

Best Practices for Java Projects

Horst Rechner

Abstract:

The combination of automated builds with module and integration tests and centralized bug and work tracking using a combination of Eclipse, Mylyn, Trac and CruiseControl could help ease the problems in multi-developer projects.

How will we do this?

- for each
 - Continuous Integration
 - Bug Tracking
 - Focused development
- do
 - Problems
 - Overview
 - Tool
 - How it helps
 - Lessons learned
- end

(Some of) the problems

Developer domain:

- “Who is working on that module?”
- “Is there any documentation / FAQ / written text besides code? Where is the code?”
- “Why do we have that software module twice / not / not working? What is it doing?”
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- “Is a memory stick sufficient to transfer the working software to the production system or do we need a portable hard drive?” – “Let me fix that quick.”

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Continuous Integration

(Some of) the problems

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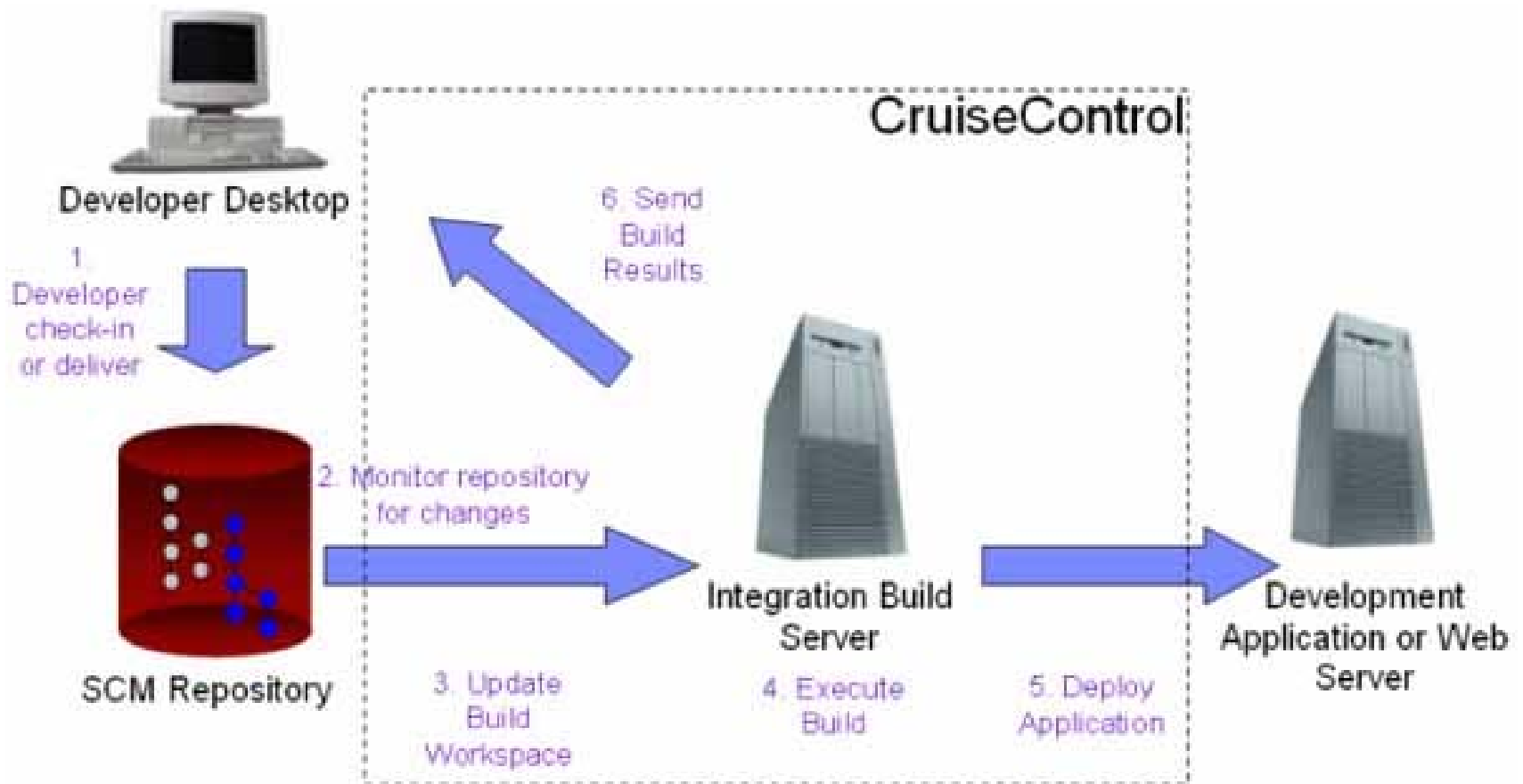
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Continuous Integration - Overview

