow you to access Business Rule Discovery repository through REST services. You can export business rule packages by using those APIs.

Complete the following steps to retrieve the list of business rule packages through BRD APIs:

1. Browse to `https://<ADI_HOSTNAME>:<ADI_PORT>/addi-brd/swagger-ui.html`, for example, to go to the Swagger UI for BRD APIs documentation. For example, `https://localhost:9443/addi-brd/swagger-ui.html`.
2. Click **business-rule-package-storage-resource** to expand the details of business rule package storage resource APIs.
3. Click **GET /api/workbook/{workbook\_uuid}/business\_rule/package** to expand the API details. You can see the details of all parameters that are required for APIs and the details of the response content.
4. Click the **Try it out** button next to the Parameters header.
5. Enter the following parameter information:
  - **page**: Enter the page number that you want to retrieve the business rule packages data. The first page starts with 0.
  - **size**: Enter the number of business rule packages that you want to retrieve in one page. The maximum size is 2,000.
  - **sort**: By default, the business rule packages are sorted in ascending order. You can change the order to descending order.
  - **workbook\_uuid**: Enter the UUID of the workbook. You can get the UUID of a workbook from the URL of the workbook summary page.

**GET** `/api/workbook/{workbook_uuid}/business_rule/package` Retrieve pages of business rule packages for a specific workbook.

**Parameters** Cancel

Name	Description
page integer(\$int32) (query)	The page you want to retrieve. The first page number is 0. <input type="text" value="0"/>
size integer(\$int32) (query)	The size of each page. It should be larger than 0. <input type="text" value="20"/>
sort array[string] (query)	Sort setting in the format of: property(asc desc). Default sort order is ascending. Multiple sort settings are supported. <input type="button" value="Add Item"/>
workbook_uuid string (path)	The uuid of the owning workbook. Must be provided. <input type="text" value="_f49okDTEemoUedUNAsCkw"/>

**Execute**

6. Click the **Execute** button below the Parameters section. The business rule packages and their details are returned as JSON under the Responses section.

**Server response**

Code	Details
200	<p><b>Response body</b></p> <pre>{   "content": [     {       "id": 3,       "uuid": "7263e19d-c5f7-49dd-8e07-14b009cae1b2",       "created": "2019-02-20T04:31:53.548+0000",       "updated": "2019-02-20T04:31:53.575+0000",       "workbookUuid": "_f49okDTEemoUedUNAsCkw",       "name": "Patient identification",       "description": "",       "status": "IN_PROGRESS",       "tags": [         {           "id": 2,           "uuid": "7b836794-9f87-478c-aa78-b9e92d226e9a",           "created": "2019-02-20T04:31:53.589+0000",           "updated": "2019-02-20T04:31:53.589+0000",           "name": "patient"         }       ],       "terms": [         {           "id": 16,           "uuid": "6f3b756a-18dd-489d-a854-6022228c84ef",           "created": "2019-02-20T04:10:27.932+0000"         }       ]     }   ] }</pre> <p><b>Response headers</b></p> <pre>cache-control: no-cache, no-store, max-age=0, must-revalidate content-language: en-CA content-type: application/json;charset=UTF-8 date: Mon, 25 Feb 2019 08:06:11 GMT expires: 0 pragma: no-cache strict-transport-security: max-age=31536000 ; includeSubDomains transfer-encoding: chunked x-content-type-options: nosniff x-frame-options: DENY x-powered-by: Servlet/3.1 x-xss-protection: 1; mode=block</pre>

**BusinessRulePackage** {

- description:* Represents a Business Rule Package, which is a group of artifacts that contribute to a business rule.
- description** string  
Additional documentation for the Business Rule Package and its usage.
- name** string  
The name of the Business Rule Package.
- snippets** > [...]
- status** string  
The status of Business Rule Package.  
Enum:
- tags** > Array [ 7 ]
- terms** > [...]
- uuid** string  
minLength: 0  
maxLength: 36  
The uuid that uniquely identifies the entity. Cannot be omitted.
- workbookUuid** string  
minLength: 1  
maxLength: 36  
The uuid of the owning workbook. Must be provided.

}

## Analyzing and displaying code coverage results

---

Code coverage results are analyzed and displayed in different views. You can navigate through different views of code coverage analysis results for a workbook.

Before you start this task, you need to add at least one workbook with one Manual Builds data provider or Rational Team Concert Builds data provider to the system. For more information, see [Chapter 7, “Managing connections, data providers, workbooks, and notifications,”](#) on page 191.

### Navigating through different views of code coverage results

Code coverage results can be analyzed and displayed in these views: **Workbooks** view, **Summary** view of a workbook, **Build Analysis** view, and **Flowpoints Analysis** view.

**Note:** A workbook is a logical grouping of programs or files. You can use a workbook to organize programs or files in the way that is meaningful to you. For more information about workbooks, see [Chapter 2, “Terminology overview,”](#) on page 5.

- **Workbooks** view

The **Workbooks** view is the home page of ADI.

The Code Coverage on this view displays the overall coverage status for each workbook. The overall status of a workbook is represented as the latest aggregated code coverage of that workbook. The aggregated code coverage is the code coverage percentage of all the latest builds within that workbook for which code coverage results have been provided. For more information, see [“Code coverage reports and information”](#) on page 251.

- **Summary** view of a workbook

From the **Workbooks** view, select the name of a workbook to browse the summary view of that workbook.

The code coverage analysis reports are displayed in the **Code Coverage** tab of the workbook summary view. By default, the reports show the code coverage analysis of the latest build of a Manual Builds data provider or a Manual Builds data provider.

You can use the dropdown list on top of the tab to switch the analysis reports to a different Manual Builds data provider or Manual Builds data provider and a different build.

On the **Code Coverage** tab, the reports are organized into two sections: **Charts** and **Trends**. For each section, you can find the following reports.

- **Charts:**

- Code Coverage
- Coverage Changed vs Unchanged Code
- Biggest Coverage Drops

- **Trends:**

- Code Coverage Percentage Trend
- Executable Lines Covered Trend

For more information, see [“Code coverage reports and information”](#) on page 251.

On top of the **Trends** section, you can see the dual slider to define the scope of builds that are displayed on the reports. Use the left slider to set the start build and the right slider to set the end build.

- **Build Analysis** view

On the **Code Coverage** tab in the summary view of a workbook, click **View Files** on the upper right corner of the tab to open the **Build Analysis** view.

By default, the **Build Analysis** view displays code coverage information of the build and the details of the files within the build that have insufficient code coverage. You can click the upside-down triangle

icon next to the current build id to select other builds available. The **Build Analysis** view is composed of three areas, that is, **Header**, **Summary**, and **Content**.

The **Header** area at the most top of the view shows the following information and the menu to filter data that is displayed. You can use the dropdown icon (v) to navigate to a different data provider or build. For more information about how to filter data that is displayed in the view, see [“Filtering data in the Build Analysis view” on page 261](#).

To view the code coverage results by source files, pinned files, or test files, you can select the menu on the upper right of the **Header** area.

The **Summary** area displays the summary of the entire build that includes the following information.

- Code Coverage: The percentage of code coverage and the percentage of code coverage change).
- Modified Files: The number of modified files.
- New Files: The number of new files
- Historical Tests: The number of historical tests that are run.
- Minimal Tests: The number of minimal tests to run.

The **Content** area displays code coverage details of the items within that build. You can examine the following information. To sort the items within the content area, you can click any one of the column headers.

- Item Name: The name of item within a build.
- Warnings: Warnings for code coverage status of the item.
- Code Coverage: The percentage of code coverage.
- Change %: The percentage of code coverage change.
- Covered: The number of executable lines that are covered.
- Total: The number of total executable lines.
- Added: The number of executable lines that are added.
- Updated: The number of executable lines that are updated.
- Change %: The change percentage of executable lines that are added and updated.
- Deleted: The number of executable lines that are deleted.
- Historical: The number of historical tests that are run.
- Minimal: The number of minimal tests to run.

For each file within the build, you can expand the row to see the code coverage detail information of flowpoints within that file. You can click on the file name or flowpoint to see the list of historical Test to Run and the list of Minimal Tests to Run.

For detailed information about each code coverage reports or code coverage, see [“Code coverage reports and information” on page 251](#)

- **Flowpoints Analysis** view

From the **Build Analysis** view, expand the file to see the flowpoints within the file and select **Show All Flowpoints**.

The **Flowpoints Analysis** view is composed of two areas, that is, **Header** and **Content**.

- The **Header** area displays the name of the file and the menu to filter data that is displayed. You can use the dropdown icon (v) next to the file name to navigate to different file within the builds. You can also use the Filter options provided on the header area to filter information that is displayed in the view. For more information, see [“Filtering data in the Flowpoints Analysis view” on page 262](#).
- The **Content** area displays code coverage details of the flowpoints within that file. You can examine the following information.
  - Item Name: The name of item within a file.



- Code Coverage: The percentage of code coverage.
- Change %: The percentage of code coverage change.
- Covered Lines: The number of executable lines that are covered.
- Total Exec. Lines: The number of total executable lines.
- Added: The number of executable lines that are added.
- Updated: The number of executable lines that are updated.
- Change %: The change percentage of executable lines that are added and updated.
- Deleted: The number of executable lines that are deleted.
- Historical: The number of historical tests that are run.
- Minimal: The number of minimal tests to run.

For each flowpoint within the file, you can click on the flowpoint to see the list of historical Test to Run and the list of Minimal Tests to Run. For detail of each code coverage reports or code coverage information, see [“Code coverage reports and information” on page 251.](#)

## Code coverage reports and information

You can find the details of reports and information that is displayed for the code coverage analysis views.

### Code coverage reports

<i>Table 14. Code coverage reports</i>		
Reports Name	Description	Displayed Location
<b>Aggregated code coverage</b>	Code coverage percentage of the Analysis workbook is calculated by percentage of executable lines that are tested for all latest builds from all build providers within the Analysis workbook.	Workbooks view
<b>Code coverage</b>	Two metrics are provided in the report. <ul style="list-style-type: none"> <li>• Code coverage percentage of the build is calculated by percentage of executable lines that are tested for all the files or program within the most recent build.</li> <li>• Percentage of code coverage change that is calculated by comparing with the previous build or the selected baseline displays along with up and down trending icon to indicate the direction of the changes.</li> </ul>	Code Coverage tab of a workbook summary view
<b>Code Coverage Percentage Trend</b>	Line charts that show the code coverage percentage trend of all builds.	Code Coverage tab of a workbook summary view
<b>Executable Lines Covered Trend</b>	Line charts that show the number of executable lines hit vs total executable lines of a build over time.	Code Coverage tab of a workbook summary view

Table 14. Code coverage reports (continued)		
Reports Name	Description	Displayed Location
<b>Coverage Changed vs Unchanged Code</b>	Stacked bar charts that display the comparison of code coverage between executable lines that are changed and executable lines unchanged in the current build. The stack for each bar presents the percentage executable lines that are hit vs not hit by the tests.	Code Coverage tab of a workbook summary view
<b>Biggest Coverage Drops</b>	Bar charts that display the top five files that have the biggest amount of code coverage drop that is compared to the last build. Any files that the code coverage drops is over 10% and the code coverage is crossed the threshold boundaries are considered as large amount of code coverage drop.	Code Coverage tab of a workbook summary view
<b>Files with Lowest Coverage</b>	Bar charts that display the top five source files that have the lowest code coverage.	Summary view of a workbook

**Note:** The order of the reports that are displayed in the **Summary** view of a workbook depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

#### Information that is displayed in Build Analysis Views

Table 15. Information that is displayed in Build Analysis views			
View	Displayed Location	Information	Description
<b>View by Source Files</b>	Summary for Entire Build	Warning	<p>The code coverage status of the build. There are two statuses: red and yellow.</p> <ul style="list-style-type: none"> <li>Yellow indicates the poor code coverage percentage.</li> <li>Red indicates the insufficient code coverage percentage.</li> </ul> <p>The threshold of red and yellow statuses are set during the workbook creation. For more information, see <a href="#">“Managing workbooks”</a> on page 214.</p>

Table 15. Information that is displayed in Build Analysis views (continued)

View	Displayed Location	Information	Description
		Code Coverage	The code coverage percentage of the build is calculated by percentage of executable lines that are tested and total executable lines of all the source files within a build.
		Change%	<p>The percentage of code coverage change is calculated by comparing the different between code coverage percentage of the current build and the previous build or the selected baseline build. There is up and down icon in front of the percentage of code coverage change to indicate the direction of the change.</p> <p><b>Note:</b> You can select baseline build to compare from the <b>Compare With</b> drop-down menu on the top.</p>
		Modified Files	The number of the files that are modified within the build comparing to the previous build.
		New Files	The number of the files that are added to the build comparing to the previous build.
		Historical Tests	The number of all the test files that are run against the builds that are analyzed from all the previous builds that are stored in the data warehouse as well as the current build.
		Minimal Tests	The number of minimal test files testing the current build that achieve the highest code coverage percentage.

