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The Eclipse Project

An introduction to the Eclipse Project

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Overview

In this module we will explore the Eclipse Project including the different aspects of the Eclipse Workbench.

We will also explore how to develop and deploy plug-ins to extend the Eclipse Workbench.

Some content taken from
Developing Plug-ins for Eclipse (http://www.eclipse.org/resources/)
by Dwight Deugo and Nesa Matic

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Goals

- Following the completion of this module and its exercises you will
  - Have an understanding of the Eclipse Workbench
  - Know some of the terminology used within the Eclipse Workbench
  - Have an understanding of the Eclipse architecture
  - Have an understanding of how Eclipse is extended
  - Be able to develop and deploy a basic plug-in

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Agenda

- What is Eclipse?
- The Eclipse Workbench
- The Eclipse Architecture
- Extending the Workbench

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What is Eclipse?

- Eclipse is an open source project
  - http://www.eclipse.org
  - Consortium of companies, including IBM
  - Launched in November, 2001
  - Designed to help developers with specific development tasks

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Projects

- On topic
  - Business Intelligence and Reporting Tools (BIRT)
  - Device Software Development Platform
  - Eclipse Project
  - Eclipse Modeling Project
- Off topic
  - Data Tools Platform
  - Eclipse RT
  - SOA Tools
  - Eclipse Technology Project
  - Tools Project
  - Test and Performance Tools Platform Project
  - Eclipse Web Tools Platform Project

http://www.eclipse.org/projects/listofprojects.php

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Brief History of Eclipse

- 1994
  - VisualAge for Smalltalk
- 1996
  - VisualAge for Java
- 1996-2001
  - VisualAge Micro Edition
- 2001
  - Eclipse Project

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The Motivation Behind Eclipse

- Support for the construction of application development tools
- Support for the development of GUI and non-GUI application development
- Support for multiple content types
  - Java, HTML, C, XML
- Facility the integration of tools
- Cross-platform support

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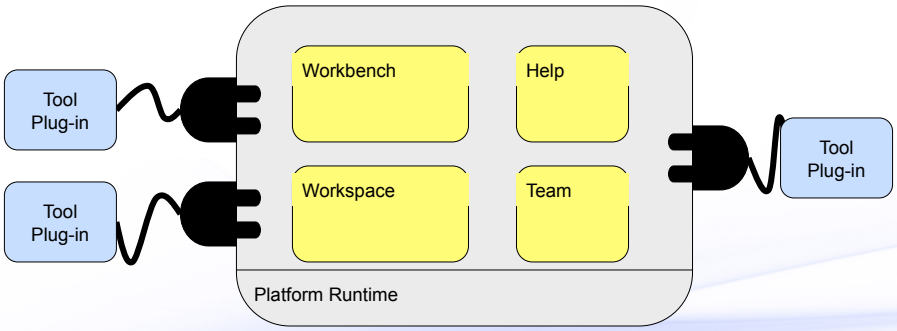
Eclipse Architecture



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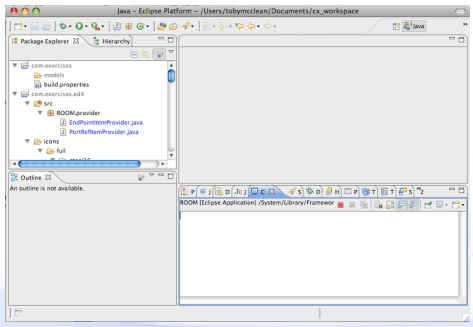
Workbench

- The desktop development environment
  - Tools for resource management
  - Common of navigating through resources
- Multiple workbenches can be opened at the same time
  - Different workspaces



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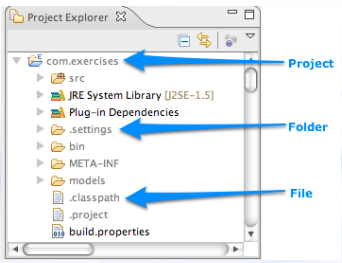
Workspace

- Represents the user data
- A set of resources
  - Projects
    - Collection of files and folders
  - Folders
    - Contain other folders or files
  - Files



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Help

- For the creation and publishing of documentation
- Supports both
  - User guides
  - Programmer guides
- Created using
  - HTML for content
  - XML for navigation
- Support for context sensitive help

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Team

- Provides support for
  - Versioning
  - Configuration management
  - Integration with team repository
- Allows team repository provider to hook into environment
  - Team repository providers specify how to intervene with resources
- Has optimistic and pessimistic locking support

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How is Eclipse Used?

