Eclipse development setup for CIShell and Sci2

Introduction

This document will walk you through installing Eclipse, installing and configuring necessary plugins, pulling all the necessary source code, and even building both CIShell and Sci2. This process is only necessary if you plan on doing advanced development on the CIShell platform or Sci2 core plugins. If you are developing or modifying a single plugin, refer to this tutorial instead. This tutorial will be presented in steps, and assumes you already have the most recent version of the Java 7 64-bit JDK installed.

Preparing Eclipse

Install and Launch Eclipse

The first thing you'll need to do is acquire Eclipse, if you don't already have it. The Eclipse.org website is the official source for these downloads. In this case, we will be installing the latest version, **Eclipse Kepler**. It is recommended to download the **Eclipse Standard** Package. If you have the Java 64-bit JDK, you will want to download the 64-bit version of Eclipse. Extract the contents of the .zip download, which should consist of a folder called `eclipse`. Place the folder wherever you would like, change the name if you wish, then open up `eclipse.exe` contained in the folder. Eclipse will ask you to select a workplace, so either accept the default location or select a custom directory. When Eclipse opens for the first time, you should see a welcome screen, which you can close.

Note:

We recommend placing your Eclipse workplace on a Solid State Drive (SSD), if you have one, since it will make the application much faster when performing various tasks.

Install and Configure Eclipse Plugins

EGit

EGit should be included in all Eclipse Standard packages. To double check, you can click on `Help->About Eclipse` from the Eclipse toolbar. EGit should be one of the plugins listed.

Subclipse

To install Subclipse, you'll want to go to `Help->Install New Software...` from the Eclipse toolbar.

1. In the Work with: field, paste the following URL: http://subclipse.tigris.org/update_1.8.x
   a. **Note:** The newest version of Subclipse, such as 1.10.x, do not currently work with plugins we will install later on
2. Click on the `Add...` button to the right of that field
3. Give a descriptive name to this new repository, such as `Subclipse`
4. After fetching data from the repository, two top level results should appear. Check the boxes to the left of `Subclipse` and `SVNKit` then click `Next`
5. Click `Next` again, accept the terms of the license agreement, then click `Finish`
6. Eclipse will now install Subclipse. It may ask to be restarted - go ahead and agree to that so that the installation can complete

Maven Integration (m2eclipse)

To install m2eclipse, you'll want to go to `Help->Install New Software...` from the Eclipse toolbar.

1. In the Work with: field, paste the following URL: http://download.eclipse.org/technology/m2e/releases
2. Click on the `Add...` button to the right of that field
3. Give a descriptive name to this new repository, such as `m2eclipse`
4. After fetching data from the repository, a single top level result should appear. Check the box to the left of `Maven Integration for Eclipse`, then click `Next`
5. Click `Next` again, accept the terms of the license agreement, then click `Finish`
6. Eclipse will now install m2eclipse. It may ask to be restarted - go ahead and agree to that so that the installation can complete

Add m2eclipse Connectors

The Maven integration software requires two connectors for Git and Subversion before we can start pulling code and importing projects with Maven. We will now install those connectors.

egit Handler

1. Go to `File->Import`... from the Eclipse toolbar
2. Select `Maven->Check out Maven Projects from SCM` and then click `Next`
3. Near the bottom of this window, where it says `Find more SCM connectors in the m2e Marketplace`, click the blue link
4. In the window that opens, in the Find: field, type in `egit`. The first result should be `m2e-egit` - check the box next to that entry and click `Finish`
5. After some processing, another window should pop up. The `Maven SCM Handler` should be checked, so you can just click `Next` here
6. Click `Next` on the following screen, then accept the license agreement and click `Finish`
7. A security warning might pop up, just click `OK`
8. A dialog will prompt you to restart Eclipse - click `Yes`

Subclipse Handler

1. Go to `File->Import`... from the Eclipse toolbar
2. Select `Maven->Check out Maven Projects from SCM` and then click `Next`
3. Near the bottom of this window, where it says `Find more SCM connectors in the m2e Marketplace`, click the blue link
4. In the window that opens, in the Find: field, type in `subclipse`. The first result should be `m2e-subclipse` - check the box next to that entry and click `Finish`
5. After some processing, another window should pop up. The `Maven SCM Handler` should be checked, so you can just click `Next` here
6. Click `Next` on the following screen, then accept the license agreement and click `Finish`
7. A security warning might pop up, just click `OK`
8. A dialog will prompt you to restart Eclipse - click `Yes`

Note:

Please note, SVN and the SVN connector will not work until you make this change:

1. After Eclipse has been restarted, go to `Window->Preferences` from the toolbar
2. In the search field in the top left corner, type in SVN, then click on the SVN header
3. In this options screen, under SVN interface, select `SVNKit (Pure Java)` for Client
4. Click `OK` to exit Preferences and save changes

Ant-Contrib

In order to build programs like CIShell, additional build steps are sometimes required outside of the usual Maven build process. For these tasks, you'll need to use Ant. In this case, you will need to install the Ant-Contrib library to your local version of Ant.

