ptc global services

Windchill 11.0 - Client Customization

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Course Description

Course Code	GS-01190_01
Course Length	

In this course, you will learn the preferred customization tools and methodology for customizing Windchill 11.0.

Course Objectives

- Identify, describe, and use Windchill client architectural components.
- Understand file structure and key files used in the Windchill client architecture.
- Configure and customize the Windchill client UI.

Module 1

Windchill 11.0 Overview

Module Overview

In this module, we focus on what has changed in the product since the previous version, and what was used to build the product. This includes UI changes and the architecture changes.

Objectives

After completing this module, you will be able to:

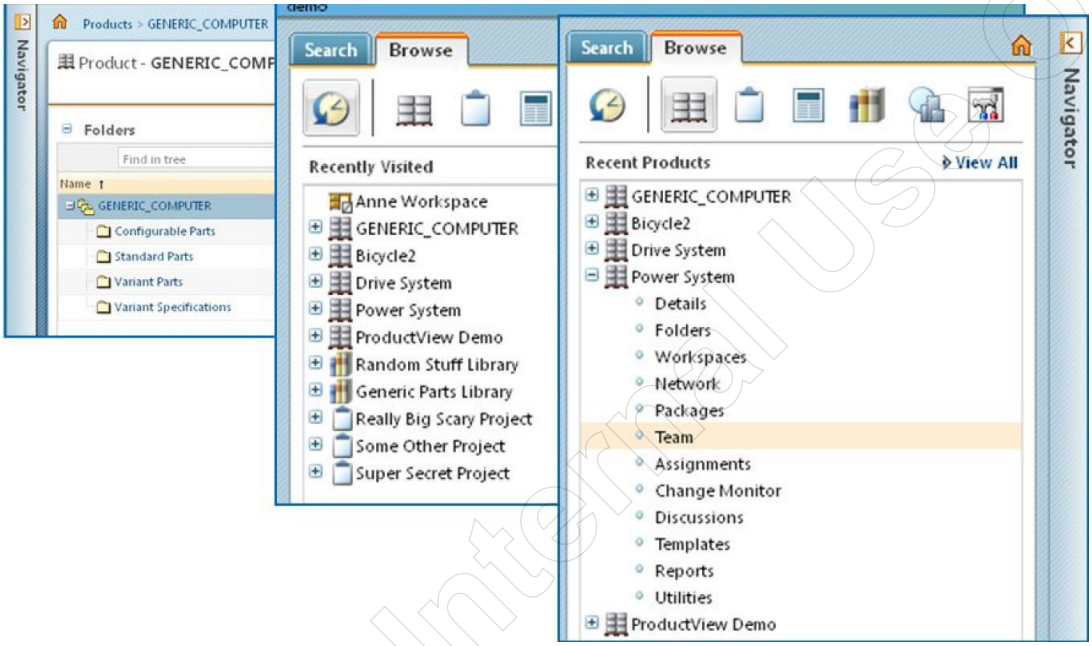
- Describe the Windchill 11.0 – Client Architecture.

Navigation

The Navigator

Highlights

- There when you need it; gone when you don't
- Recently visited contexts and workspaces tab
- Reduces clicks for navigating to recently accessed contexts
- Reduces clicks and load time for getting to second-level pages
- Integrates search into navigation

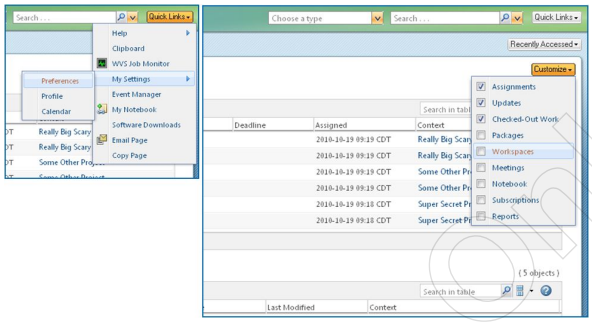


Using the Navigator

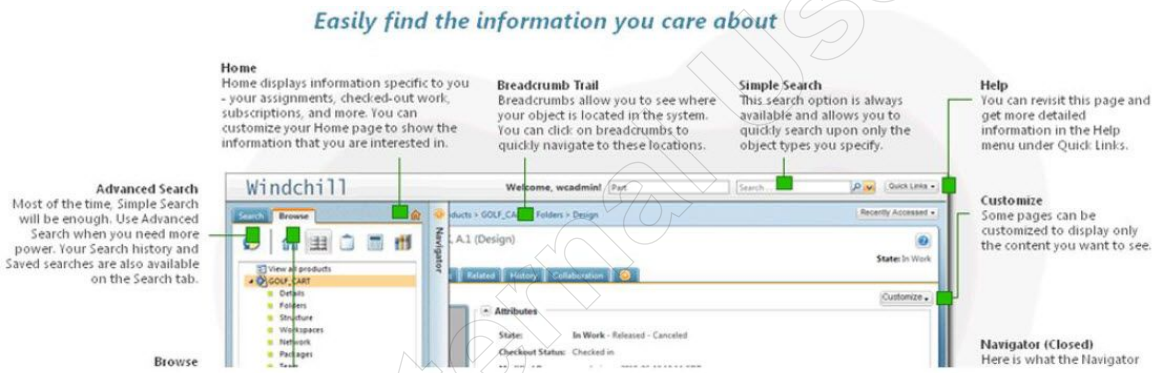
Home Page

Configurable Home Page

- Getting started page
- User chooses tables to be on home page
- Reorder tables
- Header area cleanup
- Quick links



Modifying the Home Page



Navigation

Easier to Use

The UI is easier to use because of direct access to information :

- Immediate access to help
- Ability to customize as needed

Search Page

Search Types

Search

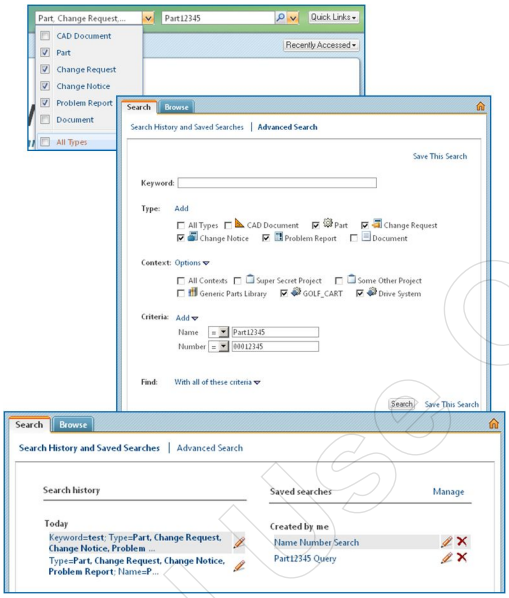
- Search of the entire system
- Search for “all types” or specific types
- Visible on all pages
- Menu with recent searches

Advanced Search

- Redesigned for enhanced usability
- Integrated into navigator
- Search results maintained for later reference

Search History and Saved Searches

- Easy access to recent and saved searches
- Edit recent searches



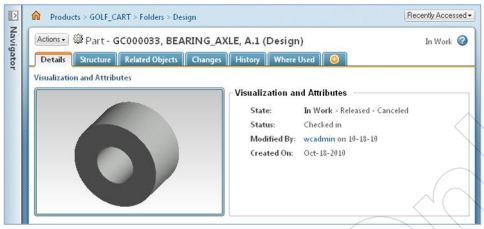
Searches

Information Page

Information Pages are Easily Configurable

Tabbed Display

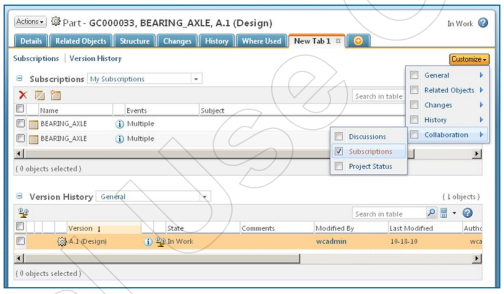
- OOTB default tabs per object type
- Administrator configurable tabs
- User configurable tabs
- Command line tool for transferring tab configs from test to production



Tabbed Display

User Configuration

- Reorder tabs
- Add tabs, rename tabs, delete tabs
- Add widgets to tabs
- Reorder widgets on tabs



Tabbed Display

Easy to Configure Tabs

Administrator can:

- Import Tabs.
- Configure tabs for Everyone in a context.

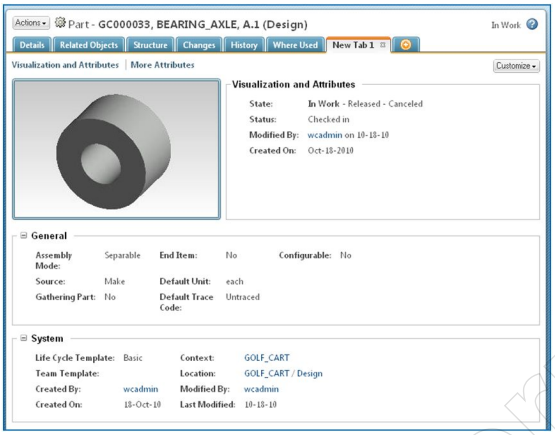
Users will:

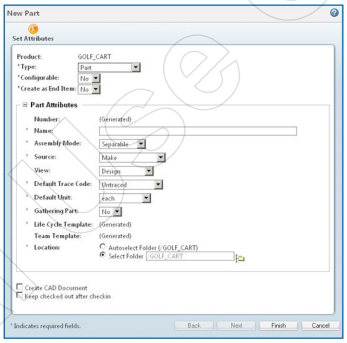
- Inherit the tabs configured by the administrator.
- Configure additional tabs viewable only by them.

Attribute Layouts

Attribute Layouts

- Created by administrator in **Type and Attribute Management**
- Hide/Show attributes per screen type (info page, edit wizard, create wizard)
- Specify order (mix modeled and soft attributes), columns, and groupings of attributes
- Define attributes as “view only” or “editable”





Customization Is No Longer Needed

Order and placement of attributes is defined in the **Type and Attribute Management**.

Tables and Trees

Tables Perform Better

Asynchronous data loading

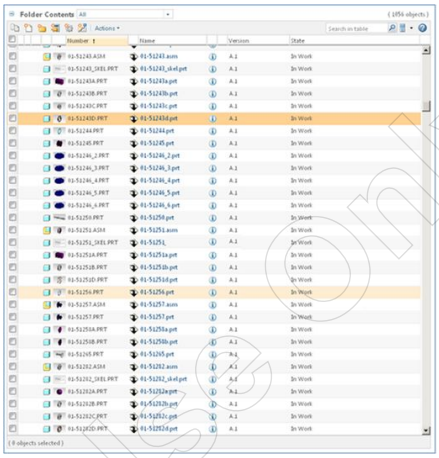
- Shell of table rendered first
- Data streams to client in chunks
- User has nearly immediate control
- Trees – load visible nodes only

Buffered view

- Scrolling instead of paging
- Holds all data up to the size limit
- Next/Previous when > size limit

Client-side data manipulation

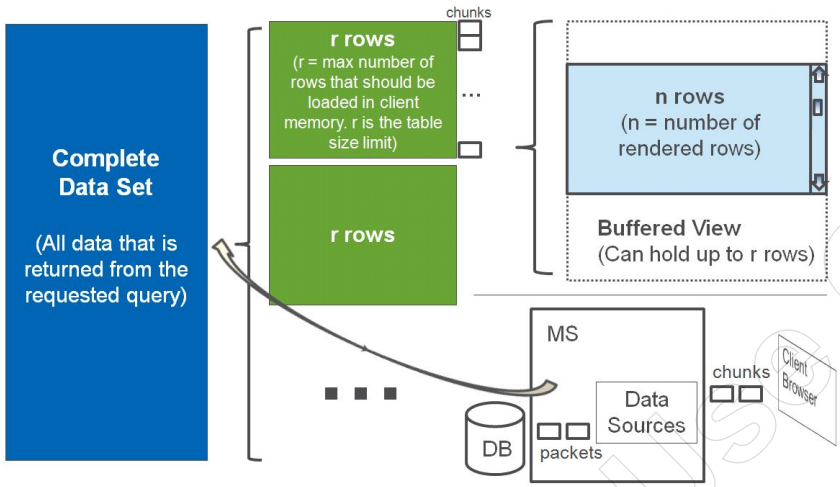
- Sorting
- Column locking
- Search in table
- Future – grouping and filtering



Tables

Data Sources and Incomplete Data Sets

Results Loaded When Needed



Data Loading

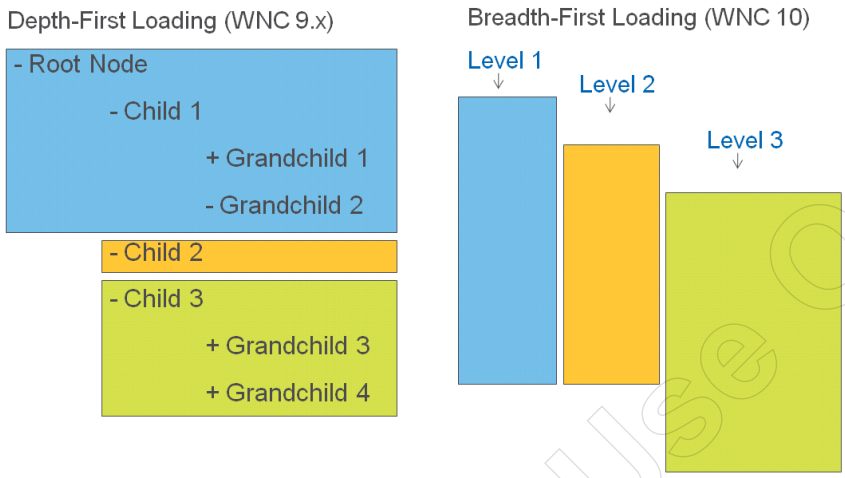
How Many Rows Should The Page Load?

Pages load only the visible number of rows.

- UI keeps track of scrolling and reloads the view as needed based on cached information.
- A cached set of information is available on the page, but the view is not rendered until the objects come into focus.
- When the cached set of data is invalidated, it needs to be refreshed from the Method Server (over the WAN).

Data Sources

Load Visible Tree Nodes Only



Comparison between Windchill 9.1 and 10

Visibility Governs the Loading of Data

The root nodes (Level 1) are more important than the sub-nodes.

- These are loaded first.
- Remaining levels are called in as needed.

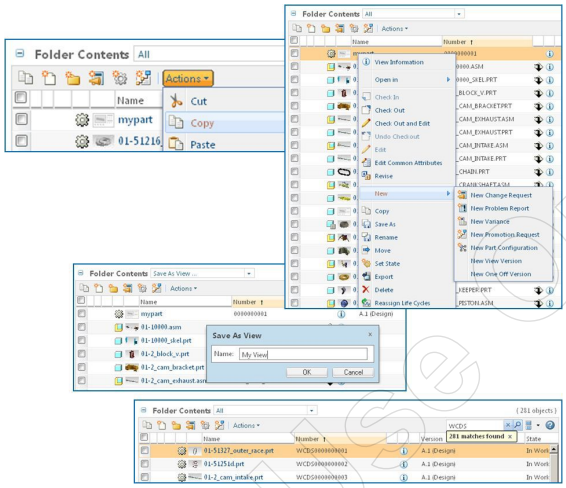
This remains same in Windchill 11.0 also.

More Tables and Trees

More Tables and Trees

Table and Tree functionality

- User Configuration
- Ad hoc Table Views
- Actions Menus
- Search in Table
- Find in Tree
- Export List to File



Folder Contents

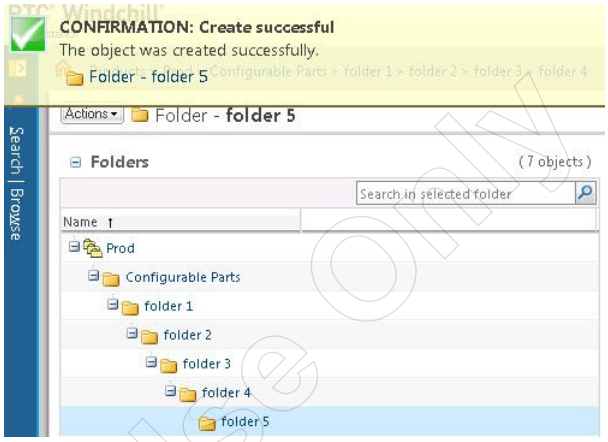
Tables Are More Functional

- User Configuration
  - Hide/Unhide columns
  - Reorder columns
  - Resize columns
  - Table height expansion
- Ad hoc Table Views
  - Save view without going to View Manager
- Action Menus
  - Right-click actions menus
  - Single and multi-select menus
  - Shortcut toolbar actions
- Search in Table/Find in Tree
  - Act on entire data set
- Export List to File
  - Export table data to CSV, HTML, TXT, XLS, XLSX, XLS Report, and XML
  - Common action but not yet available on all tables/trees

And More

And More

- New Look and Feel
  - Combined CSS
  - New Icons
- Minimize Full Page Refreshes
- Scrollbar Annihilation
- Header Area Cleanup and “Quick Links”
- Breadcrumbs
- Combining Wizard Steps
- Inline Success Messaging



Inline Success Messaging

Header Area

Quicker Better UI Experience

Page is delivered before the entire page is loaded

- AJAX is leveraged to focus on displaying the shell before the content.
- When content is required, it is loaded/reloaded without reloading the shell.

This same mechanism is used to load to provide confirmation messages.

Common Client Architecture

How many client architectures are there now?

JCA stands alone … with some exceptions.

- Resurfaced template processor (CADx)
- Ext-GWT (Product Structure Component)
- Some legacy ProjectLink UIs still use NetMarkets

No longer supported

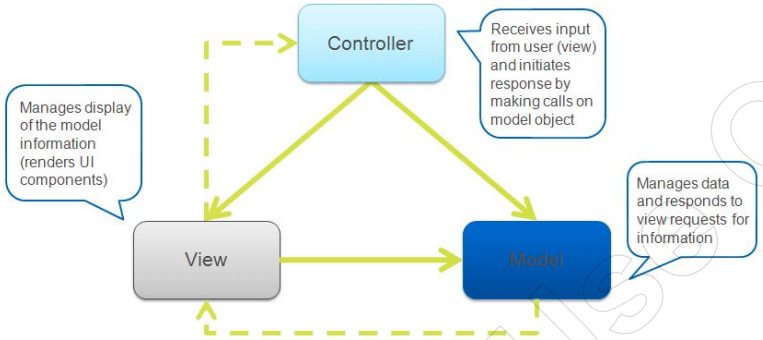
- DCA
- NetMarkets
- Template processor

Amusing Client Technologies

Upgrades to JCA

Transforming JCA from a Model 1 to a Model 2 Architecture

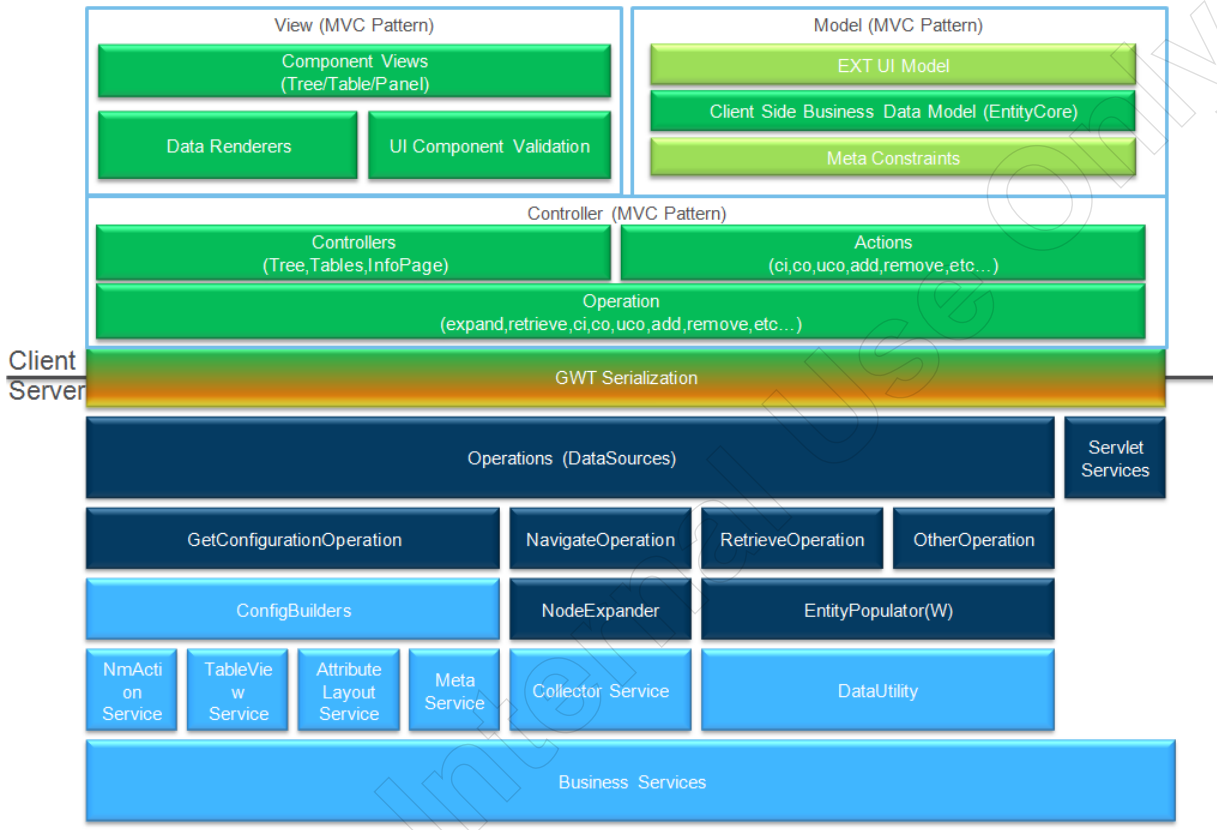
- Model 2 is an implementation of the Model View Controller (MVC) pattern.
- Separates business logic from display (view) logic.
- Model can be built and tested independent of visual presentation.



Model 2 Architecture

GWT Architecture

GWT Architecture – Client and Server



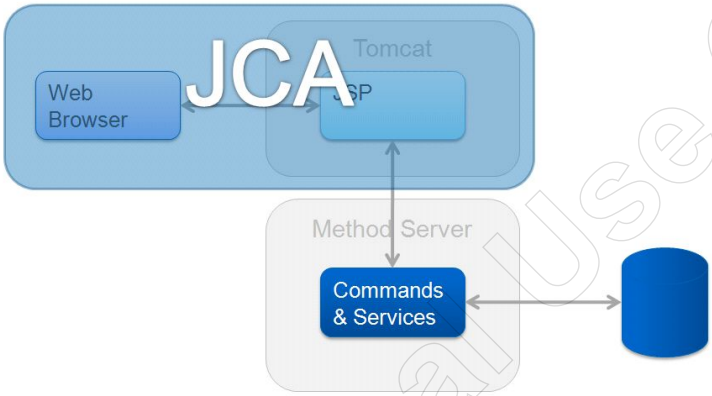
GWT Architecture

Windchill 9.1 JCA Model

Windchill Before: Model 1

JSP handles all responsibilities for the request:

- Processing the request
- Validating data
- Handling the business logic
- Generating a response



Model 1

Windchill Before: Model 1

Model 1

- A simple pattern whereby the code responsible for the display of content is intermixed with logic.
- Only recommended for small applications and is mostly obsolete in modern development practices.

Model 2

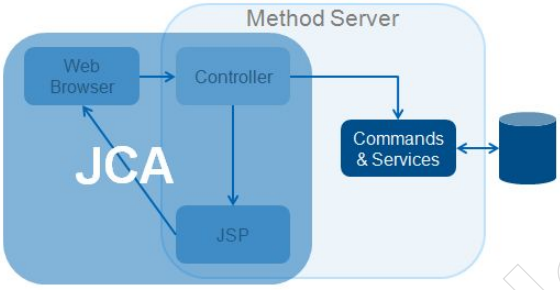
- Recommended for medium- and large-sized applications.
- More complex in that it separates the display of content from the logic used to obtain and manipulate the content.

Windchill 10.2 JCA Model

Windchill Now: Model 2

JCA incorporates all three components and keeps them distinct:

- Move business logic out of JSPs and into controller classes
- Servlet engine (Tomcat) integrated into Method Server



Model 2

Why Model 2?

Model 2 is a more complex design pattern that separates the display of content from the logic used to obtain and manipulate the content:

- Easier to maintain and extend – views do not refer to each other and there is no presentation logic in the views.
- Enables you to clearly define the roles and responsibilities in large projects – enabling better coordination among team members.

This remains same in Windchill 11.0 also.