- As an Integrated Development Environment
  - Supports the manipulation of multiple content types
  - Used for specifying and designing applications
    - Requirements, models, documentation, etc.
  - Used for writing code
    - Java, C, C++, C#, Python, ...
- As a product base
  - Supported through plug-in architecture and customizations

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Eclipse as an IDE

- Java Development Tooling
  - Editors, compiler integration, ant integration, debugger integration, etc.
- C/C++ Development Tooling
  - Editors, compiler integration, make integration, debugger integration, etc.
- Dynamic languages
  - Editors, interpreter and compiler integration, debugger integration, etc.
- Modeling projects

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Eclipse as a Product Base

- Eclipse can be used a Java product base
- Its flexible architecture can be used as product framework
  - Reuse plug-in architecture
  - Create new plug-ins
  - Customize the environment
- Support for branding
- Rich client platform support

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Rich Client Platform

- A minimal set of Eclipse plug-ins necessary for building a product
- Control over resource model
- Control over look and feel
- But still capable of leveraging existing plug-ins

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Summary

- In this module we explored
  - Eclipse, its background and the components that form its foundation
  - Eclipse use cases

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Agenda

- What is Eclipse?
- The Eclipse Workbench
- The Eclipse Architecture
- Extending the Workbench

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The Eclipse Project

The Eclipse Workbench

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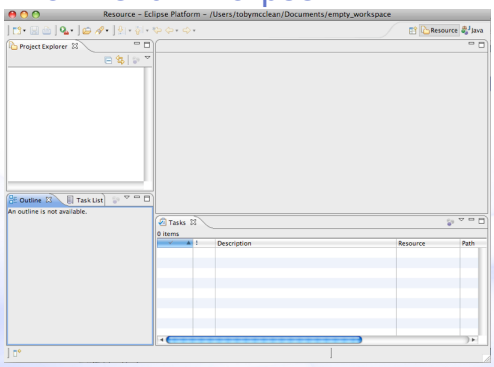
What is the Workbench?

- The working environment in Eclipse



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Multiple Workbench Instances

- Instance of Workbench comes up when Eclipse is launched
- It is possible to open another window for the Workbench
  - Window → New Window
  - This opens up a new Workbench window
  - Can have different perspectives open in the different windows
  - Same result is not achieved by launching Eclipse twice

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Resources in a Workbench

- When working in Eclipse, you work with Resources
- Resources are organized in file/directory structure in the Workbench
  - They correspond to the actual files and directories in the Workspace
  - There are four different levels of resources:
    - Workspace root
    - Projects
    - Folders
    - Files
- Resources form the file system can be dragged into the workbench

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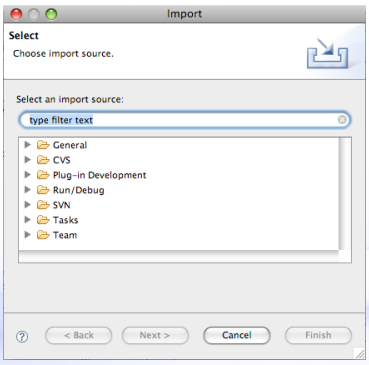
Importing Resources

- Available through
  - Menu option **File → Import...**
  - Right-click menu **Import...** option on a Folder or Project



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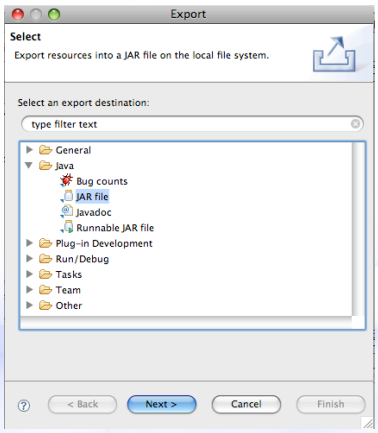
Exporting Resources

- Available through
  - Menu option **File → Export...**
  - Right-click menu **Export...** option on a Resource in the Workbench



