From Europa to Ganymede: Eclipse Packaging and Ganymatic

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Eclipse Builds and Packages

source

configure; make

pde/build

update site

Ganymatic

update site

EPP build

installable package

Linux package
The Role of Projects

source

configure; make

Linux package

pde/build

update site

Ganymatic

update site

EPP build

installable package
The Role of Ganymatic

- Source
  - pde/build
  - configure; make

- Update site
  - Ganymatic

- EPP build
  - Installable package
Ganymede, the Ideal

• Simultaneous release of ~30 projects

• A single date (June 27th)
• A single SCM tag for adopters
• A single installer / single update site for users
Ganymede, the Reality

• Ganymede should be “project coordination only”
• Limitations of update manager cause us to need a single update site with all projects
  ♦ Copies of the projects rather than just pointers to the project’s own update site
• Limitations of update manager cause us to need an update site that is as small as possible
• Thus we need a way to assemble one update site from multiple update sites…
• …without (much) extra work by each project
Ganymatic, the Build Tool (1)

Server: build.eclipse.org

Summary:
- 6 project build(s)
- 0 project(s) inactive
- 0 project build(s) failed
- 6 project build(s) succeeded
- 0 project(s) building
- 100% of projects passing

Tools:
- Add a project
- RSS Feed
- for CCTray
- for CC-Config
- JMX Console

- cleanup-artifacts-B at 19 Mar 2008 07:05 GMT +00:00
- ganymatic-R3.0-I at 19 Mar 2008 00:03 GMT +00:00
- orbit-I at 11 Mar 2008 17:30 GMT +00:00
- orbit-M at 28 Jan 2008 15:52 GMT +00:00
- orbit-R at 28 Jan 2008 15:23 GMT +00:00
- orbit-S at 9 Feb 2008 16:38 GMT +00:00
Ganymatic, the Build Tool (2)

Ganymede Build Status

| Latest Build | Mar 19, 2008 00:05:05 GMT | Fail |
| Latest Good Build | Mar 14, 2008 22:25:33 GMT | Success |

Cruise Control
- Staging update site
- Ganymede wiki page
- all builds
- successful builds
- failed builds

<table>
<thead>
<tr>
<th>Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build ID (UTC)</td>
</tr>
<tr>
<td>20080319-0540</td>
</tr>
<tr>
<td>20080318-0540</td>
</tr>
<tr>
<td>20080304-0640</td>
</tr>
<tr>
<td>20080221-1100</td>
</tr>
</tbody>
</table>

Recent
- Mar 19, 2008 00:05:05 GMT | Fail
- Mar 18, 2008 02:02:50 GMT | Fail
- Mar 14, 2008 22:25:33 GMT | Success
- Mar 14, 2008 21:57:48 GMT | unable to determine status
- Mar 14, 2008 21:56:43 GMT | unable to determine status
- Mar 14, 2008 21:16:17 GMT | Success
- Mar 14, 2008 20:12:13 GMT | Success
- Mar 14, 2008 18:52:01 GMT | unable to determine status
- Mar 14, 2008 18:46:27 GMT | Fail
- Mar 14, 2008 18:26:25 GMT | Fail
- Mar 14, 2008 16:04:55 GMT | Success
- Mar 14, 2008 15:37:28 GMT | Success
- Mar 14, 2008 15:23:27 GMT | Fail
- Mar 14, 2008 07:03:54 GMT | Success
- Mar 13, 2008 00:13:29 GMT | Fail (mylyn)
Ganymatic, Logs

Build started Mar 19, 2008 00:04:07 GMT; completed Mar 19, 2008 00:05:05 GMT

Ganymede Build Log

Errors:
- (other) 61 105

resolve.cqury:
[java] ERROR [0020]: No suitable provider for component org.eclipse.dltk.ruby:site.feature/[1.0.0.v20080204-1458-7--E8McIJKKea2IBUDc,1.0.0.v20080204-1458-7--E8McIJKKea2I] was found in searchPath org.eclipse.dltk-sc
[java] ERROR [0020]: Rejecting provider site.feature(${downloads})/technology/dltk/updates-dev/1.0/site.xml): No component match was found
[java] ERROR [0020]: No suitable provider for component org.eclipse.dltk.tcl:site.feature/[1.0.0.v20080204-1458-7A--E9IgL5fLheijKz-Mz,1.0.0.v20080204-1458-7A--E9IgL5fLheij] was found in searchPath org.eclipse.dltk-sc
[java] ERROR [0020]: Rejecting provider site.feature(${downloads})/technology/dltk/updates-dev/1.0/site.xml): No component match was found
[java] ERROR [0020]: No suitable provider for component org.eclipse.dltk.core:site.feature/[1.0.0.v20080204-1458-7A--E9IgL5gKleemUMan,1.0.0.v20080204-1458-7A--E9IgL5gKleem] was found in searchPath org.eclipse.dltk-sc
[java] ERROR [0020]: Rejecting provider site.feature(${downloads})/technology/dltk/updates-dev/1.0/site.xml): No component match was found
[java] INFO: TAG-ID 0020 = project:
Ganymatic, Success


