Predix®

Software Development Kit Installation Guide

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GE Internal

Predix®

Contents

About this Guide

About This Guide

This guide is for developers who want to install the Predix Software Development Kit (SDK) to generate their own Predix Machine OSGi container.

Predix SDK Overview

The Predix Software Development Kit (SDK) is for developers who want to develop applications using Predix Machine. The Predix SDK allows you to generate your own Predix Machine OSGi container by selecting certain feature groups that include all of the necessary bundles for that feature. You can also generate the container by selecting individual bundles. The grouping of the features is based on certain dependencies, as well as related features.

The following capabilities are included in all features, regardless of which of the following features you pick from the following list:

- OSGi Container
- Felix Dependency Manager
- Declarative Services Support
- Felix HTTP Bundle
- Jersey (jaxrs) Bundle
- MetaType-Configuration Management
- Logging
- Security Admin Service: SSL Certificate Management
- User Management Service (Account management)

The following table shows each of the Predix bundles that are included in each of the Predix feature groups.

Feature	Description	Dependency
Predix Application Services	• SAML Security Filter • Git Repository Management Service	Predix Web Tools
Predix Cloud Gateway	• Predix Cloud Identity Management	Predix Web Tools
Predix Data River	• Data River (sending and receiving)	Predix Messaging Service
Predix HTTP River	• Transfers data from Predix Machine-enabled edge devices to the Predix Cloud using HTTP.	• Predix Web Tools • Predix Cloud Gateway
Predix HTTP Tunnel	Facilitates communication of different network protocols through HTTP/HTTPS	• Predix Web Tools • Predix Cloud Gateway
Predix Machine Gateway	• OPC-UA Adapter • Modbus Adapter • Healthmonitor Adapter • Hoover	• Predix Web Tools • Store and Forward • HTTP River

Feature	Description	Dependency
Predix Messaging Bus Bridge	• Bus Bridge	• Predix Messaging Service • Predix Web Tools
Predix Messaging Fabric Configuration Service	• Fabric Configuration Service	• Predix Messaging Service • Predix Web Tools
Predix Messaging Service	• Real-time message with DDS protocol	
Predix MQTT Client	Publishes messages to a broker or subscribes to a topic to receive messages.	
Predix Security Token Service	Provides a REST endpoint that builds, issues, and signs SAML assertions.	• Predix Web Tools • Predix Application Services
Predix Store and Forward	• Forwards data to the cloud and continuously stores data to prevent data loss.	
Predix Technician Console	• Predix Technician Console	Predix Web Tools
Predix Web Console (Should only be used for debugging)	• Predix Machine Web Console and Bundle Updates  **Note:** Should only be used for debugging	Predix Web Tools
Predix Web Tools	• JSON support with JAX-RS • HTTP services for REST support	
Predix WebSocket River	• WebSocket River	Predix WebSockets
Predix WebSockets	• WebSocket Server • WebSocket Client Service	

Feature	Description	Dependency
Predix mPRM Support (Provisioning)	• Remote device management • Provisioning support when generating the container using scripts (PROV) • Bundles to handle ZIP support **Note:** See *mPRM Administration* for more information.	
OPC-UA Server	The OPC-UA server allows Predix Machine-enabled applications to expose data through the OPC-UA protocol, a common machine-to-machine protocol.	
Predix Additional Services **Note:** Only available when using the Predix SDK in Eclipse to generate the container .	• TCP Socket Server • mBSA Watchdog (available through a generated Debug container and the release image)	

Downloading the Predix SDK

You must have a Cloud Foundry account to access the download site.

To begin using the SDK, you must first download the SDK package.

1. Access the Predix SDK download at *https://artifactory.predix.io/artifactory/PREDIX-EXT/predix-machine-package/predixsdk/15.3.0/predixsdk-15.3.0.zip*.
2. Download the `PredixSDK-15.3.0.zip` file.
3. Unzip and extract all of the files in the ZIP file.

Predix SDK Directory Structure

When extracted, the downloaded SDK file creates the following directory structure:

Directory	Description
`docs`	Contains the SDK documentation and the `apidocs.zip` file with the Javadoc APIs.
`eclipse-plugins`	Indicates the location that you will point the Eclipse installation to. Includes the following folders: • `features` • `plugins`
`license`	Contains the license files.
`samples`	Contains `sample-apps.zip` and `sample-cloud-apps.zip` files for sample applications.
`utilities`	Contains scripts used for generating containers.
`InstallationGuide.pdf`	The *Predix Software Development Kit Installation Guide*.