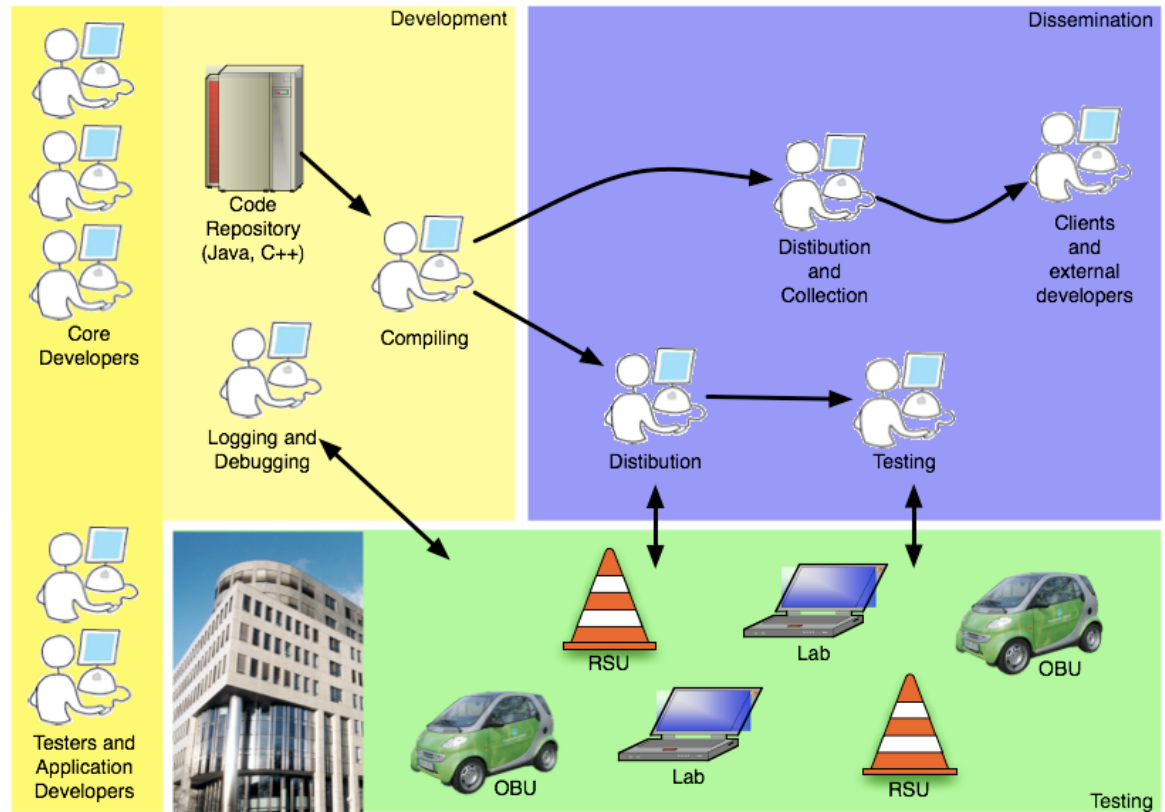
- Coding
 - Maintain a single source repository.
 - Everyone commits every day.
- Building & Deploying
 - Automate the build
 - Every commit should build the mainline on an integration machine
 - Automate deployment
- Testing
 - Make your build self-testing
 - Test in a clone of the production environment
- Informing
 - Make it easy for anyone to get the latest executable
 - Everyone can see what's happening

CruiseControl – What is it?