JCA Component

New JCA Components Use MVC

Basic Steps to Produce a JCA Component

1. Describe the component
2. Acquire the necessary data
3. Render the component

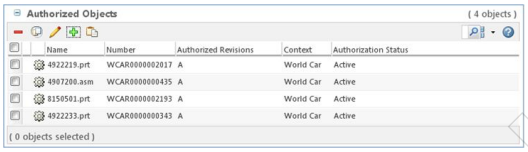


Table Example

- X12 JSP – *newAgreeAuthObjectsStep.jsp*
  - <jca:describeTable>
  - <jca:getModel>
  - <jca: renderTable>
- X20 JSP
  - <jsp:include page="${mvc:getComponentURL('security.newAgreeAuthObject')}" flush="true"/>
- X20 Builder – *NewAgreeAuthObjectsStep.java*
  - Configure the component
  - Build the component data

Industry Standard Frameworks

Including Some Industry Standard Frameworks

Spring MVC (XML configuration Files)

- Provides a framework for wiring controllers, models, and views together
- Component definition moves from the JSP to a Java builder

Ext-JS (coded using JavaScript)

- A JavaScript framework with a library of components and layouts
- Built on an Ext “theme” for a new look and feel
- Ext-JS is wrapped in JCA and thus, fairly transparent

Ext-GWT (coded using Java Swing and then translated to JavaScript using a Toolkit)

- Combines the Google Web Toolkit with the Ext-JS library of components
- Uses Java as a way to generate JavaScript
- Used by the product structure browser

Licensing

ExtJS and ExtGWT are licensed

- ExtJS does not require a tool, but does require the use of a library.
  - The use of this library is implicit in any Windchill Implementation
- ExtGWT requires a tool to convert Java Swing to JavaScript.
- Implementors are not expected to use this unless they acquire a license.

JCA Evolution

JCA, JCA+, JCA++

JCA or JSP Client Architecture

- Developed for 9.0
- Adopted from the NetMarkets infrastructure used by PJL clients and originally introduced in 6.0.

JSCA or JavaScript Client Architecture

- Enhanced for 9.1
- Rendering done in JavaScript using the jsTables framework

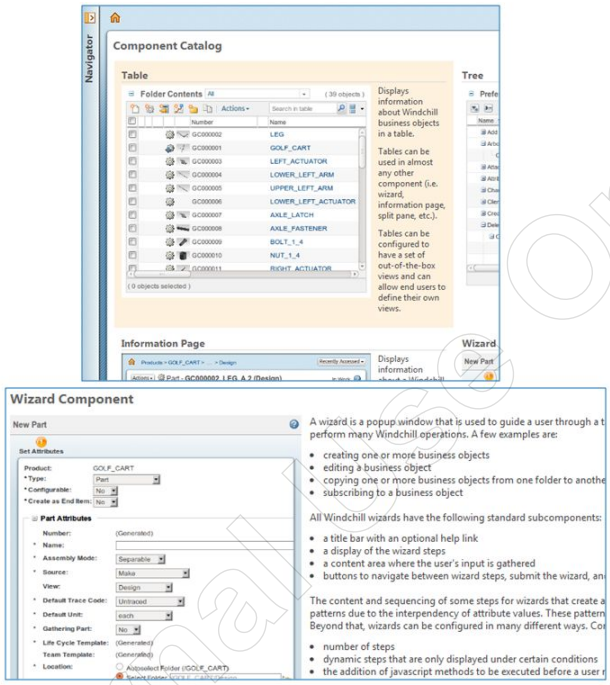
JCA or Just a Client Architecture

- Enhanced for 10.0 and continued till 11.0.
- Still uses JavaScript rendering
- Uses the Ext framework instead of the jsTables framework for rendering
- Introduces MVC

Expanded Resources For Customizers

Guide and Catalog

- Customization Guide
- Component Catalog
  - Windchill Customization Examples – /Windchill/srclib/wnc/Carambola.jar
  - Set "Client Customization" preference to yes
  - Tools and documentation for working with actions, attributes, and MVC builders



Component Catalog and Wizard Component

Module 2

Navigation

Module Overview

In this module, we revisit Navigation to see what has changed from Version 9.1, Windchill 10.0 and Windchill 10.2.

Objectives

After completing this module, you will be able to:

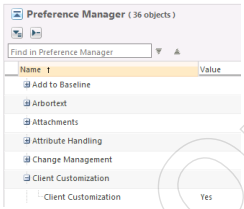
- Identify differences between 9.1 and 11.0 with respect to Navigation.
- Create a custom Tab and sub-tab.

Customization Tab

Online Tools and Examples

Windchill 11.0 offer several tools and examples for customization. These functions are organized in the **Customization** tab.

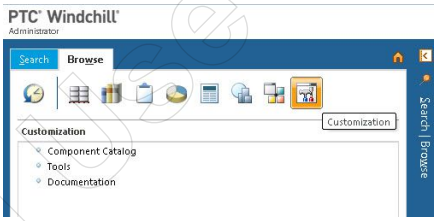
- In **Preference Manager**, set value of "Client Customization" preference to yes.
- Refresh the page and open the **Navigator**, there will be a new tab **Customization**.



Preference

Customization Tab collects tools and samples

- **ComponentCatelog** for displaying examples of Windchill UI.
- **Tools** for working with actions, attributes, and MVC builders.
- **Documentation** for reference documents links.



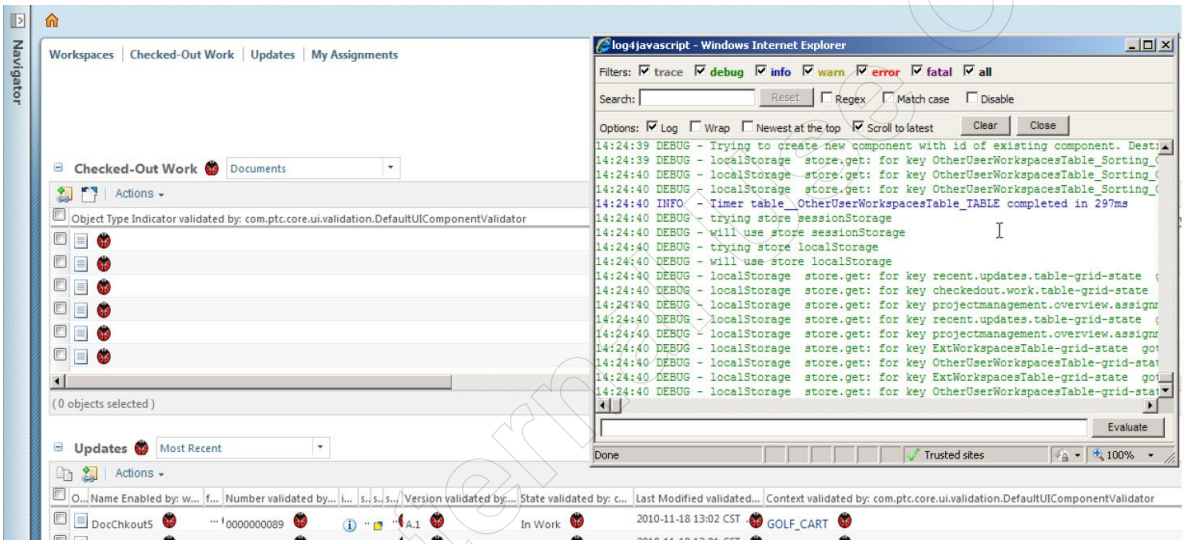
Customization Tab

Windchill 11.0 Debugging

Debugging Tools

JCA Debug

- Add “jcaDebug=1” to the end of the URL string to view Action and Action Model information
  - Depending on where you put this in the URL will determine which components of the UI use the debug settings.
  - Immediately after “/app” will give the most extensive output.
- Add “jsLog=1” to log JavaScript
- Add “jsDebug=1” to display debug messages in the JavaScript log.



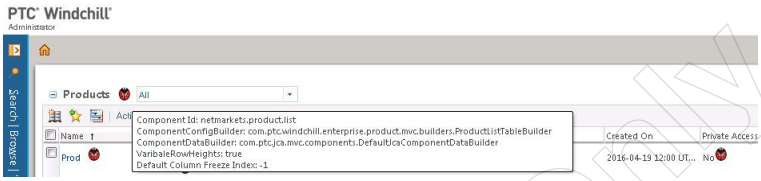
Using Internet Explorer

Finding the Code

Alternatives for Decomposing a Customization

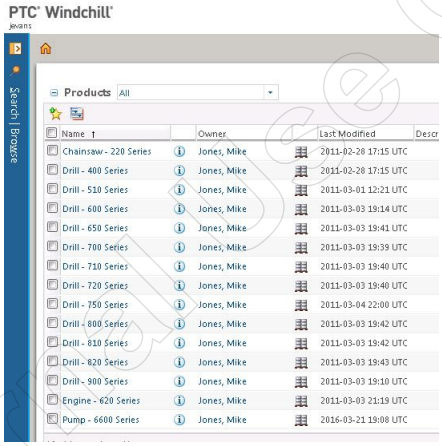
From a given URL, what code generates the page?

- Turn on jcaDebug
  - Tooltip shows the builder on components



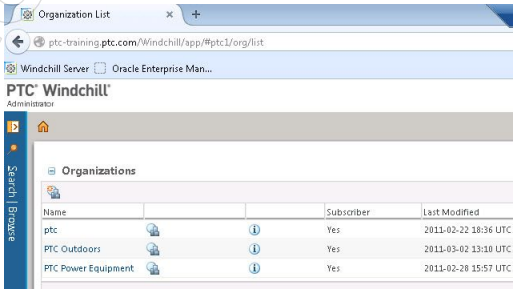
http://.../Windchill/app/?jcaDebug=true/# ptc1/...

- Look for ptc1/comp in the URL
  - Serves a builder directly where the component ID is right in the URL.
  - ptc1/comp/netmarkets.product.list shows the netmarkets.product.list table.
  - OpenGrok for “builder netmarkets.product.list,” and there’s your builder Java class.



netmarket.product.list

- Look for the path in the URL
  - For ptc1/org/list, look for codebase/org/list.jsp
  - Grok for “path:org/list”



org/list

Windchill 11.0 References

Resources

JCA

- Client Infrastructure Wiki Page: http://rdwiki.ptcnet.ptc.com/wiki/index.php?title=Client_Infrastructure_Info
- Client Architecture Forum: https://share.ptc.com/sites/rd/wpg/csi/SitePages/Home.aspx

Windchill JavaDoc

- http://rdwiki.ptcnet.ptc.com/mediawiki/index.php?title=Windchill_Javadoc

Above links are for PTC employee use only, partners likely will not be able to access it.

Architecture and Third-Party Frameworks

- MVC Pattern: http://java.sun.com/blueprints/patterns/MVC-detailed.html
- Model 1 Versus Model 2 Architectures: http://java.sun.com/developer/technicalArticles/javaserverpages/servlets_jsp/
- Spring MVC Explained: http://jnb.ociweb.com/jnb/jnbOct2004.html
- Ext-JS Overview: http://extjs.com/products/extjs/
- Googe Web Toolkit (GWT): http://code.google.com/webtoolkit/overview.html
- Ext-GWT: http://extjs.com/products/gxt/

Resource Bundle Overview

Resource Bundle Overview

- Background
  - Previously represented as rbInfo files
  - Now represented as annotated Java files (rbInfo format still supported)

```
package wt.part;

import wt.util.resource.*;

@RBUUID("wt.part.partResource")
public final class partResource extends WTListResourceBundle {
   /**
    * Messages for HTML Template Processing ------------------
    *
    **/
   @RBEntry("Invalid CGI parameters. Parameter \"{0}\" not four
   public static final String INVALID_PARAMETERS = "12";

   @RBEntry(" {0}{1} {2} {3} of {4}")
   @RBComment("For example, \"100: 16 each of Bolt - 1234\" or
   @RBArgComment0("is a line number")
   @RBArgComment1("is a separator")
   @RBArgComment2("is a quantity")
   @RBArgComment3("is a unit")
   @RBArgComment4("is and identity")
   public static final String PART_USAGE = "13";
```

Example from OpenGrok

- The parent class WTListResourceBundle relies on an OOTB Java resource API called ListResourceBundle, but adds the annotation intelligence needed to parse entries.

wt.util.resource

Class WTListResourceBundle

java.lang.Object
  └ java.util.ResourceBundle
    └ java.util.ListResourceBundle
      └ wt.util.resource.WTListResourceBundle

Javadoc for WTListResourceBundle

Annotations

In the past, RBInfo files were used to create Java resource bundles. But now, Annotations simplify the creation of resource bundles in Java.

- Annotations are used to specify both the strings used to reference the resource class and the resource entries contained in the resource class.
- The values of the @RBEntry annotations are the values of the resources.

Reference Resource Bundle

Using Resources with Actions

- Resources can be referenced in the action configuration files:
- These actions will get their localized text from the Java class resource converted in the previous slides from a legacy RBInfo file.

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>

    <action name="multiComponent">
        <component name="com.ptc.serviceAcademy.builders.MultiComponentBuilder" windowType="page"/>
    </action>

    <action name="treeExample">
        <component name="com.ptc.serviceAcademy.builders.TreeBuilder" windowType="page"/>
    </action>
</objecttype>
```

Refer the Resource Bundle in the Actions

Action Models and Actions

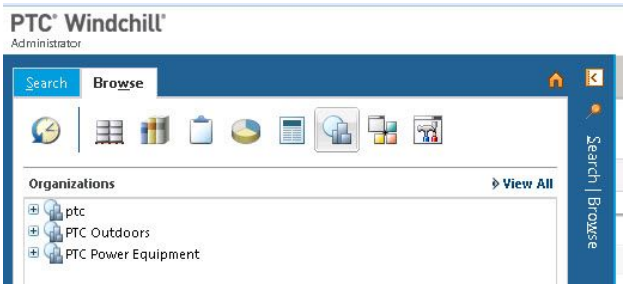
Tabs Are Similar to Windchill 9.1 and Windchill 10.2

Action Models assemble Actions.

- Below is the Main Navigation

```
<model name="main navigation"
id="browseActions"
 resourceBundle="com.ptc.core.ui.navigationRB">
    <description>
        Main navigation (tabs)
    </description>
    <action name="recentContexts" type="navigation"/>
    <action name="program" type="navigation"/>
    <action name="product" type="navigation"/>
    <action name="project" type="navigation"/>
    <action name="change" type="navigation"/>
    <action name="library" type="navigation"/>
    <action name="org" type="navigation"/>
    <action name="site" type="navigation"/>
    <action name="supplier" type="navigation"/>
    <action name="search" type="navigation"/>
    <!-- entry for customization tab -->
    <action name="customization" type="navigation"/>
</model>
```

Main Navigation



Actions define the type of command that runs.

```
<?xml version="1.0"?>
<!DOCTYPE listofactions SYSTEM 'actions.dtd'>
<listofactions>
    <objecttype name="navigation" class="" resourceBundle="com.ptc.core.ui.navigationRB">
        <action name="recentContexts"/>

        <action name="program">

        <action name="product">

        <action name="project">

        <action name="library">

        <action name="change">

        <action name="site">

        <action name="org">

        <action name="supplier">

        <action name="product.list">

        <action name="project.list">

        <action name="program.list">

        <action name="library.list">

        <action name="org.list">
            <command class="netmarkets" url="org/list" windowType="page"/>
        </action>

        <action name="search"/>

    </objecttype>
```

Actions

Similar to Windchill 9.1 and Windchill 10.2

This customization pattern is similar to what we saw in Windchill 9.1 and Windchill 10.2.

- custom-actionmodel.xml controls the assembly of actions.
- custom-actions.xml defines custom actions.
- Anything in these files overrides OOTB behavior.

Inserting a Tab

Steps for Creating a Tab

To create a tab:

1. Define/Reuse the Actions.
2. Create the sub-tab model.
3. Update Resources Bundles with icons and Text.
4. Reference the sub-tab the main tab.

```
<model name="serviceAcademy navigation"
       resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
    <action name="tableExample" type="object"/>
    <action name="multiComponent" type="object"/>
    <action name="treeExample" type="object"/>
</model>
```

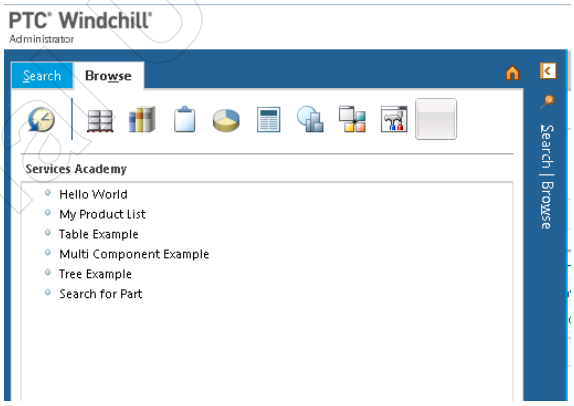
Sub-tab model

```
package com.ptc.serviceAcademy.resource;

import wt.util.resource.RBEntry;

@RBUUID("com.ptc.serviceAcademy.resource.NavigationRB")
public final class NavigationRB extends WTListResourceBundle{

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_DESCRIPTION = "navigation.serviceAcademy.description";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TITLE = "navigation.serviceAcademy.title";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TOOLTIP = "navigation.serviceAcademy.tooltip";

    @RBEntry("serviceAcademy.gif")
    public static final String NAVIGATION_SERVICEACADEMY_ICON = "navigation.serviceAcademy.icon";
```

Resource Bundle

```
<model name="main navigation" id="browseActions"
       resourceBundle="com.ptc.core.ui.navigationRB">
    <description>
        Main navigation (tabs)
    </description>
    <action name="recentContexts" type="navigation"/>
    <action name="product" type="navigation"/>
    <action name="library" type="navigation"/>
    <action name="project" type="navigation"/>
    <action name="program" type="navigation"/>
    <action name="change" type="navigation"/>
    <action name="supplier" type="navigation"/>
    <action name="qms" type="navigation"/>
    <action name="org" type="navigation"/>
    <action name="site" type="navigation"/>
    <action name="search" type="navigation"/>
    <!-- entry for customization tab -->
    <action name="customization" type="navigation"/>
    <!-- entry for serviceAcademy tab-->
    <action name="serviceAcademy" type="navigation"/>
</model>
```

Tab Model



End Result of Sample Customization

Inserting an Action

Completing the Action Definition

The action needs:

- Resource Bundle entries
- Action Definition

```
@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_DESCRIPTION = "object.tableExample.description";

@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_TITLE = "object.tableExample.title";

@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_TOOLTIP = "object.tableExample.tooltip";
```

Resource Entries

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>
</objecttype>
```

Action Definition

Referencing a Custom JSP

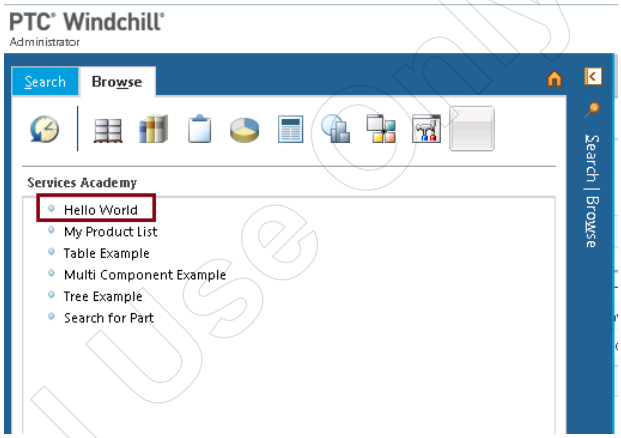
Pointing an Action to a Custom JSP

Syntax of the action is new

- clientResource has added entries (not displayed)
- URL is actually a mapping to “ptc1”

```
<objecttype name="object" class="java.lang.Object"
            resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>
</objecttype>
```

Action Definition for Empty Page



Navigation Entry for Empty Page

```
<%@page language="java" session="true" pageEncoding="utf-8"%>
<%@include file="/netmarkets/jsp/util/begin.jspf" %>

Hello World!

<%@include file="/netmarkets/jsp/util/end.jspf"%>
```

Simple JSP file

Display of Page

A Few Ways to Do This

This slide presents the legacy way to include tabs

class="netmarkets"

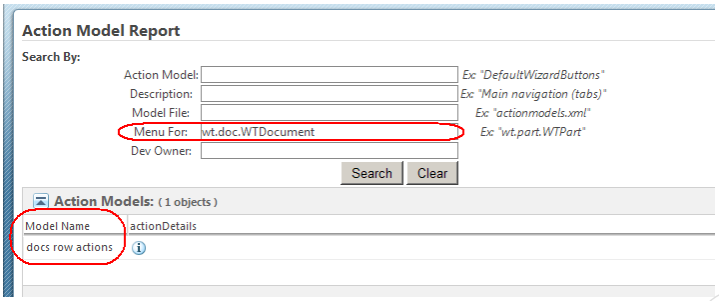
- This method looks for JSP file under `codebase/netmarkets/jsp`.

The exercise will present a different way.

Menus for Objects

Identify and Modify Menus

Identify customization using the tools.

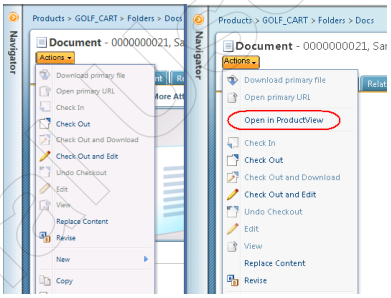


Searching for Action Model

Modify the models identified by the tool

```
<!-- list used for document actions -->
   <model name="docs row actions" menufor="wt.doc.WTDocument">
      <action name="view"    type="object"/>    <!-- Info page -->
      <action name="separator"              type="separator"/>
      <action name="download_primary_attachment"   type="attachments"/>
      <action name="redirect_primary_attachment"   type="attachments"/>

      <action name="checkin"                type="wip"/>       <!-- Check In -->
```

Sample Modification of a Model



Before and After Removing Open in ProductView Action

Changing the Action Menu for a Document

On this side, we show how to search for the model that controls the action menu on a document.

- In Action Model Report page under Action Model table you will see “Menu For” search field which can be used to identify the menu for a given object.
- This was not available in previous versions.

Exercise 1: Modify List of Actions

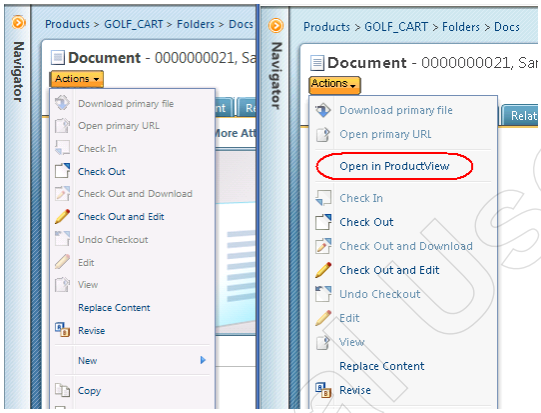
Objectives

After successfully completing this exercise, you will be able to:

- Modify List of Actions

Scenario

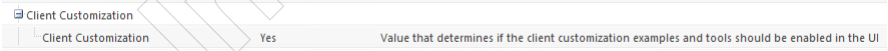
In this exercise, you will use the Windchill Tools menu to identify the menu for an object and then you will change the menu.



Result

Task 1: Enable the Customization Tab.

1. Navigate to **Site** >**Utilities** >**Preference Management.**
2. Update **Client Customization**>**Client Customization** to Yes
   Example:

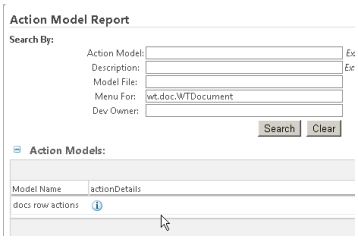


   Result:

   You should now see the customization Tab

Task 2: Determine the action model for Documents.

1. Navigate to the **Customization** >**Tools** Tab.
2. Run the **Action Model**
3. Enter “wt.doc.WTDocument” for **“Menu For”** for field.
4. Search for the action model
5. Click the information icon next to the action model to determine the file that holds the Action Model
   Result:

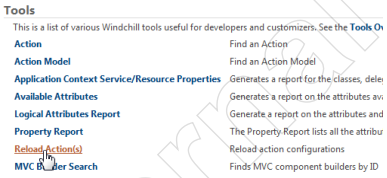


Task 3: Update the Action Model.

1. Copy the "docs row actions toolbar" model from the location found in the previous task (*/config/actions/ DocumentManagement-actionmodels.xml*) into */config/actions/Custom-actionmodels.xml*.
2. Choose an Action to Remove
3. Remove an action

Task 4: Reload the Action Model.

1. Navigate to **Customization Tab** >**Tools**.
2. Select **Reload Actions**.
   Example:



Task 5: Test the Customization.

1. Create a document/search for an existing Document.
2. Review the **Actions** tab.
3. Verify that the action you have removed does not exist in the list of actions.

Completion Criteria

1. Students modified the list of actions.

This completes the exercise.

Exercise 2: Configure Eclipse for Windchill Development

Objectives

After successfully completing this exercise, you will be able to:

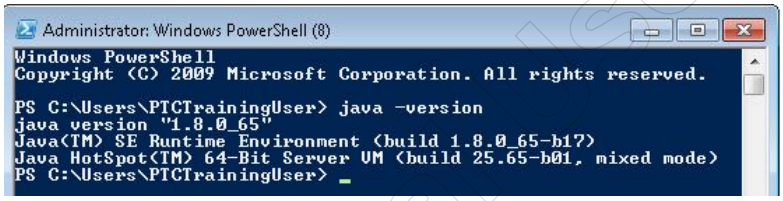
- Set up the developing environment.
- Successfully create Java project and debug.