Verifying Requirements

Requirements

The following software packages are required to use the Predix SDK.

- Eclipse (Kepler or Luna versions) with the Plug-in Development Environment (PDE), for example Eclipse IDE for Java EE Developers.

  Note: Download Eclipse *Kepler*, Eclipse *Luna*, or Eclipse *Mars*.

  If you are using a different version for your development environment, you can install and use another Eclipse version to use for the Predix SDK.

- Predix SDK. Download the Predix Machine SDK at *https://artifactory.predix.io/artifactory/PREDIX-EXT/predix-machine-package/predixsdk/15.3.0/predixsdk-15.3.0.zip*.

  Note: See also *Downloading the Predix SDK* in this guide.

- Maven. Ensure that you have Maven installed. (On a command line interface, type `mvn -version`. Your version should be 3.1 or above.)

  Note: You can download Maven *here*.

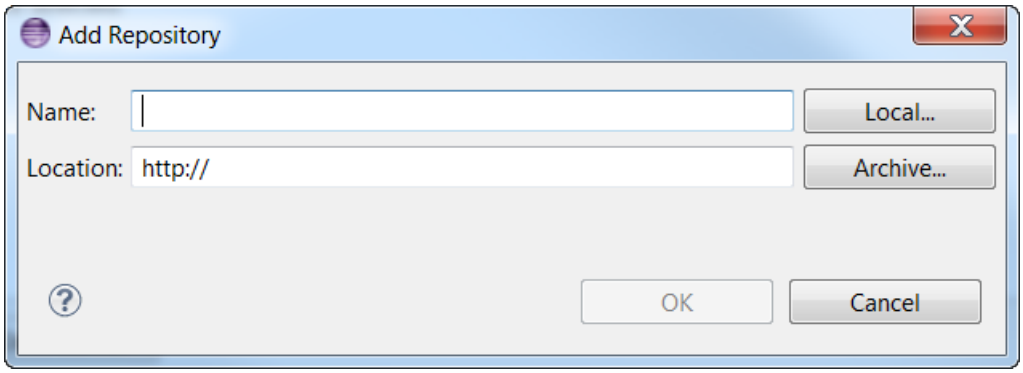
Installing the Predix SDK

To install the Predix SDK, follow these steps.

