

Course Exercises Guide

Developing Solutions with IBM Decision Server Insights V8.10

Course code WB403 / ZB403 ERC 1.0



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Exercises description

This course includes the following exercises:

- [Exercise 1, "Getting started with Decision Server Insights"](#)
- [Exercise 2, "Creating a solution in Insight Designer"](#)
- [Exercise 3, "Defining the business model"](#)
- [Exercise 4, "Creating a rule agent"](#)
- [Exercise 5, "Writing and testing rules"](#)
- [Exercise 6, "Using event and shared aggregates in rules"](#)
- [Exercise 7, "Testing for the absence of events"](#)
- [Exercise 8, "Testing solutions"](#)
- [Exercise 9, "Defining connectivity"](#)
- [Exercise 10, "Installing Decision Server Insights"](#)
- [Exercise 11, "Configuring Decision Server Insights"](#)
- [Exercise 12, "Deploying solutions"](#)
- [Exercise 13, "Administering Decision Server Insights"](#)

Exercise objectives

After completing the exercises, you should be able to:

- Install Decision Server Insights
- Create a Decision Server Insights solution
- Create rule agents and Java agents
- Implement the business logic in rules that use time-based and location-based reasoning
- Work with shared aggregates
- Write rules that test for the absence of an event
- Deploy solutions to the Insight Server runtime and manage deployed artifacts
- Use the REST API to manage solution artifacts
- Use Insight Inspector and other test clients to validate implementation behavior
- Model and define connectivity for a solution
- Configure and administer a grid environment

Working on the exercises

Each exercise depends on successful completion of the previous exercises.

The exercises can be categorized into these groups:

- ***Starting from scratch***

- [Exercise 1, "Getting started with Decision Server Insights"](#)
- [Exercise 2, "Creating a solution in Insight Designer"](#)
- [Exercise 3, "Defining the business model"](#)
- [Exercise 4, "Creating a rule agent"](#)

- ***Writing and testing***

- [Exercise 5, "Writing and testing rules"](#)
- [Exercise 6, "Using global aggregates in rules"](#)
- [Exercise 6, "Using event and shared aggregates in rules"](#)
- [Exercise 8, "Using time-based and location-based reasoning in rules"](#)
- [Exercise 7, "Testing for the absence of events"](#)
- [Exercise 8, "Testing solutions"](#)
- [Exercise 11, "Using the Map Viewer"](#)
- [Exercise 9, "Defining connectivity"](#)

- ***Administration***

- [Exercise 10, "Installing Decision Server Insights"](#)
- [Exercise 11, "Configuring Decision Server Insights"](#)
- [Exercise 12, "Deploying solutions"](#)
- [Exercise 13, "Administering Decision Server Insights"](#)

For the first set of exercises, you start from scratch to become familiar with the product installation, set up your workspace, and create a solution. For the next exercises, some additional projects are provided for you to help you test the behavior of the business logic that you implement. The administration section demonstrates how to deploy and manage your solutions in a grid environment.

The exercises build on each other and you are encouraged to complete each exercise in order before continuing. However, solution projects are also provided if you are unable to finish an exercise.

General exercise information

This section provides general information about the exercises in this course. Review this section before starting the exercises.



Important

The exercises in this course use a set of lab files that might include scripts, applications, files, solution files, PI files, and others. The course lab files can be found in the following directory:

- C:\labfiles for the Windows platform
- /usr/labfiles for the Linux platform

The exercises point you to the lab files as you need them.

User IDs and passwords

Here is a list of user ID and password information for this course.

Entry point	User ID	Password
VMware image	administrator	passw0rd
Windows 2012 R2	administrator	passw0rd
Decision Server Insights servers	admin	ins1ghts

How to follow the exercise instructions

Structure of exercise steps

Each exercise is divided into sections with a series of numbered steps and lettered substeps:

- The numbered steps (1, 2, 3) represent actions to be done.
- The lettered substeps (a, b, c) provide detailed guidance on how to complete the action.



Information

If you already understand how to do the action in the numbered step, you can skip the specific guidance in the lettered substeps.

Here is an example from this exercise.

 **1+1=2 Example***Excerpt from Exercise 1*

-
- 1. Start IBM Installation Manager.
 - a. Go to **Start > All Programs > IBM Installation Manager**.
 - b. Click **IBM Installation Manager**.

In this example, the numbered instructions say to start IBM Installation Manager. The “a” and “b” substeps provide specific guidance on the menu steps to find and start the tool.

Text highlighting in exercises

Different text styles indicate various elements in the exercises.

Words that are highlighted in **bold** represent GUI items that you interact with, such as:

- Menu items
- Field names
- Icons
- Button names

Words that are highlighted with a `fixed font` include the following items:

- Text that you type or enter as a value
- System messages
- Directory paths
- Code

Tracking your progress

As shown in the example step, you can see that an underscore precedes each numbered step and lettered substep.

You are encouraged to use these markers to track your progress by checking off each step as you complete it. Tracking your progress in this manner might be useful if you are interrupted while working on an exercise.

Required exercise sections

Most exercises include required sections that should always be completed. It might be necessary to complete these sections before you can start subsequent exercises.

Dependencies between exercises are listed in the exercise introduction.

Optional exercise sections

Some exercises might also include optional sections that you can complete if you have sufficient time and want an extra challenge.

File references

Exercise steps contain references to files or projects to open or import. Two directories are used in these references:

- <*InstallDir*>: This directory refers to the IBM Decision Server Insights V8.10 installation directory. During the class, you install Decision Server Insights.
- <*LabfilesDir*>: This directory refers to the directory that contains the files that are required during demonstrations, exercises, and the workshop steps, such as samples of code that you can copy and paste. By default, this directory is: C:\labfiles



Note

If you are not using the VMware images that are provided with this course, ask the installer of your environment, or your instructor, where to find the <*LabfilesDir*> directory.

Projects for exercises

Most of the exercises for this course are done in Insight Designer, which uses the Decision Insight perspective of Eclipse.

The exercise projects are provided for you to import into Insight Designer, which you install during the exercises.

When you open Insight Designer, you are prompted for a workspace. You can type the path directly in the Workspace Launcher, for example:

C:\labfiles\workspaces\myWorkspace

When you type a path, an empty workspace is created and opens in the Decision Insight perspective.

Using the product documentation

The product documentation is not installed locally on the VMware image that is provided with this course.

If you have Internet access, you can also view the online IBM Knowledge Center for Operational Decision Manager available at this URL:

www.ibm.com/support/knowledgecenter/SSQP76_8.10.0/welcome/kc_welcome_odmV.html

Classes that are delivered through the IBM Remote Lab Platform (IRLP)

To log on to the lab virtual machine image, use ID `administrator` and password `websphere`, and then follow the instructions.

Refer to the `readme.txt` file on the lab image desktop for possible additional information.



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Online course material updates might exist for this course. To check for updates, visit the IBM Cloud Education wiki at:

<http://ibm.biz/CloudEduCourses>

Exercise 1. Getting started with Decision Server Insights

Estimated time

01:30

Overview

This exercise explores the installation and configuration of Decision Server Insights.

Objectives

After completing this exercise, you should be able to:

- Install Decision Server Insights with IBM Installation Manager
- Prepare a workspace in Insight Designer
- Set the debug port for your installation

Introduction

This exercise includes these sections:

- [Section 1, "Checking for course corrections"](#)
- [Section 2, "Installing Decision Server Insights"](#)
- [Section 3, "Exploring your Decision Server Insights installation"](#)
- [Section 4, "Setting up the Decision Insight perspective"](#)
- [Section 5, "Starting the server from Insight Designer"](#)
- [Section 6, "Setting the debug port"](#)

Requirements

This exercise requires that you have the Decision Server Insights V8.10 installation package that is downloaded on your computer.



Important

The exercises in this course use a set of lab files that include start projects, solution files, and code snippets. The course lab files are in the following directory:

C:\labfiles (also referred to as <*LabfilesDir*>)

The exercises point you to the lab files as you need them. For this first exercise, you do not use the `<LabfilesDir>` files.

Section 1. Checking for course corrections



Stop

Course updates and corrections



A Course Corrections document might be available for this course.

If you are taking the class with an instructor, the instructor can provide this document to you.

If you are taking the course in a self-paced environment, the course corrections document is provided with the other manuals.

To check whether a Course Corrections document exists for this course:

1. Go to the following URL: <http://www.ibm.biz/CloudEduCourses>
2. Find your course in the list and click the link.
3. Click the **Attachments** tab to see whether an errata document exists with updated instructions.
4. To save the file to your computer, click the document link and follow the prompts.

Section 2. Installing Decision Server Insights

You install Decision Server Insights by using IBM Installation Manager.

2.1. Verify your lab environment

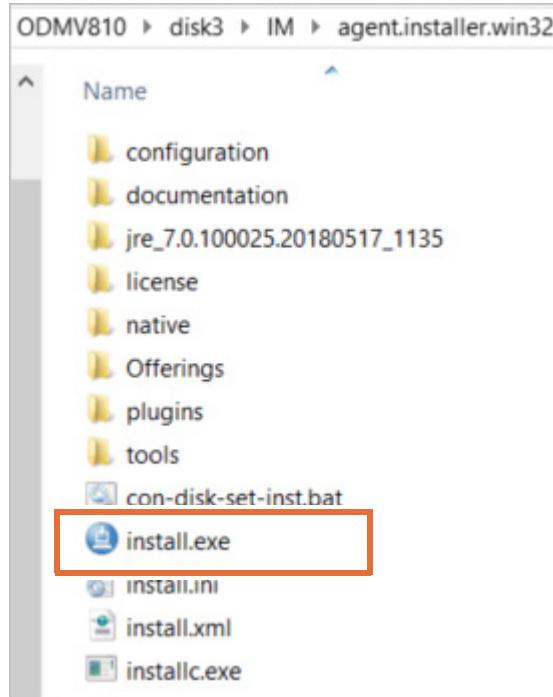
Your lab environment includes four hosts. For this exercise, you install Decision Server Insights on the main host. The default name for the main host is dsiHost1. However, your host might have a unique name.

- 1. Make a note the host names and IP addresses for the hosts that were assigned to you for your lab environment. See [Appendix A, "Host names and IP addresses"](#).

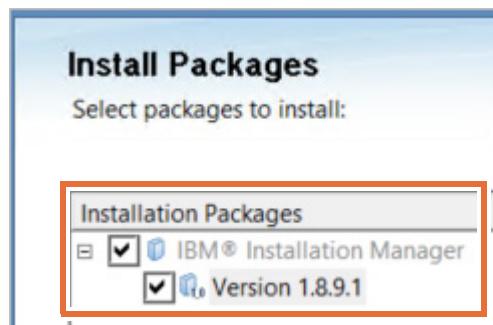
2.2. Installing IBM Installation Manager

IBM Installation Manager is an installation program that uses remote or local software repositories to install, modify, or update certain IBM products.

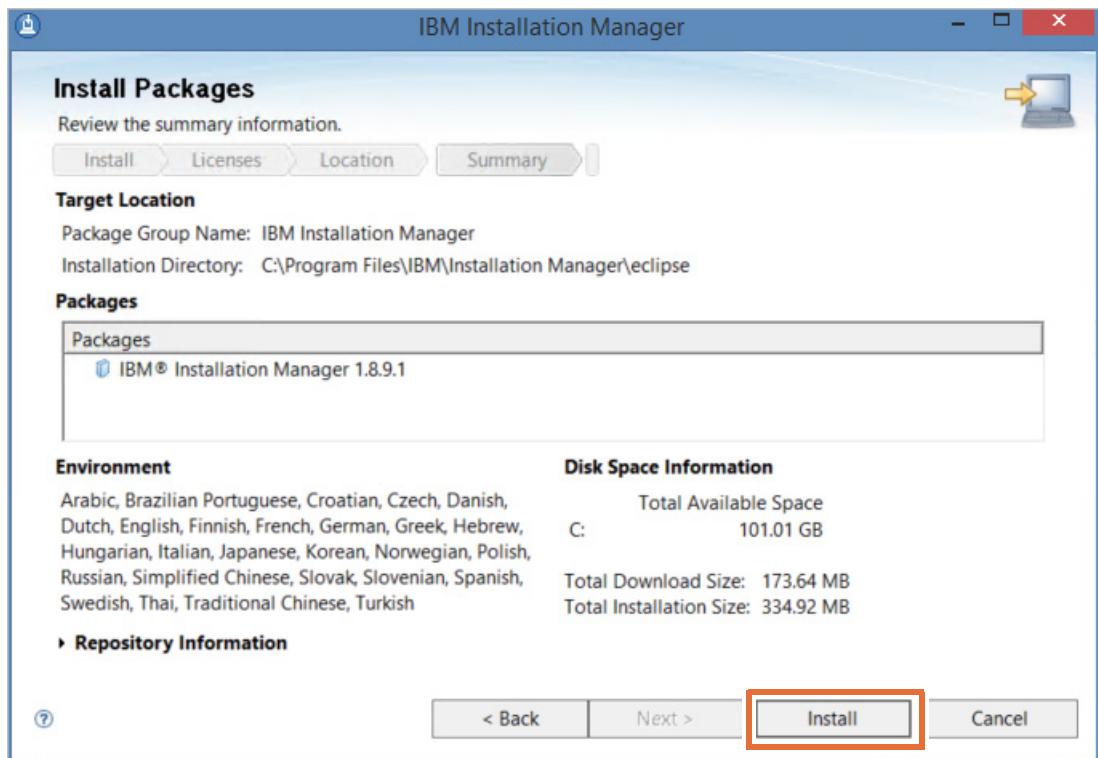
- 1. Go to the C:\ODMV810\disk3 directory and open the IM folder.
- 2. In the C:\ODMV810\disk3\IM folder, extract the agent.installer.win32.win32.x86_64_1.8.9001.20180709_1302.zip file.
- 3. In the extracted folder, right-click the `install.exe` file and select **Run as Administrator**.



- ___ c. In the Install Packages window, make sure that the **IBM Installation Manager** is selected and click **Next**.



- ___ d. Select **I accept the terms in the license agreement** and click **Next**.
 ___ e. Keep the default installation path and click **Next**.
 ___ f. Click **Install**.



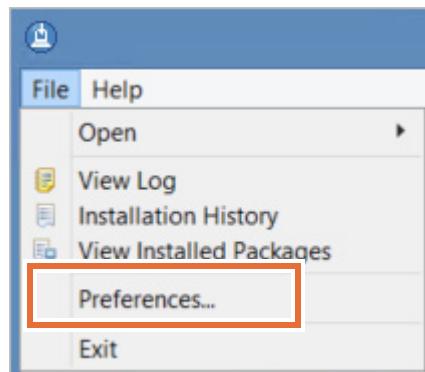
- ___ 4. When the installation of Installation Manager is complete, click **Restart Installation Manager**.

You can now use Installation Manager to install IBM software.

2.3. Installing Decision Server Insights

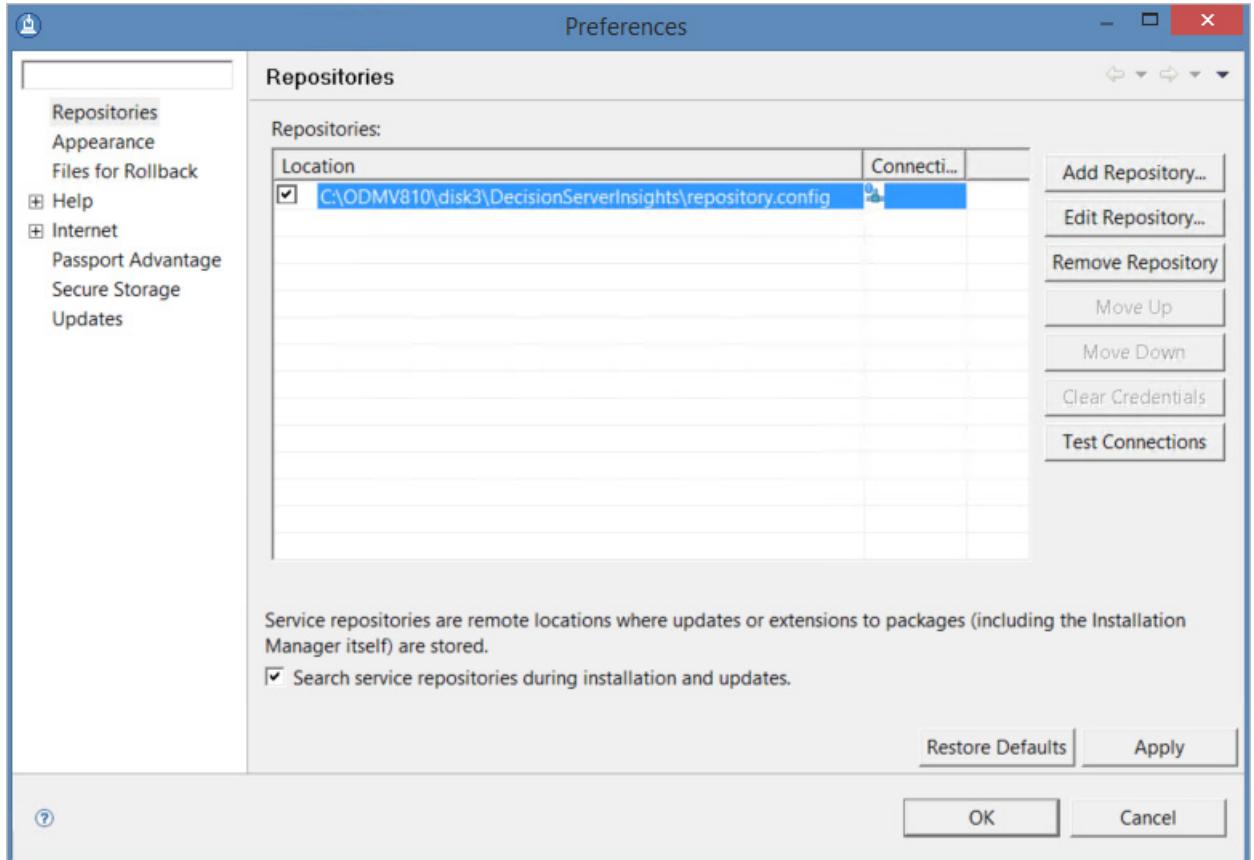
To install Decision Server Insights, you must first add the Decision Server Insights installation folder as a repository in IBM Installation Manager.

- 1. Add the Operational Decision Manager Insights installer file as an IBM Installation Manager repository.
 - a. In the IBM Installation Manager main window, click **File > Preferences**.



- b. On the Repositories page, click **Add Repository**.
- c. In the Add Repository window, click **Browse**.
- d. Go to the `C:\ODMV810\disk3\DecisionServerInsights` directory, select `repository.config`, and click **Open**.
- e. In the Add Repository window, click **OK**.

On the Repositories page, the Decision Server Insights installation repository is listed.

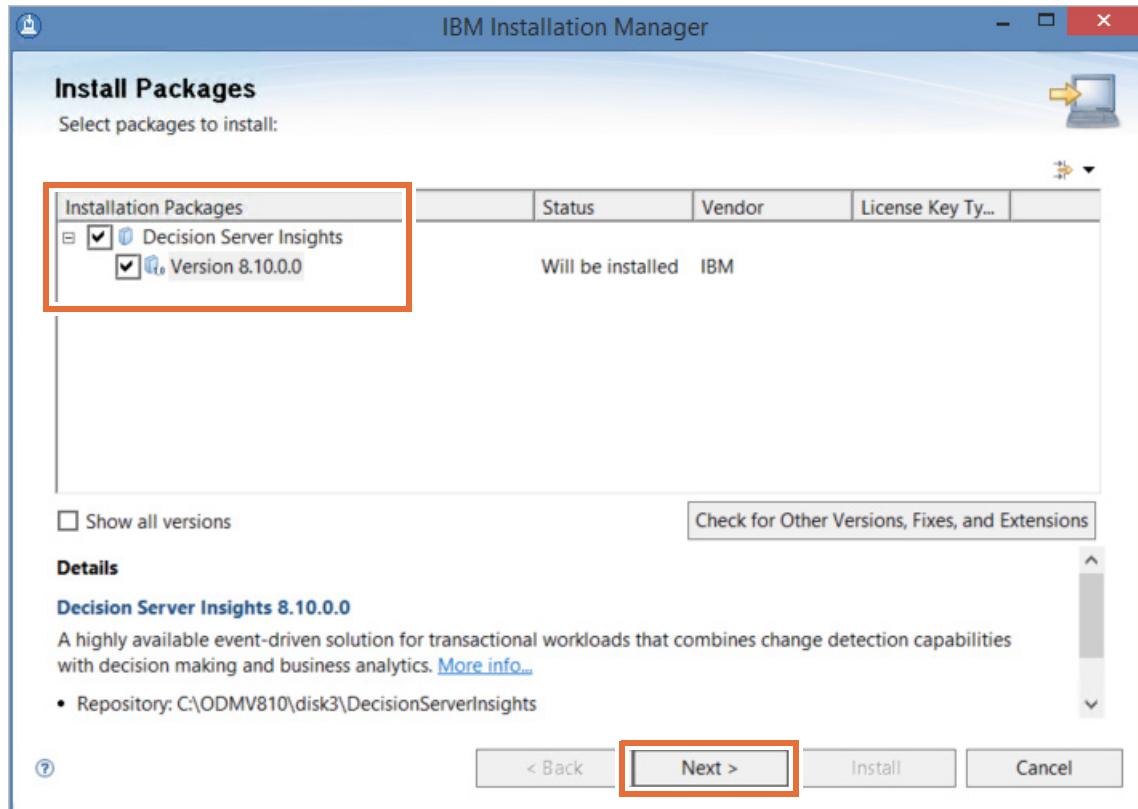


- __ f. Click **OK** to close the Preferences window.

2. In the IBM Installation Manager window, click **Install**.

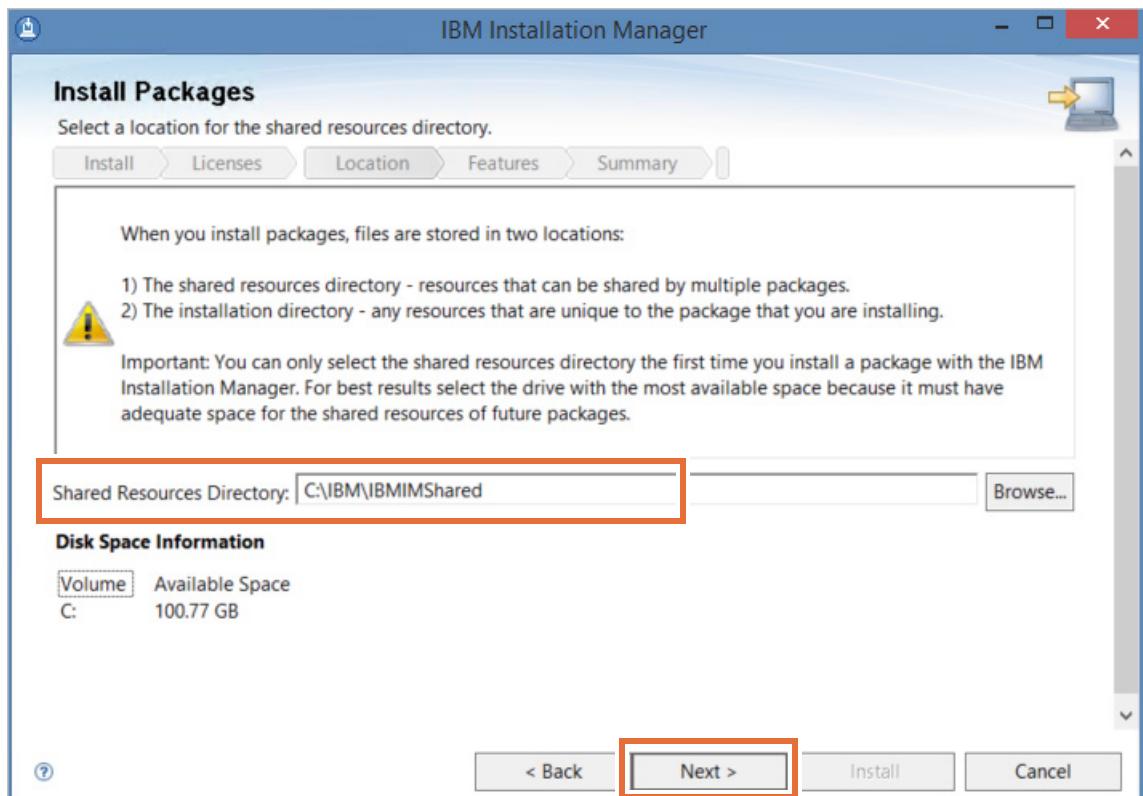


- 3. In the Installation Packages list, select **Decision Server Insights Version 8.1.0.0**, and click **Next**.



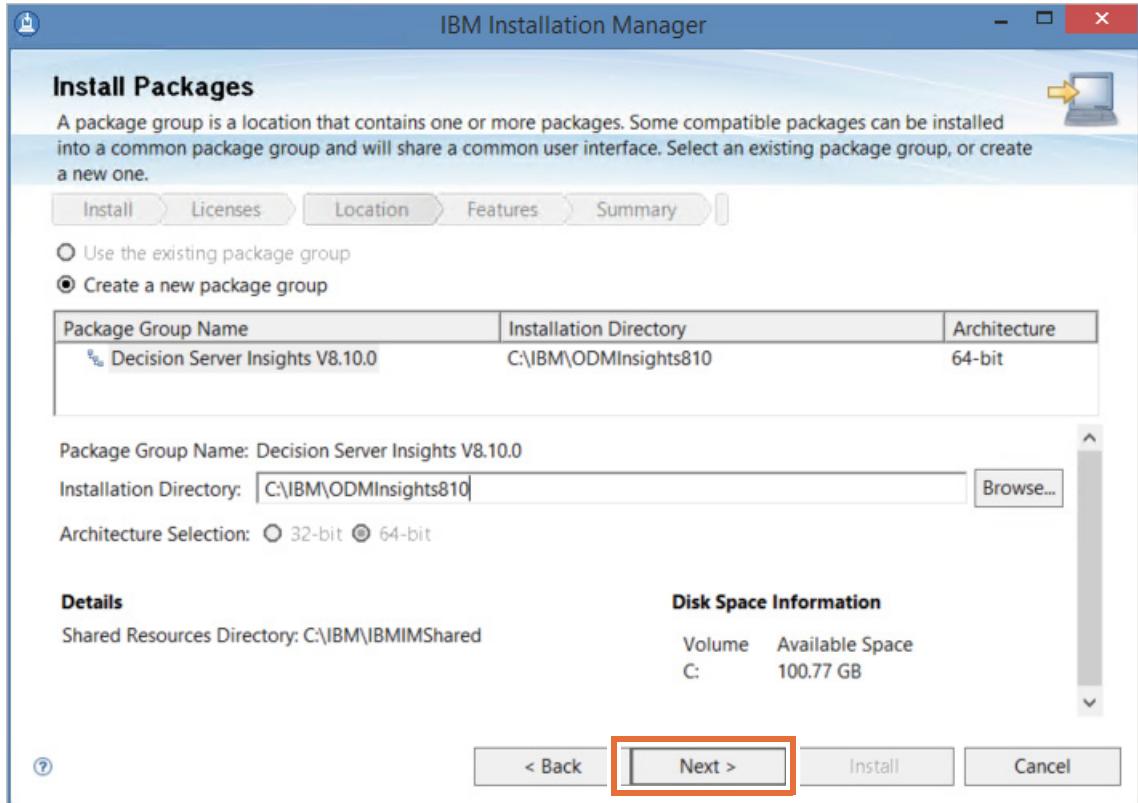
- 4. In the Install Packages Licenses window, select **I accept the terms in the license agreement**, and click **Next**.

- 5. In the Install Packages Location window, choose the shared resources directory and the installation directory. Set the installation path.
 - a. Change the **Shared Resources Directory** path to C:\IBM\IBMIMShared and click **Next**.



- b. Make sure that **Create a new package group** is selected, and change the **Installation Directory** field to the following path, and click **Next**.

C:\IBM\ODMInsights810



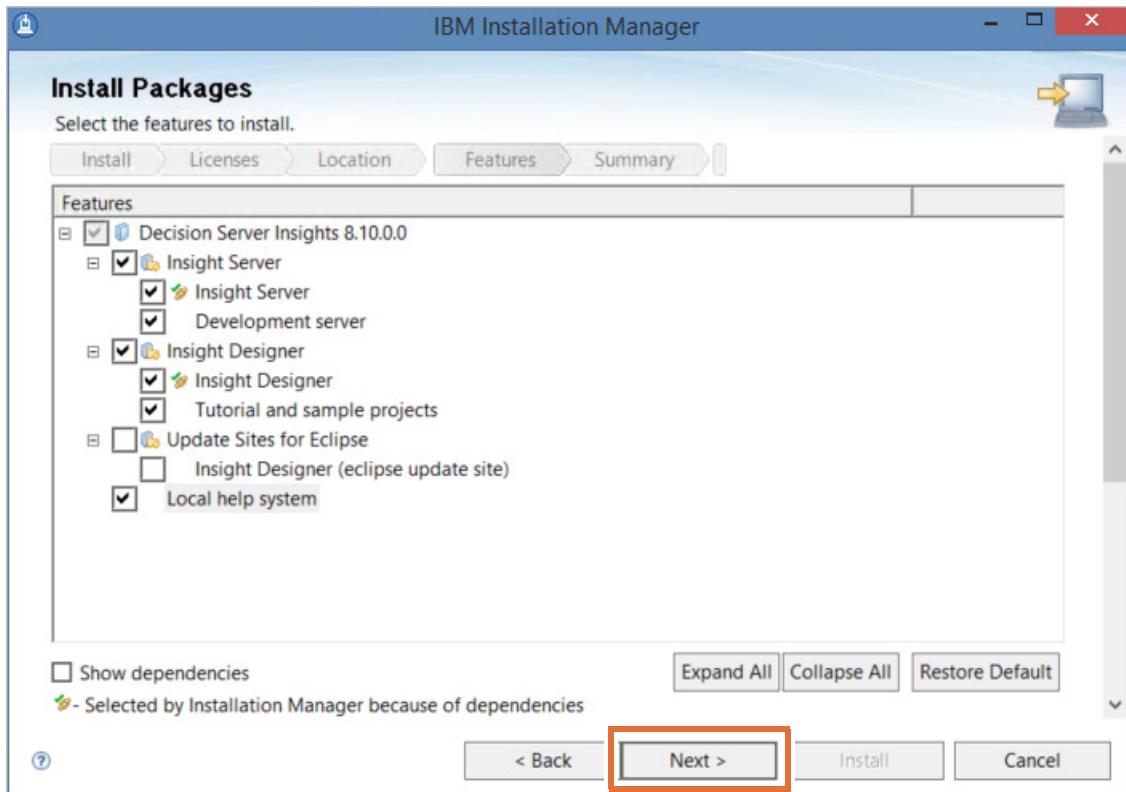
Important

To avoid potential conflicts with user permissions in Operational Decision Manager and Decision Server Insights, you must install Decision Server Insights in a separate directory from Operational Decision Manager.

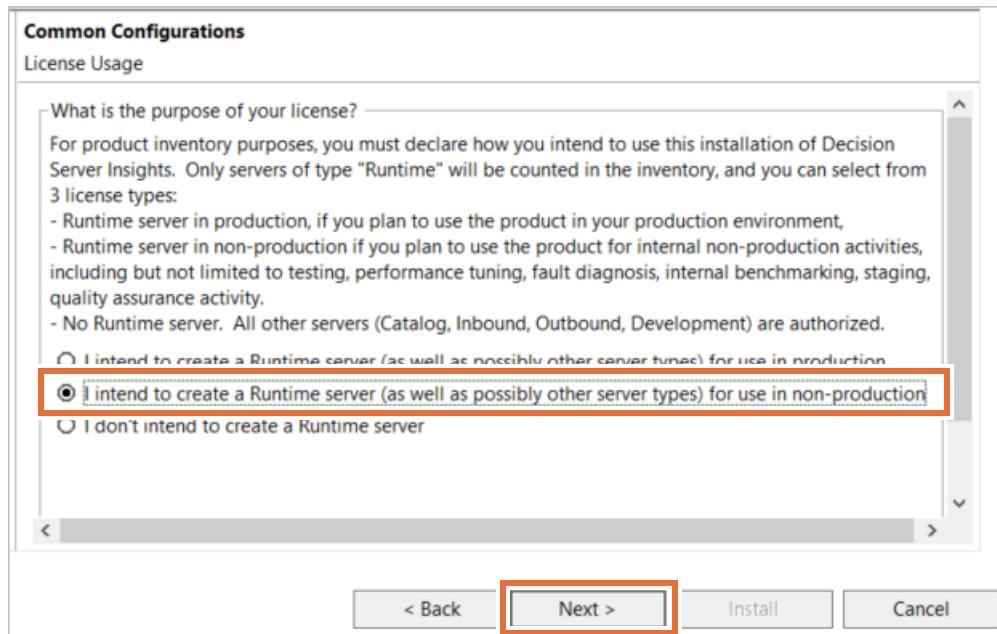
By default, Operational Decision Manager is installed in the C:\Program Files\IBM\ODMInsights810 directory. Make sure that you install Decision Server Insights outside of Program Files and Program Files (x86) to avoid user privilege conflicts.

- 6. In the Install Packages “Select the translations to install” window, keep **English** as the selected language, and click **Next**.
- 7. In the Install Packages “Select the features to install” window:
- a. Keep the default feature selections, which include Insight Server and Insight Designer features.
 - b. Select **Local help system**.

- c. Click **Next**.

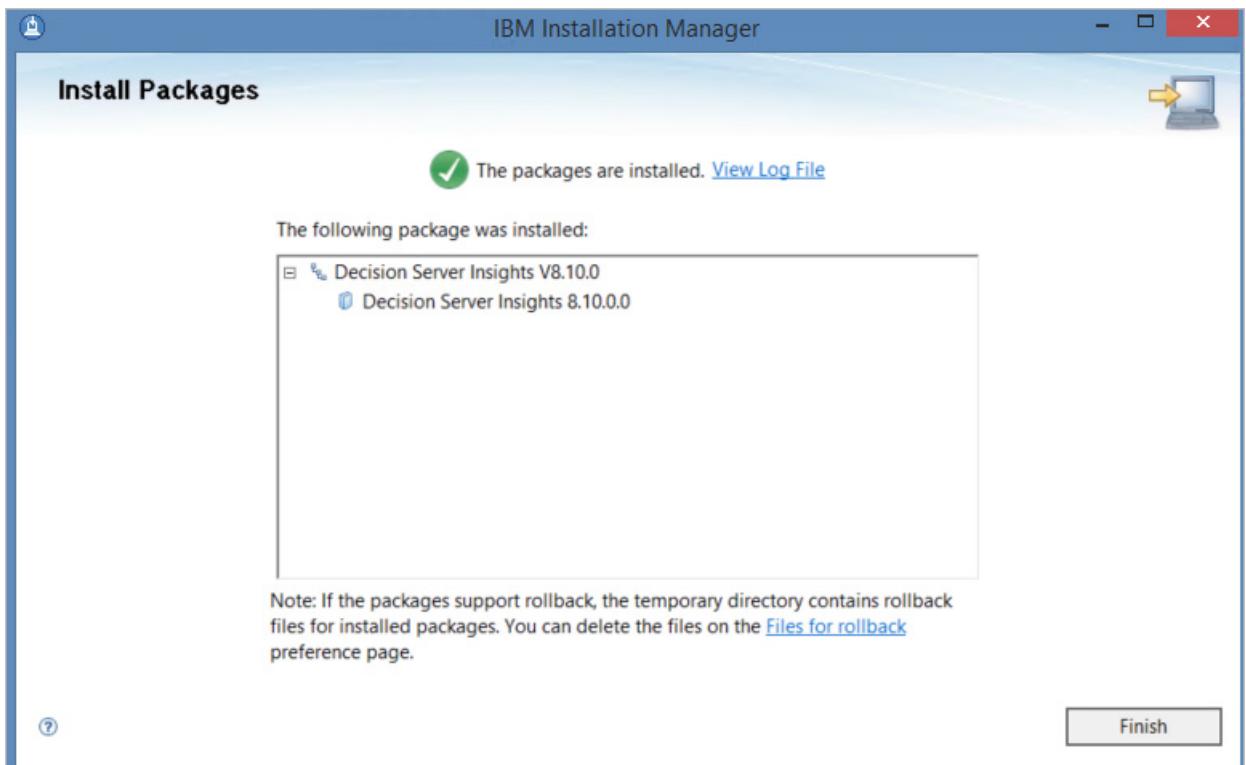


- 8. In the Install Packages “Fill in the configurations for the packages” window, select **I intend to create a Runtime server (as well as possibly other server types) for use in non-production**, and click **Next**.



- 9. In the Install Packages “Review the summary information” window, click **Install**.
The Decision Server Insights installation can take several minutes to complete.

When the installation is finished, you see a confirmation message that Decision Server Insights is installed.



- ___ 10. Click **Finish** to exit the Installation Summary window.
- ___ 11. Close IBM Installation Manager.

Section 3. Exploring your Decision Server Insights installation

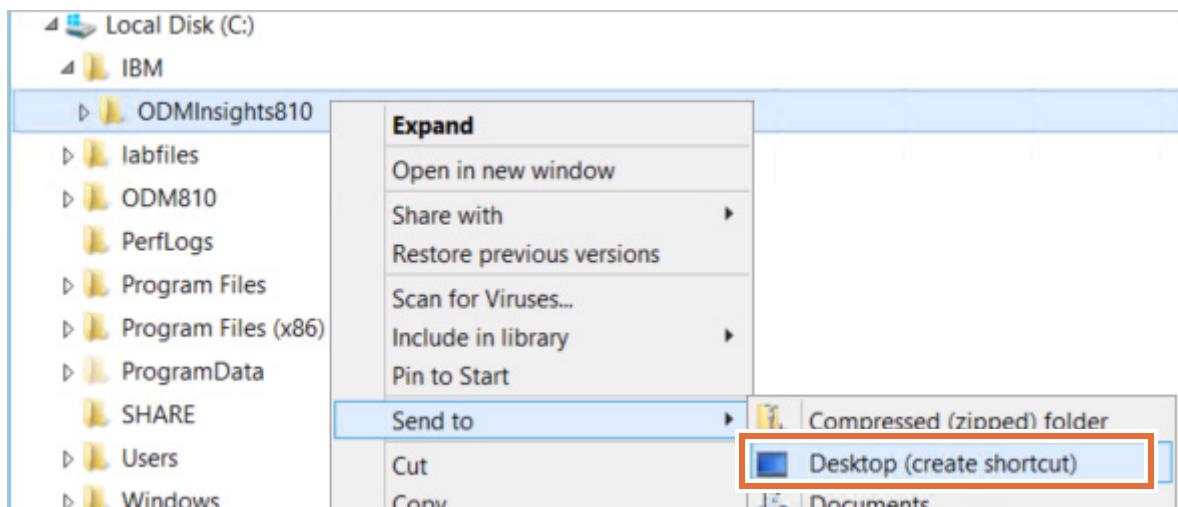
- __ 1. In Windows Explorer, open the <*InstallDir*> (C:\IBM\ODMInsights810) directory.



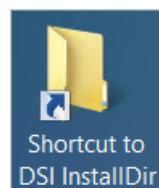
Note

For this course, Decision Server Insights is installed in the C:\IBM\ODMInsights810 directory.

- __ 2. Create a desktop shortcut to the installation directory.
 - __ a. Right-click **ODMInsights810** and click **Send to > Desktop (create shortcut)**.

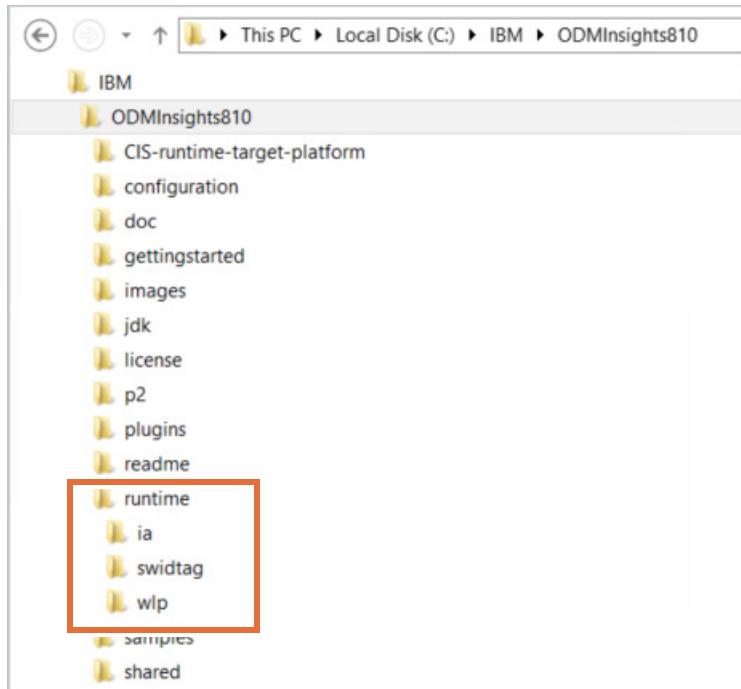


- __ b. You can rename the shortcut: Shortcut to DSI InstallDir



During the labs, you can use this shortcut for quick access to the installation directory.

- ___ 3. Expand the ODMInsights810 folder to view the installed files and folders, and notice the **runtime** folder.

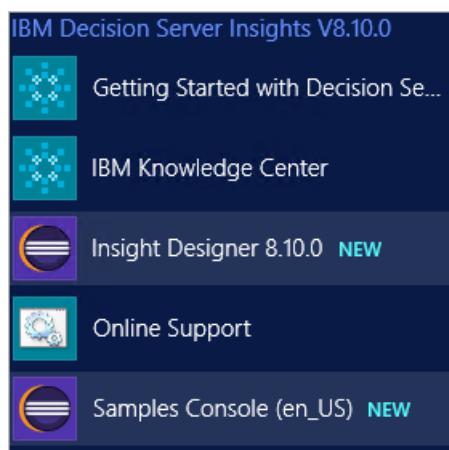


During the course, you refer often to the folders in this directory to access and manage solution files and WebSphere Liberty Profile.

- ___ 4. Close Windows Explorer.
___ 5. From the Windows Start menu, click the arrow to open the **Apps** list.

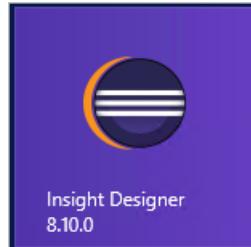


- ___ 6. In the **IBM Decision Server Insights V8.10.0** group, notice the list of menu options.



- ___ 7. Right-click **Insight Designer 8.10.0** and click **Pin to taskbar**,

- 8. Right-click **Insight Designer 8.10.0** and click **Pin to Start**. You see the Insight Designer icon on the Start menu.



- 9. Return to the Desktop.

You see the Insight Designer icon on the taskbar.



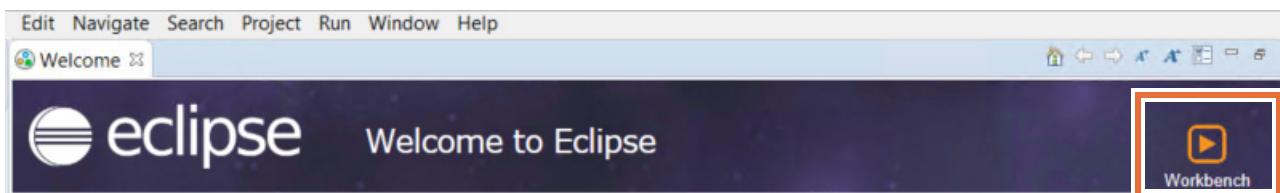
Throughout the labs, you work with **Insight Designer 8.10**. You can use these shortcuts for quick access to the tool.

Section 4. Setting up the Decision Insight perspective

In this section, you see how to start the sample server from the Samples Console perspective in Insight Designer.

4.1. Opening Insight Designer

- 1. Open Insight Designer by either clicking the **Insight Designer 8.10** icon on the **Start** menu or taskbar.
- 2. Create an empty workspace in the Workspace Launcher.
 - a. In the **Workspace** field, type the following name to create an empty workspace:
`<LabfilesDir>\workspaces\start`
 Where `<LabfilesDir>` refers to C:\labfiles.
 - b. Click **Launch**.
 - c. When the workspace opens, in the **Welcome** tab, click **Workbench**.

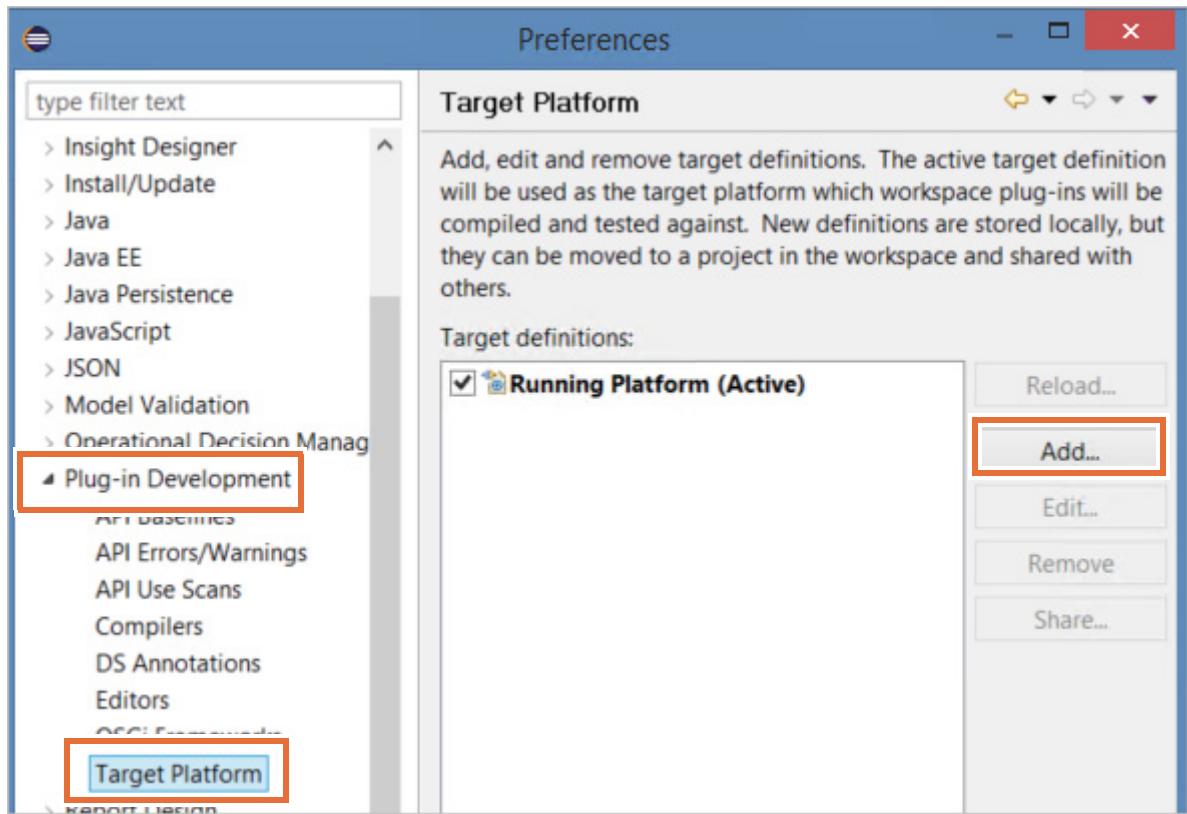


By default, Insight Designer opens in the Decision Insight perspective.