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Refreshing Workbench

- Used for refreshing resources that change in the Workspace outside the workbench
- For example, if a file added to a directory in the Workspace
  - Select the project or directory in the workbench
  - Choose **Refresh** from its context menu
  - Alternatively you can press the **F5 button** on your keyboard
- Best practice
  - Work with the resources from within the Workbench when possible

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Resource History

- Changing and saving a resource results in a new version of the resource
  - All resource versions are stored in local history
  - Each resource version is identified by a time stamp
  - This allows you to compare different versions of the resource
- There are two actions to access the local history of a resource, from its context menu
  - **Compare With → Local History...**
  - **Replace With → Local History...**

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Workbench Components

- The Workbench contains Perspectives
- A Perspective has Views and Editors

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Perspectives

- Perspective defines the initial layout of views in the Workbench
- Perspectives are task oriented, i.e. they contain specific views for doing certain tasks

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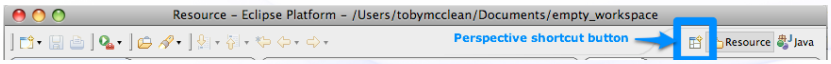
Choosing a Perspective

- To change the current perspective of the Workbench
  - **Window → Open Perspective →**
  - Clicking on the Perspective shortcut button



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Saving a Perspective

- Arrangement of views and editors can be modified and saved for perspectives
  - **Window → Save Perspective As...**
  - It can be saved under an existing name or a new name creating a user-defined perspective

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Resetting a Perspective

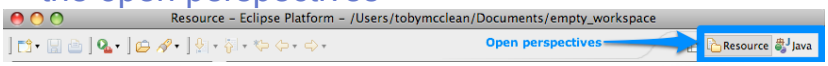
- Sometimes views and editors for a perspective need to be reset to the defaults
  - **Window → Reset Perspective...**
- This only applies to default Eclipse perspectives not user-defined ones

Customizing Perspectives

- The shortcuts and commands for the current perspective can be customized
  - **Window → Customize Perspective...**
- This is in addition to the customization of the views that are available in the perspective

Closing Perspectives

- The upper right corner of the workbench shows the open perspectives



- It is possible to close a perspective
  - **Window → Close Perspective**
  - **Window → Close All Perspectives**

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Editors

- An editor for a resource opens when you double-click on a resource
  - Editor type depends on the type of resource
  - An editor stays open when the perspective is changed
  - Active editor contains menus and toolbars specific to the editor
  - When a resource has been changed an asterisk in the editor's title bar indicates unsaved changes

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Editors and Resource Types

- It is possible to associate an editor with a resource type by the following actions
  - **Window → Preferences**
  - Select **General**
  - Select **Editors**
  - Select **File Associations**
  - Select the resource type
  - Click the **Add** button to associate it with a particular editor
- In same dialog the default editor can be set
- Others are available from **Open With** in the resources context menu

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Views

- The main purpose of a view is
  - Support editors
  - Provide alternative presentation and navigation
- Views can have their own menus and toolbars
  - Items available in menus and toolbars are only available in that view

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More Views

- Views can
  - Appear on their own
  - Appear stacked with other views
- Layout of views can be changed by clicking on the title bar and moving views
  - Single views can be moved together with other views
  - Stacked views can be moved to be single views

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Adding Views to the Perspective

- To add a view to the current perspective
  - **Window → Show View → Other...**
  - Select the desired view
  - Click the **Ok** button

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Stacked Views and Stacking Views

- Stacked views appear in a notebook form
  - Each view is a page in the notebook
- A view can be added to a stack by dragging into the area of the tab area of the 'notebook'
- Similarly a view can be removed from a stack by dragging its tab away from the 'notebook'

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Fast Views

- A fast view is hidden and can be quickly opened and closed
- Created by
  - Dragging an open view to the shortcut bar
  - Selecting Fast View from the view's menu
- A fast view is activated by clicking on its Fast View pop-up menu option
  - Bottom right of the workbench
- Deactivates as soon as focus is given to another view or editor

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Summary

- In this module we explored
  - Components of the Eclipse workbench
    - Perspectives;
    - Editors; and
    - Views

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Agenda

- What is Eclipse?
- The Eclipse Workbench
- The Eclipse Architecture
- Extending the Workbench

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Eclipse Architecture

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Eclipse Architecture

- Flexible, structured around
  - Extension points
  - Plug-ins
- Architecture allows for
  - Other tools to be used within the platform
  - Other tools to be extended
  - Integration between tools and the platform

