

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?”
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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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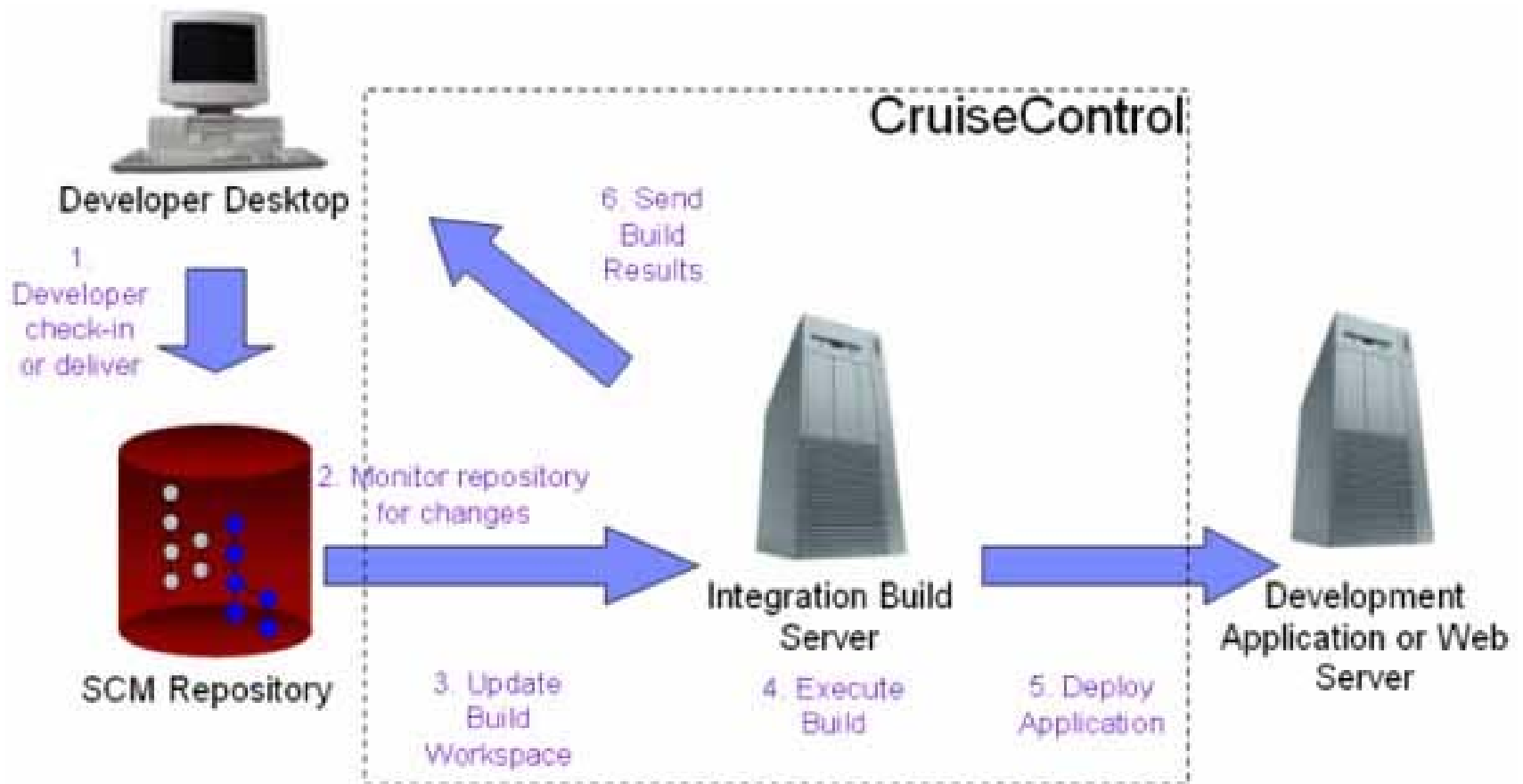
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Continuous Integration - Overview