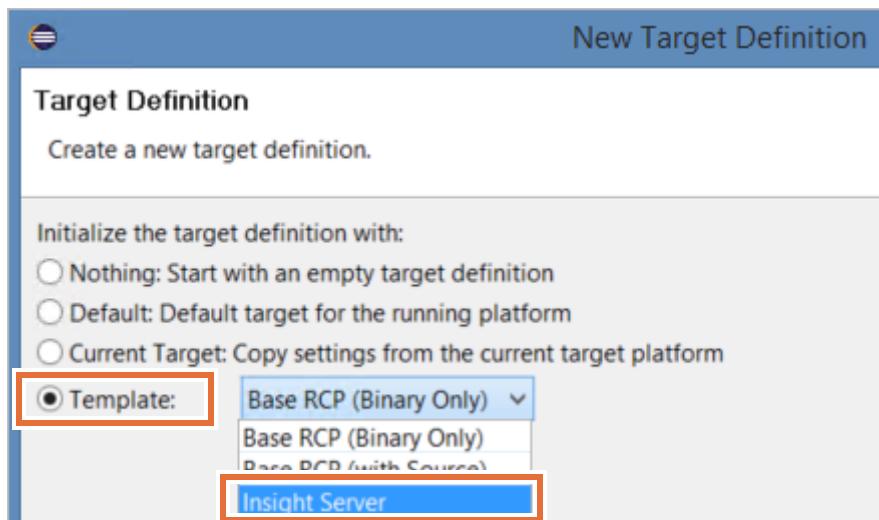
4.2. Setting the target platform

- 1. From the **Window** menu, click **Preferences**.

- 2. Expand **Plug-in Development**, click **Target Platform**, and when the Target Platform page opens, click **Add**.



- 3. On the Target Definition page, select **Template**, and select **Insight Server** from the list.

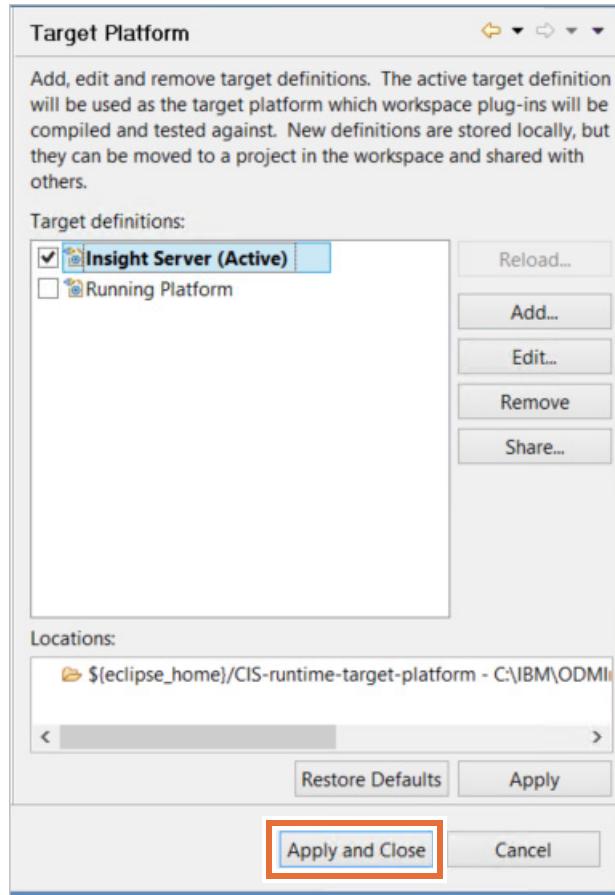


- 4. Click **Next**.

- 5. Click **Finish**.

On the Target Platform page, Insight Server is now in the list of Target definitions.

6. Select **Insight Server** so that it becomes active, and click **Apply and Close**.

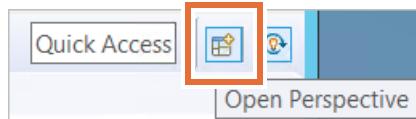


Note

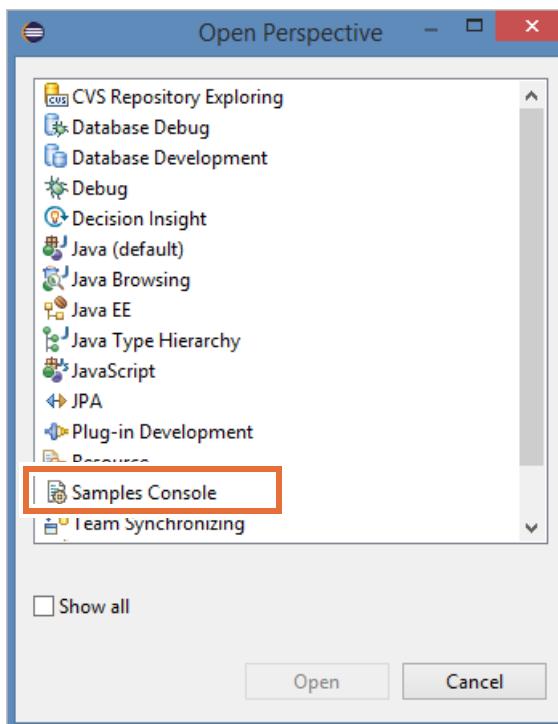
As you learn during the labs, you can set the Target Platform automatically for imported projects.

Section 5. Starting the server from Insight Designer

- 1. Switch to the Samples Console perspective.
- a. Click the **Open Perspective** icon in the upper-right corner of the Eclipse window.



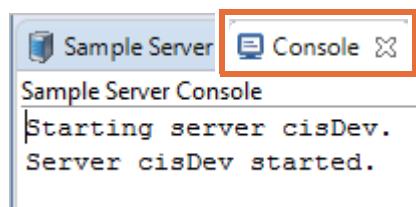
- b. In the Open Perspective window, select **Samples Console** and click **Open**.



- 2. In the **Sample Server** view in the lower part of the workspace, click the **Start the sample server** icon to start the server.



The default server is called cisDev. The Console opens with the message that the server is started.



Section 6. Setting the debug port

The debug port is part of your installation configuration. After you set the debug port for your installation, the port value can be found in the `server.xml` file.

- ___ 1. Use the `propertyManager` utility to set the debug port to 6543.



Note

The server must be started before you can run the `propertyManager`.

The `propertyManager` utility is a Decision Server Insights general administration script that runs from the `InstallDir/runtime/ia/bin` directory.

- ___ a. Open a command prompt, go to the `C:\IBM\ODMInsights810\runtime\ia\bin` directory, and press Enter:

```
cd C:\IBM\ODMInsights810\runtime\ia\bin
```



Hint

You can copy and paste the commands for this exercise from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder.

- ___ b. Type the following command, and press Enter.

```
propertyManager set --username=tester --password=tester debugPort=6543
```

- ___ 2. Wait for the “Set property successful” message and close the command prompt.

```
Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\IBM\ODMInsights810\runtime\ia\bin
C:\IBM\ODMInsights810\runtime\ia\bin>propertyManager set --username=tester --pas
sword=tester debugPort=6543
Set property successful. Property name: debugPort, old value: null, new value:
6543

C:\IBM\ODMInsights810\runtime\ia\bin>
```

- ___ 3. Verify the port setting in the `server.xml` file.

- ___ a. On the Desktop, double-click **Shortcut to DSI InstallDir** and open the `<InstallDir>\runtime\wlp\usr\servers\cisDev` directory.



Reminder

The default installation path is: `C:\IBM\ODMInsights810`

The Liberty profile is managed through the `C:\IBM\ODMInsights810\runtime\wlp` directory.

- ___ b. Right-click the `server.xml` file and click **Edit with Notepad++** to view the file.
 - ___ c. Scroll to the last entry in the file to see the newly added `ia_runtime debugPort` property value:
`<ia_runtime debugPort="6543"/>`
 - ___ d. Close the `server.xml` file and Windows Explorer.
- ___ 4. Close the command prompt.
- ___ 5. Keep Insight Designer open for the next exercise.
-

**Note**

By default, the debug port is set to null and is not listed in the `server.xml` file. The `ia_runtime debugPort` property is listed in this file only after you set the value.

End of exercise

Exercise review and wrap-up

This exercise looked at the installation of Decision Server Insights.

Exercise 2. Creating a solution in Insight Designer

Estimated time

00:15

Overview

This exercise demonstrates how to create the solution project in Insight Designer.

Objectives

After completing this exercise, you should be able to:

- Create a solution project

Introduction

This exercise includes these sections:

- [Section 1, "Creating a solution project"](#)

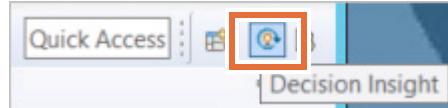
Requirements

This exercise requires that you use the workspace that you created in [Exercise 1, "Getting started with Decision Server Insights".](#)

Section 1. Creating a solution project

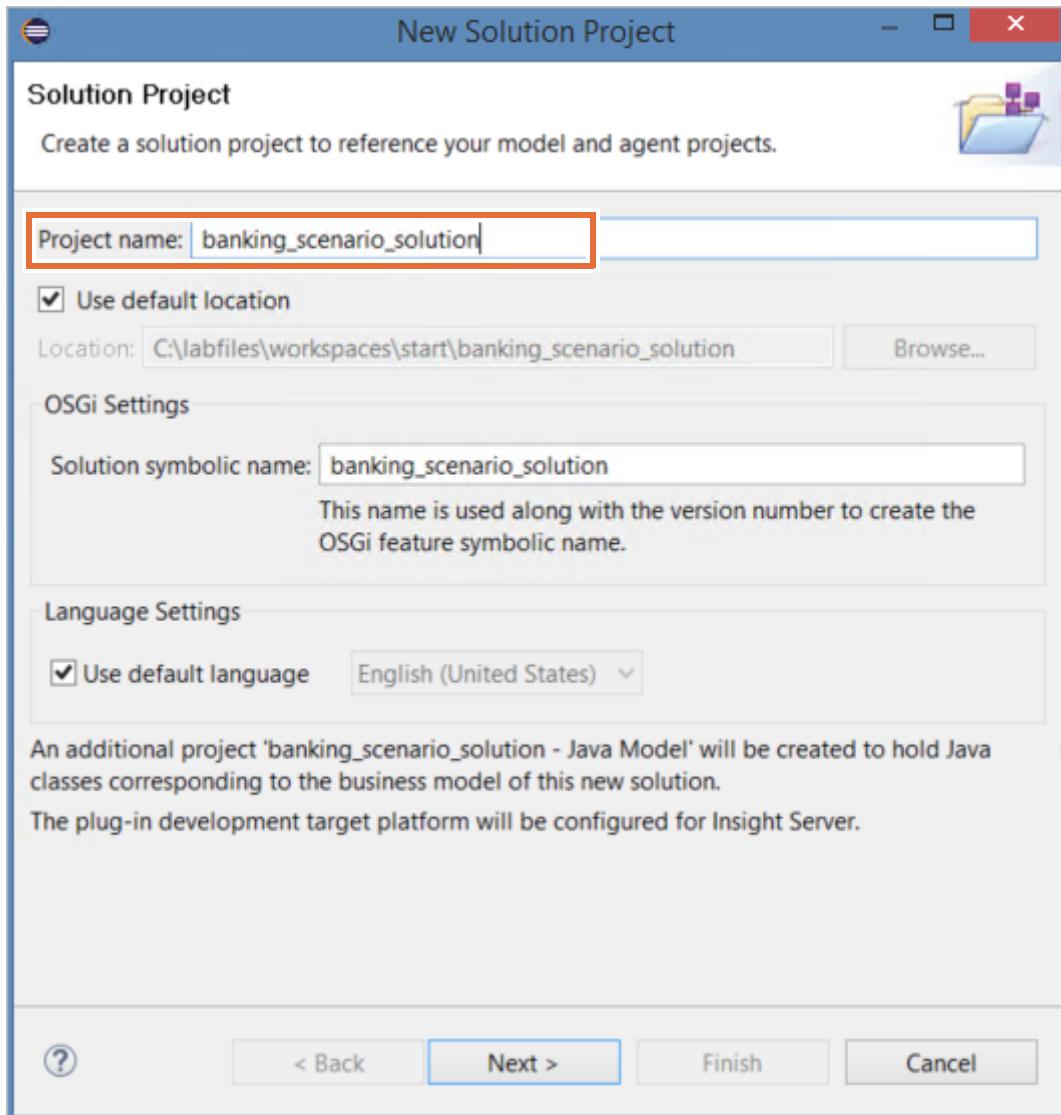
All solution artifacts are managed through a solution project. In this section, you create a solution project and its referenced projects.

- ___ 1. If Insight Designer is closed, open it by clicking the Insight Designer shortcut on your taskbar.
- ___ 2. When prompted for a workspace, browse to:
`<LabfilesDir>\workspaces\start`
Where `<LabfilesDir>` refers to C:\labfiles.
- ___ 3. In Insight Designer, switch to the Decision Insight perspective by clicking the Decision Insight icon on the perspective toolbar.



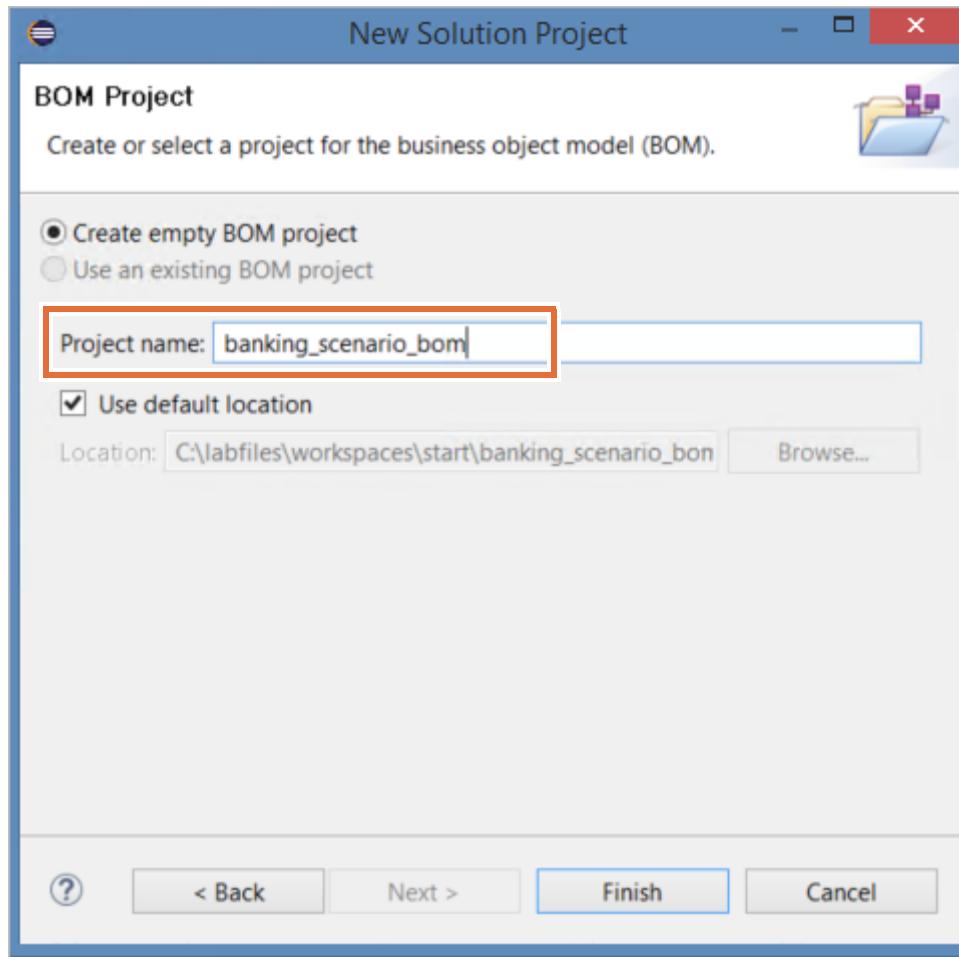
- ___ 4. Create a solution project.
 - ___ a. Click **File > New > Solution Project**.

- __ b. In the **Project name** field, type: banking_scenario_solution



- __ c. Click **Next**.

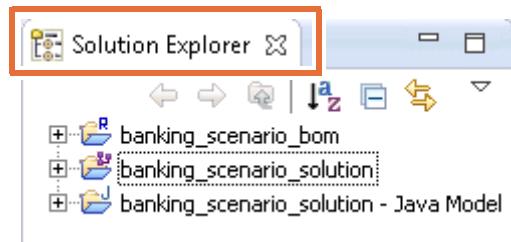
- __ d. On the BOM Project page, type a project name for the BOM: banking_scenario_bom



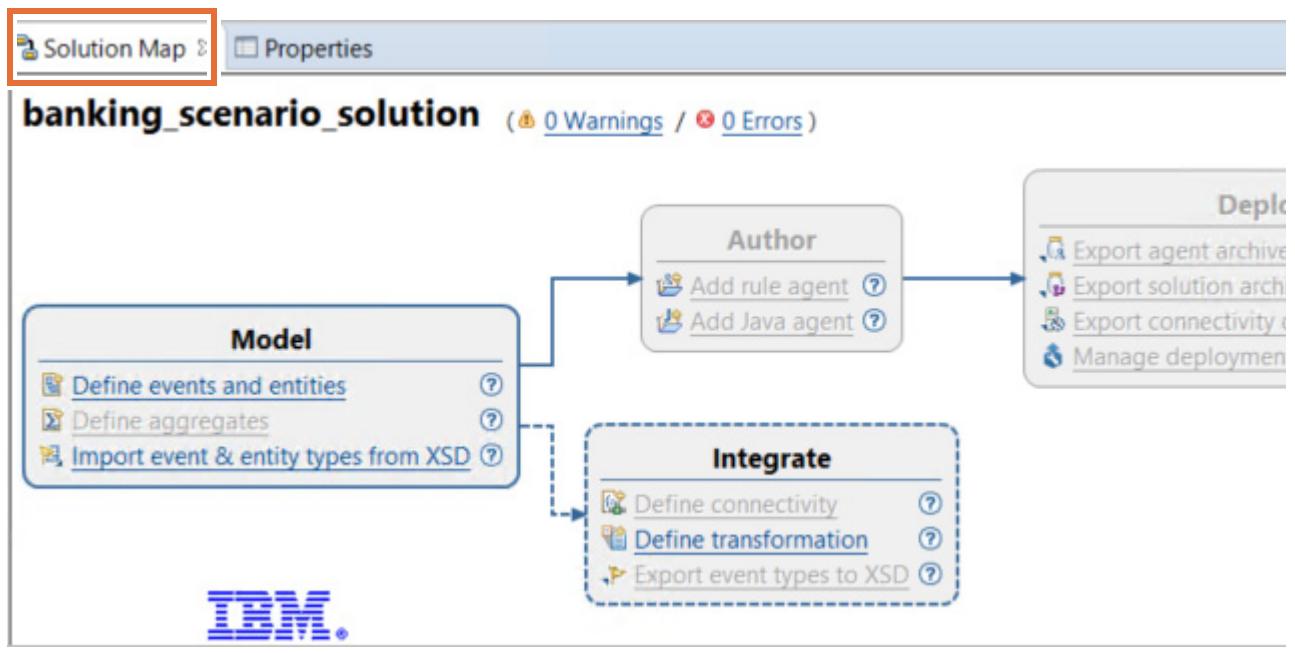
- __ e. Click **Finish**.

You now have three projects in Solution Explorer.

- banking_scenario_bom
- banking_scenario_solution
- banking_scenario_solution - Java Model



- ___ 5. In Solution Explorer, click **banking_scenario_solution** and notice that the **Solution Map** view opens.



Hint

You can use the maximize icon in the upper-right corner of the Solution Map view to open it to full view, and then restore it to the lower pane.

The Solution Map guides you through the steps of solution development. Notice that most of the links are not yet enabled because some tasks in the first goal, **Model**, must be complete before you can start on other goals.

- ___ 6. Keep Insight Designer open for the next exercise.

End of exercise

Exercise review and wrap-up

This exercise showed you how you create a solution project and the associated business object model (BOM) project. The generated Java project is empty. During the next exercise, you see how you model the entities and events by populating the BOM project.

Exercise 3. Defining the business model

Estimated time

00:30

Overview

This exercise covers how to create a business model.

Objectives

After completing this exercise, you should be able to:

- Create a business model definition file

Introduction

This exercise includes these sections:

- [Section 1, "Modeling the domain"](#)
- [Section 2, "Creating the business model definition"](#)

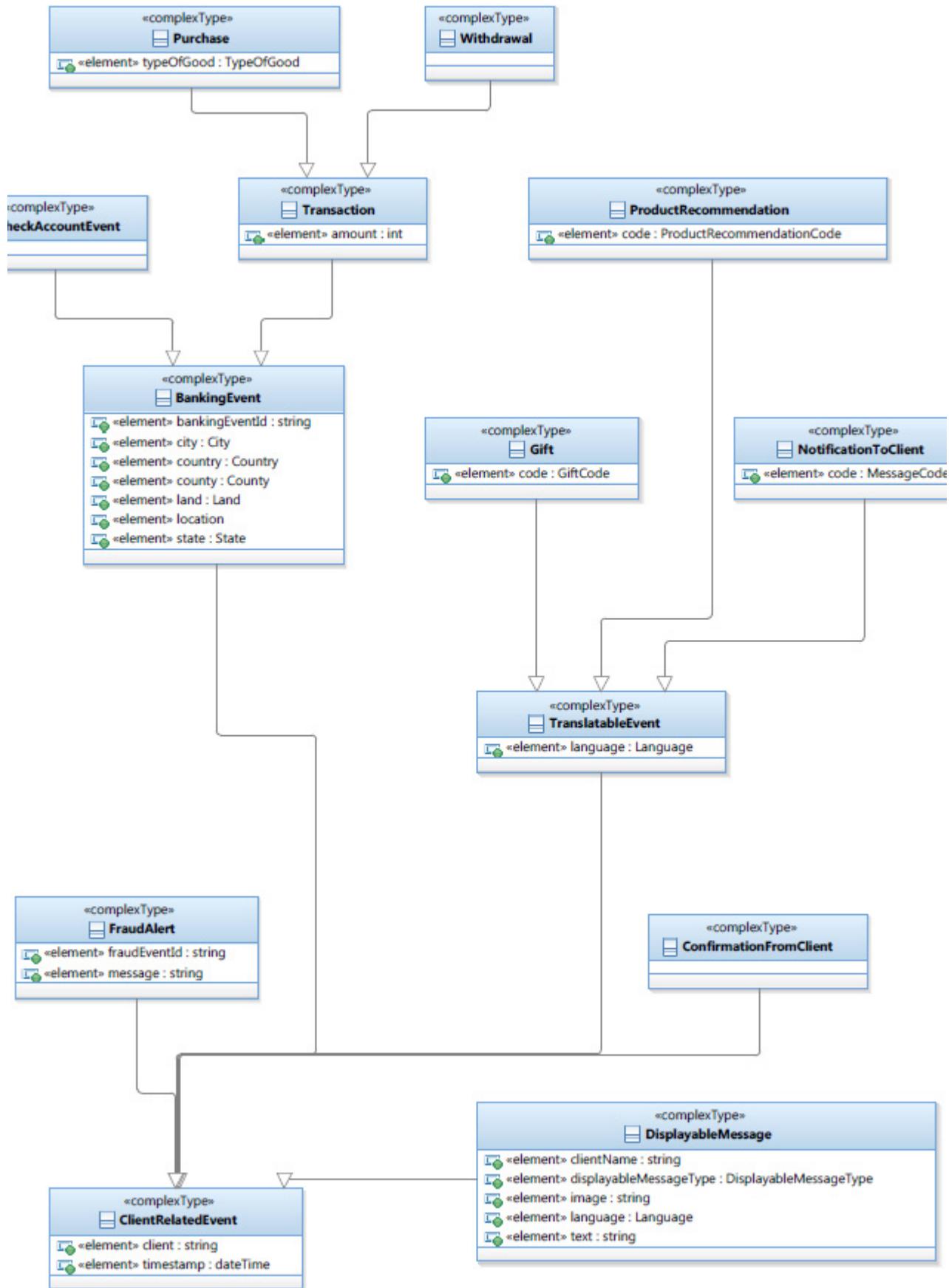
Requirements

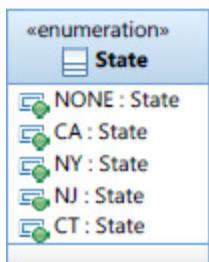
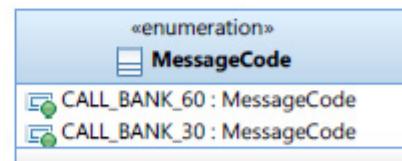
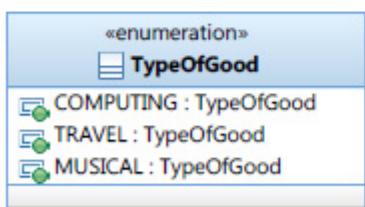
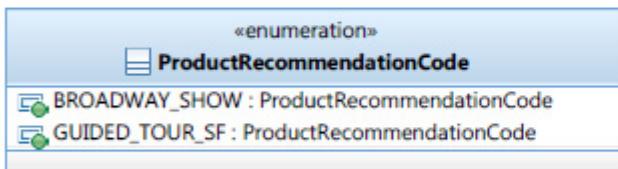
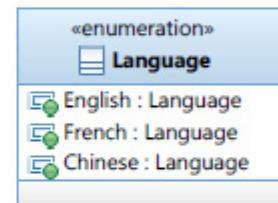
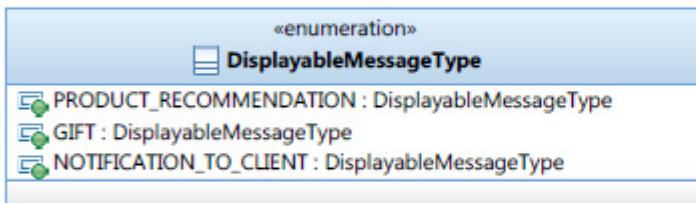
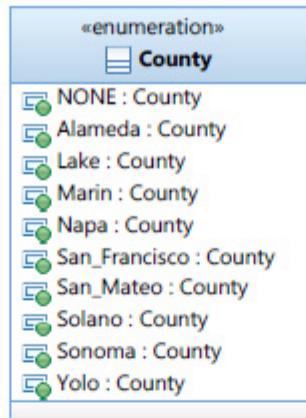
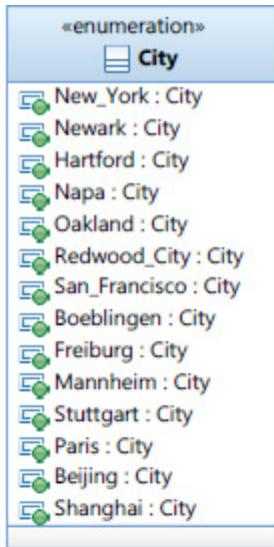
This exercise requires that you continue in the workspace that you created in [Exercise 1, "Getting started with Decision Server Insights"](#).

Section 1. Modeling the domain

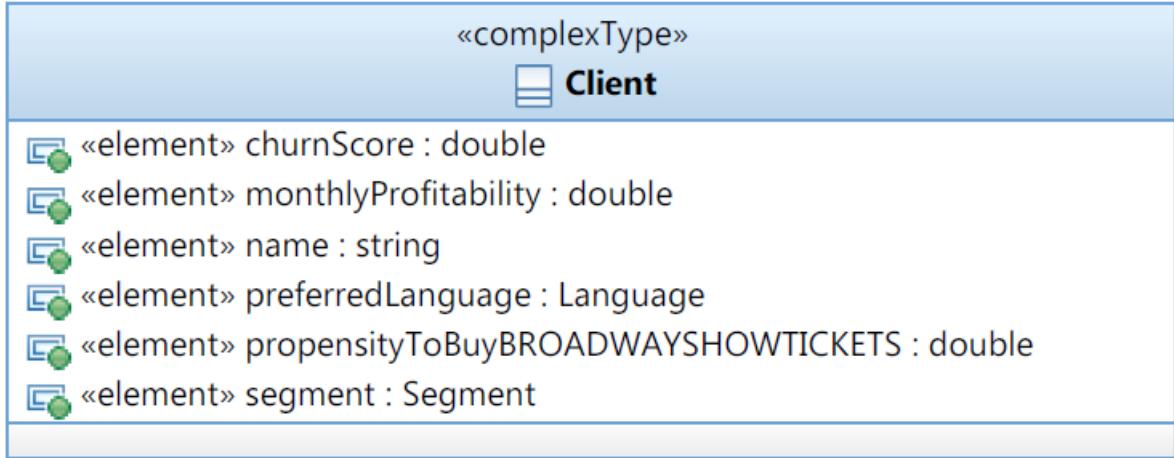
Before you can define how to process events, you must first define which events to monitor, which entities are involved, and the relationships between entities and events. Modeling the entities in your domain is key to creating a complete business model definition.

- 1. Look at the business model diagrams that are shown here.

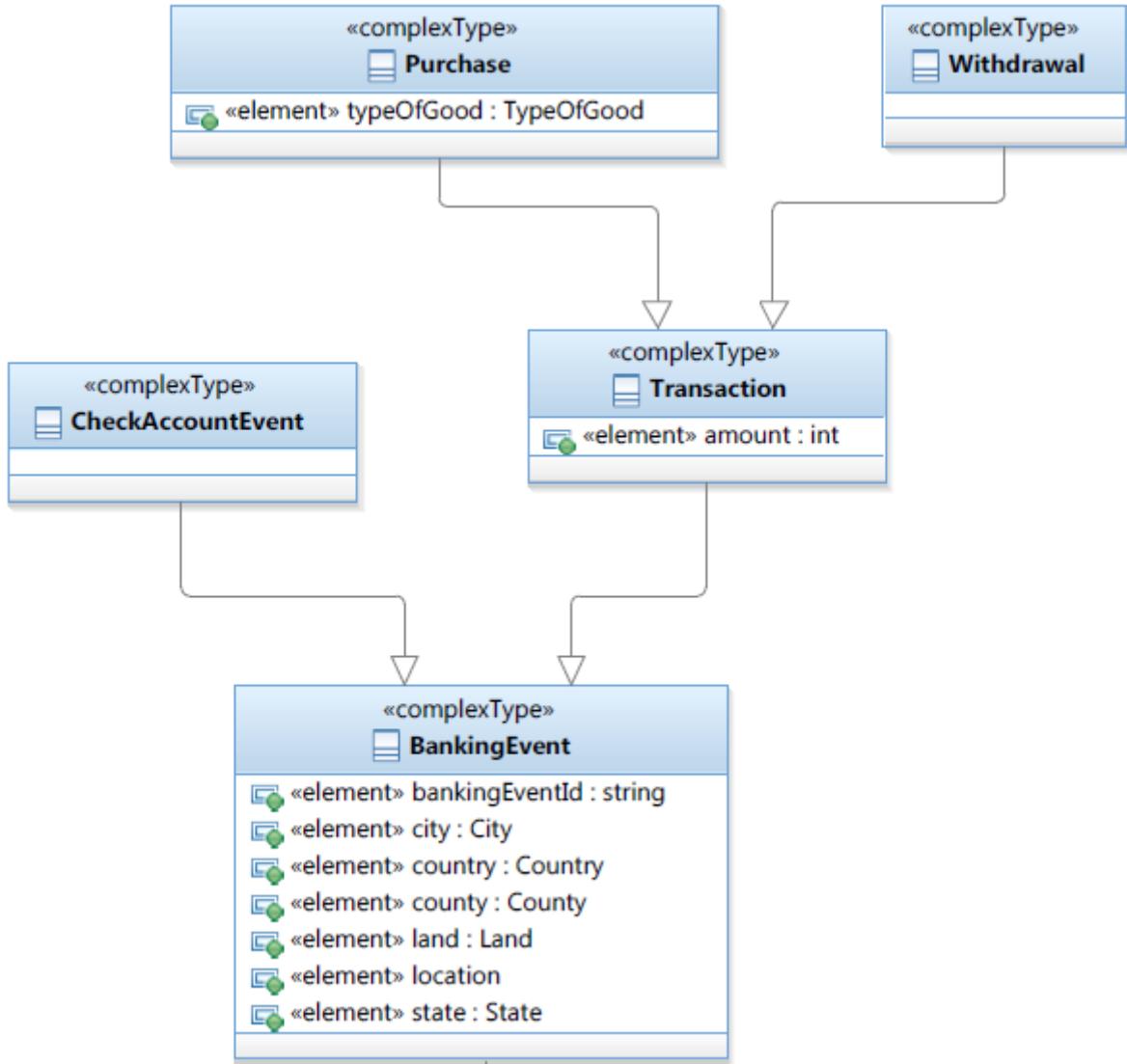




- 2. Look at the Client class diagram, and note the attributes and types.



- 3. Notice the events, such as BankingEvent and Transaction, and the inheritance relationships between them.



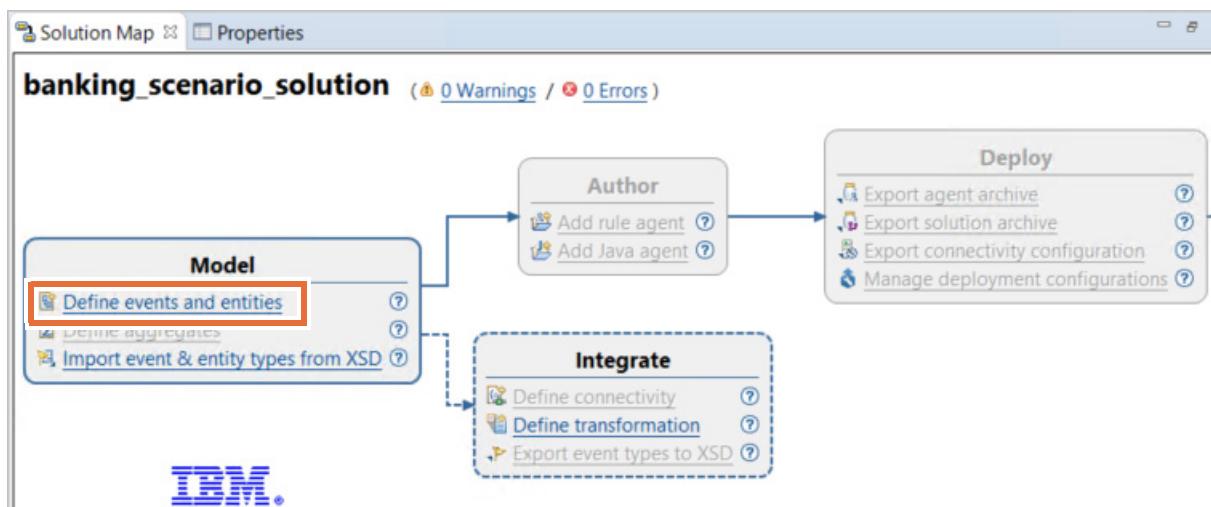
The entities and events in the domain model must be defined in the business model for your solution.

Section 2. Creating the business model definition

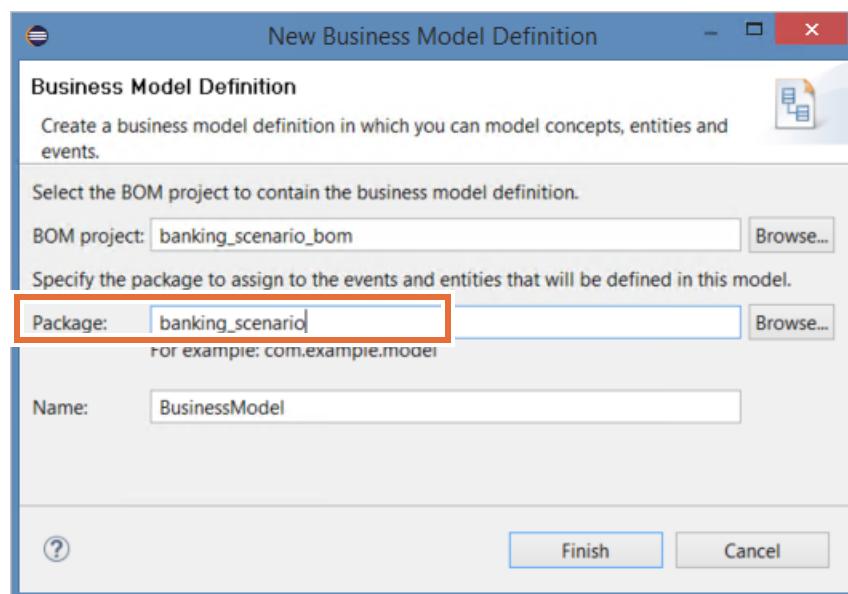
Next, you transfer the information from the domain models to a business model definition (BMD) file.

2.1. Create the BMD

- 1. In Insight Designer, make sure that you are in the same workspace that you used during [Exercise 2, "Creating a solution in Insight Designer"](#).
- 2. Use the Solution Map to create a BMD file.
 - a. In Solution Explorer, click **banking_scenario_solution** to open the **Solution Map** view.
 - b. In the Model task of the Solution Map, click **Define events and entities**.



- c. In the **Package** field of the New Business Model Definition wizard, type:
banking_scenario



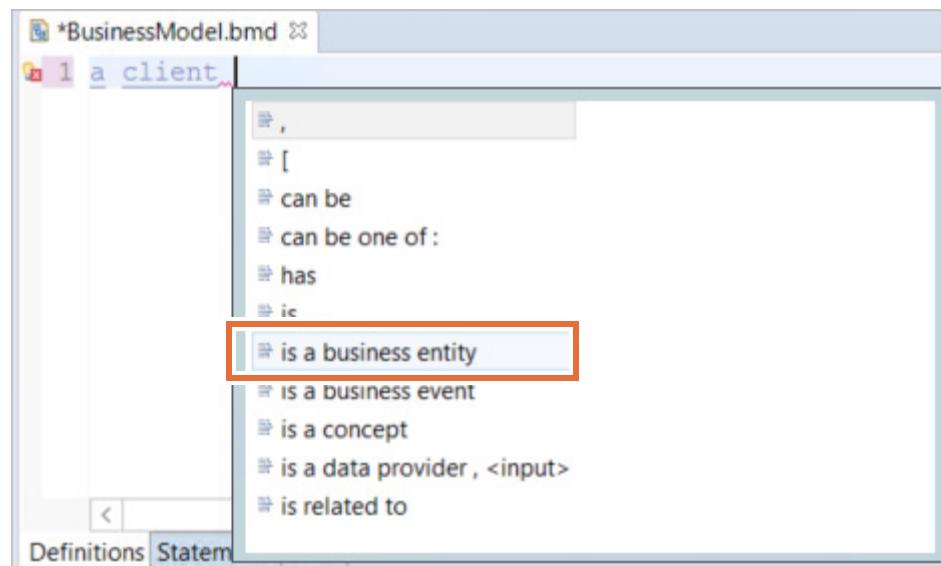
- d. Click **Finish**.

An empty `BusinessModel.bmd` file is created in the **banking_scenario_bom > bom > banking_scenario** folder and opens in the editor.

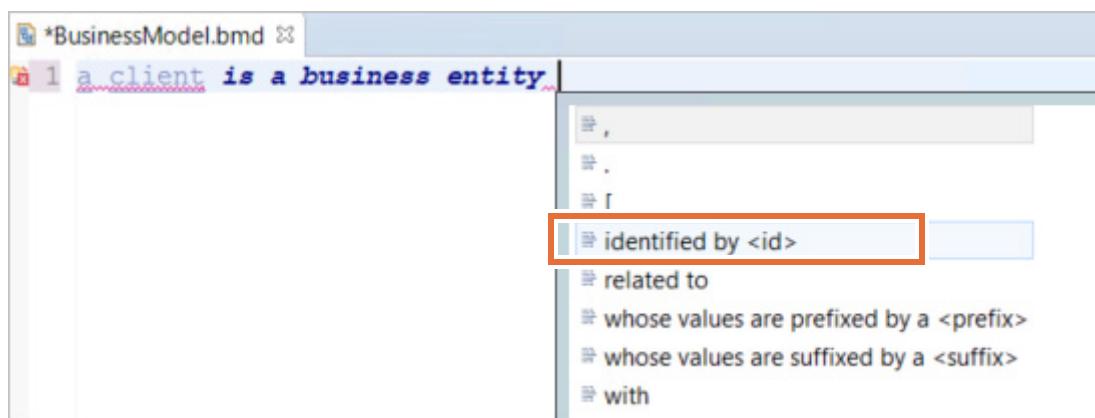
- 3. Create an entity definition.
 - a. Look again at the Client object in the UML diagram and its attributes:

- a. Look again at the Client object in the UML diagram and its attributes:
 - name
 - segment
 - churn score
 - monthly profitability
 - propensity to buy BROADWAYSHOWTICKETS
 - preferred language

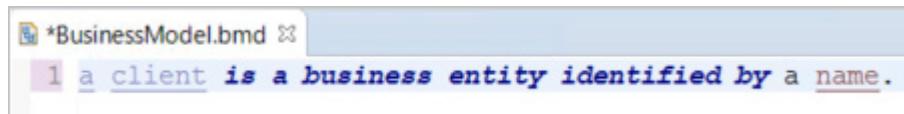
- b. In the BMD editor, start the definition by typing: a client
- c. When you press Space and the editor prompts you for the next part of the statement, double-click **is a business entity**.



- d. Next, choose **identified by <id>** from the list.



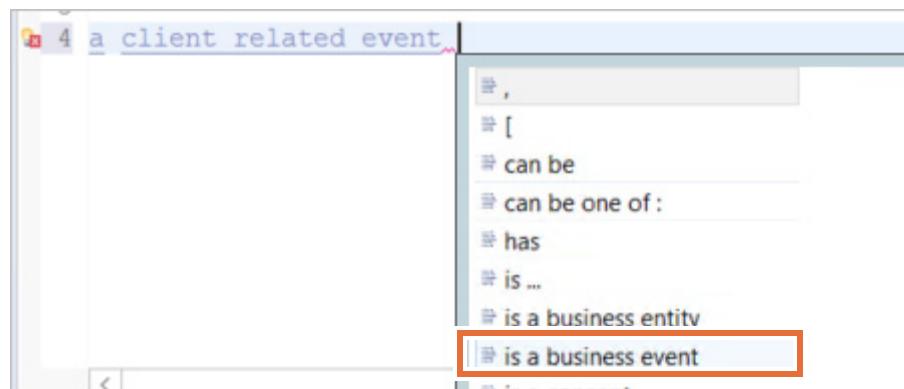
- e. Complete the statement by typing: a name.



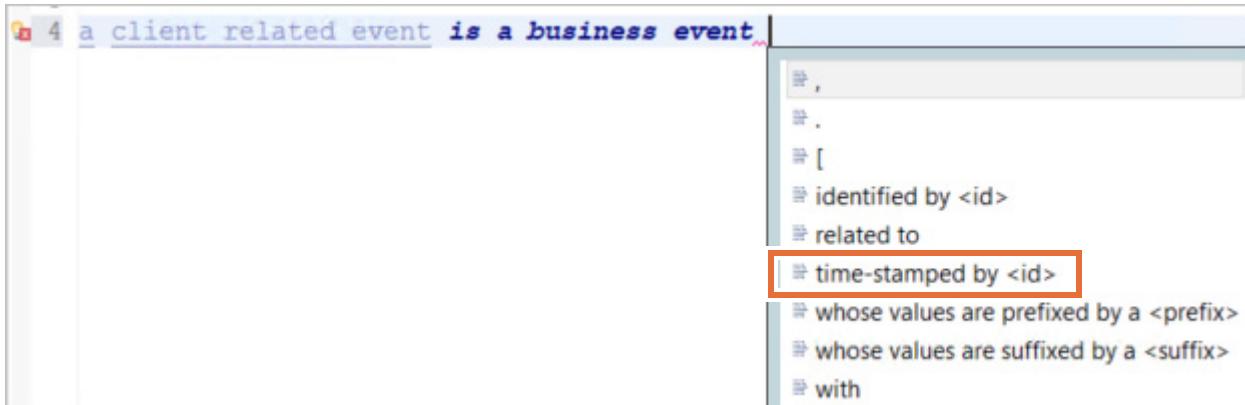
Hint

Make sure that you include a period (.) at the end of the definition phrase.

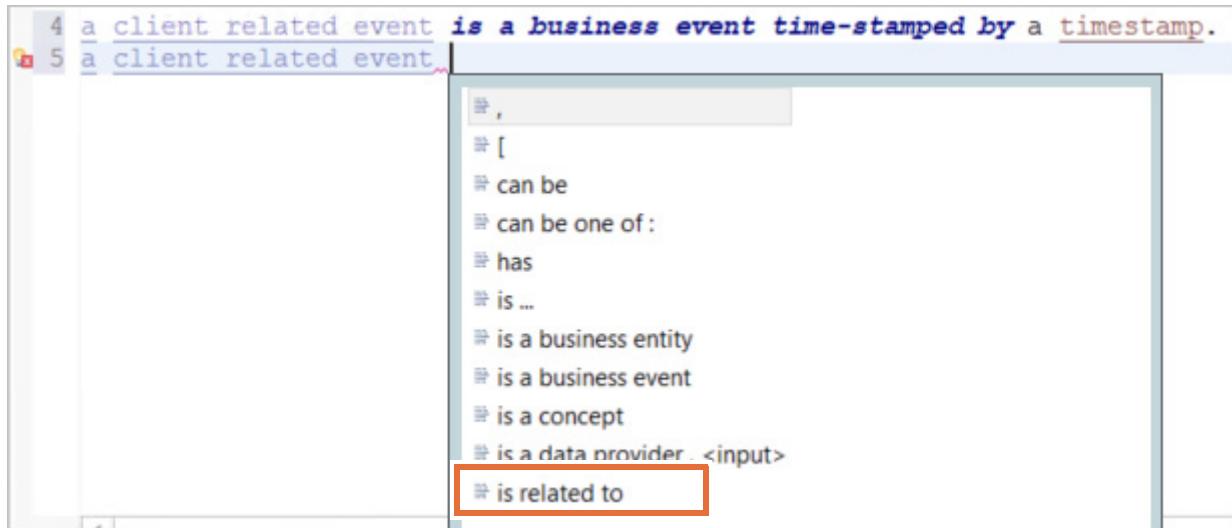
- f. Press Enter to start a new line.
- g. Add an attribute to the Client entity by typing this line:
a client has a segment.
By default, attributes are of type String.
- h. **Optional.** You can complete the Client by adding the remaining attributes:
- churn score
 - monthly profitability
 - propensity to buy BROADWAYSHOWTICKETS
 - preferred language
4. Define an event.
- a. Look again at the UML diagram, and note BankingEvent, which inherits from the ClientRelatedEvent, and the event attributes.
- b. On a new line, define ClientRelatedEvent by typing: a client related event
- c. When you press Space and the editor prompts you for the next part of the statement, choose **is a business event**.



- __ d. Next, choose **time-stamped by <id>**.



- __ e. Type: a timestamp.
 __ f. Press Enter to start a new line.
 __ g. Define the relationship between the client-related event and the client by using the “is related to” construct.



- __ h. Complete the statement by typing: a client.



Questions

How would you define the inheritance relationship between `BankingEvent` and `ClientRelatedEvent`?

- __ i. On a new line, define `BankingEvent` by using the “is a” construct, and typing this line:
 a banking event is a client related event.

2.2. Complete the BMD

To complete the model, you use a predefined model that is provided for you in the `<LabfilesDir>\code` directory.

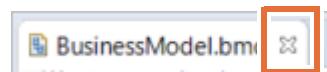
- ___ 1. In Windows Explorer, go to the `<LabfilesDir>\code` directory, and open the `bmd.txt` file.
- ___ 2. Copy the contents of the `bmd.txt` file by pressing **Ctrl+A**, and then **Ctrl+C**.
- ___ 3. Go to Insight Designer, and in the business model editor, overwrite the contents by pressing **Ctrl+A**, and then **Ctrl+V**.
- ___ 4. Review the BMD definitions and compare these lines to the UML diagram.
 - Is the relevant information from the UML diagram captured in this file?
 - How are “is-a” and “has-a” relationships defined?
 - How do the entity and the event models refer to each other? For example, a `client` related event `is related to` a `client`.



Information

The business model definition is expressive. You can use the **BOM** tab of the BMD editor to verify that your definitions are correct.

- ___ 5. Save your work by pressing **Ctrl+S** and close the `BusinessModel.bmd` file editor window by clicking the **X**.



- ___ 6. Close the `bmd.txt` file.
- ___ 7. Keep Insight Designer open for the next exercise.