Table 15. Information that is displayed in Build Analysis views (continued)

View	Displayed Location	Information	Description
	Hover-over Summary For Entire Build Section	Covered / Total Executable Lines	The number of executable lines that are exercised by the test and number of total executable lines within the entire build.
	Table	Item Name	The name of the item within the build. The item can be source file, program, package, flowpoints, and method.
		Warnings	<p>The code coverage status of the build. There are two statuses: red and yellow.</p> <ul style="list-style-type: none"> <li>• Yellow indicates the poor code coverage percentage.</li> <li>• Red indicates the insufficient code coverage percentage.</li> </ul> <p>The threshold of red and yellow statuses are set during the workbook creation. For more information, see <a href="#">“Managing workbooks”</a> on page 214.</p>
		Code Coverage	The code coverage percentage of the item displayed. For more information, see <a href="#">Chapter 2, “Terminology overview,”</a> on page 5.
		Change %	The difference in code coverage of the item comparing to the previous build or the selected baseline build as a percentage.
		Covered (Executable Lines)	The number of the executable lines for an item displayed that are exercised by the tests.

Table 15. Information that is displayed in Build Analysis views (continued)

View	Displayed Location	Information	Description
		Total (Executable Lines)	The total number of executable lines for an item displayed. Executable line is defined as the line of code that the compiler marks as executable. For COBOL, the executable line might not directly correspond to the exact source line, as COBOL is not debugged by using source but rather the expanded source.
		Added (Executable Lines)	The number of executable lines that are added to the item comparing to the previous build.
		Updated (Executable Lines)	The number of executable lines that are modified within the item comparing to the previous build.
		Change %	The percentage of executable lines that are added and modified within the item comparing to the previous build.
		Deleted (Executable Lines)	The number of executable lines that are deleted from the item comparing to the previous build.
		Historical (Tests)	The number of tests that test the item analyzed from all the previous builds as well as the current build.
		Minimal (Tests)	The number of minimal list of tests that test the item to achieve the highest code coverage percentage.

Table 15. Information that is displayed in Build Analysis views (continued)

View	Displayed Location	Information	Description
	Detailed section of the item (Click the item name to view)	Historical Tests To Run	The list of tests that test the source file or program analyzed from all the previous builds as well as the current build.
		Minimal Tests to Run	Recommendation of the list of minimal set of tests to run to achieve the highest code coverage percentage. The list is sorted by the test files with the higher test coverage.
<b>View by Tests</b>	Table	Item Name	Name of the test. For the definition of test, see <a href="#">Terminology Overview</a> .
		Code Coverage	The code coverage percentage of the test that is calculated by the number of executable lines the test exercises and the total number of the executable lines of the source files the test exercises.
		Change %	The difference in code coverage of test comparing to the previous build or the selected baseline build as percentage.
		Covered (Executable Lines)	The number of executable lines the test exercises per total number of the executable lines of the source files the test exercises.
		Total (Executable Lines)	Total number of executable lines in the source files the test exercises.
		Flowpoints Covered	The number of flowpoints that the test exercises.
		Total Flowpoints	The total number of flowpoints in the sources files that the test exercises.

Table 15. Information that is displayed in Build Analysis views (continued)

View	Displayed Location	Information	Description
		File Tested	The number of source files that are exercised by the test for the current build being analyzed.
		Files Missing	The number of files that the test did not exercise in the test of the current build being analyzed but they were exercised in the previous tests of the previous builds.
		Elapsed Time	The time in seconds taken to exercise the test.
	Detailed section of the item (Click the item name to view)	Files Tested by Current® Build	The list of source files exercised by the test for the current build being analyzed.
		Historical Files Missing	The list of files that the test did not exercise in the test of the current build being analyzed but they were exercised in the previous tests of the previous builds.
<b>File Trends</b>		Name	The name of the source file or program within the builds.
		Build Name	The name of the build or build ID for automated build.
		Language	Programming language of the source file or program being analyzed.
		<other columns>	Same as the columns listed above for <b>View by Source Files</b> .

#### Information Display in Flowpoints Analysis View

Table 16. Information that is display in Flowpoints Analysis views

View	Information	Description
Summary	Code Coverage	The code coverage percentage of a source file. See <a href="#">Terminology Overview</a> for Code Coverage.

Table 16. Information that is display in Flowpoints Analysis views (continued)

View	Information	Description
	Coverage Change	It shows the difference in coverage of a source file in the current build compared to the same source file in the previous build as a percentage.
	Executable Lines Changed	The number of executable lines that are updated in a source file from the previous build.
	Executable Lines Added	The number of executable lines that are added to a source file from the previous build.
	Executable Lines Deleted	The number of executable lines that are deleted from a source file from the previous build.
Table	Item Name	The name of a function or method within a source file.
	Code Coverage	The code coverage percentage of a function or method.
	Change %	<p>It shows the difference in coverage of a function or method in the current build that is compared to the same function or method in the previous build or the selected baseline build as a percentage. For Java, on the package level you see the rollup coverage changes percentage for all methods under that package.</p> <p><b>Note:</b> You can select baseline build to compare from the <b>Compare With</b> drop-down menu on th top.</p>
	Covered Lines	The number of the executable lines for a function or method displayed that are exercised by the tests.
	Total Exec. Lines	Total number of executable lines for a function or method.
	Added	The number of executable lines that are added to the function or method comparing to the previous build.
	Updated	The number of executable lines that are updated in the function or method comparing to the previous build.



Table 16. Information that is display in Flowpoints Analysis views (continued)

View	Information	Description
	Change %	The percentage of executable lines that is added or updated in the function or method comparing to the previous build.
	Deleted	The number of executable lines that are deleted from the function or method comparing to the previous build.
	Historical	The number of test cases that test a function or method analyzed from all the previous builds as well as the current build.
	Minimal	The number of minimal list of tests that achieve the highest code coverage percentage.
Detailed section of the item (Click the item name to view)	Historical Tests to Run	The list of test cases that test a function or method analyzed from all the previous builds as well as the current build.
	Minimal Tests to Run	For each function or method, recommend the list of minimal set of test cases to be run to achieve the highest code coverage percentage. The list is sorted by the test files with the higher test coverage.

## Analyzing code coverage trends

You can compare multiple builds to analyze code coverage trends. To analyze code coverage trends of multiple builds, you need to select two or more builds with code coverage data.

Complete the following steps to analyze code coverage trends.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of a workbook of the builds that you want to compare.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select a Manual Builds data provider or Manual Builds data provider that is associate with the builds that you want to analyze. The code coverage reports of selected data provider appear.
5. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information of the latest build and all the files within the build are displayed in the **Build Analysis** view.
6. Select **File Trends** from the menu options on the upper right corner. The **File Trends** page appears.
7. Select the check boxes of two or more builds from the list to analyze. The maximum number of builds that are allowed to be selected is 5.
8. Click **Compare** to show the code coverage trends of the builds. The page that displays the information of all selected builds appears.

9. Optional: For Java code coverage, you can click the **Expand** icon to expand the packages and view the detailed package comparison.

For more information that is displayed in the **File Trends** view, see [“Code coverage reports and information” on page 251](#).

## Comparing code coverage results with baseline builds

ADI uses code coverage information of baseline builds to analyze code coverage information, such as the percentage of code coverage changes or percentage of code coverage drop. By default, these information is calculated against the previous build. You can select any baseline builds to be used for comparison instead of the previous build.

**Note:** You can define one or more baseline builds within a Manual Builds data provider or Rational Team Concert Builds data provider. For more information, see [“Defining baseline builds for a Manual Builds data provider” on page 203](#) and [“Defining baseline builds for a Rational Team Concert Builds data provider” on page 210](#).

Complete the following steps to select baseline builds on the workbook summary view for comparison.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to perform the analysis on the builds.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. On the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that are associated with the build that you want to analyze. The latest build information is displayed in the **Build Analysis** view.

**Note:** By default, the code coverage information on the workbook summary view, such as the percentage of code coverage changes and percentage of code coverage drop, is calculated from the previous build.

5. To compare code coverage results with baseline builds, select **Compare With** drop-down menu from the menu options on the top.
6. Select a build that you want to use as a baseline for analysis. The reports on the **Code Coverage** tab is recalculated against the selected baseline build.

Complete the following steps to select baseline builds on the **Build Analysis** view for comparison.

1. From the summary view of the workbook, select **View Files**.
2. The **Build Analysis** view appears with the code coverage information of all the files within the selected build.
3. Select **Compare With** drop-down menu from the menu options on the top.
4. Select a build that you want to use as a baseline for analysis. The code coverage analysis information is recalculated against the selected baseline build.

## Analyzing pinned files

You can learn how to compare pinned files within a build to analyze code coverage for set of files.

**Note:** Everyone who has access to the workbook can see the same set of the files that are pinned.

Complete the following steps to pin files and perform analysis on the pinned files:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook of the builds that you want to analyze.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.

4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.
5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.
7. Click the **Pin** icon in front of the item name to pin a set of items that you want to perform the code coverage analysis on.
8. On the top menu, select **Pinned Files** menu on the right.
9. On the header area, you can find the code coverage analysis summary for the pinned files next to the code coverage analysis summary for the entire build. You can see the following information.
  - Code Coverage
  - Modified Files
  - New Files
  - Historical Tests
  - Minimal Tests

For more information, see [“Code coverage reports and information” on page 251](#).

10. Click the **Minimal Tests** value for the pinned files on the header area. A list of minimal tests to run for the pinned files appears in the table on the content area. You can see the following information for each test file:
  - Item Name
  - Code Coverage
  - Covered Lines
  - Total Exec. Lines
  - Flowpoints Covered
  - Total Flowpoints
  - Files Tested
  - Files Missing
  - Elapsed Time

For more information, see [“Code coverage reports and information” on page 251](#).

11. Click the **Pinned Files** menu to go back to the list of pinned files or click the **Files** menu to go to the list of all files within a build.
12. Optional: Click the **Pin** icon in front of the pinned items to unpin them.

## Filtering data in the Build Analysis view

In this topic, you can learn how to filter information in the **Build Analysis** view.

Complete the following steps to filter the information:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the workbook name that you want to view analysis information.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.

5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.
7. On the top menu, click the **Filters** drop down menu.
8. In the drop down menu, select one or more of the following options to filter the information based on your needs.
  - **Show Only Files:** Select this option to show the flat list of all the files within the build.
  - **Changed Files Only:** Select this option to show only the files in the build that are modified.
  - **Hide 0% Coverage Items:** Select this option to hide items in the build that have zero percent code coverage.
  - **Line Changes Percentage:** Select this option and set the slider bars below this option to show the items in the build that the percentage of added and updated executable lines is between the slider bars values.
  - **Code Coverage Percentage:** Select this option and set the slider bar below this option. You can see the items in the build that have the code coverage between the slider bars values you set.

To clear a filter, you can uncheck the filter option or close the filtering message box that is displayed on top of the table

## Filtering data in the Flowpoints Analysis view

In this topic you can learn how to filter information in the **Flowpoints Analysis** view.

Complete the following steps to filter the information:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, click the name of Manual Builds data provider or Rational Team Concert Builds data provider with the latest build name that you want to view analysis information. The latest build information is displayed in the **Build Analysis** view.
4. Click the file or program name that you want to view analysis information. The **Flowpoints Analysis** view appears.
5. On the top menu, click the **Filters** dropdown menu.
6. In the **Filters** dropdown menu, select one or more of the following options to filter the information based on your needs.
  - **Changed Flowpoints Only:** Select this option to show the flowpoints in the files that are modified.
  - **Line Changes Percentage:** Select this option and then set the slider bars. You can see the items in the files that have the percentage of executable lines added and updated between the values you set in the slider bars.
  - **Code Coverage Percentage:** Select this option and set the slider bars. You can see the items in the files that the code coverage is between the values you set in the slider bars.

**Note:** By default, the **Build Analysis** view is displayed by applying this filter and setting the slider bar between 0% and insufficient code coverage threshold value. So it shows only the files that have insufficient code coverage.

To clear a filter, you can uncheck the filter option or close the filtering message box that is displayed on top of the table.

## Searching for files, packages, or directories within a build

You can learn how to search for files, packages or directories within a build from the **Build Analysis** view to view code coverage results.