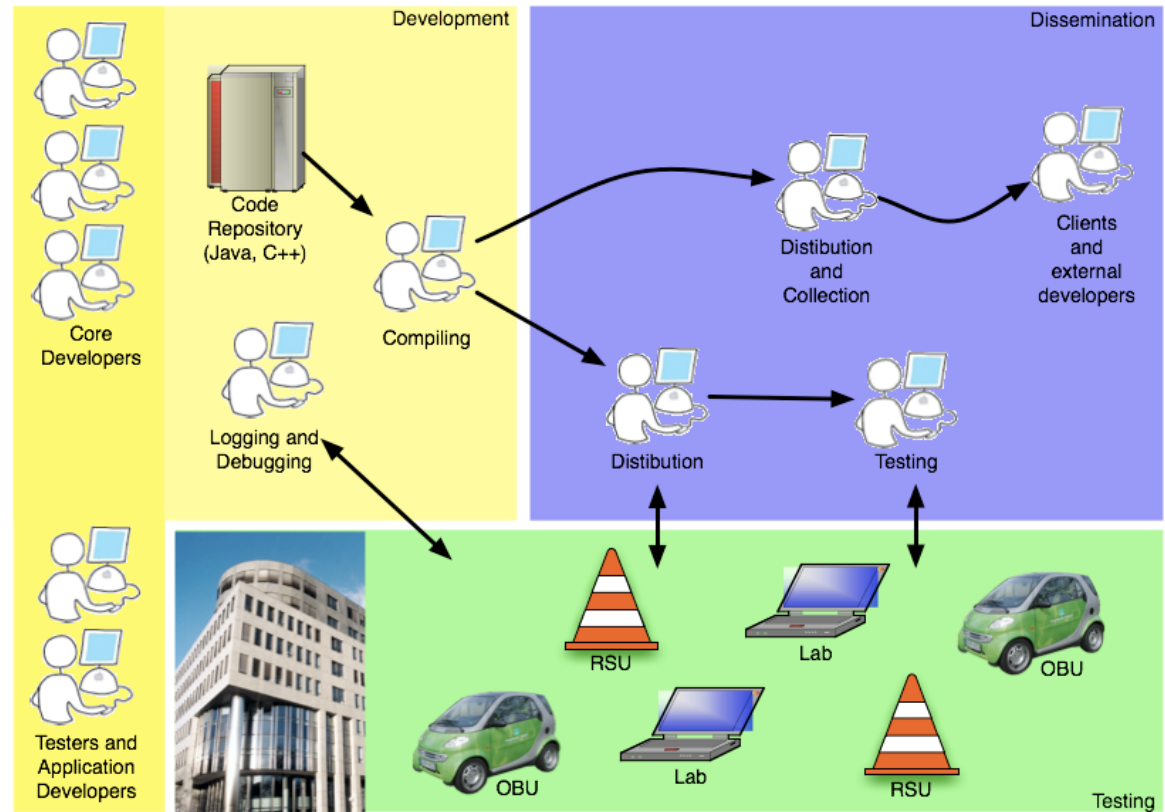
- Coding
 - Maintain a single source repository.
 - Everyone commits every day.
- Building & Deploying
 - Automate the build
 - Every commit should build the mainline on an integration machine
 - Automate deployment
- Testing
 - Make your build self-testing
 - Test in a clone of the production environment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

CruiseControl – What is it?



