IBM® Tivoli Workload Scheduler Integration Workbench V8.6.: How to customize your automation environment by creating a custom Job Type plug-in

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Abstract

This document describes how to customize your automation environment by creating a custom Job Type plug-in with very few lines of code using the IBM® Tivoli Workload Scheduler Integration Workbench V8.6.

Intended Audience

Read this guide if you want to create your Job Type plug-in in order to extend, integrate and maximize your IBM® Tivoli Workload Scheduler automation environments.

Introduction

The main purpose of IBM Tivoli Workload Scheduler since the very first versions is to minimize the production time and costs, by instructing a production facility on what to do, when to do it, and what IT resources to use.
During the years, Tivoli Workload Scheduler became increasingly used in enterprises to orchestrate the integration of real-time business activities with traditional background IT processing, across various operating systems, platforms and business application environments.

The Dynamic Workload Console provides Tivoli Workload Scheduler with a Web Graphical User Interface that acts as a single point of control for the definition and monitoring of background executions in a distributed network of workstations.

The main advantage of a scheduled orchestration consists in cost saving. Usually, when an enterprise invests in scheduling and automation, after an initial high cost (compared with the unit cost of the single operations), it eventually gets an improvement of efficiency and operation in production, therefore reducing costs.
The main disadvantages of older versions of the Tivoli Workload Scheduler were related to a specific technical limitation: in fact, previous versions were not able to easily automate all the desired tasks.

Environments and operations, alongside with the business, are increasingly growing in complexity and difficulty of managing: just think of the difficulties often encountered in the integration of business software products with scheduling software, expecially in heterogeneous environments. This is true both for architectural solutions with high complexity and for small homemade integrations. In most cases, to reach a good baseline of automation tasks that can be performed, you need to implement a huge amount of scripts, often difficult to write and only supported on a single operating system. This solution has low reliability, is impossible to reuse and its production cost will probably disencourage the prosecution of the implementation.

In order to cope with these kinds of issues, Tivoli Workload Scheduler version 8.6 introduced the new Job Type plug-in. The main feature of this type of job is that everyone can create a new job type that suits various business needs, from the integration with an advanced reporting suite to a file copy. In this way the powerful set of the features of scheduling is inclided with the flexibility of Java technology, in a single integrated solution.
We will now describe how to create a Job Type Plug-in that meets our automation needs.

Scenario

In our example we will make a simple, but powerful job, that with a few lines of code can work with files on the filesystem, interact with a Java-based existing software solution and finally interact with a second software solution through a command line.

In this way we will demonstrate how the use of this new technology can simplify not only the integration with highly technological products, but also the automation of its daily tasks.

Imagine the following scenario in which the user is responsible for the same daily operations:

- from a particular input directory, select a folder *(SELECT)*
- using Java code, perhaps written by the user, analyze and aggregate all the information contained in the selected folder. The result of this operation is a series of output files *(ANALYZE)*
- the output, with appropriate input parameters, is given as an input to a command line that compresses all the data and saves this information in a remote repository *(COMPRESS)*

Then our Job, from now on called *Select Analyze Compress (SAC)*, aims to automate all the tasks described above, therefore simplifying the daily tasks of our example user.

The Select Analyze Compress Job Type Plug-in

First of all, install *IBM Tivoli Workload Scheduler Integration Workbench version 8.6* on your development machine.

The operation is easy, fast and does not require more than 5 minutes.

Once installed, we can start the Tivoli Workload Scheduler Integration Workbench.

IBM Tivoli Workload Scheduler Integration Workbench

Version 8.6

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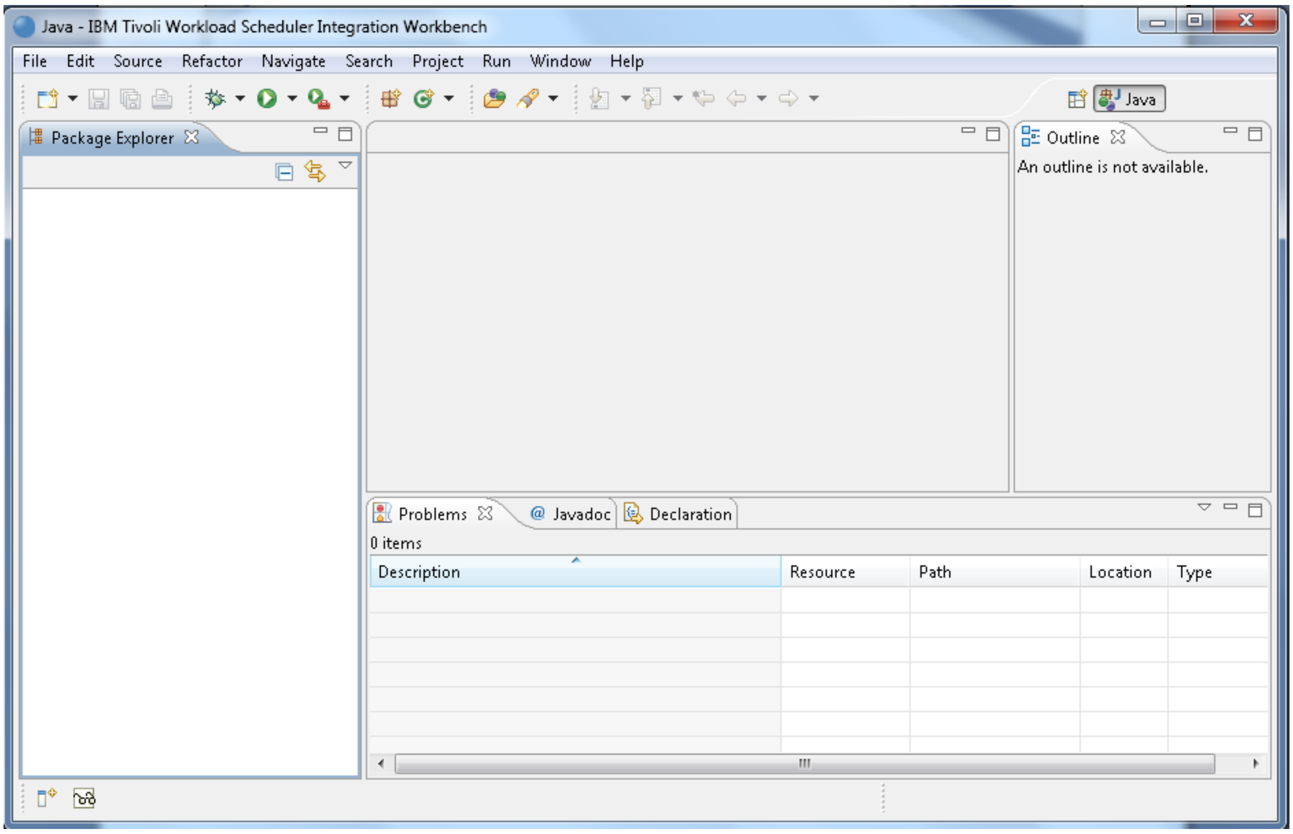
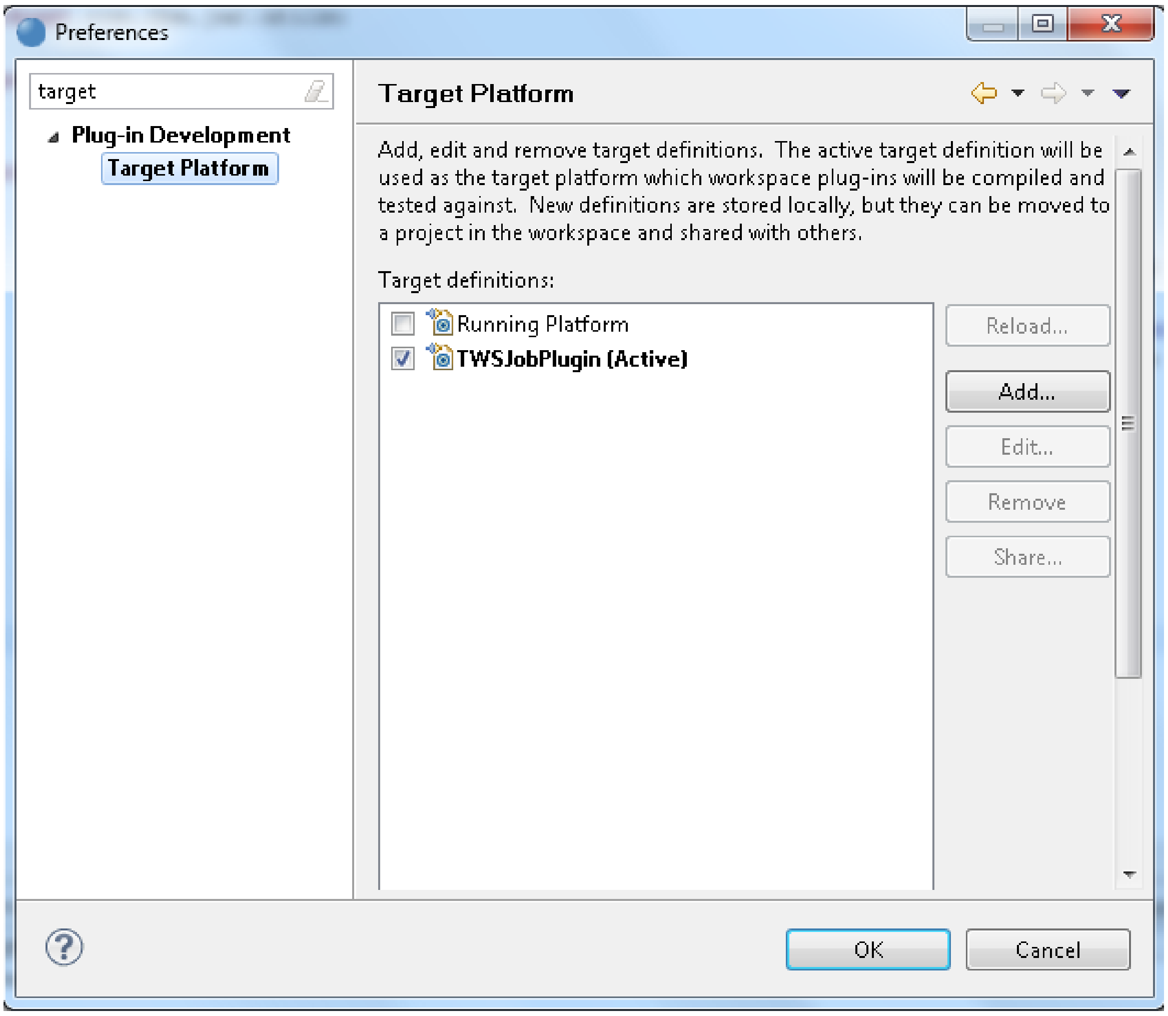

Java - IBM Tivoli Workload Scheduler Integration Workbench
File Edit Source Refactor Navigate Search Project Run Window Help
Java
Package Explorer
Outline
An outline is not available.
Problems
Javadoc
Declaration
0 items
Description
Resource
Path
Location
Type

First thing to do is to point the correct Target Platform so that our Job Type Plug-in can be compiled.

Do the following in order to create a new Target Platform definition:

- From the toolbar, select Window → Preferences → Plug-in Development → Target Platform.
- Add a new empty target definition and in Locations panel type your <Integration_Workbench_Home>/eclipse/features/com.ibm.tws.sdk_8.6.0.v<version>/JavaExt/eclipse directory


Preferences

target

Plug-in Development

Target Platform

Target Platform

Add, edit and remove target definitions. The active target definition will be used as the target platform which workspace plug-ins will be compiled and tested against. New definitions are stored locally, but they can be moved to a project in the workspace and shared with others.

Target definitions:

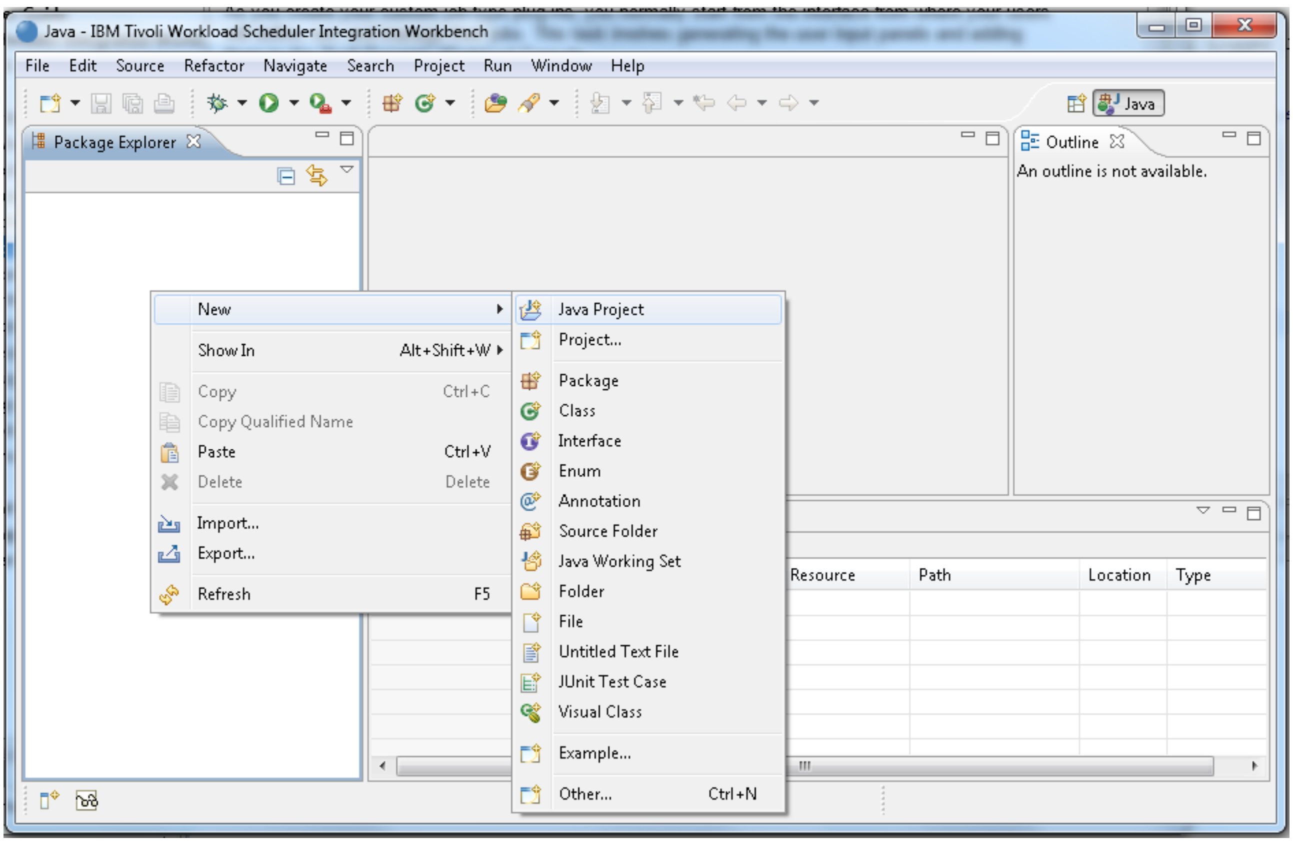
- [ ] Running Platform
- [✓] **TWSJobPlugin (Active)**

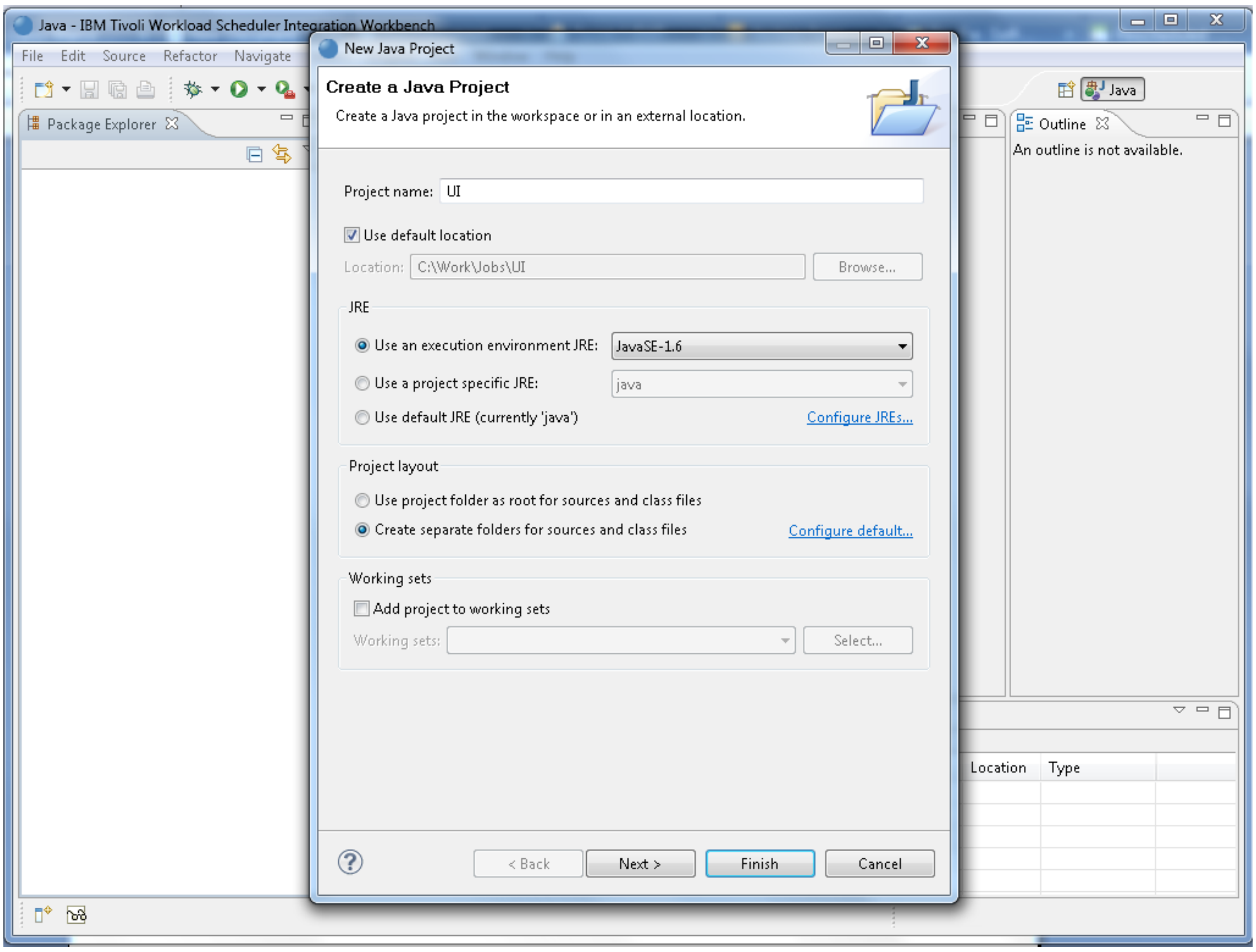
- Select the checkbox corresponding to the newly created target definition. Click Apply and OK.

