jStar Eclipse tutorial

September 16, 2010

1 Installation

Prerequisites:

- JDK 6 (not JRE since it does not have a compiler needed for annotation processing). You can specify it in eclipse.ini:

  Windows Example
  -vm
  C:\Java\JDK\1.6\bin\javaw.exe

  Linux Example
  -vm
  /opt/sun-jdk-1.6.0.02/bin/java

  Mac Example
  -vm
  /System/Library/Frameworks/JavaVM.framework/Versions/1.6.0/Home/bin/java

  For more information go to http://wiki.eclipse.org/Eclipse.ini

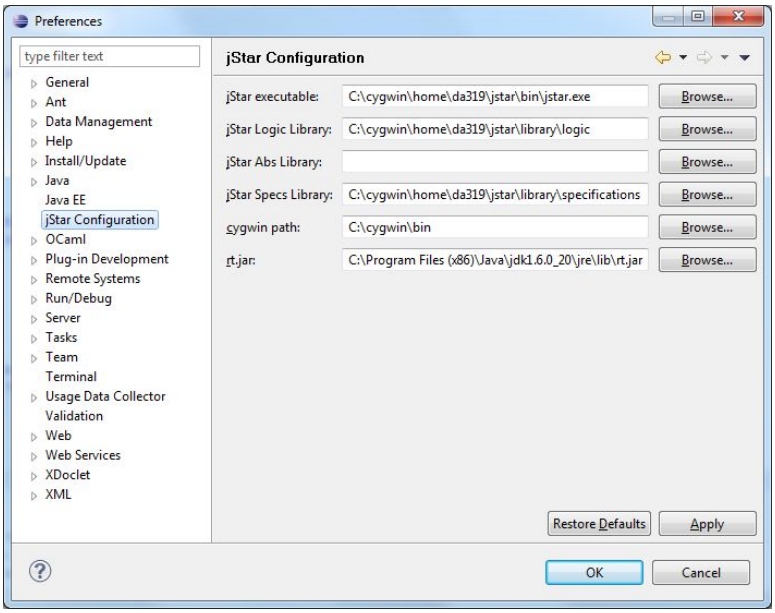
Two ways:

1. Add the jar file **jar_files/plugins/com.jstar.eclipse_1.0.0.x.jar** to `eclipse/dropins/` folder and restart Eclipse.
2. Need to create an update site.

2 Configuration

2.1 Windows with cygwin

Go to Windows → Preferences → jStar and set the required directories.



rt.jar could be found in jdk1.6.0/jre/lib/. It is required library for soot. The plugin will try to find it automatically.

2.2 Linux

rt.jar could be found in jdk1.6.0/jre/lib/. It is required library for soot. The plugin will try to find it automatically.

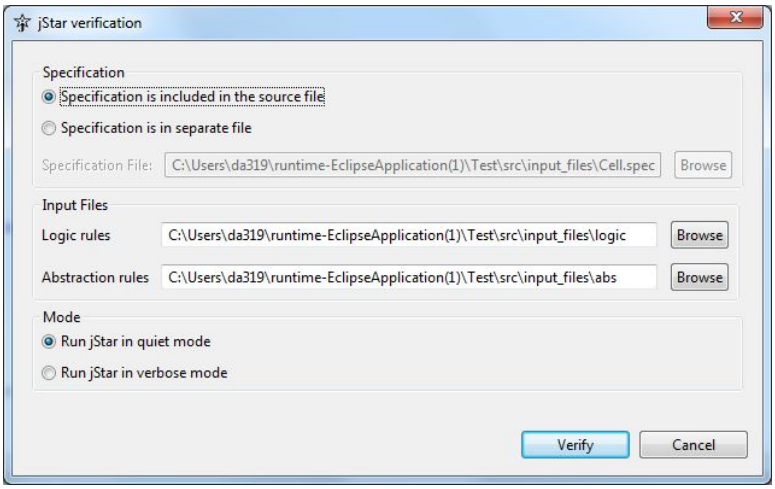
2.3 Mac

classes.jar and ui.jar cound be found in /System/Library/Frameworks/JavaVM.framework/Versions/1.6.0/Classes/. They are required libraries for soot. The plugin will try to find them automatically.

3 Verification

You can verify source file by selecting `Verify with jStar` from the context menu or the main toolbar.

By selecting `Verify with jStar Configurations...`, you can indicate the location of specification, logic and abstraction rules.



Specification in source file

If you want to write specification in the source file, you need to add annotations.jar (can be found in com.jstar.eclipse/jar files/annotations) to your project Java Build Path.