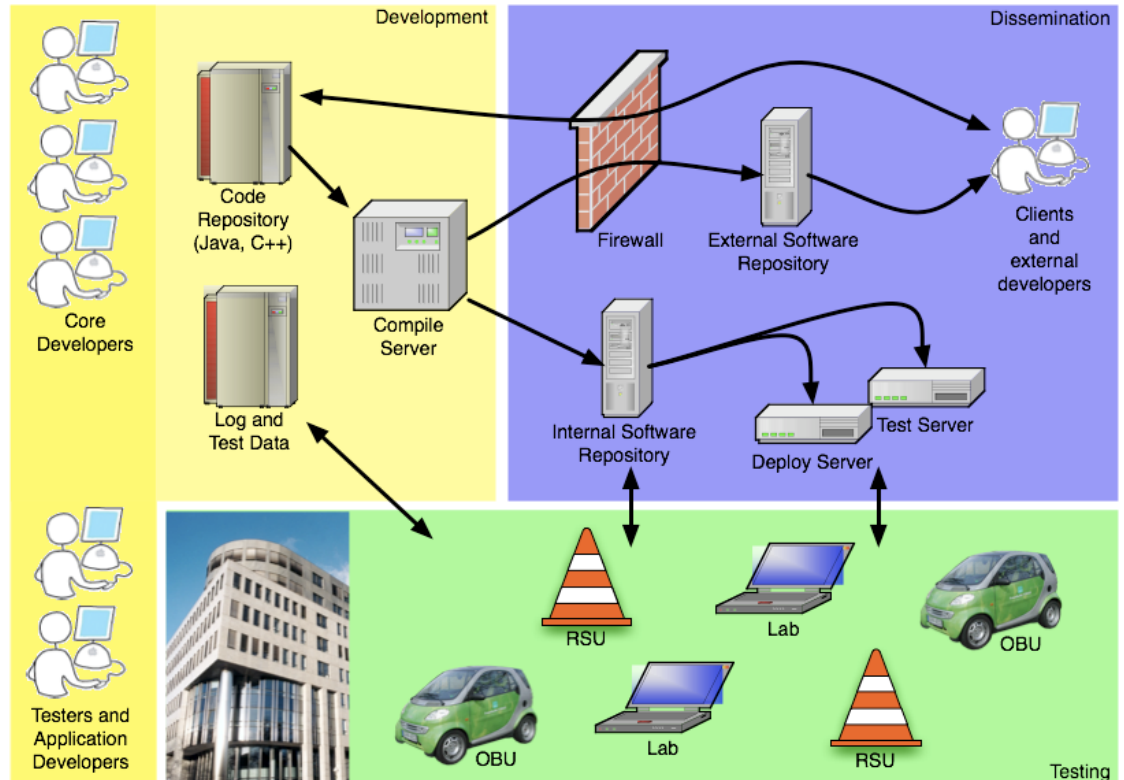
Before continuous Integration

- 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 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, a 'BUILD COMPLETE - build.259' notification is shown 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'. A link for 'Build Artifacts' is provided. Below the notification, 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 is a search bar and navigation links for Wiki, Timeline, Roadmap, Browse Source, View Tickets, New Ticket, Search, and Admin. The Roadmap section displays three milestones:

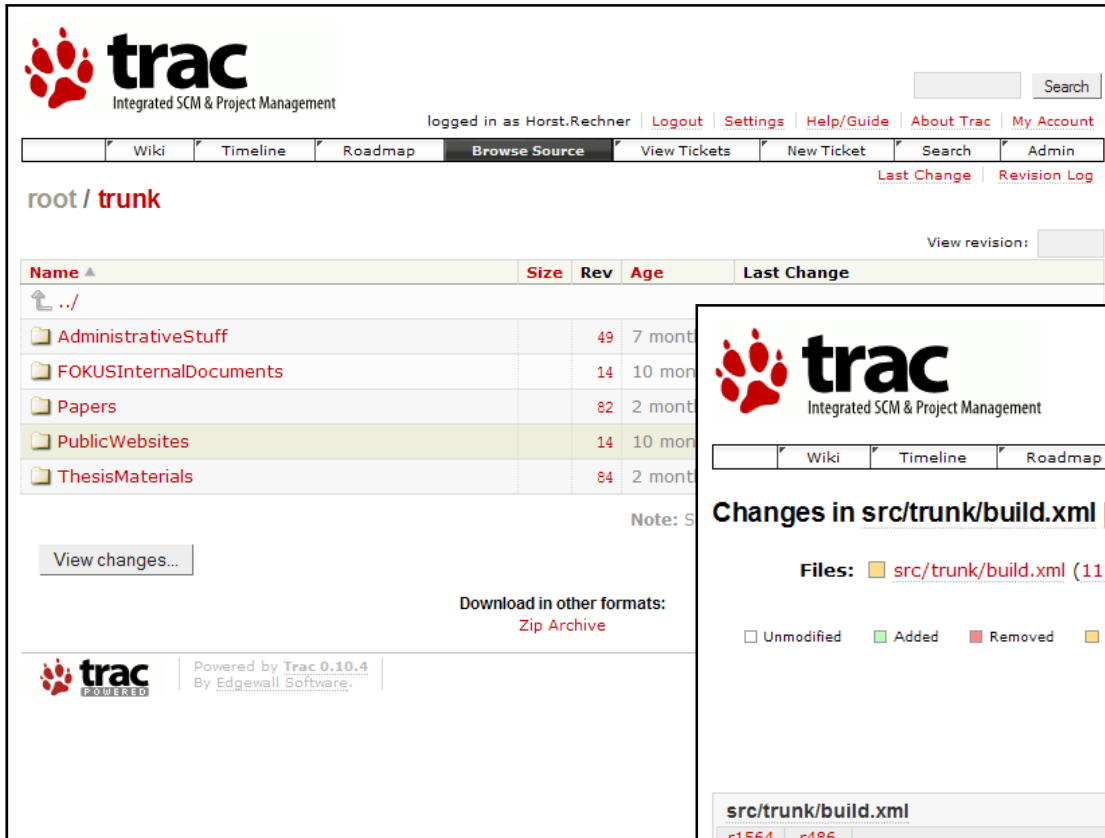
- Milestone 1: Definition des Themas der Studienarbeit** (10 months late, 01/21/07) with 100% progress, 1 closed ticket, and 0 active tickets.
- Milestone 2: Erste Recherche** (8 months late, 03/31/07) with 50% progress, 1 closed ticket, and 4 active tickets.
- Milestone 3: Erstellung der Arbeit** (4 months late, 07/21/07).