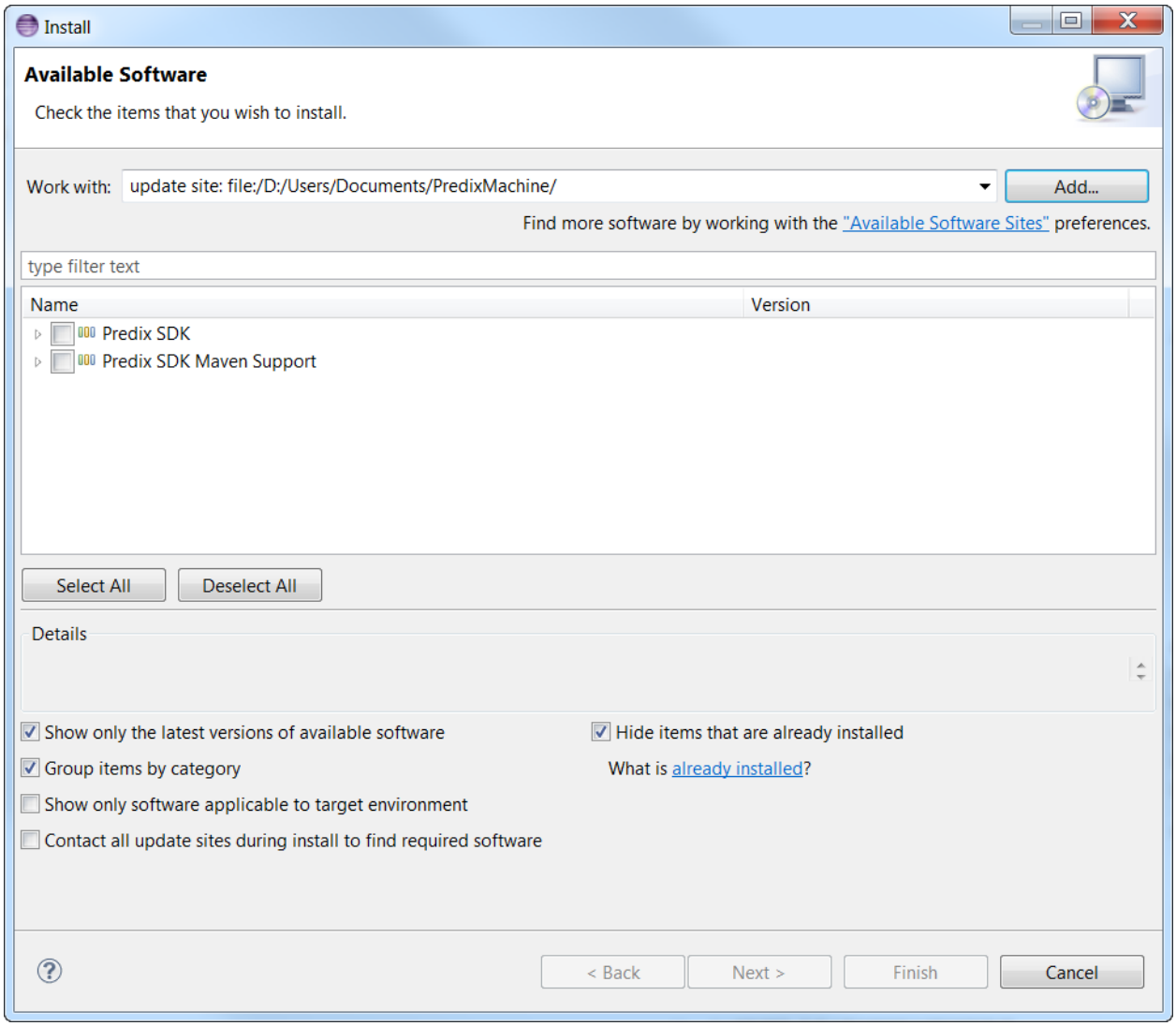
1. Open Eclipse.
   The **Welcome to Eclipse** page appears.
2. On the **Help** menu, select **Install New Software**.
   The **Available Software** window appears.

   Note: If you just downloaded the latest version of Eclipse, you should clear the **Contact all updates sites during install to find required software** checkbox to prevent Eclipse from searching for updates for all installed packages. If you have an older version of Eclipse, you can select the checkbox to perform this procedure, but it may take a long time.

3. Click the **Add** button.
   The **Add Repository** dialog box appears.



4. Click the **Local** button and then browse to the installation location where you unzipped the Predix SDK files, select the **eclipse-plugins** folder, and click **OK**.
   The Predix SDK and Predix SDK Maven Support options now appear in the list of available software.