Scenario

In this exercise, you will install the Eclipse and set up some configuration for Windchill, and create a Java project and validate the configuration.

Task 1: Check for Java version.

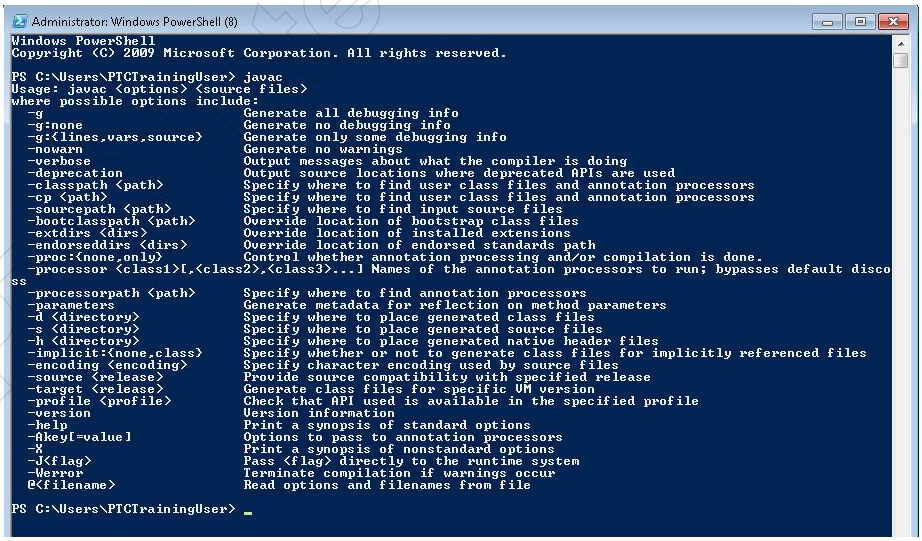
1. JDK should be installed on your local computer.
2. Open Command Prompt and Execute the command: ***java –version*** It should be 1.6 or above.



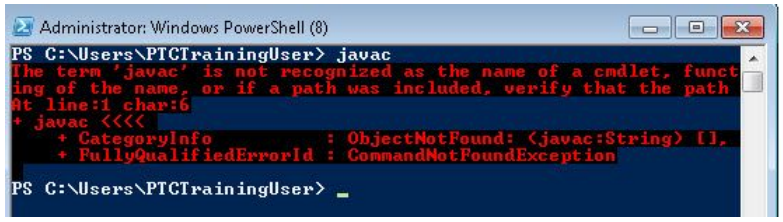
Task 2: Set the Environmental Variables.

1. Execute the command: ***javac***

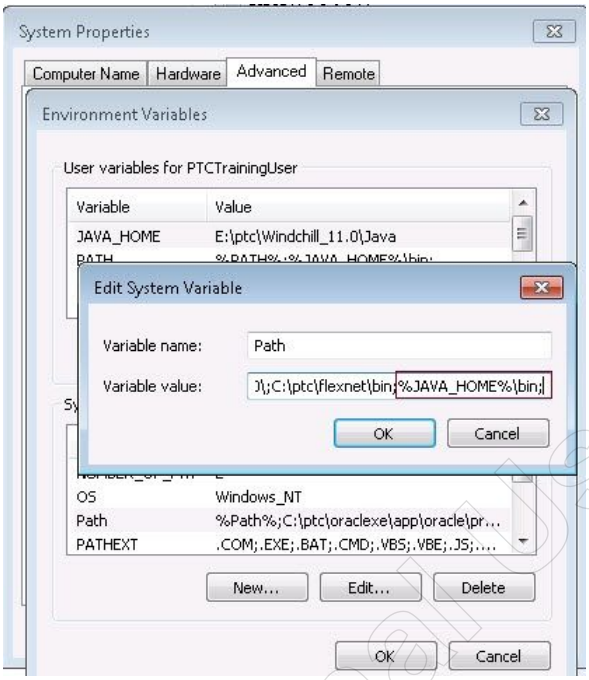
   The command should return “help” information for the command.



   If the command returns the following result, it means your ***environment variable*** is not set properly.



To set your ***environment variable***, navigate to Computer/Properties/Advanced System Settings/Environment Variables and set JAVA_HOME and Path as shown in Environment Variables figure.

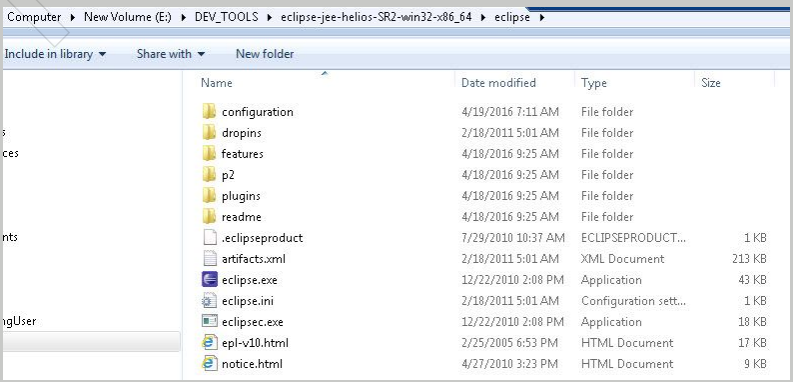


Any spaces in the Java directory path may cause problems.

Task 3: Install Eclipse.

1. Download Eclipse from the following links. The eclipse version is: Helios 3.6 R2
   - Eclipse Helios 3.6 R2 for Windows 64Bit
   - Eclipse Helios 3.6 R2 for Windows 32Bit
2. Extract compressed file and copy to any directory on local machine.

It is widely accepted that all of the developing tools are installed in the directory: *E:\DEV_TOOLS*



Task 4: Configure BIF in Windchill.

1. To Download BIF SDK, go to https://ssp.ptc.com/wiki/display/bif/BIF , Latest BIF SDK (jar file) can be downloaded from the “Download” tab as shown in below snapshot

Download

BIF distribution is available for to all PTC employees. For more information on BIF usage for NON-PTC employees, see BIF License Agreement

BIF 2.2

- Supported release of BIF 2.2 can be downloaded from or externally link to https://sspsvn.ptc.com/Tools/BIF/11.0/releases/2.2.0/LATEST.release

BIF 2.1

2. Create a copy of BIF to your Windchill development environment. Download the latest jar file to the location: *E:\ptc\Windchill_11.0\Windchill\BIF*

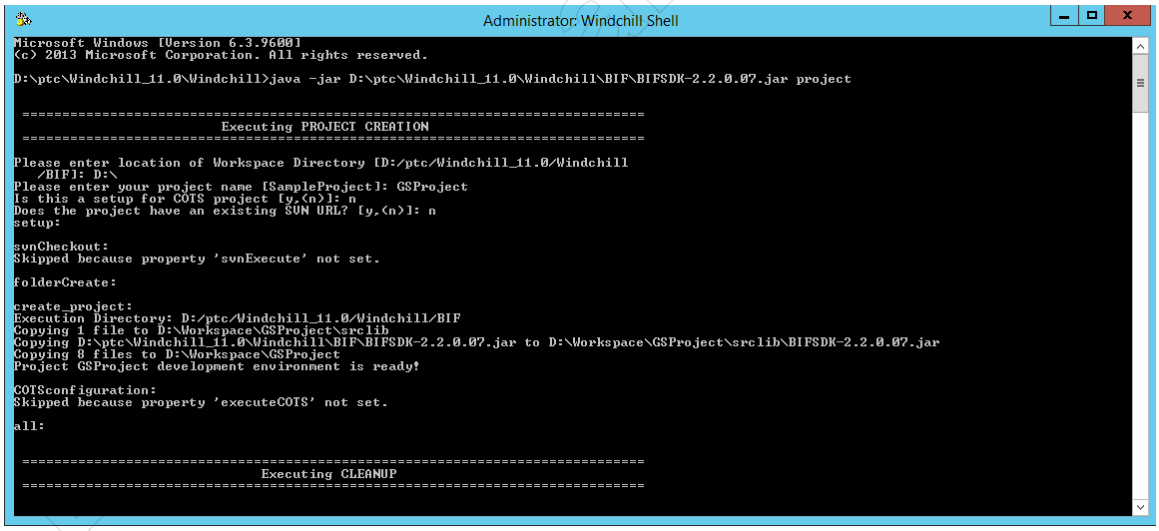
   - The jar file is required to execute the BIF installer.
   - The contents of the jar do not need to be extracted for execution.

3. Open a Windchill shell, and execute following command;
   `java -jar <Location>/BIFSDK-2.2.x.x.jar project`

   Answer the following questions presented to create a project:

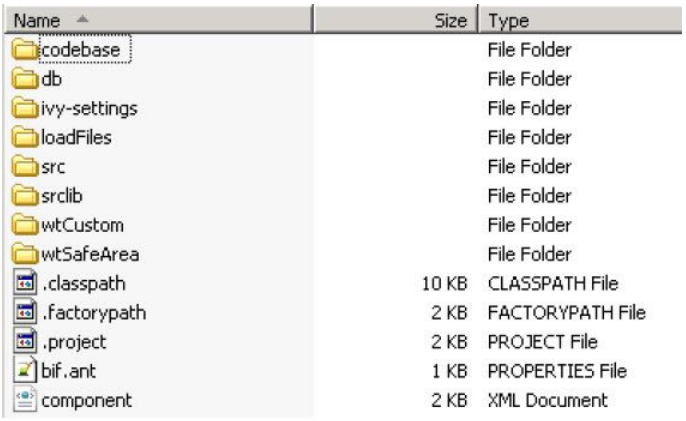
   The following questions will be asked:

   - The Location of the Workspace directory - Example: If the location of the workspace directory is desired to be E:\Workspace, then the location is E:\.
   - The name of the project: **GSProject.**
   - If third party libraries should be installed - This is only asked if Ivy is not already installed.
   - Is the setup related to COTS: **n**.
   - Is there an associated SVN repository: **n**.



The prompts may contain default values, values inside a set of brackets, that can be used by just pressing enter on the prompt. If the default contains a set of values, that are the only valid responses, the default value will be inside a set of parenthesis ( ).

4. A blank project skeleton with the necessary BIF and Eclipse artifacts will be created at the location with the name specified.

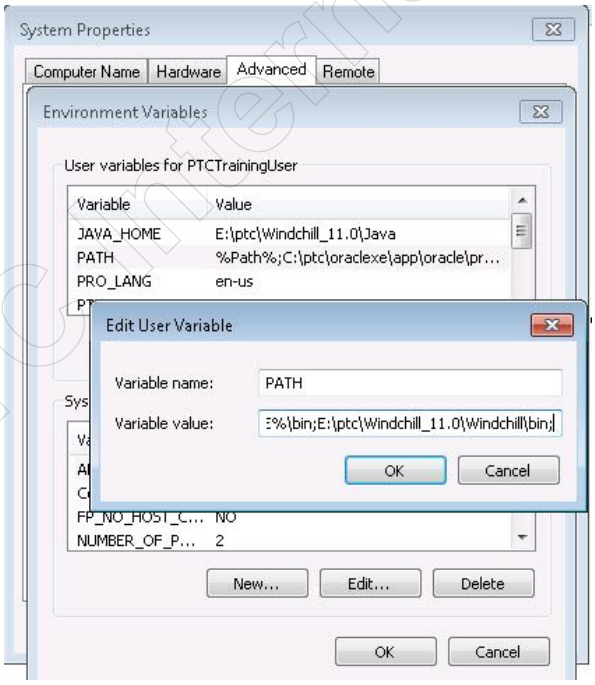


Name	Size	Type
codebase		File Folder
db		File Folder
ivy-settings		File Folder
loadFiles		File Folder
src		File Folder
srclib		File Folder
wtCustom		File Folder
wtSafeArea		File Folder
.classpath	10 KB	CLASSPATH File
.factorypath	2 KB	FACTORYPATH File
.project	2 KB	PROJECT File
bif.ant	1 KB	PROPERTIES File
component	2 KB	XML Document

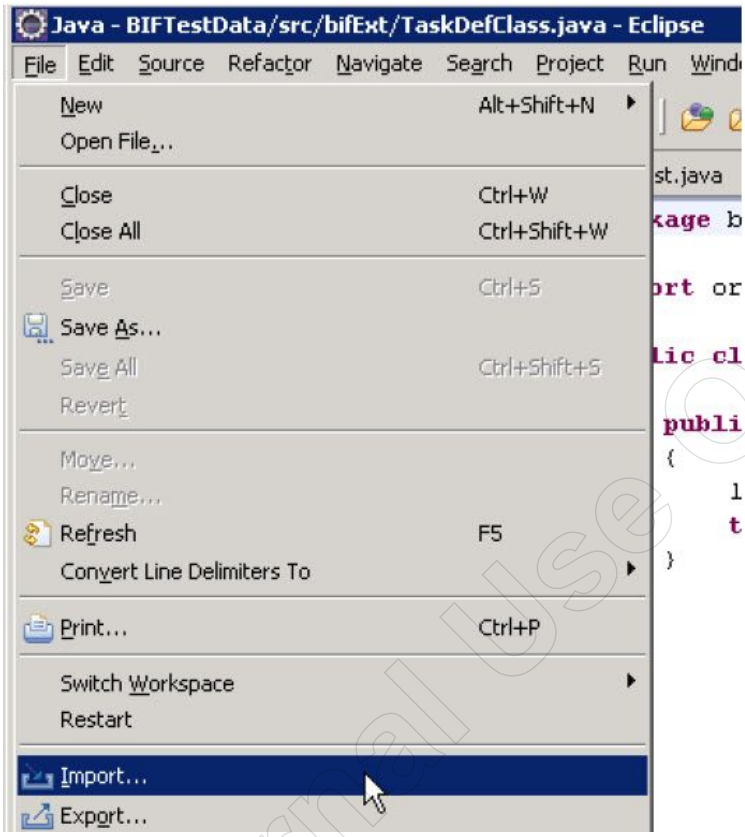
5. Copy the Workspace folder to your local machine say at **E:\Wokspace**

Task 5: Configure eclipse and Import BIF Project.

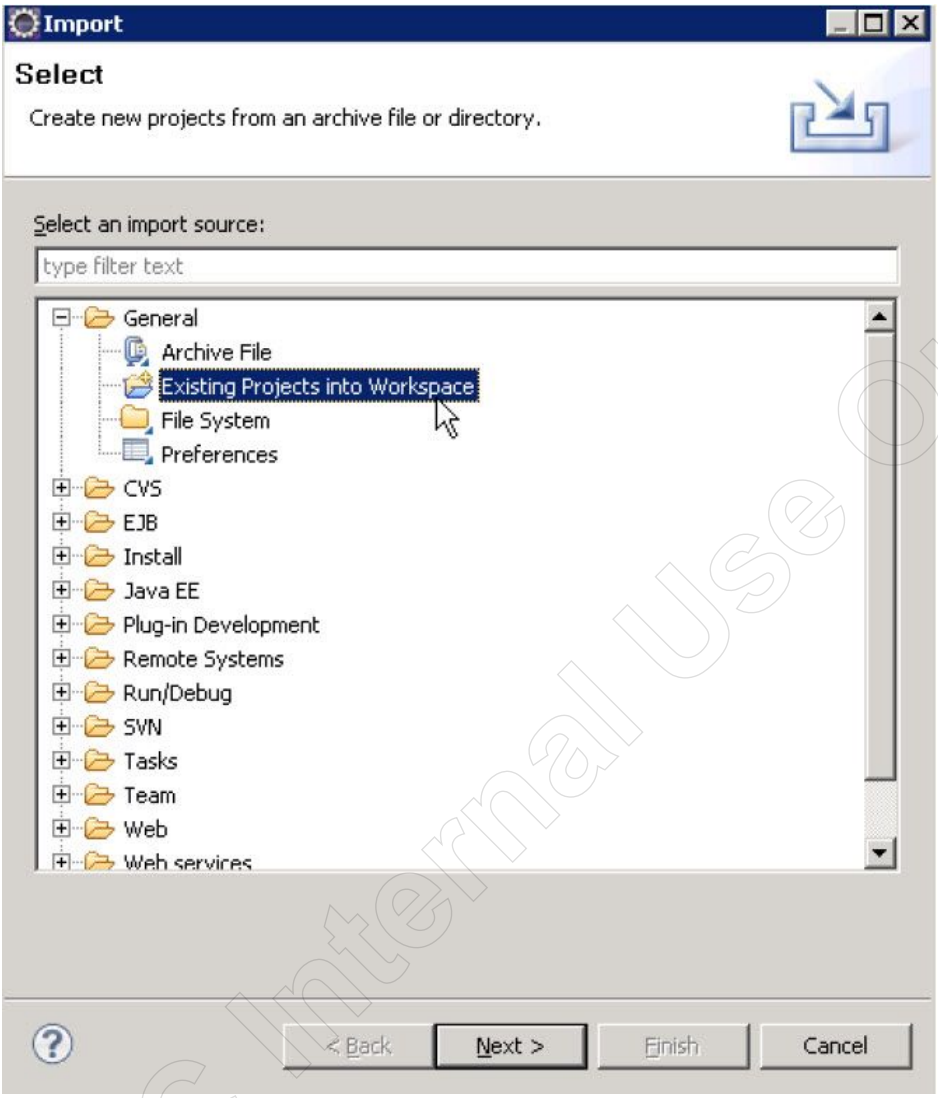
1. BEFORE OPENING ECLIPSE, Add <WT_HOME>/bin to the System Environment variable PATH.
   - Right click on **My Computer** and select **Properties**
   - Select the **Advanced** tab and click the **Environment Variables** button.
   - Highlight the **PATH** variable under *User variables for Administrator* and click the **Edit** button
   - In the *Edit User Variable* window, add <*WT_HOME*>/bin to the end of the *Variable value.*
   - Click **OK**.



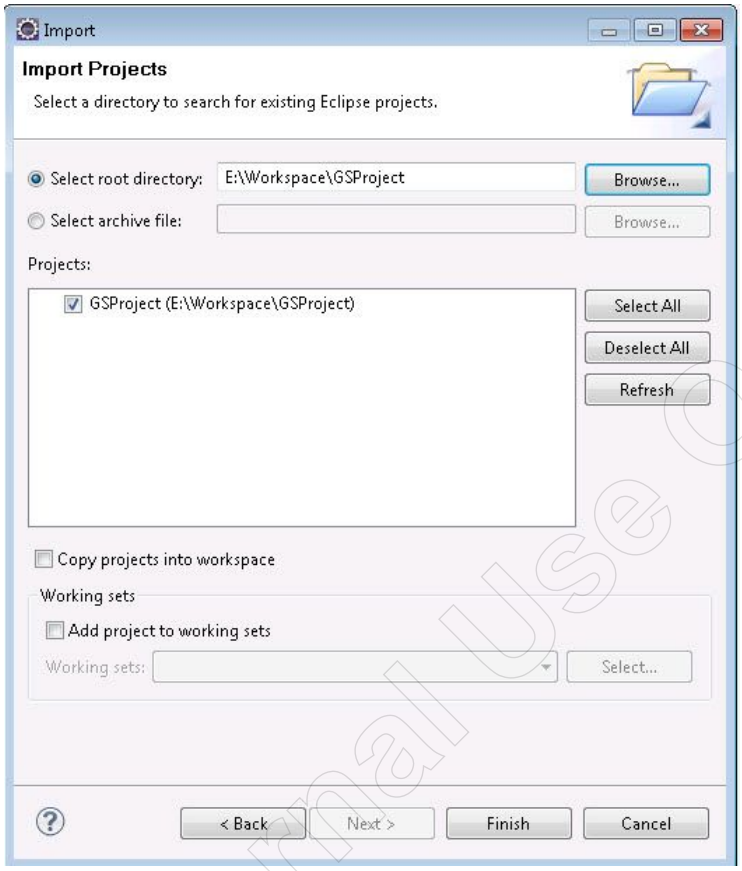
2. **Import BIF Project**
   - Open Eclipse and click **File** --> **Import**



- Select **Existing Projects into Workspace** under the **General** folder within the Import window.



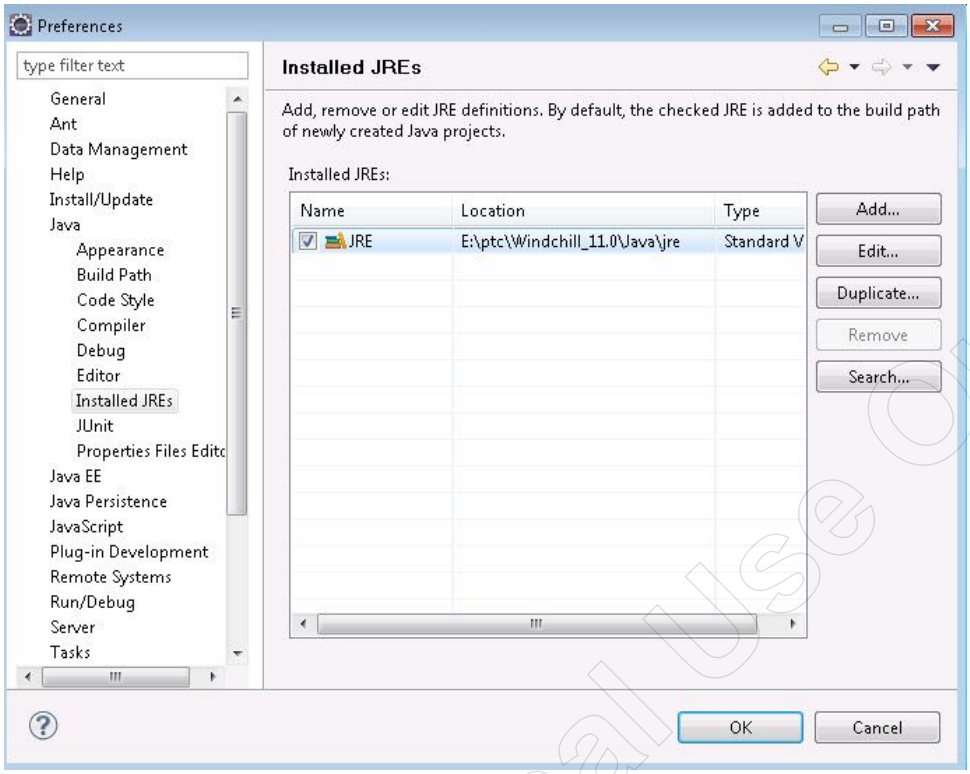
- Browse to the location of the newly created project and select the directory that contains the project.



Images shown here are just for reference purpose. Project's path and name may vary depending upon student choice, it is a directory path where student have copied project folder at local machine.

- The imported project will be listed within the **Package Explorer**.

3. **Configure JAVA used by Eclipse**
   - Switch the Java JRE Eclipse uses from **Window** -> **Preferences** -> **Java** -> **Installed JREs**
   - Add the Windchill JRE and deselect the default.



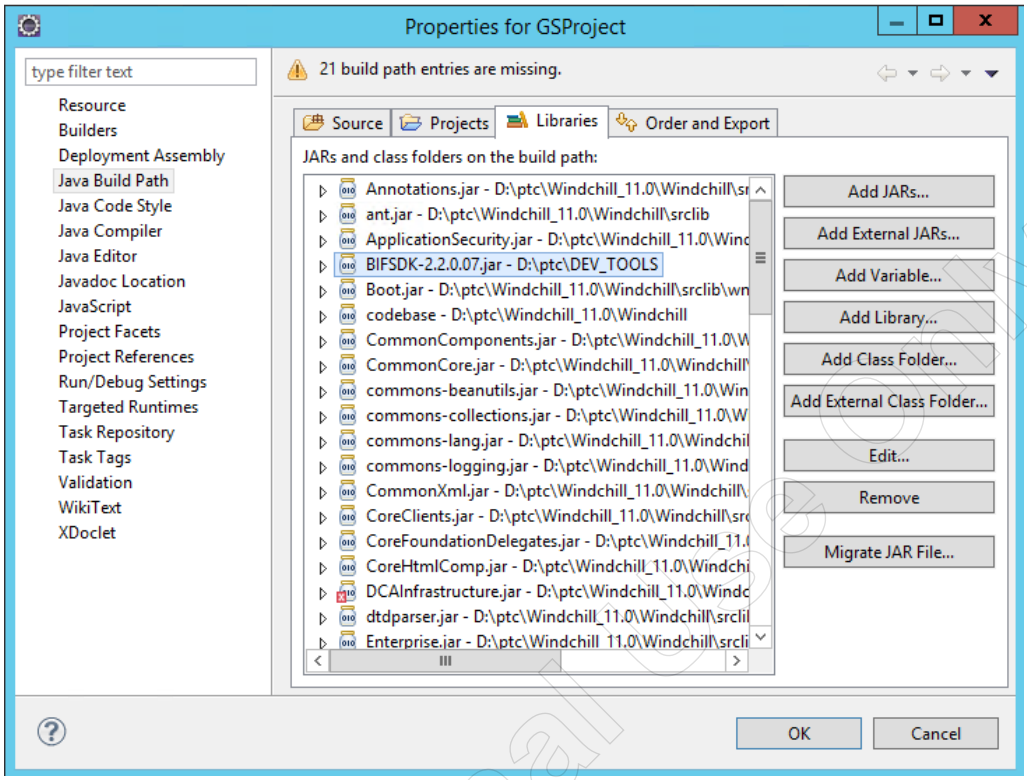
4. Modify Eclipse Preference not to delete Windchill codebase
   - Navigate to ***Window > Preferences > Java > Compiler > Building > Output folder***
   - Uncheck ***Scrub output folder when cleaning projects***

   If you leave this option as “checked” then when you are building Windchill project then eclipse will DELETE your “codebase” directory, so better “uncheck” this option.