- Wiki
- Simple Project Planner
- Timeline

The screenshot shows the Trac Timeline view. At the top, there is a search bar and navigation links for Wiki, Timeline, Roadmap, Browse Source, View Tickets, New Ticket, Search, and Admin. The Timeline section 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:**

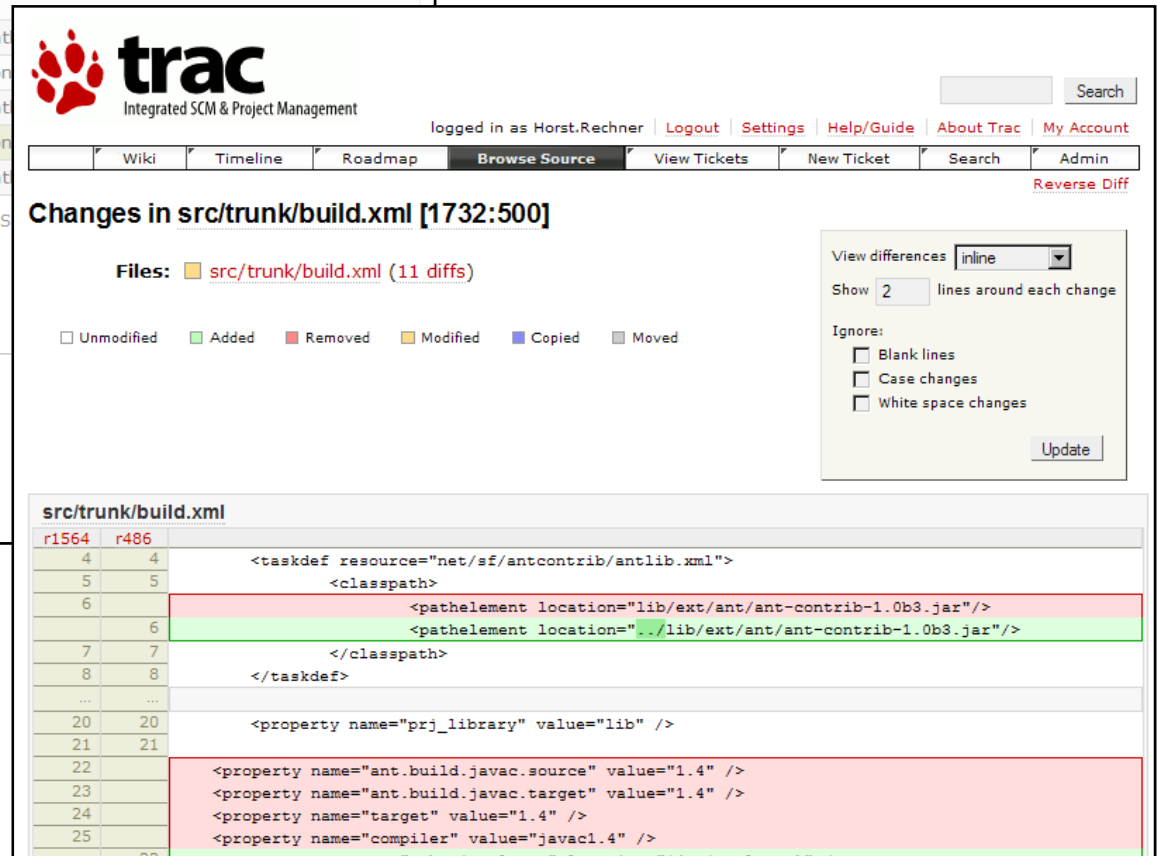
trac – Source Browser



The screenshot shows the Trac source browser interface. At the top left is the Trac logo and the text "Integrated SCM & Project Management". A search box is located at the top right. Below the logo, there 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, the current path is "root / trunk". A table lists the contents of the trunk directory:

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



The screenshot shows the Trac source browser interface displaying the changes in the file "src/trunk/build.xml". At the top left is the Trac logo and the text "Integrated SCM & Project Management". A search box is located at the top right. Below the logo, there 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, the current path is "root / trunk". The main heading is "Changes in src/trunk/build.xml [1732:500]". Below the heading, there is a "Files:" section with a legend for "Unmodified", "Added", "Removed", "Modified", "Copied", and "Moved". A "View differences" dropdown menu is set to "inline", and a "Show" dropdown menu is set to "2 lines around each change". There are also checkboxes for "Ignore: Blank lines", "Case changes", and "White space changes", and an "Update" button. Below the legend, the changes in the file "src/trunk/build.xml" are displayed in a table:

Revision	Line	Content
r1564	4	<taskdef resource="net/sf/antcontrib/antlib.xml">
r486	4	<taskdef resource="net/sf/antcontrib/antlib.xml">
	5	<classpath>
	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	</classpath>
	7	</classpath>
	8	</taskdef>
	8	</taskdef>
...
20	20	<property name="prj_library" value="lib" />
21	21	<property name="prj_library" value="lib" />
22	22	<property name="ant.build.javac.source" value="1.4" />
23	23	<property name="ant.build.javac.target" value="1.4" />
24	24	<property name="target" value="1.4" />
25	25	<property name="compiler" value="javac1.4" />
25	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?



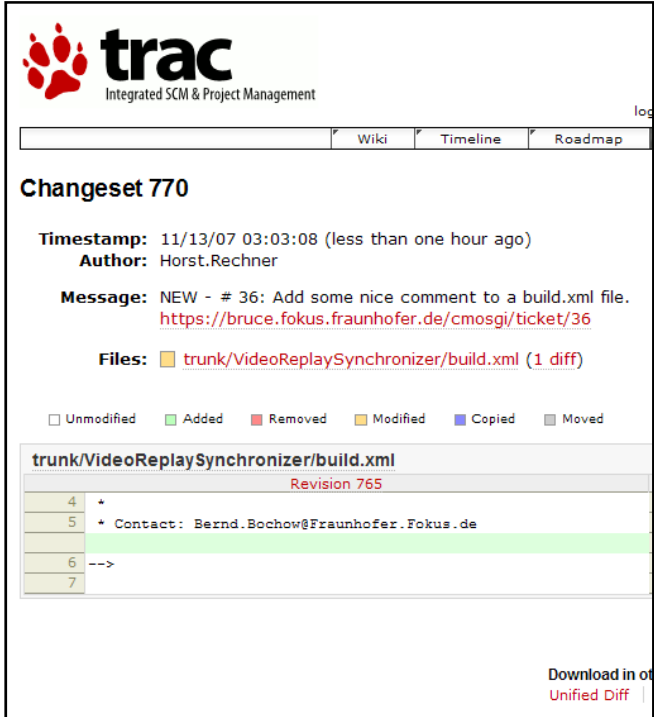
Before Mylyn



- 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**



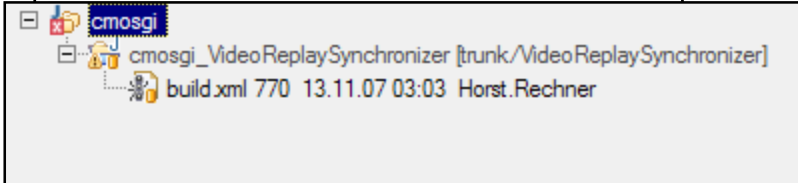
The screenshot shows the Trac web interface for a project. The header includes the Trac logo and the text "Integrated SCM & Project Management". Below the header, there are navigation tabs for "Wiki", "Timeline", and "Roadmap". The main content area displays "Changeset 770" with the following details:

- 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 the file "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 screenshot shows the Eclipse IDE interface. The top bar displays the "cmsogi" project name. The main workspace shows a tree view with the following items:

- cmsogi_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