Complete the following steps to search for files, packages, or directories within a build.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.
5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.
7. Enter the name or part of the name of the files, packages, or directories you want to search for in the Search box on the top of the table header. You can see the items that match the name or part of the name you are searching for in the table with the code coverage analysis status.

## Analyzing the Tests to Run

You can learn how to use ADI for suggestions about which tests to run based on the analysis of code coverage results. With the list of **Historical Tests to Run** or **Minimal Tests to Run**, ADI helps you plan the testing of your build.

Before you begin this activity, you need to add at least one workbook and one data provider with code coverage results.

For more details about the information that is displayed in the code coverage analysis views, see [Code Coverage Reports and Information](#).

### Analyzing the tests to run based-on the Historical Tests to Run

Complete the following steps to analyze tests to run by using the list of **Historical Tests to Run**.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.
5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.
7. For each of the file, check the number of historical tests to run on the **Historical** column.
8. Select the item name to view the list of Historical Tests to Run.

**Note:** To find the item that you want to view the list of Historical Tests to run, you can use the search box on top of the table header to search for the item or you can click on the column header to sort the items based on the value in that column.

9. View the **Historical Tests to Run** column on the left. This column suggests the list of tests that are exercising a file from all the builds stored in data warehouse. You can use this list to construct the testing of your current build.
10. Optional: Select **Tests** view menu from the top menu to get the list of test files.

### Analyzing the tests to run based on the Minimal Tests to Run

Complete the following steps to analyze the tests to run by using the list of Minimal Test to Run.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.
5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.
7. For each of the item, check the number of minimal tests to run on the **Minimal** column.
8. Select the name of the item to view the list of Minimal Tests to Run.

**Note:** To find the item that you want to view the list of Minimal Tests to run, you can use the search box on top of the table header to search for the item or you can click on the column header to sort the items based on the value in that column.

9. View the **Minimal Tests to Run** column on the right. This column suggests the list of minimal set of tests that yields the maximum code coverage. You can use this list to construct the testing when perform regression testing to reduce amount of test effort.
10. Optional: Select **Tests** view menu from the top menu to get the list of test files.

### Analyzing code coverage of flowpoint level break-down

The flowpoint level break-down refers to the function or method within a file. ADI provides the detailed code coverage analysis of the flowpoint level break-down for a file. In this topic you can learn how to analyze code coverage data of flowpoint level break-down.

Complete the following steps to view the code coverage analysis of flowpoint level break-down. Before you perform this activity, you need to add at least one workbook and one data provider with code coverage results.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Code Coverage** tab if you are not yet on the tab.
4. From the **Provider** drop-down menu on top of the **Code Coverage** tab, select the Manual Builds data provider or Rational Team Concert Builds data provider that is associated with the build you want to analyze. The latest build information is displayed in the **Build Analysis** view.
5. Optional: Select the build that you want to analyze from the **Build** drop-down menu on top of the **Code Coverage** tab.
6. Select **View Files** on the upper right corner of the **Code Coverage** tab. The code coverage information for all files within the selected build is displayed in the **Build Analysis** view.

7. Expand the file or program name that you want to view the flowpoint analysis information and then some flowpoints are displayed.
8. Select **Show All Flowpoints** on the bottom to view all flowpoints. The **Flowpoints Analysis** view appears. The list of functions or methods within the file and the code coverage information is displayed in the **File Analysis** view with detail information. For more details about the information displayed in the **Flowpoints Analysis** view, see [“Code coverage reports and information”](#) on page 251.
9. Click **Filters** drop-down menu from the menu options on top.
10. Select one or more of the following options from the **Filters** drop-down menu to filter the information based on your needs.
  - **Changed Flowpoints Only:** Select this option to show the flowpoints in the files that are modified.
  - **Line Changes Percentage:** Select this option and then set the slider bars. You can see the items in the files that have the percentage of executable lines that are added and updated between the values you set in the slider bars.
  - **Code Coverage Percentage:** Select this option and set the slider bars. You can see the items in the files that the code coverage is between the values you set in the slider bars.
11. Clear the filter options or close the filtering message box that is displayed on top of the table.

## Analyzing and displaying operational data from IBM OMEGAMON for CICS

Operational data from IBM OMEGAMON for CICS is analyzed and displayed in different views. You can navigate through different views of operational data analysis results for a workbook.

Before you start this task, you need to add at least one connection with one OMEGAMON for CICS data provider to the system. For more information, see [Chapter 7, “Managing connections, data providers, workbooks, and notifications,”](#) on page 191.

### Navigating through different views of OMEGAMON for CICS data analysis

Operational data from IBM OMEGAMON for CICS for a workbook can be analyzed and displayed in these views: **Workbooks** view, **Summary** view for a workbook, and **Transaction Analysis** view.

- **Workbooks** view

The **Workbooks** view is the home page of ADI. The page is displayed after you log in ADI. You can go to the Workbooks view by selecting Workbooks menu from the menu panel.

The **Workbooks** view is the view that shows all the statuses of all the workbooks in the system. Each workbook displays its latest data analysis results from their associated data provider. For the workbooks s associated with OMEGAMON for CICS data provider, an average response time gauge report displays on the **Workbooks** view. For more information, see [“OMEGAMON for CICS related reports and information”](#) on page 266

- **Summary** view of a workbook

From the **Workbooks** view, select the name of any workbook that is associated with OMEGAMON for CICS data provider to browse the **Summary** view for a workbook.

The OMEGAMON for CICS related reports are displayed on the **OMEGAMON** tab under the **Performance** tab of the summary view. The reports on the **OMEGAMON** tab displays all the service classes within that workbook. Each service class card displays the operational data reports related to the analysis of the latest operational data that is collected from the associated OMEGAMON for CICS data provider. The following five reports are displayed. The order of reports that is displayed depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

- Average transactions
- Average response time
- Average CPU time

- Transaction with Performance and Reliability Issues

**Note:** The average value of the reports are calculated by using the timeframe you select during the workbook creation. For example, if you select, Last Month timeframe, the average response time report is calculated by using the response time of all transactions within the past month from the present time.

For more information, see [“OMEGAMON for CICS related reports and information”](#) on page 266.

- **Transaction Analysis** view

From the **Summary** view of a workbook, you have two different ways to get to **Transaction Analysis** view report:

- Select the name of a service classe to view all transactions under the service class. Then select the name of the transaction you want to view the analysis results.
- Click on the transaction name under **Transaction with Performance and Reliability Issues** report.

The **Transaction Analysis** view is composed of **Header** and **Content** areas.

The **Header** area displays the name of service class the transaction belongs to, transaction name, maximum number of execution counts, maximum CPU time, maximum response time, and number of transactions exceeding goal response time. You can use the dropdown (v) icon, which locates next to the name of the transaction, to view transaction analysis for different transactions. You can also type part of the transaction name on the **Select Transaction** text box to search for a transaction.

The **Content** area display the history trends of average response time, average DB2 and File I/O wait time of response time, average execution count, and average CPU time of that transaction. The charts can be view hourly, daily, or weekly. The default display timeline can be set when you create an OMEGAMON for CICS workbook. For more information, see [“Adding a workbook”](#) on page 215.

- For more information, see [“OMEGAMON for CICS related reports and information”](#) on page 266.

## OMEGAMON for CICS related reports and information

You can find the details of reports and information that is displayed for OMEGAMON for CICS data analysis.

For OMEGAMON for CICS data providers, two types of timeframe are available, including data collection interval timeframe and dashboard display timeframe.

**Data collection interval timeframe** refers to the timeframe that the collection of data from OMEGAMON for CICS server runs every 5 minutes.

**Dashboard display timeframe** refers to the default timeframe that the data displays on the dashboard. You can set the dashboard display timeframe during the workbook creation.



Table 17. OMEGAMON for CICS data analysis reports

Reports Name	Description	Displayed Location
Average of Average response time and its indicator status	<p>The average of average response time is calculated by averaging the average response time of all CICS transactions within all service classes in the scope of a workbook. The average response time data is collected within the dashboard display timeframe. The indicators show the level where the average response time exceeding the goal response time that is set in the OMEGAMON for CICS server.</p> <p>Red indicates that the average response time for all CICS transactions within the workbook exceeds the goal response time by 400%</p> <p>Orange indicates that the average response time for all CICS transactions within the workbook exceeds the goal response time by 200 - 400%</p> <p>Yellow indicates that the average response time for all CICS transactions within the workbook exceeds the goal response time by 100 - 200%</p> <p>Blue indicates that the average response time for all CICS transactions within the workbook exceeds the goal response time less than 100%</p>	Workbooks view
Average transactions	<p>Average transactions viewlet shows the average number of CICS transactions for today comparing with that of yesterday and the average number of CICS transaction for the entire week. The average transactions are calculated by taking number of transactions for each data collection (every 5 minutes) within a specific timeframe (for example, today, yesterday or a week) and averaging them.</p>	Performance tab of the workbook summary view

Table 17. OMEGAMON for CICS data analysis reports (continued)

Reports Name	Description	Displayed Location
Average response time	<p>Average response time that is calculated by averaging the average response time of all CICS transactions within a service class. The average response time data is collected within the dashboard display timeframe. The indicator shows the level where the average response time exceeds the goal response time that is set in the OMEGAMON for CICS server..</p> <p>Red indicates that the average response time for all CICS transactions within the service class exceeds the goal response time by 400%</p> <p>Orange indicates that the average response time for all CICS transactions within the service class exceeds the goal response time by 200 - 400%</p> <p>Yellow indicates that the average response time for all CICS transactions within the service class exceeds the goal response time by 100 - 200%</p> <p>Blue indicates that the average response time for all CICS transactions within the service class exceeds the goal response time less than 100%</p>	Performance tab of the workbook summary view
Average CPU time	Average CPU time that is calculated by averaging the CPU time of all CICS transactions in the workbook that are collected within the dashboard display timeframe.	Performance tab of the workbook summary view
Transactions with Performance and Reliability Issues	Transactions with Performance and Reliability Issues displays the table view of all transactions that exceeding the goal response time threshold that is set in the OMEGAMON for CICS server. The report is sorted based on the number of average execution counts to emphasize on the transactions with the potentially biggest impact on the top.	Performance tab of the workbook summary view

*Table 17. OMEGAMON for CICS data analysis reports (continued)*

<b>Reports Name</b>	<b>Description</b>	<b>Displayed Location</b>
Average response time trends	Average response time trends show history of average response time of a CICS transaction over the dashboard display setting timeframe (for example, hourly, daily, or weekly).	Transaction Analysis view
Average DB2 and File I/O Wait Time of Response Time trends	<p>This chart displays two trend lines: average DB2 wait time of response time trends and average file I/O wait time of response time trends.</p> <p>Average DB2 wait time of response time trends shows history of percent DB2 wait time of the response time of a CICS transaction over the dashboard display setting timeframe (for example, hourly, daily or weekly).</p> <p>Average file I/O wait time of response time trends shows history of percent file I/O wait time of the response time of a CICS transaction over the dashboard display setting timeframe (for example, hourly, daily or weekly).</p>	Transaction Analysis view
Average execution count trends	Average execution count trends show history of average execution count of a CICS transaction over the dashboard display setting timeframe (for example, hourly, daily, or weekly).	Transaction Analysis view
Average CPU time trends	Average CPU time trends show history of average CPU time of a CICS transaction over the dashboard display setting timeframe (e.g. hourly, daily or weekly).	Transaction Analysis view

**Note:** The display order of the reports in the summary view of a workbook depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

*Table 18. OMEGAMON for CICS data analysis information*

<b>View</b>	<b>Information</b>	<b>Description</b>
<b>Transaction Analysis</b> view	Service Class	The name of service class the transaction belongs to.
	Transaction Name	The name of the transaction that is analyzed.

Table 18. OMEGAMON for CICS data analysis information (continued)

View	Information	Description
	Max Execution Count	Maximum number of execution counts of the transaction that is analyzed over the period of the dashboard display timeframe.
	Max CPU Time	Maximum number of CPU times in second of the transaction that is analyzed over the period of the dashboard display timeframe.
	Max Response Time	Maximum number of response times in minute of the transaction that is analyzed over the period of the dashboard display timeframe.
	Transaction Exceeding Goal Response Time	Number of transactions that the response time is going over the goal response time set in IBM OMEGAMON for CICS server.
	Average Response time	Average response time in seconds for a transaction.
	Average execution count	Average number of execution count for a transactions.
	Average CPU time	Average CPU time in milliseconds for a transaction.

## Analyzing transaction data

ADI provides the detailed CICS transaction analysis within a service class.