Task 6: *Configure Eclipse to execute BIF SDK*

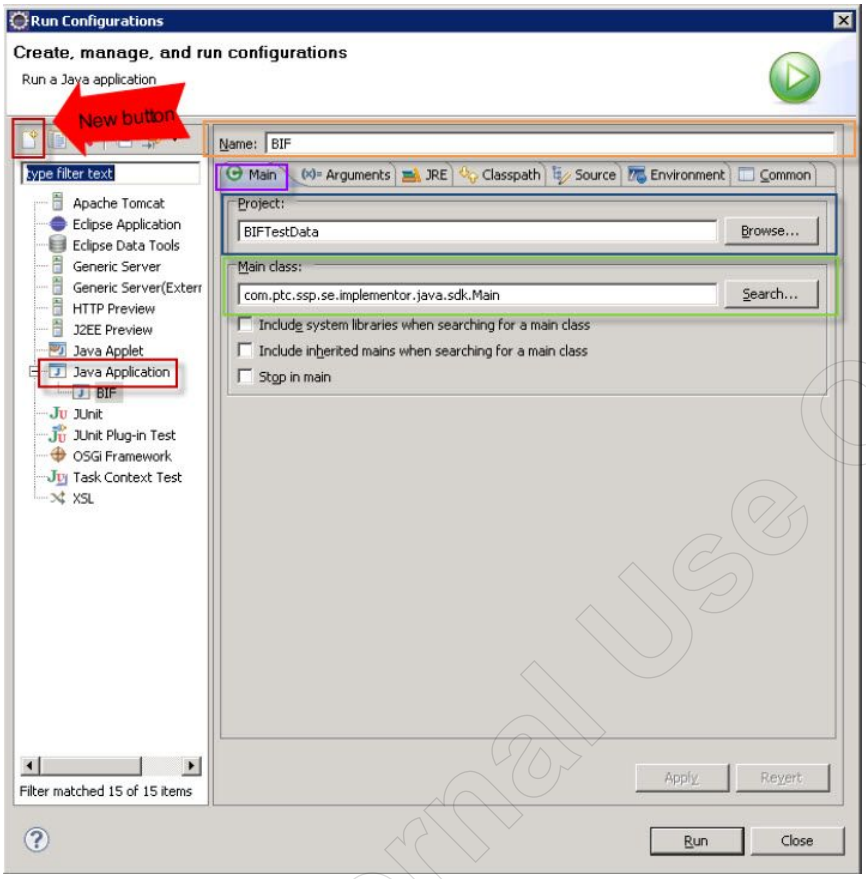
1. Add BIF SDK to the project's Build Path by selecting **Project > Properties**

   Within the Properties Window,
   - Select **Java Build Path**
   - Select the **Libraries** tab
   - Select the **Add External JARs...** button
   - Select the BIFSDK-2.2.0.07.jar from the global location and click **OK**
   - Click **OK**



Please note that image shown above is for example purpose only, path of the file may vary as per installation.

2. Configure your project to run with the BIF by selecting **Run > Run Configurations**
   - Highlight **Java Application** and click the **New** button
   - Enter *BIF* for the **Name** In the **Main** tab
     1. Enter a name in the **Project** field that the BIF will execute against.
     2. In the **Main class** field, enter *com.ptc.ssp.se.implementor.java.sdk.Main*



- In the **Environment** tab, create the following properties
  - **ANT_HOME** with the value of <*WT_HOME*>*/ant*
  - **eclipse.pdebuild.home** with the value of *true.*
  - **JAVA_HOME** with the value of *Windchill*'s version of JAVA For example, *D:\ptc\Windchill11.0\Java*
  - **WT_HOME** with the value of <*WT_HOME*>.
- Click **Run** to execute the configuration or **Close** to save the configuration for a later date.

To execute the BIF from outside the Configuration window, click the **Run** button from the toolbar.

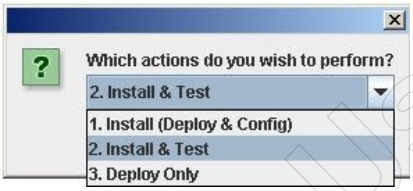
3. During the execution, the BIF will prompt the user which action to run.

For **First Time Execution of Component**, following actions are listed. Select **Install & Test**.

Which actions do you wish to perform:

1. 1. Install (Deploy & Config)
2. Install & Test
3. Deploy Only

Enter valid response [1-3]:



For **Subsequent Executions**, following actions are listed. You can select 'Test Only' action from it or any other action as per your requirement:

Which actions do you wish to perform:

1. Install (Deploy & Config)
2. Install & Test
3. Deploy Only
4. Config Only
5. Config & Test
6. Test Only

Enter valid response [1-6]:

4. In Console tab, you will see the BUILD SUCCESSFUL message.

MyClass.java

```
package com.ptc;
import wt.part.*;
public class MyClass {

}
```

Problems | Javadoc | Declaration | Console | Progress

<terminated> BIF [Java Application] Z:\Java\jre\bin\javaw.exe (Apr 11, 2014 4:18:52 PM)

```
-vf:

Running Component Validations...

AlterPropertiesVerifier
        [Passes: 00 Fails: 00] executed in 0.0 sec
WtSafeAreaVerifier
        [Passes: 00 Fails: 00] executed in 0.0 sec
XConfVerifier
        [Passes: 00 Fails: 00] executed in 0.0 sec
XMLTaskInsertVerifier
        [Passes: 00 Fails: 00] executed in 0.0 sec

Running Object Validation...

Validation completed successfully.

testing:


 ============================================================================
                              Executing CLEANUP
 ============================================================================


Deleting temporary BIF directory...

BUILD SUCCESSFUL
Total time: 1 minutes 42 seconds
```

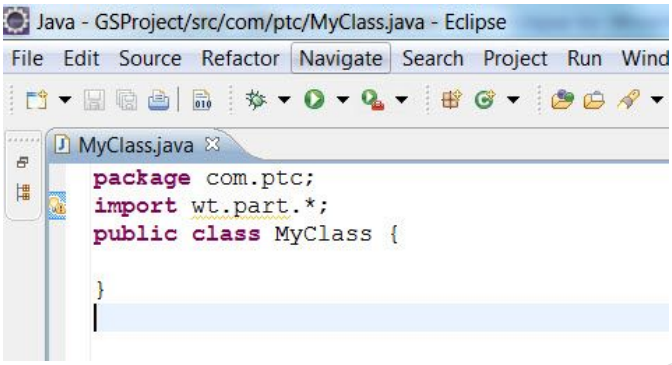
5. A jar file with project name will be created under %WT_HOME%\codebase\WEB-INF\lib

In eclipse, If you face following error:
"The type java.lang.Object cannot be resolved. It is indirectly referenced from required .class files"
Then execute following steps:

1. Right-click on project » Properties » Java Build Path
2. Select Libraries tab
3. Find the JRE System Library and remove it.
4. Click "Add Library" button at right side and Add the JRE System Library (Workspace default JRE).

Completion Criteria

1. The students must have created a new class in eclipse. Enter the code:
   `import wt.part.WTPart;`
   There is no error pointed out by eclipse.



You can add some more code here which you want to execute.

This completes the exercise.

Exercise 3: Add First- and Second-Level Navigation Tabs

Objectives

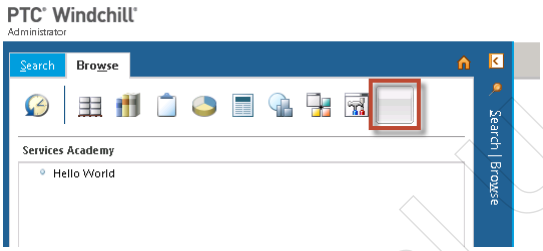
After successfully completing this exercise, you will be able to:

- Incorporate a custom JSP into the Windchill UI.
- Modify the Tab Model.
- Add Actions to the Action Framework.

Scenario

In this exercise, you will create a custom tab and sub-tab to display a JSP.

Result of Exercise screenshots shown here is the expected output for the exercise.



Result of Exercise

This is based on best practices delivered with the product:

- Client_JCA_Overview_ActionFramework.doc
- Client_CC_Cust_Navigation_HowtoaddTabsandSubtabs.doc

The above documents are only available to download for PTC internal access, partners likely will not be able to access it.

Task 1: Create the JSP.

1. In Eclipse, create a folder named **serviceAcademy** under the directory *codebase\netmarkets\jsp*
2. In the folder **serviceAcademy**, create a new file names: **navigationlist.jsp**

Example:

```
<%@page language="java" session="true" pageEncoding="utf-8"%>
<%@include file="/netmarkets/jsp/util/begin.jspf" %>

Hello World!

<%@include file="/netmarkets/jsp/util/end.jspf"%>
```

navigationlist.jsp

Refer Lab files for navigationlist.jsp code.

Task 2: Create an icon file with the dimension: 24 X 24, named as **serviceAcademy.gif** and save it in your network drive, in the directory *codebase\netmarkets\images*.

All of the icons and the images are saved in the directory *%WT_HOME%\codebase\netmarkets\images*.

Task 3: Create and Deploy Resource Entries.

1. In Eclipse, under the folder src, create a package named: **com.ptc.serviceAcademy.resource**.
2. In the package **com.ptc.serviceAcademy.resource**, create two files for the Resource Bundles. The two files are named as:
   - NavigationRB.java
   - NavigationRB_en_US.java

   The file *NavigationRB_en_US.java* is used for Localization. *_en_US.java is for English, *_zh_CN is for Chinese, and so forth

   Fill code in the two .java files, it looks like the following:

   Example:

```
package com.ptc.serviceAcademy.resource;

import wt.util.resource.RBEntry;
import wt.util.resource.RBUUID;
import wt.util.resource.WTListResourceBundle;

@RBUUID("com.ptc.serviceAcademy.resource.NavigationRB")
public final class NavigationRB extends WTListResourceBundle{

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_DESCRIPTION = "navigation.serviceAcademy.description";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TITLE = "navigation.serviceAcademy.title";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TOOLTIP = "navigation.serviceAcademy.tooltip";

    @RBEntry("serviceAcademy.gif")
    public static final String NAVIGATION_SERVICEACADEMY_ICON = "navigation.serviceAcademy.icon";



    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_DESCRIPTION = "object.helloWorld.description";

    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_TITLE = "object.helloWorld.title";

    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_TOOLTIP = "object.helloWorld.tooltip";

}
```

NavigationRB.java

```java
package com.ptc.serviceAcademy.resource;

import wt.util.resource.RBEntry;
import wt.util.resource.RBUUID;
import wt.util.resource.WTListResourceBundle;


@RBUUID("com.ptc.serviceAcademy.resource.NavigationRB_en_US")
public final class NavigationRB_en_US extends WTListResourceBundle{
    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_DESCRIPTION = "navigation.serviceAcademy.description";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TITLE = "navigation.serviceAcademy.title";

    @RBEntry("Service Academy")
    public static final String NAVIGATION_SERVICEACADEMY_TOOLTIP = "navigation.serviceAcademy.tooltip";

    @RBEntry("serviceAcademy.gif")
    public static final String NAVIGATION_SERVICEACADEMY_ICON = "navigation.serviceAcademy.icon";



    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_DESCRIPTION = "object.helloWorld.description";

    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_TITLE = "object.helloWorld.title";

    @RBEntry("Hello World")
    public static final String OBJECT_HELLOWORLD_TOOLTIP = "object.helloWorld.tooltip";

}
```

NavigationRB_en_US.java

Refer Lab Files for NavigationRB and NavigationRB_en_US java files.
If you face following issue:
"set workspace compiler compliance settings to '1.5' eclipse"
It can be resolved as follows:

- Go to Project properties -> 'Java Compiler' -> Check the box ('Enable project specific settings')
- Change the compiler compliance level to '5.0' or '1.5' & click ok.
- Do rebuild.

It will be resolved.

Task 4: Create the Action.

1. In Eclipse, under the folder *codebase\config\actions*, update the file *custom-actions.xml*
   Example:

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE listofactions SYSTEM "actions.dtd">
<listofactions>
    <objecttype name="navigation" class="" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
        <action name="serviceAcademy">
        </action>
    </objecttype>

    <objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
        <action name="helloWorld">
            <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
        </action>
    </objecttype>

</listofactions>
```

Action Definitions in custom-actions.xml

Refer Lab Files for custom-actions.xml

Task 5: Update the Action Model.

1. In Eclipse, under the folder *codebase\config\actions*, update the file *custom-actionModels.xml*
   Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE actionmodels SYSTEM "actionmodels.dtd">
<actionmodels>
    <model name="main navigation" id="browseActions" resourceBundle="com.ptc.core.ui.navigationRB">
        <description>
            Main navigation (tabs)
        </description>
        <action name="recentContexts" type="navigation"/>
        <action name="product" type="navigation"/>
        <action name="library" type="navigation"/>
        <action name="project" type="navigation"/>
        <action name="program" type="navigation"/>
        <action name="change" type="navigation"/>
        <action name="supplier" type="navigation"/>
        <action name="qms" type="navigation"/>
        <action name="org" type="navigation"/>
        <action name="site" type="navigation"/>
        <action name="search" type="navigation"/>
        <!-- entry for customization tab -->
        <action name="customization" type="navigation"/>
        <!-- entry for serviceAcademy tab-->
        <action name="serviceAcademy" type="navigation"/>
    </model>

    <model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
        <action name="helloWorld" type="object"/>
    </model>

</actionmodels>
```

Navigation Model in custom-actionModels.xml

Refer Lab Files for custom-actionModels.xml

Task 6: Deployment.

1. Use lightBuild to deploy the component.
2. Restart the Method Server.
3. Check the results.

Completion Criteria

1. The first level Tab and the second level Tab are displayed in the Navigator. When the second Tab is clicked, a page displayed on the right.

This completes the exercise.

Module 3

Information Pages

Module Overview

In this module, we will review the new Information Pages in the content. After a review of the basic layout, and a comparison to earlier versions of Windchill, we will review the structure of the pages and identify how to create custom pages.

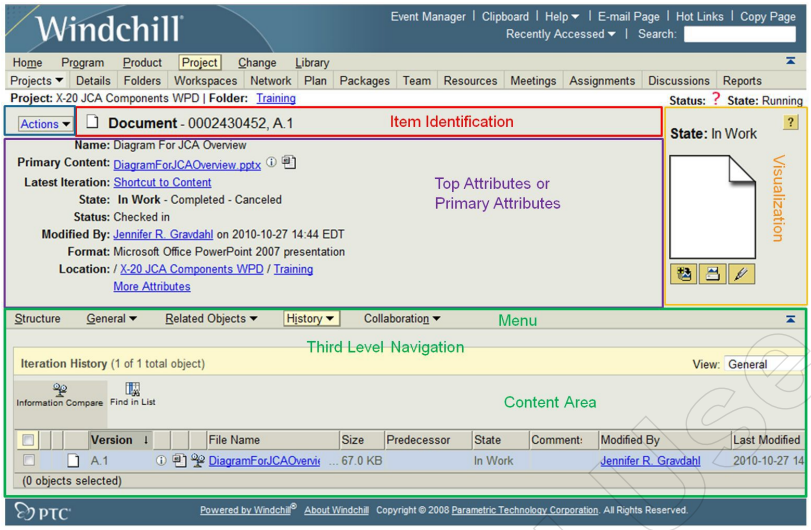
Objectives

After completing this module, you will be able to:

- Relate existing Information Pages to those in previous release.
- Review the basic layout of the new Information Page.
- Describe the code behind the information page.
- Customize the Info Page.

Windchill 9.1 Information Page

Information Page in Windchill 9.1

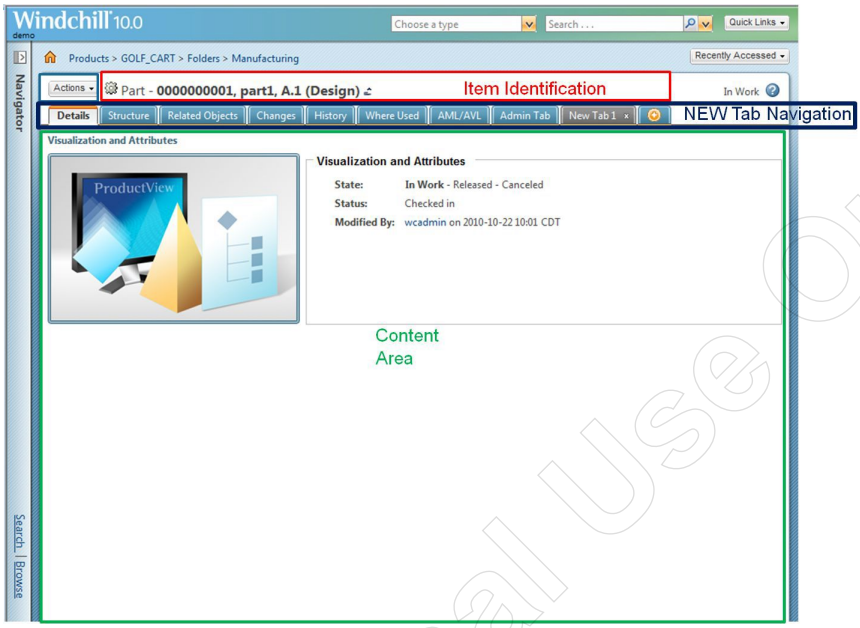


Key Areas of the Information Page

- Item Identification
- Actions
- Top Attributes or Primary Attributes
- Visualization
- Third level navigation area – consists of two pieces
  - Menu for navigation
  - Content area
    - Attributes, Tables, and other kinds of content.
    - Controlled by the action model

Windchill 10.2 Information Page

Information Page in Windchill 10.2



Key areas of the information page

- Item Identification
- Actions
- Tab navigation
  - Replaces third level navigation menu
- Content Area
- Attributes and Visualization are just content
  - Like any other content
  - Not always visible on the page — generally available on the details tab.

This remains same in Windchill 11.0 also.

Exercise 1: Modify the Customize Menu for Part

Objectives

After successfully completing this exercise, you will be able to:

- Modify the action menu on a part
- Augment an Information Page with additional actions.

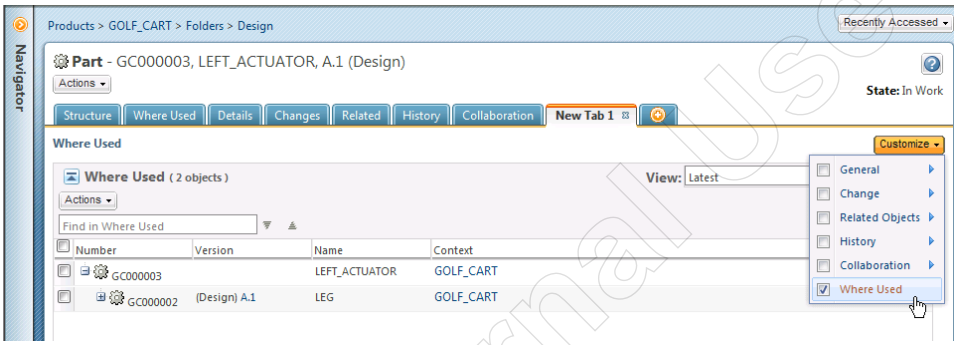
Prerequisites

Display the **Customization** tab in Windchill

Navigate to **Site** >**Utilities** >**Preference Management**, In the table, find the **Client Customization**, and change the value to *Yes*.

Scenario

In this exercise, we show how you can add an already registered action to the Information Page of a part.



Modified Third-Level Navigation

Task 1: Determine the action for the “Customize” menu by enabling jcaDebug=true

1. Open Windchill in the browser, browse to the product folder, click on one of the parts and then go to the Part information Pages.

   There might pop up plug-in of “pvvercheck_ie.cab”; it will ask for installation. If it pops up, do install it.

2. In the end of the URL, add
   `&jcaDebug=1`
   click **Enter** in order to refresh the page
3. Clicking the ladybug tab reveals the actionmodel file used – looking for “third_level” in that file will reveal clues.
   Example:

Ladybug tab

Task 2: Register a custom Part Menu.

1. Open *%WT_HOME%\codebase\config\actions\PartClient-actionmodels.xml*

   “PartClient-actionmodels.xml” file is located in virtual machine. So open it in VM only and then update the “custom-actionModels.xml” in eclipse. Or you can directly copy it from Lab Files provided.

2. Search for
   `<model name="third_level_nav_part">`
   Result:

```
<!-- ************************************************************ -->
<!-- ***  Information Page 3rd Level Navigation Menu Bar      *** -->
<!-- ************************************************************ -->

<!-- Part information page 3rd level nav menu bar -->
   <model name="third_level_nav_part">
      <submodel name="general"/>                    <!-- General -->
      <submodel name="relatedItems"/>               <!-- Related Objects -->
      <submodel name="changes"/>                    <!-- Change -->
      <submodel name="history"/>                    <!-- History -->
      <submodel name="collaboration"/>              <!-- Collaboration -->
      <submodel name="prodAnalytics"/>              <!-- Product Analytics -->
   </model>
```

Third-Level Navigation for Parts

3. Copy the model to the *codebase\config\actions\custom-actionModels.xml*

Task 3: Modify the custom part menu.

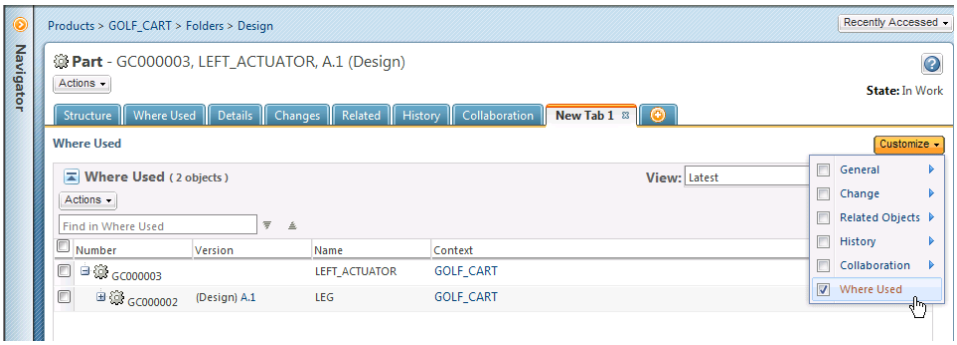
1. Add an entry referencing the “whereUsed” action in modified *codebase\config\actions\custom-actionModels.xml*
   Result:

```
<!-- ************************************************************ -->
<!-- ***  Information Page 3rd Level Navigation Menu Bar      *** -->
<!-- ************************************************************ -->

<!-- Part information page 3rd level nav menu bar -->
   <model name="third_level_nav_part">
      <submodel name="general"/>                    <!-- General -->
      <submodel name="relatedItems"/>               <!-- Related Objects -->
      <submodel name="changes"/>                    <!-- Change -->
      <submodel name="history"/>                    <!-- History -->
      <submodel name="collaboration"/>              <!-- Collaboration -->
      <submodel name="prodAnalytics"/>              <!-- Product Analytics -->
      <action name="whereUsed" type="object"/>      <!--Customize the menu bar -->
   </model>
```

Refer Lab Files for custom-actionModels.xml

Task 4: Test it out.

1. Use lightbuild to deploy the component.
2. Restart the method server.
3. Navigate to the **Customization** >**Tools**, click on **Reload Action(s)**.
4. Create a part or open the existing part.
5. Create a new Tab and review the Customize menu.
   Result:



Modified Third-Level Navigation

6. Notice the **Where Used** Action on the **Customize** menu.

Completion Criteria

1. The new Action **Where Used** is displayed in the **Customize** action model.

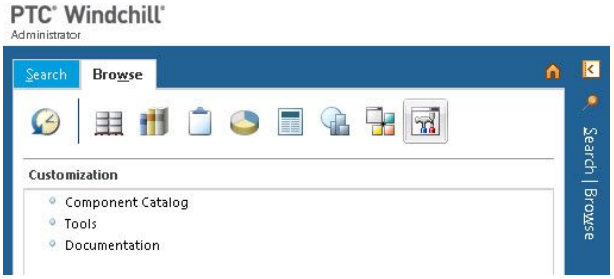
This completes the exercise.