Now your Tivoli Workload Scheduler Integration Workbench is ready.

The next step is to create our Job Type Plug-in. Usually, we start from the interface from where our users will define, run, and manage their jobs. This task involves all the activities related to the user's input panels that will be shown into the Tivoli Dynamic Workload Console.

My personal approach for this operation is the following. Create a new empty Java project and call it UI




New Java Project

Create a Java Project

Create a Java project in the workspace or in an external location.

Project name: UI

[✓] Use default location

Location: C:\Work\Jobs\UI

JRE

(●) Use an execution environment JRE: JavaSE-1.6

( ) Use a project specific JRE: java

( ) Use default JRE (currently 'java')

Project layout

( ) Use project folder as root for sources and class files

(●) Create separate folders for sources and class files

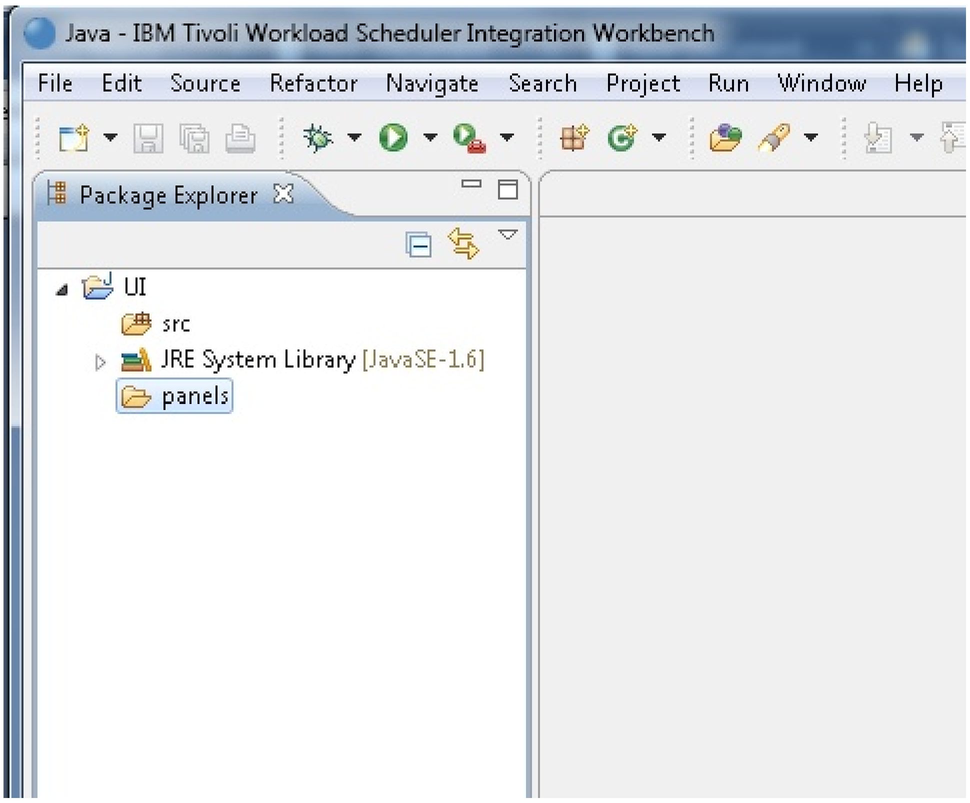
Working sets

[ ] Add project to working sets

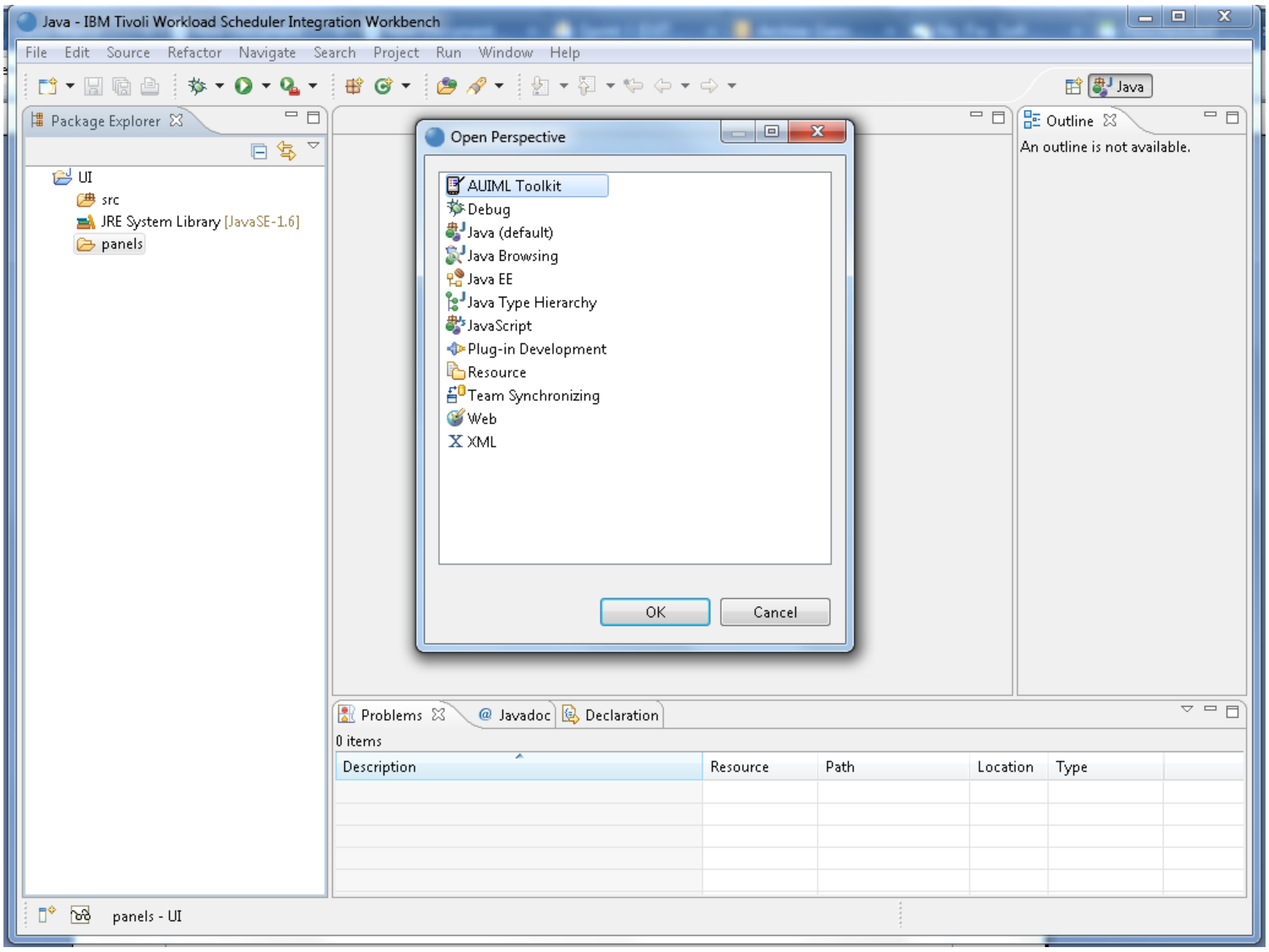
Working sets:

Inside this new project we can create a new folder, called panels, that will be the container of our ui panels.

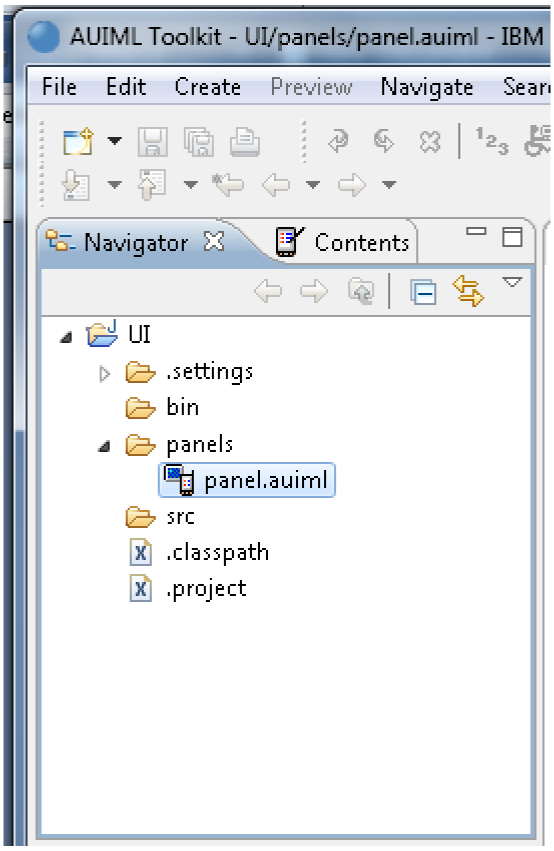
The result of this operation is the following


Java - IBM Tivoli Workload Scheduler Integration Workbench
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
UI
src
JRE System Library [JavaSE-1.6]
panels

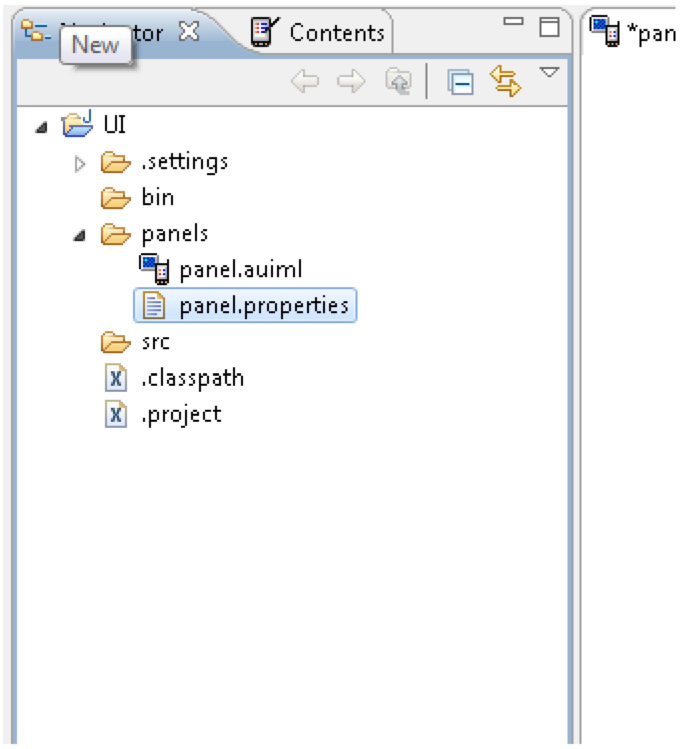
After that we need to switch to the AUIML Toolkit perspective. The Abstract User Interface Markup Language (AUIML) is the technology that allows the quick creation of our ui panels.



Inside the panel directory, we can now create a new AUIML File called, for example, panel.auiml. The result is


AUIML Toolkit - UI/panels/panel.auiml - IBM
File Edit Create Preview Navigate Sear
Navigator
Contents
UI
.settings
bin
panels
panel.auiml
src
.classpath
.project

Select the panel.auiml that you created earlier. From the Properties panel, select the Resource field. From the drop-down list, select the value property resource bundle and click Save. The result is the following

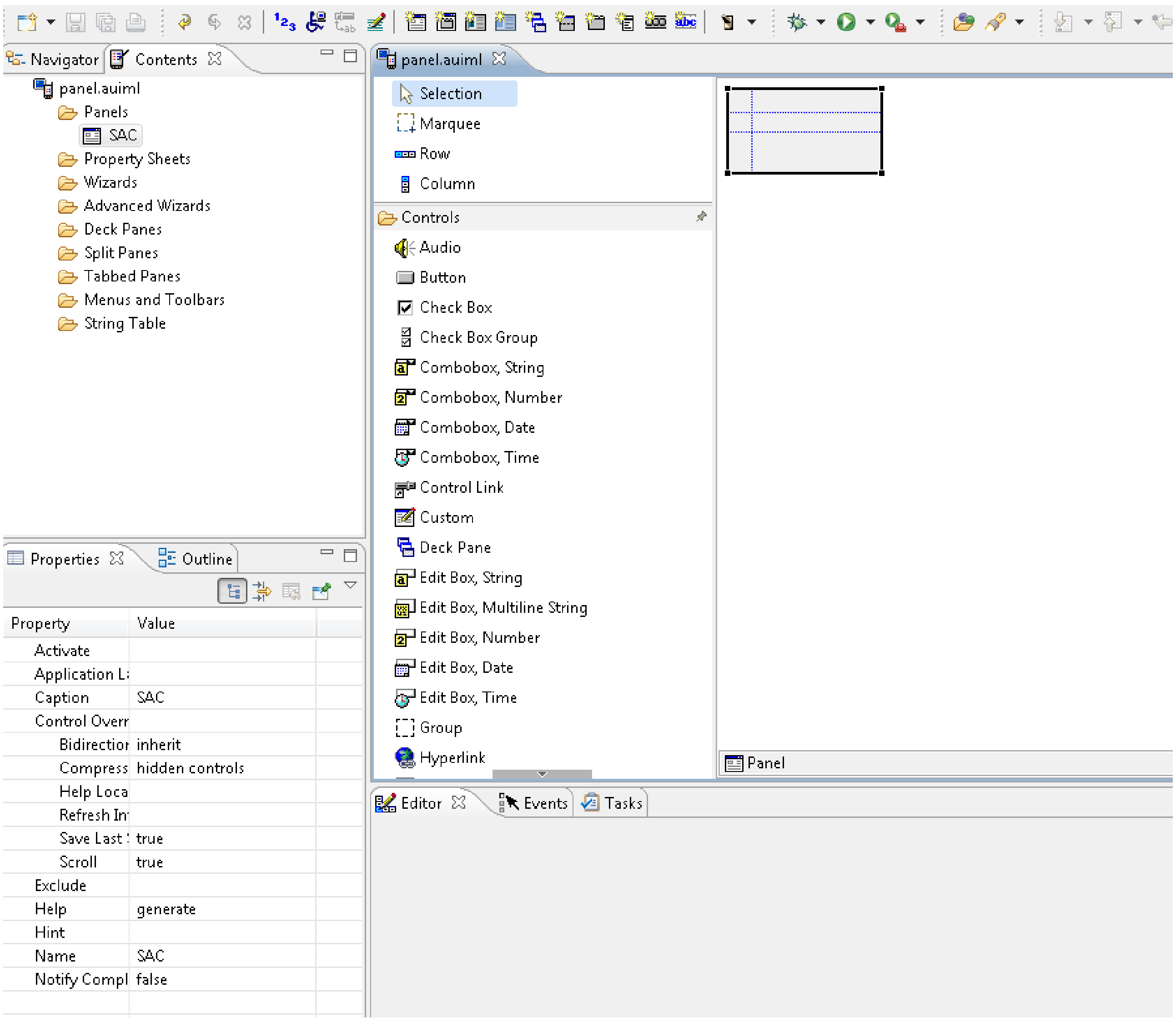


At this point you can use AUIML VisualBuilder tool to create our panels. The AUIML VisualBuilder tool provides What You See Is What You Get (WYSIWYG) editing. For example, you can add the following GUI objects: Buttons, check boxes , combo boxes, edit boxes, list boxes, and so on.