Annotations

- `@Import` has one element `String[] value`. This annotation can be used to annotate only type declarations.
- `@Predicate` is used for `define` and `export` statements. It has three elements: `String predicate`, `String formula`, `DefinitionType type`. `DefinitionType` is enum with two values `Define` and `Export`. The default value of type is `DefinitionType.Define`. This annotation can be used to annotate only type declarations.
- `@Predicates` is used if you want to have more than one `define` and/or `export` statements. It has one element `Predicate[] value`. This annotation can be used to annotate only type declarations.
- `@InitSpec` is a (dynamic / both static and dynamic) specification for constructor which is not explicitly defined in the source code. It has two elements: `String pre`, `String post`. This annotation can be used to annotate only type declarations.
- `@InitSpecs` is (dynamic / both static and dynamic) specifications which are conjuncted with `also` for constructor which is not explicitly defined in the source code. It has one element `InitSpec[] value`. This annotation can be used to annotate only type declarations.

- `@InitSpecStatic` is a static specification for constructor which is not explicitly defined in the source code. It has two elements: `String pre`, `String post`. This annotation can be used to annotate only type declarations.
- `@InitSpecsStatic` is static specifications which are conjuncted with `also` for constructor which is not explicitly defined in the source code. It has one element `InitSpecStatic[] value`. This annotation can be used to annotate only type declarations.
- `@Spec` is a (dynamic / both static and dynamic) specification for a method or a constructor. It has two elements: `String pre`, `String post`. This annotation can be used to annotate only method and constructor declarations.
- `@Specs` is (dynamic / both static and dynamic) specifications which are conjuncted with `also` for a method or a constructor. It has one element: `Spec[] value`. This annotation can be used to annotate only method and constructor declarations.
- `@SpecStatic` is a static specification for a method or a constructor. It has two elements: `String pre`, `String post`. This annotation can be used to annotate only method and constructor declarations.
- `@SpecsStatic` is static specifications which are conjuncted with `also` for a method or a constructor. It has one element: `SpecStatic[] value`. This annotation can be used to annotate only method and constructor declarations.

Examples of annotations in the source code:

Annotation in source file	Generated specification file
`@Import("Spec.spec")`	`import("Spec.spec");`
`@Import({"Spec1.spec", "Spec2.spec"})`	`import("Spec1.spec");` `import("Spec2.spec");`

`@Predicate(`
`  predicate = "P(x)",`
`  formula = "F(x)"`
`)`
	`define P(x) as F(x);`

```
@Predicate(
   predicate = "P(x)",
   formula = "F(x)",
   type = DefinitionType.Export
)
```

```
export P(x) as F(x);
```

```
@Predicates({
   @Predicate(
      predicate = "P1(x)",
      formula = "F1(x)",
      type = DefinitionType.Export
   ),
   @Predicate(
      predicate = "P2(x)",
      formula = "F2(x)"
   )
})
```

```
export P1(x) as F1(x);
define P2(x) as F2(x);
```

```
@InitSpec(
   pre = "precondition",
   post = "postcondition"
)
```

```
void <init>() :
   { precondition }
   { postcondition }
```

```
@InitSpecs({
   @InitSpec(
      pre = "precondition 1",
      post = "postcondition 1"
   ),
   @InitSpec(
      pre = "precondition 2",
      post = "postcondition 2"
   )
})
```

```
void <init>() :
   { precondition 1 }
   { postcondition 1 }
   andalso
   { precondition 2 }
   { postcondition 2 }
```

```
@InitSpecStatic(
   pre = "precondition",
   post = "postcondition"
)
```

```
void <init>() static :
   { precondition }
   { postcondition }
```

```
@InitSpecsStatic({
   @InitSpecStatic(
      pre = "precondition 1",
      post = "postcondition 1"
   ),
   @InitSpecStatic(
      pre = "precondition 2",
      post = "postcondition 2"
   )
})
```

```
void <init>() static :
   { precondition 1 }
   { postcondition 1 }
   andalso
   { precondition 2 }
   { postcondition 2 }
```

```
@Spec(
   pre = "precondition",
   post = "postcondition"
)
```

method declaration

method declaration :

```
   { precondition }
   { postcondition }
```

```
@Specs({
   @Spec(
      pre = "precondition 1",
      post = "postcondition 1"
   ),
   @Spec(
      pre = "precondition 2",
      post = "postcondition 2"
   )
})
```

method declaration

method declaration :

```
   { precondition 1 }
   { postcondition 1 }
   andalso
   { precondition 2 }
   { postcondition 2 }
```

```
@SpecStatic(
   pre = "precondition",
   post = "postcondition"
)
```

method declaration

method declaration `static :`

```
{ precondition }
{ postcondition }
```

```
@SpecsStatic({
   @SpecStatic(
      pre = "precondition 1",
      post = "postcondition 1"
   ),
   @SpecStatic(
      pre = "precondition 2",
      post = "postcondition 2"
   )
})
```

method declaration

method declaration `static :`

```
{ precondition 1 }
{ postcondition 1 }
andalso
{ precondition 2 }
{ postcondition 2 }
```

Verification errors

In case there are some verification errors, you can see error messages in console. The lines in source code where the problem appeared are annotated as squiggly marks.