Complete the following steps to view the response time, CPU time or execution count analysis of CICS transaction. Before you begin this activity, you need to add at least one workbook with associated OMEGAMON for CICS data provider.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Performance** tab if you are not yet on the tab.
4. On the **Performance** tab, select the **OMEGAMON** tab if you are not yet on the tab.
5. View the reports on the **OMEGAMON** tab. The latest analysis information such as number of average transactions, average CPU time, and average response time are displayed.
6. Go to the **Transaction Analysis** view by using one of the following steps.
  - a. Select the transaction name that you want to view the transaction analysis information from either **Top Average Execution Count** report or **Transaction Exceeding Response Time Threshold** report.
  - b. Select the name of the service class that you want to view analysis information. The list of all CICS transactions within that service class displays. Then, select the transaction name that you want to view the transaction analysis information.

7. The **Transaction Analysis** view displays with the following information calculating from the latest data that is collected within the default timeframe that is set when you create the collection. For more information, see [“OMEGAMON for CICS related reports and information”](#) on page 266.
  - Maximum execution count
  - Maximum CPU time
  - Maximum response time
  - Number of transactions exceeding goal response time
  - Average response time and average response time trends
  - Average DB2 and File I/O Wait Time of Response Time trends
  - Average Execution count and average execution count trends
  - Average CPU time and average CPU time trends
8. Hover over the trend line to view data on that trend line.
9. Observe the warning icon on top of the average response time trends. The icon indicates the time where the maximum response time occurs.
10. Observe the DB2 and File I/O wait time trends to see the area where the DB2 or File I/O wait time is above the red line which is the acceptable value. Currently it is set to 50%.
11. Select different timeframe, for example, Hourly, Daily or Weekly, on top of the trend chart to zoom in or zoom out information.
12. Optional: If you associated Application Discovery data provider with this workbook, you can perform deep analysis of your performance issues based on the Application Discovery metrics by performing one of the actions below.

**Note:** The analysis can be done only when there are transactions with the same name on both OMEGAMON for CICS and Application Discovery data.

  - Analyze the potential artifacts that are cause of the performance issues.
    - a. Click on the area of the Average response time trends where you want to do deep analysis. The dialogue box with Performance data appears.
    - b. Click **OK** to navigate to the Artifact Composition graph. The Artifact Composition graph appears with artifacts that connect to either DB2 or File I/O. This depends on if the potential cause is due to DB2 wait time or File I/O wait time. For example, if DB2 wait time is much above the acceptable value, the slow response time can be caused by the DB2 wait time. The Artifact Composition graph will display all the artifacts that connect to DB2 wait time.
  - Analyze all artifacts within the transaction:
    - Clicking on the Artifact Composition button on the top right of the Transaction Analysis view. The Artifact Composition graph appears with all artifacts within the Transaction. For more information about how to analyze Artifact Composition, see [“Analyzing the Artifact Composition”](#) on page 282.

## Analyzing and displaying project data from Application Discovery

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Application Discovery (AD) data provides static analysis of projects. Project data such as number of artifacts, maintainability index, and number of statements that are collected from AD are analyzed and displayed in different views. You can navigate through different views of project inventory data analysis results for a workbook.

Before you start this task, you need to add at least one connection with one Application Discovery data provider to the system. For more information, see [Chapter 7, “Managing connections, data providers, workbooks, and notifications,”](#) on page 191.

## Navigating through different views of project data analysis

Static analysis data for a workbook can be analyzed and displayed in three main views: **Workbooks** view, detailed analysis of a workbook, and **Artifact Composition** view.

- **Workbooks** view

For the workbooks associated with the Application Discovery data provider, the **Workbook** view displays the number of Application Discovery projects within the workbook and their average maintenance status. When there is only one project within a workbook, the name of project is displayed instead of the number of projects. For more information on the report, see [“Project data from Application Discovery reports and information”](#) on page 273.

- Detailed analysis of a workbook

From the **Workbooks** view, select the name of any workbook that is associated with Application Discovery data provider to browse the detailed analysis reports. The analysis reports and information of Application Discovery data are displayed on the **Static Analysis** tab of this view.

Four sub-tabs are available on the **Static Analysis** tab.

- The **Overview** tab displays the bubble chart as the summary of overall status for all projects within the scope of a workbook. You can select individual bubble on the bubble chart to navigate to the detailed reports of that project.
- The **Metrics** tab displays the radar chart of different metrics you are interested in. You can compare up to five projects along with the metrics.
- The **Structure** tab displays the information about the shared resources for selected projects.
- The **Trends** tab displays the historical trends of different metrics that you are interested in. You can compare up to five projects for each of the historical trends chart.

**Note:** You can select up to 5 projects to be analyzed on the **Static Analysis** tab.

For more information, see [“Project data from Application Discovery reports and information”](#) on page 273.

**Note:** For Application Discovery data analysis, you can associate only one Application Discovery data provider with a workbook.

- The **Artifact Composition** view displays the information of all artifacts within a transaction. It can be switched between the following two reports.

- **Artifact Composition graph**

You can navigate to the **Artifact Composition graph** from the **Overview** view of a workbook by selecting the name of an Application Discovery project. When the page to select a transaction for analysis appears, select the transaction you want to analyze. The Artifact Composition graph view appears. For more information about the Artifact Composition graph, see [“Project data from Application Discovery reports and information”](#) on page 273. For more information about how to analyze Artifact Composition, see [“Analyzing the Artifact Composition”](#) on page 282.

- **Artifact Composition table**

You can navigate to the **Artifact Composition table** view from the **Artifact Composition graph** view by selecting the **Table View** icon on the top right of the view. For more information about the Artifact Composition table, see [“Project data from Application Discovery reports and information”](#) on page 273. For more information about how to analyze Artifact Composition, see [“Analyzing the Artifact Composition”](#) on page 282.

## Project data from Application Discovery reports and information

You can find the details of reports and information that is displayed for Application Discovery data analysis.

Table 19. Static metrics available from Application Discovery data provider	
Static Metrics	Description
Active Statement	The total number of statements that can be executed.
Artifacts	The total number of artifacts that are included in an application, where artifacts are entities such as programs, screens or classes.
Cyclomatic Complexity	An estimation of complexity by measuring the number of decision points within a program source code, in which the control flow can continue in more than one way. For more information, see <a href="#">Complexity Reports in Application Discovery</a> .
Delivered Bugs	Delivered Bugs is an estimated number of errors. It correlates with the overall complexity of the software. For the project level, it is calculated by averaging the number of delivered bugs for all type of artifacts within a project.
Maintainability Index	Maintainability Index(MI) is a software metric that measures how maintainable (easy to support or change) the source code is. This is calculated based on Lines of Code, Cyclomatic complexity, and Halstead volume. The MI value is 0 - 100. A higher value indicates better maintainability.  Halstead volume is an estimation of complexity measures based on number of variables, for example, the number of operands, and operators for expressions, program length, vocabulary and the number of delivered bugs.
Source Lines of Code	The total number of lines of code.
Unreachable Code	The percentage of statements that are within “live subroutines” (subroutines that can be reached by the control flow) out of the total number of statements.

Table 20. Data analysis reports for project data from Application Discovery

Reports Name	Description	Displayed Location																				
Maintenance Status	<div>The Maintenance Status is calculated based on the Maintainability Index (MI) and Unreachable Code threshold setting in the following table. The assumption is that the Maintainability Index metric has double weight of the Unreachable Code metric.</div> <table><tr><th colspan="4">Unreachable Code (Weight)</th></tr><tr><td>Maintainability Index (Weight)</td><td>Poor (3)</td><td>Acceptable (2)</td><td>Good (0)</td></tr><tr><td>Poor (6)</td><td>Red</td><td>Yellow-poor</td><td>Yellow-good</td></tr><tr><td>Acceptable (4)</td><td>Yellow-medium</td><td>Yellow-good</td><td>Yellow-good</td></tr><tr><td>Good (0)</td><td>Yellow-good</td><td>Blue</td><td>Blue</td></tr></table>	Unreachable Code (Weight)				Maintainability Index (Weight)	Poor (3)	Acceptable (2)	Good (0)	Poor (6)	Red	Yellow-poor	Yellow-good	Acceptable (4)	Yellow-medium	Yellow-good	Yellow-good	Good (0)	Yellow-good	Blue	Blue	Workbooks view
Unreachable Code (Weight)																						
Maintainability Index (Weight)	Poor (3)	Acceptable (2)	Good (0)																			
Poor (6)	Red	Yellow-poor	Yellow-good																			
Acceptable (4)	Yellow-medium	Yellow-good	Yellow-good																			
Good (0)	Yellow-good	Blue	Blue																			
Overview	Bubble chart shows overall status of all projects within the scope of a workbook. By default, X-Axis represents percent of unreachable code, Y-Axis represents Cyclomatic Complexity value and Bubble size represents the size of project as number of source lines of code.	Workbooks view-> Static Analysis tab -> Overview tab																				



Table 20. Data analysis reports for project data from Application Discovery (continued)

Reports Name	Description	Displayed Location
Artifact and Lines of Code Breakdown	<p>Artifact and Lines of Code Breakdown report displays total number of artifacts comparing with total number of lines of code breakdown by type of artifacts.</p> <p>The total number of artifacts calculated by the number of artifacts that are included in a project, where artifacts would be entities such as programs, screens, and classes.</p> <p>The total number of lines of code that is calculated by the number of lines of code in a project for each type of artifacts.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Overview</b> tab -> detailed project reports
Maintainability Index versus Delivered Bugs	Maintainability Index versus Delivered Bugs displays the line chart over time comparing maintainability index and delivered bugs.	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Overview</b> tab -> detailed project reports
Unreachable Code Trend	Unreachable code trend displays the percentage of statements that are within routines that cannot be reached by the control flow out of the total number of statements over time.	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Overview</b> tab -> detailed project reports
Total and Active Statements Trend	<p>Total and active statements display trend lines comparing total number of statements and total number of active statements within a project.</p> <p>Total number of statements that are calculated from total number of executable lines of all program within a project.</p> <p>Active number of statements that are calculated from total number of hit lines of all program within a project.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Overview</b> tab -> detailed project reports

Table 20. Data analysis reports for project data from Application Discovery (continued)

Reports Name	Description	Displayed Location
Metrics	<p>The radar chart shows the information of project metrics. By default, the chart displays the following information:</p> <ul style="list-style-type: none"> <li>• Cyclomatic Complexity</li> <li>• Number of source line of code</li> <li>• Maintainability Index</li> <li>• Unreachable Code</li> <li>• Number of estimated delivered bugs</li> </ul> <p>You can select up to five projects to display on the radar chart in order to compare metrics values.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Metrics</b> tab
Shared Resources table	<p>The table shows the list of all data sources that are shared between projects within the workbook. You can find the following types of data sources.</p> <ul style="list-style-type: none"> <li>• Database tables</li> <li>• Dataset</li> <li>• IMS Database</li> </ul>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Structure</b> tab
Shared Resources graph	<p>The network graph shows the relationship between projects and their data sources. Nodes on the right represent projects within the workbook and nodes on the left represent data sources that are used by projects. Direction of the relationship represents "read" or "write" activity.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Structure</b> tab
Shared Resources bar chart	<p>The stacked bar chart shows the number of shared resources by resource type.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Structure</b> tab
Trends	<p>The trend lines show the historical data of project metrics. By default, the chart displays the following information.</p> <ul style="list-style-type: none"> <li>• Cyclomatic Complexity</li> <li>• Number of source line of code</li> <li>• Unreachable Code</li> </ul> <p>You can select up to five projects to display on a trends line to compare the metrics values.</p>	<b>Workbooks</b> view-> <b>Static Analysis</b> tab -> <b>Trends</b> tab

Table 20. Data analysis reports for project data from Application Discovery (continued)

Reports Name	Description	Displayed Location
Artifact Composition graph	Artifact Composition graph is the connected graph showing all artifacts (for example, program and database table) within a transaction. The boxes represent artifacts within a transaction. The arrow lines represent the connection between two artifacts. The arrow direction indicates the calling direction between artifacts.	<b>Artifact Composition</b> view
Artifact Composition table	<p>Artifact Composition table shows the list of all program artifacts within a transaction. The table is sorted based on the analysis of high risk to modify. The rank of risk to modify is calculated based on combination of the following criteria:</p> <ul style="list-style-type: none"> <li>• <b>Whether the artifact is in risk areas:</b> Risk areas are based on the thresholds setting.</li> <li>• <b>Whether the artifact is an outlier:</b> Outlier artifacts are analyzed based on the outlier detection algorithm leveraging Mahalanobis distance of each artifact to the center of the distribution. Artifacts with large Mahalanobis distances mean they are outlier or abnormal because they very far away from majorities.</li> <li>• <b>Metrics values sorting:</b> Given the same risk area and outlier status, artifacts are finally sorted by the values of Maintainability Index, Unreachable Code, and Cyclomatic Complexity.</li> </ul>	<b>Artifact Composition</b> view

**Note:** The order of the reports displayed in the **Summary** view of a workbook depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

Table 21. Data analysis information for project data from Application Discovery

View	Information	Description
Shared Resources table	Resource Name	The name of the data sources that are shared between projects in a workbook.