1. Download and unzip the latest version of Ant-Contrib. Ant-Contrib has not been updated since 2006, so it's a pretty safe bet that this download will be the most recent release: ant-contrib-1.0b3-bin.zip
2. After unzipping, you'll want to move the jar file (ex: `ant-contrib-1.0b3.jar`) to your `ANT_INSTALLATION/lib/` directory. In my case, this was located at `plugins/org.apache.ant_<version>/lib` inside of my main Eclipse folder
3. Next, you need to add the new jar to Ant's classpath. To do this, go to `Window->Preferences->Ant->Runtime->Classpath` in Eclipse. Select `Ant Home Entries`, then click `Add External JARs`. Now navigate to the ant-contrib jar we imported and select it. A warning might pop up, but just click `Yes` if that happens.
4. Now click `OK` to save your preferences, and Ant-Contrib should be ready to go

Pulling Code and Building

Once your Eclipse is fully configured, you can begin the process of pulling source code from the relevant Git and SVN repositories. Keep in mind that this is only necessary if you intend to do advanced development work on the CIShell or Sci2 core, or wish to build the projects in your local Eclipse instance. Additionally, these steps may vary between internal CNS developers and the general public.

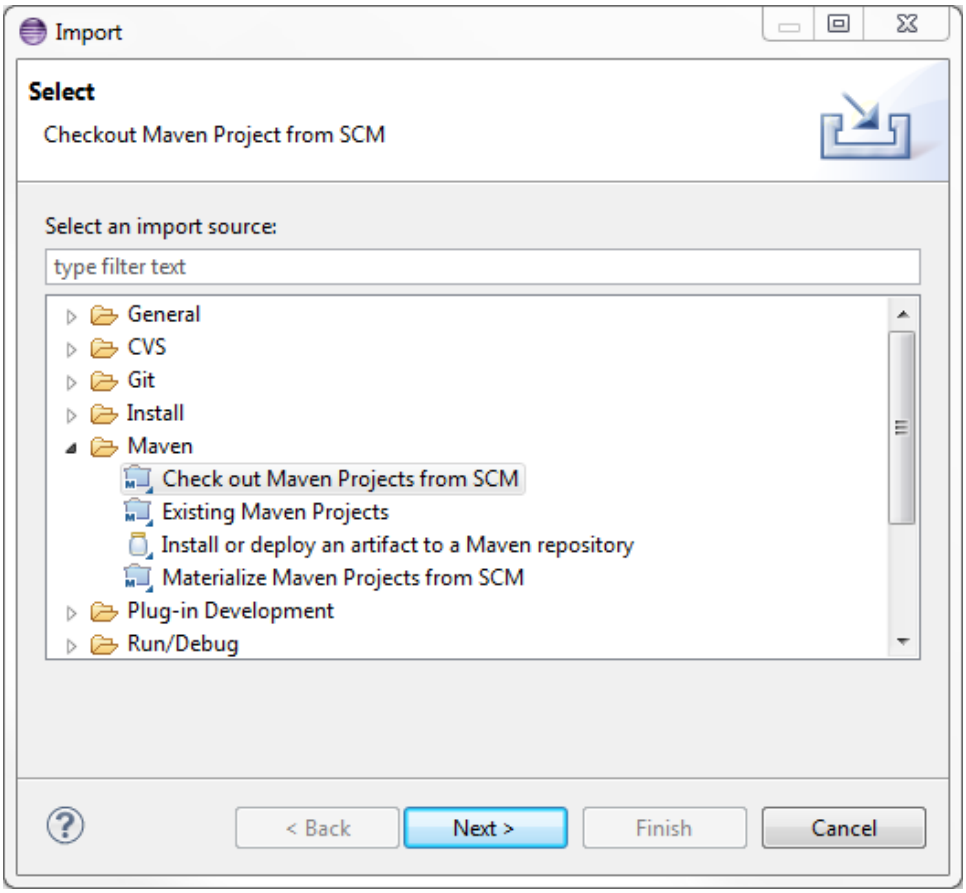
CIShell

Pulling from the GitHub Repository

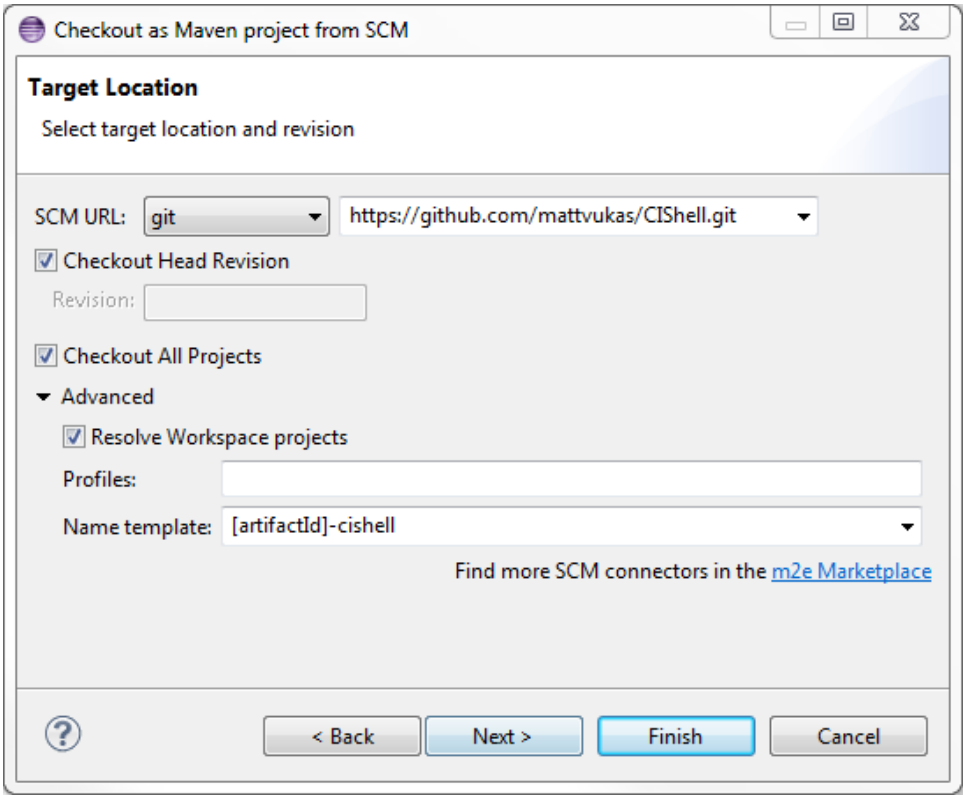
To pull and commit changes to the public GitHub repository, you will need a GitHub account. The specifics of SSH keys and configuring your GitHub are covered here, so we won't spend any time on that. If you want eventually commit changes and have them added to the main CIShell repository, you'll want to fork it and commit your changes there. Then you can submit a pull request to have your changes integrated to the production branch. For this walkthrough, I'll use my personal fork of CIShell, but the steps are generally the same for the main repository found here.

Keep in mind that this will pull the code for all the CIShell core modules and is not necessary for most developers. **If you are interested in single plugin development, refer to this guide instead:** Developing a Single Plugin

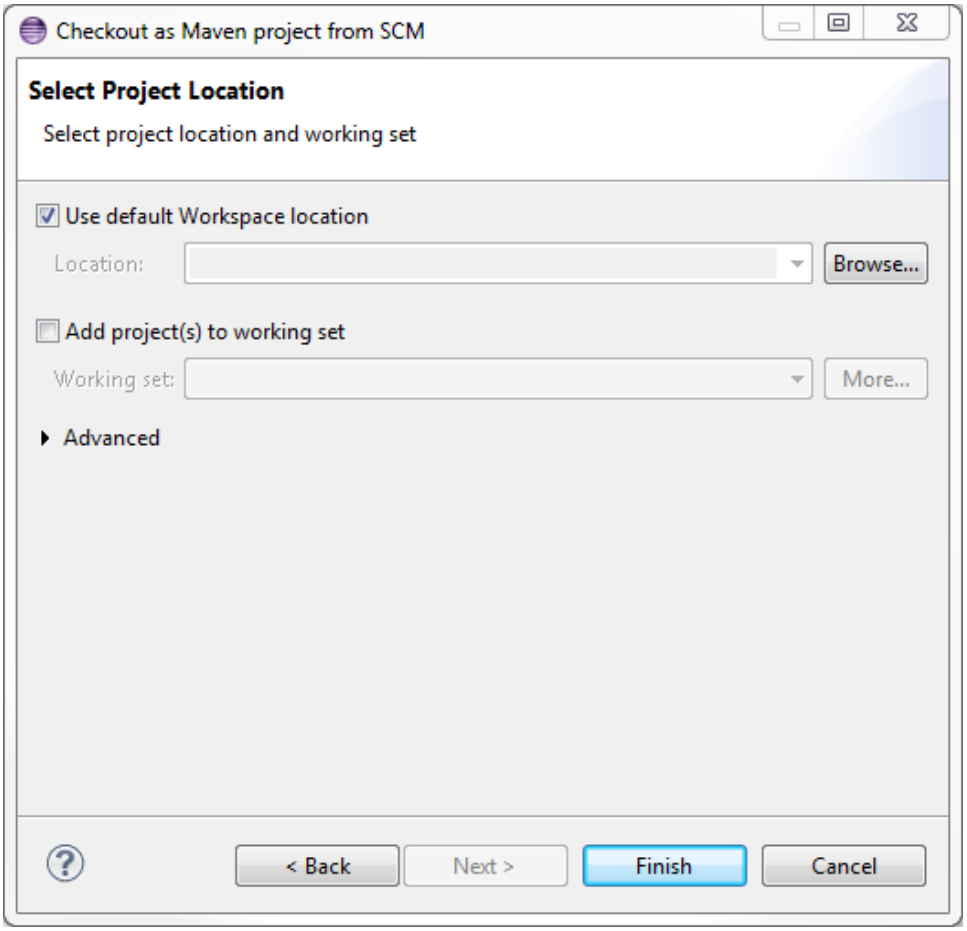
1. Go to `File->Import...` on the Eclipse toolbar
2. Select `Check out Maven Projects from SCM`, then click `Next`



