Advanced User Interface Programming Using the Eclipse Rich Client Platform

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About the Speaker

- Tod Creasey
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  - working with the IBM Rational Software since 1994, and has played an active role in the development of Envy developer, IBM Smalltalk, VisualAge for Java
  - moved on to the Eclipse Platform UI team during the 1.0 development cycle
Platform Component Structure

Rich Client Platform Components

- Core Resources
  - Core Runtime
    - OSGI
  - SWT
- JFace
  - Workbench
Plug-in Structure

- JFace is dependant on SWT and a small utility jar shared with Core Runtime and OSGi

- The workbench uses JFace and Core Runtime to build a full-featured application framework integrated with Eclipse

- The IDE layer adds a dependency on Core Resources and exposes the workspace resource model

- The IDE is an RCP application
Applications

- See
  org.eclipse.core.runtime.applications

- You need at least one application to run Eclipse with the Workbench

- The IDE is an RCP application

- If you use your own application you may not have access to the IDE classes and extensions

- org.eclipse.ui.ide assumes that the IDE application is the one running
Questions and Comments?
Workbench and IDE Advanced Topics

- Views
- Workbench
- Preferences
- Editors
- Commands
- Wizards
- Perspectives
- Startup and Shutdown
- Jobs
- Adaptable
Where We Started and Where We Are Going

- Created an SWT application to display Images in a directory
- Converted it to a JFace Dialog
- Used none of the Platform Core support for integration
- Now going to integrate it into the Workbench
- Demo of JFaceImageFileDialog to see where we started
Extension Points

- An extension point is an XML markup for elements of the workbench

- Prevents the need for more API for hooking up an extension

- All that is required is defined in the schema
Extension Points

- Allows the extension provider to decide how to use it
- For instance the newWizards extension point is used by the File->New internal item
- PDE tooling uses the schemas to help you define extensions

TIP: You should only use classes that are defined in a package that does not have the word internal in it, as these are subject to change at any time.
Views

- We use the views extension point from org.eclipse.ui.workbench
- Create a category and specify it as the category for the view
- Create a ViewPart subclass to satisfy the schema
- Move the create contents code from the Dialog
  - take the contents of createDialogArea() in the Dialog
  - move it to createPartControl() of the View

TIP: When creating extensions the plug-in containing the extension point definition must be listed as a required plug-in in order for it to be visible.
Workbench

- What is the workbench
  - user interface concept - 
    \texttt{org.eclipse.ui.workbench} defines it

- What is the workspace
  - core concept - 
    \texttt{org.eclipse.core.resources} defines it

- What is a resource?

- What is the workspace root?
Preferences

- Extension point to hook into the Workbench preferences dialog
- Define a preference page in an extension point
- Create a page for the preference
- This page will show up in the preference dialog
- Can be used to set up anything you like
Where Are Preferences Stored?

- Wherever you like
- Eclipse has a preferences mechanism
- Initialized using an `PreferenceInitializer`
- Any subclass of `AbstractUIPlugin` has an `IPreferenceStore`

TIP: Be sure to initialize your preference store using a `PreferenceInitializer`, as it will only get populated if you access it.
Preferences

- First define a PreferenceInitializer to be run when the plug-ins preference store is first accessed
  - use the org.eclipse.core.runtime.preferences extension point to define the initializer
  - pre 3.0 we set these up on plug-in startup, but this is inefficient if the preference is never referenced, and adds to startup time

- Now add a preference listener to the view, so the refresh will occur as soon as the preference changes
ImageFileView Demo
Questions and Comments?
Editors

- Workbench windows reserve an editor area for you
- We want to re-use the image canvas from the previous dialog in an editor
- Define an editor using the editors extension point
  ➢ this is used by several views to determine editors associated with the file they are displaying
  ➢ based on file extensions
Editors and IResource

- The contents of the Workspace are defined in terms of IResource

- IResource can be based on files

- As our editor is displaying the contents of a file, we will use the resources plug-in from core

- This lets us use the contents of the Resource Navigator and anything else that shows files (like the Package Explorer)
Actions for Opening an Editor

- This editor will also be used by the Resource Navigator and Package Explorer, as they build their editor list from the editors extension point.

- Look for the editor in the Open With context menu for a “gif” file from the Resource Navigator.