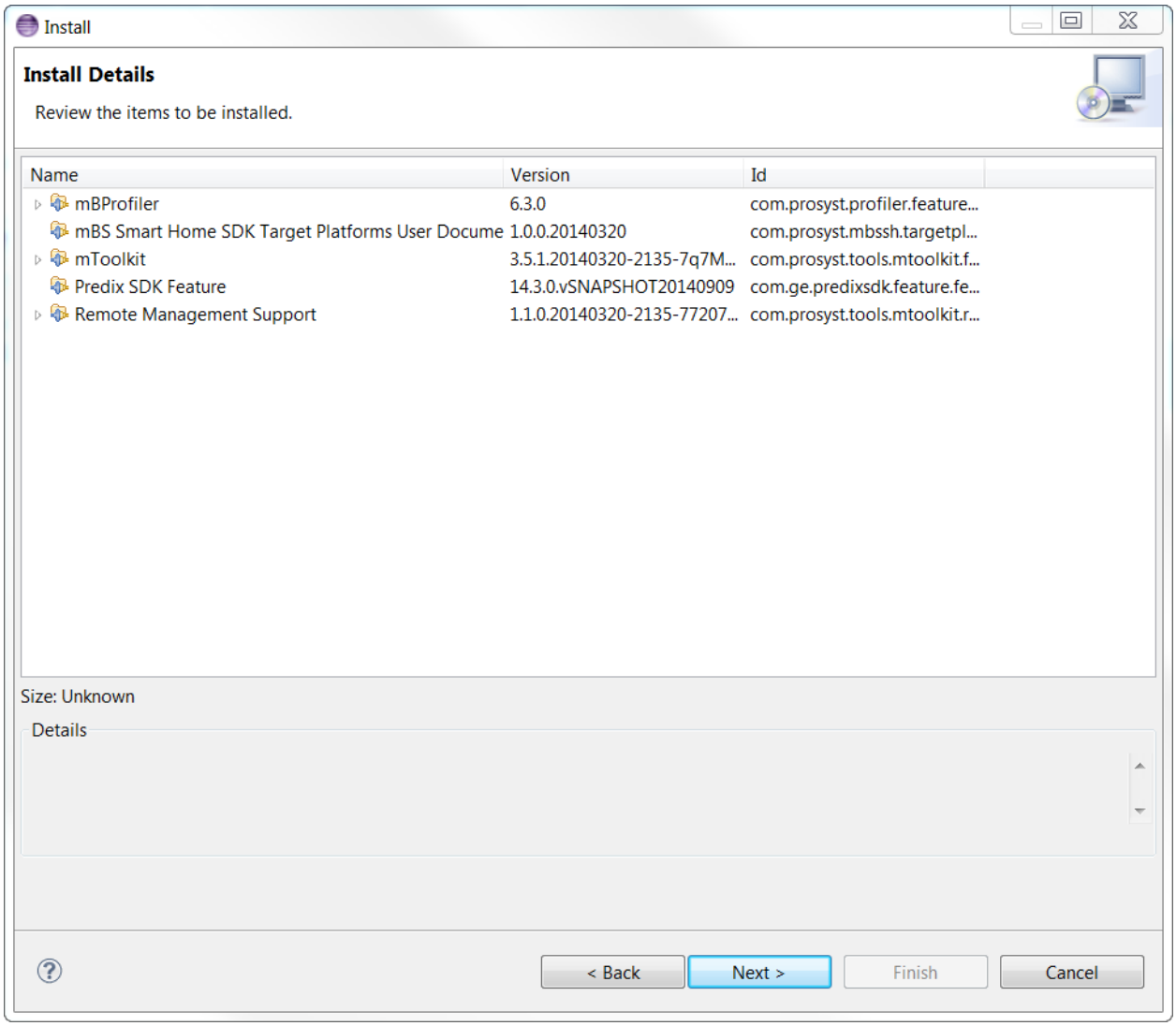


5. Select the following installation options:

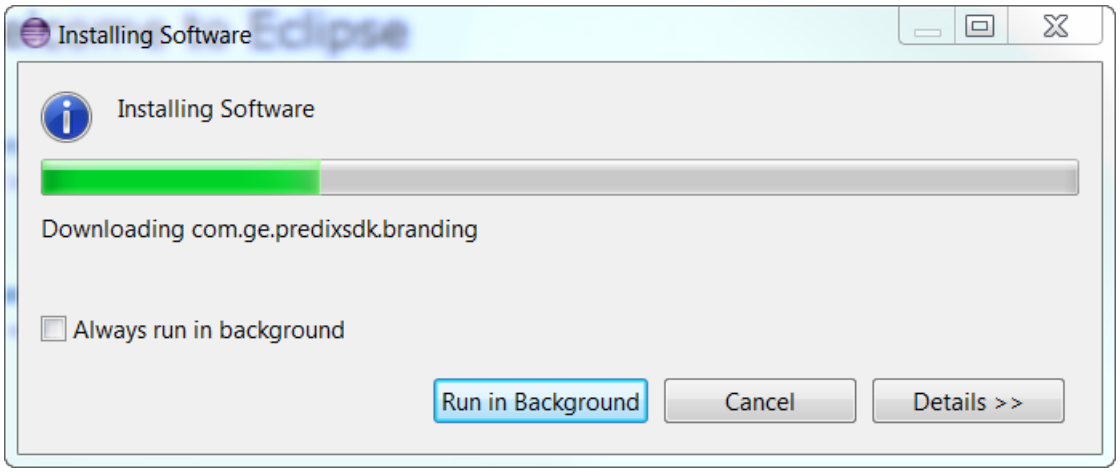
   - **Predix SDK**
   - **Predix SDK Maven Support**

   Note: Only select **Predix SDK Maven Support** if you have installed the Maven Integration (m2eclipse) plugins. If M2E is not installed, the installation cannot continue until you install M2E or the Eclipse IDE for Java JEE Developers. This is available in the Eclipse Marketplace.

6. In the **Details** section, select the options you want to customize your installation. You can use the Default selections. Click the **Next** button.
   The **Install Details** window appears.