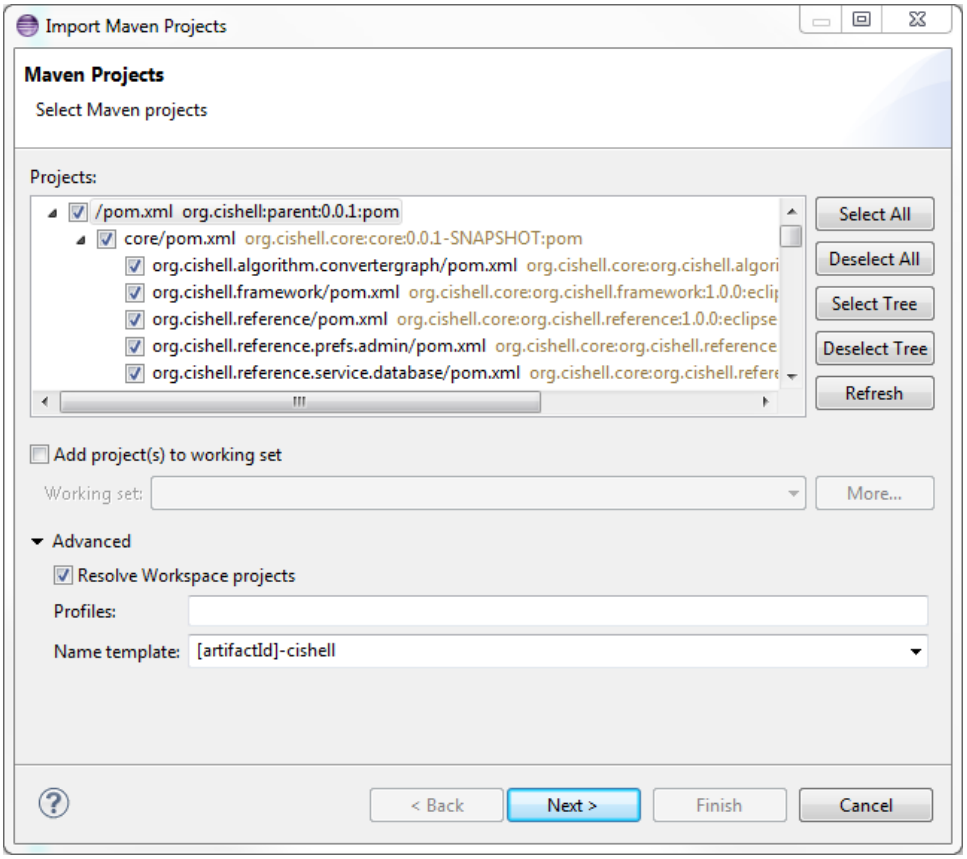
3. For `SCM URL`, select `git` from the drop down menu, then paste your Git URL to the right of that
    a. **Note:** I used the *https* URL, instead of the *ssh* URL in this case, to avoid the hassle of setting up SSH keys. Either way should work



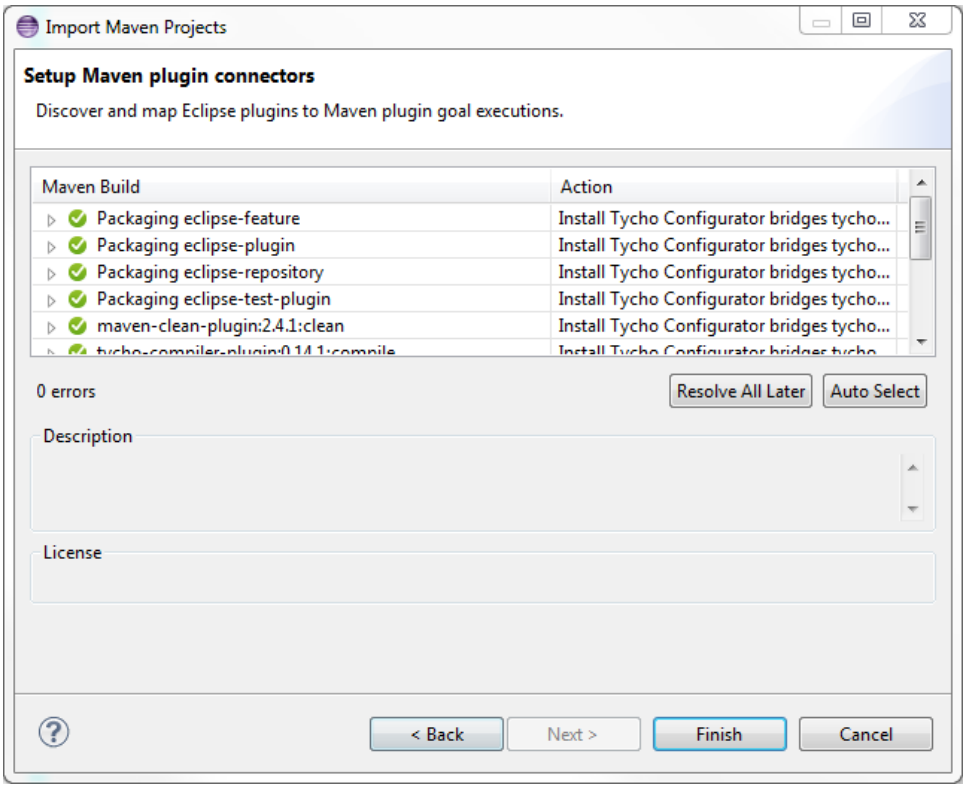
4. Most developers prefer to append a name to all projects imported from a certain repo. You can do that using the `Name template` field, as shown. Then click `Next`
5. Leave this screen as is and click `Finish`