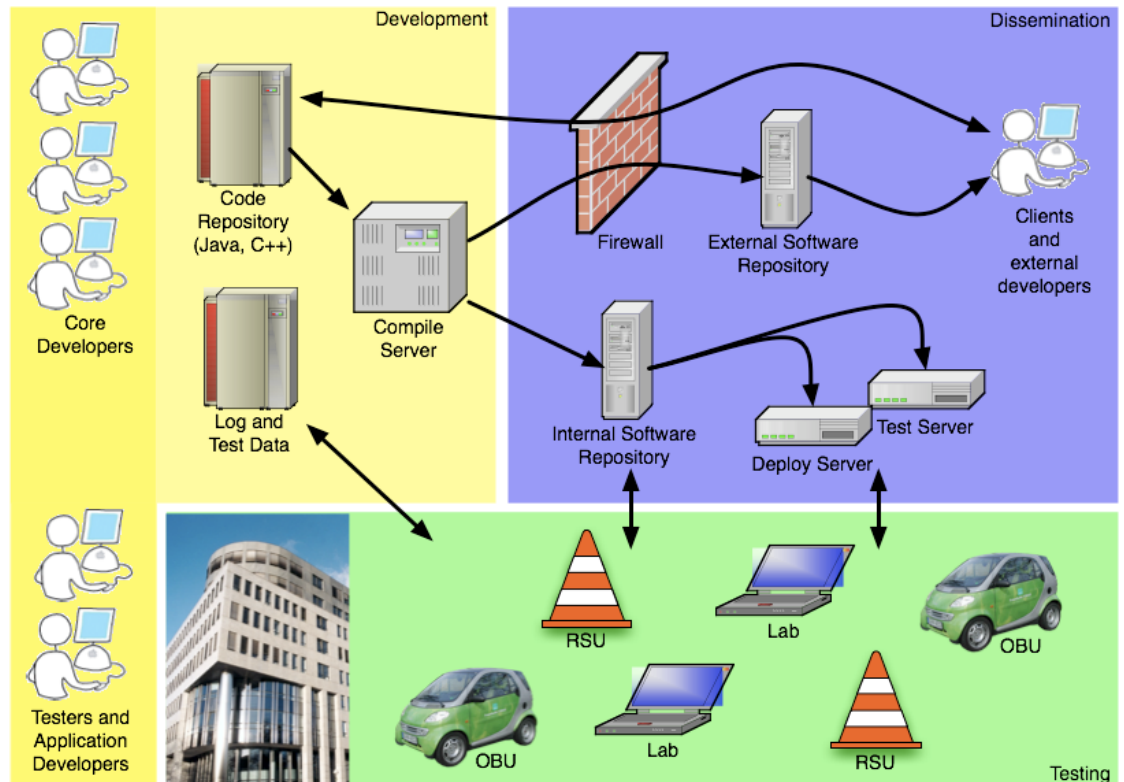
Before continuous Integration

- Manual steps
- Problems:
 - Non-reproducible errors
 - Multiple configurations / versions (internal / external)
 - Time consuming / boring work
 - Time lag (Dev -> Dist. -> Test)



After continuous integration

- Automation with CruiseControl
- Helps with:
 - Reproducible
 - **Automated!**
 - Everybody has (almost) the same code
 - Reference build
 - Fast feedback
 - Cross-platform builds



Continuous Integration - Informing


- Helps with:
 - Finding last working build
 - Aggregating test results

The screenshot displays the CruiseControl web interface. At the top, a table lists project statuses:

Project	Status (since)	Last failure	Last successful
madwifi-0.9.3-sec	waiting (9:21 AM)		9/6/07
osgi	waiting (9:41 AM)		11/9/07
v2xd-src	waiting (10:14 AM)		10:11 AM