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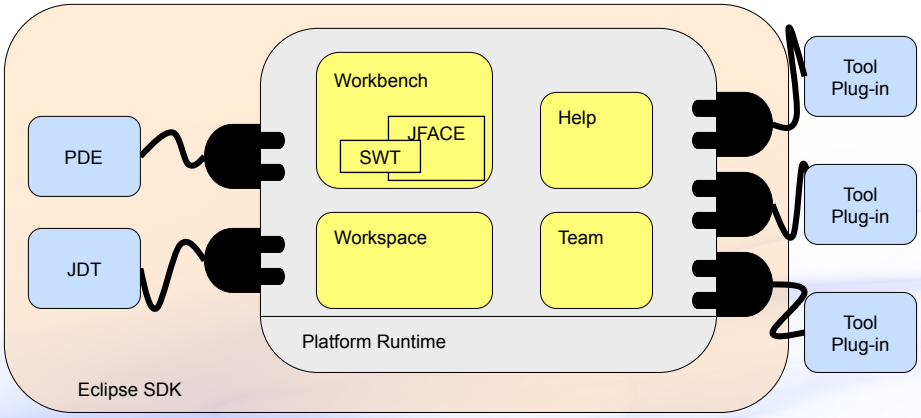
More Eclipse Architecture



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Platform Runtime

- Everything is a plug-in except the Platform Runtime
  - A small kernel that represents the base of the Platform
- All other subsystems build up on the Platform Runtime following the rules of plug-ins
  - i.e. they are plug-ins themselves

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Extension Points

- Describe additional functionality that could be integrated with the platform
  - Integrated tools extend the platform to bring specific functionality
- Two levels of extending Eclipse
  - Extending the core platform
  - Extending existing extensions
- Extension points may have corresponding API interface
  - Describes what should be provided in the extension

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Plug-ins

- External tools that provide additional functionality to the platform
- Define extension points
  - Each plug-in defines its own set of extension points
- Implement specialized functionality
  - Usually key functionality that does not already exist in the platform
- Provide their own set of APIs
  - Used for further extension of their functionalities

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More Plug-ins

- Plug-ins implement behavior defined through extension point API interface
- Plug-in can extend
  - Named extension points
  - Extension points of other plug-ins
- Plug-in can also declare an extension point and can provide an extension to it
- Plug-ins are developed in the Java programming language

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What Makes Up a Plug-in?

- Plug-ins consist of
  - Java code
    - Binaries
    - Source (optional)
  - plugin.xml
    - Defines plug-in extensions, and
    - Declares plug-in extension points
  - plugin.properties
    - For localization and configuration
  - manifest.mf
    - describes the plug-in

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Publishing Plug-ins

- Prepares plug-in for deployment on a specific platform
- Manual publishing
  - Using Export Wizard
  - Using Ant Scripts
- Automatic publishing is available by using PDE Build

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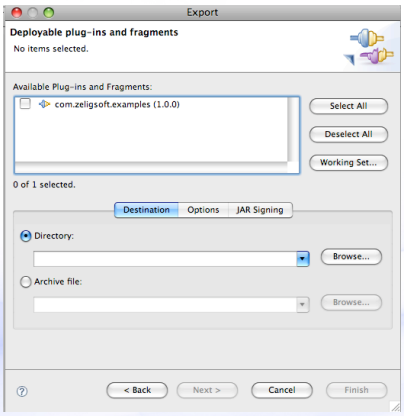
Manually Publishing a Plug-in

- A plug-in can be published manually by
  - **File → Export...**
  - Select Deployable plug-ins and fragments
  - Click **Next >** button
- Parameters configure how the plug-in published
- Can be saved as an Ant script



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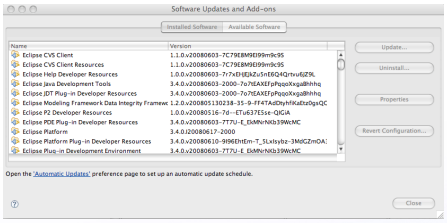
Installing Plug-ins

- Plug-ins are installed under \plugins\ directory of Eclipse installation
- Plug-ins can be installed from a update site
  - **Help → Software Updates..**
  - Typically as part of a feature
- Restart workbench