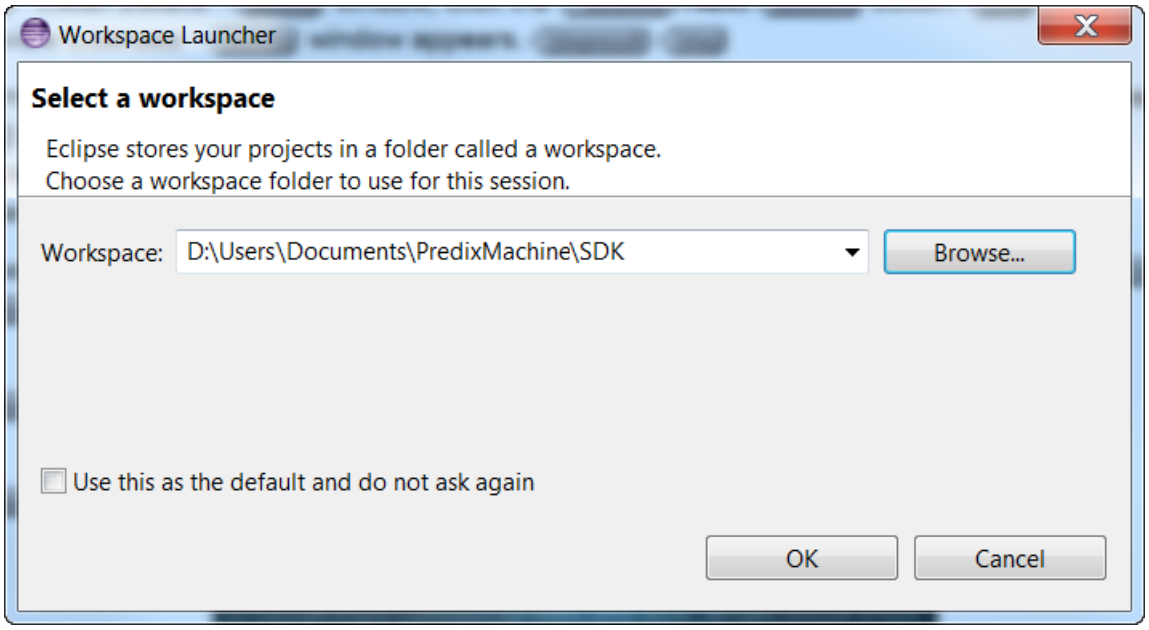


7. On the **Install Details** window, click the **Next** button.
   The **Review Licenses** window appears.
8. Review the terms of the license agreements then choose the **I accept the terms of the license agreements** option and click the **Finish** button.
   The **Installing Software** progress bar appears.



Note: If a Security Warning appears, click **OK** to continue.

9. When the software installation is complete, click the **Yes** button to restart Eclipse.
If you have not created a workspace for Eclipse, the **Select a Workspace** dialog box opens.