At this point we are ready to create our custom panel, with the following features:

- a field for the input directory with an associated button which allows to make an interactive selection *(SELECT)*
- a field for the output directory *(ANALYZE)*
- a combobox for select the compression type and a field for the remote repository hostname *(COMPRESS)*

So, we can start with the creation of the SAC panel:

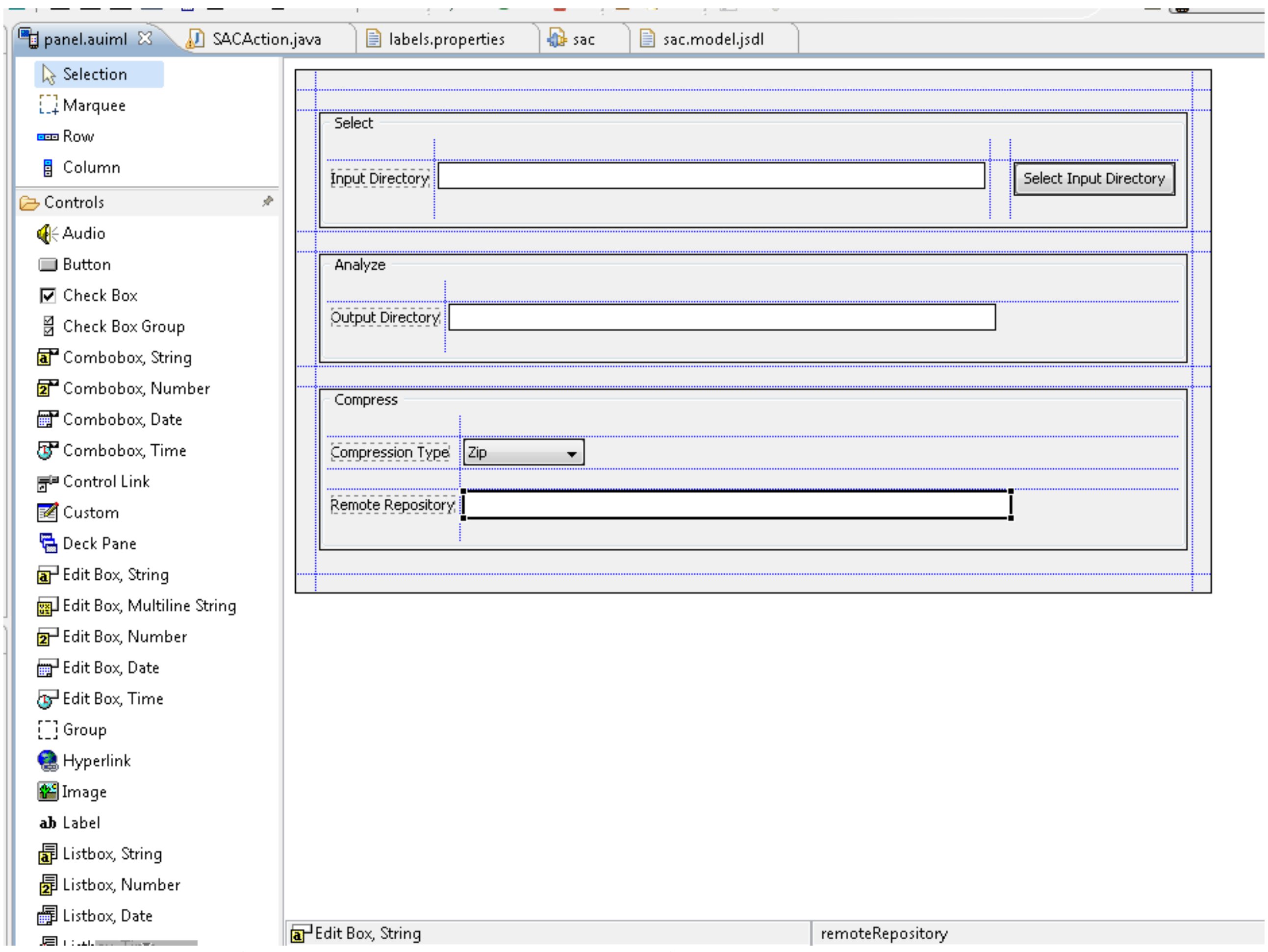


- panel.auiml
  - Panels
    - SAC
  - Property Sheets
  - Wizards
  - Advanced Wizards
  - Deck Panes
  - Split Panes
  - Tabbed Panes
  - Menus and Toolbars
  - String Table

Property	Value
Activate	
Application L	
Caption	SAC
Control Overr	
Bidirectior	inherit
Compress	hidden controls
Help Loca	
Refresh In	
Save Last	true
Scroll	true
Exclude	
Help	generate
Hint	
Name	SAC
Notify Compl	false

Inside of it we can add all the necessary fields, captions and buttons.

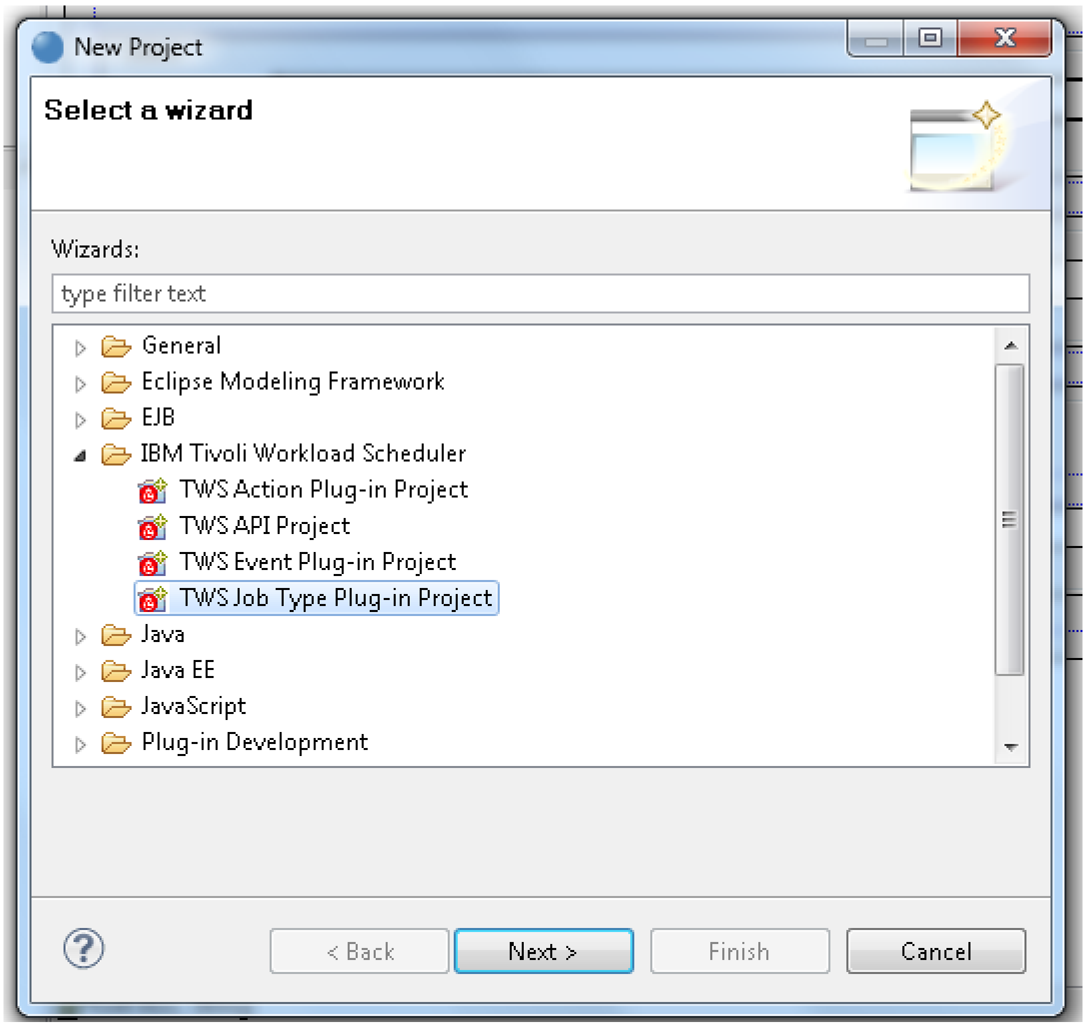
The result should look like the following:



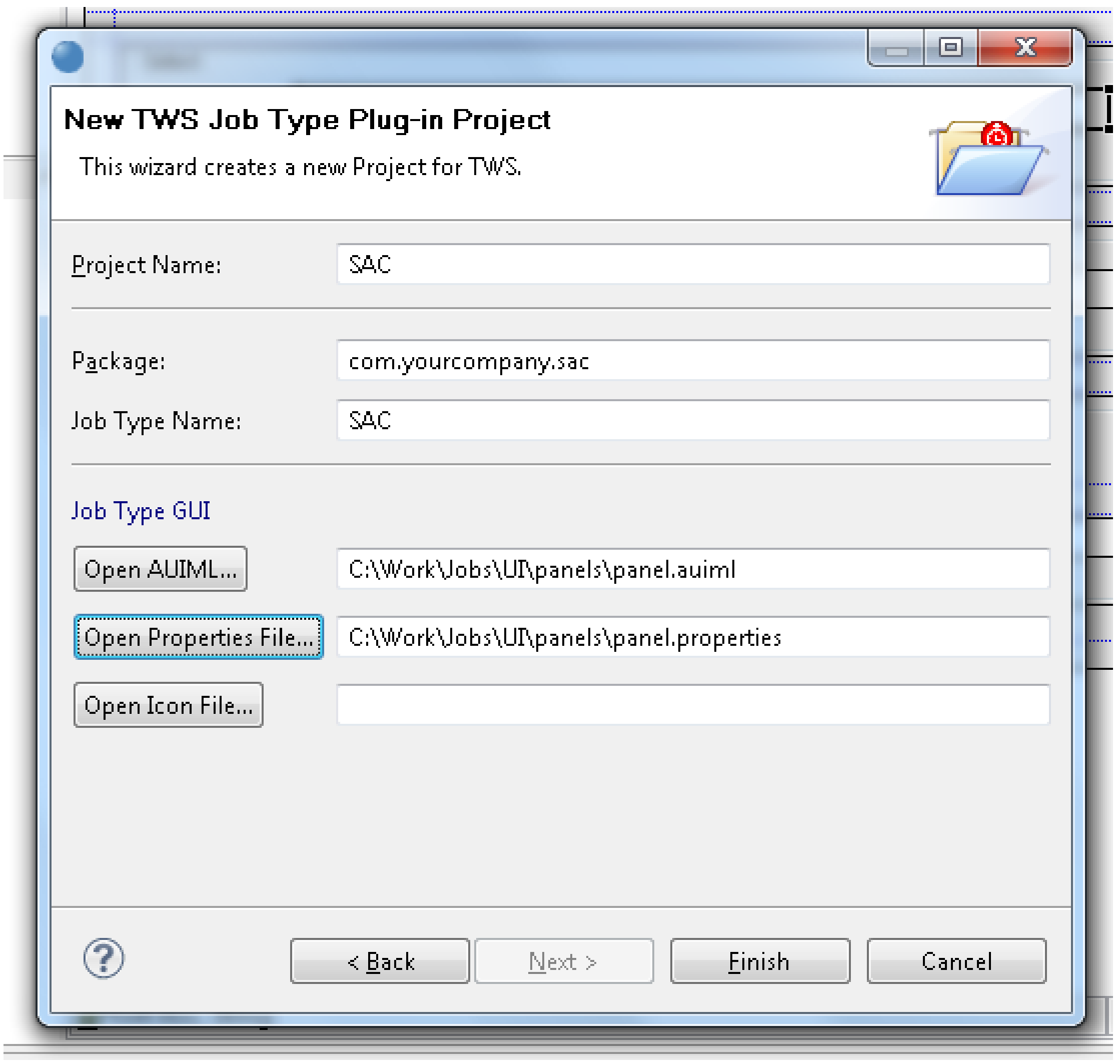
For every single field and button, we have to define a caption and a name. In particular, the name will be used when we define the Java code.

Now that our panel is ready we can create the project by going through the following steps, that consist in creating a project with our Job Type Plug-in files and all that is needed to deploy them. Do the following:

- From the toolbar select File → New → Project.... The New Project window opens.
- In the list of wizards, double-click first on IBM Tivoli Workload Scheduler and then on TWS Job Type Plug-in Project.
- The TWS Job Type Plug-in Project wizard opens.



- Enter a name for the project.
- Enter a package name for the plug-in.
- Enter the name of the job type as it will be shown on the Dynamic Workload Console panel.
- Enter the panel.auiml name and enter the names of the panel.properties files


New TWS Job Type Plug-in Project

This wizard creates a new Project for TWS.

Project Name: SAC

Package: com.yourcompany.sac

Job Type Name: SAC

Job Type GUI

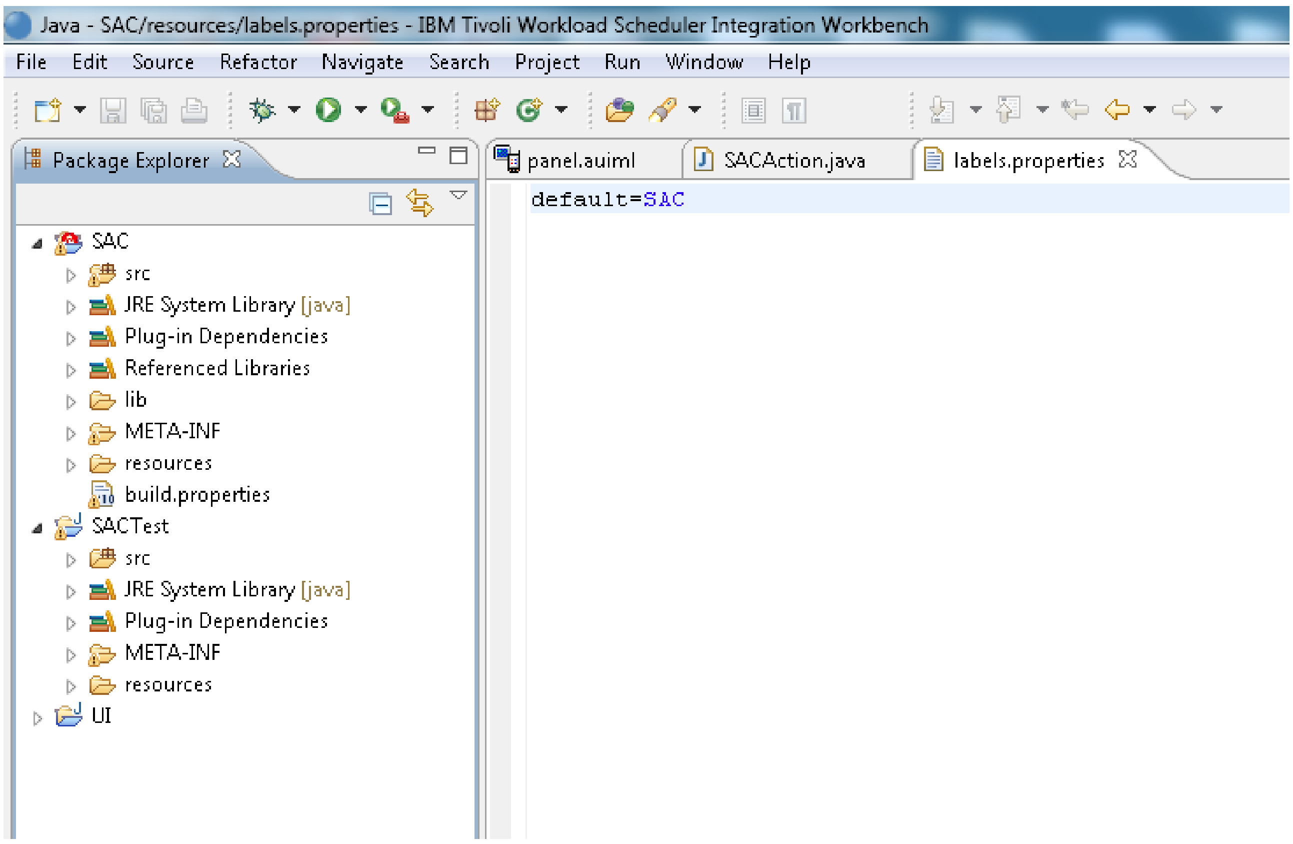
Open AUIML... C:\Work\Jobs\UI\panels\panel.auiml

Open Properties File... C:\Work\Jobs\UI\panels\panel.properties

Open Icon File...