Table 21. Data analysis information for project data from Application Discovery (continued)

View	Information	Description
	Resource Type	The type of the data source. Three types of data sources are available: <ul style="list-style-type: none"> <li>• DB2 tables</li> <li>• Files</li> <li>• IMS segments</li> </ul>
	Number of Projects	The number of projects that either "read" or "write" data from the resource.
Artifact Composition table	Outlier Status	Outlier Status indicates whether the artifact is an outlier. Outlier artifacts are analyzed based on the outlier detection algorithm leveraging Mahalanobis distance of each artifact to the center of the distribution. Artifacts with large Mahalanobis distances mean they are outlier or abnormal because they are far away from majorities.
	Artifact Type	The program type of the artifact.
	Program Name	The name of the artifact.
	Maintainability Index	See details in Table 1.
	Unreachable Code	See details in Table 1.
	Cyclomatic Complexity	See details in Table 1.
	Number of Incoming References	The number of links calling in the artifact.
	Number of Outgoing References	The number of links calling out of the artifact.

## Analyzing static metrics for a workbook

ADI provides the static metrics and reports such as project inventory, project complexity, and project quality for all projects within the scope of a workbook.

Before you begin, you need to add at least one workbook that is associated with the Application Discovery data provider. For more information, see [“Adding a workbook” on page 215](#). Complete the following steps to view the static analysis of projects within a workbook:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view the static analysis information about.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab. The Static Analysis reports of a workbook are displayed by tabs.
4. Select one of the following tabs to view information. For detailed report information, see [“Project data from Application Discovery reports and information” on page 273](#).

- **Overview**
- **Metric**
- **Structure**
- **Trends**

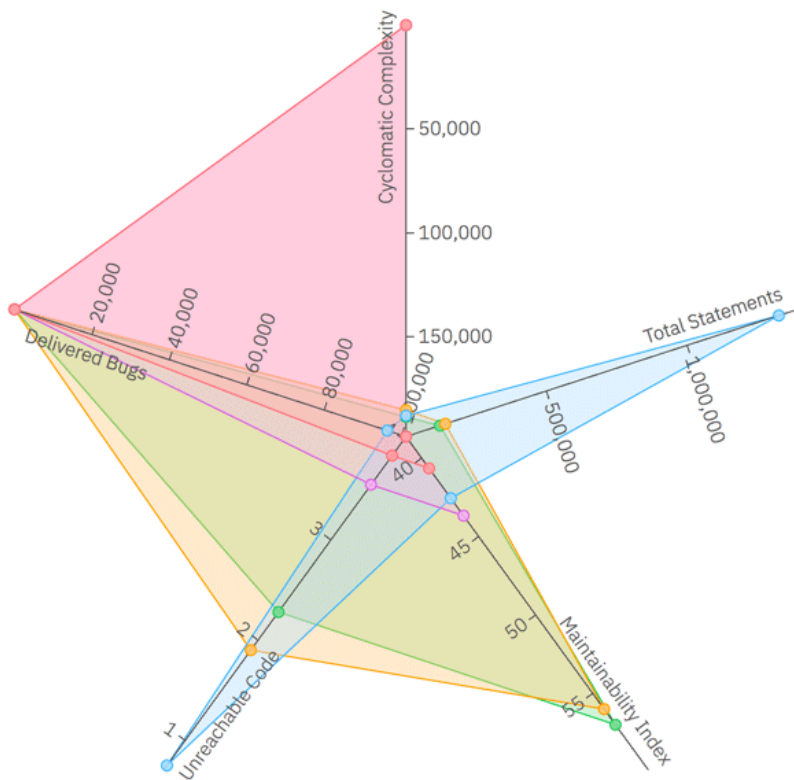
5. Select up to five projects from the list of projects within the workbook on the left pane to analyze those projects. Static analysis reports for all tabs are updated based on the project selection.
6. Optional: On the **Overview** tab, **Metrics** tab, and **Trends** tab, choose different static metric to be displayed on the reports from the metric drop-down list on the left pane. You can find the following metrics.
  - Active Statements
  - Artifacts
  - Cyclomatic Complexity
  - Delivered Bugs
  - Maintainability Index
  - Source Line of Code
  - Unreachable Code

When you choose different metrics, the report on the corresponding tab is updated based on your metric selection.

**Note:** The higher value of a metric or the lower value of a metric can be good or bad depending on the metric itself. ADI calls the rising or declining trend of metric value change as the metric direction. An increasing direction means that the higher value is better than the lower value. A decreasing direction means that the lower value is better than the higher value. For example, Active Statements metric has an increasing direction, which means that a higher number of Active Statements in the project indicates the better condition. While Unreachable Code metric has a decreasing direction, hence a lower value of unreachable code indicates a better condition. Some of the inventory metrics, such as the number of Artifacts or the number of Source Lines of Code, the metric directions might not indicate the condition of that metric. The following table shows the direction of all a available AD metrics.

Table 22. AD metrics and their directions	
Metrics	Direction
Active Statements	Increasing
Artifacts	No direction
Cyclomatic Complexity	Decreasing
Delivered Bugs	Decreasing
Maintainability Index	Increasing
Source Lines of Code	No direction
Unreachable Code	Decreasing

When the metrics are selected as axes on the bubble chart or the radar chart, the value of the axes are displayed in an increasing or decreasing trend depending on the metric direction. For the inventory metrics that have no direction, the value of the axes is increasing. You can check the following visualized metric directions for reference.



## Analyzing static metrics for a project

For projects within the scope of a workbook, you can view project level metrics for a project such as project inventory, complexity, and quality.

Complete the following steps to analyze the static metrics for a project:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view the static analysis information about.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab. The Static Analysis reports of a workbook that are organized in tabs display. You can find the following tabs.
  - **Overview**
  - **Metric**
  - **Structure**
  - **Trends**
4. On the **Overview** tab, select a bubble that represents a project of which you want to view the static analysis information on the bubble chart. The detailed project reports are displayed on the bottom with the following information that is calculated from the latest collected data from Application Discovery data provider. For detailed report information, see [“Project data from Application Discovery reports and information”](#) on page 273.
  - Artifact and lines of code breakdown
  - Maintainability index versus Delivered bugs

- Unreachable code trend
- Total and active statements trend

**Note:** The order of reports displayed depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

Next you can perform the composition analysis of artifacts within a project by navigating to the Artifact Composition function. For more information, see [“Analyzing the Artifact Composition”](#) on page 282.

## Analyzing shared resources

Data sources such as database table and data set can be shared among multiple projects. ADI helps you to understand the data sources that are shared by multiple projects within the scope of a workbook.

Complete the following steps to analyze shared resources.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information about.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab.
4. Select the **Structure** tab under the **Static Analysis** tab. The shared resources reports and information are displayed. For more information, see [“Project data from Application Discovery reports and information”](#) on page 273.
5. Select up to five projects from the list of projects within the workbook on the left pane to analyze those projects. The list of all the resources that are used by projects is displayed on the Shared Resources table.
6. Select up to 5 shared resources on the Shared Resources table. The Shared Resources graph and bar chart are updated based on the selected project and shared resources.
7. Optional: Uncheck any of the resource types under Resource Type Filters on the left pane to filter out the shared resources that are displayed on the table and charts.

## Analyzing project data

ADI provides the detailed project data analysis such as project inventory, project complexity, and quality.

Complete the following steps to view the analysis of project inventory, complexity, and quality. Before you begin this activity, you need to add at least one workbook with the associated Application Discovery data provider. For more information about how to add a workbook associated with Application Discovery, see [“Adding a workbook”](#) on page 215.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab.
4. The Static Analysis reports of a workbook are displayed with the following information that is calculated from the latest collected data from Application Discovery data provider. For detailed report information, see [“Project data from Application Discovery reports and information”](#) on page 273.
  - Artifact and lines of code breakdown
  - Maintainability index versus delivered bugs
  - Unreachable code trend
  - Total and active statements trend

**Note:** The order of reports displayed depends on your role. For more information, see [“Role-based dashboards and reports for a workbook”](#) on page 225.

For next step, you can perform the composition analysis of artifacts within a project by navigate to Artifact Composition function. For more information, see [“Analyzing the Artifact Composition” on page 282.](#)



## Analyzing the Artifact Composition

The transactions within a project can be analyzed using the Artifact Composition. The Artifact Composition allows you to analyze potential risk areas of all the artifacts within a transaction based on relationships between artifacts and Application Discovery related metrics such as maintainability index, unreachable code, and cyclomatic complexity.

The Artifact Composition is displayed in two views: the Artifact Composition graph and the Artifact Composition table. You can switch between the two views after you navigate to the Artifact Composition function. For information about Artifact Composition graph and Artifact Composition table, see [“Project data from Application Discovery reports and information” on page 273.](#)

Complete the following steps to navigate to analyze the Artifact Composition.

**Note:** If you navigate to the Artifact Composition function from the transaction analysis view of OMEGAMON for CICS data provider or from the composition search menu, you can go directly to step 5.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information about.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab.
4. On the **Overview** tab under the **Static Analysis** tab, select one of the bubble that represents the project to be analyzed. The detailed project reports appear on the bottom.
5. Select the name of that project. The page to select transaction for analysis appears.
6. Select the transaction you want to analyze. The Artifact Composition map appears. You can perform multiple actions to help analyze the Artifact Composition. For more information, see [“Analyzing transactions with the Artifact Composition graph” on page 282.](#)
7. Select the **Table** icon (  ) on the top right of the view to switch to Artifact Composition table.
8. The Artifact Composition table appears. You can perform multiple actions to help analyze the Artifact Composition. For more information, see [“Analyzing transactions with the Artifact Composition table” on page 284.](#)
9. Review the top-ranked artifacts on the table first as they are the potentially riskier ones to modify. For more information, see [“Reviewing the top-ranked artifacts” on page 285.](#)
10. Select the **Graph** icon (  ) on the top right of the view to switch back to the Artifact Composition graph.

**Note:** You can navigate to the Artifact Composition view from the **Structure** tab by clicking the name of shared resources you are interested in. The list of all transactions that use the selected shared resources appears. Select one of the transaction to go to the Artifact Composition view and analyze as described above.

### Analyzing transactions with the Artifact Composition graph

You can perform the following actions to help analyze the transactions via the Artifact Composition graph.


#### Risk Areas analysis

Risk areas are the indications of potential artifacts that could be risky. Risk areas are indicated by either blue warning icons or red warning icons. A blue warning icon indicates the artifacts that have Application Discovery metrics changes that can indicate potential source changes in the past week. A red icon indicates the value of Maintainability Index, Unreachable Code, or Cyclomatic Complexity is above or below the related threshold setting.



Complete the following steps to make a Risk Areas analysis.



1. Click the **Risk Areas** icon (  ) on the top header. The dialog box that explains the risk areas and threshold setting opens.
2. Blue warning icons and red warning icons appear on the artifact boxes.
3. Slide the threshold sliders to adjust the threshold values.
4. The warning icons update based on the adjusted threshold values.
5. Click **X** on the upper right of the dialog box to close the Risk Areas dialog box.

### Viewing program metrics

You can view all the metrics that are related to each program by clicking the artifact box. The selected artifact is highlighted and the dialog box with program metrics with the following information opens.

- The type of program and the program name
  - Metrics
    - Maintainability Index
    - Unreachable Code
    - Active Statements
    - Source Lines of Code
    - Cyclomatic Complexity
    - Delivered Bugs
    - Total Statements
- Note:** You can select **View Trends** next to the metrics header to view historical trends of the above metrics. By default, the view displays Maintainability Index and Source Lines of Code. You can select the metric name to change to different metric.
- Program Reference Information
    - Number of incoming references
    - Number of outgoing references
  - Optional: If you included the Manual Builds data provider or Rational Team Concert Builds data provider in the same workbook as Application Discovery data provider that is analyzed, the code coverage percentage of the artifacts is also displayed.

**Note:** The artifacts in the Manual Builds data provider or Rational Team Concert Builds data provider and the Application Discovery data provider need to be the same name in order to associate the data between the two providers.