Below this is a sidebar with a list of project links: [OSGiMiddleware-src](#), [c2cc-src](#), [osgi-offline](#), [emode-src](#), [dndp-src](#), [upnp](#), [c2cc](#), [c2c infra](#), [v2xd](#), [dndp](#), [poilone](#), [emode](#), [OSGiMiddleware](#), and [ics](#). The main content area shows the 'cruisecontrol' logo and 'continuous integration toolkit'. A dropdown menu for 'Project' is set to 'v2xd'. Below it, it states 'waiting for next time to build since 11/13/2007 00:17:35'. A 'Latest Build' section lists recent builds for v2xd, with the most recent being '11/12/2007 14:16:00 (build.259)'. A 'More builds' dropdown is also present. At the bottom of the sidebar is an 'RSS' button. The main content area features a navigation bar with 'Build Results', 'Test Results' (circled in red), 'XML Log File', and 'Metrics'. Below this, it displays 'BUILD COMPLETE - build.259' with details: 'Date of build: 11/12/2007 14:16:00', 'Time to build: 38 seconds', 'Last changed: 11/12/2007 13:56:56', and 'Last log entry: castor_build-OSGiMiddleware.xml'. There is a link for 'Build Artifacts'. A section for 'Errors/Warnings: (37)' shows 'Result: 1' and a list of targets: 'RECURSING THROUGH DIST TARGETS:', 'Database is next:', 'Distribution is next:', 'Filtering is next:', 'HazardEventDetector is next:', and 'MessageCreation is next:'.

Continuous Integration – Informing / Reference (with some help of O(SGi)BR)

- Helps with: 
 - Having a working binary
 - Overview of all modules

Continuous Integration – Learned Lessons

- Don't underestimate the power of light and lava!
- Danger:
If it is too fast –
people will use it.
- Central point
for feedback



Bug (Issue) Tracking

(Some of) the problems

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Bug (Issue) Tracking - Overview

- Simple bug tracking:
 - What defects do we have?
 - What features do we need?
- But bug tracking is much more!
 - Filtering / Threading / Sorting
 - Task Assignment / Retrieval / Timekeeping
 - Starting point for documentation
 - FAQ
 - Reference repository through linked Wiki / Attachments

trac – What is it?



The screenshot shows the Trac Roadmap view. At the top, there's the Trac logo and navigation links. The main content area displays three milestones:

- Milestone 1: Definition des Themas der Studienarbeit** (10 months late, 01/21/07). Progress bar is 100%. Closed tickets: 1, Active tickets: 0.
- Milestone 2: Erste Recherche** (8 months late, 03/31/07). Progress bar is partially filled. Closed tickets: 1, Active tickets: 4.
- Milestone 3: Erstellung der Arbeit** (4 months late, 07/21/07). Progress bar is empty.

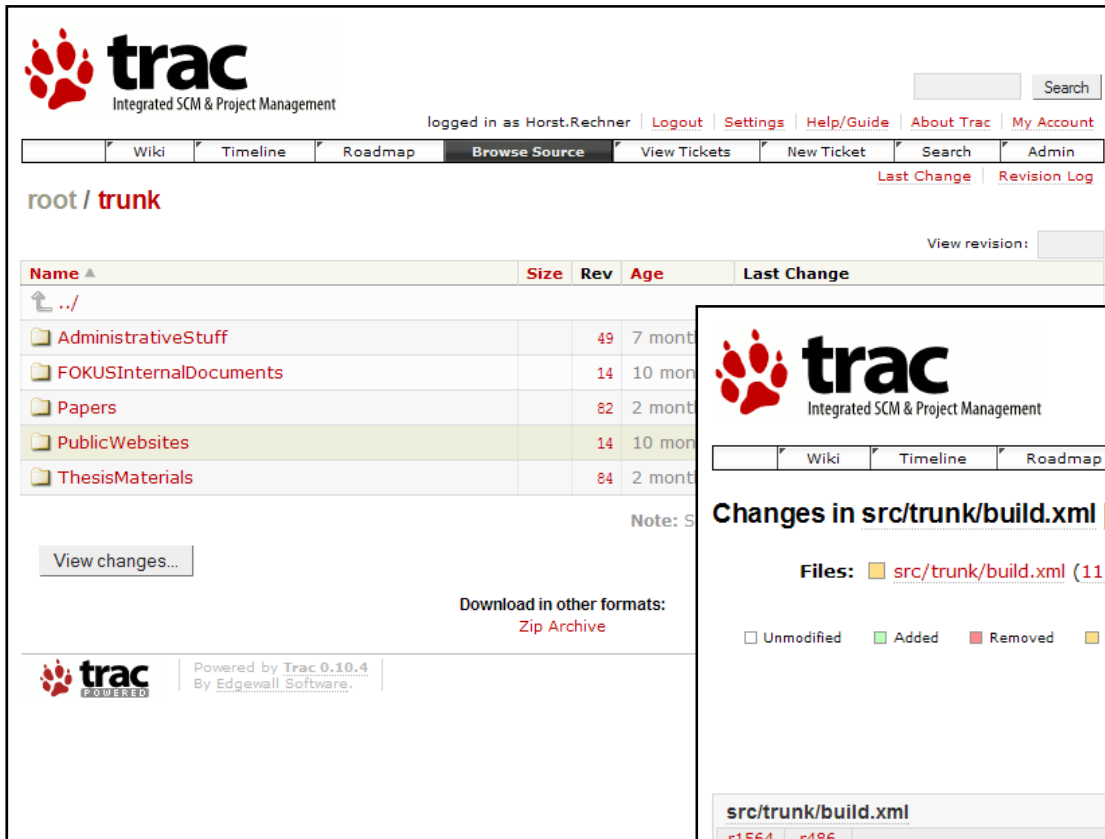
The screenshot shows the Trac Timeline view. It displays a list of changesets:

- 11/12/07:**
 - 12:57 Changeset [769] by Nico.Gawenda
 - 09:05 Changeset [768] by Horst.Rechner: deleted some files.
 - 09:03 Changeset [767] by Horst.Rechner: Added binaries for media framework.
 - 02:05 Changeset [766] by Horst.Rechner: Replaced sample movie.
 - 02:04 Changeset [765] by Horst.Rechner: Switched from QTJava to JMF with JFFMPEG.
- 11/09/07:**
 - 14:59 Changeset [764] by Horst.Rechner: Added VideoReplaySynchronizer?.
 - 13:52 Changeset [763] by Horst.Rechner: Deleted VideoReplaySynchronizer?.
- 11/08/07:**

- Wiki
- Simple Project Planner
- Timeline

(see <http://trac.edgewall.org>)

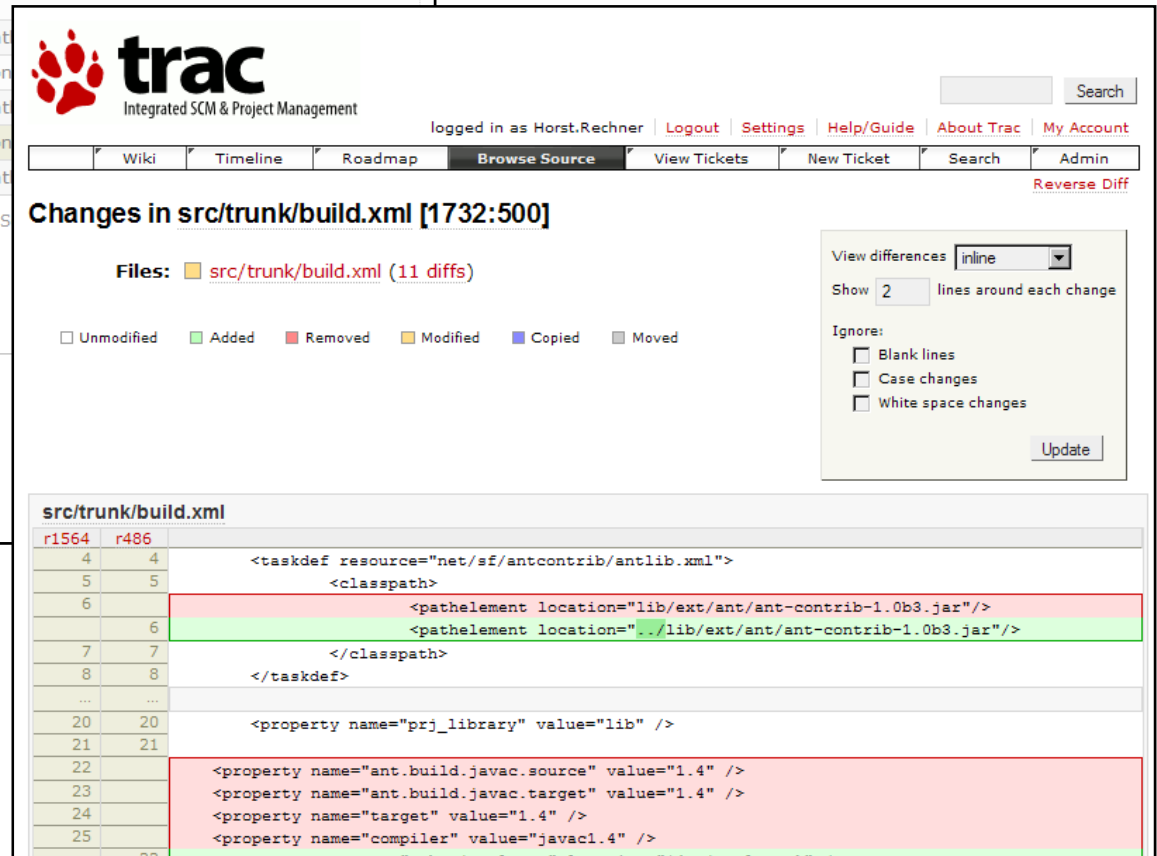
trac – Source Browser



The screenshot shows the Trac source browser interface. At the top left is the Trac logo (a red paw print) and the text "trac Integrated SCM & Project Management". To the right is a search box and a "Search" button. Below this is a navigation bar with links for "Wiki", "Timeline", "Roadmap", "Browse Source" (which is highlighted), "View Tickets", "New Ticket", "Search", and "Admin". A user is logged in as "Horst.Rechner" with links for "Logout", "Settings", "Help/Guide", "About Trac", and "My Account". Below the navigation bar is a breadcrumb trail "root / trunk". A "View revision:" input field is present. The main content area is a table listing files and directories:

Name ▲	Size	Rev	Age	Last Change
↑ ../				
AdministrativeStuff		49	7 mont	
FOKUSInternalDocuments		14	10 mon	
Papers		82	2 mont	
PublicWebsites		14	10 mon	
ThesisMaterials		84	2 mont	

Below the table is a "View changes..." button and a "Download in other formats: Zip Archive" link. At the bottom left is the Trac logo and the text "Powered by Trac 0.10.4 By Edgewall Software."