- And finally click Finish

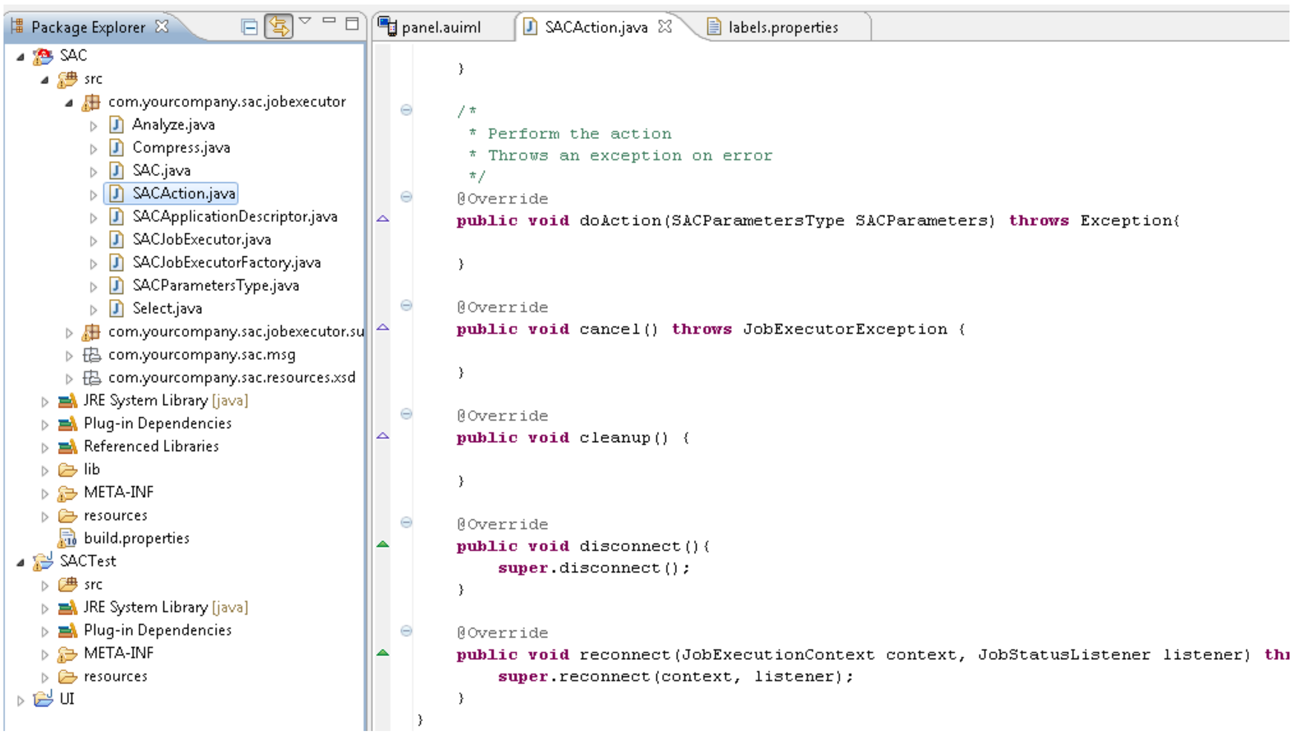
The result looks like this:



```
default=SAC
```

The most important class of our project is the *SACAction.java*. In fact, this Java class will contain the code required to make the Job operational. In particular, the code of the doAction method will be executed when the Job is in running state.

At this point we can work on the code in order to make the three main steps operational: *SELECT*, *ANALYZE* and *COMPRESS*.



```
    }

    /*
     * Perform the action
     * Throws an exception on error
     */
    @Override
    public void doAction(SACParametersType SACParameters) throws Exception{

    }

    @Override
    public void cancel() throws JobExecutorException {

    }

    @Override
    public void cleanup() {

    }

    @Override
    public void disconnect(){
        super.disconnect();
    }

    @Override
    public void reconnect(JobExecutionContext context, JobStatusListener listener) thi
        super.reconnect(context, listener);
    }
}
```

Select

The goal of this step is to make sure that, when we click on the SelectInput Directory button, a popup with show all the available directories, starting from a path defined inside a properties file present on the agent, and allow the user to make a selection.
So, first of all, we need to connect our button with our code using the procedure to define a response action.

The definition of a response action requires:

- The AUIML definition of the button that triggers the command (this operation has already been done during the panel creation)
- The implementation of a canRunOnConnector method in the SACAction.java that specifies if the action can run in the connector or it must run in the agent requesting the command. In our case, the action runs on the agent only
- The implementation of a runExecutorCommand method in the SACAction.java that runs the command. The command value of the button has been defined in the Class name field associated to it AUIML definition. In our case the command is selectInputDir

The code that we are going to add to the *SACAction.java* class is the following

```
@Override
public boolean canRunOnConnector(String command) {

      //if command equals selectInputDir it must run on the agent
      if(command.equals("selectInputDir"))
            return false;
      else
            return true;
}

@Override
public ExecutorCommandResponseType runExecutorCommand(
            Map<String, String> parameters, String command, Locale loc)
            throws JobExecutorException {

      //Create the response type
      ExecutorCommandResponseType response =
                  RestFactory.eINSTANCE.createExecutorCommandResponseType();

      //Create the picklist action
      ExecutorAction showPickListAction =
                              RestFactory.eINSTANCE.createExecutorAction();

      //Create the picklist object
      ShowPickList showPickList = RestFactory.eINSTANCE.createShowPickList();
      showPickList.setTitle("Select Input Directory");

      //connect the picklist selection with a specific field
      showPickList.setFieldName("inputDirectory");

      //get the picklist items
      List pickListItems = showPickList.getItem();
```

```
//Get the actions list
List<ExecutorAction> actions = response.getActions();


try {
      //if command is selectInputDir
      if(command.equals("selectInputDir")){
      //retrieve the config dir
      String configDir = System.getProperty("ConfigDir");

      //retrieve the sac.properties file
      File props = new File(configDir +
                        File.separatorChar +
                        "sac.properties");
      Properties properties = new Properties();

      //read properties file
      FileInputStream in = new FileInputStream(props);;
      properties.load(in);

      //read the inputDir path property
      String inputDirPath =
            (String) properties.get("inputDir");

      //scan the input dir to find all
      //the directory inside of it
      File inpuDir = new File(inputDirPath);

      //retrieve all the files inside the inputDir
      File[] inputDirChildren = inpuDir.listFiles();

      for(File current : inputDirChildren){

            //if the current file is a directory add his name
            //in the picklist items list
            if(current.isDirectory())
                  pickListItems.add(current.getName());

            }

            //connect the picklist action with the picklist object
            showPickListAction.setShowPickList(showPickList);

            //add the picklist action to the action list
            actions.add(showPickListAction);

      }

}catch (Exception e) {
        //If something goes wrong create a ShowPopup action
        //and add it to the actions list in order to shown an error
        //message
        ExecutorAction popupAction =
            RestFactory.eINSTANCE.createExecutorAction();
        ShowPopUp popup = RestFactory.eINSTANCE.createShowPopUp();
        popup.setTitle("Error Message");
        popup.setMessage(e.getMessage());
        popup.setHeight("300px");
        popup.setWidth("200px");
        popupAction.setShowPopup(popup);
```

```
            actions.add(popupAction);
        }

        return response;

    }
```

Analyze

In this step, the selected input directory should be analyzed with some particular custom code written by the user. The result of this operation will generate an output directory. In our example, this code is inside a particular jar called *analyzer.jar*.

The main class of this jar is the *Analyze.java*

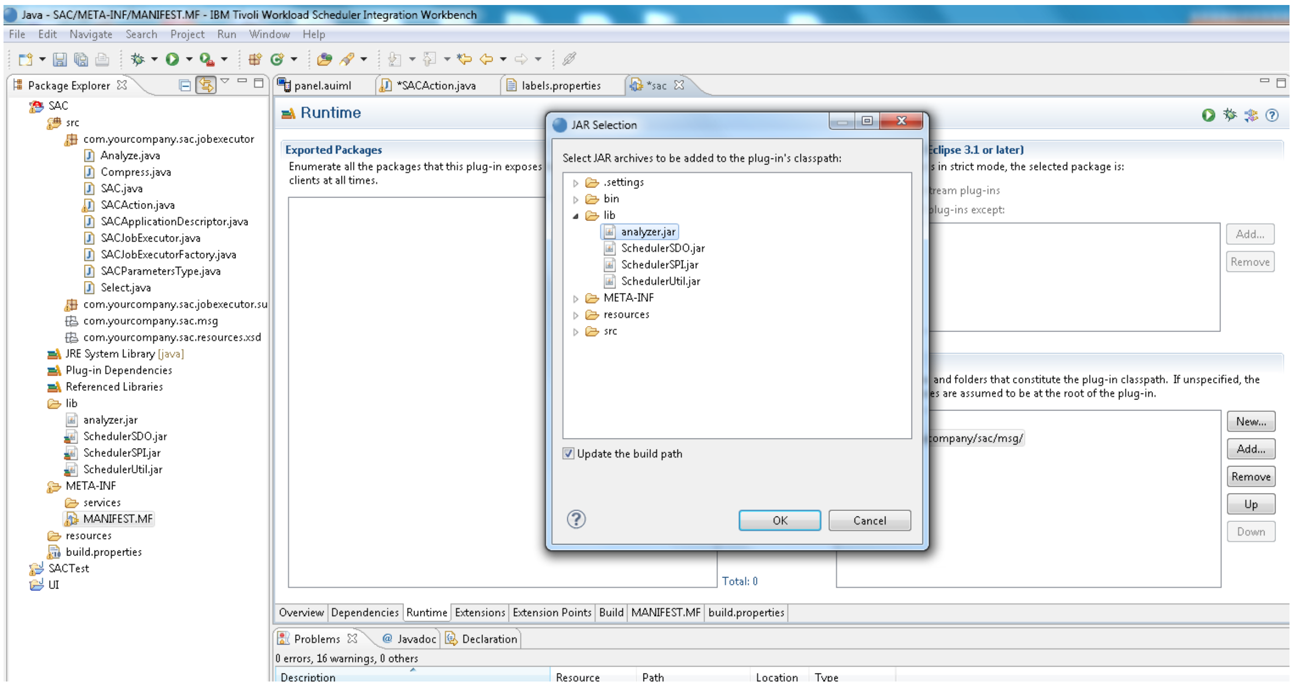
```java
package com.yourcompany.analyze;

/**
 *
 * @author Marco Ganci
 *
 */
public class Analyzer {

      /**
       * Constructor
       */
      public Analyzer() {
      }


      /**
       *
       * @param inputDirPath
       * @param outputDirPath
       */
      public void analyze(String inputDirPath,String outputDirPath){

            //analyze all the file inside the inputDir and produce
            //a new output directory

            . . .

      }

}
```

We need to integrate the jar file inside our Job Type Plug-in and its functionality inside the doAction method. Therefore, the analyze.jar must be added to the Runtime Classpath, modifying the META-INF/MANIFEST.MF file. Do the following:

- Copy the analyzer.jar inside the <project>/lib directory

- Double click the META-INF/MANIFEST.MF file. The Overview panel is displayed. Click Runtime. The Runtime panel is displayed. In the Classpath section of the Runtime panel, click New. The New Library window is displayed. Enter the value lib/analyzer.jar.

- Save the changes to the META-INF/MANIFEST.MF file.



Enumerate all the packages that this plug-in exposes to clients at all times.

Select JAR archives to be added to the plug-in's classpath:

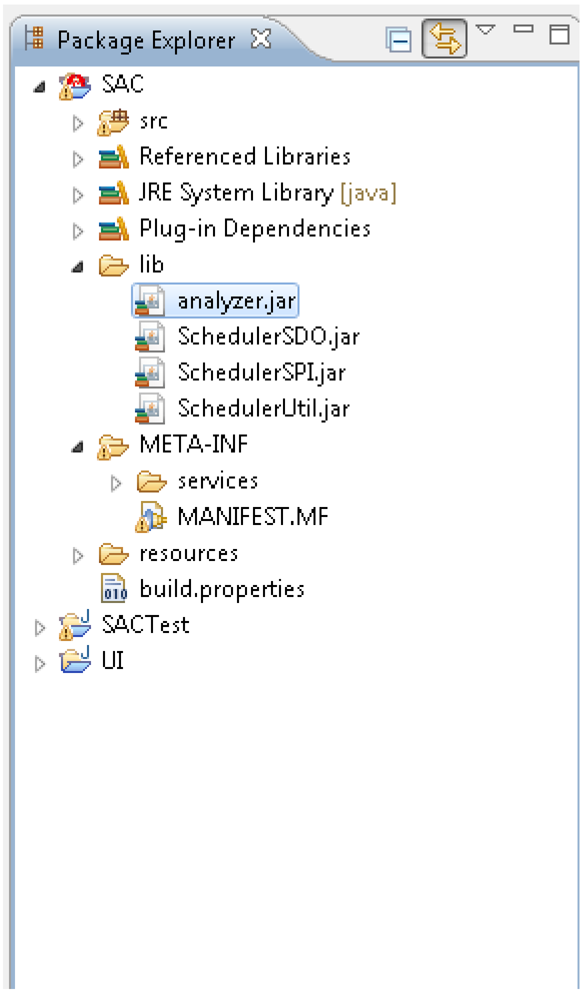
[✓] Update the build path

Eclipse 3.1 or later)
in strict mode, the selected package is:
tream plug-ins
lug-ins except:

and folders that constitute the plug-in classpath. If unspecified, the es are assumed to be at the root of the plug-in.

company/sac/msg/

0 errors, 16 warnings, 0 others



At this point we can use the code inside the analyzer.jar into our *SACAction.java* class.

After this operation, the doAction implementation will look like the following:

```
@Override
public void doAction(SACParametersType SACParameters) throws Exception{
      //retrieve input parameters from panel
      SAC panel = SACParameters.getSAC();

      //select group
      Select selectGroup = panel.getSelect();

      //input directory
      String inputDirPath = selectGroup.getInputDirectory().getText();

      //analyze group
      Analyze analyzeGroup = panel.getAnalyze();

      //output dir
      String outputDirPath = analyzeGroup.getOutDirectory().getText();

      //analyze the input dir and produce an output into the output dir
      Analyzer analyzer = new Analyzer();
      analyzer.analyze(inputDirPath, outputDirPath);

}
```

Compress

In this last step we take the compression type value selected by the user, the remote repository workstation and, using a command line already present in the agent machine, compress the output directory and save it remotely.

So we need to modify the doAction method. First of all we need to retrive the input parameters, the compression type and the remote repository. After that we can launch the command line. In the last line of code we will verify if the operation has been completed successfully or not. In case of errors the job will automatically fail.

The new doAction implementation will be the following:

```java
/*
 * Perform the action
 * Throws an exception on error
 */
@Override
public void doAction(SACParametersType SACParameters) throws Exception{
      //retrieve input parameters from panel
      SAC panel = SACParameters.getSAC();

      //select group
      Select selectGroup = panel.getSelect();

      //input directory
      String inputDirPath = selectGroup.getInputDirectory().getText();

      //analyze group
      Analyze analyzeGroup = panel.getAnalyze();

      //output dir
      String outputDirPath = analyzeGroup.getOutDirectory().getText();

      //analyze the input dir and produce an output into the output dir
      Analyzer analyzer = new Analyzer();
      analyzer.analyze(inputDirPath, outputDirPath);

      //compress
      Compress compress = panel.getCompress();

      //compression type value, one of zip, tar or rar
      String compressionTye = compress.getCompressionType().getText();

      //remote repository
      String remoteRepository = compress.getRemoteRepository().getText();

      //create the command for the command line
      String command = "compress -compressionType " + compressionTye
                                  + " -remote " + remoteRepository
                                  + " -dir " + outputDirPath;

      //run the command line command in this example the
      //compress command line has been already defined in the classpath
      Process commandLineProcess = Runtime.getRuntime().exec(command);

      //check in the standard output of the
```

```
        // command if is present the string "success"
        BufferedReader stdOutputBuffer =
        new BufferedReader(
              new InputStreamReader(commandLineProcess.getInputStream()));

        //put all the stdOut inside this object
        StringBuffer stdOut = new StringBuffer();

        //read all the stdOut
        String line;
        while ((line = stdOutputBuffer.readLine()) != null) {
              stdOut.append(line);
        }

        //verify if the command has been executed with success
        //otherwise throw a new exception and the job automatically fails
        if(!stdOut.toString().contains("success")){
              throw new Exception("Operation failed!");
        }

  }
```

Write the Job Log

At this point the base implementation of our Job Type plug-in is completed, but another last thing should be made in order to optimize the job execution and troubleshooting.