### Zooming in or out of the Artifact Composition Map

You can zoom in or zoom out on the artifact composition map by using the **+** icon, **-** icon and the slider bars on the lower left corner of the screen.


### Filtering artifacts

The artifacts can be filtered based on two criteria: filter artifacts that are connected to DB2 and filter artifacts that are connected to File I/O.

Complete the following steps to filter artifacts.

1. On the top header, click **Filters** to open the drop-down list.
2. On the drop-down list, check either of the following choices or both.
  - Select DB2 to display only the artifacts, which are connected to DB2.

- Select FILE I/O to display only the artifacts, which are connected to File I/O.

3. Click the **Expand All** icon (  ) on the top header to clear all the filters.

### Navigating through different projects and regions

A transaction can be associated with other projects and regions. You can view the Artifact Composition graph of these other projects and regions by selecting a project or a region from the **Project** drop-down list or the **Region** drop-down list on the top header.

### Navigating through different transactions

There can be other transactions within a project and a region. You can view the Artifact Composition graph of other transactions by selecting a transaction from the **Transaction** drop-down list on the top header.

### Highlighting a program

You can highlight a specific program in the artifact composition graph to display the relationship with other artifacts by selecting a program name from the **Select a Program** drop-down list on the top header.

### Changing snapshot date

By default, the Artifact Composition graph is displayed based on the latest data that is collected from the Application Discovery server. You can view the Transaction Composition graph from different snapshots by selecting a different date from the **Date** drop-down list on the top header.

### Highlighting artifacts with threshold setting

Select a metric from the **Select a Heat Map** drop-down list on the top header to display a color coded artifact composition graph based on the metric threshold values. Accordingly, the artifacts with the good, acceptable, and poor threshold values are highlighted with blue, yellow, and red color.

### Analyzing transactions with the Artifact Composition table

You can perform the following actions to help analyze transactions via the Artifact Composition table.


### Viewing metric trends

Select the program name of which you want to view historical trends of the static analysis metrics that is related to the program. By default, the view displays Maintainability Index and Source Lines of Code. You can select the metric name to change to different metric.

### Risk Areas analysis

Risk areas are the indications of artifacts that could be potentially risky. Risk areas are indicated by either the blue warning icons or the red warning icons. A blue warning icon indicates the artifacts that have Application Discovery metrics changes that can indicate potential source changes in the past week. A red icon indicates the value of Maintainability Index, Unreachable Code, or Cyclomatic Complexity is above or below the related threshold setting.

Complete the following steps to make Risk Areas analysis.

1. Click the **Risk Areas** icon (  ) on the top header. The dialogue box explaining the risk areas and threshold setting appears.
2. Slide the threshold sliders to adjust the threshold values.
3. The warning icons update based on the adjusted threshold values.
4. Click **X** on the top right of the dialogue box to close the **Risk Areas** dialogue box.

## Changing snapshot date

By default the Artifact Composition graph is displayed based on the latest data collected from Application Discovery server. You can view the Transaction Composition table from different snapshots by selecting a different date from the **Date** dropdown list on the top header.

## Navigating through other projects and regions

A transaction may be associated with other projects and regions. You can view the Artifact Composition table of these other projects and regions by selecting a project or a region from the **Project** dropdown list or the **Region** dropdown list on the top header.

## Navigating through other transactions

There may be other transactions within a project and a region. You can view the Artifact Composition table of other transactions by selecting a transaction from the **Transaction** dropdown list on the top header.

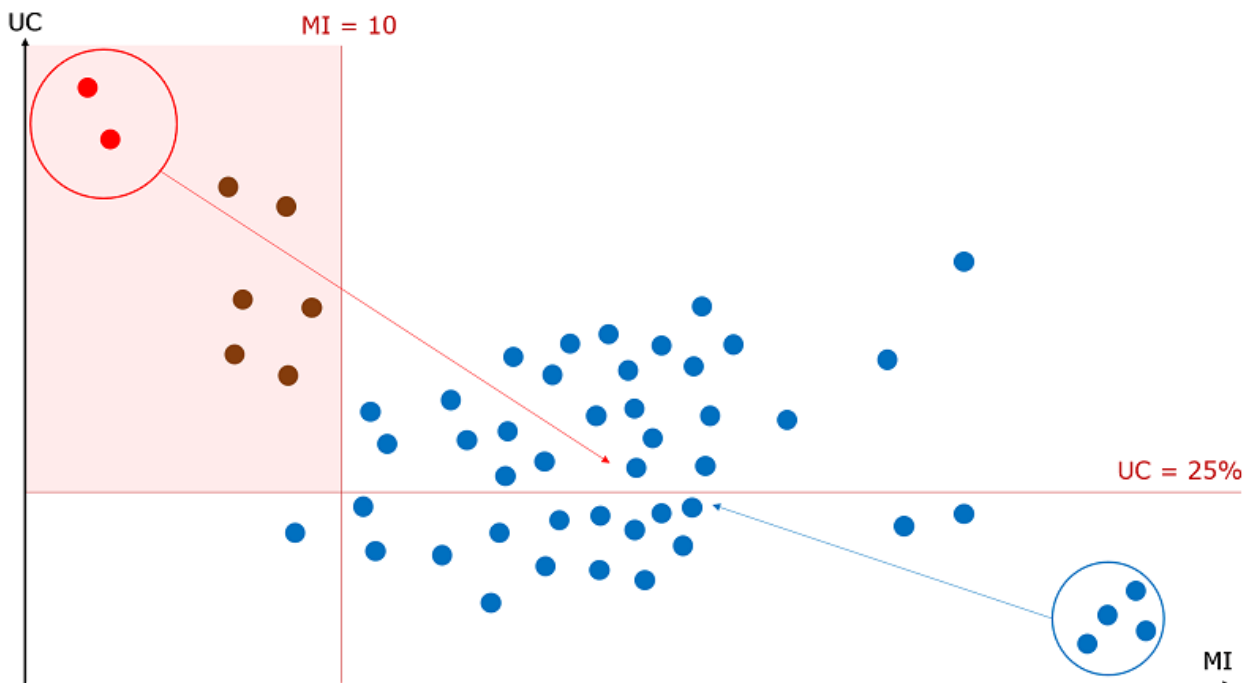
## Reviewing the top-ranked artifacts

It is recommended that you review the top-ranked artifacts on the table for analysis. This top-ranked artifacts indicate the higher risk if there are changes to these artifacts.

The top-ranked artifacts are ranked comprehensively based on three factors:

1. Risk areas analysis.
2. Outlier analysis status.
3. Static metrics sorting

The basic idea of this ranking algorithm can be illustrated in the following figure. For simplicity, a two-dimensional graph is shown with the x-axis represents Maintainability Index (MI) and the y-axis represents Unreachable Code (UC). Each solid circle on the graph represents a program artifact with two metrics: MI and UC.



- The red rectangle shown on the graph is a risk area. It is defined by a horizontal line ( $UC > 25\%$ ) and a vertical line ( $MI < 10$ ), artifacts within the risk area (color labeled as red) are heuristically riskier than those outside the risk area (color labeled as blue). As such, checking whether a program artifact is in the risk area is the first factor to calculate the ranking.

- From the graph, you can also see that there are two red artifacts and four blue artifacts having much larger distances from the center compared to the others. Such distance is measured by Mahalanobis Distance, which is a commonly-used distance measurement between a data point and a distribution, introduced by P. C. Mahalanobis in 1936. These two artifacts can be considered as bad outliers as they are within risk area and far away from the others. The four blue artifacts can be considered as good outliers as they are outside the risk area and far away from the others. Thus, checking whether an artifact is a bad outlier is the second factor in calculating the rank.

**Note:** ADI may generate false positives, that is, marking good outliers as bad outliers. It usually happens when you defined improper metrics threshold settings for risk area analysis. It is recommended that you use the default threshold settings or ask domain experts for advice.

- The last ranking factor is metrics sorting. ADI sorts artifacts by their metric values following this order: Maintainability Index, Unreachable Code, Cyclomatic Complexity, Number Of Incoming References, and Number Of Outgoing References.

## Comparing the projects within a workbook

ADI allows you to compare up to 5 projects within a workbook. You can use the radar chart to compare the recent values of project metrics or use the trend line to compare the historical data of project metrics.

Complete the following steps to compare projects within a workbook.

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information about.
3. On the summary view of that workbook, select the **Static Analysis** tab if you are not yet on the tab.
4. Select up to five projects from the list of projects within the workbook on the left pane to compare.
5. To compare the recent values of project metrics, select **Metrics** tab under the **Static Analysis** tab.
  - a. The radar chart is displayed with the recent values of Cyclomatic Complexity, Total Statement, Maintainability Index, Unreachable Code, and Delivered Bugs as default.
  - b. On the left pane, select different metrics to be displayed for each axis from the metric dropdown list. The radar chart is updated based on the metric you select.
6. To compare the historical data of project metrics, select **Trends** tab under **Static Analysis** tab.
  - a. Three trend charts showing historical value of Unreachable Code, Cyclomatic Complexity and Source Line of Code are displayed on the **Trends** tab.
  - b. On the left pane, select different metrics to be displayed for each trend chart. The trend chart is updated based on the metric you select.
  - c. Optional: From the Project Aggregation drop-down list, select the aggregation calculation you want among the following three aggregation calculations available:
    - Metric min value: Calculate the minimum value of the metric for all the selected projects.
    - Metric max value: Calculate the maximum value of the metric for all the selected projects.
    - Metric average value: Calculate the average value of the metric for all the selected projects.

## Searching for artifacts in the artifacts composition

You can learn how to search for an Application Discovery program or transaction, which you want to visualize in the artifact composition map.

Complete the following steps to search for a program or transaction.

1. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
2. Select **Composition Search** from the menu pane.
3. Type the name or part of the name of the program or transaction you want to search for in the search box next to the ADI header.

4. Under search result page, select **Programs and Transactions** tab.
5. Optional: Check one or more workbooks on the left pane to scope your search.
6. Search result appears with details. Select a program or transaction, which you want to visualize in the artifact composition map.
7. Artifact composition map that highlights the artifact you are searching for appears along with the dialog box that shows the artifact's metrics if available.

## Sharing Application Discovery reports

You can instantly share the Application Discovery workbook reports with members within the workbook for collaboration.

Complete the following steps to instantly share Application Discovery reports.

1. Analyze the static metrics for a workbook as described in [“Analyzing static metrics for a workbook” on page 278](#).
2. Select the **Share** icon on the upper right corner of either Overview or Metrics report to share information on the report.
3. Select the name of members of the workbook that you want to share the report with.
4. Click **Share** to share report or **Cancel** to cancel the operation.

Complete the following steps to view the shared report.

1. Expand the drop-down menu from the **Notifications** icon on the upper right corner of the view.
2. Select the notification message which informs you to review the shared report. The shared report is displayed.

## Analyzing and displaying performance data from SMF and APA data

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The operational data from System Management Facility (SMF) and the Application Performance Analyzer (APA) data are analyzed and displayed in different views. You can navigate through different views of performance data analysis results for a workbook.

**Note:** For SMF, ADI only uses SMF record type 30 for analysis.

Before you start this task, you need to add at least one System Management Facility data provider to the system. For more information, see [Chapter 7, “Managing connections, data providers, workbooks, and notifications,” on page 191](#).

### Navigating through different views of SMF and APA data analysis results

The performance data from System Management Facility (SMF) and Application Performance Analyzer (APA) data are analyzed and displayed in several views: Workbooks view, Summary view for a workbook, and Job Analysis view.

#### Workbooks view

The Workbooks view is the home page of ADI. The page will be displayed after you logging in or you can get to the Workbooks view by selecting the Workbooks menu from the main menu panel.

The Workbooks view is the view that shows the status of all the workbooks in the system. Each workbook displays its latest data analysis results from their associated data provider. For the workbooks that are associated with SMF data provider, a job with the highest CPU time is displayed on the Workbooks view. For more information, see [“SMF and APA related reports and information” on page 288](#).

#### Summary view for a workbook

From the Workbooks view, select the name of any workbook that is associated with the SMF data provider to navigate to the Summary view of a workbook. The SMF related reports is displayed on the **System Management Facility (SMF)** tab under **Performance** tab of the summary view.

The Summary view of SMF data provider displays performance data of all the jobs in a workbook. You can click on the column header of the table to sort the data on that column in an ascending or descending order to view the jobs with performance issues. You can find the following information that displays on this view:

- CPU time
- Execute Channel Program time count
- Service Units count
- Elapsed time

For more information, see [“SMF and APA related reports and information”](#) on page 288.