Carambola InfoPage Example Overview

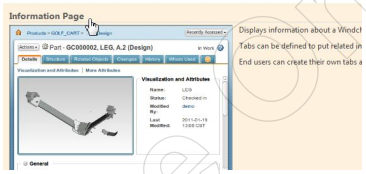
Carambola Information Page Serves as a Useful Template

The customization tab reveals an Example Information Page

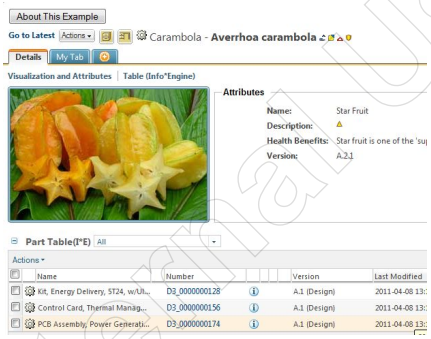
- Clicking the Example reveals the Carambola InfoPage.



Entry to See the Carambola Examples



InfoPage Example on Customization Tab



Carambola InfoPage

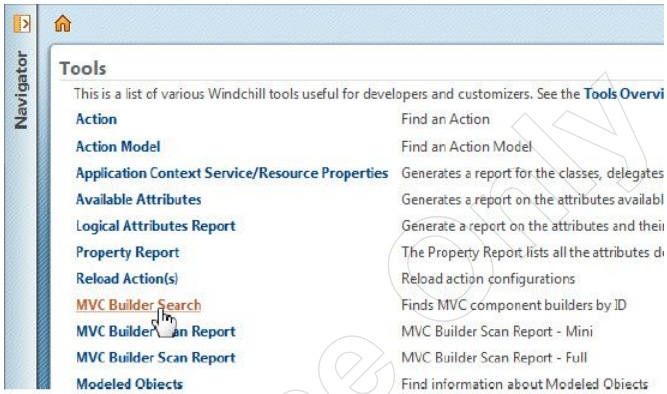
Finding the Builder

How to Find the Builder?

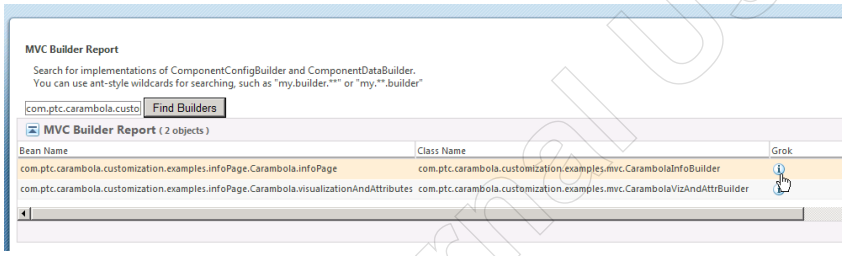
Search for
`com.ptc.carambola.customization.examples.infoPage.Carambola.*`
to reveal:

- Class Name for the Builder
- Direct link to OpenGrok source code (http://ah-opengrok.ptcnet.ptc.com/)

> OpenGrok is used to find the JAVA source code. It is currently only supported for the internal access, partners likely will not be able to access it.



Starting a Builder Search



Builder Report

Finding the Builder Is Not Always Obvious

In this case, the package naming was similar. But this is not always the case.

- jcaDebug will usually reveal the builder.

Carambola Builder

The Carambola Builder

The builder is very simple

- Few lines of code
- extends AbstractInfoConfigBuilder and implements ComponentDataBuilder
- Common commands include:
  - newInfoConfig
  - setNavBarName
  - setActionListName
  - setHelpContext
  - addComponent
  - setView
  - setType

Simple Builder

Main point is to show how simple it can be, the code can fit on a single slide. Next slides go into the detail.

Carambola Component Builder

Basic Elements of a Component Builder

```
12  package com.ptc.mvc.builders.carambola;  1
13
14  import wt.util.WTException;
15
16  import com.ptc.carambola.customization.examples.infoPage.Carambola;
17  import com.ptc.mvc.components.AbstractInfoConfigBuilder;
18  import com.ptc.mvc.components.ComponentBuilder;
19  import com.ptc.mvc.components.ComponentConfig;
20  import com.ptc.mvc.components.ComponentDataBuilder;
21  import com.ptc.mvc.components.ComponentId;
22  import com.ptc.mvc.components.ComponentParams;
23  import com.ptc.mvc.components.InfoComponentConfigFactory;
24  import com.ptc.mvc.components.InfoConfig;
25  import com.ptc.mvc.components.PropertyConfig;
26  import com.ptc.mvc.components.TypeBased;
27  import com.ptc.mvc.util.ClientMessageSource;
28
29 2@TypeBased(value = "com.ptc.carambola.customization.examples.infoPage.Carambola")
30  @ComponentBuilder(value = ComponentId.INFOPAGE_ID) 3
31 4public class CarambolaInfoBuilder extends AbstractInfoConfigBuilder implements ComponentDataBuilder {
32                                                                                              5
33      private static final String PART_RESOURCE = "com.ptc.windchill.enterprise.part.partResource";
34
35      ClientMessageSource part_source = getMessageSource(PART_RESOURCE);
36
37      private PropertyConfig newStatusGlyph(String id) {
44
45      @Override
46      public InfoConfig buildInfoConfig(ComponentParams params) throws WTException {
47
48          InfoComponentConfigFactory factory = getComponentConfigFactory();
49 6        InfoConfig result = factory.newInfoConfig();
```

1. Where is the example?
2. Java annotation to define the business object type this builder applies to
3. Java annotation that indicates that this is an information page
4. Java Annotation indicating this file is a ComponentBuilder.
5. Information page builders all extend AbstractInfo – ConfigBuilder
6. The abstract class defines one method, start with an empty config from the factory

Carambola Component Config Builder

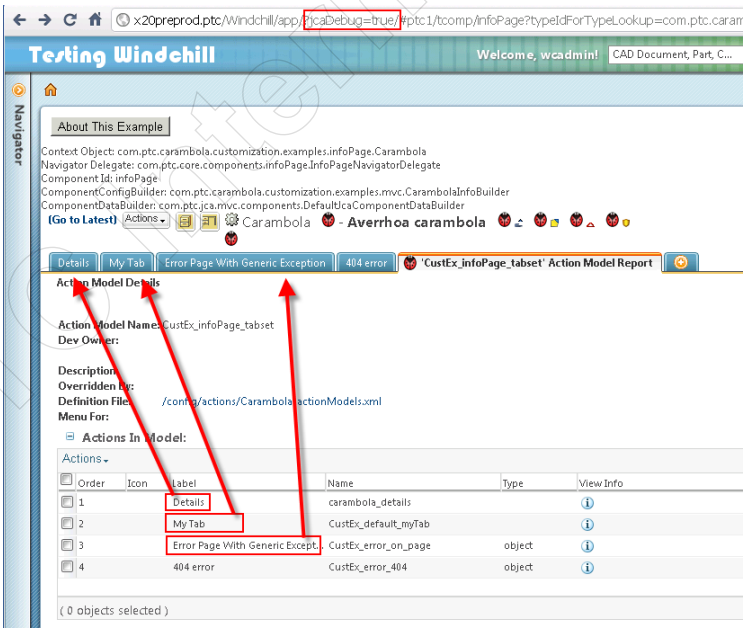
Component Config of the Carambola Builder

```
@Override
public InfoConfig buildInfoConfig(ComponentParams params) throws WTException {

    InfoComponentConfigFactory factory = getComponentConfigFactory();
    InfoConfig result = factory.newInfoConfig();

    result.setNavBarName("CustEx_infoPage_third_level_navigation");
1   result.setActionListName("carambola_info_page");
2   result.setTabSet("CustEx_infoPage_tabset");
3   result.setHelpContext("CarambolaHelpTopic");

    result.addComponent(newStatusGlyph("statusFamily_Share"));
4   result.addComponent(newStatusGlyph("statusFamily_General"));
    result.addComponent(newStatusGlyph("statusFamily_Change"));
    result.addComponent(newStatusGlyph("statusFamily_Security"));
5   result.setView("/carambola/carambolaInfoPage.jsp");
    result.setType(Carambola.class.getName());

    return result;
}

@Override
public Object buildComponentData(ComponentConfig config, ComponentParams params) throws Exception {
    return new Carambola();
}
```

1. Define the menu for the Action Button
2. Define the navigation tabs
3. Help
4. Additional components can be added, like glyphs
5. Reference the JSP file that will govern the placement of objects on the page.

Each of the Subcomponents Are Also Defined by Actions

Use jcaDebug to reveal the page configuration.



- Page Layout is revealed to demonstrate which action models are in use.
- Information can be correlated to the ComponentBuilder to show which pieces of the builder are responsible for displaying the page layout.

Module 4

MVC

Module Overview

In this module, we review the different types of components, how MVC components are defined, and how new components can be created.

Objectives

After completing this module, you will be able to:

- Demonstrate existing components.
- Explain how MVC components are defined.
- Create a new MVC component.

Windchill Client Architecture

Two Approaches to the Windchill Client Architecture

- An MVC-based architecture
  - MVC = Model, View, Controller
- Two customization paths:
  - JSP approach: Legacy Windchill 9.1, Supported in Windchill 10 and later releases till Windchill 11.0 also.
  - Java Builder approach: A new feature in Windchill 10 and continued till later releases also.

Two Customization Paths

- JSP approach
  - This approach is the same as in Windchill 9.1, which comprises of JSP pages referencing Java beans and tag libraries specifically created for the Windchill API..
  - This is a “Model 1” approach, with the JSP page serving as two components in the architecture – View and Controller.
- Java Builder approach
  - This approach is new to Windchill 10, comprised of SpringMVC beans (Java classes) configured to URL paths.
  - This is a “Model 2” approach, with the three architectures represented by separate components (View=JSP page, Controller=Component controller (inside Spring), Model=Component config + data).

MVC

Model–View–Controller

Architectural pattern used in software engineering.

Model

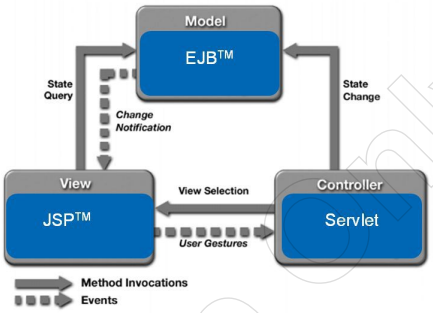
- Enterprise data and the business rules that govern access and updates to this data.

View

- Renders the model

Controller

- Translates interactions with the view into actions to be performed by the model.

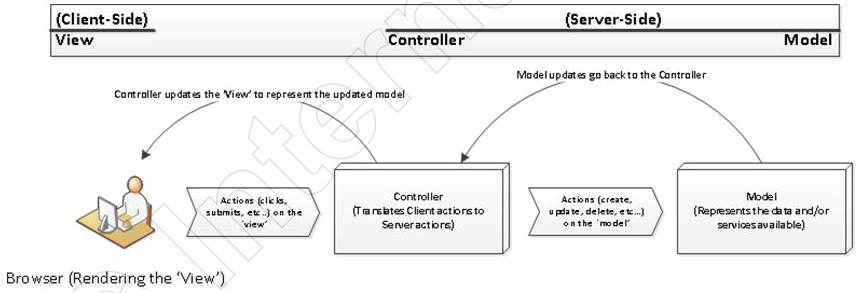


MVC Conceptually

For Web-based clients:

- JavaServer Pages (JSP) pages render the view.
- A Servlet acts as the controller.
- Enterprise JavaBeans (EJB) represent components as the model.

High-Level Overview of Components



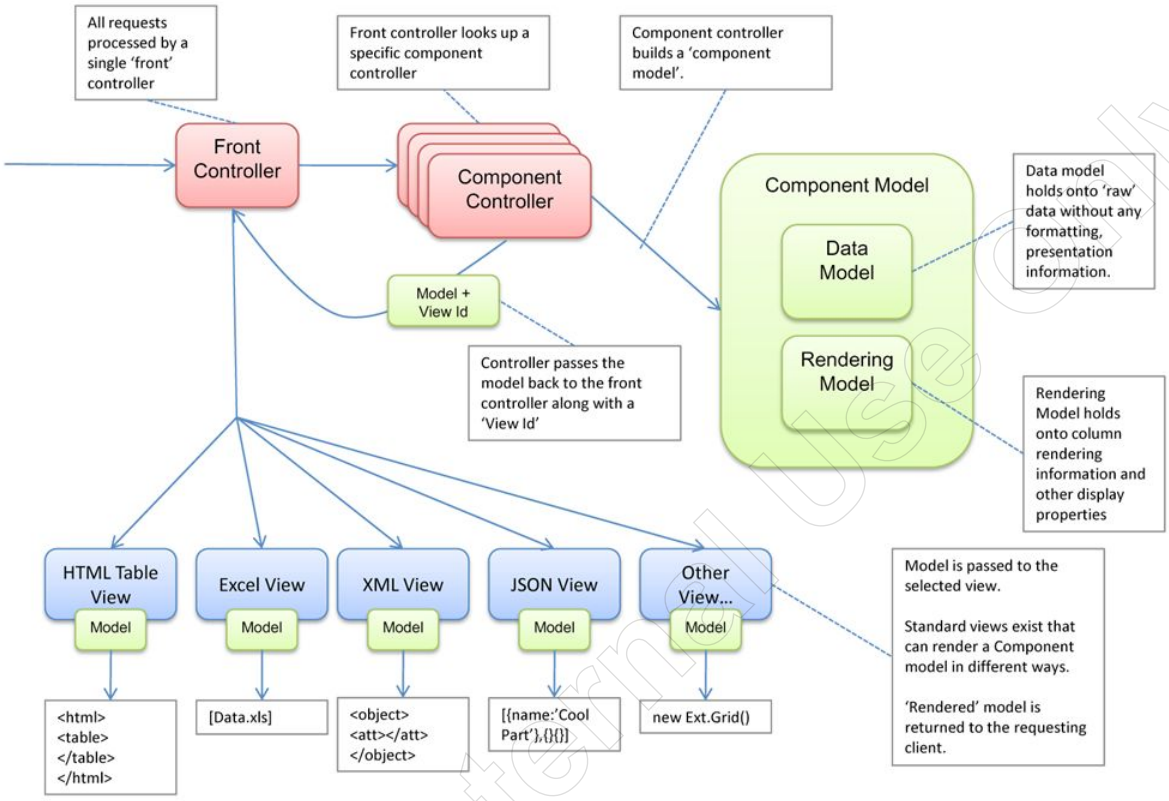
MVC High-Level Overview

Disassembly of the UI paradigm simplifies development of complex user interfaces.

- Enables the division of development work based on Skill Area.
- Enables for the use of third-party frameworks.
- Promotes reuse of components.

MVC Pattern

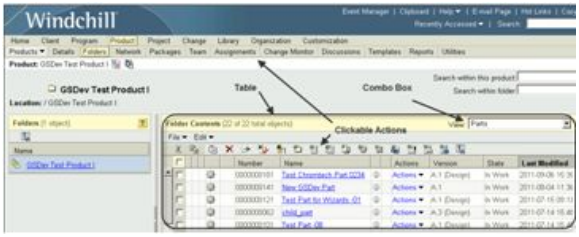
MVC Pattern – The Big Picture



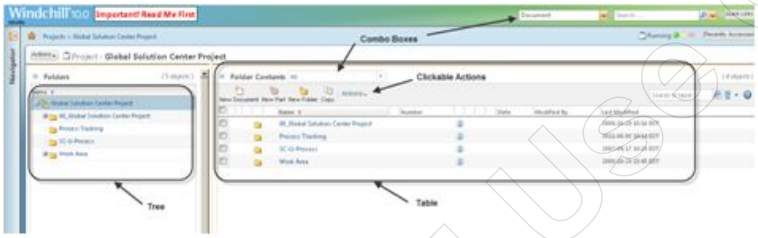
MVC Pattern

MVC — View

Examples of the Windchill Client Side



Windchill 9.1



Windchill 10

This remains same in Windchill 11.0 also

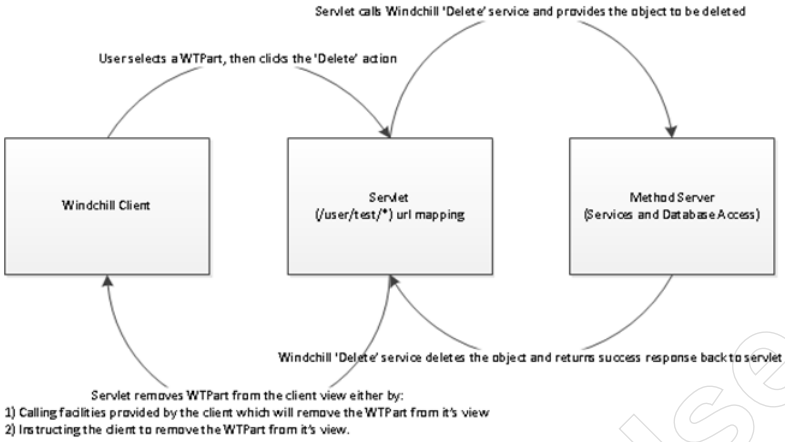
In More Detail

View

- This is the part of the application that is displayed to the user.
- Typically this includes user interface components such as input fields, property panels, layouts, tables, trees, URL links, combo boxes, and many other components we use everyday when interacting with Web sites and Web applications.
- In terms of client/server – the user interacts with the “View” components, initiating requests that are sent over the wire to the server side of the application. The view also provides facilities that enable it to be updated, either by itself or the server side of the application.

MVC — Controller

Example of a Controller



Controller Example

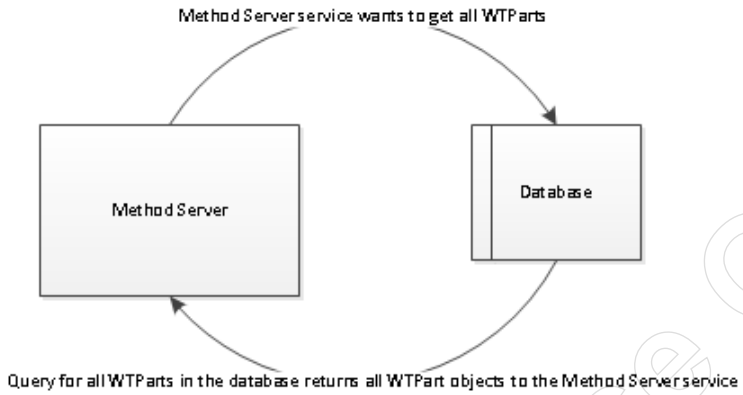
In More Detail

Controller

- The “Controller” here is implemented as a Java-based Servlet, but this has changed over time. The Controller can actually be implemented in a few different ways.
- The “Controller” is responsible for translating the actions between the two sides. How it achieves this depends on what facilities or services are available on the View and on the Model and how these correspond to one another.

MVC — Model

Example of a Model



Model Example

- The WTPart and the service to get all WTParts comprise the “Model” portion of the architecture. Like the Controller portion, this portion has changed over time.

In More Detail

Model

- This is the part of the application that represents the data. This can and often does include the services available to interact with that data.
- Services called on the server side will manipulate or gather data, which in the case of Windchill will be housed in a database.
- Services called on the server side will inform the Controller of any updates made. The Controller then translates these back to updates that must be made on the view to reflect the updates.

Windchill Turns to Spring

Windchill Now Uses the Spring Framework

Benefits of Using Spring:

- Consistent way of managing business objects
- Encourages good practices such as programming to interfaces, rather than classes.
- Provides the MVC Web framework

Instead of having multiple servlets as controllers, a main Servlet is used to make control more manageable.

- Front Controller pattern
- Centralized controller
- org.springframework.web.servlet.DispatcherServletacts as the Front controller.

In Windchill 9.x:

- JSP served both as the Controller and View

In Windchill 10.0,

- Separation between Controller and View

Same is continued in Windchill 11.0 also.

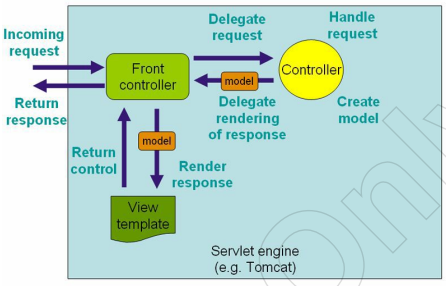
Other details can be found on the Web: http://static.springsource.org/spring/docs/2.5.x/reference/index.html

Spring MVC Overview

MVC Request Handling

The DispatcherServlet is an actual Servlet

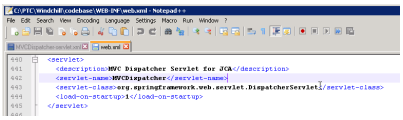
- Inherits from the HttpServlet base class
- Declared in the *web.xml*



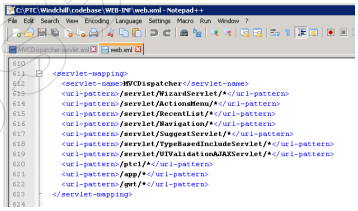
Request Handling in General

Requests that you want the DispatcherServlet to handle are mapped using a URL mapping.

- Standard J2EE servlet configuration



Servlet Mapping



URL Mapping for the Servlet

Spring MVC DispatcherServlet

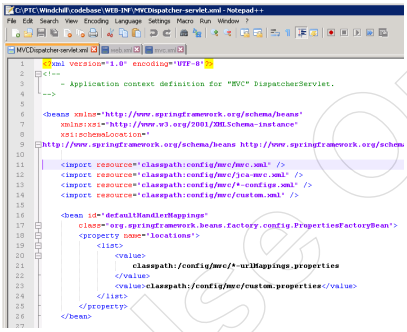
DispatcherServlet registers Handlers, Controllers, and Resolvers

The framework will look for a file named *[servlet-name]-servlet.xml* in the *WEB-INF* directory of your Web application and create the beans defined therein

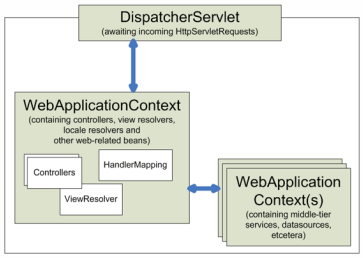
- In Windchill, this file is *%WT_HOME%\codebase\WEB-INF\MVCDispatcher-servlet.xml*

The definition consists of:

- Controllers – Create, Update, Delete Objects
- Handler Mappings – Flow execution
- View Resolvers – Where to find JSP files and how to draw them.
- Theme Resolvers
- Locale Resolvers



Windchill Spring Configuration File



DispatcherServlet

Windchill Uses Multiple Configuration Files

%WT_HOME%\codebase\WEB-INF\MVCDispatcher-servlet.xml includes the following files:

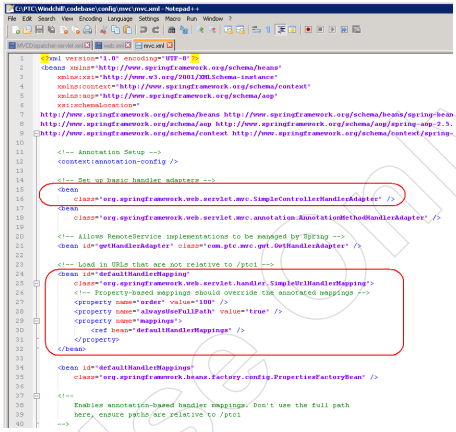
- *%WT_HOME%\codebase\config\mvc\mvc.xml* – Base classes
- *%WT_HOME%\codebase\config\mvc\jca-mvc.xml* – JCA framework
- *%WT_HOME%\codebase\config\mvc*-configs.xml* – specific configurations for various product area
- *%WT_HOME%\codebase\config\mvc\custom.xml* – customization hook for implementations.

MVC Request Handling

MVC in Windchill

Spring handles a request in the following order

1. The Client requests for a Resource in the Web Application.
2. The Spring Front Controller intercepts the Request and then will try to find out the appropriate Handler Mappings
3. Handler Mappings are used to map a request from the Client to Handler.
4. Handler Adapters dispatch the Request to the Handler.