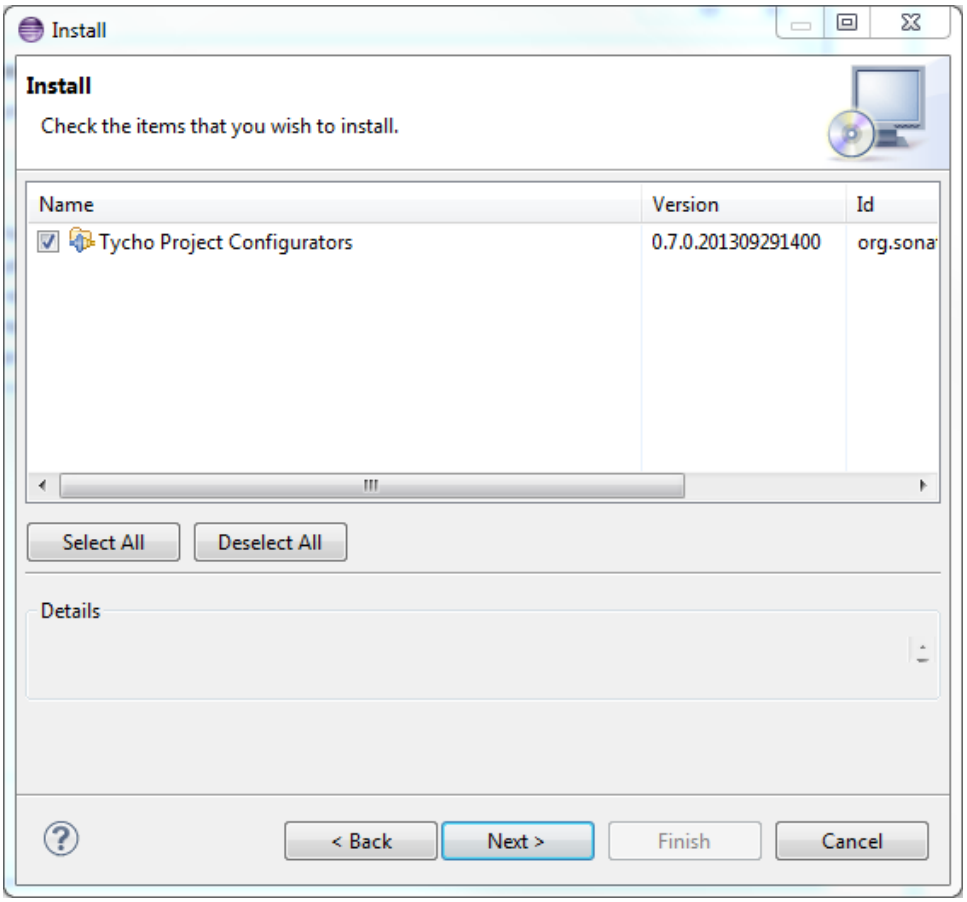
6. A Maven project import screen *may* pop up. Just leave everything selected, then under `Advanced`, you may have to reenter the same `Name template` you added on that previous step. Then click `Next`.



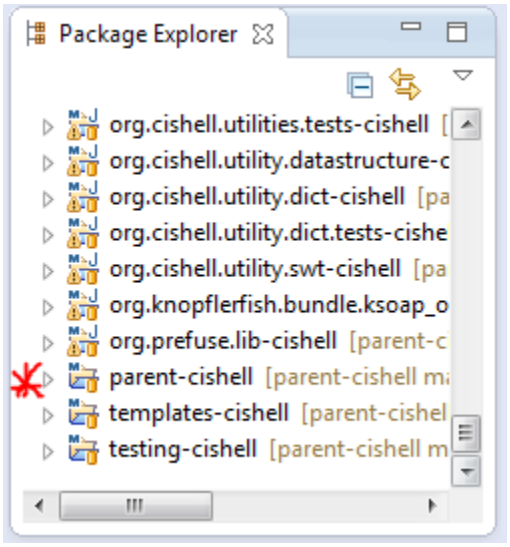
7. On this next screen with all the green check marks, just click `Finish`



8. Tycho builds eclipse plugin with maven. So Eclipse will prompt to install 'Tycho Project Configurators' . Just click 'Next' though the dialogs and accept license agreement. After installation, it will prompt to restart. Click 'Yes'.



9. At this point, Eclipse will pull in all the CIShell projects. Each project should now be managed by Maven and in sync with your Git repository, as shown by the symbols on each project



10. The parent project is the top level CIShell project, which you can later use to build CIShell with

You now have everything you need to work on the CIShell core in your local development environment, or build CIShell completely.