### Job analysis view

From the Summary view of a workbook, select the job name under the **Job with Performance Issues** report. The Job analysis view is composed of the graph area and report area. By default, it displays the trending graphs of the selected job. On the trending graph, when there is an APA report available, the APA report icon is displayed on the graph. You can select the **APA report** icon to display APA report on the bottom of the graphs. For more information, see [“SMF and APA related reports and information”](#) on page 288.

## SMF and APA related reports and information

You can find the details of reports and information that is displayed for System Management Facility (SMF) and Application Performance Analyzer (APA) data analysis.

<i>Table 23. System Management Facility (SMF) and Application Performance Analyzer (APA) Reports</i>		
<b>Report Name</b>	<b>Description</b>	<b>Displayed Location</b>
Job with highest CPU time	The name of job which has the highest CPU time within the scope of a workbook and its CPU time in seconds.	Workbook view
Jobs with Performance Issues	The table displaying the list of all the jobs in the scope of a workbook with their performance information e.g. CPU time, executable channel time, service units and elapsed time count. By default it sorts by highest CPU time to lowest CPU time.	Workbook summary view
CPU Time trends	The trends line showing CPU time for a selected job.	Job analysis view
Executable Channel Program Time trends	The trends line showing the count of Execute Channel Program time for a selected job.	Job analysis view
Total Services Unit trends	The trends line showing the amount of total service units consumed by a selected job.	Job analysis view
CPU Services Unit trends	The trends line showing the amount of CPU service units consumed by a selected job.	Job analysis view
I/O Services Unit trends	The trends line showing the amount of I/O service units consumed by a selected job.	Job analysis view

*Table 23. System Management Facility (SMF) and Application Performance Analyzer (APA) Reports (continued)*

Report Name	Description	Displayed Location
MSO Services Unit trends	The trends line showing the amount of main storage service units consumed by a selected job.	Job analysis view
SRB Services Unit trends	The trends line showing the amount of Service Request Block (SRB) service units consumed by a selected job.	Job analysis view
Application Performance Analyzer report	The table displaying the list of all programs within a selected job with their performance information e.g. CPU time, executable channel time count, service units count and elapsed time.	

*Table 24. System Management Facility (SMF) and Application Performance Analyzer (APA) Information*

View	Information	Description
Workbook summary view	Job	The name of job within a workbook.
	CPU time	The amount of time CPU was used for processing a job.
	Executable Program Channel (EXPC) time count	The count of call for low level-device access by a job.
	Service Units (SRVU) count	The amount of service unit consumed by a job.
	Elapsed time	The elapsed time processing a job.
Job analysis view	Program	The name of program within a job.
	CPU time	The percentage of CPU time used for processing a program.
	Measurements	The APA measurement count for a program.
	Description	The amount of service unit consumed by a program.

## Analyzing the job performance data

You can analyze the job performance data from System Management Facility (SMF) and Application Performance Analyzer (APA).

**Note:** Before you start analyze the job performance data, you need to add at least one workbook with the associated System Management Facility data provider.

Complete the following steps to view the job performance:

1. Go to the **Workbooks** view. By default, you are on the **Workbooks** view after you log in ADI. If you are not yet on the **Workbooks** view, click the **Menu** icon next to the IBM ADI header, and select **Workbooks** from the menu pane that appears.
2. Select the name of the workbook that you want to view analysis information.
3. On the summary view of that workbook, select the **Performance** tab if you are not yet on the tab.
4. On the **Performance** tab, select the **System Management Facility (SMF)** tab if you are not yet on the tab.
5. View the **Job with Performance Issues** report on the **System Management Facility (SMF)** tab. You can find the following information.
  - CPU time in second
  - Execute Channel Program (EXCP) time count
  - Service Units count
  - Elapsed time in second
6. Optional : Search for jobs by the job name in the search box on the top of the table.
7. Select the job name to go to the analysis of the selected job.
8. View the two trends lines to compare the performance data of the selected job. By default, the view displays the trends of CPU time and Execute Channel Program Time.
9. Optional: Click the label of trend line and select the different data to display such as CPU Service Units, I/O Service Units, MSO Service Units, and SRB Service Units.
10. Optional : Select the **APA report** icon on the trends line if it is available on the trend line to view the APA report that corresponds to the date you selected on the trend line.
11. View the following information of the APA report:
  - CPU time in seconds
  - Execute Channel Program (EXCP) time count
  - Service Units count
  - Elapsed time in second



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## Chapter 9. Troubleshooting

Troubleshooting helps you identify and solve problems that occur while using ADI.

### Limited platform support

This application is built by using the Jazz infrastructure. However, ADI doesn't support all the platforms that are currently listed as supported for Jazz. For more information about the supported environment for ADI, see [“Hardware and software requirements” on page 103](#).

### Requirements on the pop-up blocker configuration

Currently, when you need to authenticate, the ADI log-on dialog pops up. Therefore, the browser that you are using must be configured to allow all the pop-up windows from the ADI server machine. In other words, you do not need to disable your pop-blocker, but you must configure it to allow the pop-up window from the ADI server. You can typically accomplish it in the browser's preferences settings by specifying an exception. Another method is to let the browser block the first initial pop-up window and then click the configuration banner or button that is displayed to inform you that a pop-up window was blocked. You need to select the option to allow pop-ups from this site in the future and then reload the page to make the pop-up log-on window appear.

### Requirements on a self-signed certificate and browser configurations for the application server shipping with ADI

After the installation, you need to configure a certificate authority that is a signed or self-signed certificate for your application server. You need to send instructions to your end users about how to import this certificate to avoid warnings of errors in their browsers.

- For instruction about configuring the certificates, see the Jazz online help: [Configuring security certificates](#).
- For information about how to configure the certificate, you can follow the same instructions as described in [Configuring security certificates for Report Builder servers](#).
- For information about how to configure a browser for such self-signed certificates, follow the instructions in [Importing certificates and configuring browsers for Report Builder reports](#).

### Login problem after setting up ADDI

After you set up IBM ADDI, you need to restart the server. Otherwise, you will not be able to log in with the correct credentials and IBM ADDI will request you for re-authentication. When you open the *ADI installation folder\adi\server\liberty\servers\clm\logs\addi-brd.log*, you can see the warning of "Failed authentication with Jazz server". To restart the server, complete the following steps:

1. Navigate to the `<unzipped-adi-installer>/adi/server` directory.
2. Shut down the server by running the `server.shutdown` script.
3. Restart the server after the you shut down the server successfully by running the `server.startup` script.

### Icon display error on ADI browser page

ADI uses a custom font to display all of its icons and browser settings might prevent the custom font from being downloaded. In that case, when you browse ADI, the UI might be filled with strange characters and numbers that don't make sense. Therefore, you need to make sure that your browser preferences are set to allow pages to choose their own fonts. This icon display error occurs in Mozilla Firefox browser.

To verify that your Mozilla Firefox browser is configured to download the custom font, make sure that the following settings are correct:

1. Select **Tools>Options**.
2. Select **Content** in the left navigation area.
3. In the **Fonts & Colors** section, click **Advanced...**
4. On the **Fonts** window, verify that the checkbox for **Allow pages to choose their own fonts, instead of my selections above** is selected and then press **OK**.

### SQL error (SQLCODE = -964) on massive data update transactions for DB2

When you perform massive DB2 update transactions, for example, deleting a data provider with 200,000 entries, you might observe SQL error with error code -964. The possible cause for the error is that your DB2 log setting is wrong or too restrictive. To solve this issue, you need to increase the size of your transaction logs. You can refer to the following sample statements to increase log size, supposing the name of your DB2 data warehouse is "DW".

- db2 get db cfg for DW
- db2 update db cfg for DW using LOGPRIMARY 64
- db2 update db cfg for DW using LOGSECOND 192

**Note:** The total number of primary logs plus secondary logs cannot exceed 256. It is recommended to set larger secondary log size since they are constantly cleared by DB2.

### Migration error (Error 503: CRJAZ1173W) when migrating from ADI 1.0.1 or ADI 1.0.1 ifix01 to ADI 1.0.2

When you complete the migration steps, start the new server, and navigate to the applications main page: <https://servername:9443/adi/web>, you might hit the following error.

```
Error 503: CRJAZ1173W The com.ibm.team.repository.service.internal.ILogoutRestService service is not available.
```

This error is caused by services trying to access Jazz Team Server (JTS) root services too early in the application. This means that JTS is not fully started and the root services that are required for authentication are not yet available.

To fix the error, you should try the following steps:

1. Open a browser and navigate to the JTS admin page: <https://servername:9443/jts/admin> to ensure that Jazz Team Server is fully started.
2. If you can successfully access the JTS admin page, you can retry accessing the applications main page: <https://servername:9443/adi/web>.
3. Review the progress of migration tasks in the log file located in `adi102/server/logs/adi.log` to verify that your data is migrated successfully.
4. Confirm that these two lines are shown in the log.

```
CRIDA0059I The DIMEZ warehouse schema validation has completed.
```

and

```
CRIDA0052I Completed checking the ADI data migration status.
```

5. If you find errors in the log, review the error message to understand the nature of the problem. Contact technical support to get further help with any migration error messages.

### Incorrect statuses of business terms after the migration from ADI 5.1.0 to ADI 5.1.0.2

The statuses of business terms in V5.1.0 are not preserved after you migrate from ADI V5.1.0 to ADI V5.1.0.2. You need to manually correct the statuses based on the following mapping.

Table 25. The status mapping between V5.1.0 and V5.1.0.2

V5.1.0 Status	V5.1.0.2 Status
New	Waiting For Approval
In Progress	New
Waiting For Approval	Rejected
Approved	In Progress
Rejected	Approved

### A DB2 problem after the migration from ADI 5.1.0 to ADI 5.1.0.2 or later versions

After you migrate from ADI V5.1.0 to ADI V5.1.0.2 or later versions, you might fail to save the association between a code snippet and a business term due to a DB2 problem. The problem might occur when you try to complete the following steps:

1. Create a Business Rules Discovery data provider and a workbook.
2. Navigate to the Keyword details page.
3. Associate a code snippet to a business term.

You might find the association cannot be saved and nothing happens when you click the **Save** button. If you check the ADI server console log, you might find the following error messages:

```
org.springframework.web.util.NestedServletException: Request processing failed; nested
exception is org.hibernate.exception.GenericJDBCException: could not extract ResultSet
```

and

```
ERROR org.hibernate.engine.jdbc.spi.SqlExceptionHelper - DB2 SQL Error: SQLCODE=-668,
SQLSTATE=57016, SQLERRMC=7;ADDI.OCCURRENCE, DRIVER=4.21.29
```

As a workaround to the problem, an ADI server admin and a DB2 admin should complete the following steps:

1. Navigate to the `<unzipped-adi-installer>/adi/server` directory.
2. Shut down the server by running the `server.shutdown` script.
3. Start the DB2 command line processor and run the following commands.
  - a. Run `CONNECT` command to connect to the ADI warehouse database.

```
DB2 CONNECT TO <ADI warehouse database name>
```

- b. Run `REORG TABLE` command to reorganize the table.

```
DB2 REORG TABLE ADDI.OCCURRENCE
```

- c. Run `DISCONNECT` command to disconnect from the ADI warehouse database.

```
DB2 DISCONNECT <ADI warehouse database name>
```

4. Navigate to the `<unzipped-adi-installer>/adi/server` directory.
5. Start the server by running the `server.startup` script.

### Error in importing archive files from a Mac machine

When you create an archive file on a Mac machine, a metadata file will be created in the archive file. You can import that file to ADI but an error message will occur because ADI doesn't understand the metadata file.

You can ignore the error message. The import function is still working correctly.

## Application log files

Application logs contain important information about the JTS server and ADI server applications. Consult the application logs when you encounter errors in the application. If there is an error ID associated with the error message, the administrator can search for that ID in the application logs to ensure the appropriate message is being investigated. IBM Support may request log levels be adjusted for ADI application.

Perform the following steps to adjust the log levels.

1. Browse to `Installed_ADI_folder > adi > server > conf > adi` and edit `log4j.properties` files.
2. Go to the line 17 on the `log4j.properties` and switch the log level from `WARN` to `INFO`.