HandlerAdapter to HandlerMapping Example

Windchill MVC Components

ComponentBuilderResolver Identifies the Controllers That Build Components

The Handler responsible for finding JCA component builders is ComponentBuilderResolver

```
<!-- Default resolver -->
<bean id="defaultComponentBuilderResolver"
    class="com.ptc.mvc.components.support.DefaultComponentBuilderResolver" />

<alias alias="configurableComponentBuilderResolver" name="defaultComponentBuilderResolver" />
```

ComponentBuilderResolver defined in *mvc.xml*

jca_mvc.xml defines Controllers which are used to create the model.

```
<bean id="componentHandlerMappings"
    class="org.springframework.beans.factory.config.PropertiesFactoryBean">
    <property name="properties">
        <props>
            <prop key="/comp/**">componentController</prop>
            <prop key="/tcomp/**">typeBasedComponentController
            </prop>
        </props>
    </property>
</bean>
```

Handler Mappings in *jca_mvc.xml*

```
<bean id="typeBasedComponentController" class="com.ptc.mvc.components.ComponentController"
    parent="componentController">
    <property name="componentBuilderResolver" ref="typeBasedComponentBuilderResolver" />
</bean>

<!-- The ComponentBuilderResolver for a typeBasedLook up -->
<bean id="typeBasedComponentBuilderResolver"
    class="com.ptc.jca.mvc.components.TypeBasedComponentBuilderResolver"
    parent="jcaComponentBuilderResolver">
    <property name="beanNameFactory" ref="typeBasedBeanNameFactory" />
</bean>
```

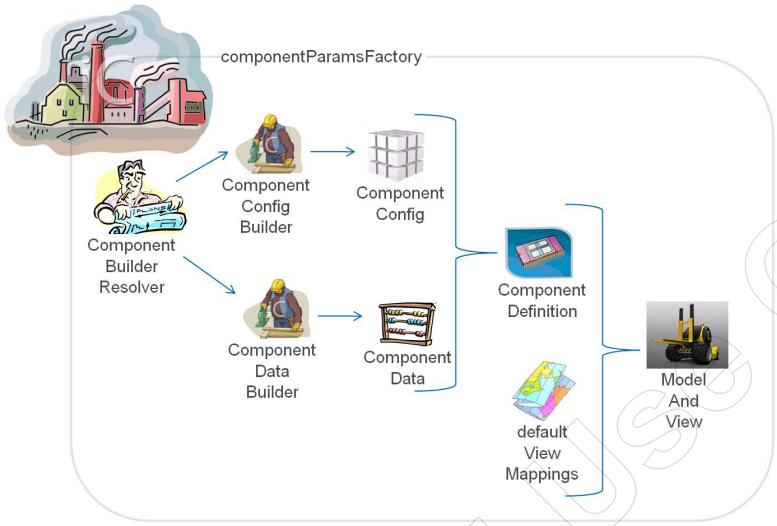
typeBasedComponentController

```
<!-- ComponentController Beans -->
<bean id="componentController" class="com.ptc.mvc.components.ComponentController">
    <property name="componentBuilderResolver" ref="jcaComponentBuilderResolver" />
    <property name="componentParamsFactory">
        <bean class="com.ptc.jca.mvc.components.JcaComponentParamsFactory" />
    </property>
    <property name="defaultViewMappings">
        <map>
            <entry key="com.ptc.mvc.components.TreeConfig" value="/components/tree.jsp" />
            <entry key="com.ptc.mvc.components.TableConfig" value="/components/table.jsp" />
            <entry key="com.ptc.mvc.components.AttributesTableConfig"
                value="/components/table.jsp" />
            <entry key="com.ptc.mvc.components.AttributePanelConfig"
                value="/components/attributePanel.jsp" />
        </map>
    </property>
    <property name="componentBuilderInterceptor" ref="componentBuilderInterceptor" />
</bean>
```

componentController

Building Components in a Factory

View the Spring Framework like a Factory creating ModelAndView Components



Spring Framework

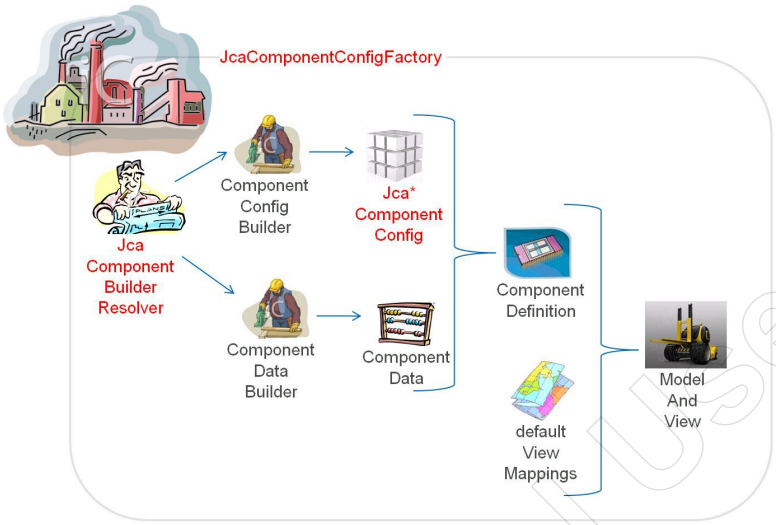
jca_mvc.xml defines Controllers which are used to create the model.

- ComponentController is a Handler provided OOTB to handle request to build MVC components.
  - Prepares a ModelAndView which will be handled by the DispatcherServlet
- ComponentDefinition
  - Model for ComponentController
  - Consist of ComponentConfig and ComponentData
- Build a component means Create a ComponentDefintion
- ComponentDefiniton is made with the help of Builders
  - ComponentConfigBuilder
  - ComponentDataBuilder
- How do we specify a component?
  - Component Id: ptc1/<controller_key>/<componentId>
- Who finds the Builders? ComponentBuilderResolver

Building JCA Components

JCA Components use the JcaComponentBuilderResolver

Identify these components with the use of comp/** in the URL



Different Java Beans Act on JCA Components

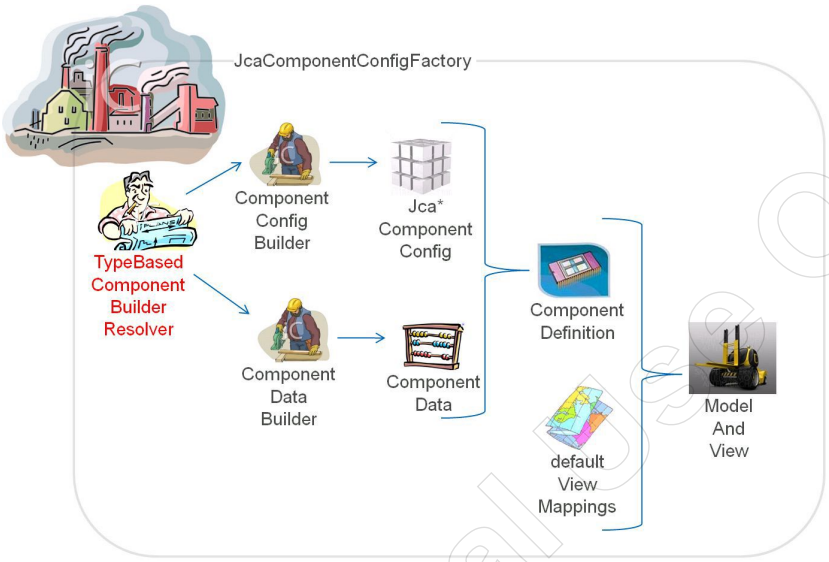
Windchill Spring knows how to use these beans based on mappings in the XML files.

- Design Pattern Remains the same
- Inheritance is from the same parent class

Building Type-Based Components

Type-Based JCA Components use the TypeBasedComponentBuilderResolver

Identify these components with the use of tcomp/** in the URL



Type-Based Components Expect Additional Parameters

Same Component Configs can be used to render these:

- There is a difference in the way the additional attributes are handled.

Registering Builders

Builders Registration Configuration

Once the builders are created, you need to let Spring infrastructure know about it. Registration can be done either via explicit configuration or by automated scanning. Automated scanning is the preferred approach for typical use cases.

- Automated scanning:
  - Configure to automatically pick up all builders within a certain package hierarchy
  - Add the configuration element to *\codebase\config\mvc \custom.xml.*

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:context="http://www.springframework.org/schema/context"
    xmlns:mvc="http://www.ptc.com/schema/mvc"
    xsi:schemaLocation="
http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd
http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context-2.5.xsd
http://www.ptc.com/schema/mvc http://www.ptc.com/schema/mvc/mvc-10.0.xsd">

    <!-- Configurations in this file override all other configurations -->
    <mvc:builder-scan base-package="com.ptc.serviceAcademy.builders"/>

</beans>
```

custom.xml

- Explicit configuration:
  - Configure to give a directly bean declaration for the builder
  - Add the configuration element to *\codebase\config\mvc \custom.xml.*

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:context="http://www.springframework.org/schema/context"
    xmlns:mvc="http://www.ptc.com/schema/mvc"
    xsi:schemaLocation="
http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd
http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context-2.5.xsd
http://www.ptc.com/schema/mvc http://www.ptc.com/schema/mvc/mvc-10.0.xsd">

    <!-- Configurations in this file override all other configurations -->
    <mvc:builder-scan base-package="com.ptc.serviceAcademy.builders"/>

    <bean class="com.ptc.serviceAcademy.builders.MyClassName"/>

</beans>
```

Builder Registration

- Automated scanning:
  - The builder-scan implementation scans the entire classpath, so you should take care to be specific with the package name you declare if using scanning. (Don't scan com.ptc.* for example.)
  - In addition, this means that classes that are outside your interest, but that are in the classpath and match the package hierarchy, will also get scanned.
  - From a performance standpoint (MethodServer startup) each scan adds up time.
  - You are requested to take advantage of the OOTB scan provided on "com.ptc.mvc.builders" base package. This means that all the builders that you author should be under com. ptc.mvc.builders package. If you are not using the OOTB scan, the rule of thumb is to use the scan if there are more than 10 builders available in the package.
- Explicit configuration:
  - You are encouraged not to specify the bean name while declaring the bean and use @ComponentBuilder annotation in the builder for proper registration of it in the Spring bean factory.

Supporting Legacy JCA

9.1 Style JCA Customizations Work in 11.0

URLS that don't have builders are handled by the default handler

```
23    <!-- Overridden for unit tests -->
24    <bean id="defaultHandlerMappings"
25        class="org.springframework.beans.factory.config.PropertiesFactoryBean">
26        <property name="location"
27            value="classpath:/config/mvc/common-urlMappings.properties" />
28    </bean>
```

Default Handler in *jca-mvc.xml*

```
104   <!-- Handles legacy netmarkets urls -->
105   <bean id="netmarketsController" class="com.ptc.jca.mvc.controllers.LegacyController" />
```

Registering the Legacy Controller in Spring (*jca-mvc.xml*)

Legacy Controller Enables Old Customizations to Run on Windchill 11.

This controller acts on URLS in the same manner that Windchill 10 did.

- These URLs are different from Windchill 10 and can easily be intercepted.

JCA Components

JCA Components implement JcaComponentConfig

JcaComponentConfig

- ... is a ComponentConfig
- ... is the super class for:
  - JcaTableConfig
  - JcaAttributesTableConfig
  - JcaTreeConfig
  - JcaAttributePanelConfig
  - JcaColumnConfig
  - JcaInfoConfig
  - JcaPropertyConfig
  - JcaPropertyPanelConfig

Overview Package Class Use Tree Deprecated Index Help

PREV CLASS NEXT CLASS FRAMES NO FRAMES

SUMMARY: NESTED | FIELD | CONSTR | METHOD DETAIL: FIELD | CONSTR | METHOD

com.ptc.jca.mvc.components

Interface JcaComponentConfig

All Superinterfaces:

ComponentConfig

All Known Implementing Classes:

AbstractJcaComponentConfig, JcaAttributeConfig, JcaAttributePanelConfig, JcaAttributesTableConfig, JcaColumnConfig, JcaGroupConfig, JcaInfoConfig, JcaPropertyConfig, JcaPropertyPanelConfig, JcaTableConfig, JcaTreeConfig

```
public interface JcaComponentConfig
extends ComponentConfig
```

A component config that can create a ComponentDescriptor

API for JCA Components

You will most likely never have to modify this class.

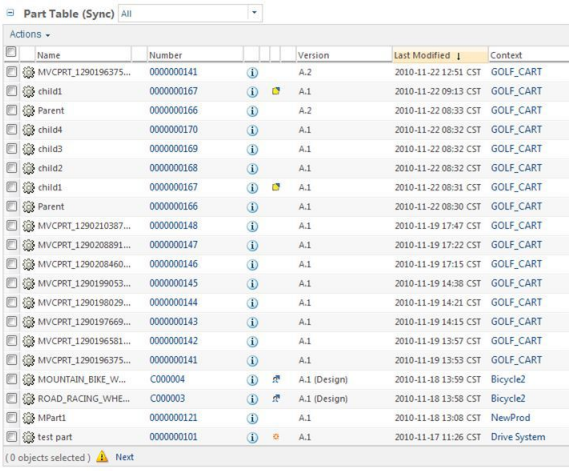
Javadoc is Available

Inheritance is used logically in the framework

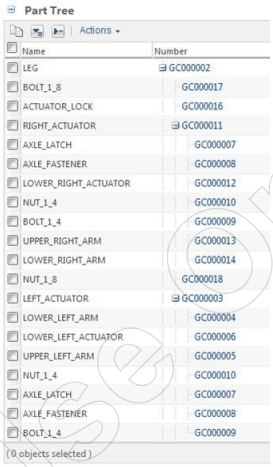
- The code is easier to follow than previous releases – because of Spring Module

JCA Tables and Trees

JCA Table and Tree



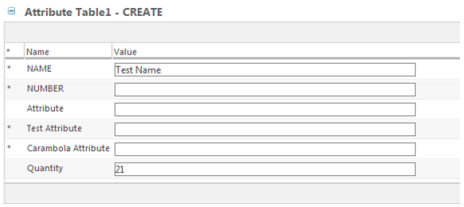
JCA Table



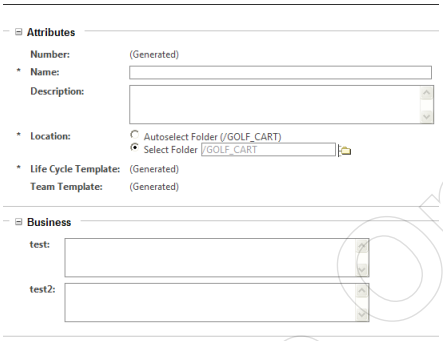
JCA Tree

Other Configs

JcaAttributeTable, JcaPropertyPanel, and JcaAttributePanel



Attribute Table



Attribute Panel

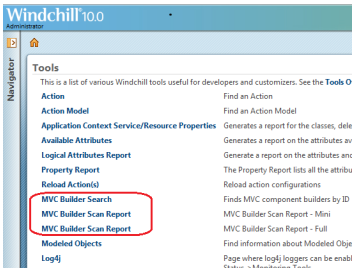
Property Panel

Customization Tools

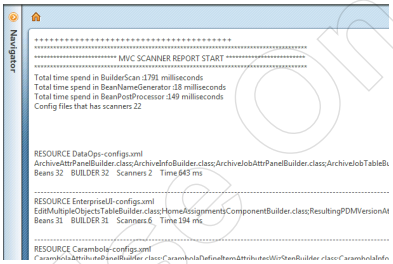
Cutomization Tools

Navigate **Customization** > **Tools**

- MVC Builder Search – Find the Builder given a componentId
- MVC Builder Scan Report – Summary of Files scanned on startup.
  - •log4j.logger.com.ptc.mvc.scan= INFO should be enabled



Tools



Builder Scan Report

Builder Scan Report

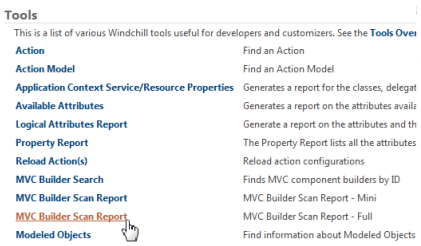
Builder Scan Report Summarizes the Files Found

Enable the report

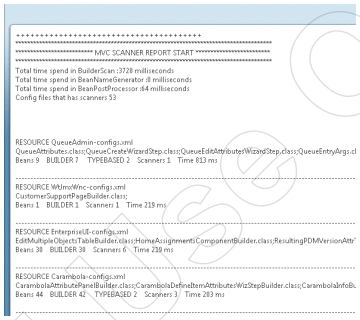
- Add the following line to *%WT_HOME%\codebase\WEB-INF\log4jMethodServer.properties*

```
log4j.logger.wt.pom.properties=INFO
log4j.logger.wt.servlet.ServletRequestMonitor.requestMBean.start=OFF
log4j.logger.wt.wvs.workeragent.StandardCadAgentService=INFO
log4j.logger.com.ptc.mvc.scan=INFO
```

Enable Builder Scan Report



Run the Report from the Tools Page



Sample Report

Exercise 1: Add a Component in Navigation

Objectives

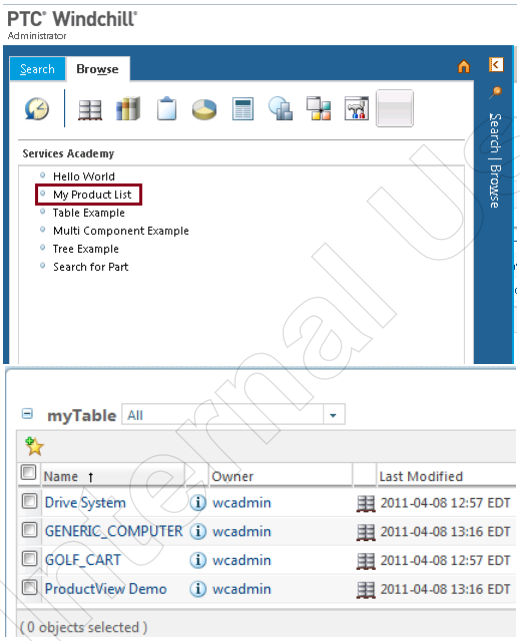
After successfully completing this exercise, you will be able to:

- Add a Web page to the Windchill UI using a Component.
- Create a component builder.
- Register a Component Builder

Scenario

In this exercise, you will create a custom Component Builder which will simply draw a table.

Screenshots below is the expected output for this exercise.



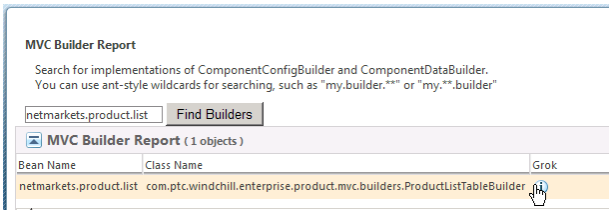
Task 1: Determine the table to use as a template.

1. The View Products page will be used as the example for this exercise. Click the link to reveal the URL information.

2. Note the URL that is displayed.
   Example:
   http://server-name/Windchill/app/#ptc1/comp/netmarkets.product.list

Task 2: Copy and modify the Builder.

1. Use the MVC Builder Search tool to determine the Builder for this page. Performing a Builder Search via **Customization** Tab > **Tools** >**MVC Builder Search**
2. Enter the keywords: **netmarkets.product.list** to find the builder.
   Example:



MVC Builder Search Results

3. In Eclipse, under the **src** folder, create a package named: **com.ptc.serviceAcademy.builders**, create class named: **MyProductListTableBuilder.**
4. Update the code with below content.
   Result:

```
package com.ptc.serviceAcademy.builders;

import wt.util.WTException;

/**
 * MVC builder class for Product List table
 */
@ComponentBuilder("com.ptc.serviceAcademy.builders.MyProductListTableBuilder")
public class MyProductListTableBuilder extends AbstractConfigurableTableBuilder{
    private final ClientMessageSource messageSource = getMessageSource("com.ptc.windchill.enterprise.product.ProductClientResource");


     * (non-Javadoc)
    @Override
    public Object buildComponentData(ComponentConfig config, ComponentParams params) throws Exception {

        String tableId="com.ptc.serviceAcademy.builders.MyProductListTableBuilder";
        return ProductListCommand.getProducts(tableId);
    }

    @Override
    public ComponentConfig buildComponentConfig(ComponentParams params) throws WTException {
        String helpContext ="ProductsHelp";
      ComponentConfigFactory factory = getComponentConfigFactory();
        TableConfig table = factory.newTableConfig();
        table.setId("com.ptc.serviceAcademy.builders.MyProductListTableBuilder");
        table.setConfigurable(true);
        table.setType("wt.pdmlink.PDMLinkProduct");
        table.setLabel("myTable");
        table.setActionModel("product list");
        table.setSelectable(true);
        table.setHelpContext(helpContext);
```

Refer Lab Files for MyProductListTableBuilder.java code.

5. Compile the Java code.

In Eclipse, the function **Build Automatically** is chosen by default. it means that every time when you save the files, the .java files will be automatically compiled. To check that, go to Project, and select **Build Automatically.**

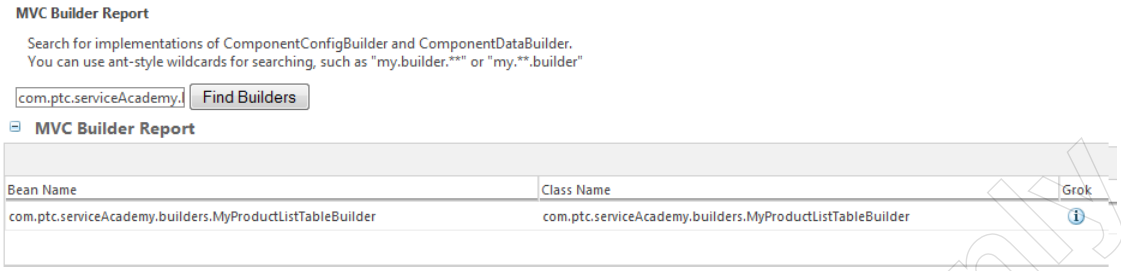
Task 3: Update the Builder.

1. Update the custom.xml file under*%WT_HOME%\codebase\ config\mvc*
   Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<beans xmlns="http://www.springframework.org/schema/beans"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:context="http://www.springframework.org/schema/context"
    xmlns:mvc="http://www.ptc.com/schema/mvc"
    xsi:schemaLocation="
http://www.springframework.org/schema/beans
http://www.springframework.org/schema/beans/spring-beans-2.5.xsd
http://www.springframework.org/schema/context
http://www.springframework.org/schema/context/spring-context-2.5.xsd
http://www.ptc.com/schema/mvc http://www.ptc.com/schema/mvc/mvc-10.0.xsd">

    <!-- Configurations in this file override all other configurations -->
    <mvc:builder-scan base-package="com.ptc.serviceAcademy.builders"/>

</beans>
```

2. Deploy through lightbuild if you have made the above change in eclipse and Restart Servers.
3. Verify that your builder was loaded by performing a Builder Search via **Customization** Tab > **Tools** >**MVC Builder Search**

4. Search with com.ptc.serviceAcademy.*
   Example:



Builder Search for Customization

Task 4: Register the Actions.

1. Update the custom-actions.xml under *codebase\config\actions*
   Example:

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>
</objecttype>
```

custom-actions.xml Entry

Refer Lab Files for custom-actions.xml.

2. Update the custom-actionModel.xml under *codebase\config\actions.*
   Example:

```
<model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
</model>
```

custom-actionModels.xml Entry

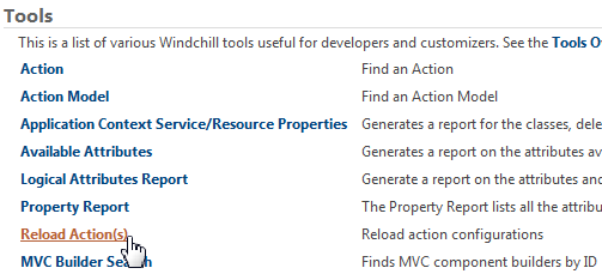
Refer Lab Files for custom-actionModels.xml.

3. Update the resource bundles: NavigationRB.java and NavigationRB_en_US.java files.
   Result:

```
@RBEntry("My Product List")
public static final String OBJECT_MYPRODUCTLISTTABLE_DESCRIPTION = "object.myProductListTable.description";

@RBEntry("My Product List")
public static final String OBJECT_MYPRODUCTLISTTABLE_TITLE = "object.myProductListTable.title";

@RBEntry("My Product List")
public static final String OBJECT_MYPRODUCTLISTTABLE_TOOLTIP = "object.myProductListTable.tooltip";
```

Refer Lab Files for NavigationRB and NavigationRB_en_US Java files.

4. Reload the Actions
   Example:



Task 5: Deployment.

1. Use lightbuild to deploy the component.
2. Restart the Method Server.
3. Navigate to **Service Academy** >**My Product List** to check the table.

Completion Criteria

1. The second tab displayed in the **Navigator** >**ServiceAcademy**.
2. A product list table displayed in the page.

This completes the exercise.

Exercise 2: Create Custom-Type Information Page

Objectives

After successfully completing this exercise, you will be able to:

- Create Information Page that has tabs.
- Create custom-type Information Page.

Scenario

When “i” icon is clicked on Folder Page, you will be directed to custom-type Information Page that shows details.

Existing components are shown for contents in tab navigation.

Task 1: Define a soft type.

1. Create “MyPart” as a subtype of Part type.
2. Log on as wcadmin.
3. Click "Site > Utility > Type and Attribute Management > Manage Types."
4. Select “Part” type and create a new subtype.
5. Specify com.ptc.MyPart for Internal Name and “MyPart” for Display Name.

Task 2: Define an action model.

1. Update the custom-actionModels.xml for “myPartInfoPageTabSet” as follows:
   Result:

```
<model name="myPartInfoPageTabSet" resource="com.ptc.core.ui.navigationRB">
 <submodel name="partInfoDetailsTab"/>
 <action name="productStructureGWT" type="psb"/>
 <submodel name="changesTab"/>
</model>
```

Refer Lab Files for custom-actionModels.xml file.