The screenshot shows the Trac source browser interface displaying a diff view for the file "src/trunk/build.xml". At the top left is the Trac logo and the text "trac Integrated SCM & Project Management". To the right is a search box and a "Search" button. Below this is a navigation bar with links for "Wiki", "Timeline", "Roadmap", "Browse Source" (which is highlighted), "View Tickets", "New Ticket", "Search", and "Admin". A user is logged in as "Horst.Rechner" with links for "Logout", "Settings", "Help/Guide", "About Trac", and "My Account". Below the navigation bar is a breadcrumb trail "src/trunk/build.xml" and a "Reverse Diff" link. The main content area is titled "Changes in src/trunk/build.xml [1732:500]". Below the title is a "Files:" section showing "src/trunk/build.xml (11 diffs)". A legend indicates the types of changes: Unmodified (white), Added (green), Removed (red), Modified (yellow), Copied (blue), and Moved (grey). To the right is a "View differences" dropdown menu set to "inline", a "Show" input field set to "2", and a "lines around each change" label. Below this are "Ignore:" options: "Blank lines", "Case changes", and "White space changes", each with an unchecked checkbox. An "Update" button is at the bottom right. The diff view shows the following changes:

```
src/trunk/build.xml
r1564 r486
4 4 <taskdef resource="net/sf/antcontrib/antlib.xml">
5 5 <classpath>
6 <pathelement location="lib/ext/ant/ant-contrib-1.0b3.jar"/>
6 <pathelement location="../lib/ext/ant/ant-contrib-1.0b3.jar"/>
7 7 </classpath>
8 8 </taskdef>
... ..
20 20 <property name="prj_library" value="lib" />
21 21
22 <property name="ant.build.javac.source" value="1.4" />
23 <property name="ant.build.javac.target" value="1.4" />
24 <property name="target" value="1.4" />
25 <property name="compiler" value="javac1.4" />
```

trac – Bug Tracker





Integrated SCM & Project Management

logged in as Horst.Rechner | [Logout](#) | [Settings](#) | [Help/Guide](#) | [About Trac](#) | [My Account](#)

[Wiki](#) | [Timeline](#) | [Roadmap](#) | [Browse Source](#) | **[View Tickets](#)** | [New Ticket](#) | [Search](#) | [Admin](#)