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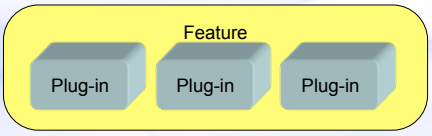
Features

- An Eclipse feature is a collection of plug-ins
  - Represents smallest unit of separately downloadable and installable functionality
- Installed into \features\ directory of Eclipse installation
- Features can be installed from an update site



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Product

- Stand-alone application built on Eclipse platform
- Typically include the JRE and Eclipse platform
- Defined by using an extension point
- Configurable
  - Splash screen
  - Default preference values
  - Welcome pages
- Customized installation

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Summary

- In this module we explored
  - Eclipse architecture
  - Extension points
  - Plug-ins
  - Features
  - Products

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Agenda

- What is Eclipse?
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The Eclipse Project

Plug-ins

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Integration Between Plug-ins

- Supported through the ability to contribute actions to existing plug-ins
  - New plug-in contributes an action to existing plug-in
  - Allows for tight integration between plug-ins
- There are many areas where actions can be contributed
  - Context menus and editors
  - Local toolbar and pull-down menu of a view
  - Toolbar and menu of an editor - appears on the Workbench when editor opens
  - Main toolbar and menu for the Workbench

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Extending Views

- Changes made to a view are specific to that view
- Changes can be made to view's
  - Context menu
  - Menu and toolbar

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Extending Editors

- When extending an editor changes can be made to
  - Editor's context menu
  - Editor's menu and toolbar
- Actions defined are shared by all instances of the same editor type
  - Editors stay open across multiple perspectives, so their actions stay the same
  - When new workspace is open, or workbench is open in a new window, new instance of editor can be created

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Action Set

- Allows extension of the Workbench that is generic
  - Should be used for adding non-editor, or non-view specific actions to the Workbench
  - Actions defined are available for all views and editors
- Allows customization of the Workbench that includes defining
  - Menus
  - Menu items
  - Toolbar items

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Choosing What to Extend

- Eclipse has a set of predefined extension points
  - Called Platform extension points
    - Comprehensive set of extension points
    - Detailed in the on-line help
- It is possible to create new extension points
  - Requires id, name, and schema to be defined
  - Done through Plug-in Development Environment (PDE)

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Some Common Extension Points

- Popup Menus for editors and views
  - org.eclipse.ui.popupMenus
- Menu and toolbar for views
  - org.eclipse.ui.viewActions
- Menu and toolbars for editors
  - org.eclipse.ui.editorActions
- Menu and toolbar for the Workbench
  - org.eclipse.ui.actionSets
- Complete set of extension points located in Eclipse help
  - Search on “Platform Extension Points”

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How to Extend the Workbench?

- Steps for adding a plug-in
  - Define Plug-in project
    - Plug-in nature
    - Java nature (optional)
  - Write the plug-in code
    - Create Java class
    - Add appropriate protocols to the class
  - Package the class
  - Create plugin.xml and MANIFEST.MF
  - Test the plug-in
  - Deploy the plug-in

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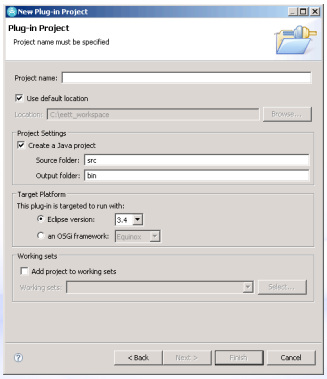
Creating Plug-in Project

- Plug-in project are created with the New Project wizard
  - File → New → Project…
- Project will contain
  - source code for the plug-in
  - manifest and property files



Implementation details

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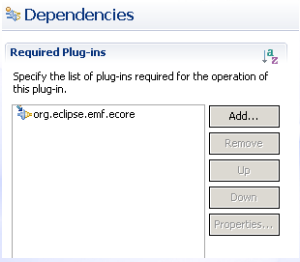
Updating Project's Dependencies

- To make classes required for the plug-in visible for the project, update its dependencies
  - You add a dependency on another plug-in
  - You can add a jar that is not part of a plug-in to the build path



Implementation details

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Creating a Class

- For menu actions, define a class that
  - Subclasses client delegate class
  - Implements interface that contributes action to the Workbench

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Interface IWorkbenchWindowActionDelegate