Building with Maven and Ant

1. Right click the parent CIShell project (named `parent-cishell` in my example), then click `Run As->Maven build...`
2. In the window that pops up, type `clean install` into the `Goals` field. This will perform a Maven clean, followed by a Maven install command
3. Click the `Run` button. Maven will then go through the CIShell build process, which may take some time
4. After the Maven tasks have completed (you should see `BUILD SUCCESS` in the console if this is the case), we need to perform the Ant tasks
    a. In the parent project, go to `deployment/org.cishell.reference.releng/postMavenTasks.xml`, right click on it, and go to `Run As->Ant Build`

b. You will probably see output of the Ant script in the Console, but it should eventually stop with a `BUILD SUCCESSFUL` message

Locating the Finished Build

1. Inside of your Eclipse workspace directory, locate your parent CIShell directory, which in my case was named `parent-cishell`
2. Inside of this folder, go to `deployment/org.cishell.reference.releng/target/products-final`
3. In this folder, there should be several compressed folders, each for a different system type
    a. Locate the one for your particular system and extract it to a new directory
4. Go inside of that new directory, right click on the CIShell application (`cishell.exe`), and create a new shortcut. Right click on the shortcut and go to `Properties`. At the end of the `Target` line, after a space, type "`-clean -console`". This will aid with adding new plugins and debugging.
5. Launch the shortcut to run CIShell

Sci2

Pulling from the NWB SVN Repository

To checkout and commit changes to the NWB SVN repo, you need to be a CNS developer with SSH access. If you only want to checkout the code, you can use the public access URL.

- Checkout and commit access (private): svn+ssh://in.cns.iu.edu/projects/svn/nwb
- Checkout only (public): https://in.cns.iu.edu/svn/nwb/

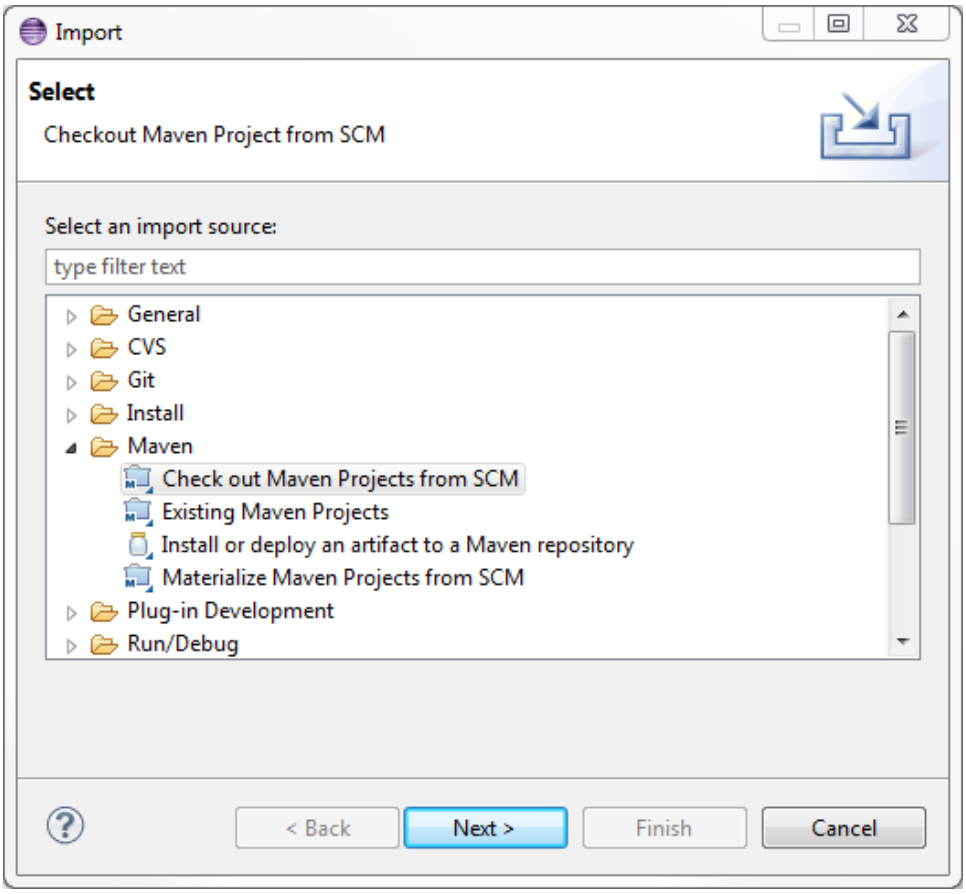
You can find out more about the various CNS source code repositories here. For this walkthrough, I'll use the private access SSH method, but the steps are generally the same for the public access SVN.