Inside the already written code, we easily add the job log associated to the execution of this job. These operations consist in the following action: retrieve the current Job Log file, create an object to write the Job Log, write the Job Log, close the Job Log writer.

The final version of doAction method will be:

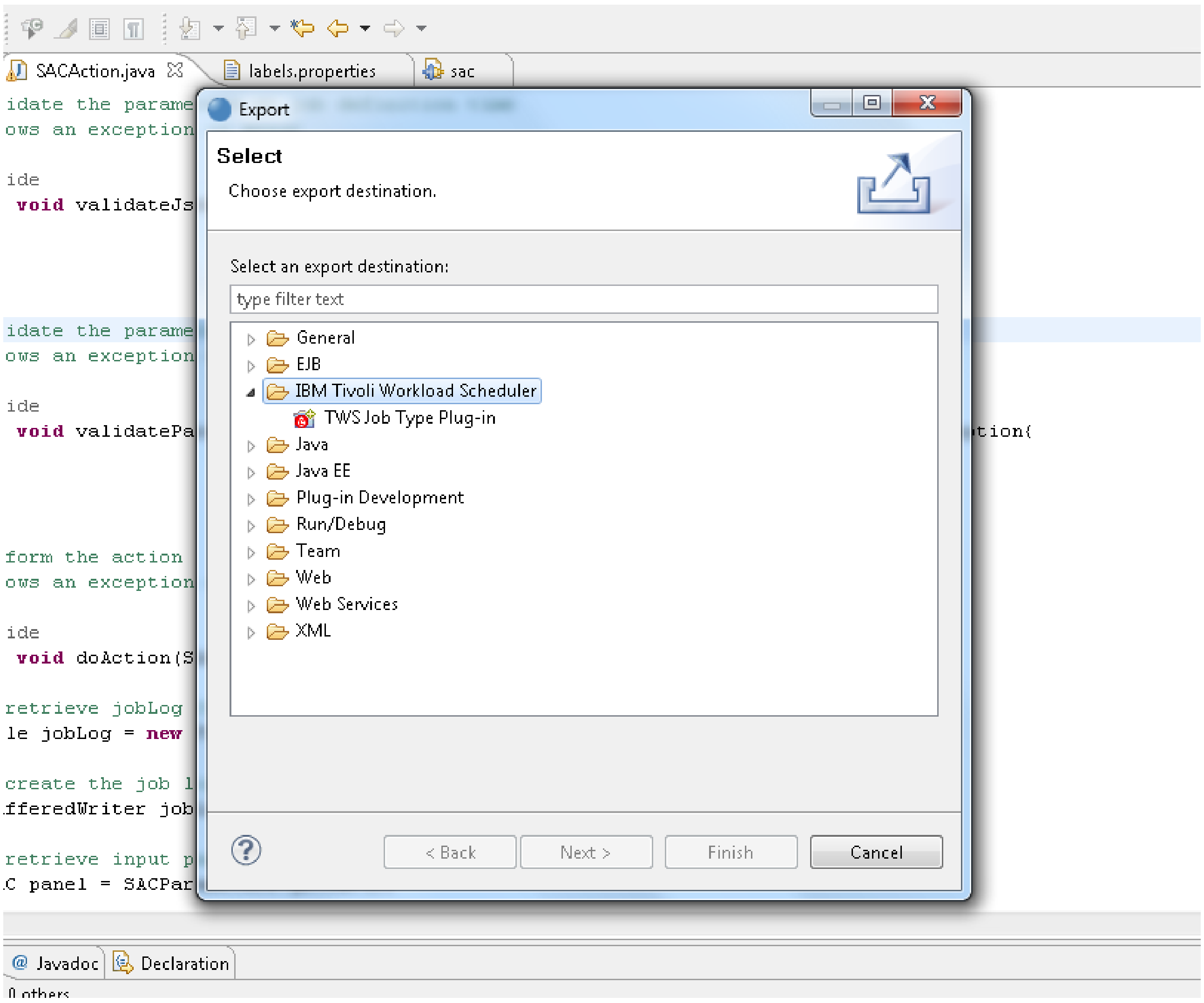
```
/*
 * Perform the action
 * Throws an exception on error
 */
@Override
public void doAction(SACParametersType SACParameters) throws Exception{

      //retrieve jobLog file using the getOutputFile api
      File jobLog = new File(getOutputFile());

      //create the job log writer
      BufferedWriter jobLogWriter = new BufferedWriter(new FileWriter(jobLog));

      //retrieve input parameters from panel
      SAC panel = SACParameters.getSAC();

      //select group
      Select selectGroup = panel.getSelect();

      //input directory
      String inputDirPath = selectGroup.getInputDirectory().getText();
      jobLogWriter.append("Input directory is: " + inputDirPath);

      //analyze group
      Analyze analyzeGroup = panel.getAnalyze();

      //output dir
      String outputDirPath = analyzeGroup.getOutDirectory().getText();
      jobLogWriter.append("Output directory is: " + outputDirPath);

      //analyze the input dir and produce an output into the output dir
      Analyzer analyzer = new Analyzer();
      jobLogWriter.append("Analyze start...");
      analyzer.analyze(inputDirPath, outputDirPath);
      jobLogWriter.append("Analyze end");

      //compress
      Compress compress = panel.getCompress();

      //compression type value, one of zip, tar or rar
      String compressionTye = compress.getCompressionType().getText();
      jobLogWriter.append("Compression type is: " + compressionTye);

      //remote repository
      String remoteRepository = compress.getRemoteRepository().getText();
      jobLogWriter.append("Remote repository is: " + remoteRepository);
```

```
        //create the command for the command line
        String command = "compress -compressionType " + compressionTye
                                                  + " -remote " + remoteRepository
                                                  + " -dir " + outputDirPath;

        //run the command line command in this example the
        //compress command line has been already defined in the classpath
        jobLogWriter.append("Compression start...");
        Process commandLineProcess = Runtime.getRuntime().exec(command);
        jobLogWriter.append("Compression end");

        //check in the standard output of the
        //command if is present the string "success"
        BufferedReader stdOutputBuffer = new BufferedReader(
                    new InputStreamReader(commandLineProcess.getInputStream()));

        //put all the stdOut inside this object
        StringBuffer stdOut = new StringBuffer();

        //read all the stdOut
        String line;
        while ((line = stdOutputBuffer.readLine()) != null) {
              stdOut.append(line);
        }

        //verify if the command has been executed with success
        //otherwise throw a new exception and the job automatically fails
        if(!stdOut.toString().contains("success")){
              jobLogWriter.append("Operation failed!");
              //close the jobLog writer
              jobLogWriter.close();
              throw new Exception("Operation failed!");
        }else{
              jobLogWriter.append("Operation completed with success!");
              //close the jobLog writer
              jobLogWriter.close();
        }

  }
```

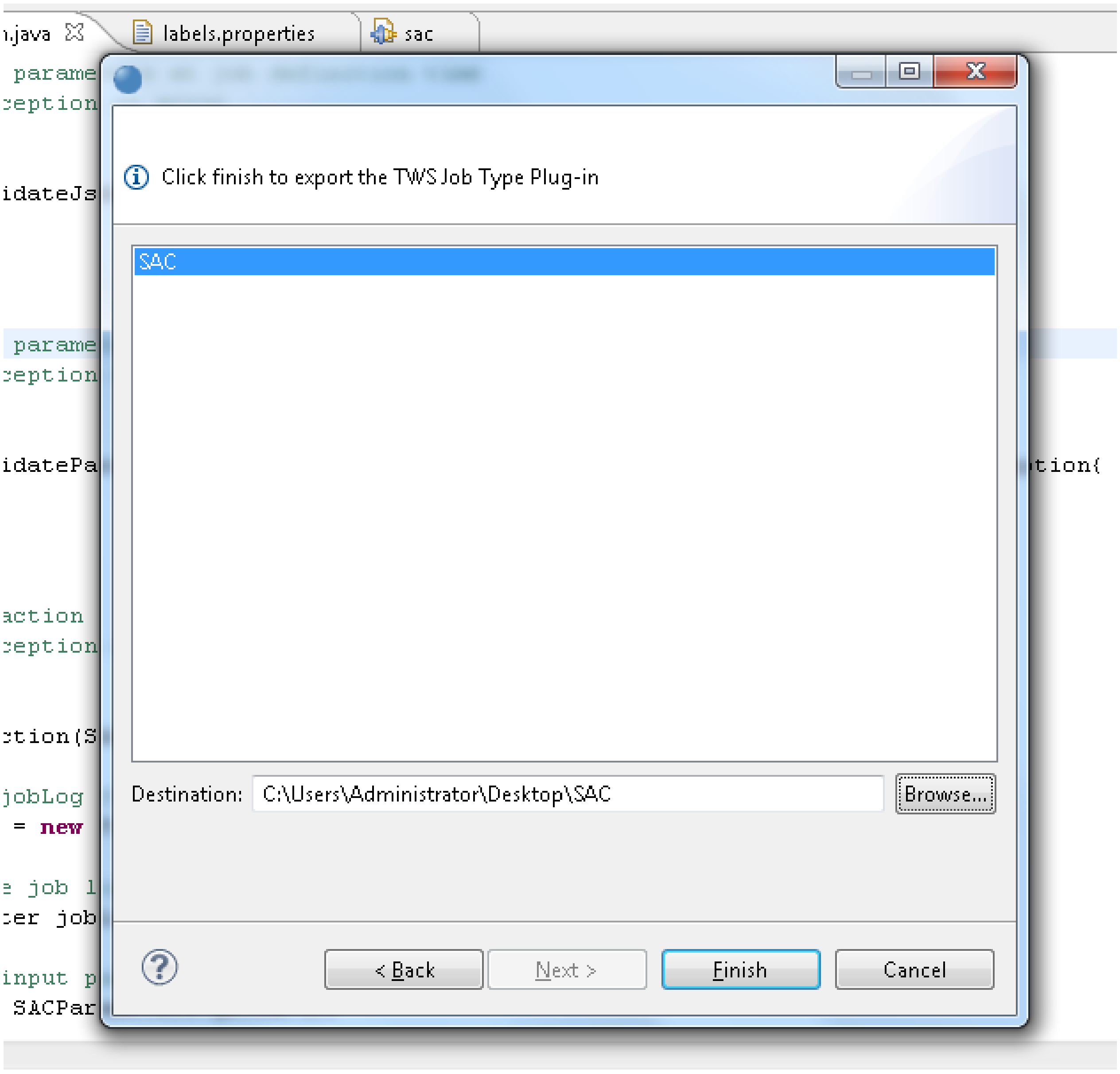
Export the Job-Type Plug-in

Now our custom Job is completed and ready to be exported. This step consists in exporting the packaged plug-in files from the Eclipse workbench to a folder on your computer so that you can install them on the agents and make them operational. Do the following to export the plug-in package:

- In the Package Explorer panel, right click on the package name and select Export. In the Export window double-click first on IBM Tivoli Workload Scheduler and then on TWS Job Type Plug-in. A list of defined TWS Job-Type Plug-in projects is displayed.



- Select the project in the list and enter the destination folder in your computer and click Finish.

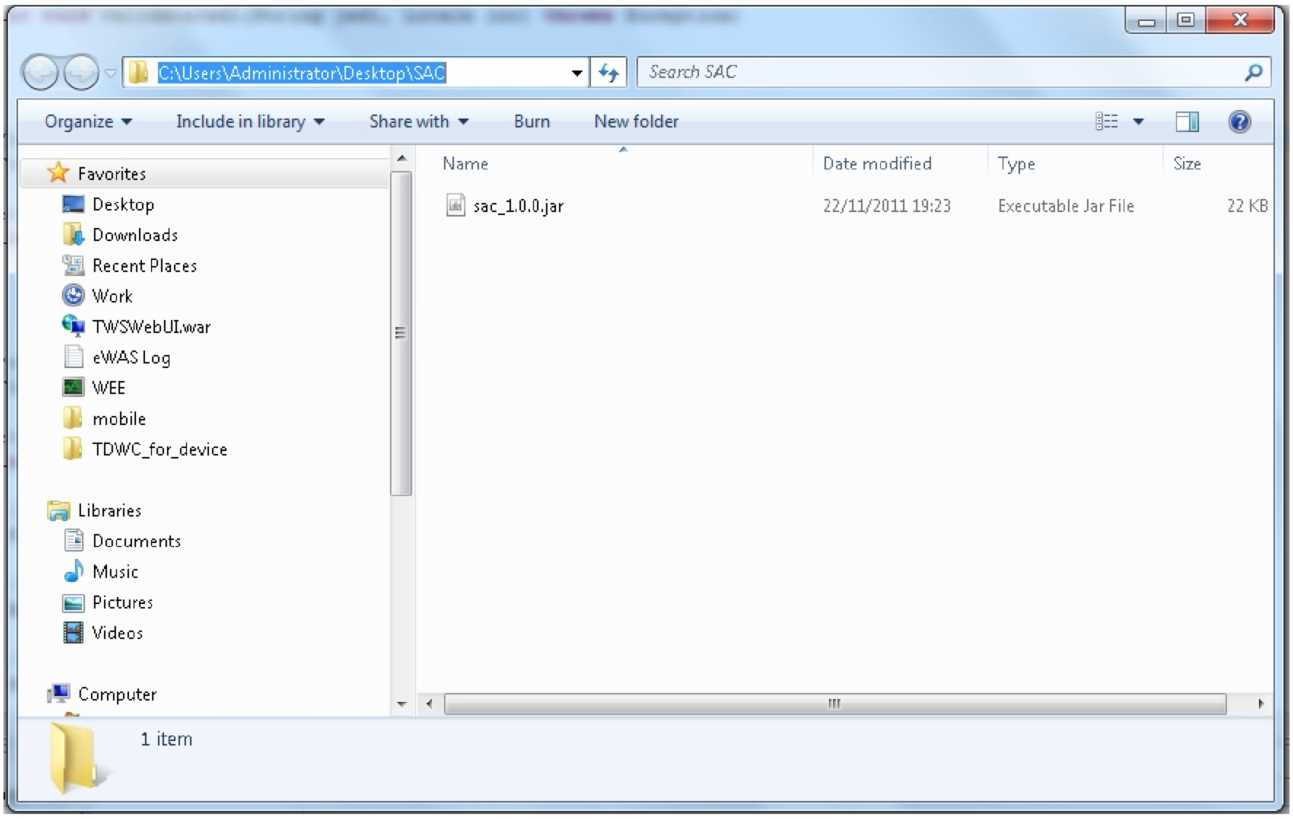


Click finish to export the TWS Job Type Plug-in

SAC

Destination: C:\Users\Administrator\Desktop\SAC

The result is the creation of a jar file named *sac_1.0.0.jar* in the destination folder of the computer you selected.