- Extend IActionDelegate and define methods
  - init(IWorkbenchWindow) - Initialization method that connects action delegate to the Workbench window
  - dispose() - Disposes action delegate, the implementer should unhook any references to itself so that garbage collection can occur
- Interface is for an action that is contributed into the workbench window menu or toolbar

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Class ActionDelegate

- Abstract base implementation for client delegate action (defines same methods as interface)
- In addition it also defines
  - runWithEvent(IAction, Event)
    - Does the actual work when action is triggered
    - Parameters represent the action proxy that handles the presentation portion of the action and the SWT event which triggered the action being run
    - Default implementation redirects to the run() method
  - run(IAction)
    - Inherited method, does the actual work as it's called when action is triggered
  - selectionChanged(IAction, ISelection)
    - Inherited method, notifies action delegate that the creation in the Workbench has changed

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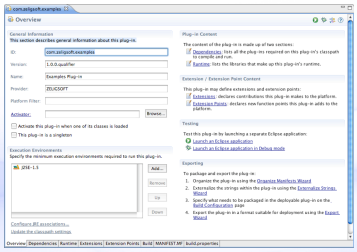
Defining Manifest

- MANIFEST.MF file
  - In the META-INF directory
- Defines
  - Plug-in name
  - Plug-in version
  - Plug-in vendor/provider
  - Plug-in dependencies
  - Packages exported
- Manifest editor available

com.zeligsoft.examples

```
Manifest-Version: 1.0
Bundle-ManifestVersion: 2
Bundle-Name: Examples Plug-in
Bundle-SymbolicName: com.zeligsoft.examples
Bundle-Version: 1.0.0.qualifier
Bundle-Vendor: ZELIGSOFT
Bundle-RequiredExecutionEnvironment: J2SE-1.5
Require-Bundle: org.eclipse.emf;bundle-version="2.4.0"
Export-Package: com.zeligsoft.examples
Import-Package: org.eclipse.uml2.uml
```



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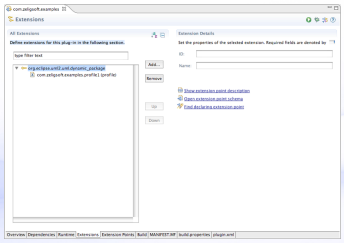
Defining plugin.xml

- In the root of the project
- Defines
  - Extensions
  - Extension points
- Extension editor
  - Includes wizards
- Extension point editor

com.zeligsoft.examples

```
<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.2"?>
<plugin>
   <extension
         point="org.eclipse.uml2.uml.dynamic_package">
      <profile
            uri="com.zeligsoft.examples.profile1">
      </profile>
   </extension>

</plugin>
```



Implementation details

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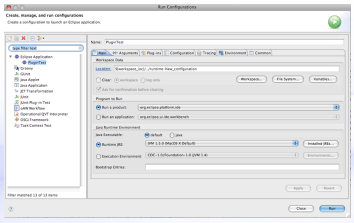
Testing Plug-in from Workbench

- Available by opening new Workbench instance
  - Run → Run As → Eclipse Application
- Used when developing plug-in within the platform
- Can be configured
  - Run → Run Configurations...
  - Eclipse Application
- Debug available
  - Run → Debug As → Eclipse Application



Implementation details

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Getting Ready to Export Plug-in

- Create a build.properties file in your project

```
source.. = src/
output.. = bin/
bin.includes = META-INF, \
               .,\
               plugin.xml, \
               plugin.properties
```

- Build properties editor available
  - Open with → Build Properties Editor

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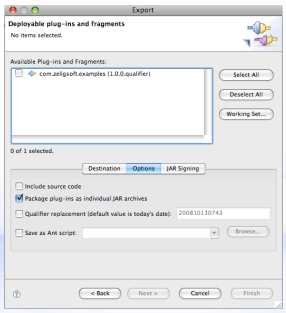
Exporting a Plug-in

- **File → Export...**
  - Deployable Plug-ins and Fragments
- Configure export
  - Archive vs. Directory
  - Packaging
  - Include source?
- Can save as ant script
- Ready to install



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Plug-in Registry

- Too see what plug-ins are registered within a Workbench instance
  - **Window → Show View → Other...**

Implementation details

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Summary

- In this module we explored
  - Plug-ins
  - MANIFEST
  - Plug-in descriptors
  - Testing plug-ins
  - Exporting plug-ins

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Questions