Ganymede Build Log

get.properties:

verify.properties.buckminster.home:

verify.properties.contribs.dir:

verify.properties.site.dir:

verify.properties.downloads:
Ganymatic, the Issues

• Project update sites contain extra versions
  ✦ = cannot just copy everything from all update sites

• Project features are not complete
  ✦ They depend on other features
  ✦ (This is a good thing)
  ✦ = just copying features is not enough, needs transitive closure
Ganymatic, powered by Buckminster

• Buckminster is a dependency resolver (and many other things)

• Ganymatic uses Buckminster to materialize an update site
  • (On my dev machine, I use Buckminster to materialize a workspace)

• Finds the minimal necessary set of features and plug-ins, then creates the collected update site.
Buckminster Highlights

• Resolution & materialization framework
  • Manages and resolves dependencies
  • Materializes components in context of choice
  • Can build workspaces defined as “virtual distros”
  • Supports CVS, SVN, PDE, update sites, other repositories

• Model agnostic meta-framework
  • Spans repos, component & build types
  • Supports complex assembly patterns

• Catalyst for distro creation
  • Simplified consumption of cross-project dependencies
Ganymatic, site contributions

```xml
<?xml version="1.0" encoding="UTF-8" ?>
<sc:siteContribution
    xmlns=... xmlns:sc=...
    updateSite="${downloads}/tools/gef/updates/site-interim-ganymede.xml">
<sc:member name="Anthony Hunter" email="anthonyh@ca.ibm.com" />
<sc:cspec name="org.eclipse.gef-sc">
    <dependencies>
        <dependency name="org.eclipse.draw2d.sdk"
            versionDesignator="[3.4.0.v20080115-677-8082A5655G39998x422_2448]" />
        <dependency name="org.eclipse.draw2d" versionDesignator=... />
        <dependency name="org.eclipse.gef.sdk" versionDesignator=... />
    </dependencies>

    <groups>
        <public name="Enabling Features">
            <attribute component="org.eclipse.draw2d.sdk" />
            <attribute component="org.eclipse.draw2d" />
        </public>
        <public name="Graphical Editors and Frameworks">
            <attribute component="org.eclipse.gef.sdk" />
        </public>
    </groups>
</sc:cspec>
</sc:siteContribution>
```
Ganymatic, a Sketch
Ganymatic, the Result
The Role of EPP

diagram showing the process from source to installable package.
Some Facts about EPP

EPP creates the packages for eclipse.org/downloads
Some Facts about EPP

One, two, three... next EPP package

- Every three seconds, an EPP package is downloaded
- 6,3M downloads in the first 9 months
Goals of the Eclipse Packaging Project

• Create entry level downloads
  ♦ This helps users to start with Eclipse

• Provide feedback about the content
  ♦ Find out about usage profiles
  ♦ Measure popularity
  ♦ EPP Usage Data Collector

• Help projects to integrate with each other
  ♦ Which project provides a suitable extension to package X?
  ♦ How can project Y structure its features to make it consumable?
  ♦ Detect dependency problems
How Eclipse build systems are different

You build from scratch / source
- Example: You have written code for your RCP application
- PDE build!
- Plugin export, feature build, site.xml build, product build
- Linux Distro build

You are consuming pre-build plugins and features
- Example: You want to create a product for your users
  - EPP: Build a product from Eclipse Update Sites
  - Ganymatic: Build an Update Site from Update Sites
Technology of the EPP Build

• Use Eclipse Update Manager to pull features from update sites
• Use PDE packager to create packages
• Everything driven by a single configuration file

4 features listed.
4 sites listed.
Looking up features...All features accounted for.
Installing features...
Created installation site at /opt/public/technology/epp/epp_build/34/workspace_cpp/extension_site.
Installing features for platform win32,win32,x86...
  Installing feature org.eclipse.cvs...Done.
  Installing feature org.eclipse.platform...Done.
  Installing feature org.eclipse.cdt...Done.
  Installing feature org.eclipse.epp.usagedata.feature...Done.
Done.
Building configured application...
Configuration files taken from /opt/public/technology/epp/epp_build/34/ws/packagerConfiguration.
The application will be built in /opt/public/technology/epp/epp_build/34/workspace_cpp.
Packing installation site....Done.
Building...Done.
Moving Files...Done.
Done.
The EPP Configuration File

One simple XML file that drives the build process

- Name, perspective, product ID
- A set of update sites
- A set of required features
- The base platform archive
- A platform specific eclipse.ini file