End of exercise

Exercise review and wrap-up

The first part of the exercise showed you how to define the entity and the event model by using natural language constructs. You also saw how entity and event relationships are defined in the model.

Exercise 4. Creating a rule agent

Estimated time

00:30

Overview

This exercise covers how to create agents, how to write agent descriptors that bind the agent to an entity, and how to write a rule that emits an event.

Objectives

After completing this exercise, you should be able to:

- Create a rule agent
- Write an agent descriptor
- Write a rule that emits an event
- Create a Java agent

Introduction

This exercise includes these sections:

- [Section 1, "Setting up your workspace"](#)
- [Section 2, "Creating a rule agent"](#)
- [Section 3, "Writing the San Francisco rule"](#)
- [Section 4, "Creating a Java agent"](#)

Requirements

This exercise requires that you continue in the workspace that you used during the previous exercise.

Section 1. Setting up your workspace

Before you start this exercise, make sure that you have Insight Designer open to the correct workspace. Insight Designer should be open from the previous exercise. You continue to work in that workspace.

1.1. Opening the workspace

- 1. Make sure that you are in the same workspace that you created during [Exercise 3, "Defining the business model"](#).

Section 2. Creating a rule agent

In this section, you learn how to create rule agents that process the business events that you defined in your business model.

Scenario: Banks want to encourage client satisfaction by recognizing purchasing trends and recommending banking and non-banking products that match client interests. Banks can provide personalized services by gathering and applying context to their operational business decisions.

The bank can look at account activity to determine whether a client is traveling, perhaps on holiday, and more likely to be interested in tourist activities, as opposed to regular activities, such as grocery shopping. The bank can also use predictive scoring and SPSS to predict the client's propensity to buy certain products. With that type of knowledge, the bank can make accurate recommendations or offer timely promotions, specific to the client's location, and at exactly the right time.



Requirements

The bank's mobile app features personalized recommendations. For example, for clients who are not residents of California, but use their mobile banking app while in the California area, the app suggests a guided tour of San Francisco.

The agent must:

- Be bound to a `Client` entity
- Subscribe to `BankingTransaction` events
- Update the entity after sending the recommendation

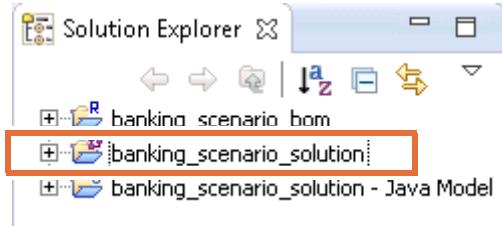
The rule must:

- Determine the location of the client
 - Emit an event that carries a product code (`GUIDED TOUR SF`) and a language code (the client's preferred language)
 - Cancel the recommendation if the client recently received a similar recommendation to avoid overwhelming the client with similar notifications
-

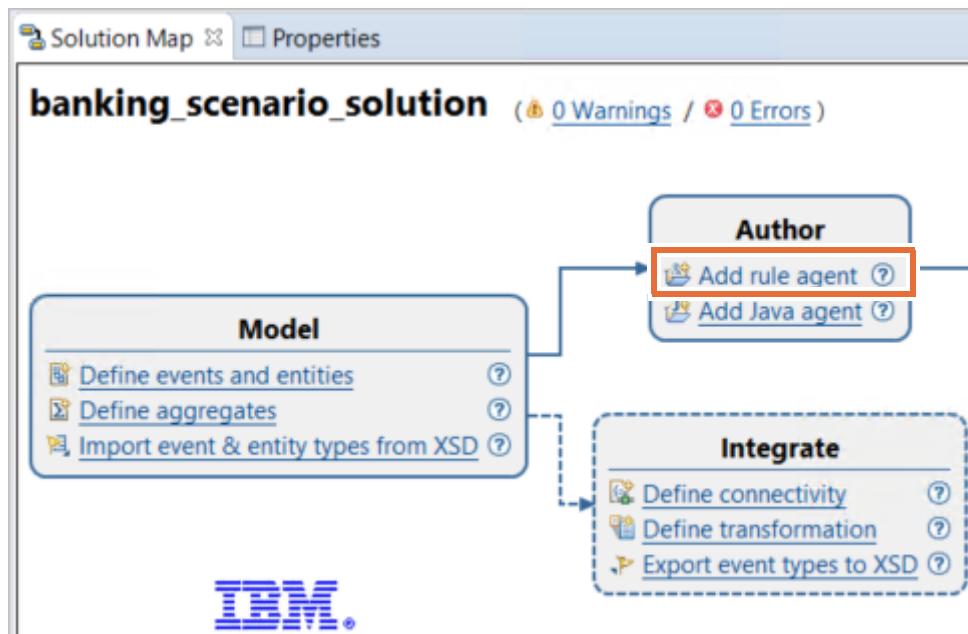
2.1. Creating the product recommendation rule agent

In this step, you create a rule agent that is bound to a client entity. The agent turns this client's past behavior, current activity, and location into *insight* and a product recommendation.

- 1. In Solution Explorer, click **banking_scenario_solution** to make sure that the **Solution Map** view is open.



- 2. In the **Author** task of the Solution Map, click **Add rule agent**.



- 3. In the **Project name** field, type: banking_scenario_agent_product_recommendation
- 4. Click **Finish**.

The `agent.adsc` file opens in the editor.

2.2. Writing the agent descriptor



Information

The `agent.adsc` file is the agent descriptor. It defines which entity the agent is bound to and which events the agent subscribes to.

For this rule agent, the descriptor tells the Decision Server Insights runtime environment that an instance of the product recommendation agent is bound to an instance of the `Client` entity.

When the Decision Server Insights runtime environment receives any banking event for a client instance, a component of the environment, called the gateway, routes the event to the appropriate agents for that client. Each agent that subscribes to that event evaluates the rules against that event, along with the current state of the context (or entity). Because the product recommendation agent is bound to the client entity, the agent can access the client's *context* to verify which recommendations this client already received and avoid sending redundant recommendations.

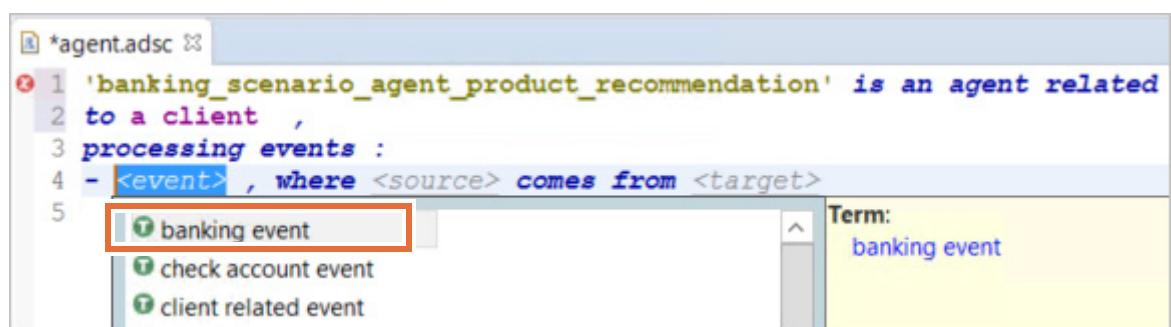
- __ 1. Start building the agent descriptor to match this text:

```
'banking_scenario_agent_product_recommendation' is an agent related to a
client ,
processing events :
    - banking event , where this client comes from the client of this banking
        event, with a horizon of 80 days
    - product recommendation , where this client comes from the client of this
        product recommendation, with a horizon of 30 seconds
```

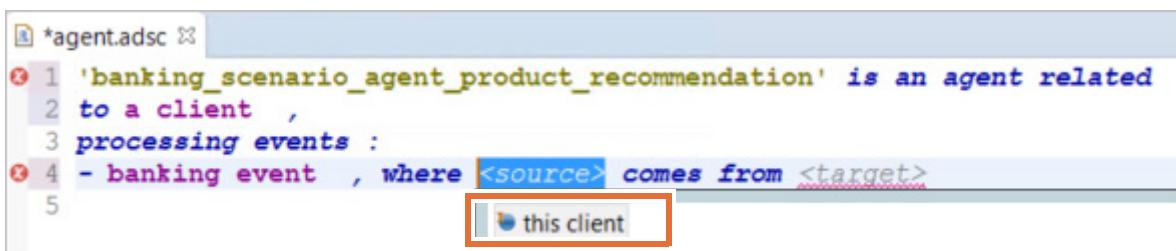
- __ a. Click **entity**, and double-click **a client**.



- __ b. Click **event**, and double-click **banking event**.



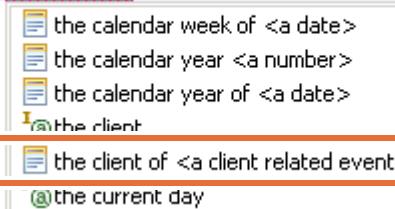
- __ c. Click **source**, and double-click **this client**.



- __ d. Click **target**, and double-click **the client of <a client related event>**.

cessing events :

inking event , where this client comes from <target>



- __ e. Click **a client related event**, and double-click **this banking event**.

comes from the client of <a client related event>

this banking event

- __ f. Double-click , with a horizon of <duration>.

comes from the client of this banking event

- <event>

, with a horizon of <duration>

- __ g. Double-click calendar duration.

of this banking event , with a horizon of

<calendar duration>

- __ h. In the **Days** box, type 80 days and press Enter.

Years	Months	Weeks	Days	Hours	Minutes	Seconds
0	0	0	80	0	0	0

- __ i. Press Enter to move to a new line.

- __ 2. Complete the descriptor by copying the complete descriptor definition from the rule-agents.txt file and pasting it in the agent editor to overwrite the definition.

- __ a. Go to the **<LabfilesDir>\code** directory.

- __ b. Open the rule-agents.txt file and copy the 'banking_scenario_agent_product_recommendation' definition section (highlight the agent description, and then press Ctrl+C).

- __ c. In the agent editor, press Ctrl+A, and then press Ctrl+V.



Hint

You can format text in the editor by selecting all your text and pressing Ctrl+Shift+F.

The agent descriptor should match this text:

```
'banking_scenario_agent_product_recommendation' is an agent related to a
client ,
processing events :
    - banking event , where this client comes from the client of this banking
event, with a horizon of 80 days
    - product recommendation , where this client comes from the client of this
product recommendation, with a horizon of 30 seconds
```

- ___ 3. Save the agent.adsc file (Ctrl+S) and close it.

Section 3. Writing the San Francisco rule

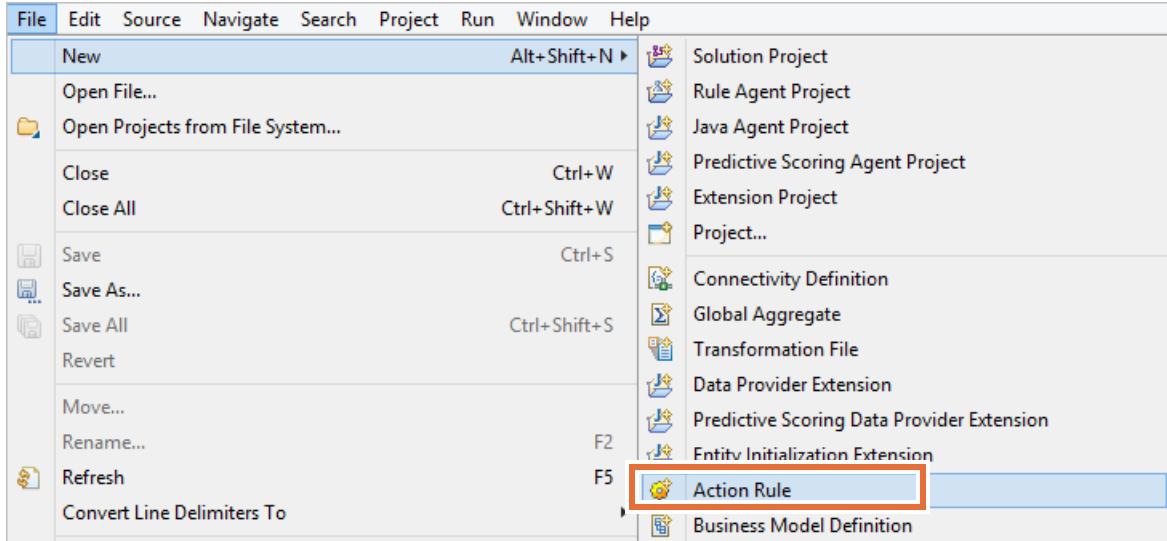


Requirements

The rule is triggered by an incoming event when clients access their accounts while they are in California. Your rule conditions also test that the client did not already receive this same recommendation recently.

The action statement emits an event that carries a product code (GUIDED TOUR SF) and a language code (the client's preferred language).

- ___ 1. Add the **Recommend guided tour of San Francisco** rule to your rule agent.
 - ___ a. Expand the **banking_scenario_agent_product_recommendation** project.
 - ___ b. Right-click the **rules** folder and click **New > Action Rule**.



- ___ c. In the **Name** field of the New Action Rule wizard, type: Recommend guided tour of San Francisco
- ___ d. Click **Finish**.

The new rule opens in the rule editor.

- __ 2. In the rule editor, define the rule to match the following text.

```
when a banking event occurs
    where the state of this banking event is CA
if
    there is no product recommendation
        where the code is GUIDED TOUR SF
        and this product recommendation is within 30 seconds before now ,
then
    emit a new product recommendation where
        the client is 'the client' ,
        the language is the preferred language of 'the client' ,
        the code is GUIDED TOUR SF ;
```



Hint

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder. To format the text in the rule editor, select all your text and press `Ctrl+Shift+F`.

- __ 3. Take a moment to review this rule in comparison to the requirements to see how the rule implements the required tests and actions.
- __ 4. Save the rule (`Ctrl+S`) and close the rule editor.
-



Note

For this lab, this rule checks for recommendations within the past 30 seconds so that you can experiment with rule behavior. In real life, a more plausible duration might be 30 days.

Section 4. Creating a Java agent



Requirements

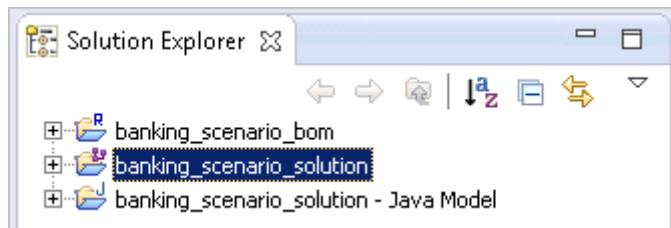
The product recommendation agent emits an event to send a message to the client's mobile device. However, Client entities have a preferred language attribute. To personalize the recommendations to use in the client's language, some post-processing is required before messages can be sent.

Open the `BusinessModel.bomd` file to see that product recommendation event is a translatable event. You must create a Java agent to intercept product recommendation events and provide the translated message in the client's language.

This multi-agent architecture enables separation of logic:

- Rule logic (what to show)
- Procedural logic (how to show it)

- 1. In Solution Explorer, click **banking_scenario_solution** to make sure that the **Solution Map** view is open.



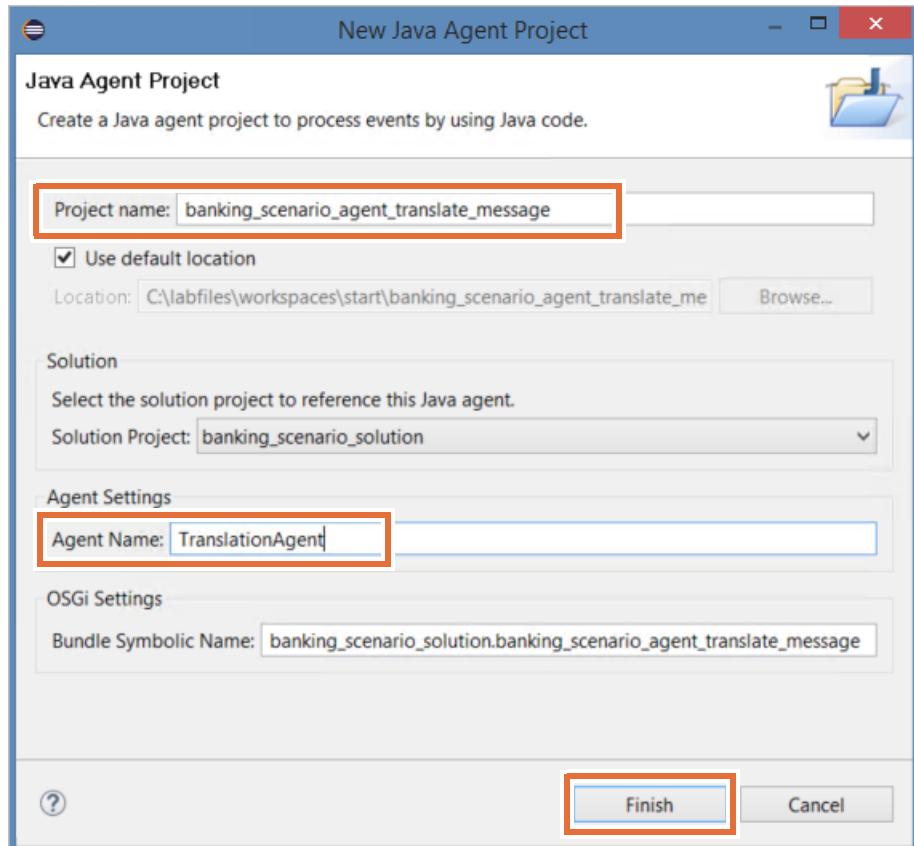
- 2. In the **Author** task of the Solution Map, click **Add Java agent**.



- 3. Define the Java project and agent name.

- a. In the **Project name** field, type: `banking_scenario_agent_translate_message`
- b. In the **Agent Name** field, type: `TranslationAgent`

- __ c. Click **Finish**.



The `agent.adsc` file opens in the editor.

- __ 4. Define the agent descriptor to match the following text.

```
'banking_scenario_solution.banking_scenario_agent_translate_message.TranslationAgent' is an agent related to a client ,  
processing events :  
    - translatable event , where this client comes from the client of this  
translatable event, with a horizon of 0 seconds
```



Hint

You can copy and paste this text from the Descriptor section of the `java-agent.xml` file in the `<LabfilesDir>\code` folder. Use Notepad++ to open the file.

To format the text in the agent editor, select all your text and press **Ctrl+Shift+F**.

- __ 5. Save your work and close the `agent.adsc` file.
- __ 6. Complete the Java code for the agent.
 - __ a. Expand the **banking_scenario_agent_translate_message > src > banking_scenario_solution > banking_scenario_agent_translate_message** folder to find the `TranslateAgent.java` file.
 - __ b. Double-click the `TranslateAgent.java` file to open it in the editor.

- __ c. Go to Windows Explorer, and in the <LabfilesDir>\code directory, right-click the java-agent.xml file and click **Edit with Notepad++**.
- __ d. Copy the import statements from the **Import statements to add** section of the java-agent.xml file to the import section of the TranslateAgent.java file.
- __ e. Replace the “TODO” line with the code that is provided in the java-agent.xml file.

```
public class TranslationAgent extends EntityAgent<Entity> {  
  
    @Override  
    public void process(Event event) throws AgentException {  
  
        // TODO Add logic to handle the event  
  
    }  
  
}
```

- __ f. Save your work to make sure that you do not have compilation errors.
 - __ g. Close the java-agent.xml file.
- __ 7. Take some time to review the code and consider how this agent might be reused with other rules or agents for translation purposes.
 - __ 8. Close the Java editor.

End of exercise

Exercise review and wrap-up

This exercise showed you how to create a rule agent and bind it to the client entity that you defined in the business model. You also wrote the business logic that detects client behaviors and emits a product recommendation event.

Exercise 5. Writing and testing rules

Estimated time

00:30

Overview

This exercise covers how to add a rule to an existing rule agent and deploy the solution for testing.

Objectives

After completing this exercise, you should be able to:

- Add a rule to a rule agent
- Deploy a solution
- Submit events through a test client to test rule behavior

Introduction

This exercise includes these sections:

- [Section 1, "Setting up your workspace"](#)
- [Section 2, "Adding the New York recommendation rule"](#)
- [Section 3, "Deploying the solution"](#)
- [Section 4, "Testing the solution"](#)

Requirements

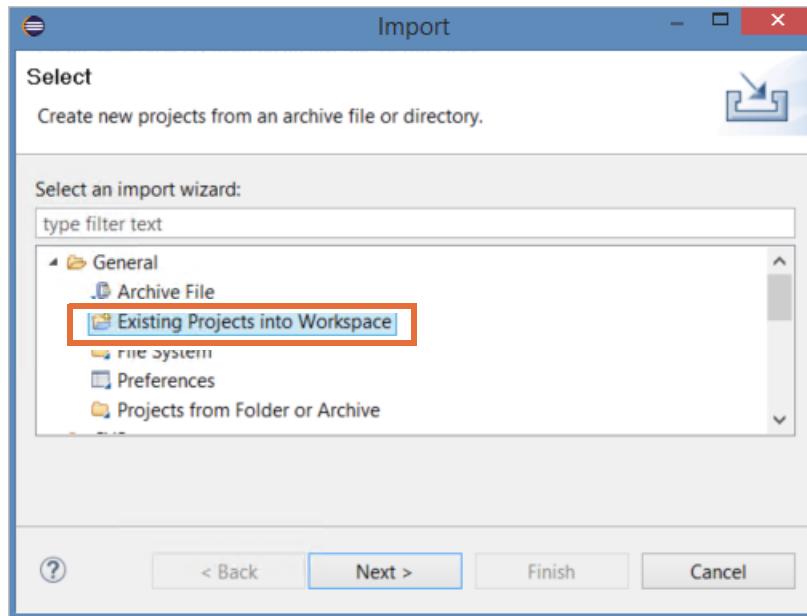
This exercise requires that you switch workspaces to use the `<LabfilesDir>\workspace1-ny` workspace that is provided for this exercise.

Section 1. Setting up your workspace

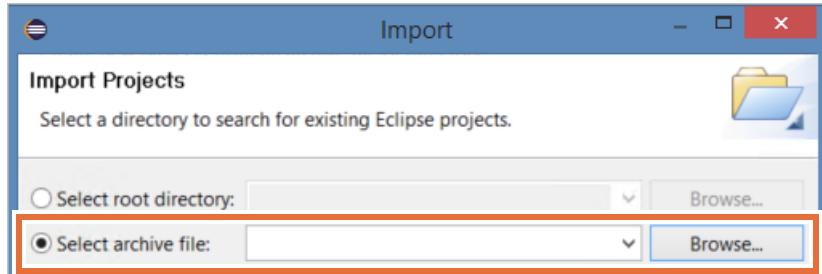
For this exercise, you switch to a new workspace.

1.1. Creating the workspace

- 1. If you closed Insight Designer after the previous exercise, open it by double-clicking the Insight Designer icon on your taskbar.
- Otherwise**, if Insight Designer is still open from the previous exercise, switch to a new workspace, by clicking the **File** menu, and clicking **Switch Workspace > Other**.
- 2. When prompted in the Workspace Launcher for a workspace, type a workspace path, such as:
- ```
C:\labfiles\workspaces\newyork
```
- 3. Click **Launch**.
  - 4. Close the **Welcome** view.
- The Decision Insight perspective opens.
- 5. Import the projects.
    - a. From the **File** menu, click **Import**.
    - b. In the Import wizard, click **General > Existing Projects into Workspace**, and click **Next**.

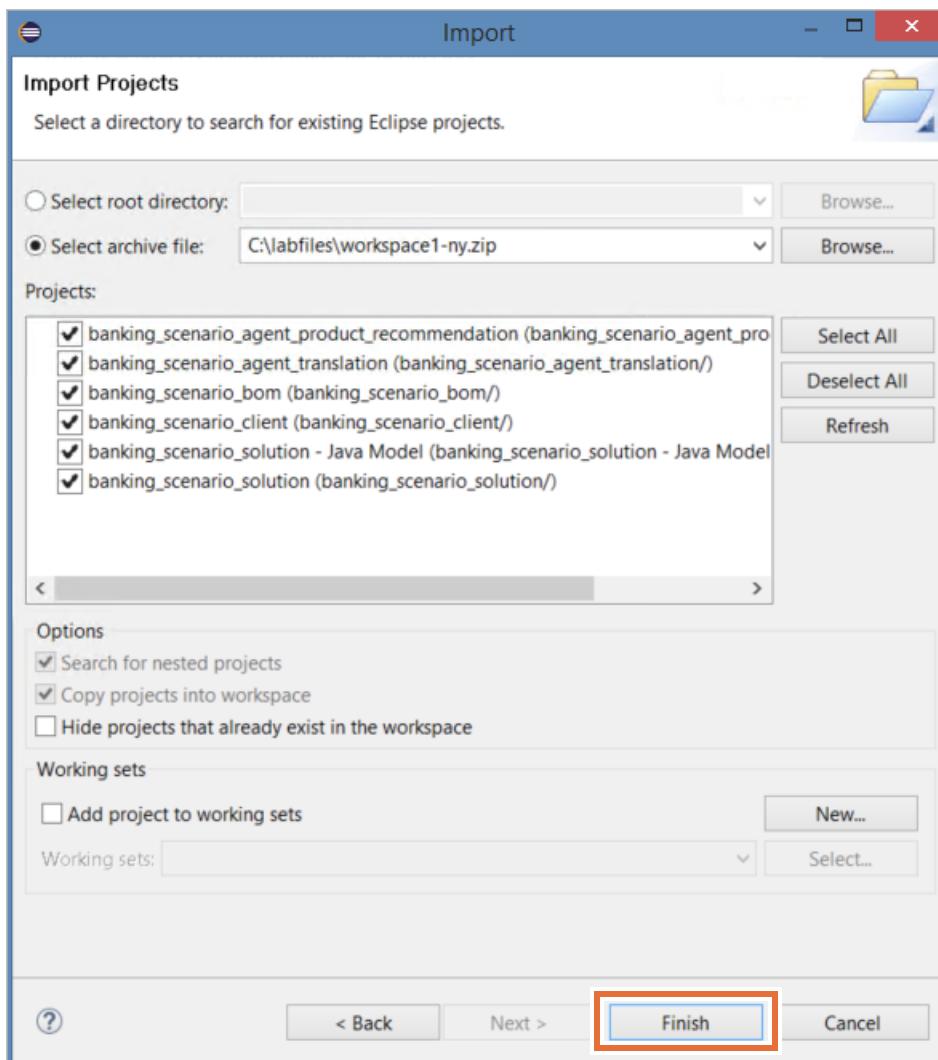


- \_\_ c. Choose **Select archive file** and click **Browse**.



- \_\_ d. Go to the <*LabfilesDir*> and select the workspace1-ny.zip file and click **Open**.

- \_\_ e. Click **Finish**.



Your workspace now contains all the required projects. The projects might contain errors, but you resolve these errors during the next steps.

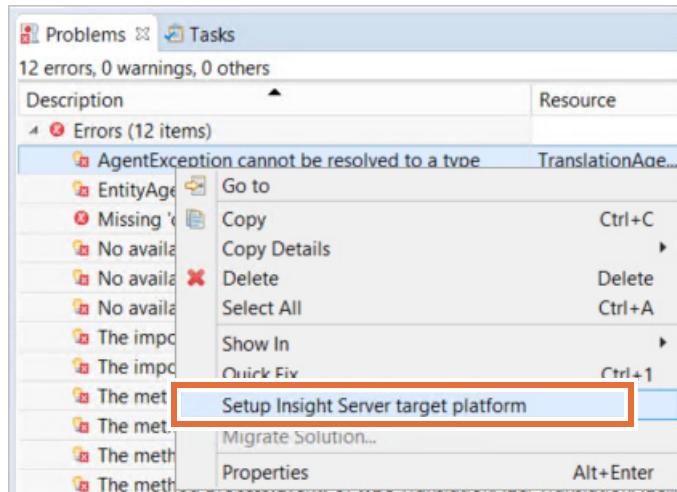


## Troubleshooting

If you get a generation error window open, click **OK** to ignore it. Make sure that you wait for the workspace to build completely.

## 1.2. Setting the target platform

- 1. In the Problems view, expand the list, right-click any of the errors, and click **Setup Insight Server target platform**.



- 2. Wait for the project to rebuild completely.

You should not have errors after the workspace is rebuilt.

## 1.3. Verifying properties

Before you can run the Java client, you must first verify the project properties for the `testdriver.properties` file.

- 1. In Solution Explorer, expand the **banking\_scenario\_client** project, and double-click **testdriver.properties** to open the properties file in the editor.
- 2. Note the value for the `debugservers` property, and make sure that it is set to port 6543, as shown here:  
`debugservers=localhost:6543`
- 3. Note the value of **trustStoreLocation**, which should be:  
`C:/IBM/ODMInsights810/runtime/wlp/usr/servers/cisDev/resources/security/key.jks`
- 4. Verify that this path matches your installation.
  - a. Double-click **Shortcut to DSI InstallDir** on the Desktop and verify that the key.jks is in the same path as the **trustStoreLocation**.

- \_\_\_ b. If the value of the `trustStoreLocation` property does not match your product installation path, change the value in `testdriver.properties` to your product installation path and save your changes (Ctrl+S).
- \_\_\_ 5. Close the `testdriver.properties` file.

## Section 2. Adding the New York recommendation rule

In this section, you learn how to create rule agents that process the business events that you defined in your business model.



### Requirements

You must add a product recommendation for bank clients who are visiting the New York area and whose past banking activities indicate that they might have an interest in Broadway shows. The rule is triggered when clients access their accounts in a particular location and at a particular time.

The rule must:

- Test the location of the client entity
- Test the date to determine whether the show is scheduled
- Determine the client's interest in Broadway
- Emit an event that carries a product code (`BROADWAY SHOW`) and a language code (the client's preferred language)
- Cancel the recommendation if the client recently received a similar recommendation

A client's interest, or propensity, to buy Broadway tickets might be determined either through historical data analysis or predictive scoring. For this rule, this interest score is stored in the `propensity to buy BROADWAY SHOW TICKETS` property.

As with the San Francisco recommendation rule, this rule emits an event that is intercepted by the Java agent to send the message to the client's mobile device in the client's language.

### 2.1. Creating the New York rule

- 1. In Solution Explorer, expand the `banking_scenario_agent_product_recommendation > rules` folder.  
You should see the San Francisco rule that listed in the project.
- 2. Add the **Recommend Broadway show New York City** rule to the `banking_scenario_agent_product_recommendation` rule agent.
  - a. Right-click the **rules** folder and click **New > Action rule**.
  - b. In the **Name** field of the New Action Rule wizard, type: Recommend Broadway show New York City
  - c. Click **Finish**.  
The new rule opens in the rule editor.

3. Define the rule to match the following text.

```

when a banking event occurs
if
 all of the following conditions are true :
 - the propensity to buy BROADWAY_SHOW_TICKETS of 'the client' is at least
 0.8
 or the total amount of all purchases during the last period of 80 days ,
 where the type of good of each purchase is MUSICAL is at least 500

 - the city of this banking event is one of { New York , Newark }
 - today is after 12/1/2018
 - there is no product recommendation
 where the code is BROADWAY SHOW
 and this product recommendation is within 30 seconds before now ,
then
emit a new product recommendation where
 the client is 'the client' ,
 the language is the preferred language of 'the client' ,
 the code is BROADWAY SHOW ;

```



### Hint

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` directory and format the text by pressing `Ctrl+Shift+F`.

4. Take a moment to review this rule in comparison to the requirements to see how the rule implements the required tests and actions.



### Note

For this lab, this rule checks for recommendations within the past 30 seconds so that you can experiment with rule behavior. In real life, a more plausible duration might be 30 days.

5. Save the rule (`Ctrl+S`) and close the rule editor window.



### Important

After you write a rule, you should test to ensure that the rule works before you continue writing more rules. For this banking scenario, a test client is provided for you.

## Section 3. Deploying the solution

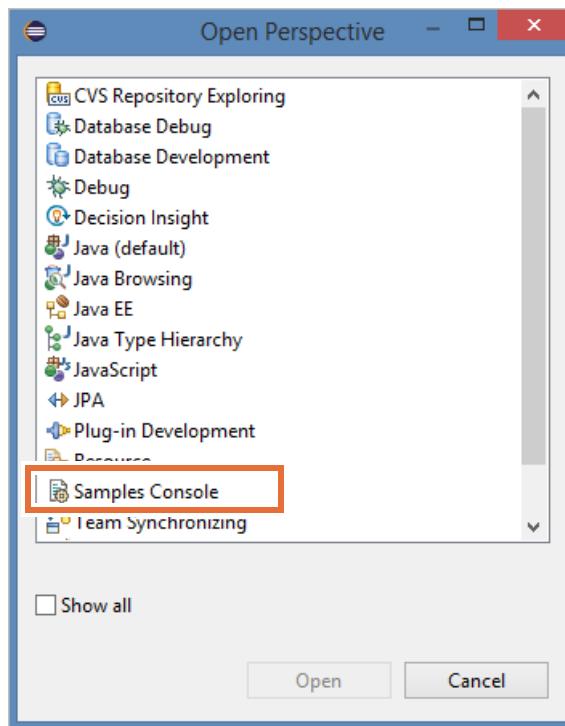
In this section, you deploy the solution and verify the deployment. If the sample server is not already started, you must start it before deployment.

### 3.1. Starting the server

- 1. Make sure that the server is started.
- a. Switch to the Samples Console perspective.
- b. Click the **Open Perspective** icon in the upper-right corner of the Eclipse window.



- c. In the Open Perspective window, select **Samples Console**.

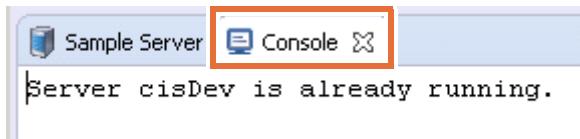


The Samples Console opens.

- 2. In the **Sample Server** pane in the lower part of the workspace, click the **Start the sample server** icon to start the server.

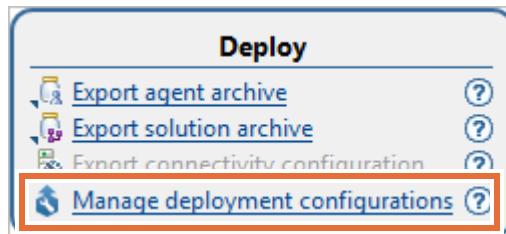


The default server is called cisDev. If the server is running when you click Start, the Console opens with the message that the server is already running.



### 3.2. Deploying the solution

- \_\_\_ 1. Switch back to the Decision Insight perspective.
- \_\_\_ 2. In the Solution Map view, in the **Deploy** goal, click the **Manage deployment configurations** link.



- \_\_\_ 3. In the **Deployment Configurations** wizard, select **local** and click **Next**.
- \_\_\_ 4. Keep **Local server** selected, leave the default server values, and click **Next**.
- \_\_\_ 5. Leave the default values for the connection properties, and click **Finish**.

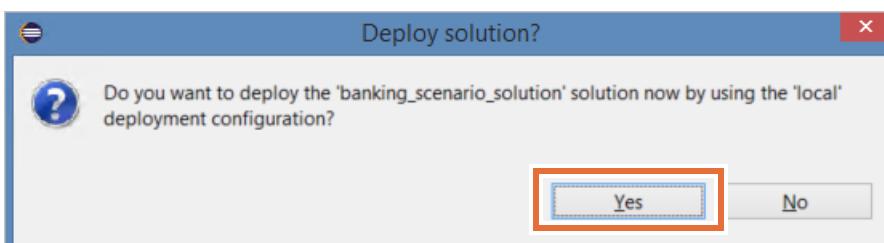


#### Note

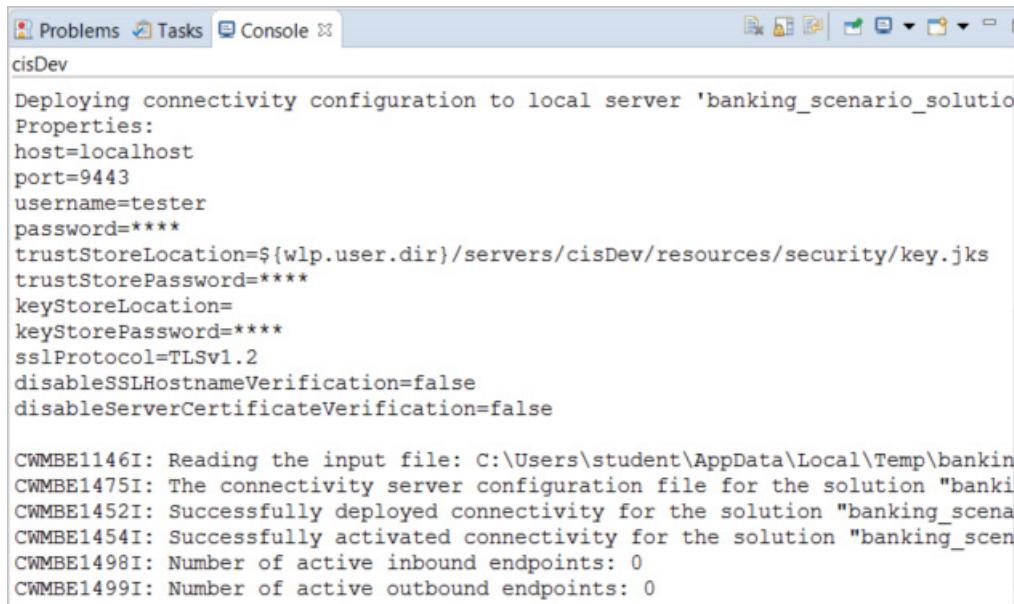
If you see a Secure Storage window, click **No**.



- \_\_\_ 6. When prompted to deploy the solution, click **Yes**.



Deployment takes a few moments. After deployment is complete, you see some messages that state that the solution and connectivity are successfully deployed.



```

Problems Tasks Console
cisDev
Deploying connectivity configuration to local server 'banking_scenario_solution'
Properties:
host=localhost
port=9443
username=tester
password=*****
trustStoreLocation=${wlp.user.dir}/servers/cisDev/resources/security/key.jks
trustStorePassword=*****
keyStoreLocation=
keyStorePassword=*****
sslProtocol=TLSv1.2
disableSSLHostnameVerification=false
disableServerCertificateVerification=false

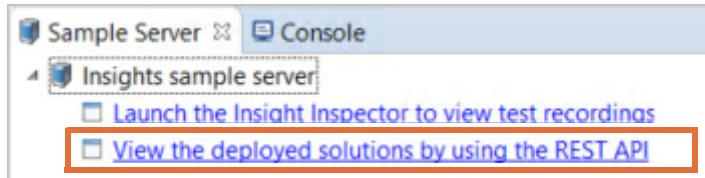
CWMBE1146I: Reading the input file: C:\Users\student\AppData\Local\Temp\bankin
CWMBE1475I: The connectivity server configuration file for the solution "banki
CWMBE1452I: Successfully deployed connectivity for the solution "banking_scena
CWMBE1454I: Successfully activated connectivity for the solution "banking_scen
CWMBE1498I: Number of active inbound endpoints: 0
CWMBE1499I: Number of active outbound endpoints: 0

```

### 3.3. Verifying deployment

To view the deployed solution, you can switch to the Samples Console perspective and use the REST API tool to verify that the solution was deployed to the application server.

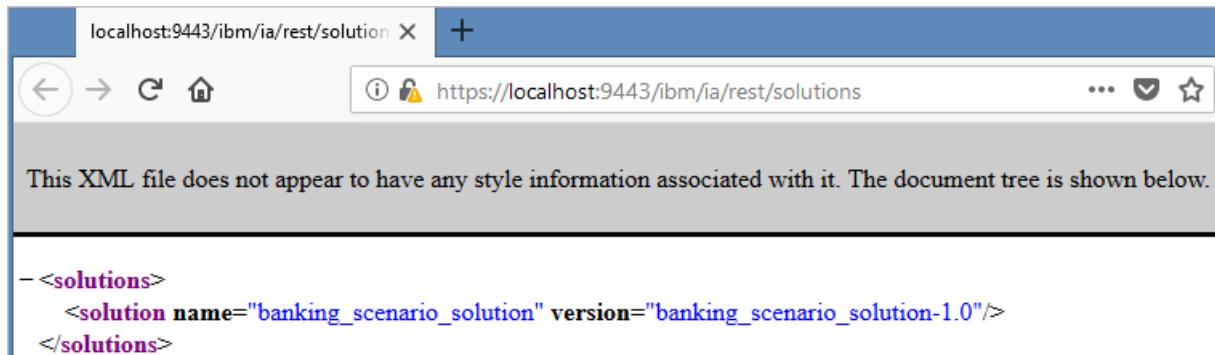
- \_\_\_ 1. Switch to the Samples Console perspective and open the **Sample Server** view.
- \_\_\_ 2. Click **View the deployed solutions by using the REST API**.



- \_\_\_ 3. When prompted to choose a browser, keep using Mozilla Firefox.
- \_\_\_ 4. When the browser window opens, accept any security warnings and continue. Click **Advanced**, click **Add Exception**, and click **Confirm Security Exception**.

The browser opens at the following URL and lists your solution:

<http://localhost:9080/ibm/ia/rest/solutions>



**Note**

The browser automatically switches to a secure connection that uses `https://localhost:9443`.

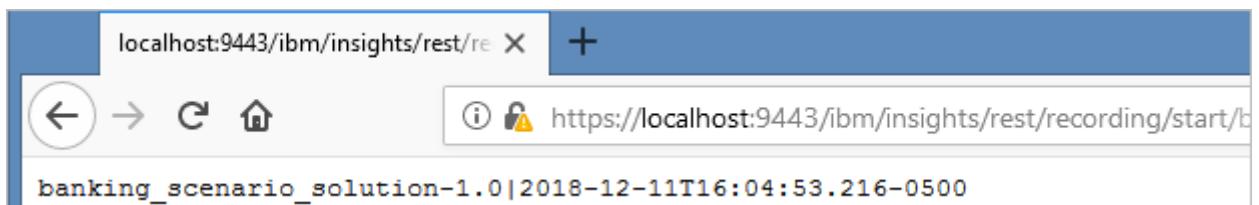
### 3.4. Preparing the recording of events in Insight Inspector

Before you submit test events, you can start the recording of event processing for your solution.

- 1. Open a new tab or browser window and type this URL:

```
http://localhost:9080/ibm/insights/rest/recording/start/
banking_scenario_solution
```

The browser returns a message with the solution name and a time stamp. You use this time stamp as the recording ID to delete this recording after your tests are finished.

**Note**

The browser automatically switches to a secure connection that uses `https://localhost:9443`.

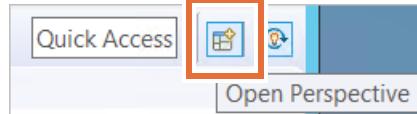
- 2. Close the browser while you run tests in the next steps.

After you finish testing, you return to Insight Inspector to view the results.

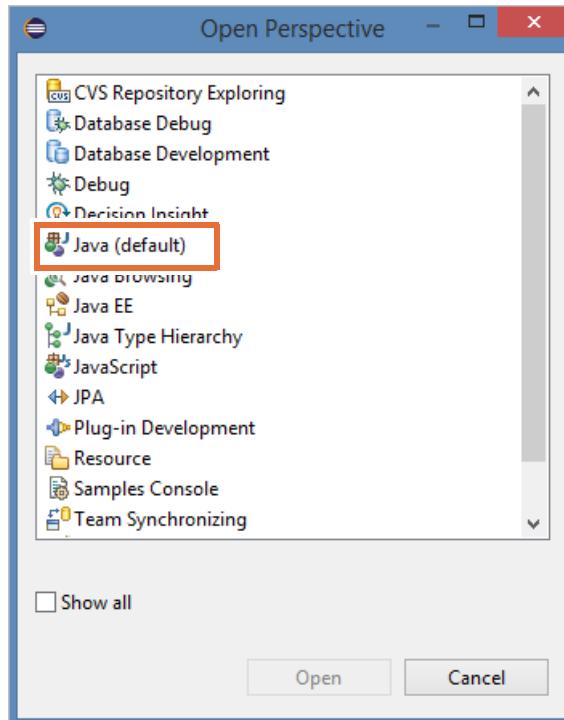
## Section 4. Testing the solution

In this section, you test the solution.

- 1. In Insight Designer, switch to the Java perspective.
- a. Click the **Open Perspective** icon in the upper-right corner of the Eclipse window.

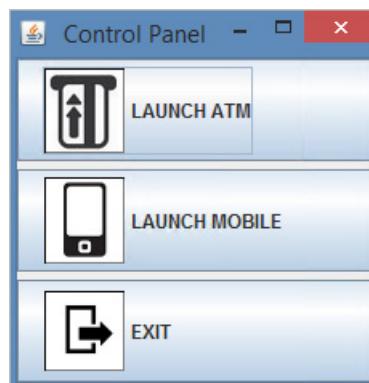


- b. In the Open Perspective window, select **Java (default)**.



- 2. In the Package Explorer, expand **banking\_scenario\_client > src > banking\_scenario\_client**, right-click **BankingScenarioClient.java**, and click **Run As > Java Application**.

The Control Panel opens.





## Troubleshooting

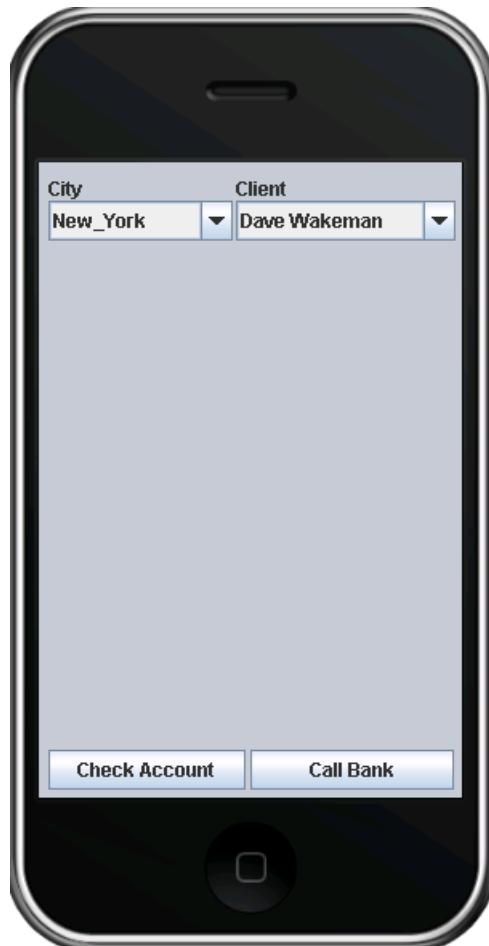
If you do not see the Control Panel, minimize all windows and open applications.

The Control Panel might open in the upper-left corner of the desktop.

The Control Panel application is designed specifically for this lab. You can use it to start pseudo-mobile devices and ATMs to interact with the solution.

- 3. Click **LAUNCH MOBILE**.

A mobile device interface opens.



- 4. Expand the **Client** list to see the list of clients that are available for this exercise.



Each client corresponds to an instance of the entity type `Client` as described in the `BusinessModel.bmd` file. These entities are created behind the scenes when you start the Control Panel.

- 5. Choose **Tonya Teyssier**, make sure that the city is **New\_York** and click **Check Account**. You should see the account balance and a message to recommend a Broadway show.



