Extending the JavaScript Development Toolkit

Bradley Childs
IBM Software Group
childsb@us.ibm.com
3/19/2008
Agenda

• Overview
• JSDT Feature Highlights
• Benefit of Extending JSDT
• JSDT Platform – What can you extend?
• JSDT Design
• Extension Examples
JSDT Features

• JavaScript Development Tools (JSDT) is the JavaScript component of WebTools 3.0
  ▪ Replaces old JavaScript editor 2.0
• JavaScript AST Driven Language Model
• JSDT provides rich JavaScript editing capability
  ▪ Content Assist
  ▪ Hover Help
  ▪ Code Completion
  ▪ Validation
  ▪ Refactoring
Benefit of Extending JSDT

- JavaScript as a Platform
- Grow Your JavaScript Technologies With Good Tooling
- Toolkits Dependant on Core JavaScript
- Easy to Leverage Features
- Minimum Effort For Maximum Results
JSDT Platform Features - User Experience I

• UI Extension
  - Hoverhelp
  - Wizards (platform)
  - Quickfix
  - Validation
  - Refactoring
  - Toolkit and Library UI
JSDT Platform Features - Core

• Core Extensions – **Inferencing**
  - JavaScript is Ambiguous
  - JavaScript Flexible to a Fault
  - Toolkits and Libraries extend JavaScript Language
  - Proprietary Information about Toolkits Necessary
  - Class and Type Recognition
Demo Toolkit ‘Lateralus’

- **ObjectFactor.createClass**(className)
  - Defines a new Class
- **ObjectFactory.addMethod**(className, functionName, functionBody)
  - Adds a method to an already defined class
- **ObjectFactory.newInstance**(className)
  - Creates a new instance of className
```javascript
// Define class 'newClass'
ObjectFactory.createClass("newClass");

// Add method newClass.displayStuff(...)
ObjectFactory.addMethod("newClass","displayStuff",
    function(args){ alert(args); });

// Add method newClass.updateStuff(...)
ObjectFactory.addMethod("newClass","updateStuff",
    function(args){ args.innerHTML='wrong'; });

var k = ObjectFactory.createObject("newClass");
```
```javascript
/* define class 'newClass' */
ObjectFactory.createClass('newClass');

/* add method newClass.displayStuff(...) */
ObjectFactory.addMethod('newClass', 'displayStuff',
    function(args){ alert(args); });

/* add method newClass.updateStuff(...) */
ObjectFactory.addMethod('newClass', 'updateStuff',
    function(args){ args.innerHTML='wrong'; });

var k = ObjectFactory.newObject('newClass');
```

[Lateralus Website Support Toolkit]ObjectFactory.newObject(classname)
Defines a new class.
function newObject()

Parameters:
  classname name of class.

Since:
  Version 1.0
Design I – The JavaScript Modeling Process

CompilationUnit

sourcefile.js

Public Model

Inference Engine

JavaScript Private Language Model

JavaScript Source Code

Extension Points

Dojo Class Inference

Rico Inference

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Extending the JSDT Library Mechanism

• Two Extension Points
  - Libraries Wizard –
    org.eclipse.wst.jsdt.ui.JsGlobalScopeContainerPage
  - Resource Management & Global Scope Handling –
    org.eclipse.wst.jsdt.core.JsGlobalScopeContainerInitializer
corpulent.net Website Common Library Example I.

- Example of utility JavaScript and common Website headers.
- JavaScript and HTML are copied into the target project. Resources are not shared across projects.
- No Global Scope management. Users must include files in HTML.
- File copy is done in the initializer.
corpulent.net Website Common Library Example II.

<?xml version="1.0" encoding="UTF-8"?>
<?eclipse version="3.2"?>
<!-- © Copyright 2008 IBM Corp. All rights reserved. This source code is made available under the terms of the Eclipse Public License, v1.0. -->
<plugin>
  <!-- JSDT wizard extension -->
  <extension point="org.eclipse.wst.jsdt.ui.JsGlobalScopeContainerPage">
    <JsGlobalScopeContainerPage
      name="corpulent.net common html headers and js"
      class="org.eclipse.wst.jsdt.internal.ui.wizards.buildpaths.CorpulantLibraryWizardPage"
      id="org.eclipse.wst.jsdt.internal.ui.wizards.buildpaths.CorpulantLibrary">
    </JsGlobalScopeContainerPage>
  </extension>