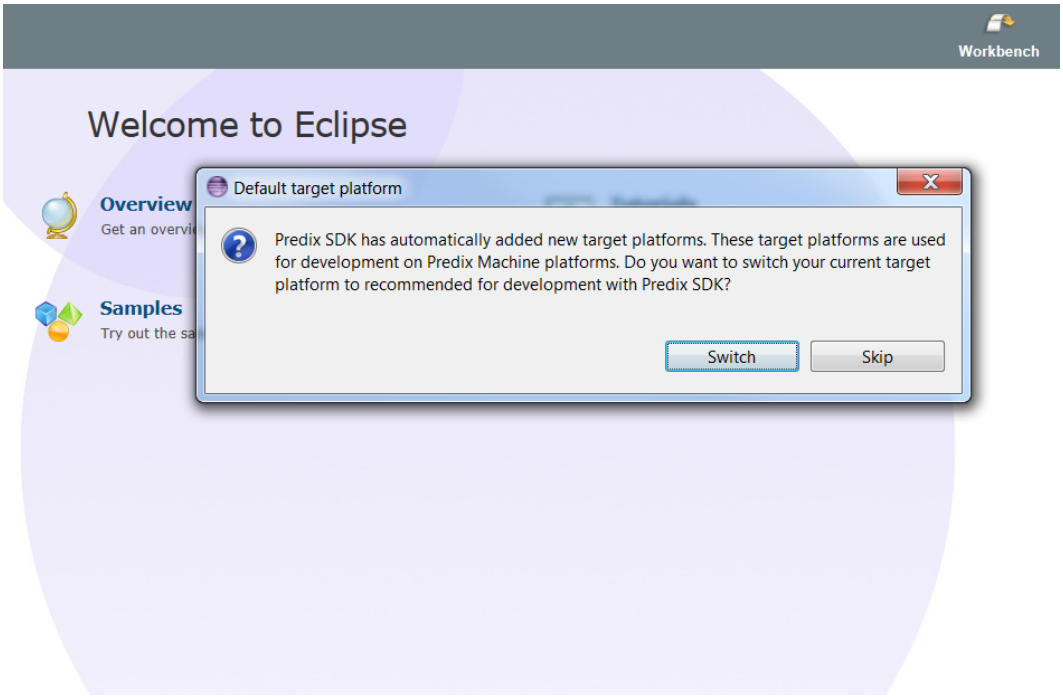


10. If you have not created a workspace, select the **Workspace** location and click **OK**.

Starting Eclipse

When you start Eclipse after installing the Predix SDK, Eclipse configures your environment to use the Predix SDK. During start-up, you are prompted to switch the Eclipse Plug-in Development Environment (PDE). The default PDE configuration uses OSGi Runtime components. If you do not switch, you can switch later.

1. Start Eclipse.
   The **Default target platform** dialog box appears.



2. Click **Switch**.

Sample Applications

The sample applications illustrate how to use Predix features.

Two sets of sample applications are provided: one for the Predix Machine Container and one for cloud applications.

To view these samples, navigate to: `<SDK installation location>/samples` and extract the files from `sample-apps.zip` or `sample-cloud-apps.zip`.

Note: You can also run samples in the Predix SDK.

The `sample-apps.zip` file includes:

- `sample-basicmachineadapter`
- `sample-configuration`
- `sample-container`
- `sample-datariver-receive`
- `sample-datariver-receivehandler`
- `sample-datariver-send`
- `sample-gitrepository`
- `sample-healthmachineadapter`
- `sample-hoover`
- `sample-httpclient`
- `sample-httpriver`
- `sample-management`
- `sample-security`
- `sample-storeforwardclient`
- `sample-subscriptionmachineadapter`
- `sample-websocketclient`
- `sample-websocketriver`
- `sample-websocketserver`

Note: See *Building Samples* and *Running Samples in the Predix SDK* or *Building Samples Using Eclipse IDE*.

The `sample-cloud-apps.zip` file includes:

- `cloud-device-config`
- `httptunnel-server`
- `predixmachine-http-data`

Note: Read the associated `readme.txt` files each cloud sample for instructions on how to use the samples.

Building Samples Using Eclipse IDE

Use the Eclipse IDE in which you installed the Predix Machine SDK to build the sample.

1. Log in to *https://artifactory.predix.io*.

2. In the `.m2/settings.xml`, configure the settings for Maven.
3. Under Profile, generate an API key.

```
<server>
      <id>artifactory.external</id>
      <username>predix cloud login</username>
      <password>{encrypted password - API key}</password>
</server>
```