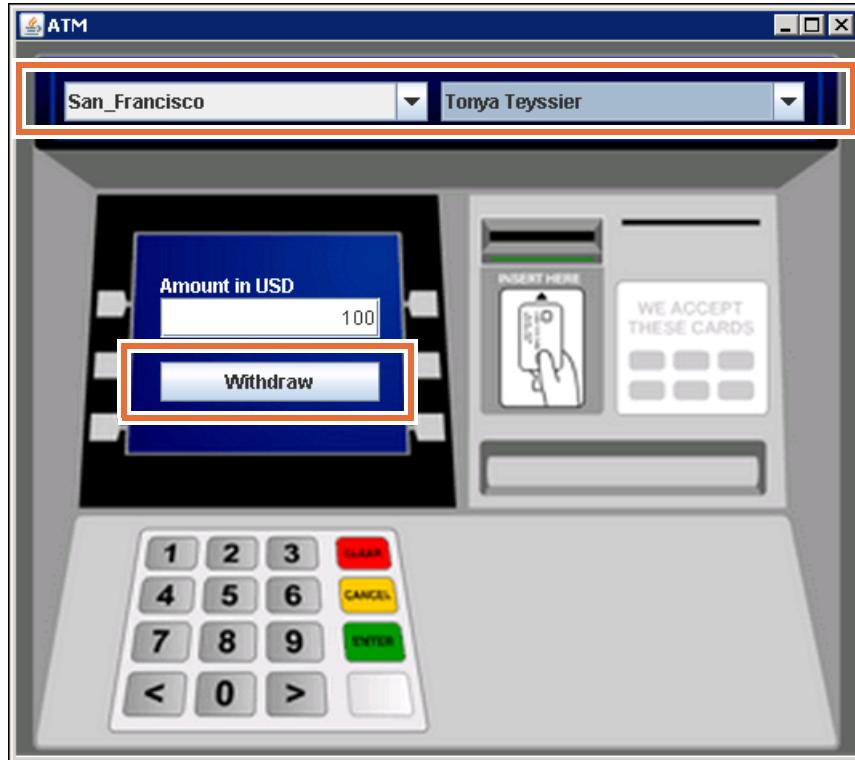
When Tonya checks her account, a check account event is sent to the Insight Server runtime.

The check account event is a banking event that includes Tonya's ID. Thus, according to the statement in the `.adsc` file, it is sent to an instance of the `banking_scenario_agent_product_recommendation` rule agent that is bound to the Tonya entity. The event triggers the New York rule, which sends a product recommendation with the code `BROADWAY SHOW`.

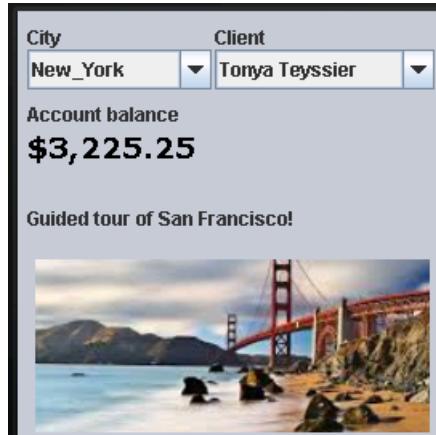
As explained earlier, a Java agent intercepts that product recommendation to check the language, then, emits a message that is displayed on the mobile device.

- 6. Keep the mobile interface open and submit a withdrawal event from a different location.
  - a. Go to the Control Panel and click **LAUNCH ATM**.

- \_\_\_ b. Select **San Francisco** and **Tonya Teyssier**, and click **Withdraw**.



Now, Tonya sees a recommendation (in English) on her mobile phone for a guided tour of San Francisco.



This recommendation is the result of the rule Recommend guided tour of San Francisco. By using the withdrawal operation, Tonya's bank detects that she is in San Francisco.

- \_\_\_ 7. Test the business logic for not resending notifications to clients who already received a particular product recommendation.
- \_\_\_ a. On the mobile device application, wait about 20 seconds, and then click **Check Account** to submit a check account event.
- You should see the Broadway message on the mobile interface because 30 seconds elapsed since the Broadway show was initially recommended.
- \_\_\_ b. Click Check Account again and the Broadway message disappears.

The logic to avoid overwhelming the clients with the same recommendations is implemented in the following condition in the New York rule:

- there is no product recommendation where the code is BROADWAY SHOW and this product recommendation is within 30 seconds before now
- \_\_\_ 8. Next, test the preferred language by switching clients.
- \_\_\_ a. In both the mobile device and the ATM, change **Client** to **Francis Friedlander** and redo the same sequence.
- In the mobile interface, with the city set to **New\_York**, click **Check Account**.
  - In the ATM interface, with the city set to **San\_Francisco**, click **Withdraw**.  
The messages that you see in the mobile interface should be in French.
- \_\_\_ b. In both the mobile device and the ATM, change **Client** to **Di Lang**, and redo the same sequence.
- In the mobile interface, with the city set to **New\_York**, click **Check Account**.
  - In the ATM interface, with the city set to **San\_Francisco**, click **Withdraw**.  
The messages that you see in the mobile interface should be in Chinese.



Rules in the rule agent banking\_scenario\_agent\_product\_recommendation emit a language-neutral product recommendation event with a product code. This event is captured by the Java agent banking\_scenario\_agent\_translation, and is transformed into DisplayableMessage with text in the client's preferred language and a corresponding graphic for the recommended product.



## Troubleshooting

If you do not see the messages as expected, you might need to pause between submitting events to allow the processes to complete.

- \_\_\_ 9. Take some time to review the agent descriptor of the banking\_scenario\_agent\_translation agent.  
You can also check the procedural logic of the agent in the `TranslationAgent.java` file.
- \_\_\_ 10. After you finish testing, click **EXIT** on the Control Panel to close all the interface windows.

## 4.1. Visualizing the event processing in Insight Inspector

Now that you submitted events to the runtime, you can visualize that activity by using Insight Inspector.

- 1. To stop recording, open a browser and type this URL:

```
http://localhost:9080/ibm/insights/rest/recording/stop/
banking_scenario_solution
```

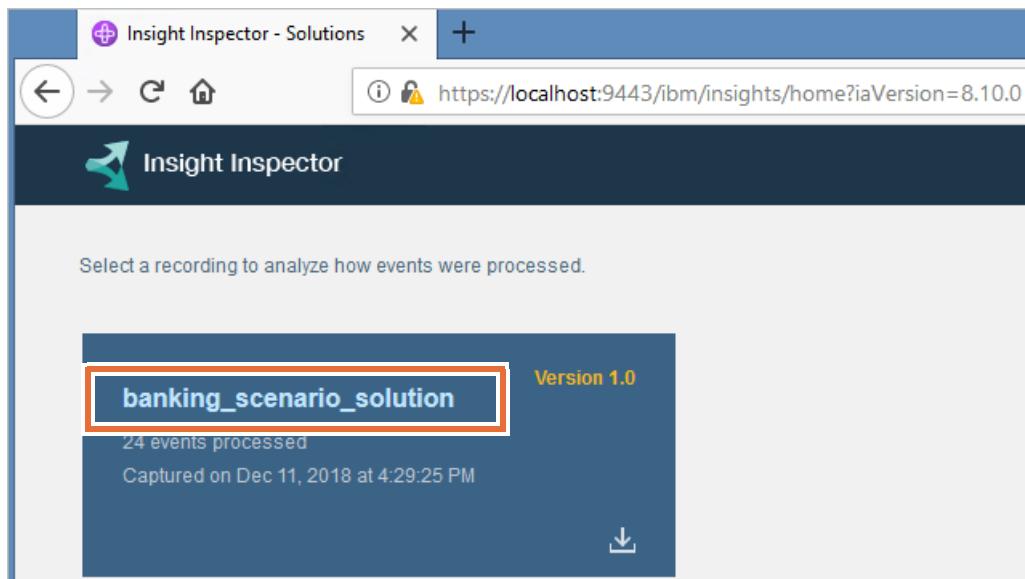
The browser returns a message that the recording stopped. You can now open Insight Inspector so see recorded events for the banking solution.

- 2. Open Insight Inspector by one of the following methods:

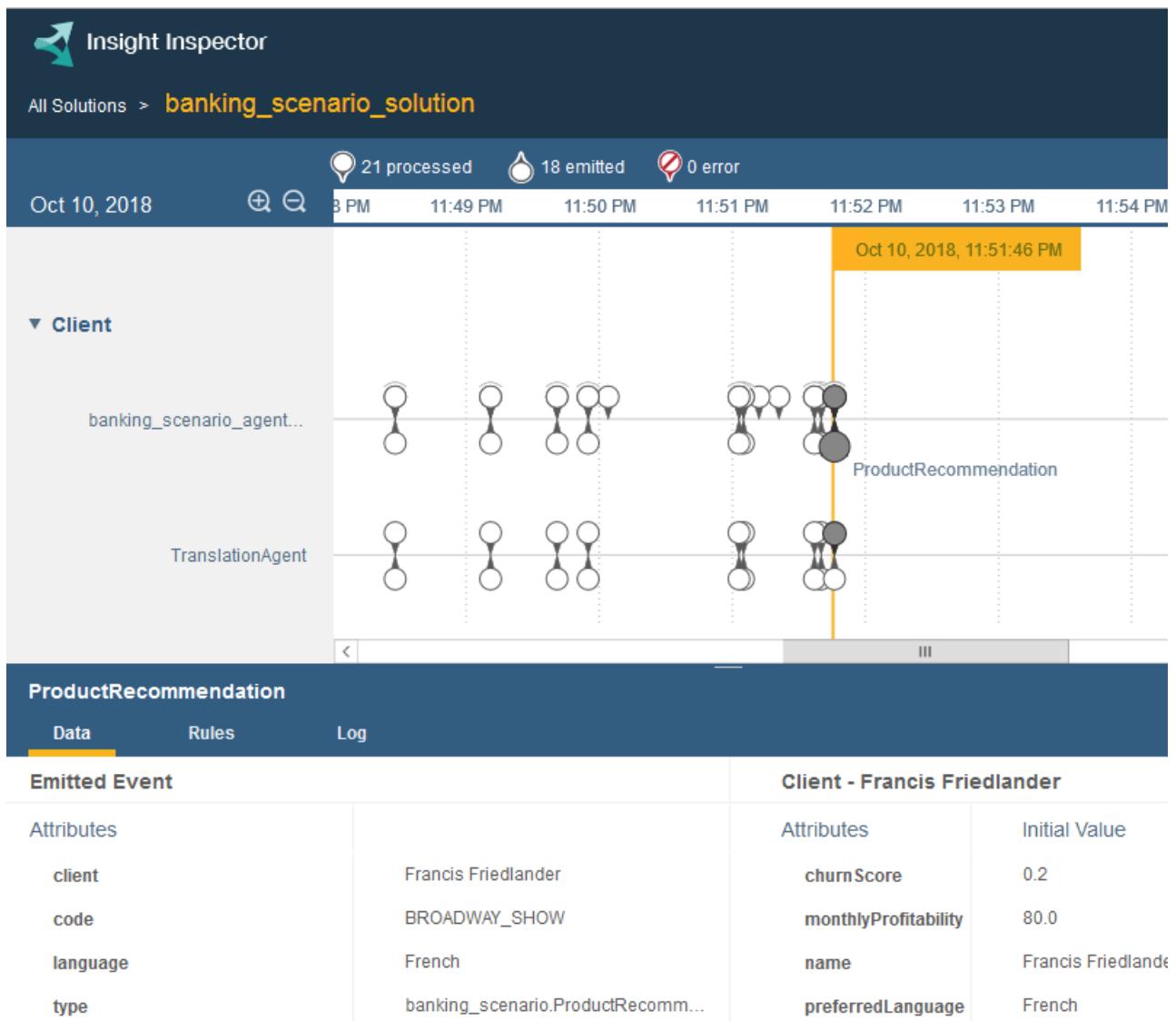
- Open a browser to this URL: <http://localhost:9080/ibm/insights>
- In the Sample Console perspective, click **Launch the Insight Inspector to view test recordings**

Your banking solution is listed on the home page.

- 3. View the events by clicking **banking\_scenario\_solution**.



On the upper pane of Insight Inspector, you see the number of events that were processed and emitted.



Insight Inspector shows a timeline that has the events marked. When you click an event marker, you can review details about that event in the Data view of Insight Inspector.



### Hint

To zoom in and see events that occurred before the end of the recording, click the plus (+) icon. To zoom out, click the minus (-) icon. You can also click and drag the timeline to the left and to the right to move to the beginning of the recording, or back to the final event.

- 4. Close the browser.

## End of exercise

## Exercise review and wrap-up

This exercise showed you how to create a rule agent and bind it to the client entity that you defined in the business model. You also wrote the business logic that detects client behaviors and emits a product recommendation event.

---

# Exercise 6. Using event and shared aggregates in rules

## Estimated time

00:45

## Overview

This exercise shows you how to use event aggregates to analyze a current transaction in comparison to historical transactions.

## Objectives

After completing this exercise, you should be able to:

- Use event aggregates and shared aggregates in rules

## Introduction

This exercise includes these sections:

- [Section 1, "Setting up your workspace"](#)
- [Section 2, "Creating the fraud detection rule agent"](#)
- [Section 3, "Deploying the solution"](#)
- [Section 4, "Testing the solution"](#)
- [Section 5, "Creating a shared aggregate"](#)

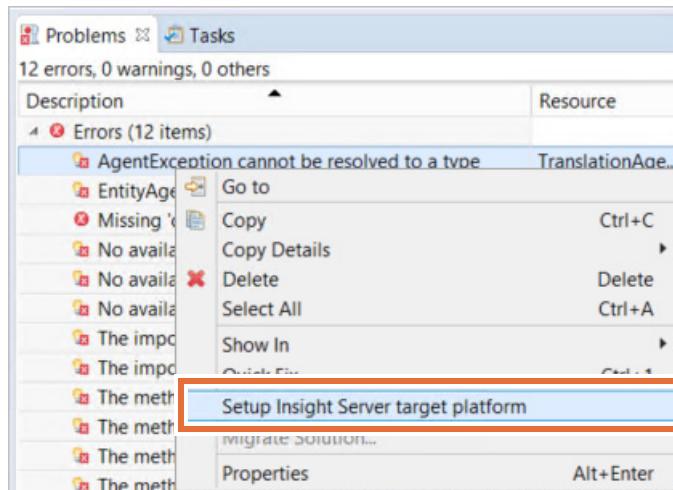
## Requirements

For this exercise, you must switch to a clean workspace and import the projects that are provided for this exercise.

## Section 1. Setting up your workspace

In Insight Designer, you switch to a new workspace for this exercise.

- \_\_\_ 1. Switch to a clean workspace.
  - \_\_\_ a. From the **File** menu, click **Switch Workspace > Other**.
  - \_\_\_ b. When prompted in the Workspace Launcher for a workspace, type a workspace path, such as:  
C:\labfiles\workspaces\fraud
  - \_\_\_ c. Click **Launch**.
- \_\_\_ 2. Import the start projects.
  - \_\_\_ a. From the **File** menu, click **Import**.
  - \_\_\_ b. In the Import wizard, click **General > Existing Projects into Workspace**, and click **Next**.
  - \_\_\_ c. Choose **Select archive file** and click **Browse**.
  - \_\_\_ d. Go to the <*LabfilesDir*> and select the workspace2-fraud-detect.zip file and click **Open**.
  - \_\_\_ e. Click **Finish**.
- \_\_\_ Your workspace now contains all the required projects.
- \_\_\_ 3. Resolve project errors.
  - \_\_\_ a. In the Problems view, expand the list, right-click any of the errors, and click **Setup Insight Server target platform**.



- \_\_\_ b. Wait for the project to rebuild completely.

You should not see any errors after the workspace is rebuilt.

## Section 2. Creating the fraud detection rule agent

In this section, you learn how to create rule agents that detect event patterns that indicate fraud.



### Information

In this step, you write the event processing rule that detects suspicious withdrawal patterns and emits a warning to the bank.

The rule is triggered by withdrawal transactions, which are a particular type of banking event that is described in the BMD. When a withdrawal occurs, the amount of transaction is compared to the average amount for transactions over a specific period, in this case, 50 days. If the comparative value seems abnormal, an alert event is emitted.

### 2.1. Creating the rule agent

- \_\_\_ 1. Create a rule agent named `banking_scenario_agent_fraud_detection`.
    - \_\_\_ a. In Solution Explorer, select `banking_scenario_solution` to open the Solution Map.
    - \_\_\_ b. In the **Author** task of the Solution Map, click **Add rule agent**.
    - \_\_\_ c. In the **Project name** field, type: `banking_scenario_agent_fraud_detection`
    - \_\_\_ d. Click **Finish**.
- The `agent.adsc` file opens in the editor.
- \_\_\_ 2. Complete the agent to match this text:
- ```
'banking_scenario_agent_fraud_detection' is an agent related to a client ,  
processing events :  
- banking event , where this client comes from the client of this banking  
event, with a horizon of 50 days
```



Hint

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder and press Ctrl+Shift+F to format the text.

- ___ 3. Save the `agent.adsc` file and close it.

2.2. Creating the rule: Check amount versus historical average

- ___ 1. Add the **Check amount versus historical average** rule to your rule agent.
 - ___ a. Expand the `banking_scenario_agent_fraud_detection` project, right-click **rules**, and click **New > Action rule**.
 - ___ b. In the **Name** field of the New Action Rule wizard, type `Check amount versus historical average` and click **Finish**.

2. Define the rule.

```

when a withdrawal occurs , called 'NEW TRANSACTION'
definitions
    set 'RECENT TRANSACTIONS' to all withdrawals during the last period of 50
days ;
    set AVERAGE to the average amount of all withdrawals in 'RECENT
TRANSACTIONS' ;
if
    there are at least 5 withdrawals in 'RECENT TRANSACTIONS'
    and the amount of 'NEW TRANSACTION' is more than 3 * AVERAGE
then
    emit a new fraud alert where
        the message is "ATTEMPTING TO WITHDRAW ABNORMALLY HIGH AMOUNT" ,
        the fraud event id is the banking event id of 'NEW TRANSACTION' ,
        the client is 'the client' ;

```

**Hint**

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder and format the text by pressing **Ctrl+Shift+F**.

3. Save the rule (Ctrl+S).**Important**

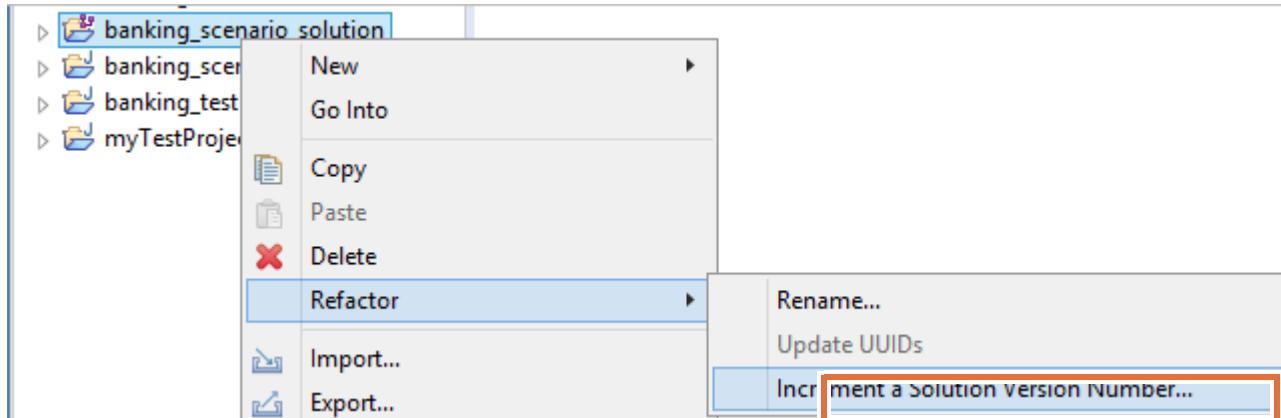
After you create a rule, you should test to ensure that the rule works before you continue writing more rules. For this banking scenario, use the test client that is provided for you.

Section 3. Deploying the solution

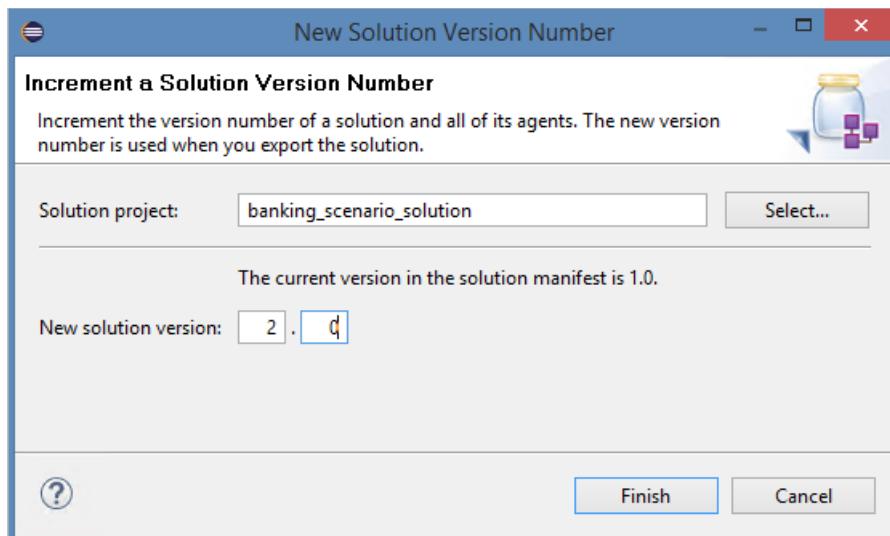
In this section, you deploy the solution.

3.1. Increment the version number

- 1. In Solution Explorer, right-click **banking_scenario_solution**, and click **Refactor > Increment a Solution Version Number**.



- 2. In the **New solution version** field, increment the version to **2.0**.



- 3. Click **Finish** and wait for the workspace to rebuild.

3.2. Deploying the solution

- 1. Make sure that the sample server is running. (You can check by opening the Samples Console perspective, and in the Sample Server view, clicking the “Start the sample server” icon.)

- __ 2. In the Solution Map view, in the **Deploy** goal, click the **Manage deployment configurations** link.



- __ 3. In the **Deployment Configurations** window, select **local** and click **Next**.
- __ 4. Keep **Local server** selected, leave the default server values, and click **Next**.
- __ 5. Leave the default values for the connection properties, and click **Finish**.
- __ 6. When prompted to deploy the solution, click **Yes**.

Deployment takes a few moments. After deployment is complete, in the console, you see messages that state that the deployment was successful.

3.3. Preparing the recording of events in Insight Inspector

Before you submit test events, you can start the recording of event processing for your solution.

- __ 1. Delete the previous recording.
 - __ a. Copy the version and time stamp of the previous recording.
 - If the browser is still open from when you stopped the previous recording, you can copy the recording ID, which includes the solution name, version number, and time stamp.
 - If the browser is closed, run the 'start recording' command:

```
http://localhost:9080/ibm/insights/rest/recording/start/
banking_scenario_solution
```

The browser returns a message that includes the recording ID for the previous recording.

- __ b. Using the recording ID for the previous recording, type the delete command in the browser.

```
http://localhost:9080/ibm/insights/rest/recording/delete/banking_scenario
_solution-version|recordingID
```

For example:

```
http://localhost:9080/ibm/insights/rest/recording/delete/banking_scenario
_solution-1.0|2018-06-06T12:05:29.153-0700
```

Note: Instead of the “|” character before the time stamp, you can use the escape characters: %7C

For example:

```
http://localhost:9080/ibm/insights/rest/recording/delete/banking_scenario
_solution-1.0%7C2018-06-06T12:05:29.153-0700
```

- __ 2. Open a new tab or browser window and type this URL:

http://localhost:9080/ibm/insights/rest/recording/start/banking_scenario_solution



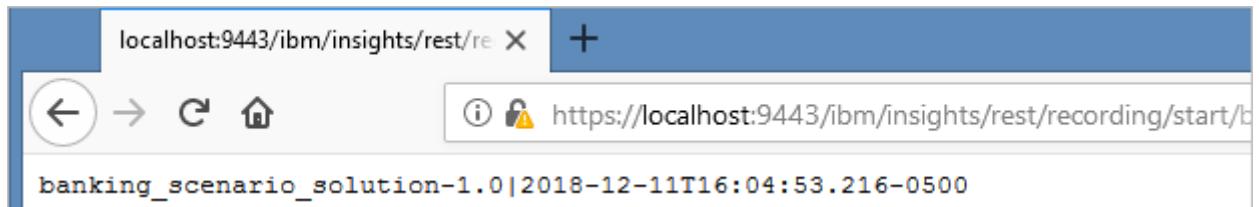
Troubleshooting

If you were unable to delete the previous recording and your browser returns a message that a recording already exists, you can add this parameter to your 'start recording' command: `overwrite=true`

For example:

http://localhost:9080/ibm/insights/rest/recording/start/banking_scenario_solution/overwrite=true

The browser returns a message with the solution name and a time stamp. You use this time stamp as the recording ID to delete this recording after your tests are finished.



- __ 3. Close or minimize the browser while you run tests in the next steps.

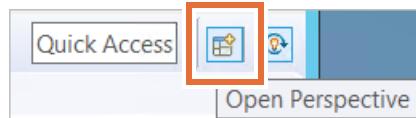
After you finish testing, you return to Insight Inspector to view the results.

Section 4. Testing the solution

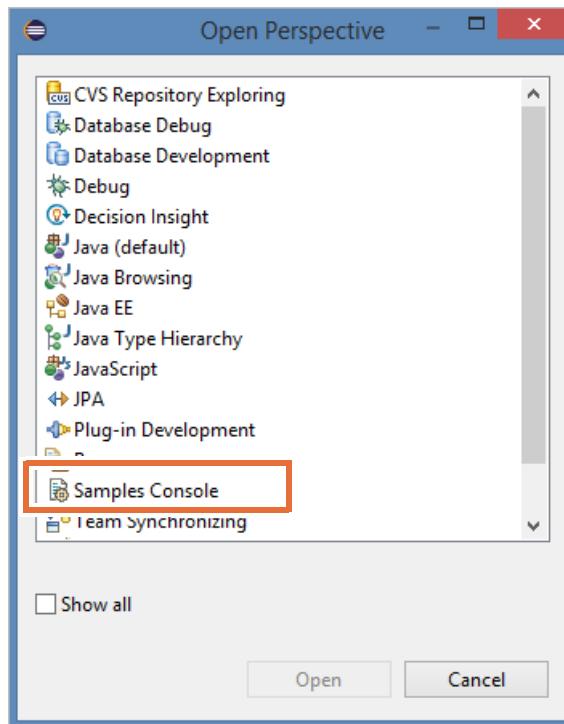
In this section, you test the solution and analyze the activity by using Insight Inspector.

4.1. Test the solution

- 1. In Insight Designer, switch to the Java perspective.
 - a. Click the **Open Perspective** icon in the upper-right corner of the Eclipse window.

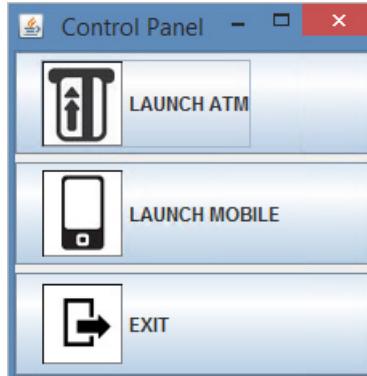


- b. In the Open Perspective window, select **Samples Console**.

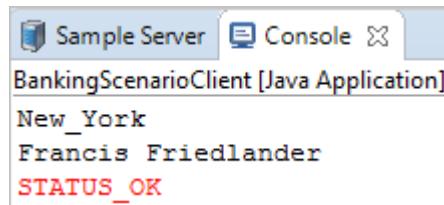


- 2. In the Package Explorer, expand **banking_scenario_client > src > banking_scenario_client**, right-click **BankingScenarioClient.java**, and click **Run As > Java Application**.

The Control Panel opens.

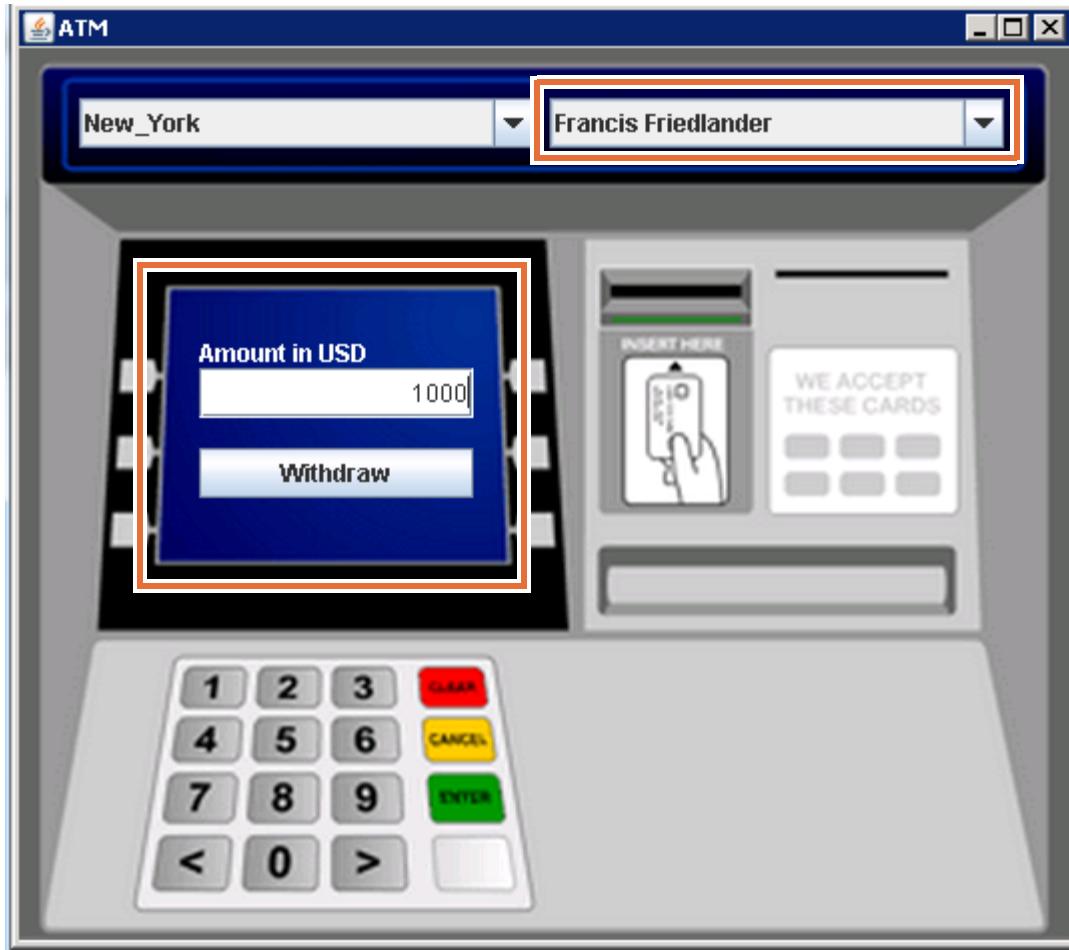


- ___ 3. Click **LAUNCH ATM** and send Withdraw events for Francis Friedlander.
 - ___ a. Set the **Name** field to **Francis Friedlander**.
 - ___ b. Make sure that the **Amount in USD** field is set to **100** and click **Withdraw**.
 - ___ c. Check the Console view to make sure that the Withdraw event was submitted and you see a **STATUS_OK** message.



- ___ d. Click Withdraw at least four more times to send five or more withdrawal events.

- ___ e. Change the value in the **Amount in USD** field to 1000 and click **Withdraw** one time.



- ___ 4. In the test client Control Panel, click **Exit** to close the test client.

Now that you submitted events to the runtime, next, you can visualize that activity by using Insight Inspector.

4.2. Analyze the test results in Insight Inspector

Now that you submitted events to the runtime, you can visualize that activity by using Insight Inspector.

- ___ 1. To stop recording, open a browser and type this URL:

```
http://localhost:9080/ibm/insights/rest/recording/stop/
banking_scenario_solution
```

The browser returns a message that the recording stopped. You can now open Insight Inspector so see recorded events for the banking solution.

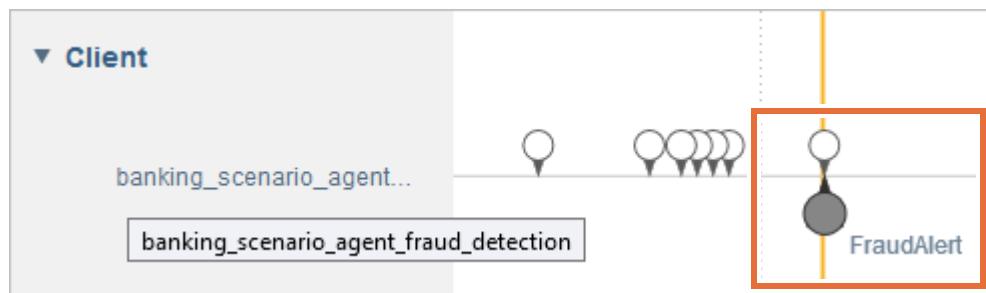
- ___ 2. Open Insight Inspector, by typing the following URL in a browser:

```
http://localhost:9080/ibm/insights
```

Your banking solution is listed on the home page.

- ___ 3. Click **banking_scenario_solution** to view the newly captured recording.

In the timeline of events for banking_scenario_agent_fraud_detection, the last event also has an emitted event icon.



- ___ 4. Click the emitted event icon.
- ___ 5. In the Data view, notice the attributes for the emitted event and their values, including the message value.

ATTEMPTING TO WITHDRAW ABNORMALLY HIGH AMOUNT

The amount of the last withdrawal event is 100 and the amount of the first five events is 1000. The fraud alert was successfully generated and emitted.

Emitted Event	
Attributes	
client	Francis Friedlander
fraudEventId	7
message	ATTEMPTING TO WITHDRAW ABNORMALLY HIGH AMOUNT
type	banking_scenario.FraudAlert

The Rules and Log are available to review next to the Data view of Insight Inspector.

- ___ 6. Click the **Rules** tab to view which rules fired.

Fired	Not Fired	All
✓ Check amount versus historical average		

- ___ 7. Click the **Log** tab to view the processing log.

The screenshot shows the FraudAlert application interface. At the top, there are three tabs: Data, Rules, and Log. The Log tab is highlighted with a yellow border. Below the tabs, a message states "Processing time was Oct 16, 2018 4:07:04 PM EDT". The log content is as follows:

- ▼ Check amount versus historical average was fired
 - AVERAGE was set to 100.0
 - aggregate_3 was set to 100.0
- ▼ NEW TRANSACTION was set
 - ▼ amount
 - \$value : 1000
 - type : int
 - bankingEventId : 7

- ___ 8. After you finish testing and reviewing the results, close Insight Inspector.

Section 5. Creating a shared aggregate

In this section, you create a shared aggregate.

5.1. Review the Check amount versus historical average rule

- 1. Return to the Decision Insight perspective in Insight Designer.
- 2. Expand the **banking_scenario_agent_fraud_detection > rules** folder and double-click the Check amount versus historical average rule to open it.
- 3. Review the rule to understand the **definitions** and the **if** statements.

```

when a withdrawal occurs , called 'NEW TRANSACTION'
definitions
    set 'RECENT TRANSACTIONS' to all withdrawals during the last period of 50
days ;
    set AVERAGE to the average amount of all withdrawals in 'RECENT
TRANSACTIONS' ;
if
    there are at least 5 withdrawals in 'RECENT TRANSACTIONS'
    and the amount of 'NEW TRANSACTION' is more than 3 * AVERAGE
then
    emit a new fraud alert where
        the message is "ATTEMPTING TO WITHDRAW ABNORMALLY HIGH AMOUNT" ,
        the fraud event id is the banking event id of 'NEW TRANSACTION' ,
        the client is 'the client' ;

```

This rule defines two variables to determine the average transactions during a period of 50 days.

Next, you create a shared aggregate and rewrite this rule.

5.2. Create a shared aggregate in the BOM

- 1. Expand **banking_scenario_bom > bom > banking_scenario** and double-click **BusinessModel.bmd**.

- __ 2. Scroll down to the Entities section and append the following line to the client entity:

a client has a average withdrawal (numeric) .

```

17 -----
18 -- Entities --
19 -----
20
21
22
23 a client is a business entity identified by a name .
24 a client has a segment .
25 a client has a churn score ( numeric ) .
26 a client has a monthly profitability ( numeric ) .
27 a client has a propensity to buy BROADWAY SHOW TICKETS ( numeric ) .
28 a client has a preferred language / a language .
29 a client has a average withdrawal ( numeric ) .

```



Hint

You can copy and paste this text from the `bmd-agg.txt` file in the `<LabfilesDir>\code` folder and format the text by pressing **Ctrl+Shift+F**.

- __ 3. Save your work and wait for the workspace to build. Ignore the error, which you resolve next.
- __ 4. In the BOM editor, click the **Statements** tab.

The screenshot shows the BOM editor interface. At the bottom, there are three tabs: Definitions, Statements, and BOM. The Statements tab is highlighted with a red box. The main area displays code starting with line 38, which includes the definition of the `a client related event`.

- __ 5. In the Shared Aggregates section, append the following statement:

the average withdrawal of a client is aggregated from withdrawals ,
where this client comes from the client of each withdrawal
as the average amount of all withdrawals
defaulting to null if there are less than 5 events
available for 50 days with a resolution of 12 hours .



Hint

You can copy and paste this text from the `bmd-agg.txt` file in the `<LabfilesDir>\code` folder and format the text by pressing **Ctrl+Shift+F**.



Information

This business model statement defines the aggregation of values for the average withdrawal as the average number of withdrawal events that the client makes.

-
- ___ 6. Save your work.

5.3. Rewrite the rule

- ___ 1. Compare the statement for the shared aggregate to the original rule in [Section 5.1, "Review the Check amount versus historical average rule".](#)
-



Questions

Consider the following questions:

- Can this statement replace parts of the rule? Which parts?
- How would you rewrite the rule?

-
- ___ 2. Open the Check amount versus historical average rule and replace the contents with the following text:

```
when a withdrawal occurs , called 'NEW TRANSACTION'
if
    the amount of 'NEW TRANSACTION' is more than 3 * the average withdrawal of
    'the client'
then
    emit a new fraud alert where
        the message is "ATTEMPTING TO WITHDRAW ABNORMALLY HIGH AMOUNT" ,
        the fraud event id is the banking event id of 'NEW TRANSACTION' ,
        the client is 'the client' ;
```

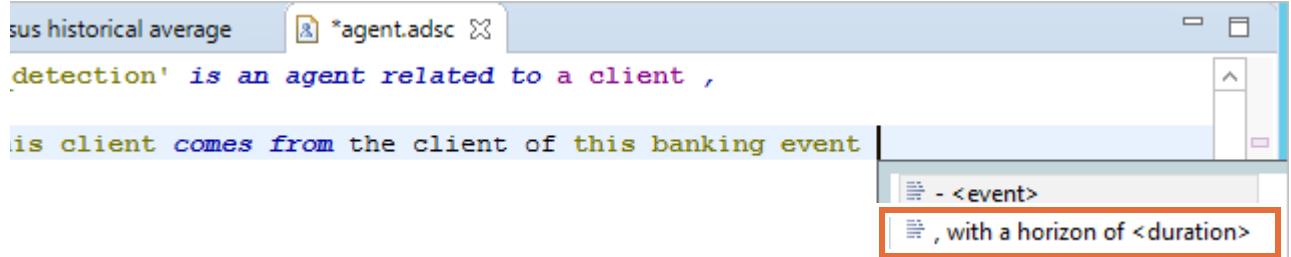


Information

This business model statement defines the aggregation of values for the average withdrawal as the average number of withdrawal events that the client makes. A rule can query the value of this aggregate up to 50 days in the past. The resolution is 12 hours, which means that the aggregate stores $50 \times 24/12 = 100$ values.

-
- ___ 3. Save your work.
 - ___ 4. Redeploy your solution by following the steps in [Section 3, "Deploying the solution"](#). You do not need to increment the solution version.
 - ___ 5. Make sure to delete the old recording for Insight Inspector and restart the recording.

- ___ 6. Test the solution by following the steps in [Section 4, "Testing the solution"](#)
- ___ 7. Optional. Change the event horizon to 0 seconds and note that you get the same results during tests.
 - ___ a. In the **banking_scenario_agent_fraud_detection** folder, double-click **agent.adsc** to open the descriptor.
 - ___ b. At the end of the banking event line, press Space and select , **with a horizon of <duration>**



- ___ c. Type 0 seconds.
- ___ d. Save your work.
- ___ e. Redeploy ([Section 3, "Deploying the solution"](#)) and retest ([Section 4, "Testing the solution"](#)). Make sure to delete the old recording for Insight Inspector and restart the recording.



Important

The default horizon is 30 days, which can result in a very large number of events being kept in history. This has a negative impact on system performance.

A good practice is to have a horizon that is consistent with the longest period of event history that is required by the rules. You can use a long horizon, such as 1 year or more, if you expect a small number of events of a particular type (for best performance, typically less than 200).

End of exercise

Exercise review and wrap-up

This exercise demonstrated the power of local event aggregates. The aggregates correlated the average across the amount attribute for past withdrawal transaction events. The rule was able to access this average for the particular client through the aggregate.

Exercise 7. Testing for the absence of events

Estimated time

00:30

Overview

This exercise covers how to recognize when an event did not occur and respond in a timely manner.

Objectives

After completing this exercise, you should be able to:

- Test for the absence of events

Introduction

This exercise includes these sections:

- [Section 1, "Setting up your workspace"](#)
- [Section 3, "Creating a fraud management rule agent"](#)
- [Section 4, "Deploying the solution"](#)
- [Section 5, "Testing the solution"](#)

Requirements

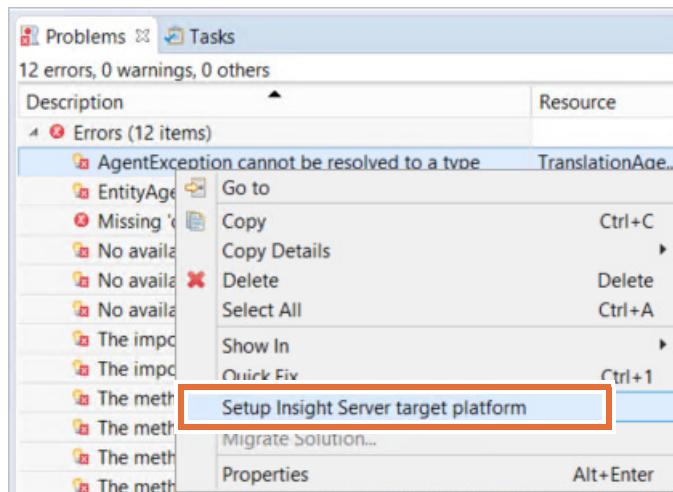
For this exercise, you switch to a clean workspace and import the projects that are provided for this exercise.

Section 1. Setting up your workspace

In Insight Designer, you can continue working in your current workspace or switch to the workspace that is provided for this exercise, which includes the solution to the previous exercise.

- ___ 1. Switch workspaces:
 - ___ a. From the **File** menu, click **Switch Workspace > Other**.
 - ___ b. When prompted in the Workspace Launcher for a workspace, type a workspace path, such as:
C:\labfiles\workspaces\fraud-manage
 - ___ c. Click **Launch**.
- ___ 2. Import the start projects.
 - ___ a. From the **File** menu, click **Import**.
 - ___ b. In the Import wizard, click **General > Existing Projects into Workspace**, and click **Next**.
 - ___ c. Choose **Select archive file** and click **Browse**.
 - ___ d. Go to the `<LabfilesDir>` and select the `workspace3-fraud-manage.zip` file and click **Open**.
 - ___ e. Click **Finish**.

Your workspace now contains all the required projects.
- ___ 3. Resolve project errors.
 - ___ a. In the Problems view, right-click any of the errors and click **Setup Insight Server target platform**.



- ___ b. Wait for the project to rebuild completely.

You should not see any errors after the workspace is rebuilt.

Section 2. Creating a rule to check time and location compatibility

In this section, you add a rule to an existing rule agent. The rule tests against the same banking events that your agent is already subscribed to.

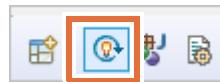


Information

The rule is triggered by any banking event, and immediately verifies the location where the transaction occurred in comparison to the location and timing of previous transactions. If the distance between locations makes the timing of these transactions impossible, a fraud alert is sent to the bank.

2.1. Creating a fraud detection rule: Check distance to recent events

- 1. In Insight Designer, make sure that you are in the same workspace that you used for the previous exercise, and if you are not in the **Decision Insight** perspective, switch to it now.



- 2. Add the **Check distance to recent events** rule to the `banking_scenario_agent_fraud_detection` rule agent.
 - a. Expand the `banking_scenario_agent_fraud_detection` project, right-click **rules**, and click **New > Action rule**.
 - b. In the **Name** field of the New Action Rule wizard, type: `Check distance to recent events`
 - c. Click **Finish**.
- 3. Define the rule.



Information

Facets

This rule uses constructs that are called *facets*. A facet is used in time-based or space-driven logic, and is defined in the business model.

In the business model for this scenario, a time facet is defined for client-related events:

a client related event is a business event time-stamped by a timestamp.

A location facet is defined for banking events:

a banking event has a location (a point) used as the default geometry.

In this rule, you use the time facet of client-related events to compare durations between banking events.

You use the location facet to compare distance between the location of event occurrence.

You see these comparisons in the definitions part of the rule:

- The distance between NEW and OLD, which technically means the distance between the location of NEW and the location of OLD
- The duration between NEW and OLD, which technically means the duration between the time stamp of NEW and the time stamp of OLD

These shortcuts are made possible through facets.

a. Enter the following rule into the rule editor:

```

when a banking event occurs , called NEW
definitions
    set OLD to a banking event ;

    set DISTANCE to the distance between NEW and OLD in terrestrial miles ;
    set DURATION to the duration between NEW and OLD in minutes ;

    set 'MINUTES PER HOUR' to 60 ;

    set 'DRIVE SPEED LIMIT' to 70.0 / 'MINUTES PER HOUR' ;
    set 'DRIVE MAX DISTANCE' to DURATION * 'DRIVE SPEED LIMIT' ;

    set 'DURATION CHECK IN AND LANDING' to 120 ;
    set 'FLY DURATION' to DURATION - 'DURATION CHECK IN AND LANDING' ;
    set 'FLY SPEED LIMIT' to 500.0 / 'MINUTES PER HOUR' ;
    set 'FLY MAX DISTANCE' to 'FLY DURATION' * 'FLY SPEED LIMIT' ;

    set 'CLOSE ENOUGH TO DRIVE' to ( DISTANCE is less than 800 ) ;
    set 'FAR ENOUGH TO FLY'      to ( DISTANCE is more than 500 ) ;

    set 'CAN DRIVE' to 'CLOSE ENOUGH TO DRIVE' and DISTANCE is at most 'DRIVE
MAX DISTANCE' ;
        set 'CAN FLY'   to 'FAR ENOUGH TO FLY'      and DISTANCE is at most 'FLY MAX
DISTANCE' ;

if
    none of the following conditions are true :
        - 'CAN DRIVE'
        - 'CAN FLY'
then
    emit a new fraud alert where
        the message is "ABNORMAL COMBINATION OF BANKING EVENTS" ,
        the fraud event id is the banking event id of NEW ,
        the client is 'the client' ;

```

**Hint**

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder and press Ctrl+Shift+F to format the text.

-
- ___ 4. Save the rule (Ctrl+S).

Section 3. Creating a fraud management rule agent

In this section, you learn how to create a rule agent that tests for the absence of an event. You write a rule to ensure that fraud alerts are handled appropriately and in a timely manner. In particular, if a fraud alert is sent to a client, but no response is received from the client within a specific time lapse, a reminder is sent.



Requirements

When the bank receives a fraud detection alert, clients are asked to verify within 60 minutes whether they are aware of the suspicious transaction.

If the bank does not receive a response from a client about a suspicious transaction, the client is sent a reminder to contact the bank. The reminder should be sent 30 minutes after the initial notification is sent to the client.

3.1. Creating the rule agent

In this step, you create a rule agent that detects suspicious transaction patterns and emits a warning to the client.

- ___ 1. Create a rule agent named banking_scenario_agent_fraud_management.
 - ___ a. In the **Author** task of the Solution Map, click **Add rule agent**.
 - ___ b. In the **Project name** field, type: banking_scenario_agent_fraud_management
 - ___ c. Click **Finish**.

The agent.adsc file opens in the editor.