- If we register an editor, we will get a context menu entry for it in any viewer that builds the Open With menu from the registry.
Demo of ImageEditor and Comments
Commands/Keys

- Define a command in the extension point (org.eclipse.ui.commands for the action and provide a key binding in the org.eclipse.ui.bindings extension point
  - bind to our action that opened the filter settings dialog
  - provide a key binding for the command (Ctrl+Alt+Shift+I)

TIP: Eclipse applications must share key bindings between plug-ins, so it is easy to run out of available key sequences. As the user can set these themselves using the Keys Preference Page, it is not a requirement that you define key sequences for all of your commands.
Commands Extensions

- `org.eclipse.ui.commands` extension point provides:
  - Commands
    - represents a request from the user

- `org.eclipse.ui.handlers`
  - Defines how a command will be executed
Command and Handler Definition

```xml
<extension point="org.eclipse.ui.commands">
  <command
    description="Allows setting of filter options for images"
    id="org.eclipse.ui.rcptalk.imagesFilter"
    name="Image Filter Settings"/>
</extension>

<extension point="org.eclipse.ui.handlers">
  <handler
    class="org.eclipse.ui.rcptalks.workbench.ImageFilterHandler"
    commandId="org.eclipse.ui.rcptalk.imagesFilter">
  </handler>
</extension>
```
Bindings

- `org.eclipse.ui.bindings`
  - specified binding between commands and key sequences

```xml
<extension point="org.eclipse.ui.bindings">
  <key
    commandId="org.eclipse.ui.rcptalk.imagesFilter"
    contextId="org.eclipse.uicontexts.window"
    schemeld="org.eclipse.ui.defaultAcceleratorConfiguration"
    sequence="M1+M2+M3+I"/>
</extension>
```

TIP: When defining a key sequence, it is better to use M1 (instead of Ctrl) and M2 (instead of Shift) for better portability across platforms.
Wizards

- The workbench has three wizard types defined in extension points
  - New
  - Import
  - Export

- When one of the wizard actions are invoked, we open a WizardDialog which provides a selection page (generated internally from the extension points) to choose one of the wizards defined in the extension points
Demo of the Command, Questions and Comments
Wizards

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New Wizards

- New wizards have a series of re-usable first pages
  - BasicNewResourceWizard (abstract)
  - BasicNewFileResourceWizard
  - BasicNewFolderResourceWizard
  - BasicNewProjectResourceWizard

- Use these in your resource based wizards so that the resource is already created for you

- Although the extensions are in the Workbench, these classes are in the IDE plug-in so you may not have access to them if you define your own application.
Import/Export Wizards

- Several classes are provided to assist in building an import or export wizard
  
  ➢ WizardResourceImportPage / WizardResourceExportPage
    • provides basic layout for source and destination
    • provides an options group
  
  ➢ FileSystemStructureProvider
    • provides structure for the ImportOperation based on java.io.File

  ➢ ImportOperation/ExportOperation
    • basic operations for performing imports and exports
      see ImageImportPage
Perspectives

- Can also define our own perspectives
- Use a PageLayout positions parts and setup other standard menus, etc.
- Create an “Image Navigation” perspective
  - Define our own IPerspectiveFactory
  - Add our view in the Page Layout
  - Add the TasksView as a fast view
  - Add the Navigator View to the short list of views
Demo of the Wizards, Image Perspective
Questions and Comments
Startup and Shutdown

- The workbench tries to avoid loading other plug-ins by allowing all required information to be defined in the XML of an extension point.

- Use the `startup()` and `shutdown()` methods in your plug-in to initialize the things you want to load, such as Images, Colors, etc.

- Plug-in loading should be avoided in general, but it is particularly noticeable when it slows down startup. You can avoid this by a lazy initialization approach whenever possible.
Jobs

- SWT and JFace must be accessed in the main Thread
- Without creating Jobs or Threads, Eclipse is single Threaded (referred to as the UI or main Thread)
- We want to process long operations that do not require SWT in a background Thread using a Job
Jobs

- Progress reporting is done in the progress area and the progress view.

- Any work done in a Job does not block the main Thread, which makes the UI more responsive as it does not stop the user from working.
IAdaptable

- What is it?
  - IAdaptable is a mechanism for accessing an Object of one type via another Object of a different type, without using interfaces

```java
if (object instanceof IAdaptable) { //See if it supports IAdaptable
    //See if it adapts to IFile
    Object resource = ((IAdaptable) object).getAdapter(IFile.class);
    if (resource == null) //Returns null if not
        return;
    //Now we can safely cast to IFile and continue
    doFileOperation((IFile) resource);
}
```
IAdaptable

Why do you care?

- this is a good way to give access to an object without defining additional interfaces
  - JDT uses this for CompilationUnits (IFile), Packages (IFolder) and Java Projects (IProject)
  - Not just for IResource – you can adapt any Object to any other Object using the org.eclipse.core.runtime.adapters extension point

Do we need it here?

- no - we are using resources directly
The End

Questions?