Other key log files are available to collect to aid the troubleshooting. The key log files are:

- Log file for ADI application: `Installed_ADI_folder\adi\server\liberty\servers\clm\logs\adi.log`
- Log file for JTS: `Installed_ADI_folder\adi\server\liberty\servers\clm\logs\jts.log`
- Log file for ADI data collection: `Installed_ADI_folder\adi\server\conf\adi\logs\adi-collections.log`
- Log file to check which patches have been applied: `Installed_ADI_folder\adi\server\liberty\servers\clm\logs\adi-patch.log`

## Slow performance of OMEGAMON for CICS data provider

If you collect many months of data for millions of transactions from an OMEGAMON for CICS data provider, you might see a slowdown for the **Transactions with Performance and Reliability Issues** viewlet. For DB2 database, you can apply the following scripts to generate additional indexes and constraints that improve the performance significantly.

If you create your database with ADI V5.0.3 or earlier versions, run the following scripts.

```
CREATE INDEX "DIMEZ"."IDX1712012235210" ON "DIMEZ"."FACTTRANSACTIONMETRICS" ("SERVICECLASS",
"PLEX", "SNAPSHOT") ALLOW REVERSE SCANS COLLECT STATISTICS;

CREATE INDEX "DIMEZ"."IDX1712012235540" ON "DIMEZ"."FACTTRANSACTIONMETRICS" ("SNAPSHOT",
"NUMTRANSEXCRESPETIMEGOAL", "NUMABENDS", "DB2WAIT", "FILEWAIT", "AVGCPUTIME",
"AVGRESPOSTIME", "TOTALTRANSACTIONS", "TRANSACTION", "MAXBUCKET", "SERVICECLASS", "PLEX")
ALLOW REVERSE SCANS COLLECT STATISTICS;

CREATE INDEX "DIMEZ"."IDX1712020039000" ON "DIMEZ"."FACTTRANSACTIONMETRICS" ("SERVICECLASS",
"NUMTRANSEXCRESPETIMEGOAL", "SNAPSHOT", "TRANSACTION", "MAXBUCKET", "PLEX") ALLOW REVERSE SCANS
COLLECT STATISTICS;

ALTER TABLE DIMEZ.FACTTRANSACTIONMETRICS ALTER COLUMN SERVICECLASS SET NOT NULL;
ALTER TABLE DIMEZ.FACTTRANSACTIONMETRICS ALTER COLUMN MAXBUCKET SET NOT NULL;
ALTER TABLE DIMEZ.FACTTRANSACTIONMETRICS ALTER COLUMN PLEX SET NOT NULL;
CALL SYSPROC.ADMIN_CMD('REORG TABLE DIMEZ.FACTTRANSACTIONMETRICS');
ALTER TABLE DIMEZ.FACTTRANSACTIONMETRICS ALTER COLUMN SNAPSHOT SET NOT NULL;
ALTER TABLE DIMEZ.FACTTRANSACTIONMETRICS ALTER COLUMN TRANSACTION SET NOT NULL;
CALL SYSPROC.ADMIN_CMD('REORG TABLE DIMEZ.FACTTRANSACTIONMETRICS');
```

In addition, if you create your database with ADI V5.0.2 or earlier versions, run the following scripts to perform an additional operation.

```
CREATE INDEX "DIMEZ"."IDX1705190119390" ON "DIMEZ"."FACTTRANSACTIONMETRICS" ("SERVICECLASS"
ASC, "NUMTRANSEXCRESPETIMEGOAL" ASC, "NUMABENDS" ASC, "DB2WAIT" ASC, "FILEWAIT" ASC,
"AVGCPUTIME" ASC, "AVGRESPOSTIME" ASC, "TOTALTRANSACTIONS" ASC, "SNAPSHOT" ASC, "TRANSACTION"
ASC, "MAXBUCKET" ASC, "PLEX" ASC) ALLOW REVERSE SCANS COLLECT STATISTICS
```

## Verifying the Elasticsearch server is running

Starting from V5.0.4, ADI integrates Elasticsearch in it and requires that elasticsearch server is always up and running in the background. The Elasticsearch server is started by default when you start ADI

application. You can easily verify that the Elasticsearch server is running through one of the following two methods.

- Open your browser and navigate to `http://localhost:9200/?pretty`.
- Open your terminal/command prompt and run the command **`curl http://localhost:9200/?pretty`**.

If a JSON response is returned successfully, you can confirm that Elasticsearch server is up and running.

If you don't see a JSON response that is returned, you can conclude that the Elasticsearch server is not running. You need to investigate further to resolve this issue.

**Note:** For more information about what went wrong, refer to the Elasticsearch log files.

### Elasticsearch log files

Elasticsearch log files contain important information about the Elasticsearch server that can help you troubleshoot errors pertaining to running/starting the Elasticsearch server.

You can find the Elasticsearch log files in the *Installed ADI folder/adi/elasticsearch/logs* folder.

### Elasticsearch failing to startup

When you start ADI application, you might notice an error message in the console stating that Elasticsearch failed to start. This error message might be different for different operating systems. Check the following tips for each operating system on how to resolve these errors.

#### Windows

On a Windows operating system, Elasticsearch is run as a background service. During ADI application startup, the "adi-elasticsearch" Windows service is installed and started. If you notice an error in the command prompt, such as "Failed to install 'adi-elasticsearch' service" or "Failed to start 'adi-elasticsearch' service", then it means that something went wrong while you were installing or starting the "adi-elasticsearch" service.

To resolve this error, complete the following steps.

1. Verify if the Elasticsearch is running or not. You can perform this task by following the steps provided in the previous section of **Verifying Elasticsearch server is running**.
2. If the Elasticsearch is not running, review the Elasticsearch log files to understand what went wrong while you were installing or starting up the Elasticsearch service. You can find the Elasticsearch log files in the *Installed ADI folder/adi/elasticsearch/logs* folder.
3. Fix the errors reported in the log files.
4. Stop and restart ADI application server.
5. Verify if the Elasticsearch service is installed and started successfully this time. To confirm it, verify that you see The service 'adi-elasticsearch' has been installed. and The service 'adi-elasticsearch' has been started. messages in the command prompt or complete the steps as described in the *Verifying Elasticsearch server is running* section.
6. If you are unable to understand the nature of the problem, complete the steps described in the following *Workaround* section.

#### Linux

On a Linux operating system, Elasticsearch is run in the background as a daemon process and it is started during ADI application startup. If you notice any errors related to Elasticsearch in the terminal during startup, then it might indicate that something went wrong when you start the Elasticsearch.

To resolve this error, complete the following steps.

1. Verify if the Elasticsearch is running or not. You can perform this task by following the steps provided in the previous section of *Verifying Elasticsearch server is running*.

2. If the Elasticsearch is not running, review the Elasticsearch log files to understand what went wrong while you were installing or starting up the Elasticsearch service. You can find the Elasticsearch log files in the *Installed ADI folder/adi/elasticsearch/logs* folder.
3. Fix the errors reported in the log files.
4. Stop and Restart ADI application server.
5. Verify if the Elasticsearch service is installed and started successfully this time. To confirm it, complete the steps as described in the *Verifying Elasticsearch server is running* section.
6. If you are unable to understand the nature of the problem, complete the steps described in the following *Workaround* section.

### Workaround

If you are unable to understand the nature of the problem, contact technical support to get further help. IBM Support might request ADI application or Elasticsearch log files for reference. Therefore, you need to preserve a copy of these log files from the session when you encountered these issues.

As a workaround, you can complete the following steps to start the Elasticsearch server manually in a separate terminal/command prompt.

1. Open terminal/command prompt and navigate to the *Installed ADI folder/adi/elasticsearch* by running the following command:

```
cd Installed ADI folder/adi/elasticsearch
```

2. In the current directory, start the Elasticsearch server by running the following command.

```
startes
```

After you complete these steps, you can start the Elasticsearch server successfully and continue to use ADI application.

### Huge Elasticsearch log files

If you are not able to access the Enterprise Artifact data or keywords information and start seeing various 500 internal server error messages, check the size of your Elasticsearch log file. If the size of Elasticsearch log file is a lot larger than usual, complete the following steps:

1. Update the `rootLogger.level` property to be error logger level:
  - a. Open the `log4j2.properties` file in the *Installed ADI folder/adi/elasticsearch/config* path.
  - b. Update the `rootLogger.level` property as `rootLogger.level = error`.
2. Investigate if any zombie ADI Java processes that might lock Elasticsearch data folder are running.
3. Terminate the zombie ADI Java processes if any.

**Note:** Avoid deleting anything in the `adi\elasticsearch\data` folder, unless you want to clean Elasticsearch server for a fresh restart.

### Problems with running ADI application on Linux using port 80 or port 443

Starting from ADI V5.0.4, the Elasticsearch is started by default during ADI application server startup. The `startes` script is used on Linux to start Elasticsearch as a non-root user when the rest of ADI is started as a root user.

ADI application cannot be configured (`jts/setup`) as a non-root user. On Linux, ports below 1024 can be opened only by a root user. If you have problems to run your ADI application on Linux by using port 80 or port 443, make sure that you run the ADI application server as a root user.

If you run ADI application on Linux by using port 80 or port 443 as a root user, the Elasticsearch server startup will fail because Elasticsearch cannot be run as a root user. In this case, you need to complete the

following steps to make a non-root user as the owner of the Elasticsearch directory and start it manually in a separate terminal.

1. Open terminal and run the following command to navigate to the *Installed ADI folder/adi/elasticsearch*:

```
cd Installed ADI folder/adi/elasticsearch
```

2. In the current directory, run the following command to change the ownership to a non-root user.

```
chown -R non-root user .
```

3. Run the following command to switch to the non-root user.

```
su non-root user
```

4. Run the following command to start the Elasticsearch server.

```
startes
```

**Note:** If you are using SSH, you need to keep the session alive. Otherwise, the Elasticsearch will terminate when you quit the SSH connection.

After you complete the previous steps, your ADI application server will run as a root user while your Elasticsearch server will run separately as a non-root user.

### Troubleshooting tip

For more troubleshooting information on ADI, you can check the Q&As on [dW Answers](#) page.





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## Chapter 10. Providing feedback

You can provide feedback to ADI by sending an email, opening a Service Request, or sending a Request For Enhancement (RFE).

### **Sending an email**

Complete the following steps to send an email to ADI.

1. Log in to ADI with your user ID and password.
2. Click the **Menu** icon next to the IBM ADI header to open the menu panel.
3. Click **Feedback** from the menu panel.
4. Select **Send Email** from the dropdown menu. Your default email program is opened with the default recipient and subject.

### **Opening a Service Request**

In the case that you have problems or issues and need ADI support, you can open a Service Request. You need to have an IBM ID and password to open a Service Request. You can register your IBM ID at [IBM site](#).

Complete the following steps to open a Service Request to ADI.

1. Login to ADI with your user ID and password.
2. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
3. Click **Feedback** from the menu panel.
4. Select **Open Service Request** from the dropdown menu. You will be redirected to the Service Request submission page on IBM site.

### **Sending a Request for Enhancement (RFE)**

In the case that you want to request or suggest an enhancement of ADI capabilities, you can submit a Request for Enhancement. You need to have an IBM ID and password to open a request. You can register IBM ID at [IBM site](#).

Complete the following steps to open a Request for Enhancement for ADI.

1. Login to ADI with your user ID and password.
2. Click the **Menu** icon next to the IBM ADI header to open the menu pane.
3. Click **Feedback** from the menu panel.
4. Select **Request for Enhancement** from the dropdown menu. You will be redirected to the Servers and Systems Software RFE Community on IBM site.



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# Chapter 11. Accessibility features for ADI

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

## Accessibility features

ADI includes the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

ADI uses the latest W3C Standard, [WAI-ARIA 1.0](http://www.w3.org/TR/wai-aria/) (<http://www.w3.org/TR/wai-aria/>), to ensure compliance to [US Section 508](http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards) (<http://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-section-508-standards/section-508-standards>), and [Web Content Accessibility Guidelines \(WCAG\) 2.0](http://www.w3.org/TR/WCAG20/) (<http://www.w3.org/TR/WCAG20/>). To take advantage of accessibility features, use the latest release of your screen reader in combination with the latest web browser that is supported by this product.

The ADI online product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described at <https://www.ibm.com/support/knowledgecenter/en/about/releasenotes.html#accessibility>.

## Keyboard navigation

This product uses standard navigation keys.

ADI uses Tab and Return as the keyboard shortcuts.

To enable keyboard navigation on Apple Mac OS X for your browser, click **System Preferences > Keyboard > Shortcuts**, and select the **All controls** radio box at the bottom of the dialog.

## Related accessibility information

In addition to standard IBM help desk and support websites, IBM has established a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service  
800-IBM-3383 (800-426-3383)  
(within North America)

## IBM and accessibility

For more information about the commitment that IBM has to accessibility, see [IBM Accessibility](http://www.ibm.com/able) ([www.ibm.com/able](http://www.ibm.com/able)).



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