- ___ 2. Complete the agent to match this text:

```
'banking_scenario_agent_fraud_management' is an agent related to a client ,  
processing events :  
- fraud alert , where this client comes from the client of this fraud alert,  
with a horizon of 60 seconds  
- confirmation from client , where this client comes from the client of this  
confirmation from client, with a horizon of 30 seconds
```



Hint

You can copy and paste this text from the rule-agents.txt file in the <LabfilesDir>\code folder and press Ctrl+Shift+F to format the text.

- ___ 3. Save the agent.adsc file and close it.

3.2. Creating a rule: Ask client to confirm within 60 minutes

- ___ 1. Add the Ask client to confirm within 60 minutes rule to your rule agent.
 - ___ a. Expand the banking_scenario_agent_fraud_management project, right-click **rules**, and click **New > Action rule**.
 - ___ b. In the **Name** field of the New Action Rule wizard, type:
Ask client to confirm within 60 minutes
 - ___ c. Click **Finish**.
- ___ 2. Define the rule to match this text.

```
when a fraud alert occurs
then
  emit a new notification to client where
    the client is the client of this fraud alert ,
    the code is CALL_BANK_60 ;
```



Hint

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder.



Note

The rule is triggered by fraud activity. However, you already wrote fraud detection rules so you do not need to retest for fraudulent conditions. You can write these rules to emit an outbound event that is based on the knowledge that fraudulent activity occurred.

- ___ 3. Save the rule (Ctrl+S) and close it.

3.3. Creating a rule: Remind after 30 min if no action taken

The rule tests for the **absence of an event**. Note for testing purposes, the rule uses 30 seconds instead of minutes.

- ___ 1. Add the Remind after 30 min if no action taken rule to your rule agent.
 - ___ a. Expand the banking_scenario_agent_fraud_management project, right-click **rules**, and click **New > Action rule**.
 - ___ b. In the **Name** field of the New Action Rule wizard, type: Remind after 30 min if no action taken
 - ___ c. Click **Finish**.

__ 2. Define the rule.

```
when a fraud alert has occurred , after a delay of 30 seconds ,  
if  
    there is no confirmation from client  
        where this confirmation from client is after this fraud alert ,  
then  
    emit a new notification to client where  
        the client is the client of this fraud alert ,  
        the code is CALL_BANK_30 ;
```



Hint

You can copy and paste this text from the `rule-agents.txt` file in the `<LabfilesDir>\code` folder.

__ 3. Save the rule (Ctrl+S) and close it.



Note

For testing purposes, the delay in this rule is set to 30 seconds instead of 30 minutes.

Section 4. Deploying the solution

- 1. In the Solution Map view, in the **Deploy** goal, click the **Manage deployment configurations** link.



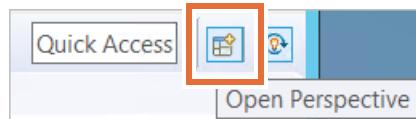
- 2. In the **Deployment Configurations** window, select **local** and click **Next**.
- 3. Keep **Local server** selected, leave the default server values, and click **Next**.
- 4. Leave the default values for the connection properties, and click **Finish**.
- 5. When prompted to deploy the solution, click **Yes**.

Deployment takes a few moments. After deployment is complete, in the console, you see messages that state that the deployment was successful.

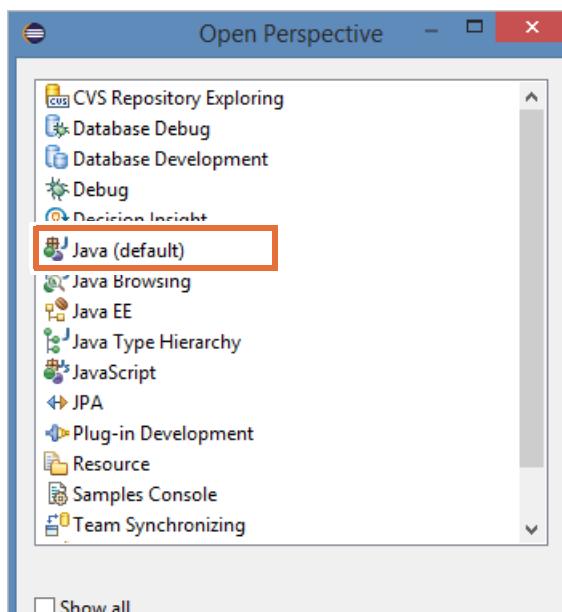
Section 5. Testing the solution

In this section, you test the solution.

- 1. In Insight Designer, switch to the Java perspective.
- a. Click the **Open Perspective** icon in the upper-right corner of the Eclipse window.



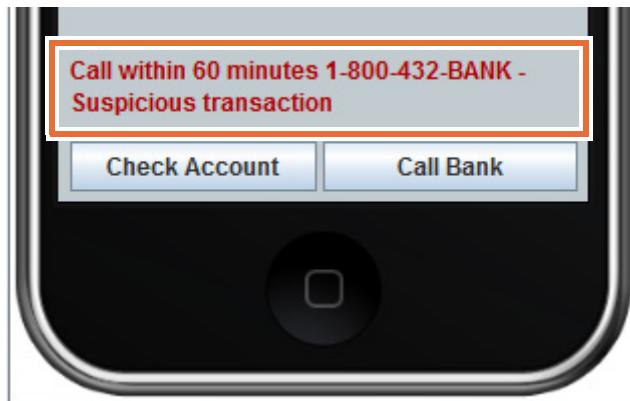
- b. In the Open Perspective window, select **Samples Console**.



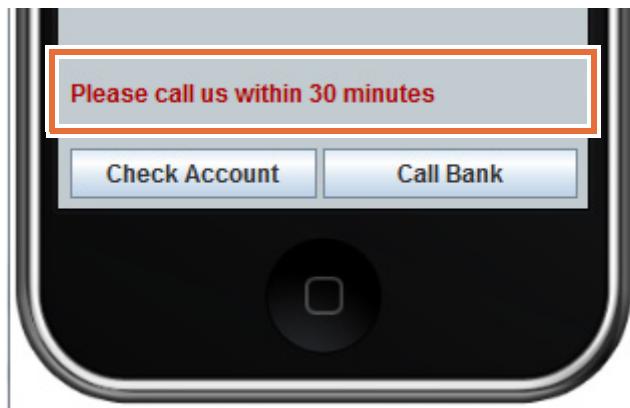
- 2. In the Package explorer, expand **banking_scenario_client > src > banking_scenario_client**, right-click **BankingScenarioClient.java**, and click **Run As > Java Application**.
- 3. Click **LAUNCH MOBILE** and select **June Yoshii** as the client.
- 4. Click **LAUNCH ATM** twice and select **June Yoshii** as the client in both.
 - a. Place the ATM interfaces side by side on your screen.
 - b. Set the ATM options:
 - ATM 1: **New_York** and **June Yoshii**
 - ATM 2: **Newark** and **June Yoshii**
 - c. Click **Withdraw** first on ATM 1, and then on ATM 2.

Make sure that the time lapse between the two clicks is less than the time June needs to drive from New York to Newark.

Immediately after June makes the second withdrawal, June's mobile device displays a message.



- ___ d. Wait for 30 seconds to see the reminder.



- ___ 5. Review the Ask client to confirm within 60 minutes rule to understand the rule behavior in relation to the alert.
- ___ 6. Review the Remind after 30 min if no action taken rule to understand the rule behavior in relation to the reminder message.
- ___ 7. Redo [Step 4](#), and then click **Call Bank** on the mobile interface within 30 seconds.
Because June is calling her bank, her bank can report the fraud case to her. Therefore, she does not get a reminder notification.
- ___ 8. After you finish testing, click **Exit** on the Control Panel.

End of exercise

Exercise review and wrap-up

The exercise demonstrated how to test for the absence of an event and respond in a timely manner.

Exercise 8. Testing solutions

Estimated time

00:30

Overview

This exercise covers how to create and test a solution with the Test Client.

Objectives

After completing this exercise, you should be able to:

- Create a test client project
- Run a test scenario

Introduction

This exercise includes these sections:

- [Section 1, "Creating a test client"](#)
- [Section 2, "Testing the solution with the test client"](#)

Requirements

This exercise requires that a solution be deployed so that you can run tests. You can continue working in the same workspace as the previous exercise or you can switch to a clean workspace.

Section 1. Creating a test client

In this section, you create and run a test client to test the solution that you worked on in previous exercises. You continue in the same workspace as the previous exercise.

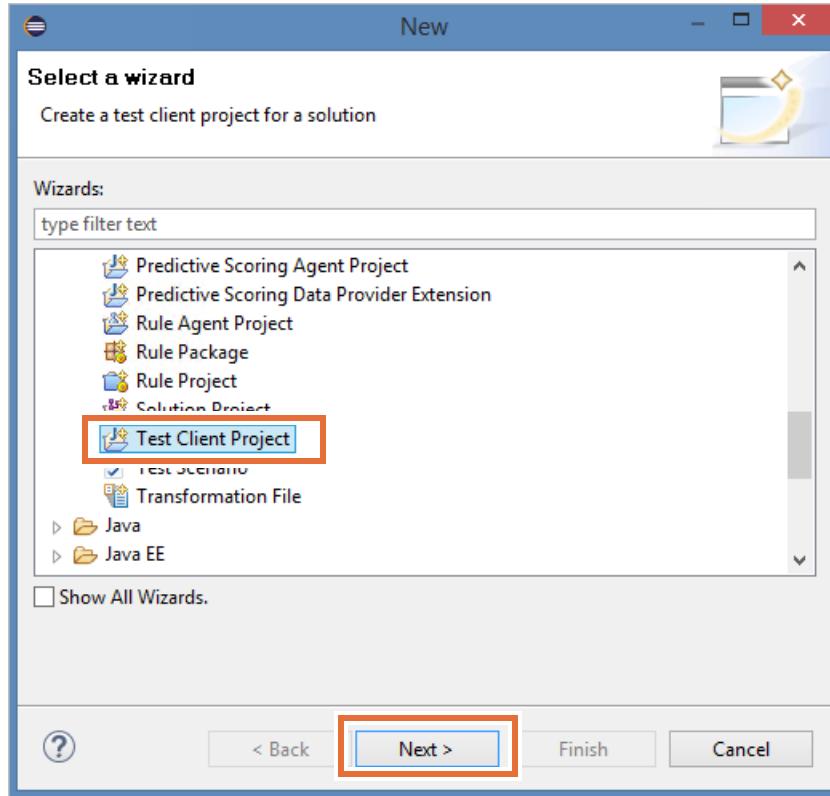


Note

If you were unable to complete the previous exercise, you can switch to a new workspace and import the `workspace4-test.zip` project.

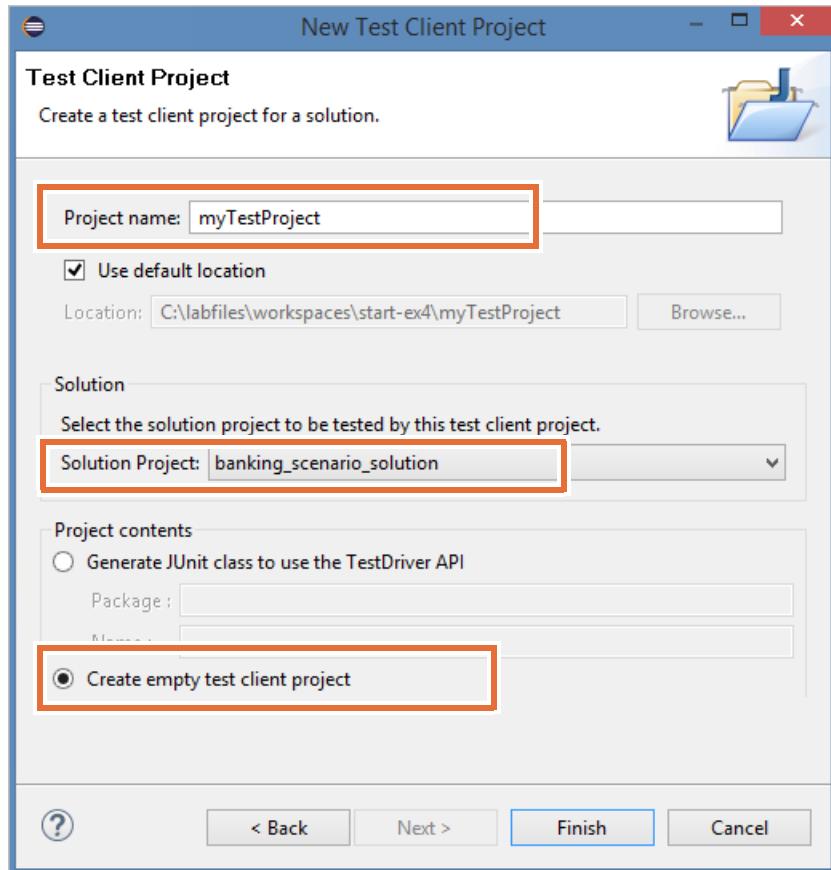
1.1. Create the test client project

- ___ 1. In Insight Designer, make sure that you are in the Decision Insight perspective.
- ___ 2. From the **File > New > Other** menu, click **Insight Designer > Test Client Project** and click **Next**.



- ___ 3. Define your test project.
 - ___ a. In the **Name** field, type: `myTestProject`
 - ___ b. In the **Solution Project** field, make sure that `banking_scenario_solution` is selected.

- __ c. In the **Project contents** section, select **Create empty test client project**.

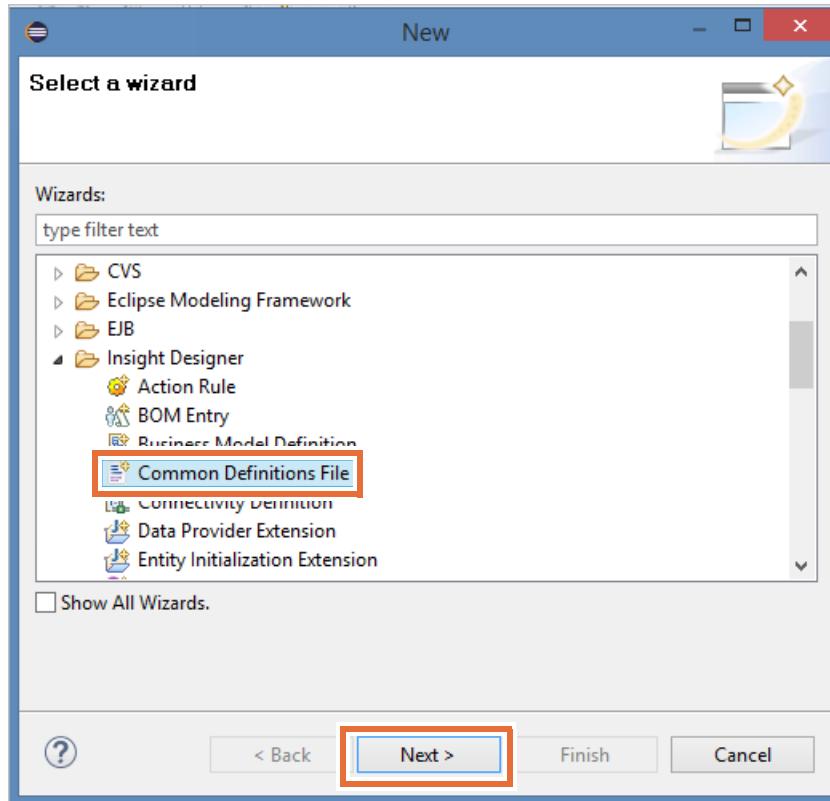


- __ d. Click **Finish**.

The new test client project is generated and opens in Solution Explorer.

1.2. Define the test client artifacts

- ___ 1. Create the common definitions file.
- ___ a. Expand **myTestProject**, right-click the **Common Definitions** folder of **myTestProject**, click **New > Other > Insight Designer > Common Definitions File**, and click **Next**.



- ___ b. In the **Name** field, type `commondef` and click **Finish**.
- ___ c. Add these definitions.

```
define 'francis' as a new client where
    the name is "Francis Friedlander" ,
    the churn score is 0.2 ,
    the monthly profitability is 80 ,
    the preferred language is French ,
    the propensity to buy BROADWAY_SHOW_TICKETS is 0.85 ,
    the segment is GOLD ;
```



Hint

You can copy and paste this text from the `test-client.txt` file in the `<LabfilesDir>\code` folder and press **Ctrl+Shift+F** to format the text.

- ___ d. Save the file and close it.

2. Create an entity loader

- a. Right-click the **Entity Loaders** folder, click **New > Other > Insight Designer > Entity Loader**, and click **Next**.
- b. In the **Name** field, type `clients` and click **Finish**.
- c. Add these entities.

```
using definitions from "commongef" ;
load francis ;
```



Hint

You can copy and paste this text from the `test-client.txt` file in the `<LabfilesDir>\code` folder and press **Ctrl+Shift+F** to format the text.

d. Save the file and close it.

3. Create an event sequence

- a. Right-click the **Event Sequences** folder and click **New > Other > Insight Designer > Event Sequence** and click **Next**.
- b. In the **Name** field, type `fraud` and click **Finish**.
- c. Add these events.

```
using definitions from "commongef" ;
```

```
define atm1 as a new withdrawal where
    the client is francis ,
    the amount is 100 ,
    the banking event id is "0021" ,
    the city is Paris ,
    the location is the point with 2.3508 as longitude and 48.8567 as
    latitude ;
```

```
define atm2 as a new withdrawal where
    the client is francis ,
    the amount is 100 ,
    the banking event id is "0022" ,
    the city is Beijing ,
    the location is the point with 116.4074 as longitude and 39.9042 as
    latitude ;
```

```
emit atm1 , time-stamped 06/01/2018 10:00:00 AM -0500 ;
emit atm2 , time-stamped 5 minutes later ;
```

**Hint**

You can copy and paste this text from the `test-client.txt` file in the `<LabfilesDir>\code` folder and press Ctrl+Shift+F to format the text.

-
- d. Save the file and close it.
 - 4. Create a test scenario.
 - a. Right-click the **Test Scenarios** folder and click **New > Other > Insight Designer > Test Scenario** and click **Next**.
 - b. In the **Name** field, type `fraud` and click **Finish**.
 - c. Add these definitions and close the file.

```
load entities from "clients" ;  
check that the client "Francis Friedlander" exists ;  
submit events from "fraud" ;
```

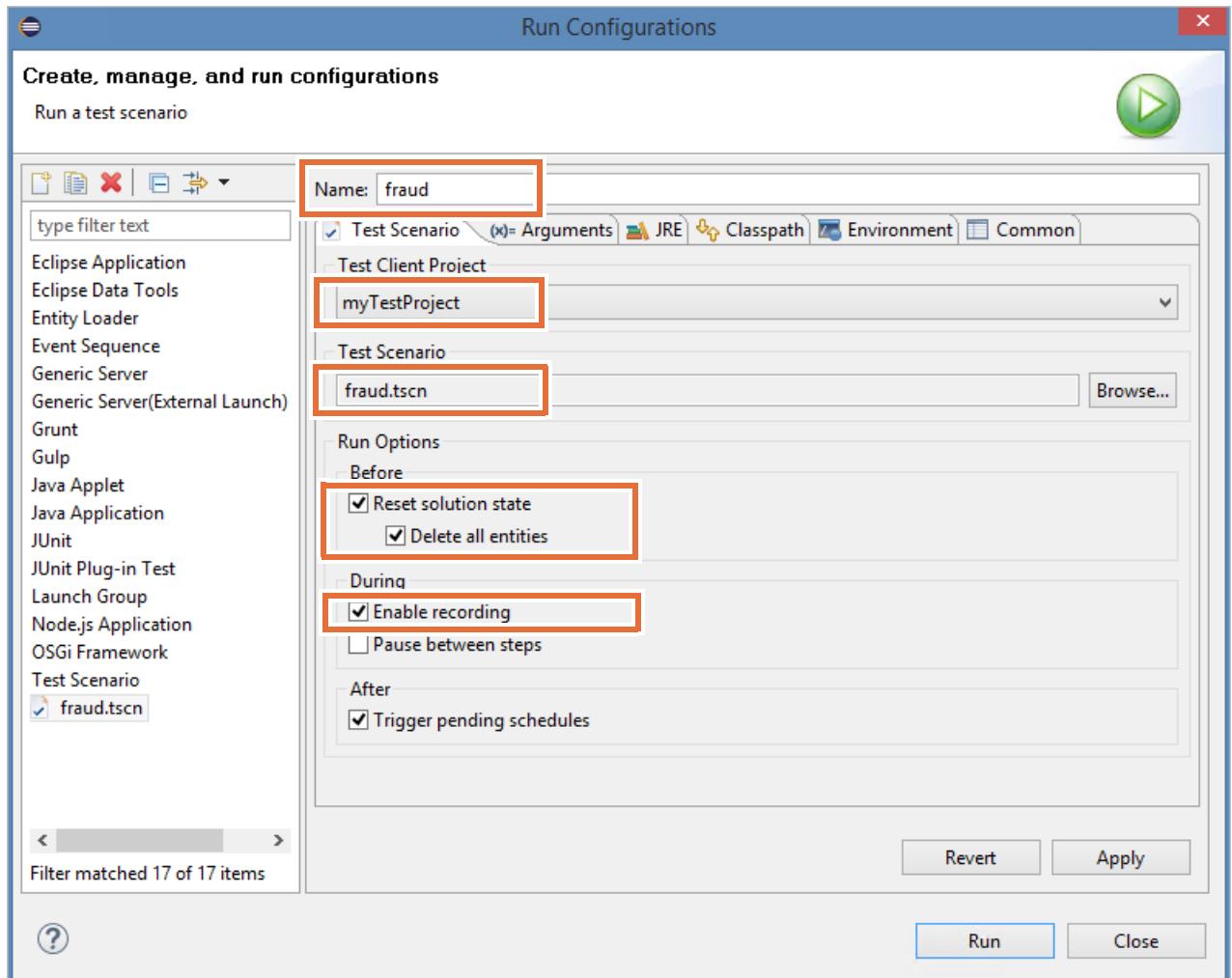
**Hint**

You can copy and paste this text from the `test-client.txt` file in the `<LabfilesDir>\code` folder and press Ctrl+Shift+F to format the text.

-
- d. Save the file and close it.

Section 2. Testing the solution with the test client

- 1. In the Solution explorer, expand **myTestProject > Test Scenarios**, right-click **fraud.tscn**, and click **Run As > Test Scenario**.
The Run Configurations window opens.
- 2. Create a Test Scenario configuration.
 - a. Set the **Name** field to **fraud** by removing “.tscn” from the name.
 - b. In the **Test Client Project** field, make sure that **myTestProject** is selected.
 - c. In the **Test Scenario** field, make sure that **fraud.tscn** is selected. Otherwise, you can click **Browse**, and browse to the **fraud.tscn** file.
 - d. In **Run Options**, select:
 - **Reset solution state**
 - Delete all entities**
 - **Enable recording**



- 3. Click **Run**.

After the test finishes, you see a message in the Console that the test scenario passed.

In the Console, the “passed” message is followed by a link to the Insight Inspector recording of this test.

```
INFO] === Test Scenario "fraud" : PASSED ===
INFO] Waiting for event processing to complete.
INFO] CWMBG5001I: Recording stopped [solution name: banking_scenario_solution]
INFO] Access the recording of this session here: https://localhost:9443/ibm/insights/view?id=banking\_scenario\_solution
WARNING] CWMBD9712W: Hostname verification is disabled by the "disableSSLHostnameVerification" connection configuration
WARNING] CWMBD9712W: Hostname verification is disabled by the "disableSSLHostnameVerification" connection configuration
```

- 4. Copy the link from the console and paste it in a browser to open Insight Inspector.

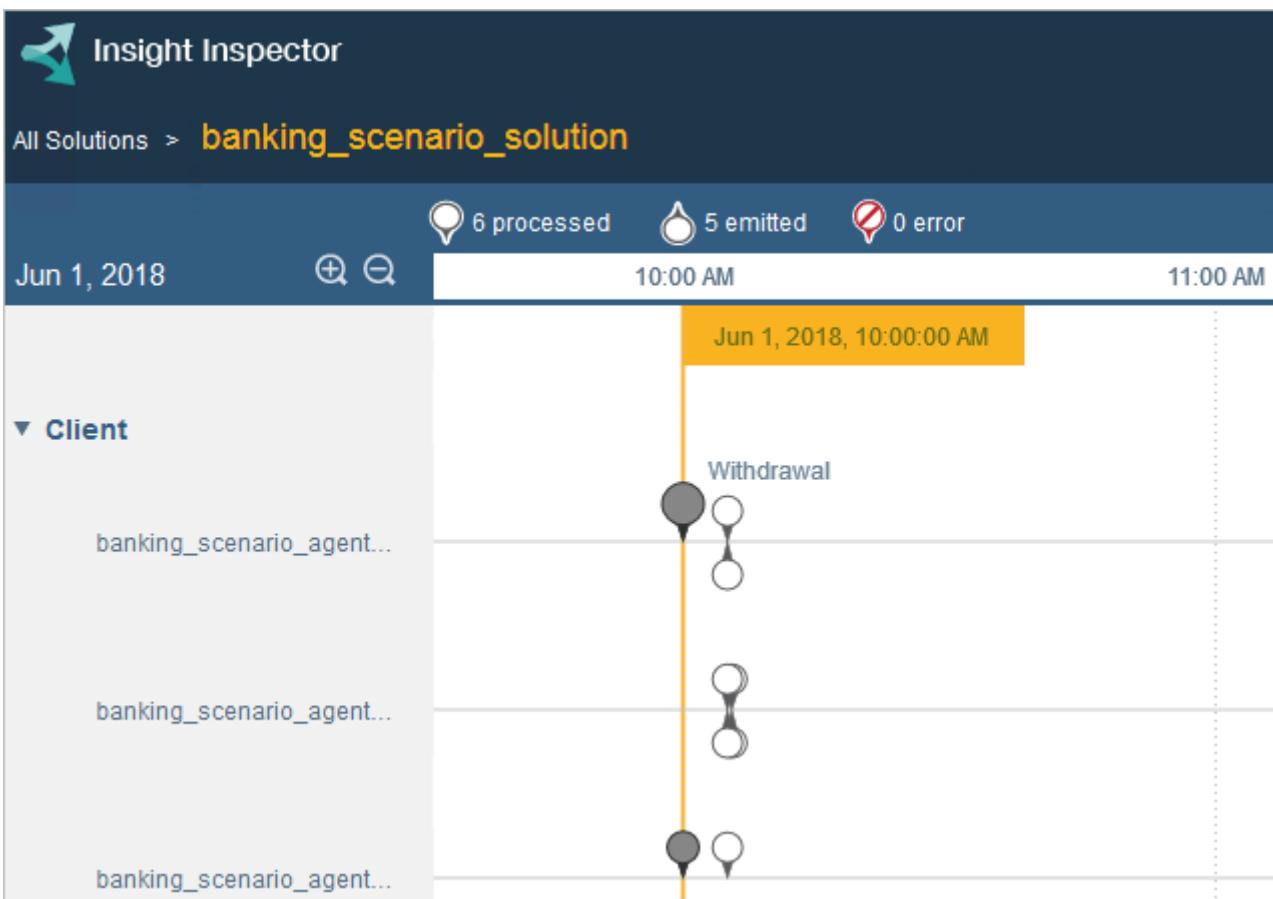
2.1. Analyze the test results in Insight Inspector

- 1. In the browser open to the Insight Inspector link from the previous step, scroll to **Jun 1, 2018** to find the events that were processed and emitted.



Note

Use the scroll and zoom tools so that you can better see the different events.



- 2. Click the first submitted “withdrawal” event to see the description in the **Data** section of the lower pane. In the **Attributes** list, the **city** is **Paris**.

- ___ 3. Click the second submitted “withdrawal” event and note that the **city** is **Beijing**.
- ___ 4. Click the **Rules** tab to see which rule fired.

The screenshot shows the 'Withdrawal' interface with the 'Rules' tab selected. Below the tabs, there are three buttons: 'Fired' (highlighted in orange), 'Not Fired', and 'All'. Under the 'Fired' button, a rule is listed with a green checkmark icon and the text 'Check distance to recent events'.

- ___ 5. Click the **Log** tab to see how the rule was processed.

The screenshot shows the 'Withdrawal' interface with the 'Log' tab selected. At the top, it says 'Processing time was Jun 1, 2018 11:05:00 AM EDT'. Below that, a list of rule execution steps is shown, starting with '▼ Check distance to recent events was fired' and ending with 'FraudAlert was emitted'.

```

▼ Check distance to recent events was fired
▶ NEW was set
CLOSE ENOUGH TO DRIVE was set to false
CAN DRIVE was set to false
DISTANCE was set to 5111.573093965814
DRIVE MAX DISTANCE was set to 5.833333333333334
CAN FLY was set to false
▶ OLD was set
MINUTES PER HOUR was set to 60
DRIVE SPEED LIMIT was set to 1.1666666666666667
FAR ENOUGH TO FLY was set to true
DURATION CHECK IN AND LANDING was set to 120
FLY MAX DISTANCE was set to -958.3333333333334
FLY DURATION was set to -115
FLY SPEED LIMIT was set to 8.333333333333334
DURATION was set to 5
FraudAlert was emitted

```

- ___ 6. After you finish reviewing the test results, close the browser.

End of exercise

Exercise review and wrap-up

The exercise demonstrated how to test for the absence of an event and respond in a timely manner.

Exercise 9. Defining connectivity

Estimated time

00:30

Overview

This exercise shows how to define connectivity for a solution. In a later exercise, you deploy and test the connectivity.

Objectives

After completing this exercise, you should be able to:

- Configure inbound and outbound endpoints
- Generate and validate connectivity configurations

Introduction

In this exercise, you define connectivity for a solution.

This exercise includes these sections:

- [Section 1, "Setting up your workspace"](#)
- [Section 2, "Creating connectivity definitions for the solution"](#)
- [Section 3, "Exporting a solution for deployment"](#)
- [Section 4, "Generating connectivity configurations"](#)

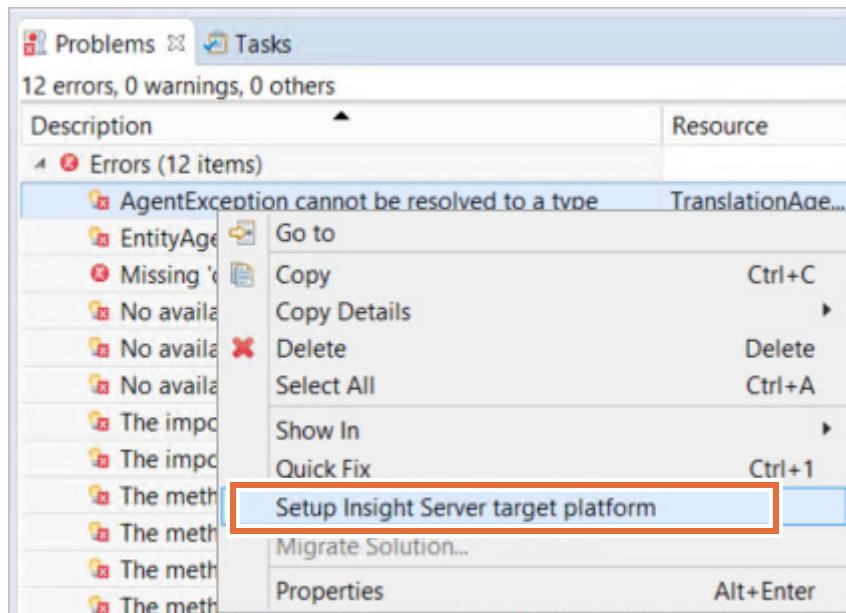
Requirements

This exercise has no requirements.

Section 1. Setting up your workspace

In Insight Designer, switch to the workspace that is provided for this exercise, which includes the solution to the previous exercise.

- ___ 1. In Insight Designer, switch to a new workspace and import the projects for this exercise:
 - ___ a. From the **File** menu, click **Switch Workspace > Other**.
 - ___ b. When prompted in the Workspace Launcher for a workspace, type a workspace path, such as:
C:\labfiles\workspaces\connectivity
 - ___ c. Click **Launch**.
- ___ 2. Import the start projects.
 - ___ a. From the **File** menu, click **Import**.
 - ___ b. In the Import wizard, click **General > Existing Projects into Workspace**, and click **Next**.
 - ___ c. Choose **Select archive file** and click **Browse**.
 - ___ d. Go to the `<LabfilesDir>` and select the `workspace-final.zip` file and click **Open**.
 - ___ e. Click **Finish** and wait for the workspace to build.
- ___ Your workspace now contains all the required projects.
- ___ 3. Resolve project errors.
 - ___ a. In the Problems view, expand the list, right-click any of the errors, and click **Setup Insight Server target platform**.



- ___ b. Wait for the project to rebuild completely.

Ignore the Warnings in the Problems view. You should not see errors after the workspace is rebuilt.

Section 2. Creating connectivity definitions for the solution

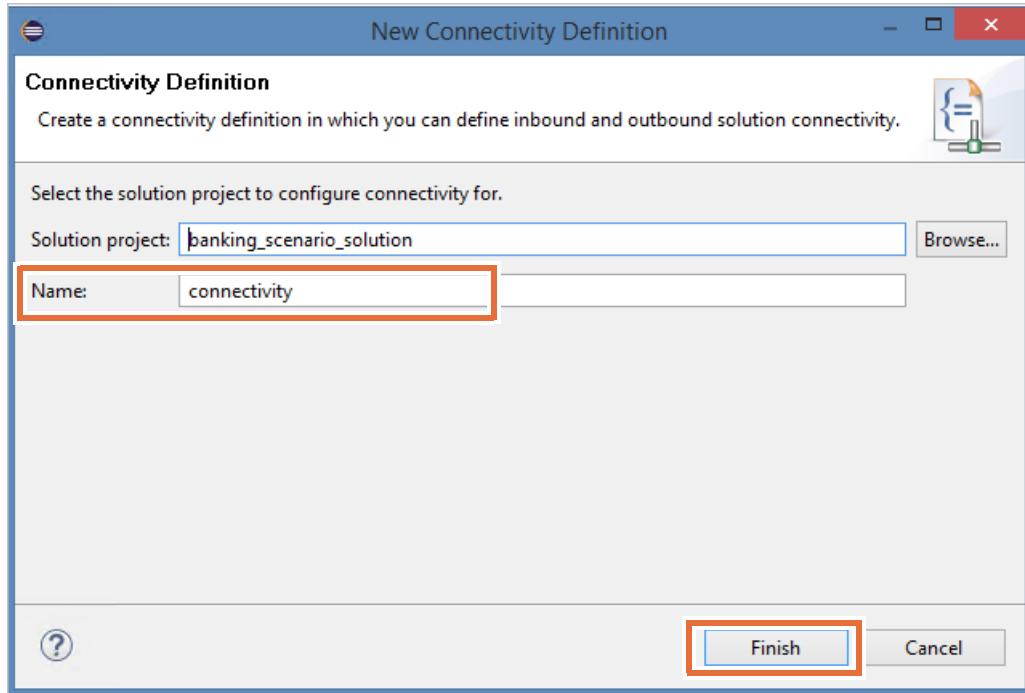
In this section, you define the inbound and outbound endpoints and connectivity definitions for a solution.

- __ 1. In Solution Explorer, click **banking_scenario_solution** to open the **Solution Map** view.
- __ 2. In the Integrate goal, click the **Define connectivity** link.

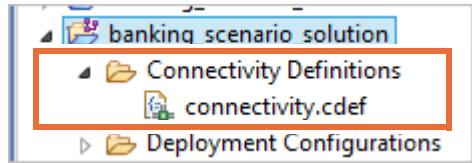


The New Connectivity Definition wizard opens.

- __ 3. Leave the **Name** field set to **connectivity** and click **Finish**.



The **connectivity.cdef** file opens in the editor. You can expand the **banking_scenario_solution > Connectivity Definitions** folder to see the file in Solution Explorer.



__ 4. Define the inbound binding and endpoint.

- __ a. In the editor, after the introductory comment line, type the following text to define the inbound binding.

```
define inbound binding 'checkAccount'
with
    description "Check Banking Account",
using
    message format application/xml ,
    protocol HTTP ,
accepting events :
    - check account event .
```



Note

You use the completion menu of the Connectivity Definition editor to specify the required elements in the `.cdef` file.

You can also copy and paste this text from the `connectivity.txt` file in the `<LabfilesDir>\code` folder. After you paste the text, press **Ctrl+Shift+F** to format it.

- __ b. Starting on a new line, type the following text to define the inbound endpoint.

```
define inbound HTTP endpoint 'banking1'
with
    description "Inbound Check Banking Account from the web",
using
    binding 'checkAccount' ,
url path "/banking/incoming".
```

```
connectivity.cdef
1 // Connectivity definitions for the solution
2 define inbound binding 'checkAccount'
3     with
4         description "Check Banking Account" ,
5     using
6         message format application/xml ,
7         protocol HTTP ,
8     accepting events :
9         - check account event .
10
11 define inbound HTTP endpoint 'banking1'
12     with
13         description "Inbound Check Banking Account from the web" ,
14     using
15         binding 'checkAccount' ,
16         url path "/banking/incoming" .
17
```

___ 5. Starting on a new line, type the following text to define the outbound binding and endpoint.

```
define outbound binding 'message'
  with
    description "Outbound displayable message" ,
    using
      message format application/xml ,
      protocol HTTP ,
    delivering events :
      - displayable message .

define outbound HTTP endpoint 'notificationToClient'
  with
    description "Outbound message" ,
    using
      binding 'message' ,
      url "http://localhost:8081" .
```

___ 6. Create a JSON-formatted inbound event.

___ a. Starting on a new line, type the following text to define the inbound binding.

```
// JSON definitions for Purchase event
define inbound binding 'purchase'
  with
    description "JSON Example binding" ,
    using
      message format application/json ,
      protocol HTTP ,
    accepting events :
      - purchase .
```

___ b. Starting on a new line, type the following text to define the inbound endpoint.

```
define inbound HTTP endpoint 'purchaseEP'
  with
    description "JSON example" ,
    using
      binding 'purchase' ,
      url path "/banking/purchase" .
```

___ 7. Save your work and close the file.



Note

DSI has specific requirements on the way you format JSON events. For guidance about mapping business model data types to JSON, see:

www.ibm.com/support/knowledgecenter/en/SSQP76_8.10/com.ibm.odm.itoa.ref/topics/ref_rest_json_mapping.html.



Syntax

Here is an example of the JSON representation and the XML representation of an instance of the Purchase event.

- JSON representation of the Purchase event:

```
{
  "$class": "banking_scenario.Purchase",
  "country": "France",
  "amount": 100,
  "city": "Paris",
  "county": "NONE",
  "typeOfGood": "COMPUTING",
  "client": "client",
  "land": "NONE",
  "bankingEventId": "bankingEventId",
  "location": {
    "coordinates": [35.04441810662473, 32.80011518953123]
  },
  "state": "NONE",
  "timestamp": "2001-12-31T12:00:00"
}
```

- XML representation of the Purchase event:

```
<?xml version="1.0" encoding="UTF-8"?>
<m:Purchase
  xmlns:m="http://www.ibm.com/ia/xmlns/default/banking_scenario_bom/model"
  xmlns:p="http://www.ibm.com/geolib/geom"
  xmlns:p1="http://www.ibm.com/geolib/crs"
  xmlns:tns="http://www.ibm.com/geolib/unit"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.ibm.com/ia/xmlns/default/banking_scenario_bom/model model.xsd ">
  <m:client>m:client</m:client>
  <m:timestamp>2001-12-31T12:00:00</m:timestamp>
  <m:bankingEventId>m:bankingEventId</m:bankingEventId>
  <m:city>Paris</m:city>
  <m:country>France</m:country>
  <m:county>NONE</m:county>
  <m:land>NONE</m:land>
  <m:location>
    <p:coordinates>35.04441810662473</p:coordinates>
    <p:coordinates>32.80011518953123</p:coordinates>
  </m:location>
```

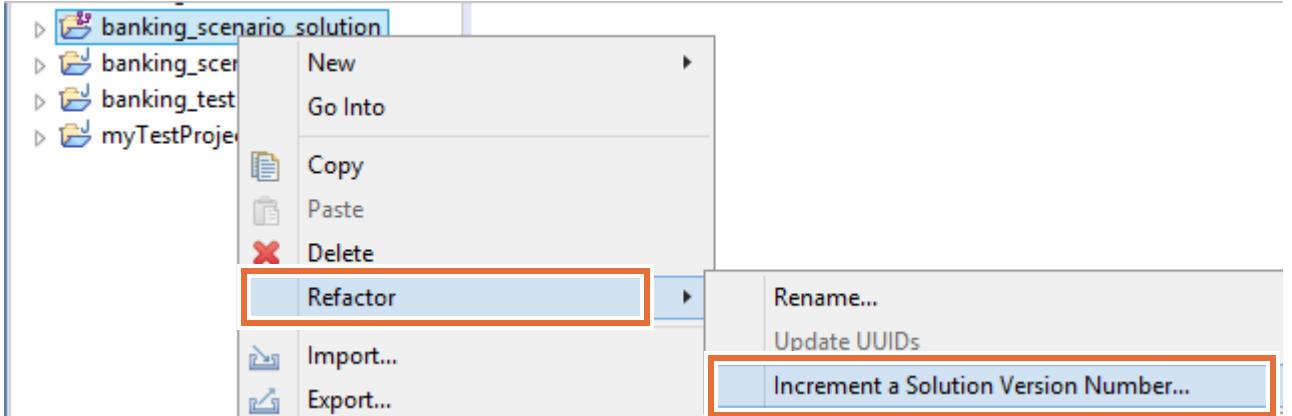
```
<m:state>NONE</m:state>
<m:amount>100</m:amount>
<m:typeOfGood>COMPUTING</m:typeOfGood>
</m:Purchase>
```

Section 3. Exporting a solution for deployment

In this section, you export the solution archive so that it can be managed for deployment.

3.1. Increment the version number

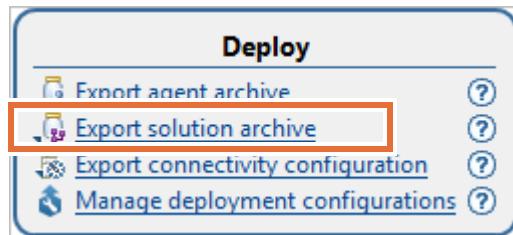
- 1. In Solution Explorer, right-click **banking_scenario_solution**, and click **Refactor > Increment a Solution Version Number**.



- 2. In the **New solution version** field, increment the major version. For example, if the version was **3.0**, change it to **4.0**.
- 3. Click **Finish** and wait for the workspace to rebuild.

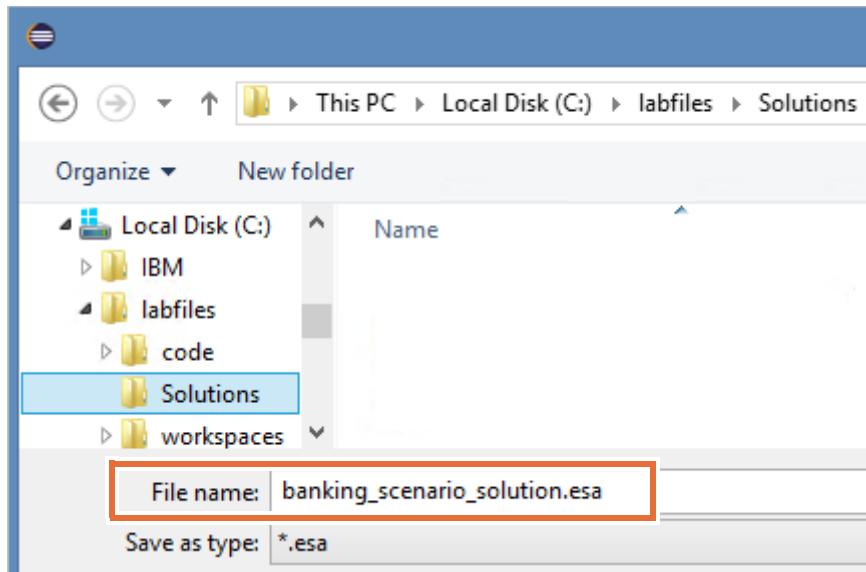
3.2. Export the solution archive

- 1. In the Decision Insight perspective, make sure that the **banking_scenario_solution** project is selected with your mouse and open the **Solution Map** view.
- 2. In the **Deploy** part of the Solution Map, click the **Export solution archive** link.



- 3. In the Solution Archive Export wizard, click **Browse** to set the **Output file** field to:
 <*LabfilesDir*>\Solutions
 Where <*LabfilesDir*> is by default: C:\labfiles

- __ 4. Remove the version number from the archive file name and click **Save**.



Note

By default, when you select the output directory, the default archive name is provided with the version number and the ".esa" file extension.

- __ 5. Click **Finish**.

Section 4. Generating connectivity configurations

In this section, you use the `connectivityManager` script to generate and validate connectivity configurations.

4.1. Preparing the inbound application and configuration

- 1. Generate an inbound application EAR.

- a. Open a command prompt and change to the `ia\bin` directory.

```
cd C:\IBM\ODMInsights810\runtime\ia\bin
```

- b. Type the following `connectivityManager` command.

```
connectivityManager generate application
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking_scenario_solution-inbound.ear
```



Hint

You can copy and paste the command lines from the `dsi.txt` file in the `<LabfilesDir>\code` folder.

After generation finishes, you see a “Successfully generated” message.

```
Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\IBM\ODMInsights810\runtime\ia\bin
C:\IBM\ODMInsights810\runtime\ia\bin>connectivityManager generate application C:
\labfiles\Solutions\banking_scenario_solution.esa C:\labfiles\Solutions\banking_
scenario_solution-inbound.ear
CWMBE1146I: Reading the input file: C:\labfiles\Solutions\banking_scenario_solut
ion.esa
CWMBE1148I: Writing to the output file: C:\labfiles\Solutions\banking_scenario_s
olution-inbound.ear
CWMBE1474I: Successfully generated the solution inbound connectivity application
file: C:\labfiles\Solutions\banking_scenario_solution-inbound.ear
```

- 2. Generate the XML configuration file for deploying inbound connectivity by typing this command.

```
connectivityManager generate config
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking-server-inbound-config.xml
--inboundEndpoints="*"
```

After generation finishes, you see a “Successfully generated” message.

```
CWMBE1494I: Successfully generated a template solution connectivity configuratio
n file "C:\labfiles\Solutions\banking-server-inbound-config.xml" for the solution
"banking_scenario_solution".
```

- ___ 3. Edit the newly generated configuration file to edit it.
 - ___ a. In the C:\labfiles\Solutions directory, right-click the banking-server-inbound-config.xml file and open it with Notepad++.
 - ___ b. Uncomment the application section by deleting the comments around the application definition at the top of the file.
 - ___ c. Configure the iaEventSubmitter role to map to the admin user by replacing this line:
`<security-role name="iaEventSubmitter"/>`
With these lines:
`<security-role name="iaEventSubmitter">
 <user name="admin"/>
</security-role>`
 - ___ d. At the bottom of the file, uncomment the HTTP endpoint definition.

The endpoint configuration is now ready for deployment.

```

<?xml version="1.1" encoding="utf-8"?><server>
<!--Application definition for inbound connectivity application for solution:

  &lt;application location="banking_scenario_solution-inbound.ear"&gt;
    &lt;application-bnd&gt;
      &lt;security-role name="iaEventSubmitter"&gt;
        &lt;user name="admin"/&gt;
      &lt;/security-role&gt;
    &lt;/application-bnd&gt;
  &lt;/application&gt;

  &lt!--Generated configuration for endpoint: banking1--&gt;
  &lt;ia_inboundHttpEndpoint endpoint="banking_scenario_solution/banking1" /&gt;

  &lt!--Generated configuration for endpoint: purchaseEP--&gt;
  &lt;ia_inboundHttpEndpoint endpoint="banking scenario solution/purchaseEP" /&gt;
&lt;/server&gt;
</pre>

```

- ___ 4. Save and close the file.