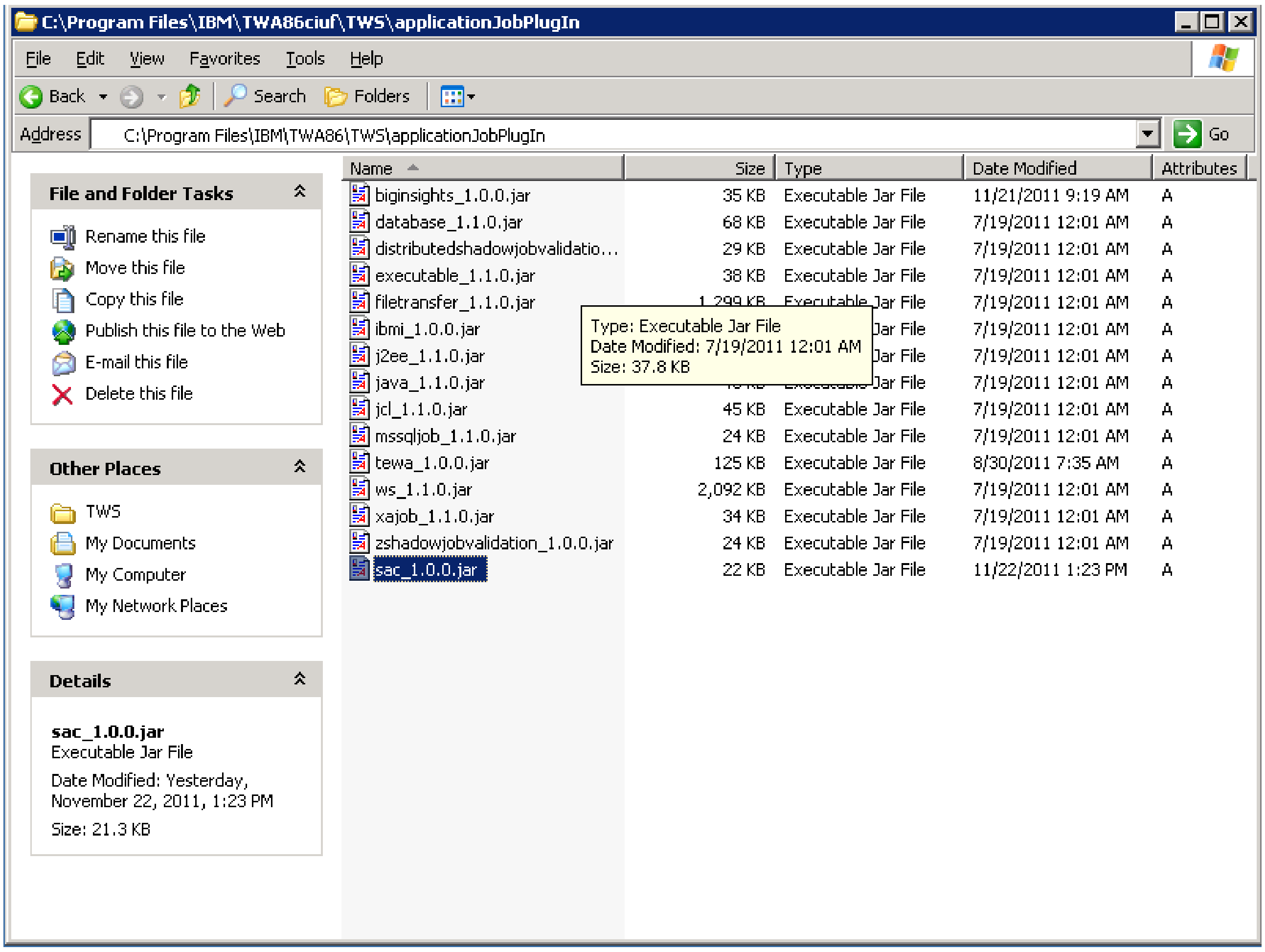
Name	Date modified	Type	Size
sac_1.0.0.jar	22/11/2011 19:23	Executable Jar File	22 KB

Some more final steps are needed to make the plug-in available to the Dynamic Workload Console and to the agent.

Installing the plug-in on the Master Domain Manager server

To install the plug-in on the Master Domain Manager server, copy the *sac_1.0.0.jar* file to <TWA_home>/TWS/applicationJobPlugIn on the system where the Master Domain Manager server is installed, and restart the WebSphere Application Server.

This is required to allow the Dynamic Workload Console to discover the jar on the Master Domain Manager.



sac_1.0.0.jar
Executable Jar File
Date Modified: Yesterday, November 22, 2011, 1:23 PM
Size: 21.3 KB

Name	Size	Type	Date Modified	Attributes
biginsights_1.0.0.jar	35 KB	Executable Jar File	11/21/2011 9:19 AM	A
database_1.1.0.jar	68 KB	Executable Jar File	7/19/2011 12:01 AM	A
distributedshadowjobvalidatio...	29 KB	Executable Jar File	7/19/2011 12:01 AM	A
executable_1.1.0.jar	38 KB	Executable Jar File	7/19/2011 12:01 AM	A
filetransfer_1.1.0.jar	1,299 KB	Executable Jar File	7/19/2011 12:01 AM	A
ibmi_1.0.0.jar		Jar File	7/19/2011 12:01 AM	A
j2ee_1.1.0.jar		Jar File	7/19/2011 12:01 AM	A
java_1.1.0.jar		Jar File	7/19/2011 12:01 AM	A
jcl_1.1.0.jar	45 KB	Executable Jar File	7/19/2011 12:01 AM	A
mssqljob_1.1.0.jar	24 KB	Executable Jar File	7/19/2011 12:01 AM	A
tewa_1.0.0.jar	125 KB	Executable Jar File	8/30/2011 7:35 AM	A
ws_1.1.0.jar	2,092 KB	Executable Jar File	7/19/2011 12:01 AM	A
xajob_1.1.0.jar	34 KB	Executable Jar File	7/19/2011 12:01 AM	A
zshadowjobvalidation_1.0.0.jar	24 KB	Executable Jar File	7/19/2011 12:01 AM	A
sac_1.0.0.jar	22 KB	Executable Jar File	11/22/2011 1:23 PM	A

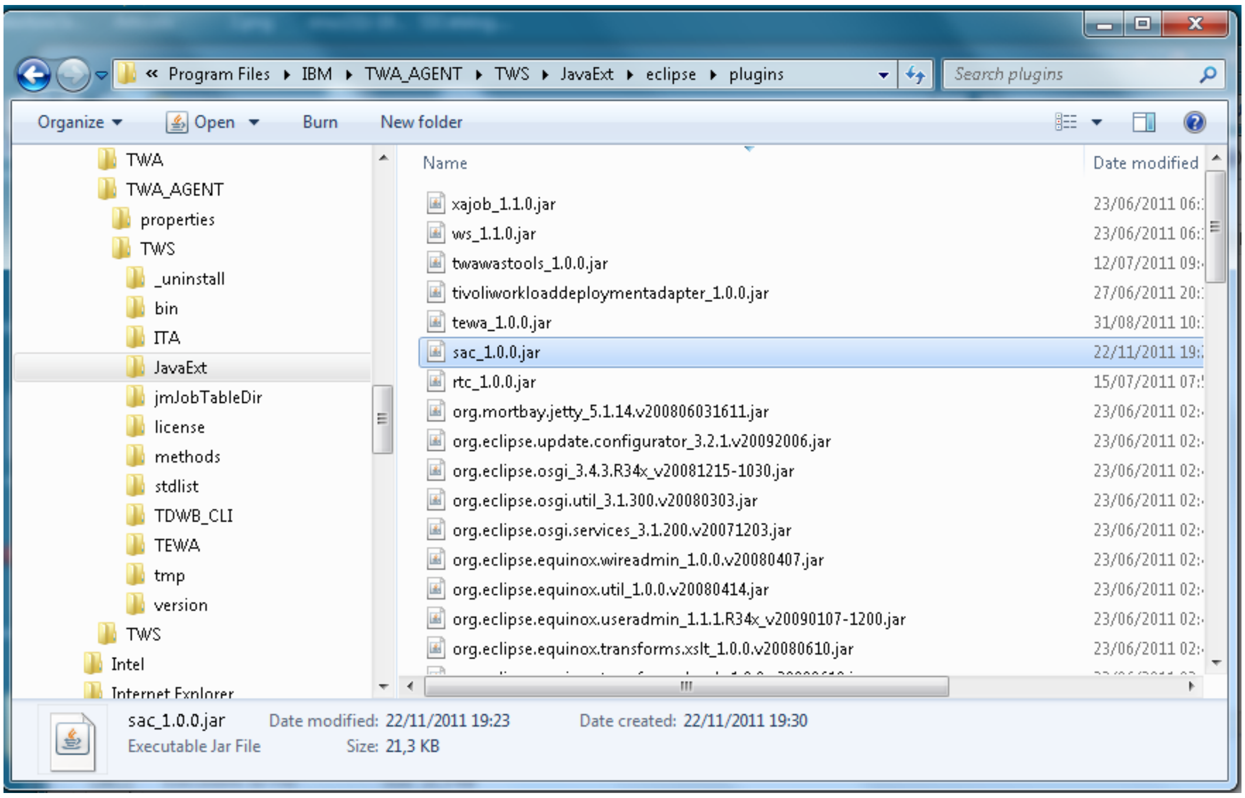
Type: Executable Jar File
Date Modified: 7/19/2011 12:01 AM
Size: 37.8 KB

Installing the plug-in on the agents

You need to install the plug-in on every workstation where you want to run a job of this type (the dynamic agent must be installed on these workstations). The procedure is as follows:

1. Stop the dynamic agent using the *ShutdownLwa* command

2. Copy the plug-in to <*TWA_home*>*/TWS/JAVAEXT/eclipse/plugins* on the agent


« Program Files ▸ IBM ▸ TWA_AGENT ▸ TWS ▸ JavaExt ▸ eclipse ▸ plugins

Search plugins

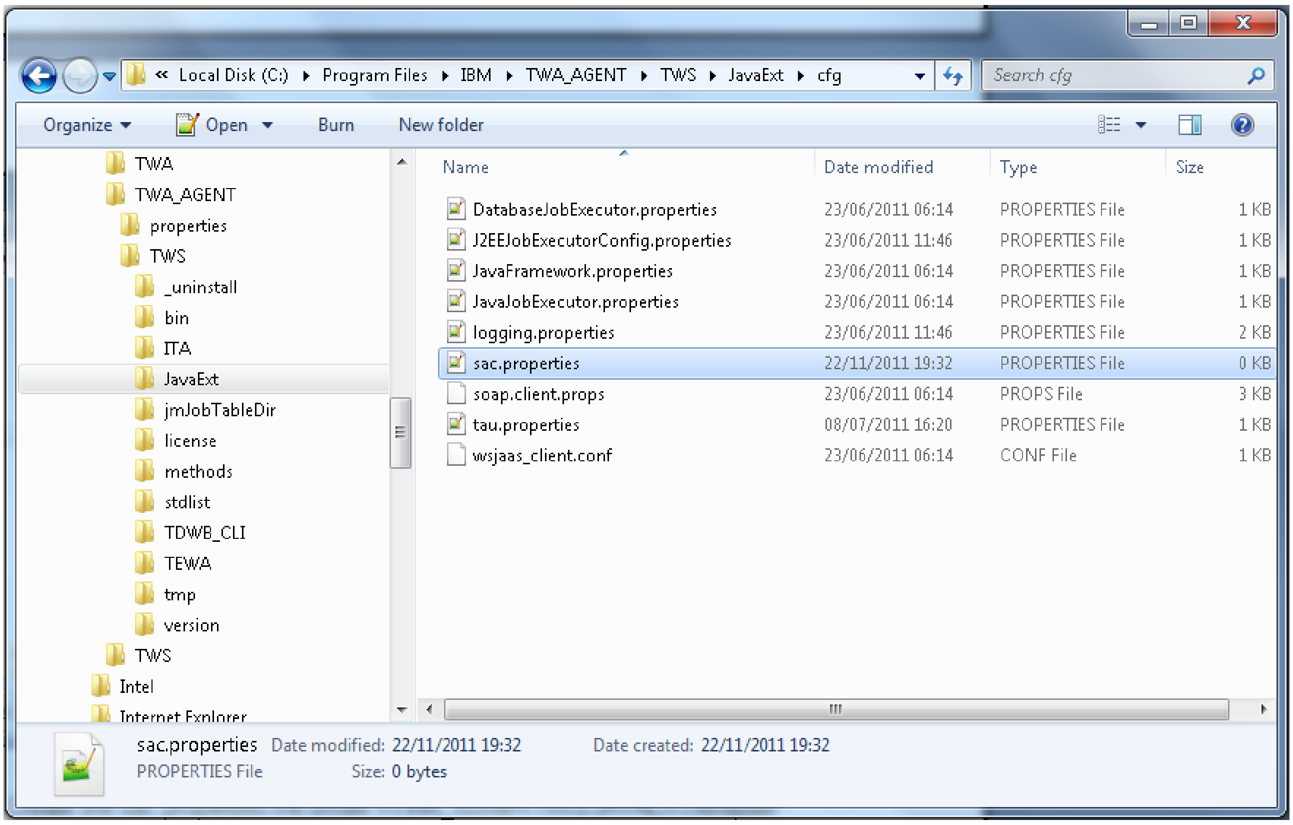
Organize ▾ | Open ▾ | Burn | New folder

TWA
TWA_AGENT
properties
TWS
_uninstall
bin
ITA
JavaExt
jmJobTableDir
license
methods
stdlist
TDWB_CLI
TEWA
tmp
version
TWS
Intel
Internet Explorer

Name	Date modified
xajob_1.1.0.jar	23/06/2011 06:
ws_1.1.0.jar	23/06/2011 06:
twawastools_1.0.0.jar	12/07/2011 09:
tivoliworkloaddeploymentadapter_1.0.0.jar	27/06/2011 20:
tewa_1.0.0.jar	31/08/2011 10:
sac_1.0.0.jar	22/11/2011 19:
rtc_1.0.0.jar	15/07/2011 07:
org.mortbay.jetty_5.1.14.v200806031611.jar	23/06/2011 02:
org.eclipse.update.configurator_3.2.1.v20092006.jar	23/06/2011 02:
org.eclipse.osgi_3.4.3.R34x_v20081215-1030.jar	23/06/2011 02:
org.eclipse.osgi.util_3.1.300.v20080303.jar	23/06/2011 02:
org.eclipse.osgi.services_3.1.200.v20071203.jar	23/06/2011 02:
org.eclipse.equinox.wireadmin_1.0.0.v20080407.jar	23/06/2011 02:
org.eclipse.equinox.util_1.0.0.v20080414.jar	23/06/2011 02:
org.eclipse.equinox.useradmin_1.1.1.R34x_v20090107-1200.jar	23/06/2011 02:
org.eclipse.equinox.transforms.xslt_1.0.0.v20080610.jar	23/06/2011 02:

sac_1.0.0.jar Date modified: 22/11/2011 19:23 Date created: 22/11/2011 19:30
Executable Jar File Size: 21,3 KB

3. Create the sac.properties file under <*TWA_home*>*/TWS/JAVAEXT/cfg*


« Local Disk (C:) ▸ Program Files ▸ IBM ▸ TWA_AGENT ▸ TWS ▸ JavaExt ▸ cfg
Search cfg
Organize
Open
Burn
New folder

TWA
TWA_AGENT
properties
TWS
_uninstall
bin
ITA
JavaExt
jmJobTableDir
license
methods
stdlist
TDWB_CLI
TEWA
tmp
version
TWS
Intel
Internet Explorer

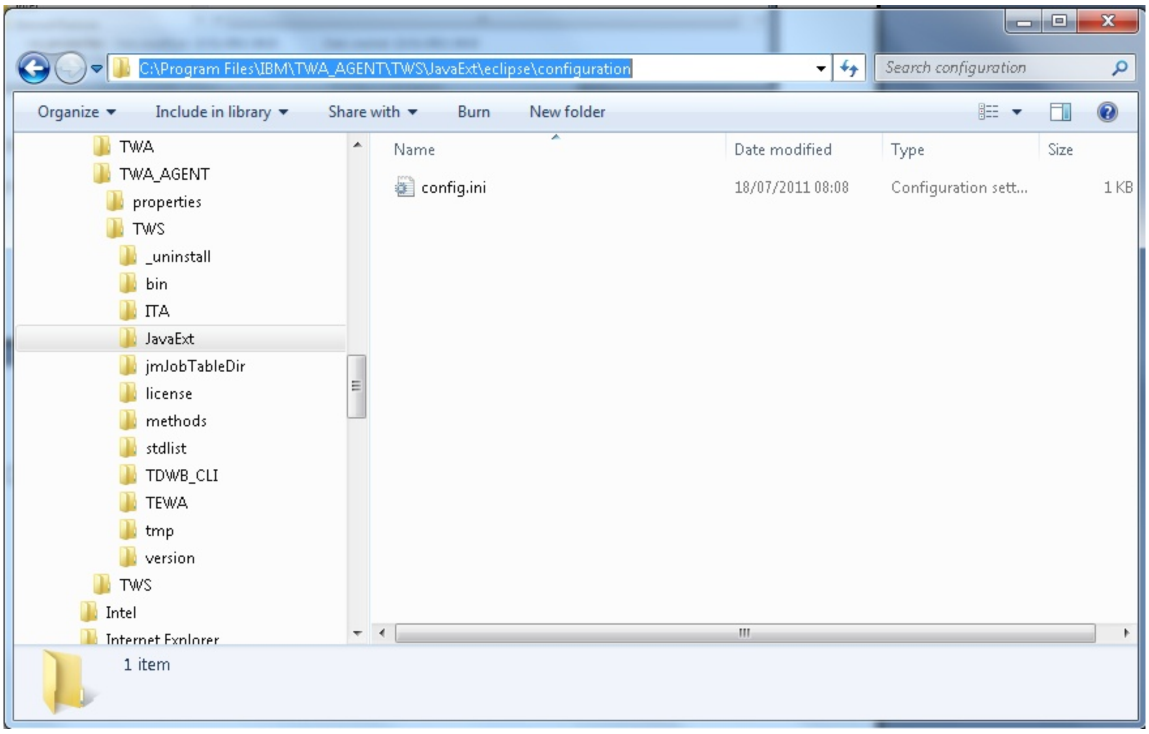
Name	Date modified	Type	Size
DatabaseJobExecutor.properties	23/06/2011 06:14	PROPERTIES File	1 KB
J2EEJobExecutorConfig.properties	23/06/2011 11:46	PROPERTIES File	1 KB
JavaFramework.properties	23/06/2011 06:14	PROPERTIES File	1 KB
JavaJobExecutor.properties	23/06/2011 06:14	PROPERTIES File	1 KB
logging.properties	23/06/2011 11:46	PROPERTIES File	2 KB
sac.properties	22/11/2011 19:32	PROPERTIES File	0 KB
soap.client.props	23/06/2011 06:14	PROPS File	3 KB
tau.properties	08/07/2011 16:20	PROPERTIES File	1 KB
wsjaas_client.conf	23/06/2011 06:14	CONF File	1 KB

sac.properties Date modified: 22/11/2011 19:32 Date created: 22/11/2011 19:32
PROPERTIES File Size: 0 bytes