In this tutorial, I'm going to be pulling code for the Sci2 project from *trunk*. Trunk is a standard SVN top-level sub-directory and is considered the main body of development, or the most stable branch. I will be importing from the private SVN trunk directory. Here are the SVN paths for trunk:

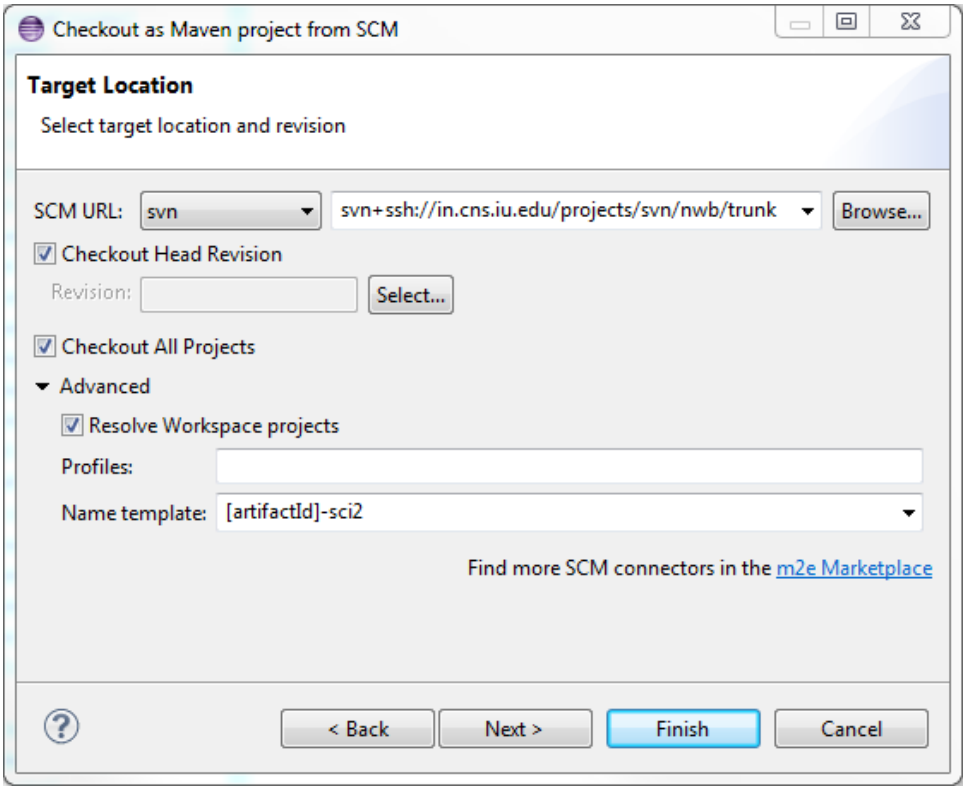
- Private SVN trunk: svn+ssh://in.cns.iu.edu/projects/svn/nwb/trunk
- Public SVN trunk: https://in.cns.iu.edu/svn/nwb/trunk

Keep in mind that this will pull all the code for Sci2 and all necessary plugins used in the Sci2 build process - it may take some time. **This is not necessary for most users, and single plugin developers should refer to this guide instead:** Developing a Single Plugin

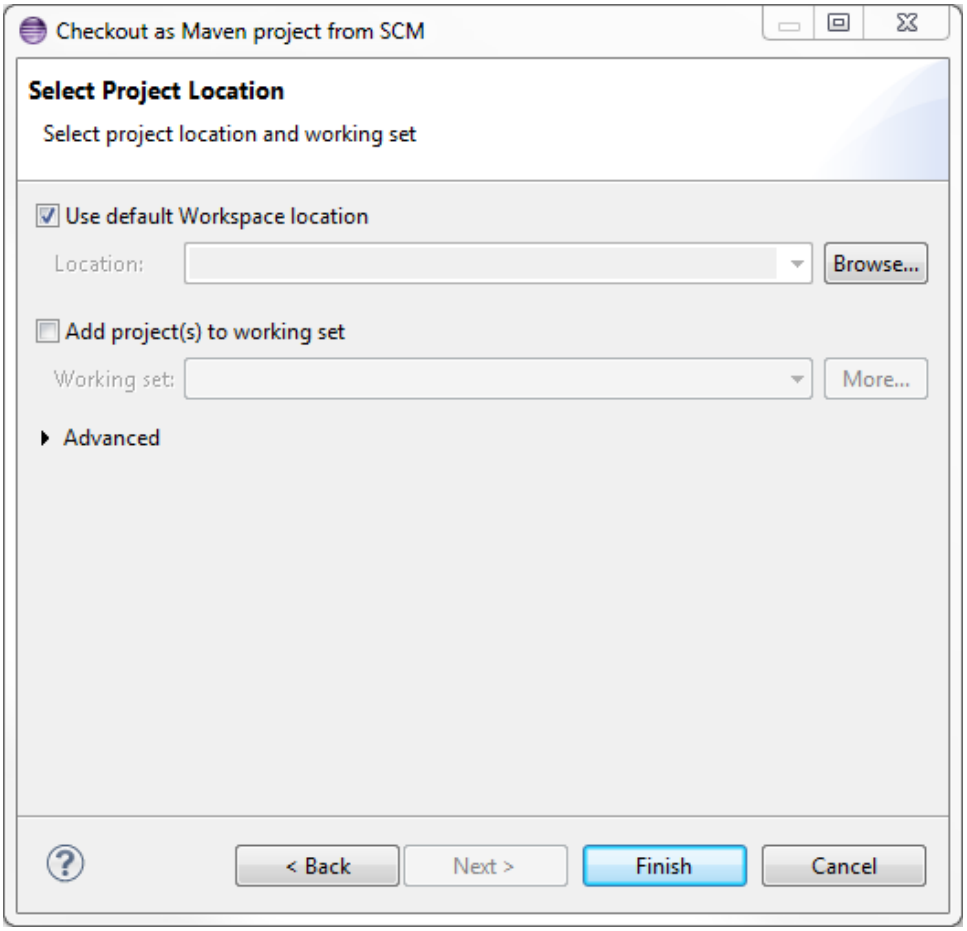
1. Go to `File->Import...` on the Eclipse toolbar
2. Select `Check out Maven Projects from SCM`, then click `Next`