Future: Metadata with a package description that can be used on a webpage etc.
The EPP Configuration File Example

```xml
<?xml version="1.0" encoding="UTF-8"?>
<configuration>
  <rcp version="3.4M4" />
  <product
    name="eclipse-java-ganymede-M4"
    eclipseProductId="org.eclipse.platform.ide"
    initialPerspectiveId="org.eclipse.jdt.ui.JavaPerspective" />
  <updateSites>
    <updateSite url="file:///home/data/httpd/download.eclipse.org/releases/ganymede/staging/" />
    <updateSite url="file:///home/data/httpd/download.eclipse.org/technology/epp/updates/0.5milestones/" />
  </updateSites>
  <requiredFeatures>
    <feature id="org.eclipse.platform" version="latest" />
    <feature id="org.eclipse.cvs" version="latest" />
    <feature id="org.eclipse.jdt" version="latest" />
  </requiredFeatures>
  <rootFileFolder folder="/home/data/httpd/download.eclipse.org/eclipse/downloads/drops/S-3.4M4-200712131700" />
  <extensionSite relativeFolder="extension_site"/>
  <targetPlatforms>
    <platform os="linux" ws="gtk" arch="x86_64">
      <archiveFormat format="tar" />
      <eclipseIniFileContent path="/eclipse/">-showsplash
        org.eclipse.platform
        -vmargs
        -Dosgi.requiredJavaVersion=1.5
        -Xms40m
        -Xmx256m</eclipseIniFileContent>
    </platform>
  </targetPlatforms>
</configuration>
```
Problems

• Dependencies
  ✷ Not only dependencies between features, but also on a bundle level

• Order of features in the configuration file and the build process (again: dependencies)
  ✷ Sometimes a wrong order of features in the

• Missing editor for configuration file
  ✷ There *could* be an editor that helps creating a valid configuration
Next Step of EPP: Being a Package Maintainer

• EPP provides the build technology and the infrastructure
• EPP provides a central Drupal web page with the help of the Foundation
• Package Maintainer provides configuration file in its own repository location
• Package Maintainer is responsible for
  ▪ Package content
  ▪ Testing
  ▪ +1 / -1 before release
Ganymede

**Download Nightly Build**
- Nightly build on Foundation server
- Early feedback about the quality of the Ganymede Staging Update Site

**Download Milestone**
- Milestone builds
- Getting feedback from the larger community

**Download Release**
- New and improved Ganymede packages
- First new packages (Modeling, Reporting) available
- Central place for 'all-in-one' packages (e.g. Webtools all-in-one)
- Improved download pages
Getting Feedback: The Usage Data Collector

• Help committers and organizations better understand how developers are using Eclipse
• Open, transparent, Opt-In
• Data to be collected
  ▪ Loaded bundles
  ▪ Commands accessed via keyboard shortcuts
  ▪ Actions invoked via menus or toolbars
  ▪ Perspective changes
  ▪ View usage
  ▪ Editor usage
• Identifying keys for workstation and workspace
• Upload to Eclipse Foundation Server
Usage Data Collector Results

• UDC included in all Ganymede M4 EPP packages

• 14 days period from 2008-02-29 to 2008-03-14

• 2,359,688 usage data events were been generated by 453 users (an average of 5,209 events per user)
## Usage Data Collector Results: Views and Editors

### Views

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.eclipse.jdt.ui.PackageExplorer</td>
<td>26257</td>
</tr>
<tr>
<td>org.eclipse.ui.console.ConsoleView</td>
<td>12766</td>
</tr>
<tr>
<td>org.eclipse.ui.navigator.ProjectExplorer</td>
<td>7022</td>
</tr>
<tr>
<td>org.eclipse.search.ui.views.SearchView</td>
<td>4941</td>
</tr>
<tr>
<td>org.eclipse.debug.ui.DebugView</td>
<td>4882</td>
</tr>
<tr>
<td>org.eclipse.ui.views.ProblemView</td>
<td>3700</td>
</tr>
<tr>
<td>org.eclipse.ui.views.ContentOutline</td>
<td>3526</td>
</tr>
</tbody>
</table>

### Editors

<table>
<thead>
<tr>
<th>Class Name</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.eclipse.jdt.ui.CompilationUnitEditor</td>
<td>17129</td>
</tr>
<tr>
<td>org.eclipse.wst.xml.ui.internal.tabletree.XMLMultiPageEditorPart</td>
<td>2595</td>
</tr>
<tr>
<td>org.eclipse.jdt.ui.ClassFileEditor</td>
<td>2175</td>
</tr>
<tr>
<td>org.eclipse.ui.DefaultTextEditor</td>
<td>1387</td>
</tr>
<tr>
<td>org.eclipse.cdt.ui.editor.CEditor</td>
<td>1279</td>
</tr>
<tr>
<td>org.eclipse.compare.CompareEditor</td>
<td>1176</td>
</tr>
<tr>
<td>org.eclipse.jst.jsp.core.jspsource.source</td>
<td>1164</td>
</tr>
</tbody>
</table>
# Usage Data Collector Results: Perspectives and Commands