4.2. Preparing the outbound configuration

- ___ 1. Generate a configuration to deploy on the outbound server by returning to the command prompt and typing this command.

```
connectivityManager generate config  
C:\labfiles\Solutions\banking_scenario_solution.esa  
C:\labfiles\Solutions\banking-server-outbound-config.xml  
--outboundEndpoints="*"
```

**Hint**

You can copy and paste the command lines from the `dsi.txt` file in the `<LabfilesDir>\code` folder.

- ___ 2. Edit the newly generated configuration file to edit it.
 - ___ a. In the `<LabfilesDir>\Solutions` directory, open the `banking-server-outbound-config.xml` file (with Notepad++).
 - ___ b. Uncomment the HTTP endpoint definition by deleting the comments around the application definition at the top of the file.

```
<!--Generated configuration for endpoint: notificationToClient-->

<ia_outboundHttpEndpoint endpoint=
"banking_scenario_solution/notificationToClient" />
</server>
```

- ___ c. Save and close the file.

4.3. Validating the connectivity configurations

**Hint**

You can copy and paste the command lines from the `dsi.txt` file in the `<LabfilesDir>\code` folder.

- ___ 1. Validate the inbound configuration by returning to the command prompt and typing the following command:

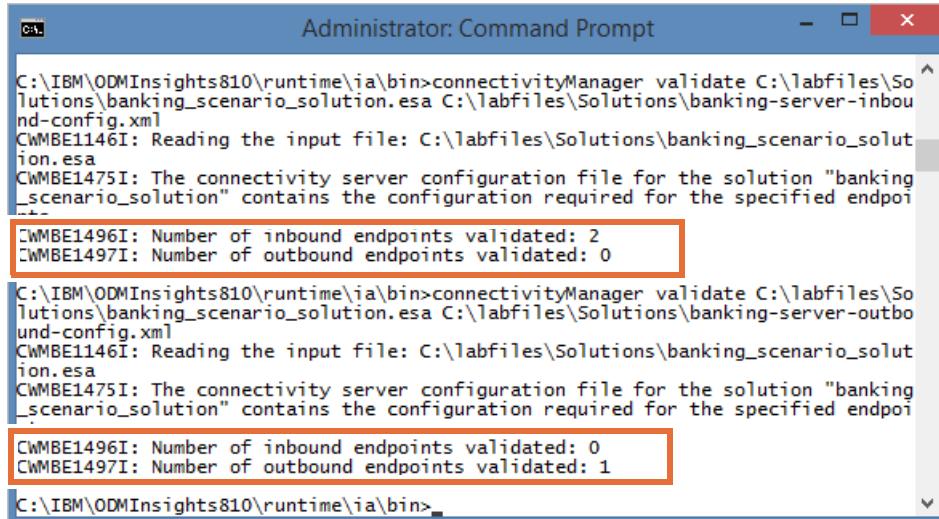
```
connectivityManager validate
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking-server-inbound-config.xml
```

The result shows a validated inbound endpoint.

- ___ 2. Validate the outbound configuration by typing the following command:

```
connectivityManager validate
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking-server-outbound-config.xml
```

After running the validation commands, the result shows one validated inbound endpoint and one validated outbound endpoint.



The screenshot shows an Administrator Command Prompt window with the title "Administrator: Command Prompt". The command entered was "connectivityManager validate C:\labfiles\Solutions\banking_scenario_solution.esa C:\labfiles\Solutions\banking-server-inbound-config.xml". The output displays several informational messages from the connectivity server configuration file, including "CwMBE1146I: Reading the input file: C:\labfiles\Solutions\banking_scenario_solution.esa", "CwMBE1475I: The connectivity server configuration file for the solution "banking_scenario_solution" contains the configuration required for the specified endpoint", "CwMBE1496I: Number of inbound endpoints validated: 2", and "CwMBE1497I: Number of outbound endpoints validated: 0". A second validation command is shown below, validating the same solution and configuration file, resulting in "CwMBE1496I: Number of inbound endpoints validated: 0" and "CwMBE1497I: Number of outbound endpoints validated: 1". The command prompt ends with "C:\IBM\ODMInsights810\runtime\ia\bin>".

- 3. Close the command prompt.

End of exercise

Exercise review and wrap-up

In this exercise, you defined connectivity for a solution and validated the connectivity configurations.

Exercise 10. Installing Decision Server Insights

Estimated time

01:00

Overview

In this exercise, you learn how to install Decision Server Insights on multiple hosts.

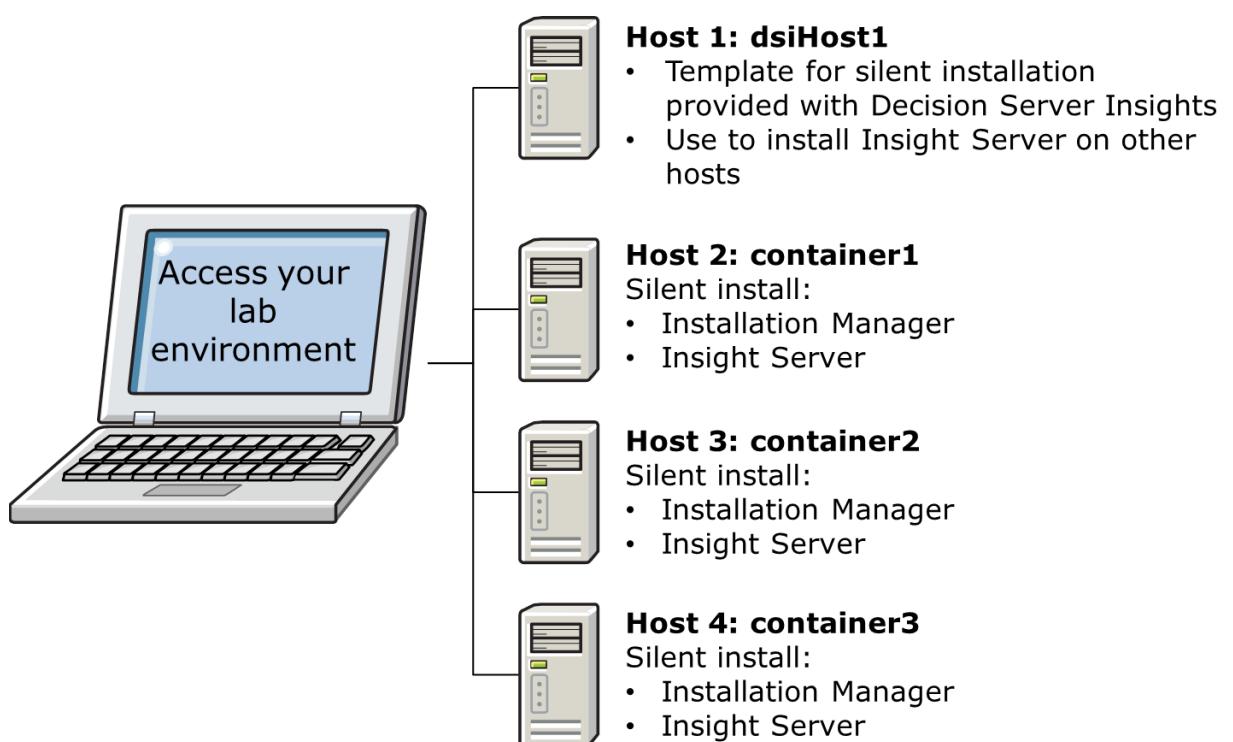
Objectives

After completing this exercise, you should be able to:

- Install IBM Installation Manager on every machine in the lab environment where Insight Server should run
- Use Installation Manager to install Decision Server Insights on every machine in the lab environment where Insight Server should run

Introduction

In this exercise, you install Decision Server Insights on each of the hosts that are in your environment.





Attention

The default host names are: **dsiHost1**, **container1**, **container2**, and **container3**. If you are in a classroom setting with multiple sets of hosts for students, your hosts might be renamed to other unique host names.

Make sure that you know the host names of the virtual images that you are using and that you use the **actual** host name or the IP address during the exercises.

This exercise includes these sections:

- [Section 1, "Preparing the Decision Server Insights template for silent installation on multiple hosts"](#)
- [Section 2, "Verifying access to the remote hosts"](#)
- [Section 3, "Running the silent installation on the remote hosts"](#)

Requirements

This exercise requires that:

- All other servers must be stopped (make sure that the sample server is not running)
- Decision Server Insights must be installed on the main host (dsiHost1)
- Decision Server Insights installation files must be on all the hosts

For this exercise, you start on dsiHost1. You also work with the other three workstations: container1, container2, and container3.



Attention

The exercise instructions assume that your machines use the default host names. However, if your hosts use other unique names, make sure that you use the **actual** host name during the exercises.

Section 1. Preparing the Decision Server Insights template for silent installation on multiple hosts

You can run a silent installation of Decision Server Insights with IBM Installation Manager. Before you run the silent installation, you must prepare the installation template that is provided for Decision Server Insights.



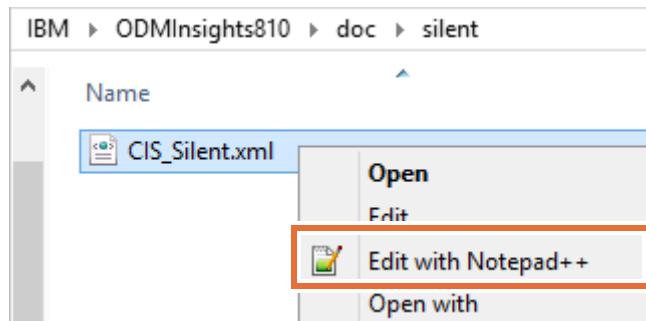
Information

For this exercise, you install Decision Server Insights on the 3 container hosts.

You already installed Decision Server Insights on Host 1: dsiHost1. After you install Decision Server Insights on a host, the template for silent installation is provided in the `<InstallDir>\doc\silent` directory.

To prepare the CIS_Silent.xml template

- __ 1. Open the `C:\IBM\ODMInsights810\doc\silent` directory.
- __ 2. Copy the `CIS_Silent.xml` file to the `C:\SHARE` directory.
- __ 3. Right-click the `CIS_Silent.xml` file, and click **Edit with Notepad++** to open the installation template.



In the template, you define the following settings:

Template placeholders	Description
<code>'!CIS_REPOSITORY!'</code>	Directory location where the installation files are stored.
<code>'!CIS_HOME!'</code>	Directory location to use as the installation path.

The placeholders are delimited with the exclamation (!) character. You replace them with the actual value.

Here you see the placeholders that are highlighted in the template.

```
All repositories are listed here.
A repository can be either a local location or a live repository.
#####
-->
<server>
    <repository location='!CIS_REPOSITORY!' />
</server>

]!--
#####
This profile node defines where Operational Decision Manager will be installed
#####

<profile id='Decision Server Insights V8.10.0' installLocation='!CIS_HOME!'>
    <data key='eclipseLocation' value='!CIS HOME!' />
    <data key='cic.selector.ni' value='fr, es, it, en, de, nl, pt, pt_BR, ru, ja' />
    <data key='user.prod.cis' value='true' />
</profile>
```

- ___ 4. In the `<server>` section of the template, set the `CIS_REPOSITORY` value to the location of the **disk3** (Decision Server Insights) installation folder on the container hosts, as you see here.

```
<server>
    <repository location='C:\labfiles\ODMV810\disk3\DecisionServerInsights' />
</server>
```

- ___ 5. Set the two instances of the `CIS_HOME` value to the directory where you want to install Insight Server, as you see here.

```
installLocation='C:\IBM\ODMInsights810'>

<data key='eclipseLocation' value='C:\IBM\ODMInsights810' />
```

- ___ 6. Save the file as `CIS_Silent.xml` in the `C:\SHARE` directory.



Note

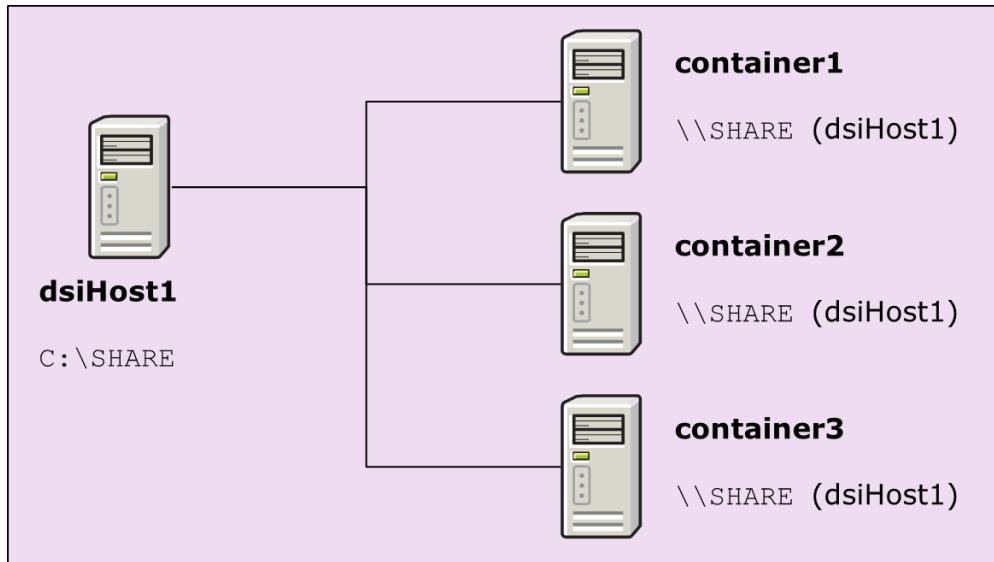
Make sure that you set all the placeholders. You can use the `CIS_Silent.xml` file in the `<LabfilesDir>\code` directory to compare your settings for this exercise.

Section 2. Verifying access to the remote hosts

Before running the silent installation on the remote hosts, you must copy the Decision Server Insights silent installation template to each host.

To transfer files from one virtual machine to another, you use the shared directory: `C:\SHARE`

The `C:\SHARE` folder is on your main host (`dsiHost1`). The other machines have a drive that is mapped to the `SHARE` folder.



Attention

The default host names are: **dsiHost1**, **container1**, **container2**, and **container3**.

Make sure that you know and use the host names and IP addresses that are assigned to your virtual images during the exercises.

You can use the [Appendix A, "Host names and IP addresses"](#) as a reference for the host names and IP addresses that are assigned to your host.

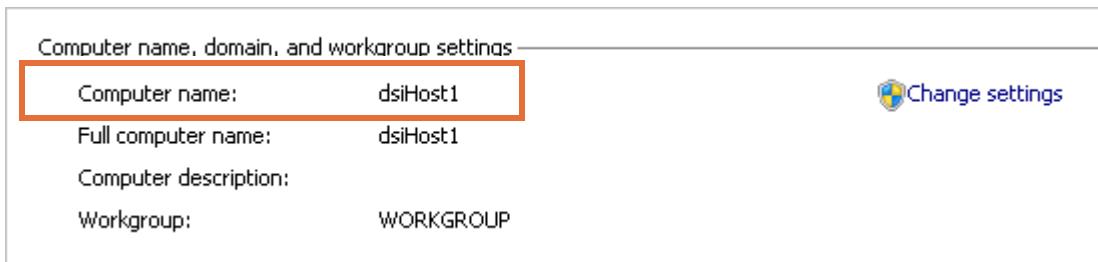
2.1. Verifying your host name

To verify the host name:

- 1. On the desktop, double-click the **Computer** icon and click **System properties**.



2. In the **Computer name, domain, and workgroup settings** section, note the value for **Computer name**.



Stop

The default host name for the “main” host is **dsiHost1**. Your “main” host might have a different name. If the computer name is not dsiHost1, take note of the actual computer name and use that name whenever the exercise instructions require the host name.



Troubleshooting

If you run into issues with the host name, you can also rename your host to a unique name. Changing host names also requires remapping drives on the remote hosts to the shared directory.

For the steps to make these changes, see [Appendix B, "Changing host names and mapped drives"](#).



Troubleshooting

If you are unable to access the \\SHARE directory on the container host, you might need to remap a drive to your main host.

For the steps to map a drive, see [Appendix B, "Changing host names and mapped drives"](#).

Section 3. Running the silent installation on the remote hosts

In this section, you use command lines to install Installation Manager. After Installation Manager is installed, you use Installation Manager to silently install Insight Server.

For this exercise, you install both Installation Manager and Decision Server Insights on one machine at a time. The commands that you use here can be added to a script for further automation.



Note

For this section, if your environment can support opening multiple hosts, you can run the installation steps simultaneously on the container hosts. Otherwise, you can install each host in sequence.

3.1. Install IBM Installation Manager

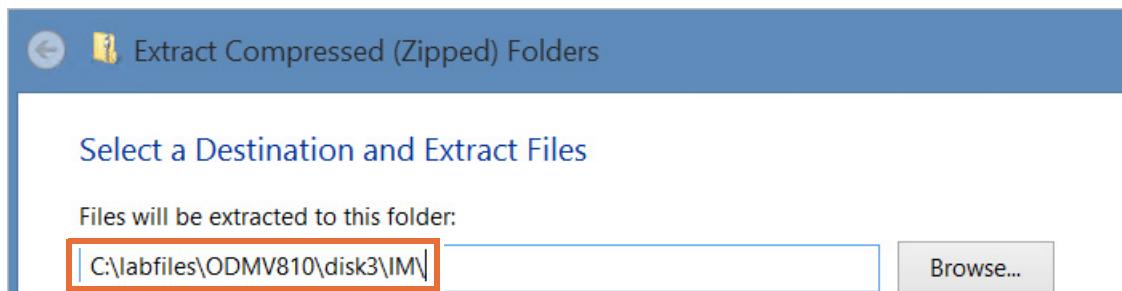
- ___ 1. Switch to the container1 workstation (or the unique name for your “container 1” host.)



Important

If your environment can support running multiple hosts, you can also open the container2 and container3 workstations.

- ___ 2. Copy the `CIS_Silent.xml` file from the `\SHARE` directory to the `C:\labfiles` directory.
- ___ 3. Install Installation Manager.
 - ___ a. In Windows Explorer, open the `C:\ODMV810\disk3\IM` directory, and extract the `agent.installer.win32.win32.x86_64_1.8.9001.20180709_1302.zip` file to the `C:\labfiles\ODMV810\disk3\IM` folder.



- ___ b. Open a command prompt and change the current directory to:
`C:\labfiles\ODMV810\disk3\IM`
`cd c:\labfiles\ODMV810\disk3\IM`

**Note**

You can copy and paste the text for the command lines in this exercise from the `dsi.txt` file in the `<LabfilesDir>\code` folder on the main host.

To make the `dsi.txt` file accessible to the remote hosts, you can place it in the `C:\SHARE` folder.

- ___ c. Run the silent installation of Installation Manager by typing this command.

```
installc.exe -silent -acceptLicense -showProgress
```

After the Installation Manager is installed on each machine, you see a message that identifies the installation path.

```
c:\labfiles\ODMV810\disk3\IM>installc.exe -silent -acceptLicense -showProgress
25%          50%          75%          100%
-----|-----|-----|-----|
..... Installed com.ibm.cic.agent_1.8.9001.20180709_1302 to the C:\Program Files\IBM\Installation Manager\eclipse directory.
c:\labfiles\ODMV810\disk3\IM>
```

3.2. Install Insight Server

- ___ 1. Install Insight Server on container1.

- ___ a. On container1, in the command prompt, change to the directory where you installed Installation Manager: `C:\Program Files\IBM\Installation Manager\eclipse\tools`

```
cd C:\Program Files\IBM\Installation Manager\eclipse\tools
```

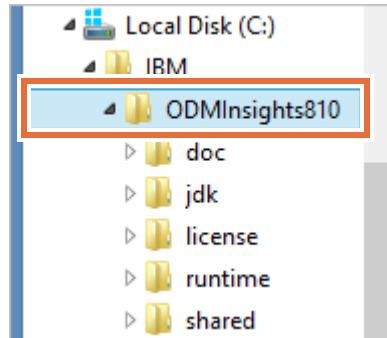
- ___ b. To install the Decision Server Insights Insight Server, type the following command:

```
imcl.exe -accessRights admin -input C:\labfiles\CIS_Silent.xml -nosplash
-silent -acceptLicense -showProgress
```

After the silent installation is complete, you see a message that identifies the installation path.

```
c:\labfiles\ODMV810\disk3\IM>cd C:\Program Files\IBM\Installation Manager\eclipse\tools
C:\Program Files\IBM\Installation Manager\eclipse\tools>imcl.exe -accessRights a
dmin -input C:\labfiles\CIS_Silent.xml -nosplash -silent -acceptLicense -showPro
gress
25%          50%          75%          100%
-----|-----|-----|-----|
..... Installed com.ibm.websphere.cis.ia.v810_8.10.0.20181108_1947 to the C:\IBM\ODMIn
sights810 directory.
```

- 2. Refresh the view in Windows Explorer to verify that Insight Server was installed in the directory that you specified in the installation template.



3.3. Install Installation Manager and Insight Server on the other containers

- 1. Repeat the steps in [Section 3.1, "Install IBM Installation Manager"](#) and [Section 3.2, "Install Insight Server"](#) on container2 and container3.

End of exercise

Exercise review and wrap-up

In this exercise, you installed the Decision Server Insights Insight Server on multiple hosts.

Exercise 11. Configuring Decision Server Insights

Estimated time

03:00

Overview

In this exercise, you learn how to configure Insight Servers on multiple hosts to create a grid.

Objectives

After completing this exercise, you should be able to:

- Create and configure catalog, container, and inbound and outbound servers

Introduction

This exercise includes these sections:

- [Section 1, "Creating catalog servers"](#)
- [Section 2, "Creating the container servers"](#)
- [Section 3, "Creating the inbound and outbound servers"](#)

Requirements

This exercise requires that Decision Server Insights be installed on dsiHost1, container1, container2, and container3. You must also have a mapped drive from the container hosts to dsiHost1.

For this exercise, you start on your main host (dsiHost1). You also work on the container hosts.



Attention

The default host names are: **dsiHost1**, **container1**, **container2**, and **container3**. If you are in a classroom setting with multiple sets of hosts for students, your hosts might be renamed to other unique host names.

Make sure that you know the host names of the virtual images that you are using and that you use the **actual** host name during the exercises.

Section 1. Creating catalog servers

In this section, you create and customize catalog servers. After you create the server prototype, you modify the `bootstrap.properties` file and the `server.xml` file for each of the catalog servers. You customize the ports that are used by each server and you make sure that each server is aware of the other servers. You also enable majority quorum.

This section includes these steps:

- [1.1., "Creating the catalog servers"](#)
- [1.2., "Defining the catalog cluster endpoints"](#)
- [1.3., "Configuring security and roles"](#)
- [1.4., "Enabling quorum"](#)
- [1.5., "Starting the catalog servers"](#)
- [1.6., "Using REST to verify that the servers are running"](#)
- [1.7., "Checking the logs to verify quorum"](#)
- [1.8., "Using WebSphere eXtreme Scale xscmd to check your catalog status"](#)

1.1. Creating the catalog servers

- 1. Make sure that you are on `dsiHost1`.
- 2. In the command prompt, type the following command to change directories to the `wlp\runtime` directory.

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```
- 3. Create the first catalog server, `cisCatalog1`, by typing this command:

```
server create cisCatalog1 --template=cisCatalog
```
- 4. Create `cisCatalog2`:

```
server create cisCatalog2 --template=cisCatalog
```
- 5. Create `cisCatalog3`:

```
server create cisCatalog3 --template=cisCatalog
```

```
C:\Users\Administrator>cd C:\IBM\ODMInsights810\runtime\wlp\bin
C:\IBM\ODMInsights810\runtime\wlp\bin>server create cisCatalog1 --template=cisCatalog
Server cisCatalog1 created.

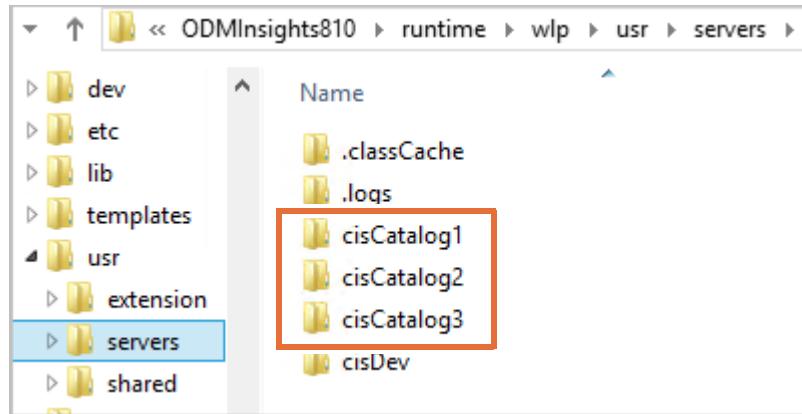
C:\IBM\ODMInsights810\runtime\wlp\bin>server create cisCatalog2 --template=cisCatalog
Server cisCatalog2 created.

C:\IBM\ODMInsights810\runtime\wlp\bin>server create cisCatalog3 --template=cisCatalog
Server cisCatalog3 created.
```

1.2. Defining the catalog cluster endpoints

- 1. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory.

You see folders for each of the catalog servers that you created.



- ___ 2. Edit the cisCatalog1 bootstrap properties.
 - ___ a. Expand the **cisCatalog1** folder, right-click the `bootstrap.properties` file and click **Edit with Notepad++**.
 - ___ b. Change the following values to match these values.
- `http.port=9081`
 - `https.port=9444`
 - `ia.host=dsiHost1`
 - `ia.listenerPort=2810`

```
# cisCatalog
#
# http.port=9081
# https.port=9444
#
# DNS or IP address of local machine
#
ia.host=dsiHost1
#
# The unique name of this server
#
ia.serverName=${ia.host}-${wlp.server.name}
#
# Catalog server client listener port
#
ia.listenerPort=2810
```

- ___ c. Save the file and close it.
- ___ 3. Edit the cisCatalog1 `server.xml` file.
- ___ a. In the **cisCatalog1** folder, right-click the `server.xml` file and click **Edit with Notepad++**.

- b. Search the element `elasticCacheCatalogCluster` and replace that section with the following values:

```
<elasticCacheCatalogCluster id="ccid">
  <server name="dsiHost1-cisCatalog1" host="dsiHost1" port="2810" peerPort="6602" clientPort="6603"/>
  <server name="dsiHost1-cisCatalog2" host="dsiHost1" port="2811" peerPort="6604" clientPort="6605"/>
  <server name="dsiHost1-cisCatalog3" host="dsiHost1" port="2812" peerPort="6606" clientPort="6607"/>
</elasticCacheCatalogCluster>
```



Note

You can copy and paste this value from the `dsi.txt` file in the **C:\labfiles\code** folder. You use this value to define the elastic cache catalog cluster so that the catalogs are aware of each other.

Later in this exercise, you copy the `server.xml` file to the folders for `cisCatalog2` and `cisCatalog3`.

- c. Save the file.
- 4. Edit the `cisCatalog2` bootstrap properties.
 - a. Expand the **cisCatalog2** folder, right-click the `bootstrap.properties` file and click **Edit with Notepad++**.
 - b. Change the following values to match these values.
 - `http.port=9082`
 - `https.port=9445`
 - `ia.host=dsiHost1`
 - `ia.listenerPort=2811`



Note

Because the catalogs are on the same host for this exercise, you must modify the ports to avoid conflicts.

- c. Save the file and close it.
- 5. Edit the `cisCatalog3` bootstrap properties.
 - a. Expand the **cisCatalog3** folder, right-click the `bootstrap.properties` file and click **Edit with Notepad++**.
 - b. Change the following values to match these values.
 - `http.port=9083`
 - `https.port=9446`
 - `ia.host=dsiHost1`
 - `ia.listenerPort=2812`
 - c. Save the file and close it.

1.3. Configuring security and roles

- ___ 1. In a command prompt, make sure that you are in the `runtime\wlp\bin` directory.

You can type the following command to change directories to the `runtime\wlp\bin` directory:

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```

- ___ 2. Configure the security for `cisCatalog1` by typing this command:

```
securityUtility createSSLCertificate --server=cisCatalog1  
--password=insights
```

```
C:\IBM\ODMInsights810\runtime\wlp\bin>securityUtility createSSLCertificate --server=cisCatalog1 --password=insights
Creating keystore C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks
Created SSL certificate for server cisCatalog1. The certificate is created with
CN=dslHost1,OU=cisCatalog1,O=ibm,C=us as the SubjectDN.
Add the following lines to the server.xml to enable SSL:
<featureManager>
  <feature>ssl-1.0</feature>
</featureManager>
<keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />
```

An SSL certificate is created for `cisCatalog1` in the **cisCatalog1\resources\security** folder. The response in the command prompt shows the encrypted password that you must add to the `server.xml` file.

- ___ 3. Leave the command prompt open.
- ___ 4. Verify that the **resources** folder with the `key.jks` file was generated for `cisCatalog1`.
 - ___ a. Open Windows Explorer and go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\server\cisCatalog1` directory.
 - ___ b. Expand the newly created **resources\security** folder.

This folder contains the `key.jks` file. For this course, you share this file with the other servers.
- ___ 5. Copy the **resources** folder from the **cisCatalog1** folder to the **cisCatalog2** and **cisCatalog3** folders.
- ___ 6. Copy the **resources** folder from the **cisCatalog1** folder to the `C:\SHARE` directory to share with the remote hosts.



Stop

You must copy the **resources** folder from the **cisCatalog1** folder to the `C:\SHARE` directory and to the other catalog folders **before** you start the catalog.

- __ 7. Add the security and roles to the server files for the catalogs.
- __ a. In the **cisCatalog1** folder, open the `server.xml` file (with Notepad++) and look for the "TODO" sections.
 - __ b. In the `keystore` section, replace `*INSERT_ENCODED_PASSWORD*` with the encrypted password that was returned from the command prompt.
- ```
<keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />
```
- \_\_ c. Move the close-comment code (`-->`) before the `keystore` section so that the `keystore` is not commented out.

```

65 <!-- *TODO* Add SSL configuration including a key store and
66 | optionally a trust store. For example:
67 | -->
68 <keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />

```

- \_\_ d. In the `basicRegistry` section, replace the section with the following lines:
- ```
<basicRegistry id="basic" realm="DWRealm">
    <user name="admin" password="insights"/>
    <group name="DWGroup">
        <member name="admin"/>
    </group>
</basicRegistry>
```
- __ e. Move the `basicRegistry` entry outside of the commented section.
 - __ f. In the `administrator-role` section, insert the group name: DWGroup
- ```
<administrator-role>
 <group>DWGroup</group>
</administrator-role>
```
- \_\_ g. Move the `administrator-role` entry outside of the commented section.



### Troubleshooting

Make sure that all your new entries to the `server.xml` file are outside the commented sections. Otherwise, you cannot access your servers later by using REST.

- 
- \_\_ h. Save the file.

## 1.4. Enabling quorum

To enable quorum, you edit two files for each catalog server:

- `server.xml`
  - `jvm.options`
- \_\_ 1. Set the `enableQuorum` property in the `server.xml` file.
    - \_\_ a. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory and expand the **cisCatalog1** folder.

- \_\_\_ b. Open the `server.xml` file (with Notepad++) and locate the `elasticCacheCatalog` entry.
- \_\_\_ c. Append this line before the closing bracket (`/>`):

```
enableQuorum="true"
```

```
<elasticCacheCatalog
 name="${ia.serverName}"
 catalogClusterRef="ccid"
 enableMBean="true"
 enableManagementConcentrator="false"
 enableQuorum="true"/>
```

- \_\_\_ d. Save the file and close it.
- \_\_\_ 2. Copy and replace the `server.xml` file from **cisCatalog1** folder to the **cisCatalog2** and **cisCatalog3** folders.  
All the catalog servers can share the `server.xml` file.
- \_\_\_ 3. In the `jvm.options` file, set the `com.ibm.websphere.objectgrid.server.catalog.majority.quorum` property.
  - \_\_\_ a. In the **cisCatalog1** folder in the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory, open the `jvm.options` file (with Notepad++).
  - \_\_\_ b. Set the `-Dcom.ibm.websphere.objectgrid.server.catalog.majority.quorum` property to `true`:  
`-Dcom.ibm.websphere.objectgrid.server.catalog.majority.quorum=true`

```
-Xgcpolicy:gencon
-Xms512m
-Xmx1g
Bypass blueprint EBA transaction interceptor
-Dcom.ibm.ws.sib.blueprint.transform_imml.RestrictAddingBundle=false
-Dcom.ibm.websphere.objectgrid.server.catalog.majority.quorum=true
WHEN using collectives, please refer to http://www.ibm.com/support/
for more details about setting up Liberty to run in SP800-131a strict
#-Dhttps.protocols=TLSv1.2
```

- \_\_\_ c. Save the file and close it.
- \_\_\_ 4. Repeat [Step 3](#) for cisCatalog2.
- \_\_\_ 5. Repeat [Step 3](#) for cisCatalog3.

Next, you start the servers and verify that they are running and that quorum is enabled.

## 1.5. Starting the catalog servers

- \_\_\_ 1. Open three command prompt, and in each, go to the `wlp\runtime\bin` directory.

You can type the following command to change directories to the `wlp\runtime\bin` directory.

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```

**Note**

You open three command prompts because you must start all the catalogs together. The catalogs are configured to be aware of each other. If you start one while the others are not yet started, an error is produced.

2. Start all the servers.

- a. In command window 1, type the following command and press Enter:

```
server start cisCatalog1
```

- b. In command window 2, type the following command and press Enter:

```
server start cisCatalog2
```

- c. In command window 3, type the following command and press Enter:

```
server start cisCatalog3
```

The image shows three separate Command Prompt windows, each titled "Administrator: Command Prompt".

- Top Window:** Shows the command "server start cisCatalog1" being run, followed by the message "Starting server cisCatalog1. Server cisCatalog1 started.".
- Middle Window:** Shows the command "server start cisCatalog2" being run, followed by the message "Starting server cisCatalog2. Server cisCatalog2 started.".
- Bottom Window:** Shows the command "server start cisCatalog3" being run, followed by the message "Starting server cisCatalog3. Server cisCatalog3 started.".

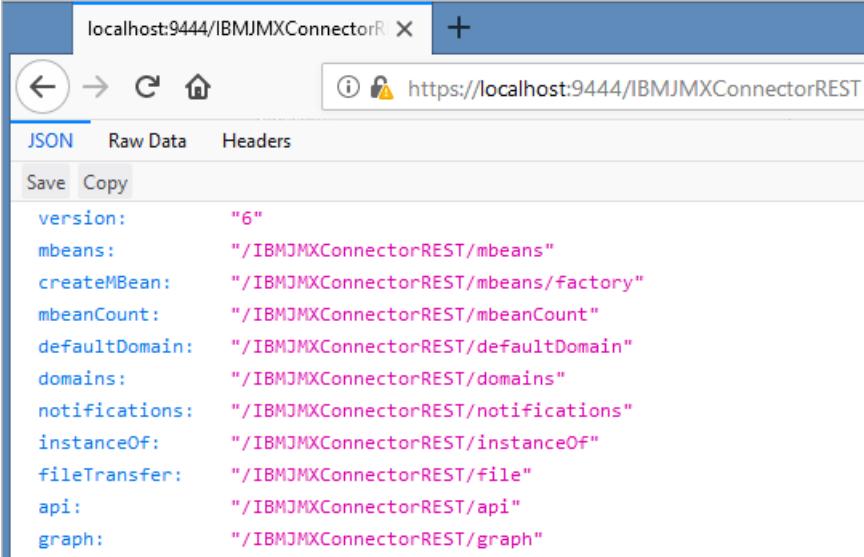
**Troubleshooting**

If you are unable to start a catalog server, you might need to check the logs for errors or problems. The **logs** folder for each catalog is in the catalog server folder. For example, to see the log for the **cisCatalog1** server, open the **messages** file in the  
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\logs directory.

## 1.6. Using REST to verify that the servers are running

- \_\_\_ 1. Open a browser to use the REST API to check that the catalog servers are running.
  - \_\_\_ a. In a browser, type:  
 https://localhost:9444/IBMJMXConnectorREST
  - \_\_\_ b. If you get a security warning, confirm the exception and continue.
- \_\_\_ 2. When prompted to sign in, use:
  - **User name:** admin
  - **Password:** insights

The browser returns a message that confirms the connection.



```

localhost:9444/IBMJMXConnectorR X +
[{"version": "6", "mbeans": "/IBMJMXConnectorREST/mbeans", "createMBean": "/IBMJMXConnectorREST/mbeans/factory", "mbeanCount": "/IBMJMXConnectorREST/mbeanCount", "defaultDomain": "/IBMJMXConnectorREST/defaultDomain", "domains": "/IBMJMXConnectorREST/domains", "notifications": "/IBMJMXConnectorREST/notifications", "instanceOf": "/IBMJMXConnectorREST/instanceOf", "fileTransfer": "/IBMJMXConnectorREST/file", "api": "/IBMJMXConnectorREST/api", "graph": "/IBMJMXConnectorREST/graph"}]

```

## 1.7. Checking the logs to verify quorum

- \_\_\_ 1. Open the log file for the cisCatalog1 server.
  - \_\_\_ a. In the C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1 directory, expand the **logs** folder.
  - \_\_\_ b. Double-click the **messages** file to open the log.
- \_\_\_ 2. Search for “quorum” to find the following confirmation message:

Quorum is enabled for the catalog service.

```
I CWOBJ1251I: Quorum is enabled for the catalog service.
5/18 23:55:04:112 EST] 000000023 com.ibm.ws.objectgrid.server.quorum.QuorumManager
```

- \_\_\_ 3. Close the file.

## 1.8. Using WebSphere eXtreme Scale xscmd to check your catalog status

- 1. Check the quorum status of the catalogs by typing this command:

```
xscmd -c showQuorumStatus -cep localhost:2810 -user admin -pwd insights -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp insights
```

```
C:\IBM\ODMInsights810\runtime\wlp>xscmd -c showQuorumStatus -cep localhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 00:09:03.739
CWXSI0068I: Executing command: showQuorumStatus
Server Host Quorum Quorum Size Active Servers
----- ----- ----- -----
dsiHost1-cisCatalog1 dsiHost1 TRUE 2 dsiHost1-cisCatalog1,
 , dsiHost1-cisCatalog2,
 , dsiHost1-cisCatalog3
dsiHost1-cisCatalog2 dsiHost1 TRUE 2 dsiHost1-cisCatalog1,
 , dsiHost1-cisCatalog2,
 , dsiHost1-cisCatalog3
dsiHost1-cisCatalog3 dsiHost1 TRUE 2 dsiHost1-cisCatalog1,
 , dsiHost1-cisCatalog2,
 , dsiHost1-cisCatalog3
CWXSI0040I: The showQuorumStatus command completed successfully.
Ending at: 2018-11-07 00:09:12.786
```

The quorum status is enabled (TRUE) for all the catalogs.

- 2. Show the primary catalog by typing this command.

```
xscmd -c showPrimaryCatalogServer -cep localhost:2810 -user admin -pwd
insights -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp insights
```

```
C:\IBM\ODMInsights810\runtime\wlp>xscmd -c showPrimaryCatalogServer -cep localhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 00:21:37.006
CWXSI0068I: Executing command: showPrimaryCatalogServer
Server Host Primary
----- ----- -----
dsiHost1-cisCatalog1 dsiHost1 TRUE
dsiHost1-cisCatalog2 dsiHost1 FALSE
dsiHost1-cisCatalog3 dsiHost1 FALSE
CWXSI0040I: The showPrimaryCatalogServer command completed successfully.
Ending at: 2018-11-07 00:21:44.694
```

The “primary” status for cisCatalog1 server is set to TRUE to show that it is the master catalog server.

## Section 2. Creating the container servers

In this section, you create and configure the container servers on the remote hosts.

### 2.1. Create cisContainer1

- \_\_\_ 1. Switch to the container1 host.



#### Stop

The default host name for the “container 1” host is **container1**. Your “container 1” host might have a different name.

- \_\_\_ 2. Open a new command prompt and change to this directory:

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```



#### Hint

You can copy and paste the command lines from the `dsi.txt` file in the `<LabfilesDir>\code` folder on your other hosts. To do so, copy the `dsi.txt` file to the shared directory to make the file available to the remote hosts.

On the `dsiHost1` host, copy the `dsi.txt` file from the `<LabfilesDir>\code` folder to the `C:\SHARE` directory.

- \_\_\_ 3. Type the following command to create the container server

```
server create cisContainer1 --template=cisContainer
```

### 2.2. Customize the container

- \_\_\_ 1. Modify the endpoints for the grid by editing the `bootstrap.properties` file for the container.

- \_\_\_ a. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory, and expand the **cisContainer1** folder.
- \_\_\_ b. Open the `bootstrap.properties` file (with Notepad++).
- \_\_\_ c. Set the hostname:

```
ia.host=container1
```



#### Stop

The default host name for the main host is **container1**. If your host has a different name, replace `localhost` in the property value with the **actual** host name for your main host.

- \_\_\_ d. Save the file and close it.
- \_\_\_ 2. Reduce the heap size to ensure that memory does not grow beyond the physical memory of the machine.
  - \_\_\_ a. In the **cisContainer1** folder, and open the `jvm.options` file (with Notepad++) and locate the `-Xms` and `-Xmx` properties.

The `-Xms` property specifies the minimum Java heap and the `-Xmx` property specifies the maximum heap.

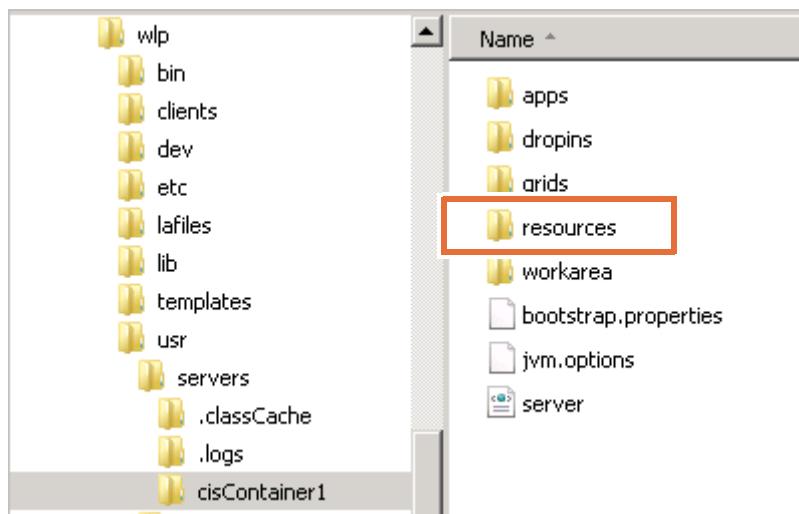
  - \_\_\_ b. Set both properties to `3g` instead of `28g`.

```

21 -Xmsnolock:balanced
22 -Xms3g
23 -Xmx3g
24 # bypass blueprint EBA transaction interceptor

```

- \_\_\_ c. Save the file and close it.
- \_\_\_ 3. Define the security and roles for the container.
  - \_\_\_ a. On container1, go to the mapped SHARE (`\\\dsiHost1`) directory and copy the **resources** folder to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer1` directory.



- \_\_\_ 4. In the `server.xml` file, configure the security and roles.
- \_\_\_ a. Open the `server.xml` file (with Notepad++).

- \_\_\_ b. Locate the `elasticCacheCatalogCluster` element and replace it with the following text:

```
<elasticCacheCatalogCluster id="ccid">
 <server name="dsiHost1-cisCatalog1" host="dsiHost1" port="2810"
peerPort="6602" clientPort="6603"/>
 <server name="dsiHost1-cisCatalog2" host="dsiHost1" port="2811"
peerPort="6604" clientPort="6605"/>
 <server name="dsiHost1-cisCatalog3" host="dsiHost1" port="2812"
peerPort="6606" clientPort="6607"/>
</elasticCacheCatalogCluster>
```



### Hint

If you want to copy and paste from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder on your main host (dsiHost1), move that file to the `C:\SHARE` directory so you can access it on the container host.

- \_\_\_ c. In the “TODO” sections, uncomment the `keystore` section and replace it with the following text:
- ```
<keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />
```
- ___ d. Uncomment the `user registry` section and replace the `basicRegistry` entries to match this text:
- ```
<basicRegistry id="basic" realm="DWRealm">
 <user name="admin" password="inslghts"/>
 <group name="DWGroup">
 <member name="admin"/>
 </group>
</basicRegistry>
```
- \_\_\_ e. Uncomment the `administrator-role` entry and replace it with the following text:
- ```
<administrator-role>
    <group>DWGroup</group>
</administrator-role>
```
- ___ f. Uncomment the authorization for the REST section and replace it with the following text:
- ```
<authorization-roles id="iaAuthorization">
 <security-role name="iaRESTWriter">
 <group name="DWGroup" />
 </security-role>
 <security-role name="iaRESTReader">
 <group name="DWGroup" />
 </security-role>
</authorization-roles>
```

- \_\_ g. Verify that each of the sections that you edited are not enclosed within commented text.

```

<!-- *TODO* Add SSL configuration including a key store and
 | optionally a trust store. For example:
 -->
<keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />

<!-- *TODO* Add basic or LDAP user registry configuration.
 | For example:
 -->
<basicRegistry id="basic" realm="DWRealm">
 <user name="admin" password="insights"/>
 <group name="DWGroup">
 <member name="admin"/>
 </group>
</basicRegistry>

<!-- *TODO* Configure authorization roles for server administration.
 | For example:
 -->
<administrator-role>
 <group>DWGroup</group>
</administrator-role>

<!-- *TODO* Configure authorization roles for the CIS REST API
 | For example:
 -->
<authorization-roles id="iaAuthorization">
 <security-role name="iaRESTWriter">
 <group name="DWGroup" />
 </security-role>
 <security-role name="iaRESTReader">
 <group name="DWGroup" />
 </security-role>
</authorization-roles>

```

- \_\_ h. Save the file and close it.

- \_\_ 5. Copy the `server.xml` file from the `cisContainer1` directory to the mapped SHARE drive.  
You can reuse this `server.xml` file for the other containers.

## 2.3. Start the container to verify that it is accessible

1. In a command prompt, make sure that you are in the `runtime\wlp\bin` directory.  
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
2. Start the server by typing this command:  
`server start cisContainer1`



### Note

The server can take a few minutes to start. When the server is started, you see the message:

`Server cisContainer1 started.`

- \_\_\_ 3. Switch to the main host (dsiHost1).
- \_\_\_ 4. Make sure that your main host can access container1.
  - \_\_\_ a. In a command prompt, make sure that you are in the C:\IBM\ODMInsights810\runtime\wlp\bin directory:  
cd C:\IBM\ODMInsights810\runtime\wlp\bin
  - \_\_\_ b. Type the following command:

```
xscmd.bat -c listHosts -cep localhost:2810 -user admin -pwd insights -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights
```

```
C:\IBM\ODMInsights810\runtime\wlp\bin>xscmd.bat -c listHosts -cep localhost:2810
-user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cis
Catalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 00:57:03.776
CWXSI0068I: Executing command: listHosts

*** Show all online hosts for com.ibm.ia.runtime.cluster data grid and iaConfigM
aps map set.
 container1
 Hosts matching = 1
 Total known containers = 1
 Total known hosts = 1

*** Show all online hosts for com.ibm.ia data grid and iaMaps map set.
 Hosts matching = 0
 Total known containers = 1
 Total known hosts = 1

*** Show all online hosts for com.ibm.ia.preload data grid and iaPreloadMaps map
set.
 Hosts matching = 0
 Total known containers = 1
 Total known hosts = 1
CWXSI0040I: The listHosts command completed successfully.
Ending at: 2018-11-07 00:57:09.589
```

This command should find that one container is running, your newly created cisContainer1.

- \_\_\_ 5. Open a browser and use the REST API to check access to the container server.
  - \_\_\_ a. In a browser, type:  
<https://<hostname>:9443/IBMJMXConnectorREST>  
where <hostname> is the unique name for your container1 host. For example:  
<https://container1:9443/IBMJMXConnectorREST>
  - \_\_\_ b. When you see the security warning, confirm the exception and continue.