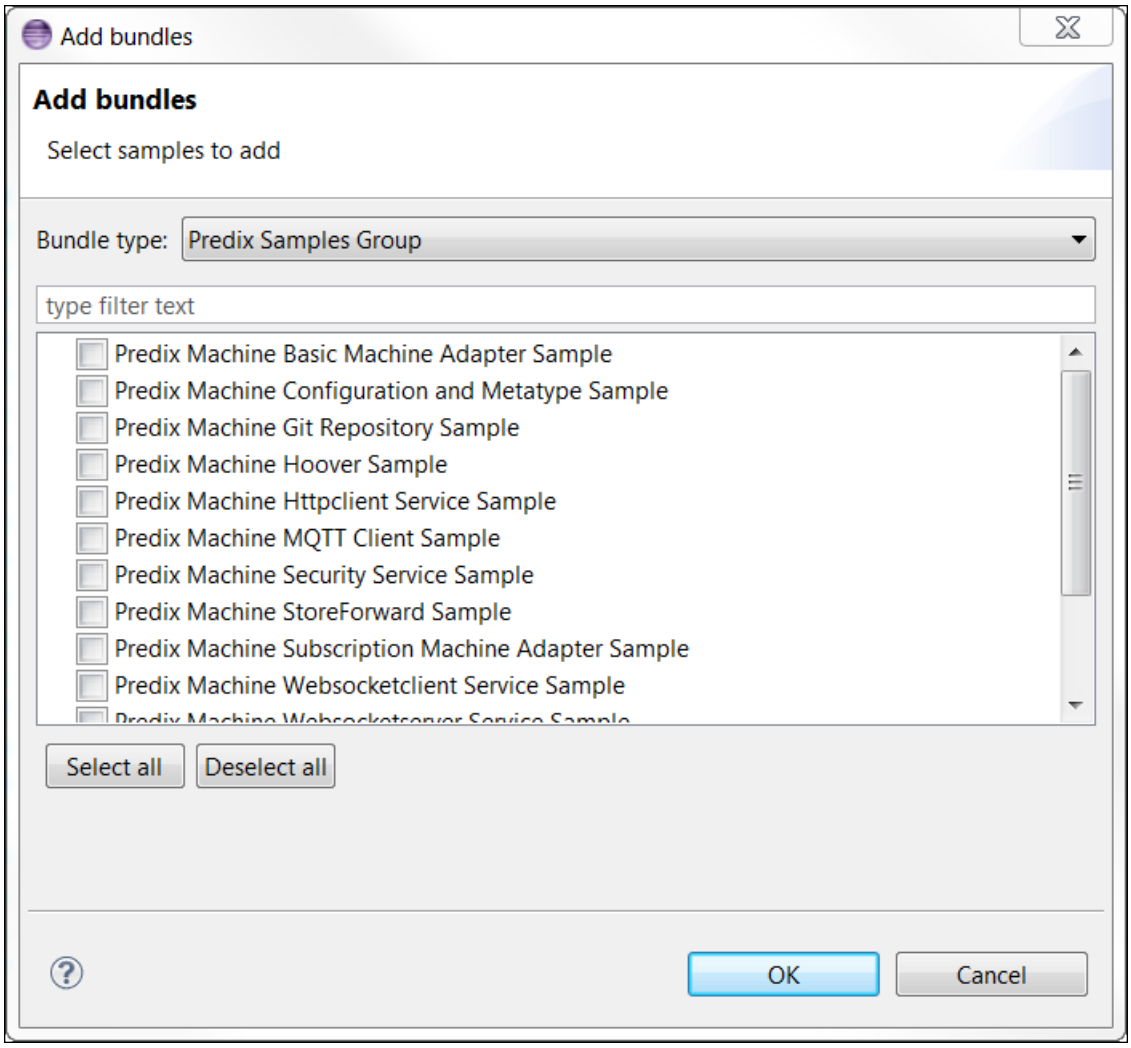
4. Launch Eclipse and create your own workspace.
5. Import samples by selecting: **File** > **Import** > **Maven** > **Existing Maven Projects**. Click **Next**.
6. Browse and select `<installation location>/sample` as the root directory.
7. Click **Finish** to import all samples into your workspace.
8. Select the root directory and then select **Run** > **Run As** > **Maven Install**.

Running Samples in the Predix SDK

You should create a new container using Eclipse. See *Generating a Predix Machine Container Using Eclipse*.

You can run samples using the Predix SDK.

1. Access the Predix SDK UI and open your Predix Machine image.
2. In the **Bundles** section, click the **Add** button.
   The **Add bundles** window appears.
3. In the **Bundle type** list, select **Predix Samples Group**.
   A list of each of the Predix samples appears.



4. Select the samples you want to run and click **OK**.
5. Click **Run**.

Running Samples from Generated Containers

You can run samples from a container that was generated using scripts..

Before running any samples from a container that was generated using scripts, make sure the project is built.

1. Copy the JAR file from `<SDK installation location>/samples/sample-apps/sample/<sample-name>` to `<Predix Machine installation location>/system/jars/solution.`
2. Copy any configuration files needed by the sample from the `<SDK installation location>/samples/sample-apps/sample/etc/` directory to the `<Predix Machine installation location>/etc/` directory.

3. Modify the `solution.ini` file by adding a `<bundle>` tag for each sample. For example::

```
<bundle>

<name>../../system/jars/solution/com.ge.dspmicro.{sample-name}-{version}.jar</name>
</bundle>
```

   You can also copy and paste the existing `solution.ini` file for all samples and modify that file. The `solution.ini` file is located in `<SDK installation location>/samples/sample-apps/sample/system/init`.