Ticket #6 (new task)

Move C2CC Java Multiplexer and V2X Java Multiplexer to OSGi Middleware Opened 5 months ago
Last modified 4 months ago

Reported by:	Horst.Rechner	Assigned to:	Carsten.Tittel
Priority:	minor	Milestone:	Milestone
Component:	OSGiJavaMultiplexer	Version:	0.2
Keywords:		Cc:	

Description (Last modified by Horst.Rechner) [Reply](#)

Die beiden [JavaMultiplexer?](#) aus C2CC und V2X sollen vereinheitlicht in die Middleware eingecheckt werden.

Attachments

[Attach File](#)

Change History

06/25/07 14:06:53 changed by Horst.Rechner [Reply](#)

- owner changed from *Horst.Rechner* to *Carsten.Tittel*.

Documentation - Incoming



- Problem / task refinement via Mail
- Problems:
 - **Unsorted**
 - High-volume / Low SNR
 - Changing topics (No threading)
- Also true for other sources like PDF etc.

Documentation - Processing



- Filtering
via trac
- Solves:
 - Assignment /
Threading
 - Clears out chatter
 - FAQ
 - Overview
 - **Can be found
2 months later**

Documentation - Outgoing



- Consolidation in the report
- Solved problems:
 - Who was working on that?
 - How long did it take? (if you want to know)
 - Problem description
 - **References (Wiki / Attachments)**

Bug Tracking – Learned lesson



- Many solutions that would have solved the problem.

Bug List

Mon Nov 12 2007 13:52:57
Gronda, gronda, Rangdo

This list is too long for Bugzilla's little mind; the Next/Prev/First/Last buttons won't appear on individual bugs.

5170 bugs found.

<u>ID</u>	<u>Sev</u>	<u>Pri</u>	<u>OS</u>	<u>Assignee</u>	<u>Status</u>	<u>Resolution</u>	<u>Summary</u>
1	nor	P2	Linu	pete-collins@mozdev.org	NEW		Many errors in js strict mode need fixing
2	nor	P2	Linu	pete-collins@mozdev.org	NEW		fix on status
4	nor	P2	Linu	pete-collins@mozdev.org	NEW		multiple skin switching crashes aphrodite
8	nor	P2	All	rcassin@supernova.org	NEW		Should be a dino context menu section
9	enh	P2	All	rcassin@supernova.org	NEW		Tasks / Windows option
11	nor	P2	Free	pete-collins@mozdev.org	NEW		Menus are broken on the mac
18	cri	P2		pete-collins@mozdev.org	ASSI		Aphrodite doesn't work the mac
19	nor	P2	All	rcassin@supernova.org	ASSI		chatzilla interface ideas
20	enh	P3	All	rcassin@supernova.org	NEW		[RFE] Mozilla should be MDI
24	nor	P2	Free	pete-collins@mozdev.org	ASSI		Need test suite
28	nor	P3	All	rcassin@supernova.org	NEW		mozOffice needs in-line spell checking
31	nor	P2	Free	pete-collins@mozdev.org	ASSI		Add option to make Aphrodite default browser
32	nor	P2	Linu	pete-collins@mozdev.org	ASSI		fix scrollbars in aphrodite
34	cri	P2	Wind	pete-collins@mozdev.org	ASSI		Can't load in web pages form urlbar
38	nor	P1	Wind	pete-collins@mozdev.org	ASSI		Chamelon needs locale abstraction
40	nor	P2	othe	rcassin@supernova.org	NEW		Styles need to be able to be defined
42	enh	P2	All	rcassin@supernova.org	NEW		mozOffice should output valid x(ht)ml code
44	nor	P2	All	zach@zachlpton.com	NEW		Fix the website

Bug Tracking - Learned lesson



- Find out what people like, and make it easy to use.

Focused development

(Some of) the problems

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Focused development - Overview


- Task-focused development
- Only display necessary information
- Provide one place to view
 - Code
 - Bugs
- in an integrated way

Mylyn – What is it?