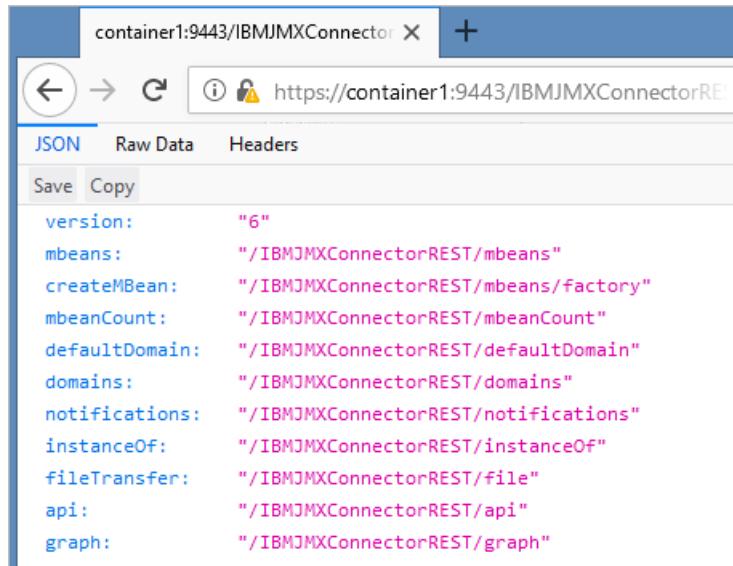
### Note

The security exception is already an indication that your host is accessible. If you prefer, you can skip signing in.

- \_\_\_ c. When prompted to sign in, use:

- **User name:** admin
- **Password:** insights

The browser returns a message that confirms the connection.



```

{
 "version": "6",
 "mbeans": "/IBMJMXConnectorREST/mbeans",
 "createMBean": "/IBMJMXConnectorREST/mbeans/factory",
 "mbeanCount": "/IBMJMXConnectorREST/mbeanCount",
 "defaultDomain": "/IBMJMXConnectorREST/defaultDomain",
 "domains": "/IBMJMXConnectorREST/domains",
 "notifications": "/IBMJMXConnectorREST/notifications",
 "instanceOf": "/IBMJMXConnectorREST	instanceOf",
 "fileTransfer": "/IBMJMXConnectorREST/file",
 "api": "/IBMJMXConnectorREST/api",
 "graph": "/IBMJMXConnectorREST/graph"
}

```



## Troubleshooting

If you are unable to access your container through REST, verify that you configured the container correctly. If you need to re-create the container server, return to the container host and follow these steps:

- \_\_\_ 1. Stop cisContainer1.
- ```
server stop cisContainer1
```
- ___ 2. Delete the container.
- ___ a. Go to the C:\IBM\ODMInsights810\runtime\wlp\usr\servers directory.
 - ___ b. Delete the **cisContainer1** folder.
- ___ 3. Repeat [Section 2.1, "Create cisContainer1"](#), [Section 2.2, "Customize the container"](#), and [Section 2.3, "Start the container to verify that it is accessible"](#).

2.4. Create and configure cisContainer2

- ___ 1. Switch to the container2 host.

**Stop**

The default host name for the “container 2” host is **container2**. Your “container 2” host might have a different name.

__ 2. Create the **cisContainer2** server.

__ a. Open a new command prompt and change to this directory:

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```

__ b. Type the following command to create the container server

```
server create cisContainer2 --template=cisContainer
```

__ 3. Configure security by reusing the **resources** folder and the **server.xml** file from mapped **SHARE** drive.

__ a. In Windows Explorer, go to the **C:\IBM\ODMInsights810\runtime\wlp\usr\servers** directory, and expand the **cisContainer2** folder.

__ b. In a separate Windows Explorer window, open the **SHARE** directory.

__ c. Copy the **resources** folder from the **SHARE** directory to the **cisContainer2** directory.

__ d. Copy the **server.xml** file from the **SHARE** directory to the **cisContainer2** directory to replace the existing file.

__ 4. Configure the bootstrap properties.

__ a. In Windows Explorer, go to the **C:\IBM\ODMInsights810\runtime\wlp\usr\servers** directory, and expand the **cisContainer2** folder.

__ b. Open the **bootstrap.properties** file (with Notepad++).

__ c. Set the hostname:

```
ia.host=container2
```

**Stop**

The default host name for the main host is **container2**. If your host has a different name, replace **localhost** in the property value with the **actual** host name for your main host.

__ d. Save the file and close it.

__ 5. Configure the JVM heap size.

__ a. In the **C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer2** directory, open the **jvm.options** file (with Notepad++).

__ b. Locate the **-Xms** and **-Xmx** properties.

__ c. Set both properties to **3g** instead of **28g**.

__ d. Save the file and close it.

- ___ 6. Verify that cisContainer2 is correctly configured by following the steps in [Section 2.3, "Start the container to verify that it is accessible".](#)

2.5. Creating and configuring cisContainer3

- ___ 1. Switch to the container3 host.
-



Stop

The default host name for the “container 3” host is **container3**. Your “container 3” host might have a different name.

- ___ 2. Create the cisContainer3 server.
 - ___ a. Open a new command prompt and change to this directory:
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
 - ___ b. Type the following command to create the container server
`server create cisContainer3 --template=cisContainer`
 - ___ 3. Configure security by reusing the **resources** folder and the `server.xml` file from mapped SHARE drive.
 - ___ a. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory, and expand the **cisContainer3** folder.
 - ___ b. In a separate Windows Explorer window, go to the `SHARE` directory.
 - ___ c. Copy the **resources** folder from the `SHARE` directory to the `cisContainer3` directory.
 - ___ d. Copy the `server.xml` file from the `SHARE` directory to the `cisContainer3` directory to replace the existing file.
 - ___ 4. Configure the bootstrap properties.
 - ___ a. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers` directory, and expand the **cisContainer3** folder.
 - ___ b. Open the `bootstrap.properties` file (with Notepad++).
 - ___ c. Set the hostname:
`ia.host=container3`
-



Stop

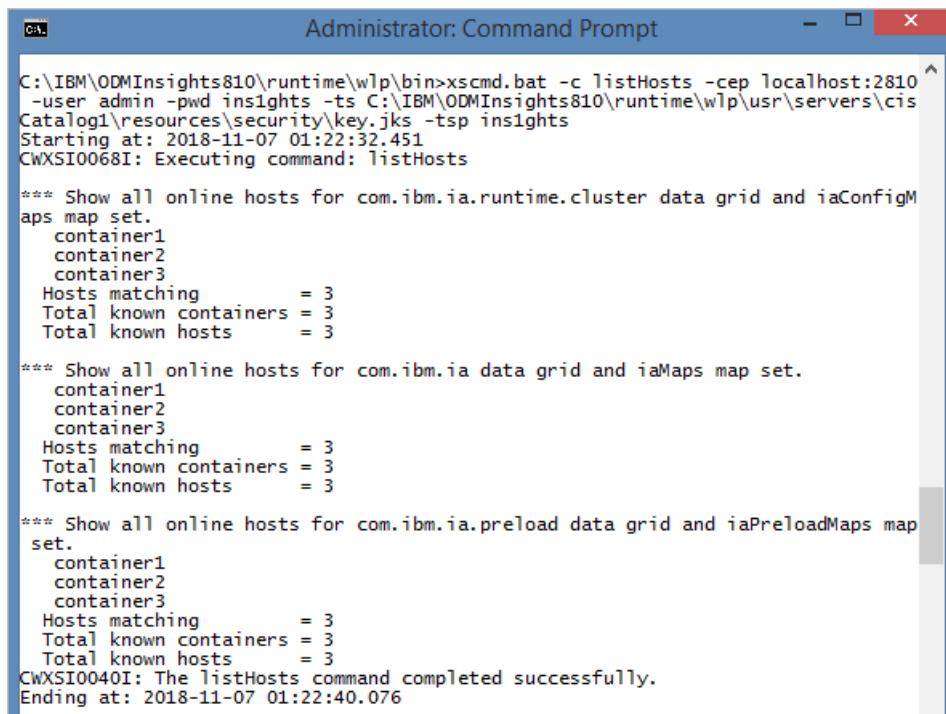
The default host name for the main host is **container3**. If your host has a different name, replace `localhost` in the property value with the **actual** host name for your main host.

- ___ d. Save the file and close it.

- ___ 5. Configure the JVM heap size.
 - ___ a. In the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer3` directory, open the `jvm.options` file (with Notepad++).
 - ___ b. Locate the `-Xms` and `-Xmx` properties.
 - ___ c. Set both properties to `3g` instead of `28g`.
 - ___ d. Save the file and close it.
- ___ 6. Verify that `cisContainer3` is correctly configured by following the steps in [Section 2.3, "Start the container to verify that it is accessible"](#).

2.6. Using WebSphere eXtreme Scale xscmd to check your container status

- ___ 1. Make sure that you are on the main host (`dsiHost1`).
- ___ 2. Make sure all the containers are running and accessible to the catalogs.
 - ___ a. In a command prompt, make sure that you are in this directory:
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
 - ___ b. Type the following command:
`xscmd -c listHosts -cep localhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights`



```

Administrator: Command Prompt
C:\IBM\ODMInsights810\runtime\wlp\bin>xscmd.bat -c listHosts -cep localhost:2810
-user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cis
Catalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 01:22:32,451
CWXSI0068I: Executing command: listHosts

*** Show all online hosts for com.ibm.ia.runtime.cluster data grid and iaConfigM
aps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3

*** Show all online hosts for com.ibm.ia data grid and iaMaps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3

*** Show all online hosts for com.ibm.ia.preload data grid and iaPreloadMaps map
set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3
CWXSI0040I: The listHosts command completed successfully.
Ending at: 2018-11-07 01:22:40.076

```

All the grid container servers and their IP addresses are listed.

Section 3. Creating the inbound and outbound servers

In this section, you switch back to your main host, dsiHost1, to configure the inbound and outbound servers.

3.1. Creating the inbound and outbound servers

- ___ 1. Make sure that you are in dsiHost1.
- ___ 2. In a command prompt, make sure that you are in the C:\IBM\ODMInsights810\runtime\wlp\bin directory:

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```
- ___ 3. Type the following command to create the inbound server

```
server create cisInbound1 --template=cisInbound
```
- ___ 4. Type the following command to create the outbound server.

```
server create cisOutbound1 --template=cisOutbound
```

3.2. Customizing the inbound and outbound servers

- ___ 1. Copy the key.jks from the cisCatalog1 server to the cisInbound1 and cisOutbound1 servers.
 - ___ a. In Windows Explorer, go to the C:\IBM\ODMInsights810\runtime\wlp\usr\servers directory.
 - ___ b. Copy the **resources** folder from the **SHARE** directory.
 - ___ c. Expand the cisInbound1 directory and paste the **resources** folder.
 - ___ d. Expand the cisOutbound1 directory and paste the **resources** folder.
- ___ 2. Modify the ports and endpoint properties in the bootstrap.properties file.
 - ___ a. In the servers\cisInbound1 directory, open the bootstrap.properties file (with Notepad++) and set these properties for the **cisInbound1** server:


```
http.port=9084
https.port=9447
ia.bootstrapEndpoints=localhost:2810,localhost:2811,localhost:2812
```
 - ___ b. Save the file and close it.
 - ___ c. In the servers\cisOutbound1 directory, open the bootstrap.properties file (with Notepad++) and set the properties for the **cisOutbound1** server.


```
http.port=9085
https.port=9448
ia.bootstrapEndpoints=localhost:2810,localhost:2811,localhost:2812
```
 - ___ d. Save the file and close it.

**Stop**

Make sure that the ports are set correctly in the `bootstrap.properties` file. Port conflict causes later exercises to fail.

-
- ___ 3. Edit the security information for the inbound server to match `cisCatalog1`.
 - ___ a. In the `servers\cisInbound1` directory, open the `server.xml` file (with Notepad++) and find the “TODO” section.
 - ___ b. Uncomment the `keystore` section, and replace `*INSERT_ENCODED_PASSWORD*` with the encrypted password.

```
<keyStore id="defaultKeyStore" password="{xor}NjEsbjg3Kyw=" />
```

**Hint**

You can copy and paste from the `dsi.txt` file.

-
- ___ c. Uncomment the basic registry section, and replace it with these values:

```
<basicRegistry id="basic" realm="DWRealm">
    <user name="admin" password="insights"/>
    <group name="DWGroup">
        <member name="admin"/>
    </group>
</basicRegistry>
```
 - ___ d. Uncomment the role section, and replace `*INSERT_GROUP_NAME*` with this group value: DWGroup

```
<administrator-role>
    <group>DWGroup</group>
</administrator-role>
```

- ___ e. Make sure each of the modified sections are not enclosed within commented text.

```

<!-- *TODO* Add SSL configuration including a key store and
     ...   optionally a trust store. For example:
     -->
<keyStore
    id="defaultKeyStore"
    password="{xor}NjEsbjg3Kyw=" />

<!-- *TODO* Add basic or LDAP user registry configuration.
     ...   For example:
     -->
<basicRegistry id="basic" realm="DWRealm">
<user name="admin" password="insights"/>
<group name="DWGroup">
<member name="admin"/>
</group>
</basicRegistry>

<!-- *TODO* Configure authorization roles for server administration.
     ...   For example:
     -->
<administrator-role>
    <group>DWGroup</group>
</administrator-role>

```

- ___ f. Save the server.xml file and close it.

- ___ 4. Repeat [Step 3](#) for the outbound server in the servers\cisOutbound1 directory.

3.3. Starting the inbound and outbound servers

- ___ 1. In the command prompt, make sure that you are in the runtime\wlp\bin directory.

```
cd C:\IBM\ODMInsights810\runtime\wlp\bin
```

- ___ 2. Run the start command for the outbound server.

```
server start cisOutbound1
```

- ___ 3. Run the start command for the inbound server.

```
server start cisInbound1
```

- ___ 4. Use REST to verify access to the inbound and outbound servers.

- ___ a. In a browser, type:

- <https://localhost:9447/IBMJMXConnectorREST> (for the inbound server)
- <https://localhost:9448/IBMJMXConnectorREST> (for the outbound server)

- ___ b. When you get a security warning, confirm the exception and continue.



Note

The browser security exception indicates that your host is accessible. If you prefer, you can skip signing in.

___ c. When prompted to sign in, use:

- **User name:** admin
- **Password:** insights

The browser returns a message that confirms the connection.

End of exercise

Exercise review and wrap-up

In this exercise, you configured the various Decision Server Insights server types on multiple hosts.

Exercise 12. Deploying solutions

Estimated time

02:00

Overview

In this exercise, you learn how to deploy solutions to a grid. You also learn how to deploy and test connectivity for a grid environment.

Objectives

After completing this exercise, you should be able to:

- Use solutionManager to deploy solutions
- Manage deployment and connectivity for a grid environment
- Test connectivity in a grid environment

Introduction

In this exercise, you deploy a solution to the grid containers. You also deploy the connectivity to the inbound and outbound servers to handle inbound and outbound events.

This exercise includes these sections:

- [Section 1, "Defining connection property files"](#)
- [Section 2, "Deploying the solution to the grid"](#)
- [Section 3, "Deploying connectivity"](#)
- [Section 4, "Testing connectivity"](#)

Requirements

This exercise requires that you complete [Exercise 9, "Defining connectivity"](#) and [Exercise 11, "Configuring Decision Server Insights"](#).

For this exercise, you work on your main host and the container hosts.



Attention

The default host names are: **dsiHost1**, **container1**, **container2**, and **container3**.

Make sure that you know the host names of the virtual images that you are using and that you use the **actual** host name during the exercises.

Section 1. Defining connection property files

In this section, you deploy the solution that you used in [Exercise 9, "Defining connectivity"](#). You deploy from dsiHost1 to the remote containers.

To help you deploy to each server, you can create connection property files that contain all the parameters that are expected by the command-line scripts. Connection properties files are stored in the `<InstallDir>\runtime\ia\etc` folder.



Important

If you run into issue during this exercise that you cannot solve with the instructions that are provided here, see [Appendix C, "Troubleshooting issues"](#).

1.1. Creating connection property files

- 1. Make sure that you are on your main host (dsiHost1).



Stop

All the steps in this section are performed on the main host. Check that you are on dsiHost1 (or the unique host name that is assigned to your main host).

- 2. Create a connection properties file so you can connect remotely to the runtime server on container1.

- a. In the `C:\IBM\ODMInsights810\runtime\ia\etc` directory, copy the `connections.properties` file, paste it in the same directory, and rename it to: `connectionC1.properties`
- b. Edit the `connectionC1.properties` file (with Notepad++) to match these values.

```
server=cisContainer1
host=container1 (or the actual name or IP address of your container 1 host)
port=9443
username=admin
password=ins1ghts
trustStoreLocation=${wlp.user.dir}/servers/cisCatalog1/resources/security
/key.jks
trustStorePassword=ins1ghts
sslProtocol=TLSv1.2
disableSSLHostnameVerification=true
```



Attention

The default container host names are: **container1**, **container2**, and **container3**.

Make sure that you use the **actual** host name or IP address to define the **host** value in the connection properties files.

-
- ___ 3. Test that your connection properties files are correct by using the `serverManager isonline` command to test access to your runtime server.

- ___ a. In a command prompt, switch to the `ia\bin` directory.

```
cd C:\IBM\ODMInsights810\runtime\ia\bin
```

- ___ b. Type the following command.

```
serverManager isonline --propertiesFile=../etc/connectionC1.properties
```



Troubleshooting

You know that your connection properties file is correct if you can successfully access your `container1` runtime server with the `serverManager isonline` command.

If you are unable to connect:

- Confirm that your runtime server is running.
- Confirm that your `connection.properties` file is edited correctly.

You can use the connection properties files that are in the `<LabfilesDir>\code` folder. However, if you use those files, make sure that the host names match the host names in your computer lab environment.

-
- ___ 4. Create a connection properties file so you can connect remotely to the runtime server on the `container2`.
 - ___ a. Copy the `connectionC1.properties` and rename it: `connectionC2.properties`
 - ___ b. Edit the following values in the `connectionC2.properties` file (with Notepad++).
 - **server=cisContainer2**
 - **host=container2** (or the actual name of your container 2 host)
 - ___ c. Test the connection.


```
serverManager isonline --propertiesFile=../etc/connectionC2.properties
```
 - ___ 5. Create a connection properties file so you can connect remotely to the runtime server on `container3`.
 - ___ a. Copy the `connectionC1.properties` and rename it: `connectionC3.properties`

- ___ b. Edit the following values in the `connectionC3.properties` file (with Notepad++).
 - **server**=cisContainer3
 - **host**=container3 (or the actual name or IP address of your container 3 host)
- ___ c. Test the connection.

```
serverManager isonline --propertiesFile=../etc/connectionC3.properties
```



Note

The `serverManager isonline` command is used to test remote containers only. You cannot use this command to test the catalogs or inbound and outbound servers.

- ___ 6. Create a connection properties file for the inbound server.
 - ___ a. In the `C:\IBM\ODMInsights810\runtime\ia\etc` directory, copy the `connectionC1.properties` file and rename it: `connectionIn1.properties`
 - ___ b. Edit the `connectionIn1.properties` file (with Notepad++) to match these values.

```
server=cisInbound1
host=localhost
port=9447
username=admin
password=insights
trustStoreLocation=$\{wlp.user.dir\}/servers/cisCatalog1/resources/security
/key.jks
trustStorePassword=insights
sslProtocol=TLSv1.2
disableSSLHostnameVerification=true
```
- ___ 7. Create a connection properties file for the outbound server.
 - ___ a. In the `C:\IBM\ODMInsights810\runtime\ia\etc` directory, copy the `connectionIn1.properties` file and rename it: `connectionOut1.properties`
 - ___ b. Edit the server name and port properties in the `connectionOut1.properties` file (with Notepad++) to match these values.

```
server=cisOutbound1
host=localhost
port=9448
```

Section 2. Deploying the solution to the grid

- ___ 1. Check that catalogs and containers are communicating.
 - ___ a. In a command prompt, switch to the C:\IBM\ODMInsights810\runtime\wlp\bin directory.
cd C:\IBM\ODMInsights810\runtime\wlp\bin
 - ___ b. Type the following remote deployment command.
xscmd.bat -c listHosts -cep localhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights

All the grid container servers and their IP addresses are listed.

```

Administrator: Command Prompt
C:\IBM\ODMInsights810\runtime\wlp\bin>xscmd.bat -c listHosts -cep localhost:2810
-user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cis
Catalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 01:22:32.451
CWXSI0068I: Executing command: listHosts

*** Show all online hosts for com.ibm.ia.runtime.cluster data grid and iaConfigM
aps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3

*** Show all online hosts for com.ibm.ia data grid and iaMaps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3

*** Show all online hosts for com.ibm.ia.preload data grid and iaPreloadMaps map
set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts    = 3
CWXSI0040I: The listHosts command completed successfully.
Ending at: 2018-11-07 01:22:40.076

```



Troubleshooting

If your containers are not all listed, you might need to restart the container server.

If you do not see any containers listed, you might need to check whether all your catalog servers are running.

See [Appendix C, "Troubleshooting issues".](#)

-
- ___ 2. Deploy the banking_scenario_solution solution to the first container.
 - ___ a. In a command prompt, switch to the ia\bin directory.

cd C:\IBM\ODMInsights810\runtime\ia\bin

- __ b. Type the following remote deployment command.

```
solutionManager deploy remote
C:\labfiles\Solutions\banking_scenario_solution.esa
--propertiesFile=../etc/connectionC1.properties
```



Hint

You can copy and paste the commands from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder.

After deployment finishes, you see a message: Solution successfully deployed.

```
C:\IBM\ODMInsights810\runtime\ia\bin>solutionManager deploy remote C:\labfiles\S
olutions\banking_scenario_solution.esa --propertiesFile=../etc/connectionC1.prop
erties
Dec 19, 2018 5:16:36 PM com.ibm.ia.common.jmx.JMXUtils
WARNING: CwMBD9712W: Hostname verification is disabled by the "disableSSLHostnam
eVerification" connection property. The client will not check the hostname speci
fied in the URL.
Solution successfully deployed.
```

- __ 3. Use the `solutionManager` script to verify the deployment:

```
solutionManager list remote --propertiesFile=..\etc\connectionC1.properties
```

```
C:\IBM\ODMInsights810\runtime\ia\bin>solutionManager list remote --propertiesFil
e=..\etc\connectionC1.properties
Dec 19, 2018 5:19:37 PM com.ibm.ia.common.jmx.JMXUtils
WARNING: CwMBD9712W: Hostname verification is disabled by the "disableSSLHostnam
eVerification" connection property. The client will not check the hostname speci
fied in the URL.
banking_scenario_solution-4.0(active)
```



Note

Your version of the deployed `banking_scenario_solution` might be different.

- __ 4. Deploy the second container by typing this command:

```
solutionManager deploy remote
C:\labfiles\Solutions\banking_scenario_solution.esa
--propertiesFile=../etc/connectionC2.properties
```

- __ 5. Deploy to the third container by typing this command:

```
solutionManager deploy remote
C:\labfiles\Solutions\banking_scenario_solution.esa
--propertiesFile=../etc/connectionC3.properties
```

- __ 6. Use the `solutionManager list` command from [Step 3](#) to verify deployment to container 2 and container 3.

__ 7. Use REST to verify the deployment to the containers.

__ a. Open a browser and type this URL to check deployment to container 1:

<http://container1:9080/ibm/ia/rest/solutions>



Attention

Make sure that you use the **actual** host name or IP address for your container in the URL.

__ b. Accept any security certificates for the browser and continue.

__ c. When prompted for authorization, use this login:

- **User name:** admin
- **Password:** insights



Note

The URL automatically switches to a secure connection (<https://container1:9443/ibm/ia/rest/solutions>).

If you do not see the solution name listed immediately, you might need to wait a few minutes and try again after the containers have time to finish load balancing.

You should see the solution and version listed.

The screenshot shows a browser window with the following details:

- Address bar: container1:9443/ibm/ia/rest/solutions
- Toolbar icons: back, forward, refresh, home.
- Status bar: ⓘ 🔒 https://container1:9443/ibm/ia/rest/solutions
- Main content area: "This XML file does not appear to have any style information associated with it. The document tree"

```
- <solutions>
  <solution name="banking_scenario_solution" version="banking_scenario_solution-4.0"/>
</solutions>
```



Note

Your version of the deployed `banking_scenario_solution` might be different.

__ d. Repeat the REST verification for container 2 and container 3.

Section 3. Deploying connectivity

In this section, you deploy the connectivity configurations to the inbound and outbound servers.



Hint

You can copy and paste the command lines from the `dsi.txt` file in the `<LabfilesDir>\code` folder.

- 1. In a command prompt, make sure that you are in the `C:\IBM\ODMInsights810\runtime\ia\bin` directory.
- 2. Deploy the inbound configuration by typing this command:

```
connectivityManager deploy local
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking-server-inbound-config.xml
--propertiesFile=../etc/connectionIn1.properties
```

- 3. Deploy the outbound configuration by typing this command:

```
connectivityManager deploy local
C:\labfiles\Solutions\banking_scenario_solution.esa
C:\labfiles\Solutions\banking-server-outbound-config.xml
--propertiesFile=../etc/connectionOut1.properties
```

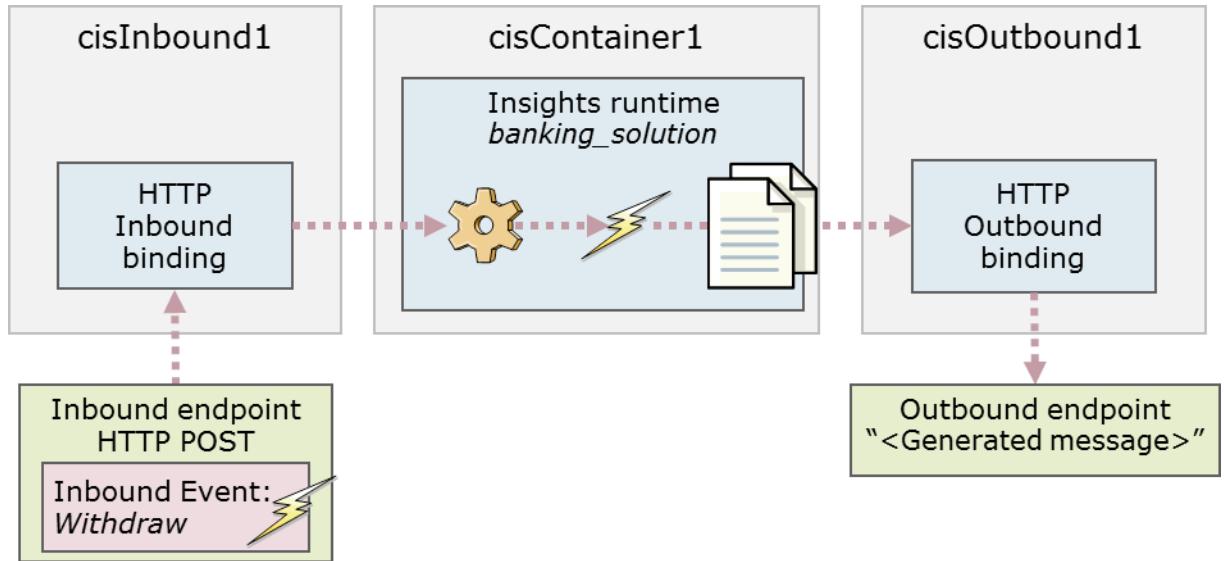
After deploying finishes, the result shows the successfully deployed and activated inbound and outbound endpoints.

```
CwMBE1144I: Successfully copied the file from "C:\labfiles\Solutions\banking-server-inbound-config.xml" to "C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisInbound1\banking_scenario_solution-config.xml".
CwMBE1452I: Successfully deployed connectivity for the solution "banking_scenario_solution".
CwMBE1454I: Successfully activated connectivity for the solution "banking_scenario_solution".
CwMBE1498I: Number of active inbound endpoints: 2
CwMBE1499I: Number of active outbound endpoints: 0
```

```
CwMBE1144I: Successfully copied the file from "C:\labfiles\Solutions\banking-server-outbound-config.xml" to "C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisOutbound1\banking_scenario_solution-config.xml".
CwMBE1452I: Successfully deployed connectivity for the solution "banking_scenario_solution".
CwMBE1454I: Successfully activated connectivity for the solution "banking_scenario_solution".
CwMBE1498I: Number of active inbound endpoints: 0
CwMBE1499I: Number of active outbound endpoints: 1
```

Section 4. Testing connectivity

In this section, you test that your endpoints are correctly configured to submit and receive events and messages.



You use two additional tools:

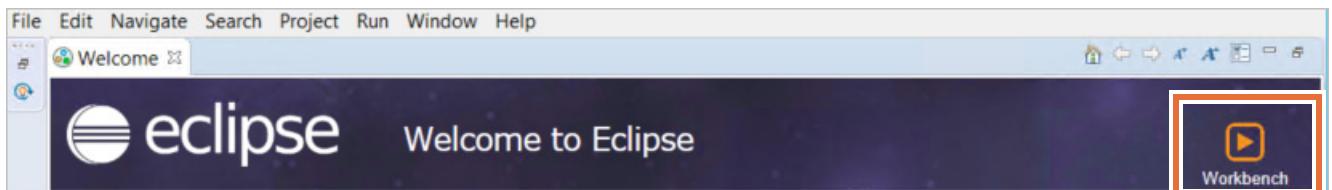
- For the inbound event producer: RESTClient add-on to Mozilla Firefox
 - For the outbound endpoint monitor: TCP/IP Monitor in Eclipse

For the event submissions, you use the text that is provided in these files of the C:\labfiles\code\bank directory.

- client.txt
 - checkAcct.txt

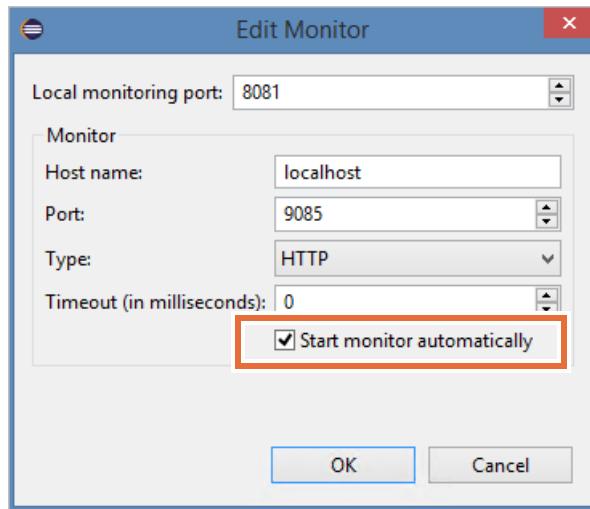
4.1. Setting up TCP/IP monitoring in Eclipse

- __ 1. Reopen Insight Designer and switch to a new workspace.
 - __ a. Go to **File > Switch Workspace > Other**.
 - __ b. When prompted for a workspace path in the Workspace Launcher, type:
C:\labfiles\workspaces\connectivity
 - __ 2. On the Welcome view, click **Workbench**.

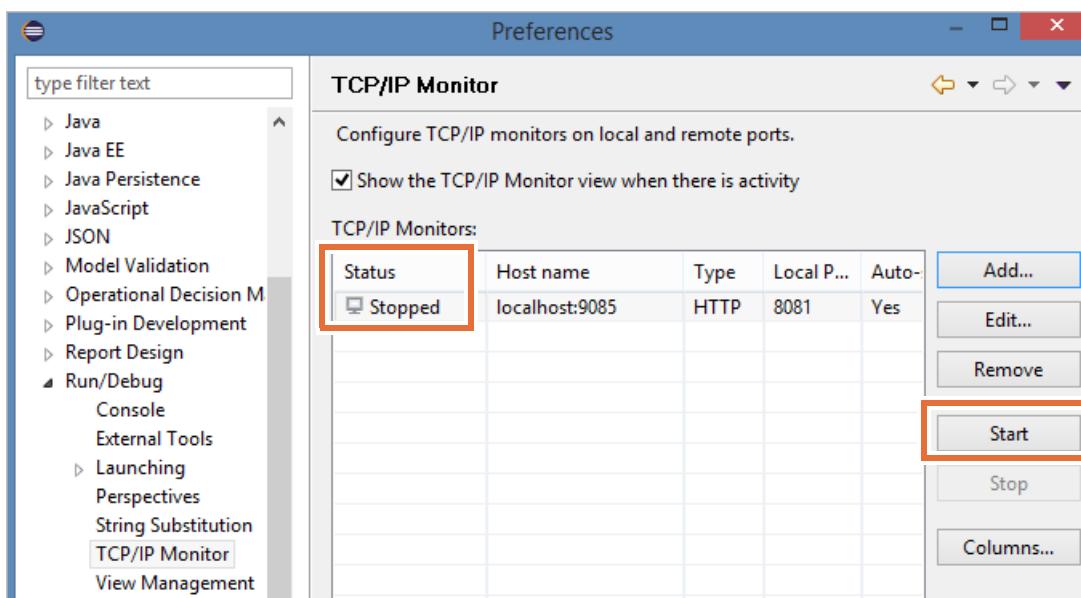


3. Switch to the Java perspective.

- __ 4. Define the TCP/IP monitoring settings from the **Window > Preferences** menu.
- __ a. Click **Window > Preferences**.
 - __ b. In the Preferences window, expand **Run/Debug** and click **TCP/IP Monitor**.
 - __ c. On the TCP/IP Monitor page, click **Add**.
 - __ d. Define the monitoring settings with these values:
 - **Local monitoring port:** 8081
 - **Host name:** localhost
 - **Port:** 9085
 - **Type:** HTTP
 - __ e. Select **Start monitor automatically**.

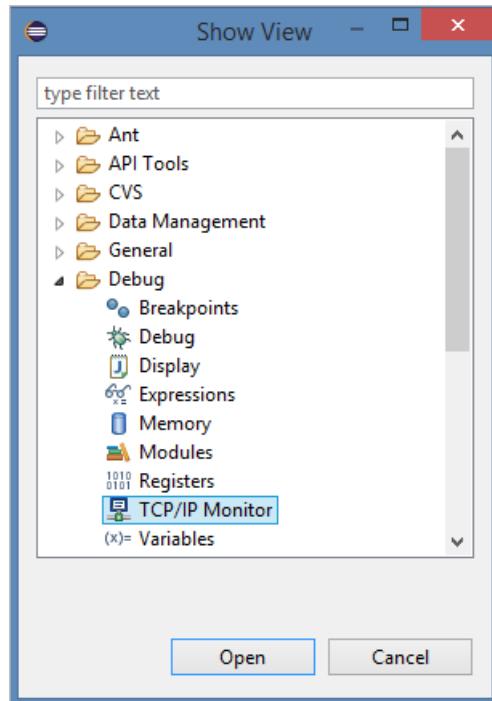


- __ f. Click **OK**.
- __ g. If the **Status** field for the newly added monitor is “Stopped”, click **Start**.

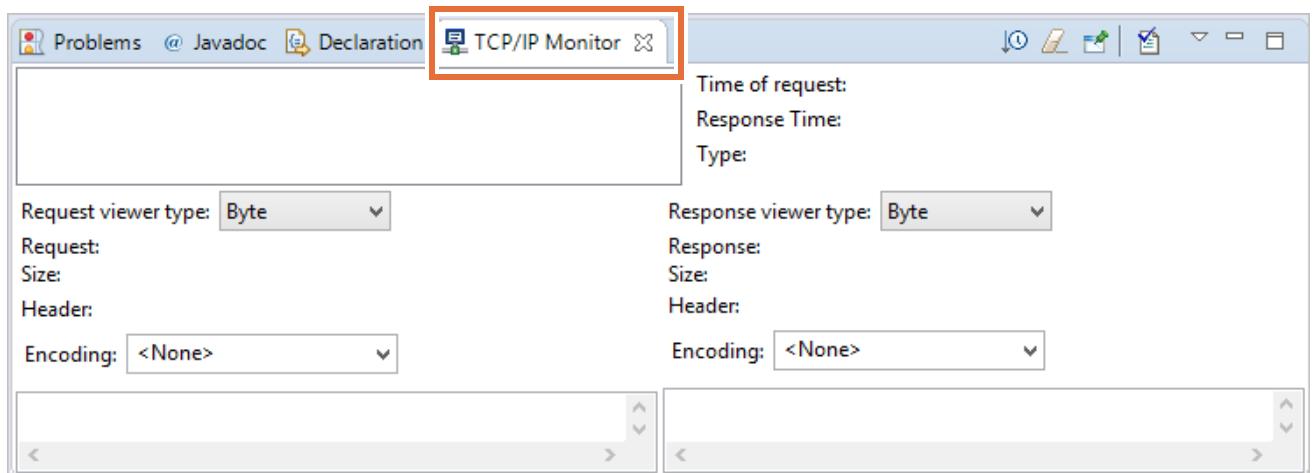


- __ h. Click **Apply** and **Close** to close the Preferences window.

- ___ 5. Open the **TCP/IP Monitor** view in the Java perspective.
 - ___ a. From the **Window** menu, click **Show View > Other**.
 - ___ b. In the **Show View** window, select **Debug > TCP/IP Monitor** and click **Open**.



The **TCP/IP Monitor** view opens in the lower part of the workspace, and is ready to monitor your outbound events on port 8081.



You leave Insight Designer running. Next, you use a browser to submit events.

4.2. Submitting events through the RESTClient

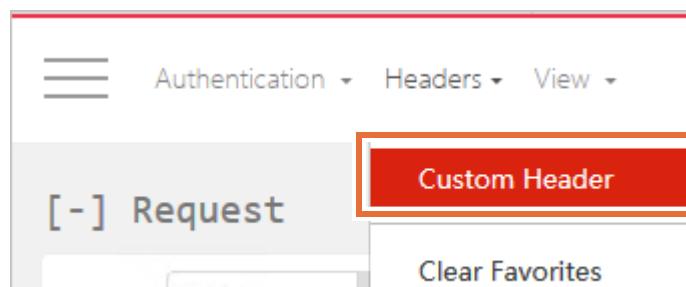
- ___ 1. Open the Mozilla Firefox browser and click the sidebar icon.



- ___ 2. When the prompt to migrate from RESTClient2 opens, close it.

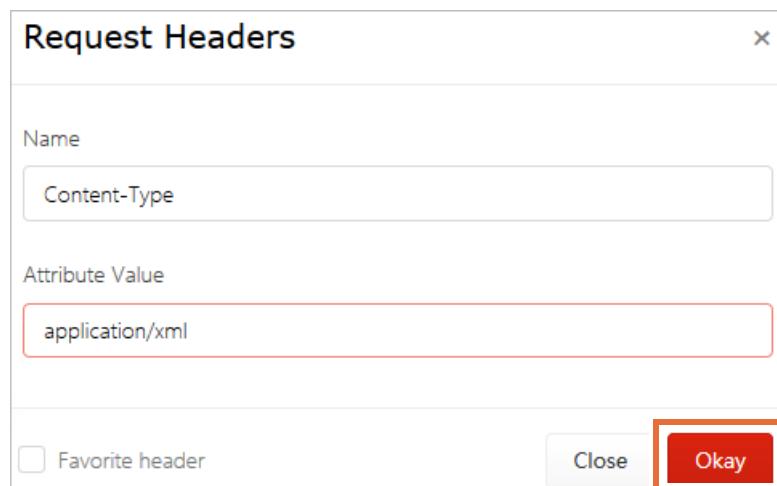
Next, you submit a REST API POST method to create entities for the banking_scenario_solution that runs on container1.

- ___ 3. On the toolbar, click **Headers > Custom Headers**.



- ___ 4. Set the **Name** and **Attribute Value** fields, and click **Okay**.

- **Name:** Content-type
- **Attribute Value:** application/xml



- ___ 5. Set **Method** to **POST**.

- ___ 6. Set the **URL** field to:

`http://container1:9080/ibm/ia/rest/solutions/banking_scenario_solution/entity-types/banking_scenario.Client/entities`

- ___ 7. Set the **Body** field to the contents of the `client.txt` file in the `C:\labfiles\code\bank` directory.

- ___ a. In the `C:\labfiles\code\bank` directory, double-click the `client.txt` file to open it in a text editor and copy the text (press `Ctrl+A` and press `Ctrl+C`).
- ___ b. Paste the text from the `client.txt` file to the **Body** field (press `Ctrl+V`).

- ___ 8. Click **SEND**.

The screenshot shows the RESTClient interface. The 'Method' dropdown is set to 'POST'. The 'URL' field contains 'http://container1:9080/ibm/ia/rest/solutions/banking_scenario_solution/entity-types/'. The 'Headers' section has a single entry: 'Content-Type: application/xml'. The 'Body' section contains an XML object definition. A large red box highlights the 'SEND' button in the top right corner.

- ___ 9. When prompted for authentication, use admin/insights as the user name and password.

The response is returned with Status Code 201 Created, which means the request was created correctly.

The screenshot shows the RESTClient interface under the 'Response' tab. It displays two entries: 'Status Code' followed by '201 Created' (which is highlighted with a red box), and 'Content-Language' followed by ': en-US'.

Next, you submit a check account event through the inbound server.

- ___ 10. Set the **URL** to:

`https://localhost:9447/banking/incoming`

- ___ 11. Set the **Body** field to the contents of the `checkAcct.txt` file in the `C:\labfiles\code\bank` directory.

- ___ a. In the `C:\labfiles\code\bank` directory, copy the text from the `checkAcct.txt` file.
- ___ b. Replace the test in the **Body Data** field with the text from the `checkAcct.txt` file by pressing **Ctrl+A** to select all the text, and then press **Ctrl+V** to paste over that text.

- ___ 12. Click **SEND**.

- ___ 13. When prompted about the security certificate, click **Open in a new tab**.

https://localhost:9447/banking/incoming uses an invalid security certificate

It seems the web site "https://localhost:9447/banking/incoming" is using an invalid security certificate. You can add an exception in order to visit the site. Please open the web site on a new tab then click on the button **Advanced**, then click **Add Exception...** button and click the button **Confirm Security Exception** in Add Security Exception dialog. After add the web site "https://localhost:9447/banking/incoming" to the exception list you can use RESTClient continue to test that web site again.

Your connection is not secure

The owner of **www.example.com** has configured their website improperly.
To protect your information from being stolen, Firefox has not connected to this website.

[Learn more...](#)

[Go Back](#) [Advanced](#)

www.example.com uses an invalid security certificate.

The certificate is not trusted because the issuer certificate is unknown.
The server might not be sending the appropriate intermediate certificates.
An additional root certificate may need to be imported.

Error code: SEC_ERROR_UNKNOWN_ISSUER

[Add Exception...](#)

For more information please refer to: [Firefox support](#)

[Open in a new tab](#) [Close](#)

- ___ 14. On the new tab, confirm the security exception.
- ___ 15. When prompted for authentication, use `admin/ins1ghts` as the user name and password.

The response is returned as 200 OK.

Status Code	200 OK
Content-Language	: en-US



Troubleshooting

If this test fails:

- Make sure that all your catalogs, containers, and inbound and outbound servers are running
- Make sure that your deployed solution is active on the container servers
- Make sure that the inbound endpoint EAR file was correctly configured in [Section 4.1, "Preparing the inbound application and configuration"](#)
- See [Appendix C, "Troubleshooting issues"](#)



Note

If you want to rerun the test, you can use the DELETE method to delete the client entities that you created with these settings:

- **Target Site:**
`http://container1:9080/ibm/ia/rest/solutions/banking_scenario_solution/entity-types/banking_scenario.Client/entities`
- **Method:** DELETE
- **Request Headers:** Content-type application/xml
- **Body Data:** Text that is copied from the `client.txt` file

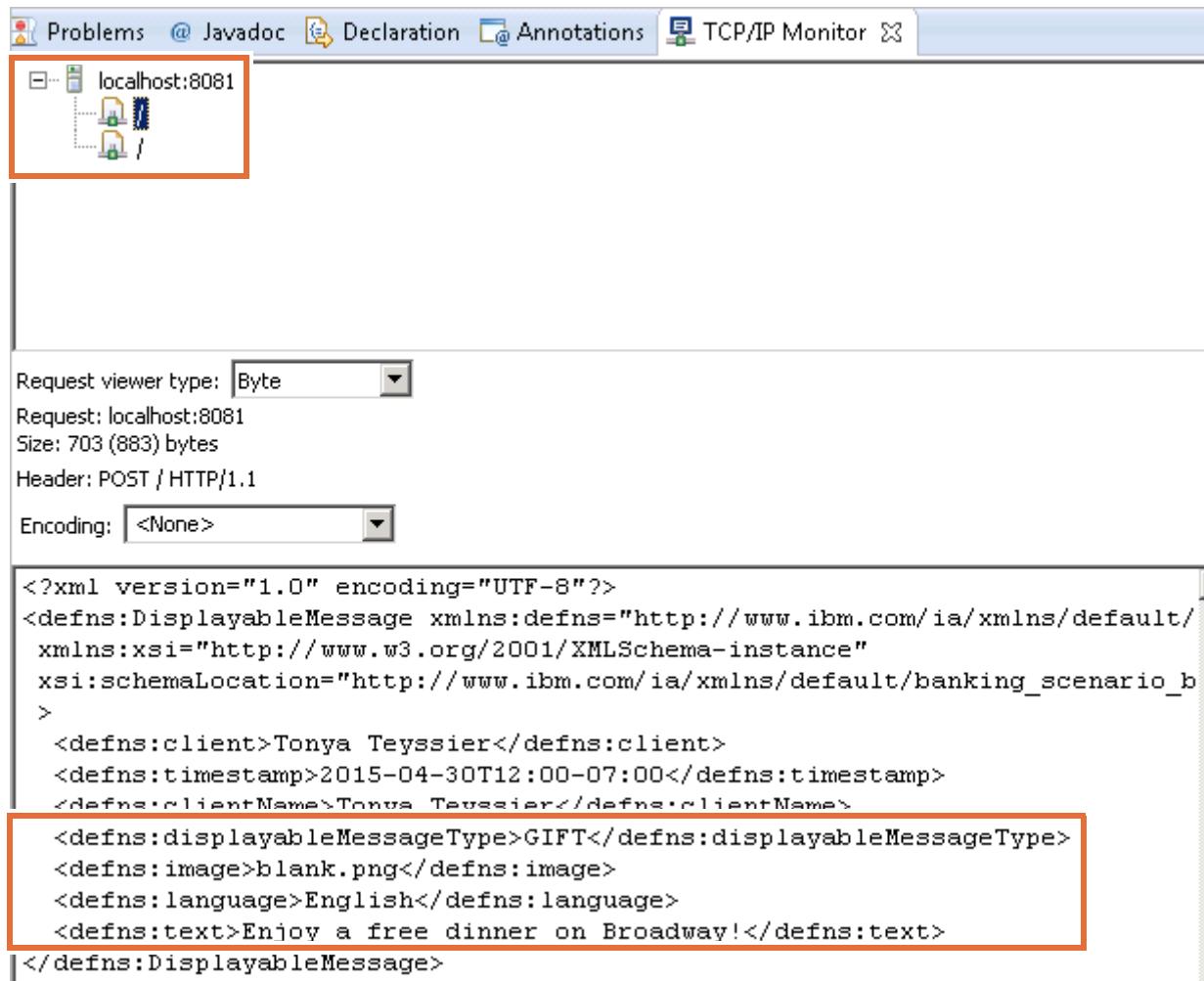
4.3. Verifying the outbound connectivity

Next, you find out whether the event submitted to the inbound server was correctly processed and generates messages that should be sent to the outbound endpoint. If the connectivity is set up correctly, the outbound server sends the messages to the outbound endpoint.

1. Return to the TCP/IP Monitor window in Eclipse.

You should see two responses that are captured by the monitor.

- __ 2. Select the first response and view the outbound displayable message event that is returned.