2. Update the custom-actions.xml as follows:
   Result:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE listofactions SYSTEM "actions.dtd">
<listofactions>
<objecttype name="navigation" class="" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
      <action name="serviceAcademy">
      </action>
 </objecttype>

    <objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
     <action name="helloWorld">
           <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
     </action>

     <action name="myProductListTable">
           <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page" />
     </action>
      <action name="productStructureGWT">
           <component name="com.ptc.serviceAcademy.builders.MyPartInfoPageBuilder" windowType="page" />
     </action>
```

Refer Lab Files for custom-actions.xml file.

Task 3: Modify the custom part menu.

1. Create “myPartInfoPage.jsp” for Information Page.
2. Save it in %WT_HOME%\codebase\WEB-INF\jsp\serviceAcademy
   Result:

```
<%@page language="java" session="true" pageEncoding="utf-8"%>
<%@taglib uri="http://www.ptc.com/windchill/taglib/core" prefix="wc"%>
<%@taglib uri="http://www.ptc.com/windchill/taglib/jcaMvc" prefix="mvc"%>
<%@include file="/netmarkets/jsp/util/begin_comp.jspf"%>
Welcome to My Part Information Page !!
<mvc:infoPage/>
<%@include file="/netmarkets/jsp/util/end_comp.jspf"%>
```

Refer Lab Files for myPartInfoPage.jsp file.

Task 4: Create a builder for Information Page.

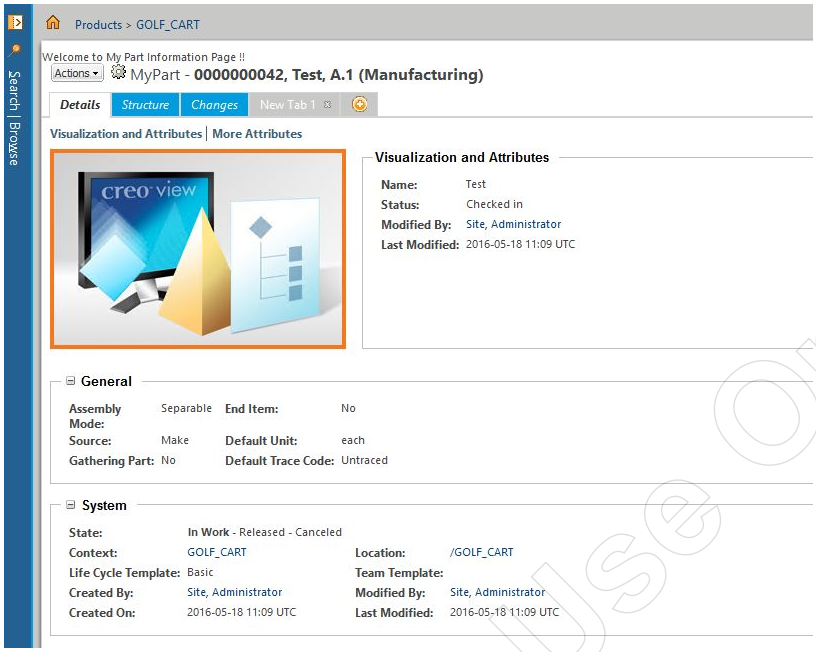
1. Create the builder package and class as “com.ptc.serviceAcademy.builders” and “MyPartInfoPageBuilder” as follows.
   Result:

```
package com.ptc.serviceAcademy.builders;
import wt.util.WTException;
import com.ptc.mvc.components.ComponentParams;
import com.ptc.mvc.components.InfoConfig;
import com.ptc.mvc.components.OverrideComponentBuilder;
import com.ptc.mvc.components.TypeBased;
import com.ptc.windchill.enterprise.part.mvc.builders.PartInfoBuilder;
@TypeBased("wt.part.WTPart|com.ptc.MyPart")
@OverrideComponentBuilder
public class MyPartInfoPageBuilder extends PartInfoBuilder {
@Override
public InfoConfig buildInfoConfig(ComponentParams params) throws WTException {
InfoConfig config = super.buildInfoConfig(params);
config.setTabSet("myPartInfoPageTabSet");
config.setView("/serviceAcademy/myPartInfoPage.jsp");
return config;
}}
```

Refer Lab FIles for MyPartInfoPageBuilder.java file.

Task 5: Deploy and test.

1. Deploy the code with lightBuild.
2. Restart the Method Server.
3. Create MyPart object.
4. Show Information Page.



Completion Criteria

1. Created custom-type information page successfully.

This completes the exercise.

Exercise 3: Create a Table Component

Objectives

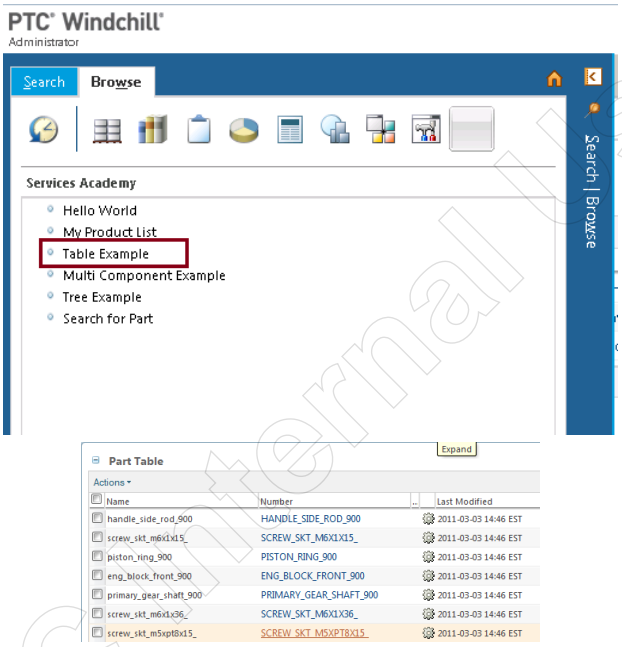
After successfully completing this exercise, you will be able to:

- Create a Table Customization.
- Register a new MVC builder.

Scenario

In this exercise, you will create a Table customization using MVC. In this customization, you will see additional available features for configuring table display.

Screenshots below is the expected output for this exercise.



Task 1: Create the Builder.

1. Create a Java file *TableBuilder.java* in the package **com.ptc.serviceAcademy.builders**

   As the package **com.ptc.serviceAcademy.builders** has already been registered, so when you put other classes in this package, there is no need to registered again, method server will scan the whole package to find the builders.

2. Update the code in the *TableBuilder.java* file as is displayed in the following:
   Result:

```
package com.ptc.serviceAcademy.builders;

import wt.fc.PersistenceHelper;
import wt.part.WTPart;
import wt.query.QuerySpec;
import wt.util.WTException;
import com.ptc.mvc.components.AbstractComponentBuilder;
import com.ptc.mvc.components.ComponentBuilder;
import com.ptc.mvc.components.ComponentConfig;
import com.ptc.mvc.components.ComponentConfigFactory;
import com.ptc.mvc.components.ComponentParams;
import com.ptc.mvc.components.TableConfig;

@ComponentBuilder("com.ptc.serviceAcademy.builders.TableBuilder")
public class TableBuilder  extends AbstractComponentBuilder{

    @Override
    public Object buildComponentData(ComponentConfig arg0, ComponentParams arg1) throws Exception {
         QuerySpec qs=new QuerySpec(WTPart.class);
         qs.setQueryLimit(10000);
         return PersistenceHelper.manager.find(qs);
    }

    @Override
    public ComponentConfig buildComponentConfig(ComponentParams arg0) throws WTException {
        ComponentConfigFactory factory = getComponentConfigFactory();
        TableConfig table = factory.newTableConfig();
        table.setLabel("Part Table");
        table.setSelectable(true);
        //set the actionModel that comes in the Table Tool bar
        table.setActionModel("mvc_tables_toolbar");

        table.addComponent(factory.newColumnConfig("name", true));
        table.addComponent(factory.newColumnConfig("number", true));
        table.addComponent(factory.newColumnConfig("type", true));
        table.addComponent(factory.newColumnConfig("thePersistInfo.modifyStamp", true));

        return table;
    }
}
```

Refer Lab Files for Tablebuilder.java code.

Task 2: Incorporate the Builder into the UI.

1. Update custom-actions.xml to create an action for the builder
   Result:

```
<objecttype name="navigation" class="" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="serviceAcademy">
    </action>
</objecttype>

<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>
</objecttype>
```

Addition of Action

Refer Lab Files for custom-actions.xml.

2. Update Action Framework custom-actionModels.xml
   Example:

```
<model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
    <action name="tableExample" type="object"/>
</model>
```

Refer Lab Files for custom-actionModels.xml.

3. Update the Resource Bundle in the two files: *NavigationRB.java* and *NavigationRB_en_US.java*.
   Example:

```
@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_DESCRIPTION = "object.tableExample.description";

@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_TITLE = "object.tableExample.title";

@RBEntry("Table Example")
public static final String OBJECT_TABLEEXAMPLE_TOOLTIP = "object.tableExample.tooltip";
```

Refer Lab Files for NavigationRB and NavigationRB_en_US Java files.

Task 3: Deploy the code and review the result.

1. Use lightbuild to deploy the component.
2. Restart Windchill.
3. You should see the example in the custom tab.

Completion Criteria

1. The second tab displayed in the **Navigator** >**ServiceAcademy**.
2. A part list table displayed in the page.

This completes the exercise.

Exercise 4: Create a Page with Multiple MVC JCA Components

Objectives

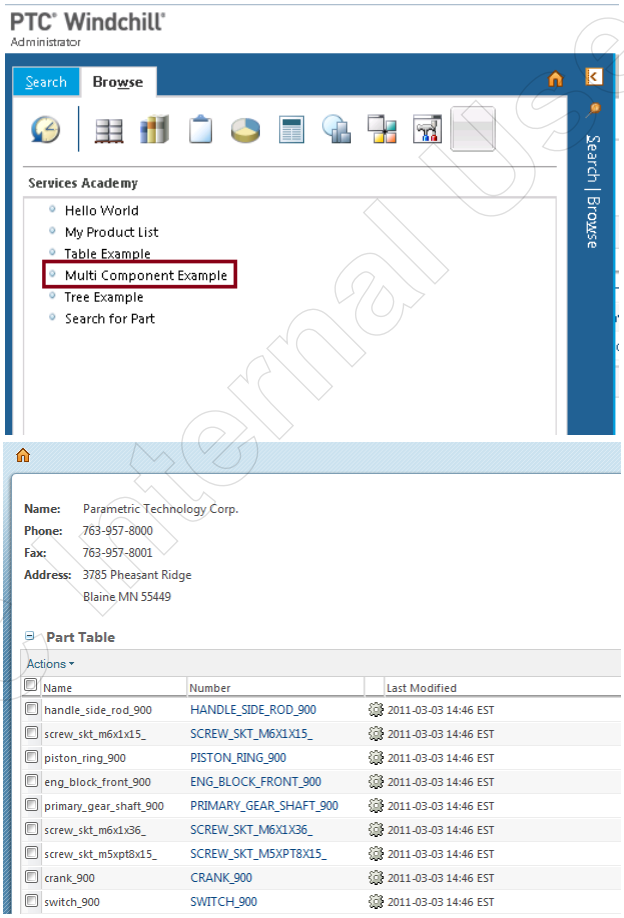
After successfully completing this exercise, you will be able to:

- Modify the View Component in MVC.
- Incorporate multiple JCA components in a single view.
- Incorporate JavaScript into a new View.

Scenario

In this exercise, you will place both a property panel and a table in a single view.

Screenshots below is the expected output for this exercise.



Task 1: Create a JAVA file to make an AttributePanel builder.

1. In Eclipse, create a Java file which will be called *AttributePanelBuilder.java* and will be located in the package:
   `com.ptc.serviceAcademy.builders`
   .
2. Update the content of the files.
   Example:

```
package com.ptc.serviceAcademy.builders;

import java.util.HashMap;
import java.util.Map;
import wt.util.WTException;
import com.ptc.mvc.components.AbstractComponentBuilder;
import com.ptc.mvc.components.AttributeConfig;
import com.ptc.mvc.components.AttributePanelConfig;
import com.ptc.mvc.components.ComponentBuilder;
import com.ptc.mvc.components.ComponentConfig;
import com.ptc.mvc.components.ComponentConfigFactory;
import com.ptc.mvc.components.ComponentParams;

@ComponentBuilder(value="com.ptc.serviceAcademy.builders.AttributePanelBuilder")
public class AttributePanelBuilder extends AbstractComponentBuilder{

    @Override
    public Object buildComponentData(ComponentConfig arg0, ComponentParams arg1)
            throws Exception {

        Map<String,String> address=new HashMap<String,String>();
        address.put("name", "Parametric Technology Corp.");
        address.put("phone", "763-957-8000");
        address.put("fax", "763-957-8001");
        address.put("address1", "3785 Pheasant Ridge");
        address.put("address2", "Blaine MN 55449");
        return address;
    }
    @Override
    public AttributePanelConfig buildComponentConfig(ComponentParams arg0)
            throws WTException {

        ComponentConfigFactory factory = getComponentConfigFactory();
        AttributePanelConfig panelConfig=factory.newAttributePanelConfig();
        panelConfig.addComponent(getAttributeConfig("name", "Name"));
        panelConfig.addComponent(getAttributeConfig("phone", "Phone"));
        panelConfig.addComponent(getAttributeConfig("fax", "Fax"));
        panelConfig.addComponent(getAttributeConfig("address1", "Address"));
        panelConfig.addComponent(getAttributeConfig("address2", ""));
        return panelConfig;

    }
     private AttributeConfig getAttributeConfig(String id, String label) {
            AttributeConfig attributeConfig = getComponentConfigFactory().newAttributeConfig();
            attributeConfig.setId(id);
            attributeConfig.setLabel(label);
            return attributeConfig;
        }
}
```

An override annotation indicates that the annotated method is required to override a method in a super class. If a method with this annotation does not override its super-class's method, the compiler will generate an error.

AttributePanelBuilder.java

Refer Lab Files for AttributePanelBuilder.java code.

Task 2: Create an JAVA file which will be called *MultiComponentBuilder.java* .

1. In Eclipse, create a java file which will be called *MultiComponentBuilder.java* and will be located in the package:
   `com.ptc.serviceAcademy.builders`
2. Update the content of the file:
   Example:

```
package com.ptc.serviceAcademy.builders;

import wt.util.WTException;

import com.ptc.mvc.components.AbstractComponentConfigBuilder;
import com.ptc.mvc.components.ComponentBuilderType;
import com.ptc.mvc.components.ComponentConfig;
import com.ptc.mvc.components.ComponentParams;
import com.ptc.mvc.components.ComponentBuilder;
import com.ptc.mvc.components.MultiComponentConfig;


@ComponentBuilder(value="com.ptc.serviceAcademy.builders.MultiComponentBuilder",type=ComponentBuilderType.CONFIG_ONLY)
public class MultiComponentBuilder extends AbstractComponentConfigBuilder{

    @Override
    public ComponentConfig buildComponentConfig(ComponentParams arg0)
            throws WTException {
        // TODO Auto-generated method stub

        MultiComponentConfig multiComp = new MultiComponentConfig();
        multiComp.addNestedComponent("com.ptc.serviceAcademy.builders.AttributePanelBuilder");
        multiComp.addNestedComponent("com.ptc.serviceAcademy.builders.TableBuilder");
        multiComp.setView("/serviceAcademy/multiComponentView.jsp");

        return multiComp;
    }
}
```

MultiComponentBuilder.java

Refer Lab Files for MultiComponentBuilder.java file.

Task 3: Create a JSP view for rendering the multiple components.

1. In Eclipse, under the folder *codebase*, create a new folder which is named: *WEB-INF*, in the folder *WEB-INF*, create a folder *jsp*, in the folder, create a folder *serviceAcademy*.

Example:

2. In the folder *codebase/WEB-INF/jsp/serviceAcademy/*, create a jsp file which will be called *multiComponentView.jsp*
3. Update the content of the file
   Example:

```
<%@ taglib uri="http://www.ptc.com/windchill/taglib/jcaMvc" prefix="mvc"%>
<%@ taglib uri="http://www.ptc.com/windchill/taglib/components" prefix="wca" %>



<!-- render the attributepanel -->
<mvc:simpleAttributePanel/>

<!-- render the table -->
<mvc:table compId="com.ptc.serviceAcademy.builders.TableBuilder"/>
```

multiComponentView.jsp

Refer Lab Files for MultiComponentView.jsp file.

Task 4: Incorporate the Builder into the UI.

1. Update custom-actions.xml to create an action for the builder.
   Result:

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>

    <action name="multiComponent">
        <component name="com.ptc.serviceAcademy.builders.MultiComponentBuilder" windowType="page"/>
    </action>
</objecttype>
```

Additions on custom-actions.xml

Refer Lab Files for custom-actions.xml.

2. Update Action Framework custom-actionModels.xml
   Result:

```
<model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
    <action name="tableExample" type="object"/>
    <action name="multiComponent" type="object"/>
</model>
```

Refer Lab Files for custom-actionModels.xml.

3. Update the Resource Bundle in the two files: *NavigationRB.java* and *NavigationRB_en_US.java*
   Example:

```
@RBEntry("Multi Component Example")
public static final String OBJECT_MULTICOMPONENT_DESCRIPTION = "object.multiComponent.description";

@RBEntry("Multi Component Example")
public static final String OBJECT_MULTICOMPONENT_TITLE = "object.multiComponent.title";

@RBEntry("Multi Component Example")
public static final String OBJECT_MULTICOMPONENT_TOOLTIP = "object.multiComponent.tooltip";
```

Additions on the Two RB Files

Refer Lab Files for NavigationRB_en_US java files.

Task 5: Deploy and Test your code.

1. Use lightBuild to deploy the component.
2. Restart Windchill.
3. Check your results

Completion Criteria

1. The second tab displayed in the **Navigator** >**ServiceAcademy**.
2. The attribute panel and the part list table displayed in the same page.

This completes the exercise.

Exercise 5: Create a Tree Component

Objectives

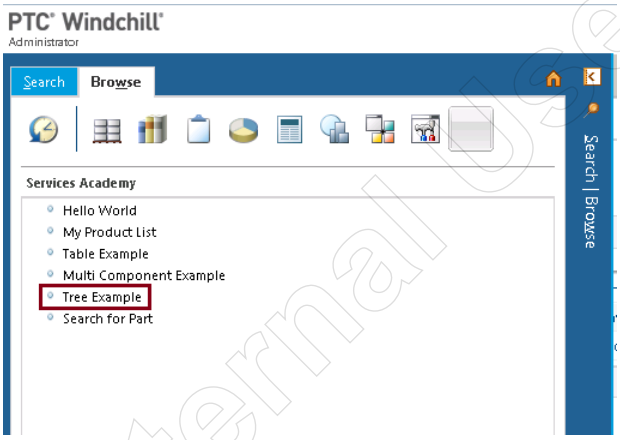
After successfully completing this exercise, you will be able to:

- Create a Tree Component.
- Use Carambola examples.
- Build data nodes for ComponentData in Tree Component.

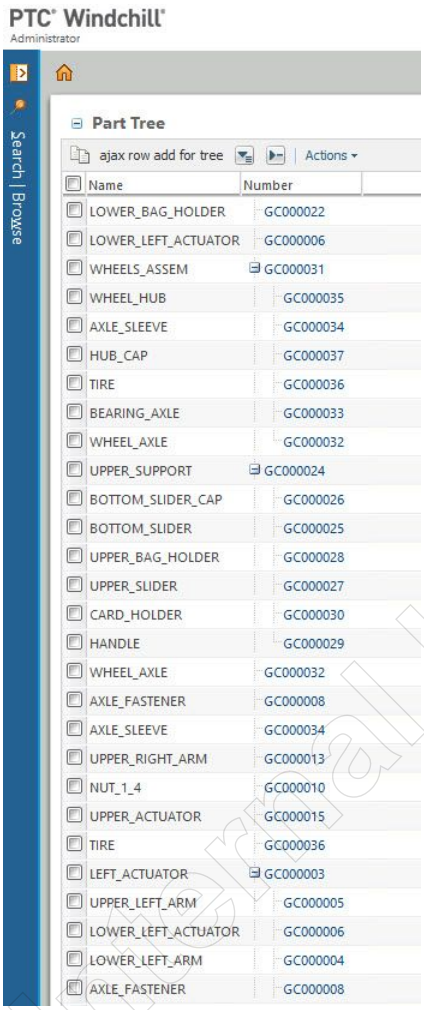
Scenario

In this exercise, you will configure a simple tree using MVC builder.

Screenshots of "Tree Example in Menu" and "Tree Example" are the expected output for this exercise.



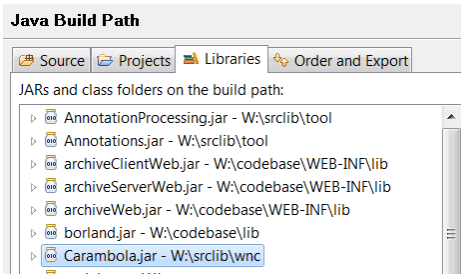
Tree Example in Menu



Tree Example

Prerequisites

This example uses example code in Carambola.jar (com.ptc.carambola.customization.examples.tree package).



Modified Build Path

Please note that W:\ in above figure is WT_HOME path.

Task 1: Create the Builder.

1. In Eclipse, create the Builder in the package `com.ptc.serviceAcademy.builders` ,name the builder : **TreeBuilder.java**.
   Result:


```
package com.ptc.serviceAcademy.builders;

import wt.util.WTException;


import com.ptc.mvc.components.AbstractComponentBuilder;
import com.ptc.mvc.components.ComponentBuilder;
import com.ptc.mvc.components.ComponentConfig;
import com.ptc.mvc.components.ComponentConfigFactory;
import com.ptc.mvc.components.ComponentParams;
import com.ptc.mvc.components.TreeConfig;
import static com.ptc.core.components.descriptor.DescriptorConstants.ColumnIdentifiers.NUMBER;
import static com.ptc.core.components.descriptor.DescriptorConstants.ColumnIdentifiers.NAME;


@ComponentBuilder("com.ptc.serviceAcademy.builders.TreeBuilder")
public class TreeBuilder extends AbstractComponentBuilder {

    @Override
    public Object buildComponentData(ComponentConfig config, ComponentParams params) throws WTException {
        return new TreeHandler();
    }
    @Override
    public  ComponentConfig buildComponentConfig(ComponentParams params) throws WTException {
        ComponentConfigFactory factory = getComponentConfigFactory();
        TreeConfig tree = factory.newTreeConfig();
        tree.setLabel("Part Tree");
        tree.setSelectable(true);
        tree.setActionModel("CustEx_tree_toolbar");
        tree.setNodeColumn(NUMBER);
        tree.setExpansionLevel("full");
        tree.setDisableAction("false");
        tree.addComponent(factory.newColumnConfig(NAME,true));
        tree.addComponent(factory.newColumnConfig(NUMBER,true));
        return tree;
    }

}
```

TreeBuilder.java

Refer Lab Files for TreeBuilder.java code.
There will be a new Class for implementing the method created in the next steps.

Task 2: Create the Class **TreeHandler.java**.

1. In the package com.ptc.serviceAcademy.builders, create a new Class named:
   TreeHandler.java
   Example:

```
package com.ptc.serviceAcademy.builders;

import java.util.*;
import com.ptc.mvc.builders.carambola.tree.CustExTreeHandler;
import wt.fc.Persistable;
import wt.fc.collections.WTArrayList;
import wt.part.WTPart;
import wt.part.WTPartHelper;
import wt.util.WTException;
import wt.vc.config.ConfigSpec;

public class TreeHandler extends CustExTreeHandler {

   private ConfigSpec configSpec;
   /**
    * Get the root node from the command bean,
    * and get a config spec based on the root node
   **/
   public List getRootNodes() throws WTException {
      return getRootAsParts();
   }
   /**
    * Get the child parents for the given list of parent parts
   **/
  public Map<Object,List> getNodes(List parents) throws WTException {
     if (configSpec == null) {
        configSpec = getDefaultConfigSpec();
     }
     Map<Object,List> result = new HashMap<Object,List>();
     //API returns a 3D array where the 1st dim is the parent parts,
     //the 2nd dim is the list of children for a given parent,
     //and the 3rd dim is 2 element array w/the link obj at 0 and the child part at 1
     Persistable[][][] all_children = WTPartHelper.service.getUsesWTParts(new WTArrayList(parents), configSpec);
     for (ListIterator i = parents.listIterator(); i.hasNext();) {
        WTPart parent = (WTPart)i.next();
        Persistable[][] branch = all_children[i.previousIndex()];
        if (branch == null) {
           continue;
        }
        List children = new ArrayList(branch.length);
        result.put(parent,children);
        for (Persistable[] child : branch) {
           children.add(child[1]);
        }
     }
     return result;
  }
```

TreeHandler.java

Refer Lab Files for TreeHandler.java code.

Task 3: Add the actions.