3. For `SCM URL`, select `svn` from the drop down menu, then paste your SVN URL to the right of that



4. Most developers prefer to append a name to all projects imported from a certain repo. You can do that using the `Name template` field, as shown. Then click `Next`
5. Leave this screen as is and click `Finish`



6. Maven will now pull all the code from the SVN repo and import it. This may take some time. In this case, the parent project was designated as `parent-sci2` in my repository. You'll use the parent project to manage the Maven build process.

Building with Maven

1. Right click the parent Sci2 project (named `parent-sci2` in my example), then click `Run As->Maven build...`
2. In the window that pops up, type `clean install` into the `Goals` field. This will perform a Maven clean, followed by a Maven install command
3. Click the `Run` button. This may take some time. If the build process stops with the message `BUILD SUCCEEDED` in the console, then congrats, you're done. If instead you see `ERROR` several times, read on

Troubleshooting the Build Process

The following information refers to ongoing issues with Sci2 that are subject to change or may be resolved in the near future

OpenCSV Error

When doing a Maven clean install, you may sometimes encounter this error which prematurely ends the build process:

Maven Build console output

```
[ERROR] Cannot resolve project dependencies:
[ERROR] Software being installed: edu.iu.sci2.javaalgorithms.feature.feature.group 1.0.0
[ERROR] Missing requirement: edu.iu.sci2.javaalgorithms.feature.feature.group 1.0.0 requires 'opencsv
[2.2.0,2.2.1)' but it could not be found
[ERROR]
```

A workaround for this issue is to actually go into the project in question (in this case, `edu.iu.sci2.javaalgorithms.feature`) in your Eclipse workspace and edit the `feature.xml` file:

1. Open `feature.xml` in the Eclipse editor

2. Select `feature.xml` at the bottom to view the raw `xml` text
3. Find the `<plugin ... />` item with an `id` value of `"opencsv"` (sometimes `"opencsv.source"`)
4. Change the `version` value to `"0.0.0"` - this will pull in the latest version of OpenCSV instead of requiring a specific version
5. Save the file

Now attempt the Maven clean install command again, as described before. You may also have to make this "fix" to the `edu.iu.sci2.source.feature` project as well.

Bipartitenet Compilation Error

Some have reported running into this issue, which is more rare but still occasionally pops up when building Sci2:

Maven console output

```
[ERROR] Failed to execute goal org.eclipse.tycho:tycho-compiler-plugin:0.14.1:compile (default-compile) on
project edu.iu.sci2.visualization.bipartitenet: Compilation failure: Compilation failure:
[ERROR] C:\Users\username\workspace\parent-sci2\sci2\plugins\normal_plugins\edu.iu.sci2.visualization.
bipartitenet\src\edu\iu\sci2\visualization\bipartitenet\model\Node.java:[30,0]
[ERROR] static final Function<String,Double> EXTRACT_DOUBLE_VALUE = new Function<String,Double>() {
[ERROR] ^^^^^^^^^^^^^^^^^^^^^^^^
[ERROR] The blank final field FLOATING_POINT_NUMBER may not have been initialized
[ERROR] 1 problem (1 error)
```

The fix is to alter a source file, `Node.java`, which causes the issue:

1. Go to the directory of `Node.java` described in the error message
    a. In this case, it is located in the Eclipse workspace directory at `parent-sci2\sci2\plugins\normal_plugins\edu.iu.sci2.visualization.bipartitenet\src\edu\iu\sci2\visualization\bipartitenet\model\`
2. Open the `Node.java` file in a text editor
3. Remove the `final` keyword for the variable declaration `EXTRACT_DOUBLE_VALUE`
4. Save the file

At this point, attempt the Maven clean install again. It should now proceed without errors.

Locating the Finished Build

1. Inside of your Eclipse workspace directory, locate your parent Sci2 directory, which in my case was named `parent-sci2`
2. Inside of this folder, go to `sci2/deployment/edu.iu.sci2.releng/target/products`
3. In this folder, there should be several compressed folders, each for a different system type
    a. Locate the one for your particular system and extract it to a new directory
4. Go inside of that new directory, right click on the Sci2 application (`sci2.exe`), and create a new shortcut. Right click on the shortcut and go to `Properties`. At the end of the `Target` line, after a space, type `"-clean -console"`. This will aid with adding new plugins and debugging.
5. Launch the shortcut to run Sci2