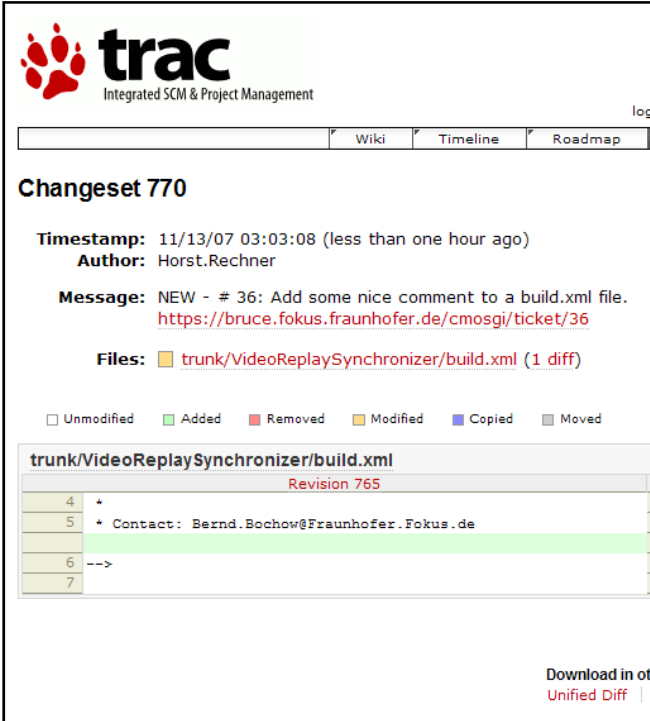
Before Mylyn



- Problems:
 - Empty commit messages 
 - **Unrelevant projects / classes / methods displayed**
 - **„Everything - all the time“**

After Mylyn

- Helped with:
 - Automatically providing commit messages
 - Linking of commits to Bugs
 - **Reducing information overload in Eclipse**
 - Providing context for next developer
 - **Fast context switches**



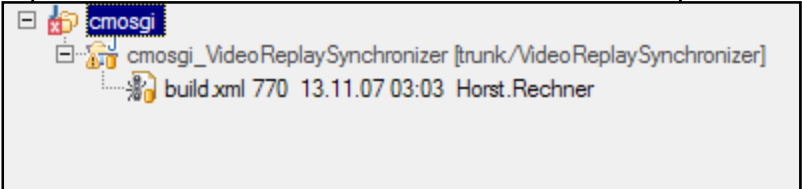
The screenshot shows the Trac web interface for a project. The top navigation bar includes links for Wiki, Timeline, and Roadmap. The main content area displays 'Changeset 770' with the following details:

- Timestamp:** 11/13/07 03:03:08 (less than one hour ago)
- Author:** Horst.Rechner
- Message:** NEW - # 36: Add some nice comment to a build.xml file. <https://bruce.fokus.fraunhofer.de/cmsogi/ticket/36>
- Files:** [trunk/VideoReplaySynchronizer/build.xml](#) (1 diff)

Below the message, there is a legend for file changes: Unmodified (white), Added (green), Removed (red), Modified (yellow), Copied (blue), and Moved (grey). The diff view for 'trunk/VideoReplaySynchronizer/build.xml' (Revision 765) shows the following changes:

```
4 *
5 * Contact: Bernd.Bochow@Fraunhofer.Fokus.de
6 -->
7
```

At the bottom right of the diff view, there are links for 'Download in original format' and 'Unified Diff'.



The bottom screenshot shows an Eclipse IDE window with a context menu open over a file named 'build.xml'. The menu items are:

- cmosgi
- cmosgi_VideoReplaySynchronizer [trunk/VideoReplaySynchronizer]
- build.xml 770 13.11.07 03:03 Horst.Rechner

Focused development - Learned lesson

- Very nice tool
- Problem of transferring contexts to other developers not yet solved thus not used by us.

Global lessons learned

- **Automate** all tasks that you would do twice
- Give everyone an **overview** of
 - His tasks
 - The tasks of the other team members
- Find the **right tools**
 - Fit into the state of mind of your team
 - Easy to use

Reading

- The Pragmatic Programmers
<http://www.pragprog.com/>
- Martin Fowler
<http://martinfowler.com/books.html>
- Thank you
for your attention!
- Any questions?
- Horst.Rechner@Fokus.Fraunhofer.de
Int. 7276