1. Create the action for navigating the tree builder
   Example:

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>

    <action name="multiComponent">
        <component name="com.ptc.serviceAcademy.builders.MultiComponentBuilder" windowType="page"/>
    </action>

    <action name="treeExample">
        <component name="com.ptc.serviceAcademy.builders.TreeBuilder" windowType="page"/>
    </action>


</objecttype>
```

custom-actions.xml

Refer Lab Files for custom-actions.xml file.

2. Add the action to the ActionModel
   Example:


```
<model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
    <action name="tableExample" type="object"/>
    <action name="multiComponent" type="object"/>
    <action name="treeExample" type="object"/>
</model>
```

custom-actionModels.xml

Refer Lab Files for custom-actionModels.xml file.

Task 4: Update the ResourceBundles.

1. Update the files **NavigationRB.java** and **NavigationRB_en_US.java**
   Example:

```
@RBEntry("Tree Example")
public static final String OBJECT_TREEEXAMPLE_DESCRIPTION = "object.treeExample.description";

@RBEntry("Tree Example")
public static final String OBJECT_TREEEXAMPLE_TITLE = "object.treeExample.title";

@RBEntry("Tree Example")
public static final String OBJECT_TREEEXAMPLE_TOOLTIP = "object.treeExample.tooltip";
```

Refer Lab Files for NavigationRB and Navigation_en_US java files.

Task 5: Deployment.

1. Use lightBuild to deploy the component.
2. Restart Windchill.
3. Check the result.

Completion Criteria

1. The second-level tab displayed in the **Navigator** >**ServiceAcademy**.
2. A part list tree displayed in the page.

This completes the exercise.

Module 5

Client-Side Technologies

Module Overview

In this module, we review the Client-side technologies, describe JavaScript and the two JavaScript third-party libraries which are used in Windchill.

Objectives

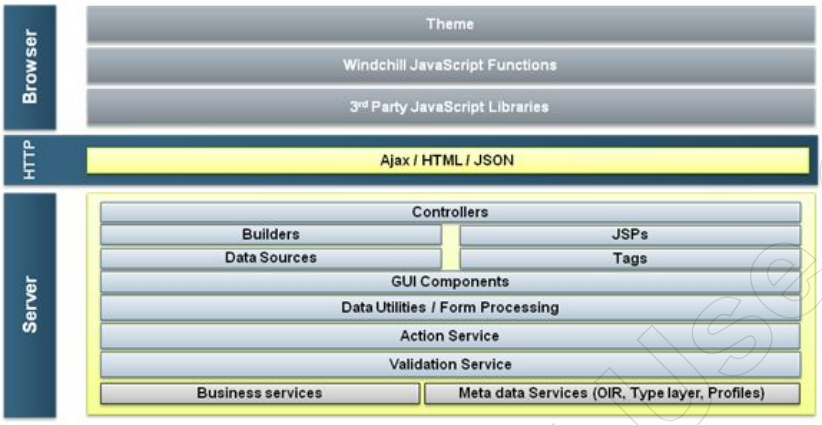
After completing this module, you will be able to:

- Describe the client-side technologies in Windchill.
- Explain the two JavaScript third-party libraries: Prototype and ExtJS.
- Explain how JavaScript is used in Windchill.
- Create a search Page and make the MVC table builder to display the result.

Windchill Client Framework

Windchill Client Architecture

The Windchill Client Architecture provides a framework for building pages easily and consistently by providing a standard set of components and services that are configurable and customizable.



Windchill Client Framework

The Framework Explanation

- The set of components includes, but is not limited to, a table, a tree, an information page, a wizard, and a dynamic JavaScript menu.
- At a lower level, these container components use other common components, called actions, action models and GUI components, to display data inside them.
- GUI Components are objects that define how an attribute is to be rendered. They are controlled though properties set in the Data Utilities. A GUI Component also contains a renderer that is responsible for writing out the HTML and/or JavaScript.

JavaScript Key Points

A Few Things to Understand Upfront about JavaScript

JavaScript is a prototype-based scripting language that is dynamic, weakly typed and has first-class functions. It is a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles.

- JavaScript has prototypal inheritance.
  - This means that objects in JavaScript inherit from other objects, not classes.
- JavaScript is dynamic and weakly typed.
  - This means that most of the type checking normally done by the compiler is done at runtime in JavaScript.
  - It also means that most type conversions as well as ad hoc polymorphism (object property and function inheritance) are done at runtime.
- JavaScript has a global namespace.
  - This means that JavaScript code begins in a global container and anything created in that container can be referenced anywhere else in the container.
- JavaScript gives first-class status to functions.
  - This means that functions are objects and can have properties and methods, can be created, assigned to variables, passed as arguments, returned by other functions, and manipulated like any other object.

JavaScript Used in Windchill 11.0

- JavaScript is being used to a far greater extent in Windchill 10.0 than in previous releases such as Windchill 9.1.
- Though many customizations can be done without involving any custom JavaScript functionality, it is more vital now to understand how to best integrate custom JavaScript functionality into Windchill 11.0, as well as the best practices for writing custom JavaScript code.

JavaScript with Windchill

Using JavaScript with Windchill

- JavaScript can be integrated into either JSP pages (using the JSP or legacy approach to MVC) or into JSP views (using the Spring or builder approach to MVC).
- JavaScript can be included in one of three ways:
  - When created inside a *.js file and included as a source library in a JSP.
  - When created directly inside <script> tags in the JSP page or JSP view.
  - When created as a *.jsfrag file and compiled into main.js

This is a Windchill only option.

- There are two JavaScript third-party libraries which are used in Windchill:
  - Prototype
  - ExtJs

The detailed description about the two third-party libraries will be introduced in the following pages.

Three Ways to Include JavaScript in Windchill

- Option 1: Create a *.js library file of JavaScript functions and/or objects and include the file as a source library in a JSP.

```
<html>
<script type="Javascript" src="netmarkets/javascript/components/wizard.js"/>
<head>
<title>Insert title here</title>
</head>
<body>
</body>
</html>
```

- Option 2: Create the JavaScript directly in <script> tags in a JSP file:

```
<html>
<script type="Javascript" src="netmarkets/javascript/components/wizard.js"></script>
<head>
<title>Insert title here</title>
</head>
<body>
</body>
<script type="Javascript">
    var myVar = "hello";
    function myFunction()
    {
        alert("some javascript");
    }
</script>
</html>
```

- Option 3: Build a custom JavaScript library into Windchill's main.js file which is included in all pages.
  - This is a good option if you are planning to extend the Windchill JavaScript libraries and will be using these extensions throughout many different contexts.
  - There are two steps to accomplish this:
    1. Create a *.jsfrag file and move it to *WT_HOME/codebase/netmarkets/javascript/jsfrags*
    2. Run the following Windchill jsfrag compile script: From a Windchill shell on the *WT_HOME/bin* path, run the command: *ant –f jsfrag_combine.xml*

- Make sure the *.jsfrag file contains no errors, otherwise this will break main.js and the entire jsTables JavaScript libraries for rendering
- A tool such as jslint can help find errors: www.jslint.com

Prototype Shortcuts

Prototype JavaScript Library and DOM Shortcuts

The Prototype API, available in Windchill 9.1, Windchill 10 and Windchill 11.0, offers many convenient shortcuts to accessing and manipulating DOM elements.

- document.getElementById('elementId') is replaced with a shorter version $('elementId').

```
<script type="Javascript">

    function myFunction()
    {
        document.getElementById("someId");    // this...
        $("someId");                          // is the same as this...
    }


</script>
```

- The prototype shortcut is much cleaner syntax when longer functions are performed

```
<script type="Javascript">

    function myFunction()
    {
        document.getElementById("someId").onclick=function() { alert("hello"); };

        $("someId").onclick = function() { alert("hello"); };
    }


</script>
```

- Retrieval of elements by css selectors and tag and/or attribute names are realized with the following shortcuts
  - $$("tagName") > getElementsByTagName
  - $$("attr=value") > getElementsByTagAttributeValue (not available elsewhere)

```
function prototypeDemo()
{
    // get element by id
    var htmlTable = $("tableId");

    // get all links with a href of #
    var local_links = $$('a[href="#"]');

    // get all div tags with a 'foo' class
    var foo_divs = $$('div.foo');

}
```

Developers can see the API here: http://api.prototypejs.org/
The Prototype library is available under the open source MIT license.

Prototype and Ajax Abstraction

Prototype and Ajax Abstraction

With prototype, Ajax calls are made simpler:

```
<script type="text/javascript">
//'PTC' is the namespace global object created for Windchill 10
//a namespace global object in the case of javascript is just an boject that is created
//that we extend(prototypal) to define our state,methods, and inner objects...basically
//our API is contained within one object.
PTC.onReady(function(){
    $('serviceAcademy.table').onclick=function(event){
        console.debug(event.target);

        //setup the ajax request based on a parameter
        new Ajax.Request('ptc1/custom/relatedItemsData',{
            method:'post',
            parameters:{changeRecord:'002'},
            onSuccess:function(result){
                alert('Ajax call returned successfully with '+result.responseText);
            },
            onFailure:function(result){
                alert('Ajax call returned unsuccessfully with '+result.responseText);
            }
        });
    };
});
</script>
```

- The Ajax request setup in the example above sends data to a Spring service (static data for the example) and handles the return result through separate “onSuccess” and “onFailure” callback functions.
- The prototype API handles all of the underlying browser differences and provides a single, simple interface from which to create Ajax calls and callbacks.

Prototype and Ajax Update Operation

Prototype and Ajax Update Operation

Prototype can also create an Ajax update operation

- This type of Ajax procedure links an Ajax call directly into a target component in the page.
- In this way, the target component can be updated automatically by the result of the Ajax call.

```
<script type="text/javascript">
//'PTC' is the namespace global object created for Windchill 10
//a namespace global object in the case of javascript is just an boject that is created
//that we extend(prototypal) to define our state,methods, and inner objects...basically
//our API is contained within one object.

PCT.onReady(function(){
    $('serviceAcademy.table').onclick=function(event){
        //setup the ajax request based on a parameter
        new Ajax.Update('contentPanel', 'ptc1/custom/relatedItemsData',{
            method:'post',
            parameters:{changeRecord:'002'},
            insertion:'top'
        });
    };
});
</script>
```

In the above example, the “contentPanel” div element in the page is updated by the result of the Ajax call every time it is fired.

In this specific setup, the Ajax call will just add string content to the top of the content area every time the table on the page is clicked.

ExtJS Overview

What is ExtJS?

ExtJS is a JavaScript library for building interactive Web applications using techniques such as Ajax, DHTML, and DOM scripting.

It was originally an add-on library for YUI (Yahoo! User interface library) but has evolved into a full JavaScript library intended for the implementation of rich Internet applications (RIA).

- RIA Views with ExtJS
  - "RIA" is a term used in the industry to describe a Web-based application which shares many of the characteristics of desktop application software.
  - ExtJS uses Ajax, DHTML, and DOM scripting to mimic these characteristics.

For more information about ExtJS, please go to ExtJS official Website:http://www.sencha.com/products/extjs/

GUI Controls

Ext JS includes a set of GUI-based form controls (or "widgets") for use within Web applications:

- Text field and text area input controls
- Date fields with a pop-up date-picker
- Numeric fields
- List box and combo boxes
- Radio and checkbox controls
- Html editor control
- Grid control (with both read-only and edit modes, sortable data, lockable and draggable columns, and a variety of other features)
- Tree control
- Tab panels
- Toolbars
- Desktop application-style menus
- Region panels to allow a form to be divided into multiple sub-sections
- Sliders
- Vector graphics charts

Many of these controls are able to communicate with a Web server using Ajax.

ExtJS 3 and Windchill

ExtJS JavaScript Library

- Windchill 11.0 utilizes the ExtJS JavaScript library to render much of its UI.
- The ExtJS library starts under a namespace called “Ext” and all of its functionality is encapsulated within that namespace.

```
<%@page language="java" session="true" pageEncoding="utf-8"%>
<%@include file="/netmarkets/jsp/util/begin.jspf" %>

<script language="Javascript">

Ext.onReady(function(){
alert('Hello World!');});
</script>

<%@include file="/netmarkets/jsp/util/end.jspf"%>
```

ExtJS Code Example

ExtJS UI Example

Plug-In for Editing ExtJS

Use the Aptana Studio 3 plugin with Eclipse for code complete with ExtJS and Prototype.

- Eclipse Help > Install New Software
- Link to Add: **http://download.aptana.com/studio3/plugin/install**
- Download the ExtJS 3.2.1 Library: http://www.sencha.com/products/extjs/download/ext-js-3.2.1
- Download the ExtJS sdocml file for Eclipse projects: http://wiki.appcelerator.org/display/tis/JavaScript+Library+Support

Use the 3.3.0 version as there is no 3.2.1 version.

Exercise 1: Create a Search Table

Objectives

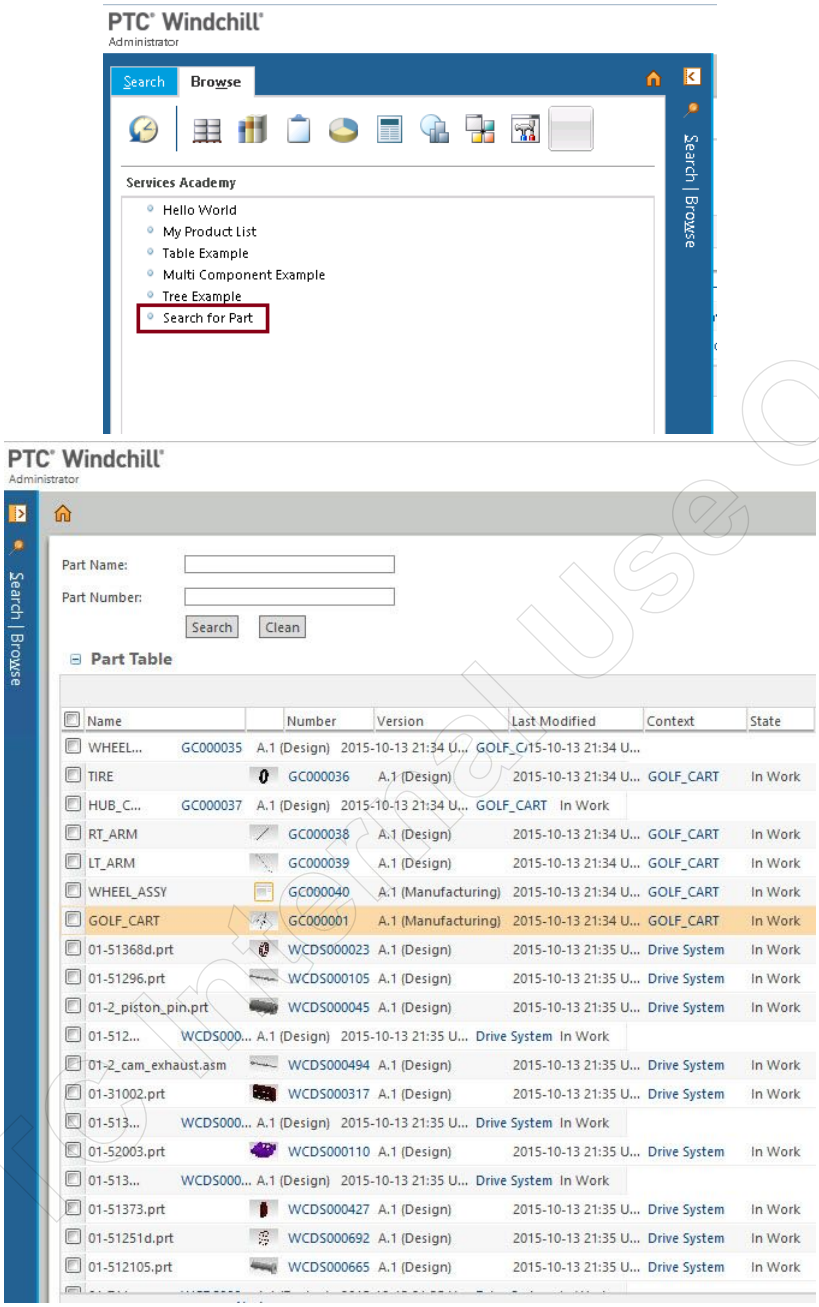
After successfully completing this exercise, you will be able to:

- Create a Search page for searching objects in Windchill
- Transfer the parameters using JavaScript
- Build a MVC Table builder to display the search result

Scenario

In this exercise, you will create a Search page used for searching Windchill object: Part, and make the results displayed in a MVC builder Table.

Screenshots below is the expected output for this exercise.



Part Search Table

Task 1: Create the Builder.

1. In Eclipse, Create a Java file *PartSearchBuilder.java* in the package **com.ptc.serviceAcademy.builders**.

> As the package **com.ptc.serviceAcademy.builders** has already been registered, so when you put other classes in this package, there is no need to register again, and the method server will scan the whole package to find the builders.

Result:

```
package com.ptc.serviceAcademy.builders;

import static com.ptc.core.components.descriptor.DescriptorConstants.ColumnIdentifiers.CONTAINER_NAME;
@SuppressWarnings("unused")
@ComponentBuilder("com.ptc.serviceAcademy.builders.PartSearchBuilder")
public class PartSearchBuilder extends AbstractComponentBuilder {
    private static final String RESOURCE = "com.ptc.carambola.carambolaResource";
    @SuppressWarnings("deprecation")
    @Override
    public Object buildComponentData(ComponentConfig  config, ComponentParams params) throws Exception {
        String number = (String) params.getParameter("number");
        String name = (String) params.getParameter("name");
        if(number != null && number.length() > 0 ) number = number.trim();
        if(name != null && name.length() > 0 ) name = name.trim();
        QueryResult result = null;
        QuerySpec spec = new QuerySpec(WTPart.class);

        if (number != null&& number.length()>0){
            spec.appendWhere(new SearchCondition(WTPart.class, "master>number" , SearchCondition.LIKE, "%"+number+"%"));
        }
        if(name!=null&&name.length()>0) {
            if (number != null&& number.length()>0) {
                spec.appendAnd();
            }
            spec.appendWhere(new SearchCondition(WTPart.class, "master>name" , SearchCondition.LIKE, "%"+name+"%"));
            }
            LatestConfigSpec latestCSpec =  new LatestConfigSpec();
       spec = latestCSpec.appendSearchCriteria(spec);
       result = PersistenceHelper.manager.find(spec);
       return result;
       }
  @Override
 public ComponentConfig buildComponentConfig(ComponentParams params) throws WTException {
    ComponentConfigFactory factory = getComponentConfigFactory();
    ClientMessageSource messageSource = getMessageSource(RESOURCE);
    TableConfig table = factory.newTableConfig();
    table.setLabel(messageSource.getMessage("PART_TABLE_LABEL"));
    //make row in the table selectable
    table.setSelectable(true);
    table.addComponent(factory.newColumnConfig(NAME,false));
    //thumbnail icon
    table.addComponent(factory.newColumnConfig("smallThumbnail",false));
    table.addComponent(factory.newColumnConfig(NUMBER,false));
    table.addComponent(factory.newColumnConfig(VERSION,true));
    table.addComponent(factory.newColumnConfig(LAST_MODIFIED,true));
    table.addComponent(factory.newColumnConfig(CONTAINER_NAME,false));
    table.addComponent(factory.newColumnConfig(STATE,true));
    return table;

}
}
```

PartSearchBuilder.java

Refer Lab Files for PartSearchBuilder.java code.

Task 2: Create the Search UI Page.

1. Create a JSP file *partSearch.jsp* in the folder location *codebase/netmarkets/jsp/serviceAcademy/*.
2. Draw a search page using HTML language.
   Example:

```
<%@page language="java" session="true" pageEncoding="UTF-8"%>
<%@ taglib prefix="jca" uri="http://www.ptc.com/windchill/taglib/components"%>
<%@ taglib prefix="mvc" uri="http://www.ptc.com/windchill/taglib/jcaMvc"%>
<%@include file="/netmarkets/jsp/util/begin.jspf" %>


<table width="100%" border="0">
    <tr>
        <td height="25" width="100px" class="wizFormLabel">Part Name: </td>
        <td>
            <input type="text" size="25px" id="partSearchName" name="partSearchName">
        </td>
    </tr>
    <tr>
        <td height="25"  class="wizFormLabel">Part Number: </td>
        <td>
            <input type="text" size="25px" id="partSearchNum" name="partSearchNum" value=""
            onkeyup="javascript:this.value=this.value.toUpperCase();">
        </td>
    </tr>
    <tr>
        <td></td>
        <td class="wizFormLabel">
            <input type="button" size="15px" id="partSearchSubmit" name="partSearchSubmit"
            value="Search" onClick="submitDocSearch();">
               
            <input type="button" size="15px" id="partSearchClean" name="partSearchClean" value="Clean"
            onClick="clean();">
        </td>
    </tr>
</table>

<!-- here is the place for loading the result table -->
<div id="mvcTable">
    <mvc:tableContainer compId="com.ptc.serviceAcademy.builders.PartSearchBuilder" height="600" />
</div>

<%@ include file="/netmarkets/jsp/util/end.jspf"%>
```

partSearch.jsp

3. Fill the JavaScript functions.

Example:

```
<script>
    function submitDocSearch(){
        var ecnImg = document.getElementById('mvcTable');
        ecnImg.style.display="";
            submitParameters();
    }

    function submitParameters() {
        var number = document.getElementById('partSearchNum').value;
        var name = document.getElementById('partSearchName').value;
        var params = {
                number : number,
                name : name
        };
        //reload the table builder
        PTC.jca.table.Utils.reload('com.ptc.serviceAcademy.builders.PartSearchBuilder', params, true);
    }

    function clean(){
        //clear the textbox number
            var filetextNum = document.getElementById("partSearchNum");
            if (filetextNum.outerHTML) {
                filetextNum.outerHTML = filetext.outerHTML;
              } else {
                 filetextNum.value = "";
              }
        //clear the textbox name
            var filetextName = document.getElementById("partSearchName");
            if (filetextName.outerHTML) {
                filetextName.outerHTML = filetext.outerHTML;
              } else {
                 filetextName.value = "";
              }
    }
</script>
```

Refer Lab Files for partSearch.jsp code.
Refer the below link to enable the Java Code Validation and ways to configure JavaScript with eclipse using JSHint plugins.
https://ssp.ptc.com/wiki/display/lms/Eclipse+Optimizations
https://ssp.ptc.com/wiki/display/lms/JSHint+Usage

Task 3: Incorporate the Builder into the UI.

1. Update custom-actions.xml to create an action for the builder.
   Result:

```
<objecttype name="object" class="java.lang.Object" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld">
        <command url="netmarkets/jsp/serviceAcademy/navigationlist.jsp" windowType="page"/>
    </action>

    <action name="myProductListTable">
        <component name="com.ptc.serviceAcademy.builders.MyProductListTableBuilder" windowType="page"/>
    </action>

    <action name="tableExample">
        <component name="com.ptc.serviceAcademy.builders.TableBuilder" windowType="page"/>
    </action>

    <action name="multiComponent">
        <component name="com.ptc.serviceAcademy.builders.MultiComponentBuilder" windowType="page"/>
    </action>

    <action name="treeExample">
        <component name="com.ptc.serviceAcademy.builders.TreeBuilder" windowType="page"/>
    </action>
    <action name="partSearch">
        <command url="netmarkets/jsp/serviceAcademy/partSearch.jsp" windowType="page"/>
    </action>

</objecttype>
```

Additions on custom-actions.xml

Refer Lab Files for custom-actions.xml.

2. Update Action Framework custom-actionModels.xml.
   Result:

```
<model name="serviceAcademy navigation" resourceBundle="com.ptc.serviceAcademy.resource.NavigationRB">
    <action name="helloWorld" type="object"/>
    <action name="myProductListTable" type="object"/>
    <action name="tableExample" type="object"/>
    <action name="multiComponent" type="object"/>
    <action name="treeExample" type="object"/>
    <action name="partSearch" type="object"/>
</model>
```

Additions on custom-actionModels.xml

3. Update the Resource Bundle in the two files: *NavigationRB.java* and *NavigationRB_en_US.java*.
   Example:

```
@RBEntry("Search for Part")
public static final String OBJECT_PARTSEARCH_DESCRIPTION = "object.partSearch.description";

@RBEntry("Search for Part")
public static final String OBJECT_PARTSEARCH_TITLE = "object.partSearch.title";

@RBEntry("Search for Part")
public static final String OBJECT_PARTSEARCH_TOOLTIP = "object.partSearch.tooltip";
```

Additions on the two RB files

Refer Lab Files for NavigatonRB and NavigationRB_en_US java files.

Task 4: Deploy and Test your code.

1. Deploy code using lightBuild and restart the Method Server.
2. Check your results.

Completion Criteria

1. The second tab displayed in the **Navigator** >**ServiceAcademy**.
2. The search conditions are displayed in the table, when the search button clicked, the result table displayed in the page.
3. All Students taking the GS-00663 - Client Customization Workshop after this course are expected to retain the same Virtual Machine (with exercises performed in GS-00338) for the Workshop (GS-00663).

This completes the exercise.