4. To run the container:
   a) Navigate to `<Predix Machine installation location>/bin/`.
   b) Run the following command: `./predixmachine` (for Linux) or `predixmachine.bat` (for Windows).

Generating a Predix Machine Container using Scripts

You can use a command line interface to generate a container using a script. Before you begin, you should:

- Download the Predix Machine 15.3 SDK from *https://artifactory.predix.io/artifactory/PREDIX-EXT/predix-machine-package/predixsdk/15.3.0/predixsdk-15.3.0.zip*.

  Tip: For Windows, put your SDK download in a high-level directory on your computer. For example, avoid `c:\\<directory>\<directory>\<directory>\Predix SDK` instead use something like `c:\\PredixSDK`. If you nest the download within several directories, the path name may be too long when you try to run the container.

- Download Eclipse with PDE runtime plug-ins; for example Eclipse IDE for Java EE Developers. This download should remain in the .zip or tar.gz format.
- Ensure that you have Maven installed. On a command line interface, type `mvn -version`. Your version should be 3.1 or above.

Note: Some features are only included in the container if you build the container with the Predix SDK. See *Services Available through the Predix SDK* .

You can generate any of the following types of containers:

- STS: Predix Security Token Service
- PROV: Predix Machine Provision (includes only the JAR bundles that support mPRM)
- DEBUG: Predix Machine Debug with Predix Machine Web Console
- [not specified]: Predix Machine container
- FCS: Predix Messaging Fabric Configuration Service
- BB: Bus Bridge
- CUSTOM <image file path>: A Predix Machine container using a custom image you created in Eclipse
- TECH: A Technician Console image

Note: Each of these container types maps to the **Workspace Image** selection in the **Image Description** dialog box in the Predix SDK User Interface.

1. Open a terminal window.
2. In the command line, navigate to the `<SDK download location>/predixsdk-15.3/utilities/containers` folder.
3. Run one of the following commands.
   a) For Windows:

   ```
   GenerateContainers.bat <full path and name of downloaded Eclipse.zip file>
   -<type of container>
   ```

   b) For UNIX and Linux:

   ```
   GenerateContainers <full path and name of downloaded Eclipse.tar.gz file>
   -<type of container>
   ```

   For example, in Windows:

   ```
   GenerateContainers.bat D:\users\15.3\SDK\eclipse-jee-luna-SR2-win32-x86-64.zip
   -PROV
   ```

The script creates the Predix Machine container in the `<SDK download location>/predixsdk-15.3/utilities` folder.

Note: If you receive the following console error, you can ignore it: `java.lang.ClassCastException: org.eclipse.osgi.internal.framework.EquinoxConfiguration$1 cannot be cast to java.lang.String at org.eclipse.m2e.logback.configuration.LogHelper.logJavaProperties(LogHelper.java:26) at org.eclipse.m2e.logback.configuration.LogPlugin.loadConfiguration(LogPlugin.java:189) at org.eclipse.m2e.logback.configuration.LogPlugin.configureLogback(LogPlugin.java:144) at org.eclipse.m2e.logback.configuration.LogPlugin.access$2(LogPlugin.java:107) at org.eclipse.m2e.logback.configuration.LogPlugin$1.run(LogPlugin.java:62) at java.util.TimerThread.mainLoop(Timer.java:555) at java.util.TimerThread.run(Timer.java:505)`

Reference

Related Documentation

For more documentation related to Predix Machine, go to *https://predix-io.grc-apps.svc.ice.ge.com/docs/* and select **Connect Industrial Assets**.

Contact Support

About Predix

Predix is GE's software platform for the Industrial Internet. Learn more about Predix at *http://predix.sw.ge.com*.

Contact us at:

predixcustomer.feedback@ge.com

Development teams from GE businesses are encouraged to engage with the SWCOE Predix architecture team and solution engineering teams for best practices, methodology guidance, and application architecture consultation.

Please direct technical support questions to our Technical Support Engineers. Call toll-free in the United States at 1-844-PREDIX (844-677-3349) or use our international toll number at 1-925-487-5484 from outside of the United States. Register for our *Support Portal*, which allows you to submit, track, and view historical incidents.

Documentation Comments? Feedback?

We are continuing to enhance the user experience through documentation. Help us improve this content by sending your comments and feedback.

Contact us at:

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