  <!-- JSDT Global Scope Handler -->
  <extension
    point="org.eclipse.wst.jsdt.core.JsGlobalScopeContainerInitializer">
    <JsGlobalScopeContainerInitializer
      class="org.eclipse.wst.jsdt.core.compiler.libraries.CorpulentCommonLibraryInitializer"
      id="org.eclipse.wst.jsdt.launching.corpulant.common">
    </JsGlobalScopeContainerInitializer>
  </extension>
</plugin>
corpulent.net Website Common Library Example III.

```java
/* © Copyright 2008 IBM Corp. All rights reserved. This source code is made available under the terms of the Eclipse Public License, v1.0. */

public class CorpulantLibraryWizardPage extends NewElementWizardPage implements IJsGlobalScopeContainerPage,
IJsGlobalScopeContainerPageExtension, IJsGlobalScopeContainerPageExtension2 {

    private static final String CONTAINER_ID = "org.eclipse.wst.jsdt.launching.corpulant.common";

    public CorpulantLibraryWizardPage() {
        super("CorpulantCommon");
    }

    /* Setup the wizard UI */
    public void createControl(Composite parent) {
        Composite composite = new Composite(parent, SWT.NONE);
        composite.setFont(parent.getFont());
        DialogField field = new DialogField();
        field.setLabelText("corpulent.net common website components added to Project.\n\n  - This library copies JavaScript elements shared by the corpulent.net website.");
        LayoutUtil.doDefaultLayout(composite, new DialogField[]{field}, false, SWT.DEFAULT, SWT.DEFAULT);
        Dialog.applyDialogFont(composite);
        setControl(composite);
        setDescription("corpulent.net common website components");
    }

    /* return the container id that does the file handling for this library */
    public IClasspathEntry[] getNewContainers() {
        IClasspathEntry library = JavaCore.newContainerEntry(new Path(CONTAINER_ID));
        return new IClasspathEntry[]{library};
    }
}
```
corpulent.net Website Common Library Example IV.

```java
/* © Copyright 2008 IBM Corp. All rights reserved. This source code is made available under the terms of the Eclipse Public License, v1.0. */
public class CorpulentCommonLibraryInitializer extends JsGlobalScopeContainerInitializer implements IJsGlobalScopeContainerInitializerExtension {

    public void initialize(IPath containerPath, IJavaProject project) throws CoreException {
        copyFiles(project);
        JavaCore.setJsGlobalScopeContainer(containerPath, new IJavaProject[] { project },
            new IJsGlobalScopeContainer[] { getContainer(containerPath, project) }, null);
    }

    public void removeFromProject(IJavaProject project) {
        removeFiles(project);
    }

    public int getKind() {
        return IJsGlobalScopeContainer.K_APPLICATION;
    }

    public String getDescription(IPath containerPath, IJavaProject project) {
        return CorpulentCommonLibraryInitializer.ContainerDescription;
    }

    public String getDescription() {
        /* … */
    }

    public ImageDescriptor getImage(IPath containerPath, String element, IJavaProject project) {
        /* … */
    }
}
```
Advanced Toolkit – Lateralus Toolkit I.

- Similar UI and resource handling as previous examples.
- Provides class inference.
JSDT Core / Inference Support

• Class / Type Inference –
  org.eclipse.wst.jsdt.core.inferenceSupport
Advanced Toolkit – Lateralus Toolkit II.

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<!-- JSDT wizard extension -->
<extension point="org.eclipse.wst.jsdt.ui.JsGlobalScopeContainerPage">
  <JsGlobalScopeContainerPage name="Lateralus Toolkit" class="org.eclipse.wst.jsdt.internal.ui.wizards.buildpaths.LateralusLibraryWizardPage" id="org.eclipse.wst.jsdt.internal.ui.wizards.buildpaths.LateralusLibrary"/>
</JsGlobalScopeContainerPage>
</extension>

<!-- JSDT Global Scope Handler -->
<extension point="org.eclipse.wst.jsdt.core.JsGlobalScopeContainerInitializer">
  <JsGlobalScopeContainerInitializer class="org.eclipse.wst.jsdt.core.compiler.libraries.LateralusLibraryInitializer" id="org.eclipse.wst.jsdt.launching.LateralusLibrary"/>
</JsGlobalScopeContainerInitializer>
</extension>

<!-- Inference Support -->
<extension point="org.eclipse.wst.jsdt.core.infer.LateralusInferenceProvider"/>
</extension>
Advanced Toolkit – Lateralus Toolkit III.

/* © Copyright 2008 IBM Corp. All rights reserved. This source code is made available under the terms of the Eclipse Public License, v1.0. */

public class LateralusInferenceProvider implements InferrenceProvider {
    public int appliesTo(IScriptFileDeclaration scriptFile) {
        return InferrenceProvider.MAYBE_THIS;
    }

    public InferEngine getInferEngine() {
        InferEngine engine = new LateralusInferEngine();
        engine.inferenceProvider = this;
        return engine;
    }

    public String getID() {
        return "org.eclipse.wst.jsdt.infer";
    }
}

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Advanced Toolkit – Lateralus Toolkit IV.

/* © Copyright 2008 IBM Corp. All rights reserved. This source code is made available under the terms of the Eclipse Public License, v1.0. */

public class LateralusInferEngine extends InferEngine{
    // goto demo in eclipse
}

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The FireFox Browser Library - Example

- JSDT Browser Library provides all the types + objects from the FireFox Library.
- Objects are defined with `.prototype` structure in `.js` files.
- Defines `Window()` object for inheritance.
- When the FireFox Browser Support Library is added, the source file is copied to the workspace `working` directory. All projects reference the same sourcefile.
- No inference support needed. Only UI and Global Scope management are used –
  - Global Scope Handling - `FireFoxLibInitializer.java`
  - Library Wizard UI - `FireFoxLibraryWizardPage.java`
Global Scope

• All CompilationUnits within a project share the same Global Scope.
• Depending on the project’s library configuration, high level types + fields in source CU’s are added back to the projects Global Scope.
• Library plug-ins may contribute JavaScript source for inclusion in a project’s Global Scope.
• The Global Scope is managed through the *Library Configuration* page.
Conclusion and Additional Resources

• CVS Repository Locations
  ❖ /cvsroot/webtools

• As Standalone JavaScript Editor
  ❖ sourceediting/plugins/org.eclipse.wst.jsdt.core
  ❖ org.eclipse.wst.jsdt.core
  ❖ org.eclipse.wst.jsdt.manipulation
  ❖ org.eclipse.wst.jsdt.ui

• Integrated with Web Tools
  ❖ sourceediting/plugins/org.eclipse.wst.jsdt.core
  ❖ org.eclipse.wst.jsdt.web.core
  ❖ org.eclipse.wst.jsdt.web.ui

• See Wiki page for more information
  ❖ http://wiki.eclipse.org/JSDT
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