The screenshot shows the Eclipse IDE interface with the TCP/IP Monitor perspective selected. In the top navigation bar, the 'TCP/IP Monitor' tab is active. Below the tabs, there is a tree view showing a single node 'localhost:8081'. A red box highlights this node. Underneath the tree view, there are several configuration options: 'Request viewer type: Byte', 'Request: localhost:8081', 'Size: 703 (883) bytes', 'Header: POST / HTTP/1.1', and 'Encoding: <None>'. The main content area displays an XML document. A red box highlights the entire XML content. The XML code is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<defns:DisplayableMessage xmlns:defns="http://www.ibm.com/ia/xmlns/default/
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.ibm.com/ia/xmlns/default/banking_scenario_b
>
  <defns:client>Tonya Teyssier</defns:client>
  <defns:timestamp>2015-04-30T12:00-07:00</defns:timestamp>
  <defns:clientName>Tonya Teyssier</defns:clientName>
  <defns:displayableMessageType>GIFT</defns:displayableMessageType>
  <defns:image>blank.png</defns:image>
  <defns:language>English</defns:language>
  <defns:text>Enjoy a free dinner on Broadway!</defns:text>
</defns:DisplayableMessage>
```

- __ 3. Close Eclipse.
__ 4. Close the browser that is running RESTClient.
__ 5. Close the client.txt and checkAcct.txt files.

End of exercise

Exercise review and wrap-up

In the first part of this exercise, you deployed a solution to the grid. You then configured and deployed connectivity to the inbound and outbound connectivity servers, and you tested your deployment.

Exercise 13. Administering Decision Server Insights

Estimated time

01:00

Overview

In this exercise, you learn how to manage security, deploy solutions, and monitor the grid.

Objectives

After completing this exercise, you should be able to:

- Monitor and manage the hosts in a Decision Server Insights grid

Introduction

This exercise includes these sections:

- [Section 1, "Checking the status of your servers"](#)
- [Section 2, "Monitoring the grid"](#)
- [Section 4, "Managing server properties"](#)
- [Section 5, "Creating a trace file"](#)
- [Section 6, "Enable and use Insight Monitor"](#)
- [Section 7, "Undeploying solutions"](#)

Requirements

This exercise requires that you complete [Exercise 12, "Deploying solutions"](#).

For this exercise, you start on your main host (dsiHost1 or the unique name that is assigned to your main host). You also work on the container hosts.

Section 1. Checking the status of your servers

In this section, you use scripts to determine server status.

- 1. Make sure that you are on dsiHost1.
- 2. Open a command prompt, and change to the C:\IBM\ODMInsights810\runtime\ia\bin directory.

```
cd C:\IBM\ODMInsights810\runtime\ia\bin
```



Hint

You can copy and paste the commands for this exercise from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder.

- 3. Run the `serverManager isonline` command to check that your container servers are running.
 - To check the `cisContainer1` is running, type:
`serverManager isonline --propertiesFile=../etc/connectionC1.properties`
 - To check the `cisContainer2` is running, type:
`serverManager isonline --propertiesFile=../etc/connectionC2.properties`
 - To check the `cisContainer3` is running, type:
`serverManager isonline --propertiesFile=../etc/connectionC3.properties`
- 4. Open another command prompt, and change to the C:\IBM\ODMInsights810\runtime\wlp\bin directory.
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
- 5. Run the `server status` command to check that your container servers are running.
 - To check that the inbound server is running, type:
`server status cisInbound1`
 - To check that the outbound server is running, type:
`server status cisOutbound1`

Section 2. Monitoring the grid

In this section, you use the WebSphere eXtreme Scale `xscmd` utility to monitor the servers in your grid. You used some of these commands to verify your configuration during [Exercise 11, "Configuring Decision Server Insights"](#).



Troubleshooting

If you run into issues during this section, see [Appendix C, "Troubleshooting issues"](#).

- ___ 1. Make sure that you are on your main host (`dsiHost1`).
- ___ 2. In a command prompt, make sure that you are in the `C:\IBM\ODMInsights810\runtime\wlp\bin` directory.
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
- ___ 3. Check the quorum status of the catalogs by typing this command:

```
xscmd.bat -c showQuorumStatus -cep localhost:2810 -user admin -pwd inslghts
-ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp inslghts
```

```
C:\IBM\ODMInsights810\runtime\wlp\bin>xscmd -c showQuorumStatus -cep localhost:2810 -user admin -pwd inslghts -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp inslghts
Starting at: 2018-11-07 00:09:03.739
CWXSI0068I: Executing command: showQuorumStatus
Server          Host    Quorum Quorum Size Active Servers
-----      -----
dsiHost1-cisCatalog1 dsiHost1 TRUE    2           dsiHost1-cisCatalog1,
                     , dsiHost1-cisCatalog2,
                     , dsiHost1-cisCatalog3
dsiHost1-cisCatalog2 dsiHost1 TRUE    2           dsiHost1-cisCatalog1,
                     , dsiHost1-cisCatalog2,
                     , dsiHost1-cisCatalog3
dsiHost1-cisCatalog3 dsiHost1 TRUE    2           dsiHost1-cisCatalog1,
                     , dsiHost1-cisCatalog2,
                     , dsiHost1-cisCatalog3
CWXSI0040I: The showQuorumStatus command completed successfully.
Ending at: 2018-11-07 00:09:12.786
```

The quorum status is enabled (TRUE) for all the catalogs.

- ___ 4. Show the primary catalog by typing this command.

```
xscmd.bat -c showPrimaryCatalogServer -cep localhost:2810 -user admin -pwd
inslghts -ts
```

```
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp insights
```

```
C:\IBM\ODMInsights810\runtime\wlp>xscmd -c showPrimaryCatalogServer -cep loc
alhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\
servers\cisCatalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 00:21:37.006
CWXSI0068I: Executing command: showPrimaryCatalogServer
Server          Host      Primary
-----        -----
dsiHost1-cisCatalog1 dsiHost1 TRUE
dsiHost1-cisCatalog2 dsiHost1 FALSE
dsiHost1-cisCatalog3 dsiHost1 FALSE
CWXSI0040I: The showPrimaryCatalogServer command completed successfully.
Ending at: 2018-11-07 00:21:44.694
```

The “primary” status for cisCatalog1 server is set to TRUE to show that it is the master catalog server.

5. Make sure that the containers are running.

```
xscmd -c listHosts -cep localhost:2810 -user admin -pwd insights -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp insights
```

All the grid container servers and their IP addresses are listed.

The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The command entered was "xscmd -c listHosts -cep localhost:2810 -user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp insights". The output displays information about three containers: container1, container2, and container3. It shows the number of hosts matching (3), total known containers (3), and total known hosts (3) for each. The command completed successfully at 01:22:40.076.

```
C:\IBM\ODMInsights810\runtime\wlp>xscmd -c listHosts -cep localhost:2810
-user admin -pwd insights -ts C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cis
Catalog1\resources\security\key.jks -tsp insights
Starting at: 2018-11-07 01:22:32.451
CWXSI0068I: Executing command: listHosts

*** Show all online hosts for com.ibm.ia.runtime.cluster data grid and iaConfigM
aps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts     = 3

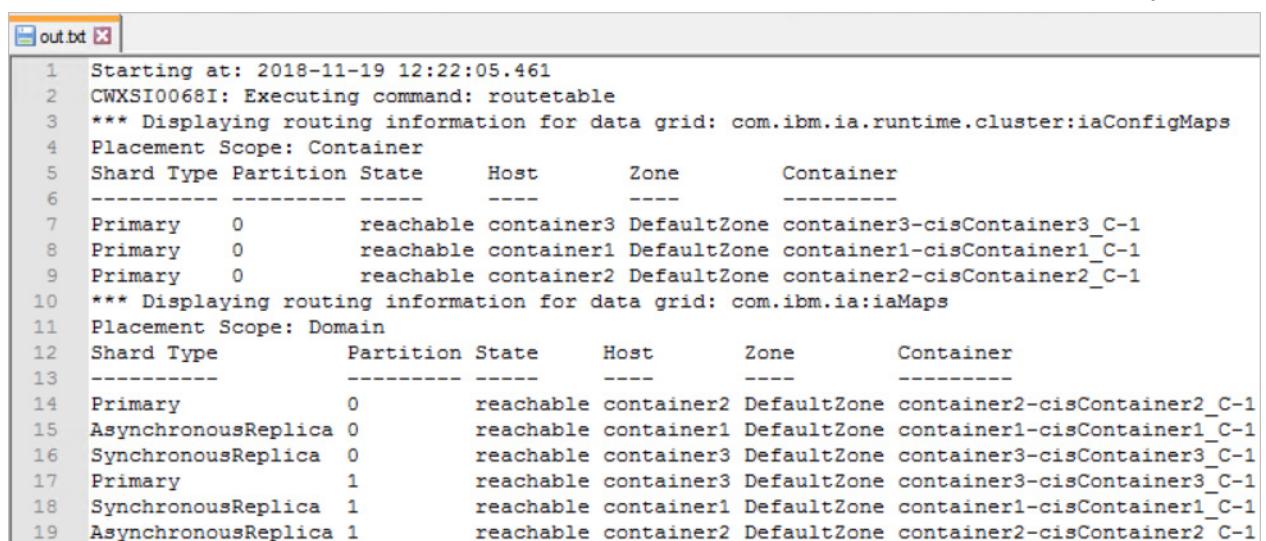
*** Show all online hosts for com.ibm.ia data grid and iaMaps map set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts     = 3

*** Show all online hosts for com.ibm.ia.preload data grid and iaPreloadMaps map
set.
  container1
  container2
  container3
  Hosts matching      = 3
  Total known containers = 3
  Total known hosts     = 3
CWXSI0040I: The listHosts command completed successfully.
Ending at: 2018-11-07 01:22:40.076
```

6. Make sure that the catalogs and containers are communicating and see all partitions on the online hosts for the data grid by typing this command:

```
xscmd -c routetable -cep localhost:2810 -user admin -pwd insights -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp insights > out.txt
```

The result is too large to see in the command prompt. To view the complete result, you can open the `out.txt` file in the `C:\IBM\ODMInsights810\runtime\wlp\bin` directory.



The screenshot shows a Windows Notepad window with the title 'out.txt'. The content of the window is a log of routing information for data grids. It starts with a timestamp and a message about executing a command, followed by sections for 'iaConfigMaps' and 'iaMaps' with their respective shard placement details. The log ends with a section for 'iaMaps' under 'Domain' placement scope.

```
1 Starting at: 2018-11-19 12:22:05.461
2 CWXSI0068I: Executing command: routetable
3 *** Displaying routing information for data grid: com.ibm.ia.runtime.cluster:iaConfigMaps
4 Placement Scope: Container
5 Shard Type Partition State Host Zone Container
6 -----
7 Primary 0 reachable container3 DefaultZone container3-cisContainer3_C-1
8 Primary 0 reachable container1 DefaultZone container1-cisContainer1_C-1
9 Primary 0 reachable container2 DefaultZone container2-cisContainer2_C-1
10 *** Displaying routing information for data grid: com.ibm.ia:iaMaps
11 Placement Scope: Domain
12 Shard Type Partition State Host Zone Container
13 -----
14 Primary 0 reachable container2 DefaultZone container2-cisContainer2_C-1
15 AsynchronousReplica 0 reachable container1 DefaultZone container1-cisContainer1_C-1
16 SynchronousReplica 0 reachable container3 DefaultZone container3-cisContainer3_C-1
17 Primary 1 reachable container3 DefaultZone container3-cisContainer3_C-1
18 SynchronousReplica 1 reachable container1 DefaultZone container1-cisContainer1_C-1
19 AsynchronousReplica 1 reachable container2 DefaultZone container2-cisContainer2_C-1
```

Section 3. Working with map data

The `showMapsizes` command generates a report that is important for problem diagnosis, memory sizing, and understanding the distribution of data in the grid. Use `showMapsizes` early in the solution development process.

3.1. Generating a grid map data report

- ___ 1. Get a report of the grid map data.

```
xscmd -c showMapSizes -cep localhost:2810 -user admin -pwd inslghts -ts
C:\IBM\ODMInsights810\runTime\wlp\usr\servers\cisCatalog1\resources\security
\key.jks -tsp inslghts > out.txt
```

The map data shows the number, distribution, and size of objects in the WebSphere eXtreme Scale maps. Map data can be useful to identify artifacts that use large amounts of memory or an uneven distribution of artifacts due to hot entities. This data is also useful for memory sizing. During solution development, you can use map data to get an early idea of the size and number of entities, events, and scheduled events.

Map Name	Partition	Map Entries	Used Bytes	Shard	Type	Container
Config	0	4	2 KB		Primary	container2-cisContainer2
StaticRuntimeServers	0	127	54 KB		Primary	container2-cisContainer2
StaticRuntimeTokensStable	0	3	3 KB		Primary	container2-cisContainer2
StaticRuntimeTokensVolatile	0	0	0		Primary	container2-cisContainer2
Server total:	134	(59 KB)				

3.2. Analyzing grid map data

In this section, you analyze an existing grid map data report.

- ___ 1. In the **C:\labfiles\code** folder, open the `MapSizesReport.txt` file (with Notepad++).
- ___ 2. Calculate the following results:
 - ___ a. What is the average size of the `banking_scenario.Client` entity?

 - ___ b. What is the average size of the `banking_scenario.ClientRelatedEvent` event?

 - ___ c. How much memory you would need for the following (not taking into account overhead):
 - 1 million Client entity instances
 - An average of 3 ClientRelatedEvents per entity
 - 1 sync replica

- ___ 3. Compare your answers with the `MapSizesSolution.txt` file in the **C:\labfiles\code** folder.

Section 4. Managing server properties

In this section, you use the `propertyManager` script to manage server properties.

- ___ 1. Make sure that you are on `dsiHost1`.
- ___ 2. Open a command prompt, and make sure that you are in the `C:\IBM\ODMInsights810\runtime\ia\bin` directory.
`cd C:\IBM\ODMInsights810\runtime\ia\bin`



Hint

You can copy and paste the commands for this exercise from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder.

- ___ 3. Run the `propertyManager` to list which properties you can manage with this script.

You can use the `connectionC1.properties` file to manage the `cisContainer1` server on `container1`.

```
propertyManager list --propertiesFile=../etc/connectionC1.properties
```

- ___ 4. Run the `propertyManager` script to get the current `solutionAutoStart` value for `cisContainer1`.

```
propertyManager get solutionAutoStart  
--propertiesFile=../etc/connectionC1.properties
```

The `propertyManager` returns the value of `solutionAutoStart` as `false`.

- ___ 5. Set the `solutionAutoStart` property to `true` and the `LogSuppressionThreshold` property to `2`.

```
propertyManager set solutionAutoStart="true" LogSuppressionThreshold="2"  
--propertiesFile=../etc/connectionC1.properties
```

After you run this command, you see “Set property successful” messages with the property names, old values, and new values.

- ___ 6. Verify that the setting was changed in the `server.xml` file for `cisContainer1`.

- ___ a. Switch to the `container1` host.
- ___ b. In Windows Explorer, open the `server.xml` file in the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer1` directory.
- ___ c. Locate the `<ia_runtime>` entry and note that the entry includes:
`logSuppressionThreshold="2" solutionAutoStart="true"`
- ___ d. Close the `server.xml` file.

Section 5. Creating a trace file

In this section, you review the logging properties in the `server.xml` file of the container servers. To edit these properties, you modify the `server.xml` file on each of the containers, and on the inbound and outbound servers.

5.1. Modifying the containers, inbound and outbound servers

- ___ 1. Make sure that you are on container1.
- ___ 2. Create a trace file and increase the logging values for the server.
 - ___ a. In Windows Explorer, go to the `C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer1` directory.
 - ___ b. Expand the **cisContainer1** folder, and make a backup of the `server.xml` file. (For example, you can copy and paste the file in the **cisContainer1** folder, and it is automatically renamed as “server – Copy”.)
 - ___ c. Open the `server.xml` file with Notepad++.
 - ___ d. In the `server.xml` file, locate the logging entry and notice the property values:
`<logging maxFiles="5"`
`traceSpecification="com.ibm.ia.*=info:com.ibm.rules.*=info:*=info"/>`



Information

You can add or modify existing entries to the following values to get extensive trace of the solution.

For example, if you want to receive more messages, you can increase the `maxFiles` property to: `maxFiles=10`

You can also change the `traceSpecification` property to get more detailed log results for specific applications. For example, you can change `*=info` to `*=warning`.

- ___ e. Replace the logging entry with the following values:

```
<logging
traceSpecification="com.ibm.rules.generated.dataie.banking_scenari.*=detail:com
.ibm.ia.*=warning:
com.ibm.ia.runtime.SolutionProviderMgr=finest:com.ibm.rules.*=info:*=warning"
maxFiles="10" messageFileName="bankingSolutionMessags.log"/>
```



Hint

You can copy and paste the commands for this exercise from the `dsi.txt` file that is in the `<LabfilesDir>\code` folder.

- ___ f. Save the `server.xml` file and close it.

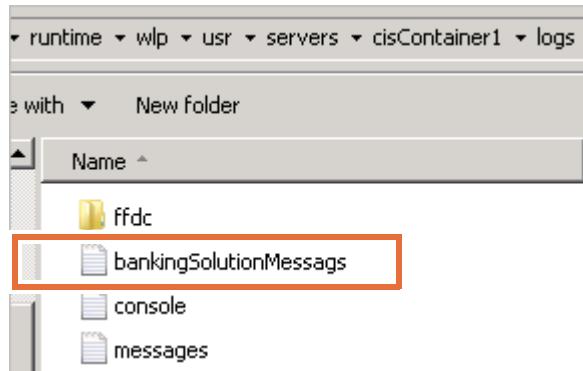
- ___ 3. Switch to container2 and repeat [Step 2](#) for the cisContainer2.
 - ___ 4. Switch to container3 and repeat [Step 2](#) for the cisContainer3.
 - ___ 5. Switch to your main host (dsiHost1) and repeat [Step 2](#) for the cisInbound1 and cisOutbound1 servers.
-



Important

You do not need to restart the servers. The changes are detected and applied automatically.

-
- ___ 6. Look for the new bankingSolutionMessages trace file.
 - ___ a. Open the C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer1 directory, and expand the **logs** folder to see the new bankingSolutionMessages file.



Troubleshooting

If you do not see the bankingSolutionMessages file immediately, wait a few minutes and refresh the directory. Or, switch to the **logs** folder of another server. Sometimes, the file takes a few minutes to be generated.

-
- ___ b. Open the new bankingSolutionMessages file (in any text editor) to view the contents.
The bankingSolutionMessages.log file contains all messages that are written or captured by the product. This file is created only if you enable additional traces.
 - ___ c. Close the file when you are done.

Section 6. Enable and use Insight Monitor

6.1. Enable Insight Monitor

- ___ 1. Make sure that you are on the main host (dsiHost1).
- ___ 2. Enable the Liberty admin center feature on the primary catalog server (catalog 1).
 - ___ a. Expand the C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1 directory and open the server.xml file in Notepad++.
 - ___ b. In the <featureManager> section, add the ia:iaAdminCenter feature tag.

```
<feature> ia:iaAdminCenter-8.10.0 </feature>
```

```
<server description="CIS Catalog Server">

  <featureManager>
    <feature>appSecurity-2.0</feature>
    <feature>restConnector-2.0</feature>
    <feature>ssl-1.0</feature>
    <feature>elasticCacheCatalog-1.0</feature>
    <feature> ia:iaAdminCenter-8.10.0 </feature>
  </featureManager>
```

- ___ c. Append the ia_admincenter tag at the end of the server.xml file and include the user and password attributes for authentication.

```
<ia_admincenter http.ssl.config="defaultSSLConfig" user="admin" password="insights"/>
```

```
<administrator-role>
  <group>DWGroup</group>
</administrator-role>

<ia_admincenter http.ssl.config="defaultSSLConfig"
  user="admin" password="insights"/>
```

- ___ d. Save the file.
- ___ 3. Enable monitoring on the runtime containers.
 - ___ a. Switch to the container1 host.
 - ___ b. Expand the C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisContainer1 directory, and open the server.xml file in Notepad++.

- ___ c. In the <featureManager> section, add the monitor feature tag.

```
<feature>monitor-1.0</feature>

--><server description="CIS Container Server">

    <featureManager>
        <feature>appSecurity-2.0</feature>
        <feature>restConnector-2.0</feature>
        <feature>ssl-1.0</feature>
        <feature>ia:iaRuntime-8.10.0</feature>
        <feature>ia:iaDispatcher-8.10.0</feature>
        <feature>ia:iaAnalytics-8.10.0</feature>
        <feature>ngr:banking scenario solution-5.0</feature>
        <feature>monitor-1.0</feature>
    </featureManager>
```

- ___ d. Save the file.

- ___ 4. Repeat [Step 3](#) on the remaining servers:

- cisContainer2 on the container2 host
- cisContainer3 on the container3 host

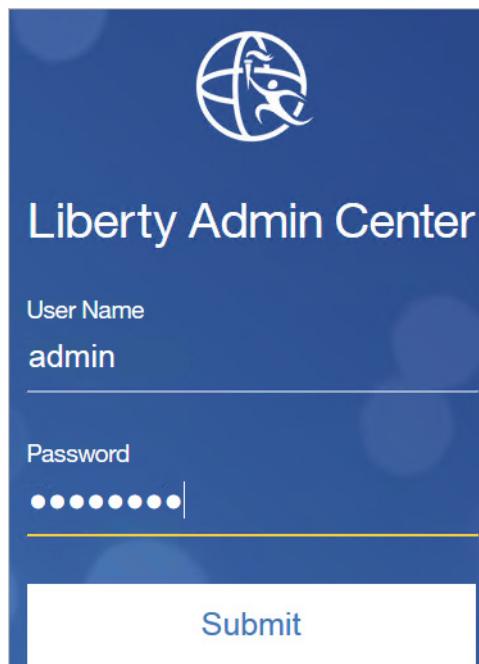
6.2. Using Insight Monitor

- ___ 1. Return to the main host (dsiHost1) and open a browser to this URL:

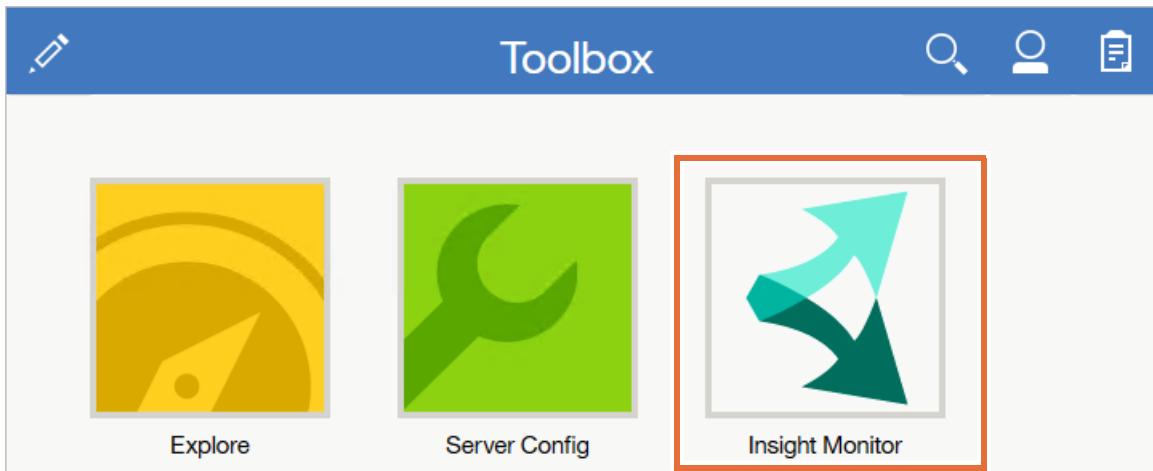
<https://localhost:9444/adminCenter>

- ___ 2. When prompted to log in, use the following credentials and click **Submit**:

- **User:** admin
- **Password:** ins1ghts



- 3. On the Toolbox page, click the **Insight Monitor** icon.



Insight Monitor opens and you see three tabs: **Events**, **Memory**, and **CPU**.

On the **Events** page, you do not see any information because no events have been submitted yet since you enabled monitoring. When events are submitted to the grid, Insight Monitor Events tab is updated.

- 4. On the Events tab, expand **banking_scenario_solution**, and notice the list of accumulated events.



- ___ 5. Click the **Memory** tab, and note that the memory values for each of the containers that you are monitoring.

The screenshot shows the Insight Monitor interface with the Memory tab selected. The title bar says "Insight Monitor". Below it are three tabs: Event, Memory (which is highlighted with a red box), and CPU. On the left, there's a green icon with a double-headed arrow and the word "Memory". The main area displays a table titled "Memory consumption per server." with the following data:

	Used (MB)	Free (MB)	Total (MB)
container1-cisContainer1	2236.6	835.7	3072
container2-cisContainer2	1045.2	2027.4	3072
container3-cisContainer3	826.2	2246	3072

- ___ 6. Click the **CPU** tab and note the utilization rates for each of the containers.

The screenshot shows the Insight Monitor interface with the CPU tab selected. The title bar says "Insight Monitor". Below it are three tabs: Event, Memory, and CPU (which is highlighted with a red box). On the left, there's a green icon with a double-headed arrow and the word "CPU". The main area displays a table titled "CPU utilization per server." with the following data:

	CPU Utilization
container1-cisContainer1	5.1
container2-cisContainer2	3.2
container3-cisContainer3	0.9

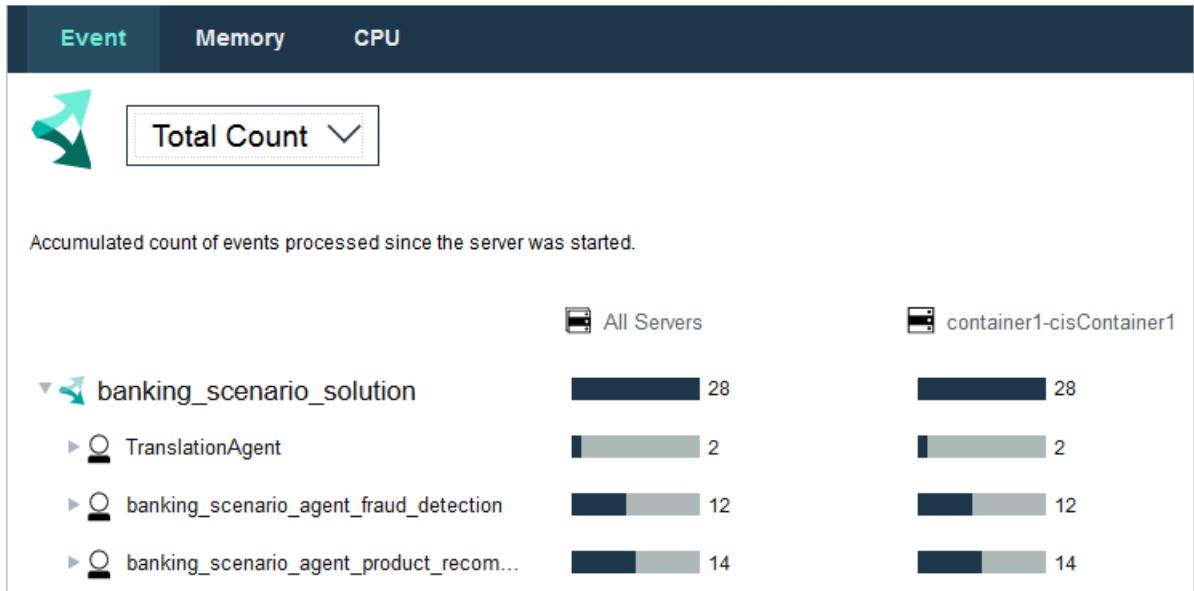
- ___ 7. Click the **Events** tab and click **Event Distribution** in the menu.
___ 8. In a separate Mozilla Firefox browser window, reopen **RESTClient**.



- ___ 9. Submit events.
- ___ a. Set **Header > Custom Header**:
- **Name:** Content-Type
 - **Value:** application/xml
- ___ b. Set **Method to POST**.
- ___ c. Set **URL** to:

<https://localhost:9447/banking/incoming>

- d. Set **Header > Custom Header**:
 - e. Open the `C:\labfiles\code\bank` directory, copy the text from the `checkAcct.txt` file.
 - f. Replace the test in the **Body Data** field with the text from the `checkAcct.txt` file by pressing **Ctrl+A** to select all the text, and then press **Ctrl+V** to paste over that text.
 - g. Click **SEND**.
 - h. The Response view opens with a Status Code 200 response.
 - i. Submit the event about 10 times.
10. Return to Insight Monitor, and on the **Events** tab, check **Total Count** to see the number of processed events and which events were processed.



Section 7. Undeploying solutions

This section shows you how to stop, undeploy, and delete solution files from a runtime server.



Information

This section provides useful steps that both developers and administrators should be familiar with in case of issues with deployed solutions that require the server to be cleaned and the solution to be redeployed.

7.1. Stopping and undeploying solutions

- 1. In a command prompt, switch to the ia\bin directory.

```
cd C:\IBM\ODMInsights810\runtime\ia\bin
```

- 2. Stop the solution on one of the containers by running the stop command.

```
solutionManager stop banking_scenario_solution  
--propertiesFile=../etc/connectionC3.properties
```

You see a “successfully stopped” message.

```
C:\IBM\ODMInsights810\runtime\ia\bin>solutionManager stop banking_scenario_solution --propertiesFile=../etc/connectionC3.properties  
Nov 20, 2018 12:46:14 PM com.ibm.ia.common.jmx.JMXUtils  
WARNING: CWMBD9712W: Hostname verification is disabled by the "disableSSLHostnameVerification" connection property. The client will not check the hostname specified in the server certificate.  
  
Solution successfully stopped: banking_scenario_solution
```

- 3. Undeploy the solution from container 3.

```
solutionManager undeploy remote banking_scenario_solution-4.0  
--propertiesFile=../etc/connectionC3.properties
```



Your version of the deployed banking_scenario_solution might be different. If you are unsure of the version, use the solutionManager list command.

You see a “successfully undeployed” message.

```
C:\IBM\ODMInsights810\runtime\ia\bin>solutionManager undeploy remote banking_scenario_solution-4.0 --propertiesFile=../etc/connectionC3.properties  
Dec 19, 2018 11:58:11 PM com.ibm.ia.common.jmx.JMXUtils  
WARNING: CWMBD9712W: Hostname verification is disabled by the "disableSSLHostnameVerification" connection property. The client will not check the hostname specified in the server certificate.  
  
Solution successfully undeployed.
```

Before you can delete the solution files, you must stop the servers.

7.2. Deleting solution files

- ___ 1. Stop the runtime server on the container 3 host.
 - ___ a. Switch to the container 3 host.



Stop

The default host name for the “container 3” host is **container3**. Your “container 3” host might have a different name.

- ___ b. Open a command prompt to the `runtime\wlp\bin` directory.
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
 - ___ c. Stop the `cisContainer3` runtime server.
`server stop cisContainer3`
- ___ 2. Delete the `banking_scenario_solution` files from the container.
 - ___ a. In a command prompt, switch to the `ia\bin` directory.
`cd C:\IBM\ODMInsights810\runtime\ia\bin`
 - ___ b. Type the following remote deployment command.
`solutionManager delete banking_scenario_solution-4.0`
 (for example, to delete version 4.0)



Note

Your version of the deployed `banking_scenario_solution` might be different. Make sure that you use the correct version number.

- ___ 3. In the command prompt, switch to the `wlp\bin` directory.
`cd C:\IBM\ODMInsights810\runtime\wlp\bin`
- ___ 4. Restart the runtime server with the `--clean` option to delete any remaining solution files from the `\runtime\extension\lib` and `\runtime\extension\lib\features` directories.
`server start cisContainer3 --clean`
- ___ 5. Wait until you see the message that states that the server started successfully.
- ___ 6. Use REST to verify the that the solution was undeployed from the container.
 - ___ a. Open a browser and type this URL to check deployment to container 3:
`http://container3:9080/ibm/ia/rest/solutions`

**Attention**

Make sure that you use the ***actual*** host name or IP address for your container in the URL.

- ___ b. Accept any security certificates for the browser and continue.
- ___ c. When prompted for authorization, use this login:
 - **User name:** admin
 - **Password:** insights

You should not see any solution listed.

7.3. Redeploying the solution archive (.esa)

- ___ 1. Switch to the main host (dsiHost1).
 - ___ 2. Deploy the banking_scenario_solution solution again to container 3.
 - ___ a. In a command prompt, make sure you are in the ia\bin directory.
cd C:\IBM\ODMInsights810\runtime\ia\bin
 - ___ b. Type the following remote deployment command.

solutionManager deploy remote
C:\labfiles\Solutions\banking_scenario_solution.esa
--propertiesFile=..\etc\connectionC3.properties
- After deployment finishes, you see a message: Solution successfully deployed.
- ___ 3. Return to a browser with this URL:

http://container3:9080/ibm/ia/rest/solutions
The deployed solution should be listed.
 - ___ 4. Verify the deployment by using the solutionManager list command:

solutionManager list remote --propertiesFile=..\etc\connectionC3.properties

End of exercise

Exercise review and wrap-up

In this exercise, you used administration tools to manage the servers and logging properties on multiple hosts.

Appendix A. Host names and IP addresses

Write the host names and IP addresses that are assigned to the virtual machines in your environment.

Main host <i>Default host name: dsiHost1</i> Assigned host name: _____ IP: _____	Container 1 host <i>Default host name: container1</i> Assigned host name: _____ IP: _____
Container 2 host <i>Default host name: container2</i> Assigned host name: _____ IP: _____	Container 3 host <i>Default host name: container3</i> Assigned host name: _____ IP: _____



Important

When host names are specified in the exercise steps, make sure that you use the actual host name that you noted here.

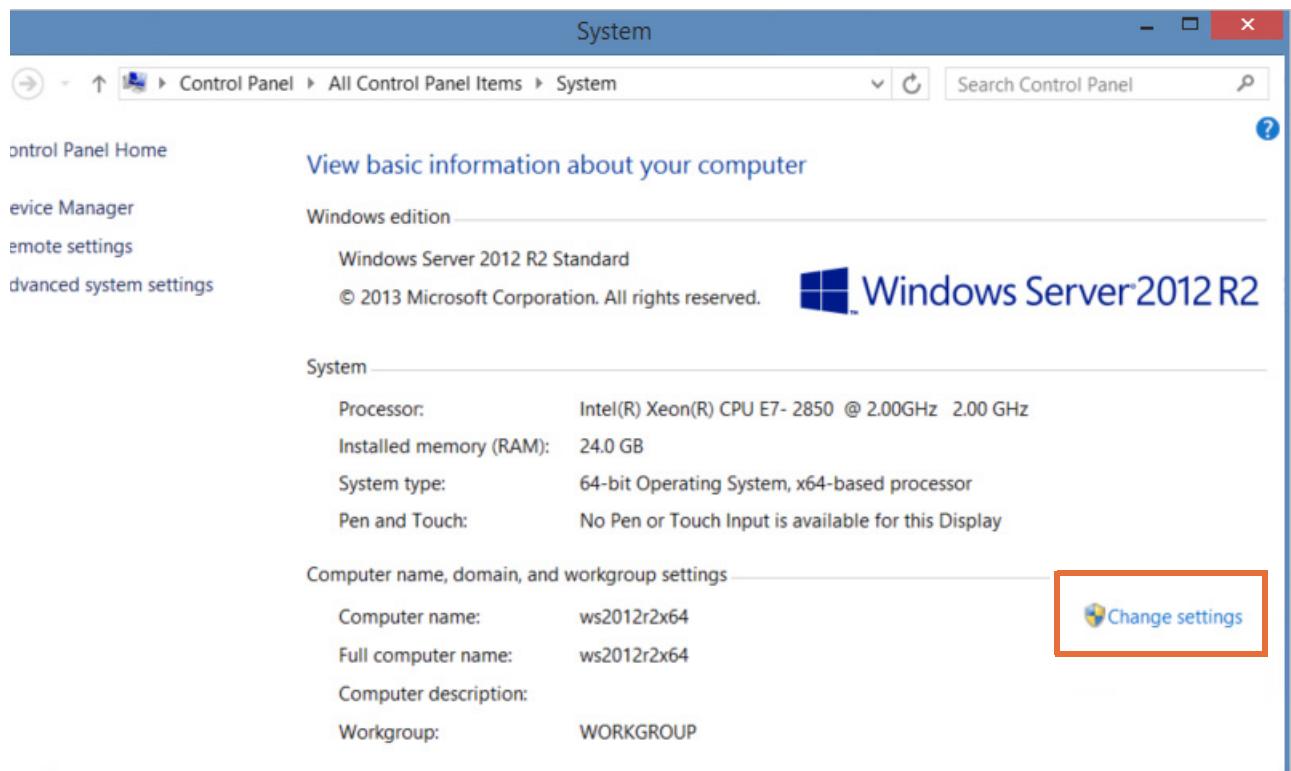
Appendix B. Changing host names and mapped drives

B.1. Renaming hosts

- 1. On the desktop, right-click the **Computer** icon and click **Properties**.

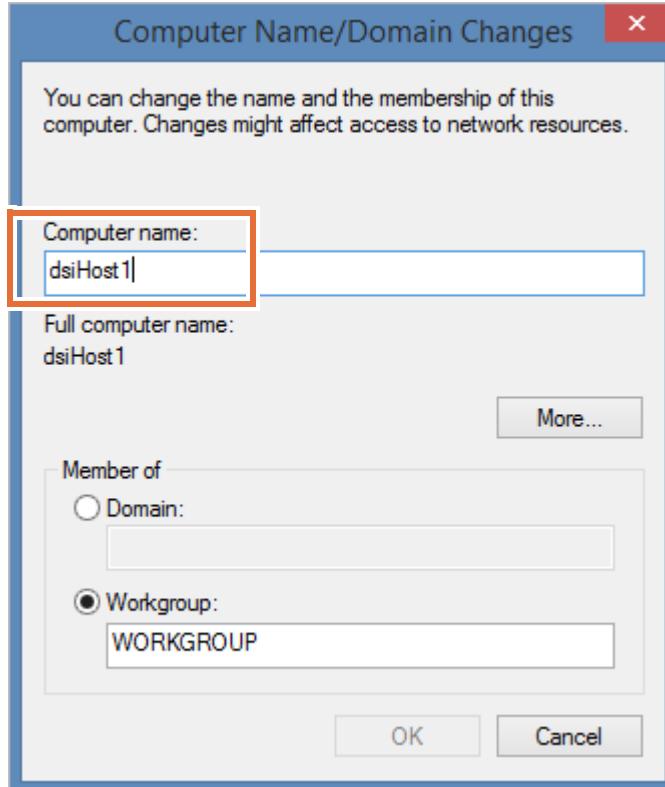


- 2. In the **Computer name, domain, and workgroup settings** section, click **Change settings**.



- 3. In the System Properties dialog box, on the **Computer Name** page, click **Change** and click **OK**.

- ___ 4. In the **Computer name** field, type a unique name for your host and click **OK**.



- ___ 5. Accept the warnings about restarting and close the System Properties windows.
- ___ 6. When prompted to restart the workstation, click **Restart Now** and wait for your workstation to restart before proceeding.



Note

You use this method if you also need to rename your container hosts.

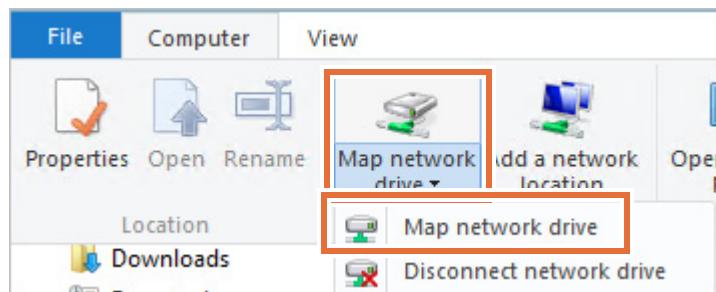
B.2.Mapped drives

If you rename your main host, you must also create a new mapped drive on each of the container hosts.

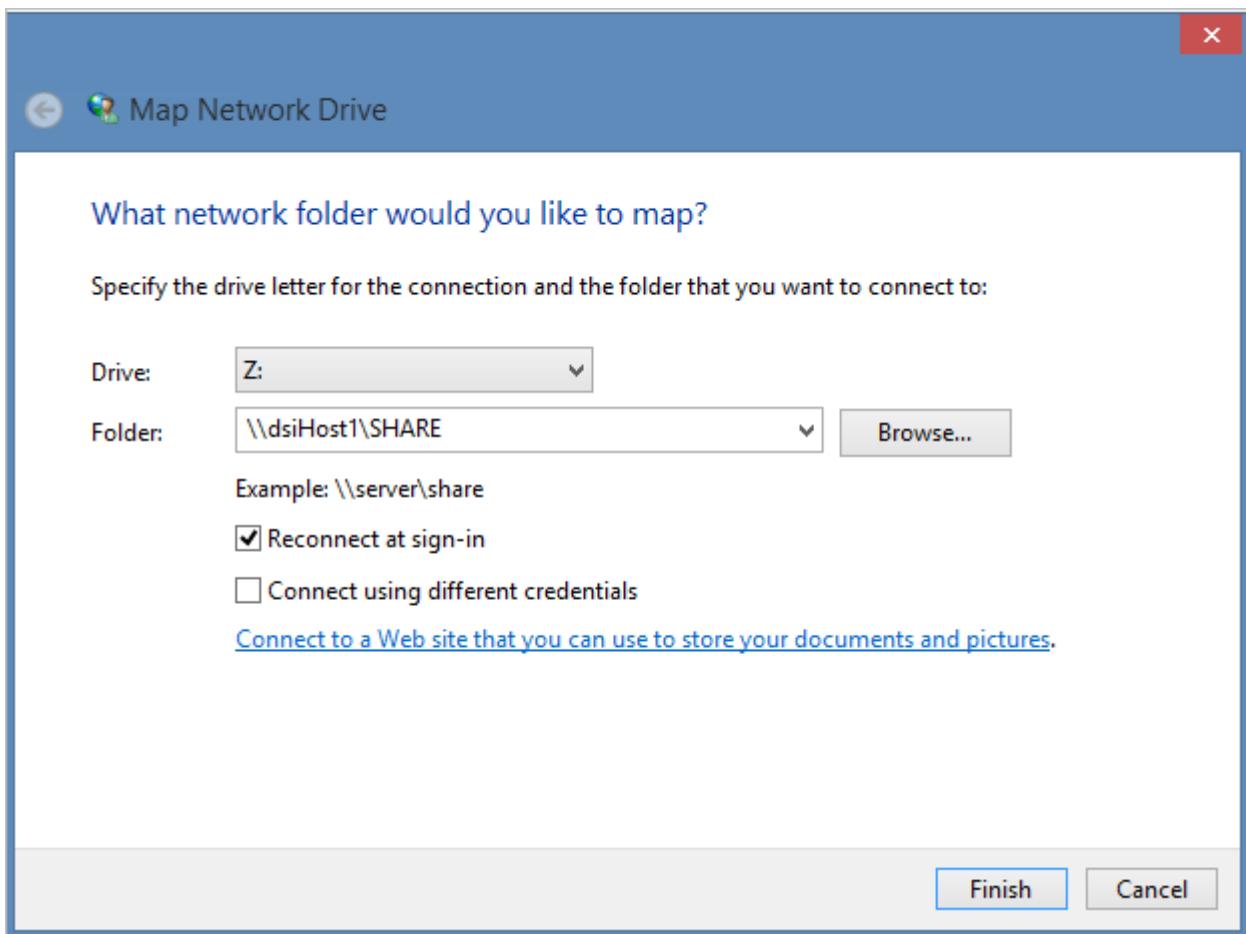
To map each container host to the shared drive:

- ___ 1. Go to containerHost1 (or the name of your “container 1” host).
- ___ 2. Map a drive to the main host.
- ___ a. On the desktop of this host, double-click **Computer**.

- __ b. Click **Map network drive**.



- __ c. In the **Drive** field, you can choose a drive or keep the default drive.
 __ d. In the **Folder** field, type: \\dsiHost1\SHARE



- __ e. Click **Finish** and close Windows Explorer.
 3. Go to container2 (or the name of your “container 2” host) and repeat [Step 2](#) on that host.
 4. Go to container3 (or the name of your “container 3” host) and repeat [Step 2](#) on that host.

Appendix C. Troubleshooting issues

This appendix provides some suggestions to resolve issues that you might encounter during the exercises.

- ["Container servers are not responding"](#)
- ["The catalog service is not available"](#)
- ["Unable to stop a server"](#)
- ["The deployed solution is not responding to REST requests or the RESTClient HTTP request tool"](#)
- ["Shutting down the grid"](#)

Container servers are not responding

If you run commands, such as deployment commands, that call your container hosts but the commands fail, you might need to verify that the servers are running.

- To check whether the catalogs and containers are communicating, switch to the C:\IBM\ODMInsights810\runtime\wlp\bin directory and run the `listHosts` command:


```
xscmd -c listHosts -cep localhost:2810 -user admin -pwd inslghts -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp inslghts
```
- If only 1 or 2 of your container hosts are listed by the `xscmd` command, take note of the IP addresses for the hosts that are listed to determine which hosts are not listed.
- Check that the container not listed is running by using this command.


```
serverManager isonline --propertiesFile=../etc/connection<Number>.properties
```
- If the `isonline` command fails to access the server, go to the host for that container to restart the server.
- If the container is running but was not listed, stop and restart the container server.

The catalog service is not available

- If this command fails because the catalog service is not available, check that each of your catalog servers are running **and** reachable by using this command.


```
xscmd -c showQuorumStatus -cep localhost:2810 -user admin -pwd inslghts -ts
C:\IBM\ODMInsights810\runtime\wlp\usr\servers\cisCatalog1\resources\security\key.jks -tsp inslghts
```
- If all the catalog servers are running, but not all are not listed when you run the `showQuorumStatus` command, stop and restart the catalog server that is not listed. Because quorum is enabled, it might be necessary to stop and restart all the catalogs together.

- If you must stop all the catalogs, follow the shutdown sequence for the grid as described in "[Shutting down the grid](#)" on page C-3.

Unable to stop a server

- If a server hangs or times out when you run the `server stop` command:
 - Reboot the VMware image.
 - Start the server.

The deployed solution is not responding to REST requests or the RESTClient HTTP request tool

If you experience performance issues, such as not being able to use the REST API to access deployed solutions on your container hosts, or failure messages when you try to test the solution on the grid, try these suggestions:

- Check the logs of your inbound and outbound servers.
- Make sure all your servers are running **and** reachable by using the methods described in "[The catalog service is not available](#)" and "[Container servers are not responding](#)".
- Shut down the grid and restart it as described in "[Shutting down the grid](#)".
- Redeploy the solution. To undeploy a solution from container servers, follow the instructions in [Exercise 13, "Administering Decision Server Insights"](#), [Section 7, "Undeploying solutions,"](#) on page 13-15.
 - From your main host (dsiHost1), stop and undeploy the solution on **each** of the containers. See [Section 7.1, "Stopping and undeploying solutions"](#).
 - On **each** container host, follow the instructions from [Section 7.2, "Deleting solution files"](#):
 - Stop the server.
 - Delete the solution files.
 - Restart the server with the `--clean` option.
 - From your main host (dsiHost1), redeploy the solution to each of the containers. See [Section 7.3, "Redeploying the solution archive \(.esa\)"](#).
- Undeploy and redeploy connectivity:
 - __ a. In a command prompt, switch to the `C:\IBM\ODMInsights810\runtime\ia\bin` directory.
 - __ b. For the inbound server, type:
`connectivity Manager undeploy local banking_scenario_solution
--propertiesFile=../etc/connectionIn1.properties`
 - __ c. For the outbound server, type:
`connectivity Manager undeploy local banking_scenario_solution
--propertiesFile=../etc/connectionOut1.properties`

- To regenerate and deploy connectivity configurations, follow the steps from [Section 4, "Generating connectivity configurations,"](#) on page 9-10 and [Section 3, "Deploying connectivity,"](#) on page 12-8.

Shutting down the grid

You might need to shut down the grid for various reasons, such as facing performance issues or an error in the grid or server configuration.

Shut down the grid by stopping the servers in this order:

- cisInbound1
- cisOutbound1
- cisContainer1, cisContainer2, cisContainer3
- cisCatalog1, cisCatalog2, cisCatalog3 (concurrently)

Restart the servers in the reverse order.

- cisCatalog1, cisCatalog2, cisCatalog3 (concurrently)
- cisContainer1, cisContainer2, cisContainer3
- cisOutbound1
- cisInbound1



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