4. Inside the sac.properties file, put and set the *inputDir* property, for example

   inputDir=c:/myinputdir

5. Configure the plug-in as follows:
   1. Go to: *<TWA_home>/TWS/JAVAEXT/eclipse/configuration*
   2. Open the config.ini file in a text editor


C:\Program Files\IBM\TWA_AGENT\TWS\JavaExt\eclipse\configuration

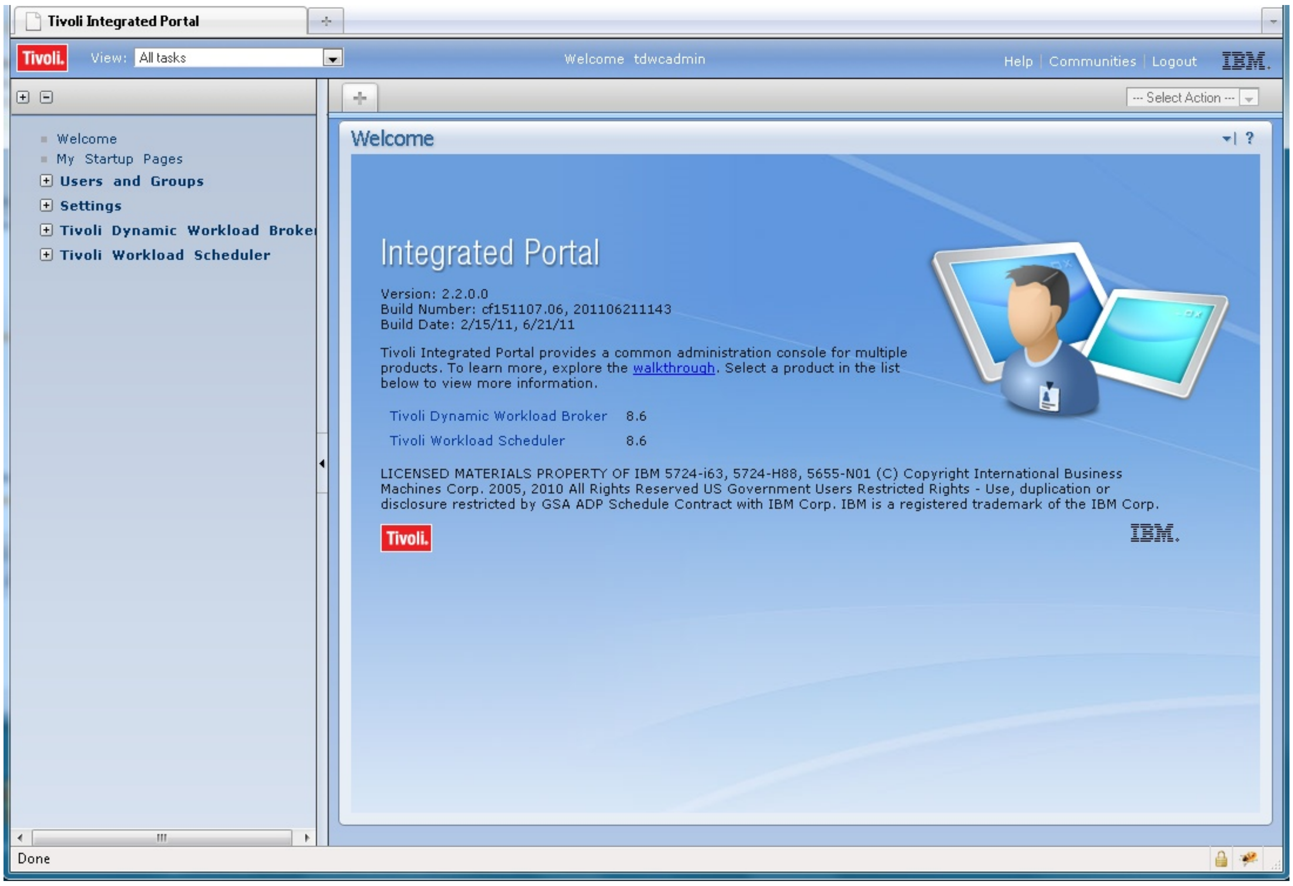
Name	Date modified	Type	Size
config.ini	18/07/2011 08:08	Configuration sett...	1 KB

3. Add the following value to the first line: *sac@4:start*

4. Start the dynamic agent using the *StartupLwa* command

Test the SAC Job-Type plug-in

Open the Dynamic Workload Console



Integrated Portal

Version: 2.2.0.0
Build Number: cf151107.06, 201106211143
Build Date: 2/15/11, 6/21/11

Tivoli Integrated Portal provides a common administration console for multiple products. To learn more, explore the walkthrough. Select a product in the list below to view more information.

Tivoli Dynamic Workload Broker	8.6
Tivoli Workload Scheduler	8.6

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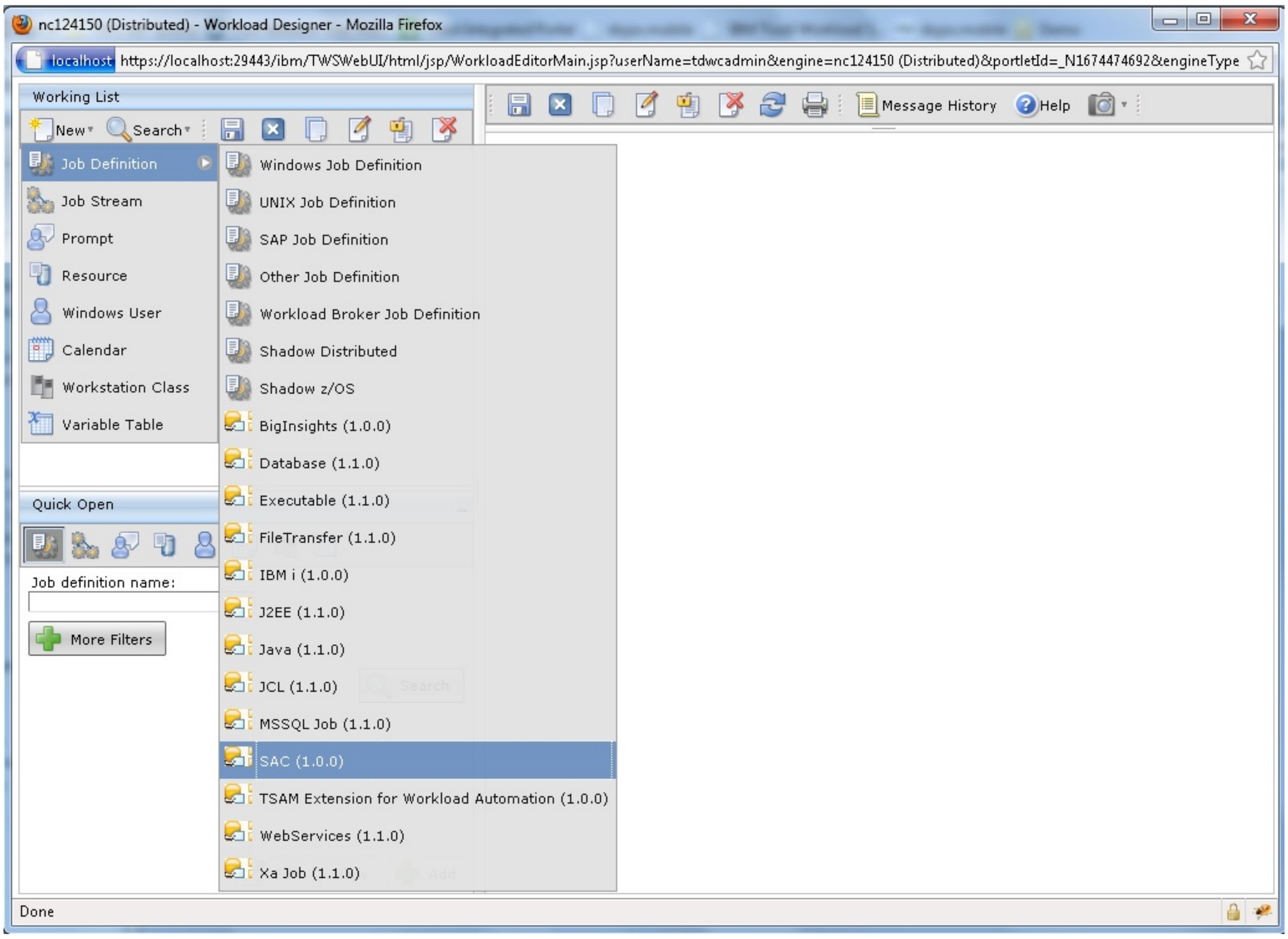
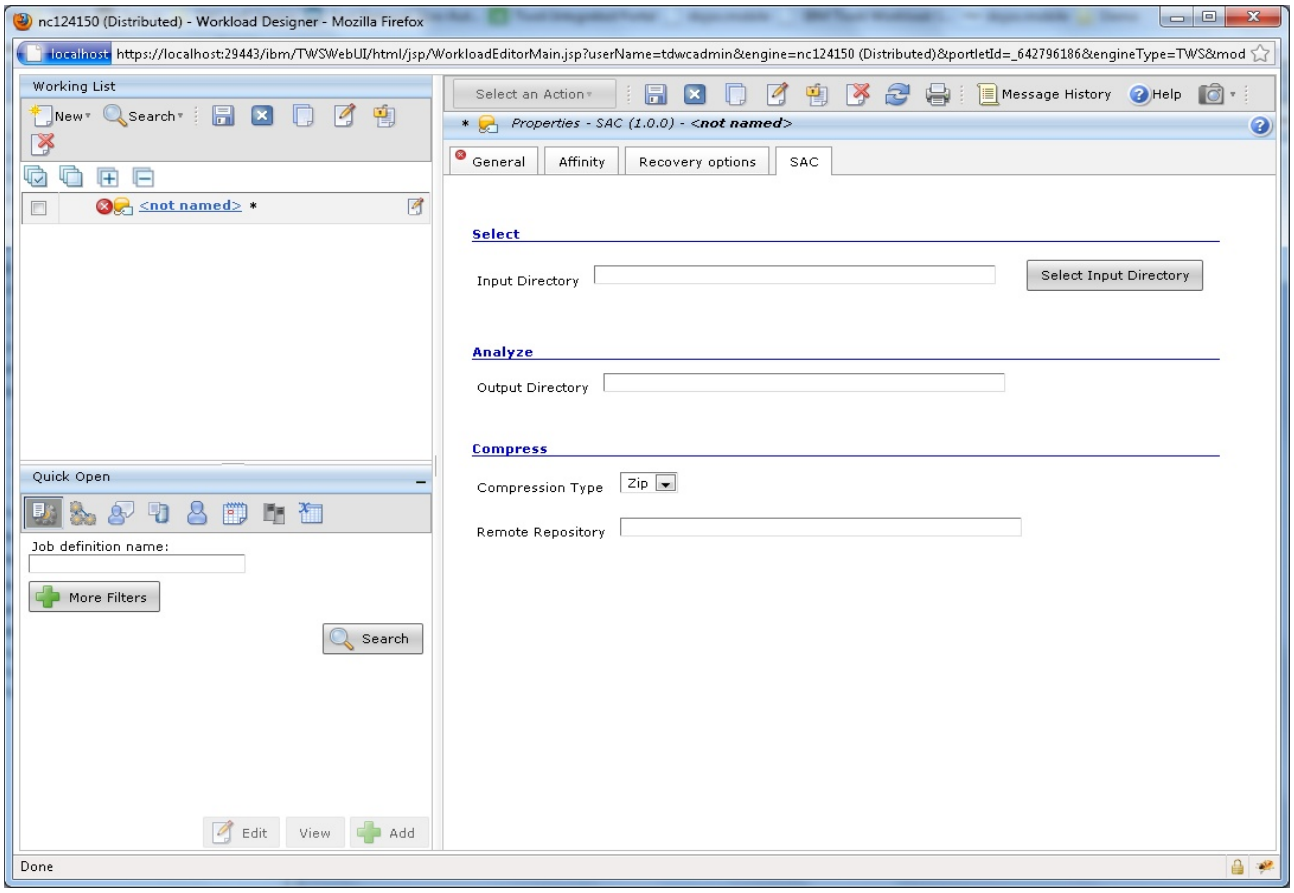
Open the Workload editor. As you can see, a new Job Definition is available:



Select to create a new SAC job


nc124150 (Distributed) - Workload Designer - Mozilla Firefox

https://localhost:29443/ibm/TWSWebUI/html/jsp/WorkloadEditorMain.jsp?userName=tdwcadmin&engine=nc124150 (Distributed)&portletId=_642796186&engineType=TWS&mod