## Perspectives

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.eclipse.jdt.ui.JavaPerspective</td>
<td>4092</td>
</tr>
<tr>
<td>org.eclipse.debug.ui.DebugPerspective</td>
<td>2240</td>
</tr>
<tr>
<td>org.eclipse.team.ui.TeamSynchronizingPerspective</td>
<td>1150</td>
</tr>
<tr>
<td>org.eclipse.jst.jee.JEEPerspective</td>
<td>790</td>
</tr>
<tr>
<td>org.eclipse.pde.ui.PDEPerspective</td>
<td>299</td>
</tr>
<tr>
<td>org.eclipse.team.cvs.ui.cvsPerspective</td>
<td>192</td>
</tr>
<tr>
<td>org.eclipse.ui.resourcePerspective</td>
<td>182</td>
</tr>
<tr>
<td>org.eclipse.cdt.ui.CPerspective</td>
<td>182</td>
</tr>
</tbody>
</table>

## Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>org.eclipse.ui.file.save</td>
<td>87307</td>
</tr>
<tr>
<td>org.eclipse.ui.edit.text.goto.wordNext</td>
<td>71286</td>
</tr>
<tr>
<td>org.eclipse.ui.edit.delete</td>
<td>66741</td>
</tr>
<tr>
<td>org.eclipse.ui.edit.paste</td>
<td>57605</td>
</tr>
<tr>
<td>org.eclipse.ui.edit.text.goto.wordPrevious</td>
<td>51207</td>
</tr>
</tbody>
</table>
EPP and p2

• EPP will include the necessary p2 bits in its packages
  - This allows users to use Eclipse Update Manager and p2 technology

• p2 will allow to consume EPP configuration files
  - p2 installer reads EPP configuration files and creates an EPP package on the fly
  - Features...

• EPP build will be switched from using PDE packager to p2
Further Information

• EPP Project Webpage
  • http://www.eclipse.org/epp

• Newsgroup
  • http://dev.eclipse.org/newslists/news.eclipse.technology.packaging maillist.html

• Mailing List
  • https://dev.eclipse.org/mailman/listinfo/epp-dev
The Role of Linux Packages
Another way: Linux distributions
Differences from EPP
Avoid potential barriers
Make it easier
Why do this?
millions of potential users
How to reach them
How to reach them

Become part of distributions
yum install eclipse-jdt
apt-get install eclipse-sdk
Difference #1 between EPP and Linux distributions: granularity
How to reach them

Become part of distributions
<table>
<thead>
<tr>
<th>Package</th>
<th>Arch</th>
<th>Version</th>
<th>Repository</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>eclipse-pde</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>71 M</td>
</tr>
<tr>
<td>Installing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eclipse-cvs-client</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>7.2 M</td>
</tr>
<tr>
<td>eclipse-jdt</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>49 M</td>
</tr>
<tr>
<td>eclipse-pde-runtime</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>461 k</td>
</tr>
<tr>
<td>eclipse-platform</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>54 M</td>
</tr>
<tr>
<td>eclipse-rcp</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>24 M</td>
</tr>
<tr>
<td>libswt3-gtk2</td>
<td>i386</td>
<td>1:3.3.1.1-13.fc8</td>
<td>installed</td>
<td>7.4 M</td>
</tr>
<tr>
<td>Installing for dependencies:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Transaction Summary

<table>
<thead>
<tr>
<th>Install</th>
<th>0 Package(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update</td>
<td>0 Package(s)</td>
</tr>
<tr>
<td>Remove</td>
<td>16 Package(s)</td>
</tr>
</tbody>
</table>
How to reach them

Become part of distributions

Need packages
You: “But I target multiple versions in my work!”

\[ You_2: \text{“I always use the latest N-build”} \]

Me: “You're not the target audience”
Then why are you here?
millions of potential users
You: “I want my project to be a part of this”

Me: “Awesome! It's easy”
How do packages get made?
magic
No, seriously ...
Buildable source
Buildable source is *reproducible*
Buildable source
  + patches (ideally none)
  + build system (distro-provided)
  + file shuffling (common places)

packages!
FIXME

Issues with shared installations
(ex. https://bugs.eclipse.org/215034)

Making sure test suites work against installed packages
Do this

should be buildable offline

simple (e.g. ./configure; make)
Don't do this

cvs -d:ext:myusername@dev.eclipse.org

scp myusername@dev.eclipse.org

SCM tagging as part of build
Do this

Make 2-phase builds:

1. fetch, tag, post buildable source drop
2. build from source drop
From Europa to Ganymede: Eclipse Packaging and Ganymatic

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