Properties - SAC (1.0.0) - <not named>

General | Affinity | Recovery options | SAC

Select

Input Directory

Select Input Directory

Analyze

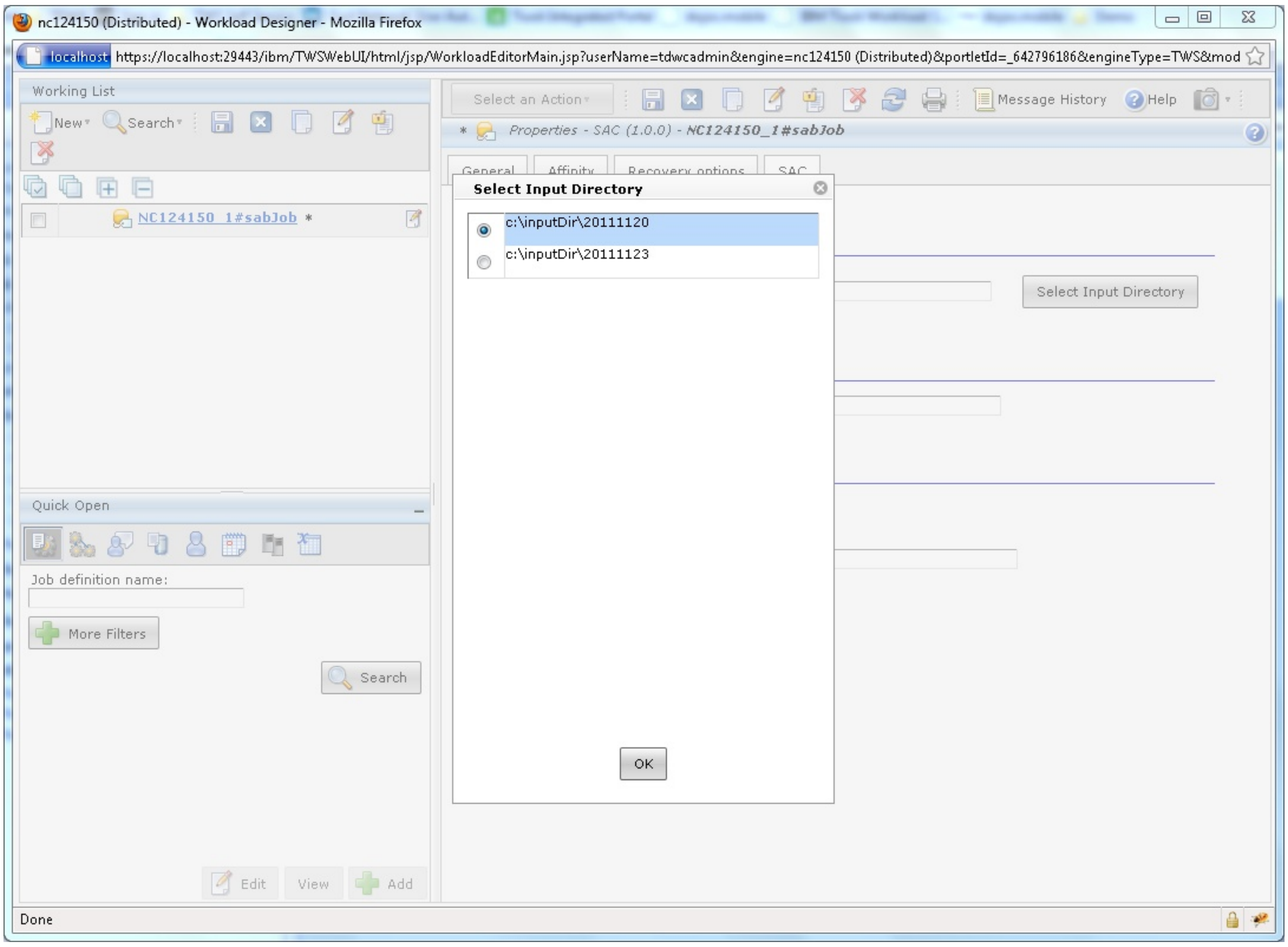
Output Directory

Compress

Compression Type: Zip

Remote Repository

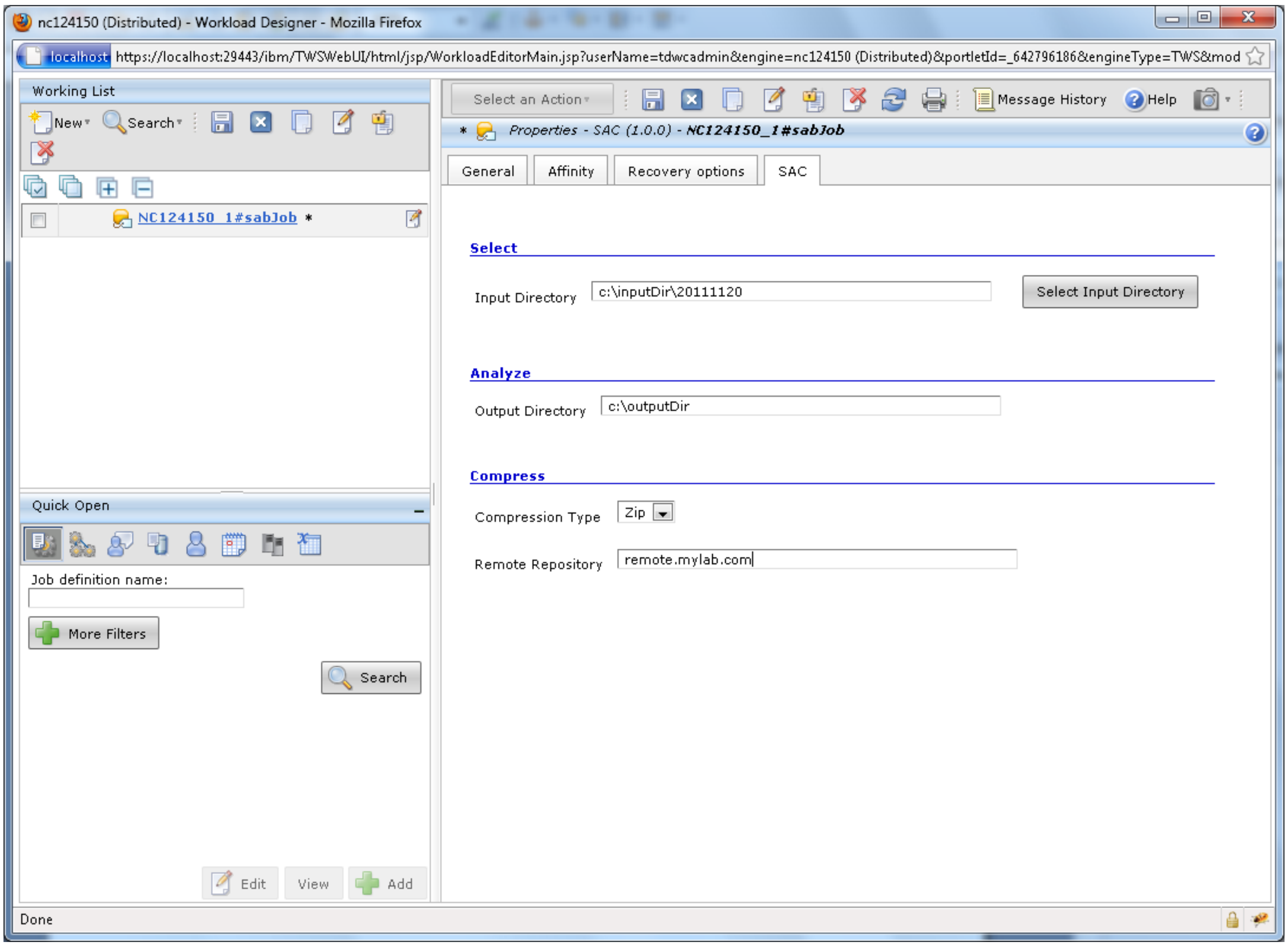
Select the input directory using the Select Input Directory button


nc124150 (Distributed) - Workload Designer - Mozilla Firefox
https://localhost:29443/ibm/TWSWebUI/html/jsp/WorkloadEditorMain.jsp?userName=tdwcadmin&engine=nc124150 (Distributed)&portletId=_642796186&engineType=TWS&mod
Working List
New
Search
NC124150_1#sabJob *
Quick Open
Job definition name:
More Filters
Search
Edit
View
Add
Select an Action
Message History
Help
Properties - SAC (1.0.0) - NC124150_1#sabJob
General
Affinity
Recovery options
SAC
Select Input Directory
Select Input Directory
OK
Done

Select Input Directory

- [✓ c:\inputDir\20111120]
- c:\inputDir\20111123

Fill in all the other parameters


nc124150 (Distributed) - Workload Designer - Mozilla Firefox

https://localhost:29443/ibm/TWSWebUI/html/jsp/WorkloadEditorMain.jsp?userName=tdwcadmin&engine=nc124150 (Distributed)&portletId=_642796186&engineType=TWS&mod

Working List: NC124150_1#sabJob *

* Properties - SAC (1.0.0) - NC124150_1#sabJob

General | Affinity | Recovery options | SAC

Select

Input Directory: c:\inputDir\20111120 [Select Input Directory]

Analyze

Output Directory: c:\outputDir

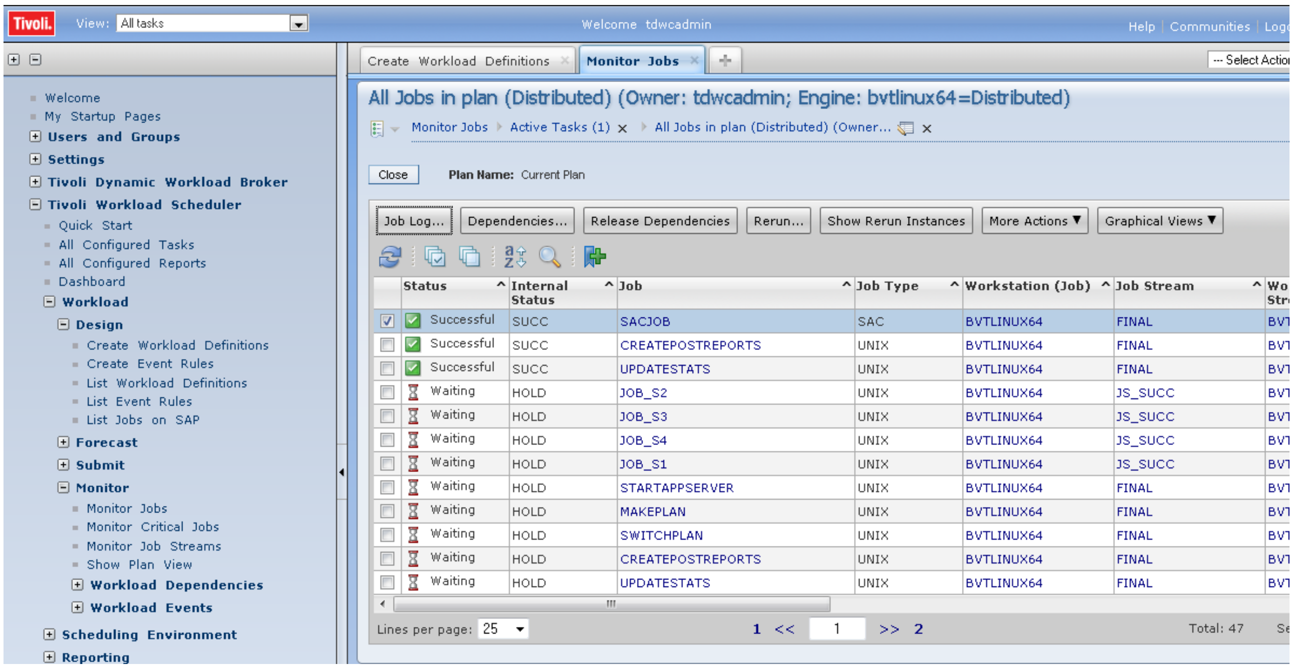
Compress

Compression Type: Zip

Remote Repository: remote.mylab.com

Done

After the submission of the Job, using the Monitor Jobs portlet, we can see the execution details of our SAC Job

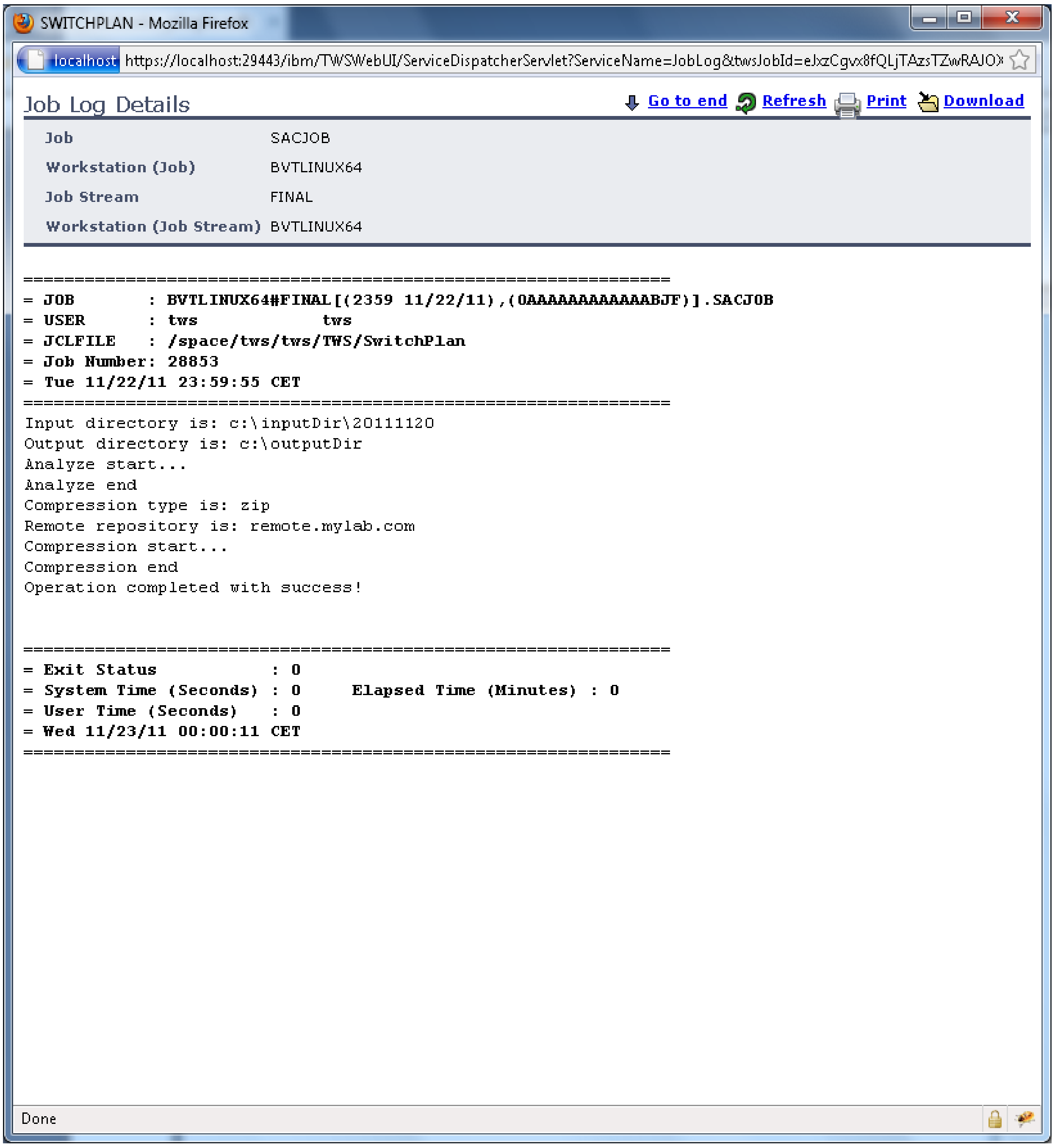

All Jobs in plan (Distributed) (Owner: tdwcadmin; Engine: bvtlinux64=Distributed)

Plan Name: Current Plan

Status	Internal Status	Job	Job Type	Workstation (Job)	Job Stream	Wo Str
Successful	SUCC	SACJOB	SAC	BVTLINUX64	FINAL	BVT
Successful	SUCC	CREATEPOSTREPORTS	UNIX	BVTLINUX64	FINAL	BVT
Successful	SUCC	UPDATESTATS	UNIX	BVTLINUX64	FINAL	BVT
Waiting	HOLD	JOB_S2	UNIX	BVTLINUX64	JS_SUCC	BVT
Waiting	HOLD	JOB_S3	UNIX	BVTLINUX64	JS_SUCC	BVT
Waiting	HOLD	JOB_S4	UNIX	BVTLINUX64	JS_SUCC	BVT
Waiting	HOLD	JOB_S1	UNIX	BVTLINUX64	JS_SUCC	BVT
Waiting	HOLD	STARTAPPSERVER	UNIX	BVTLINUX64	FINAL	BVT
Waiting	HOLD	MAKEPLAN	UNIX	BVTLINUX64	FINAL	BVT
Waiting	HOLD	SWITCHPLAN	UNIX	BVTLINUX64	FINAL	BVT
Waiting	HOLD	CREATEPOSTREPORTS	UNIX	BVTLINUX64	FINAL	BVT
Waiting	HOLD	UPDATESTATS	UNIX	BVTLINUX64	FINAL	BVT

Lines per page: 25 | 1 << 1 >> 2 | Total: 47

And finally we can see the JobLog associated with our execution



SWITCHPLAN - Mozilla Firefox

localhost https://localhost:29443/ibm/TWSWebUI/ServiceDispatcherServlet?ServiceName=JobLog&twsJobId=eJxzCgvx8fQLjTAzsTZwRAJOX

Job Log Details

Job	SACJOB
Workstation (Job)	BVTLINUX64
Job Stream	FINAL
Workstation (Job Stream)	BVTLINUX64

```
===============================================================
= JOB       : BVTLINUX64#FINAL[(2359 11/22/11),(0AAAAAAAAAAAAABJF)].SACJOB
= USER      : tws              tws
= JCLFILE   : /space/tws/tws/TWS/SwitchPlan
= Job Number: 28853
= Tue 11/22/11 23:59:55 CET
===============================================================
Input directory is: c:\inputDir\20111120
Output directory is: c:\outputDir
Analyze start...
Analyze end
Compression type is: zip
Remote repository is: remote.mylab.com
Compression start...
Compression end
Operation completed with success!


===============================================================
= Exit Status           : 0
= System Time (Seconds) : 0     Elapsed Time (Minutes) : 0
= User Time (Seconds)   : 0
= Wed 11/23/11 00:00:11 CET
===============================================================
```

Done

Conclusion

In conclusion, we have discusses how to customize our automation environment by creating a custom Job with very few lines of code. This custom job can perform three different types of operations: select a file, execute Java code and then use a command line. This is possible through the integration of Java and IBM Tivoli Workload Scheduler Integration Workbench. This, combined with the multiple capacities of scheduling of Tivoli Workload Scheduler, allows end users to extend, integrate and maximize their automation environments. Available tasks for automations include not only advanced software suites but also user's daily tasks.

For more information you can see also:

Tivoli Workload Scheduler
http://www-01.ibm.com/software/tivoli/products/scheduler/

IBM Tivoli Workload Automation V8.6 Information Center
http://publib.boulder.ibm.com/infocenter/tivihelp/v47r1/topic/com.ibm.tivoli.itws.doc_8.6/welcome_TWA.html

IBM Tivoli Workload Automation V8.6 Information Center – Developer's Guide
http://publib.boulder.ibm.com/infocenter/tivihelp/v47r1/topic/com.ibm.tivoli.itws.doc_8.6/awsdgmst.html