



# **Software Engineering and Architecture**

SCM Collaboration



# Concepts II: Collaboration

Theory of SCM

- *What do you get if you put two developers on a code base?*
  - *Answer: Conflicts!*

## Definition: Conflict

A conflict is a situation where the same piece of code has been changed at the same time in two or more different workspaces.

- I.e. Arne and Bente check-out version 17 of Receipt.java
- *And both edit and change the same part of the code!*
- Question: Whose edits are the correct ones to check-in?

## Definition: Pessimistic concurrency

Ensure strict sequential modifications by *locking* configuration items during modification.

- You ask *permission* by the SCM system to *edit* a file
- If granted, you ‘own’/‘lock’ the file
  - Anyone else will be rejected!
- Outcome: No conflicts ever occur...
- Popular in early SCM systems, like RCS

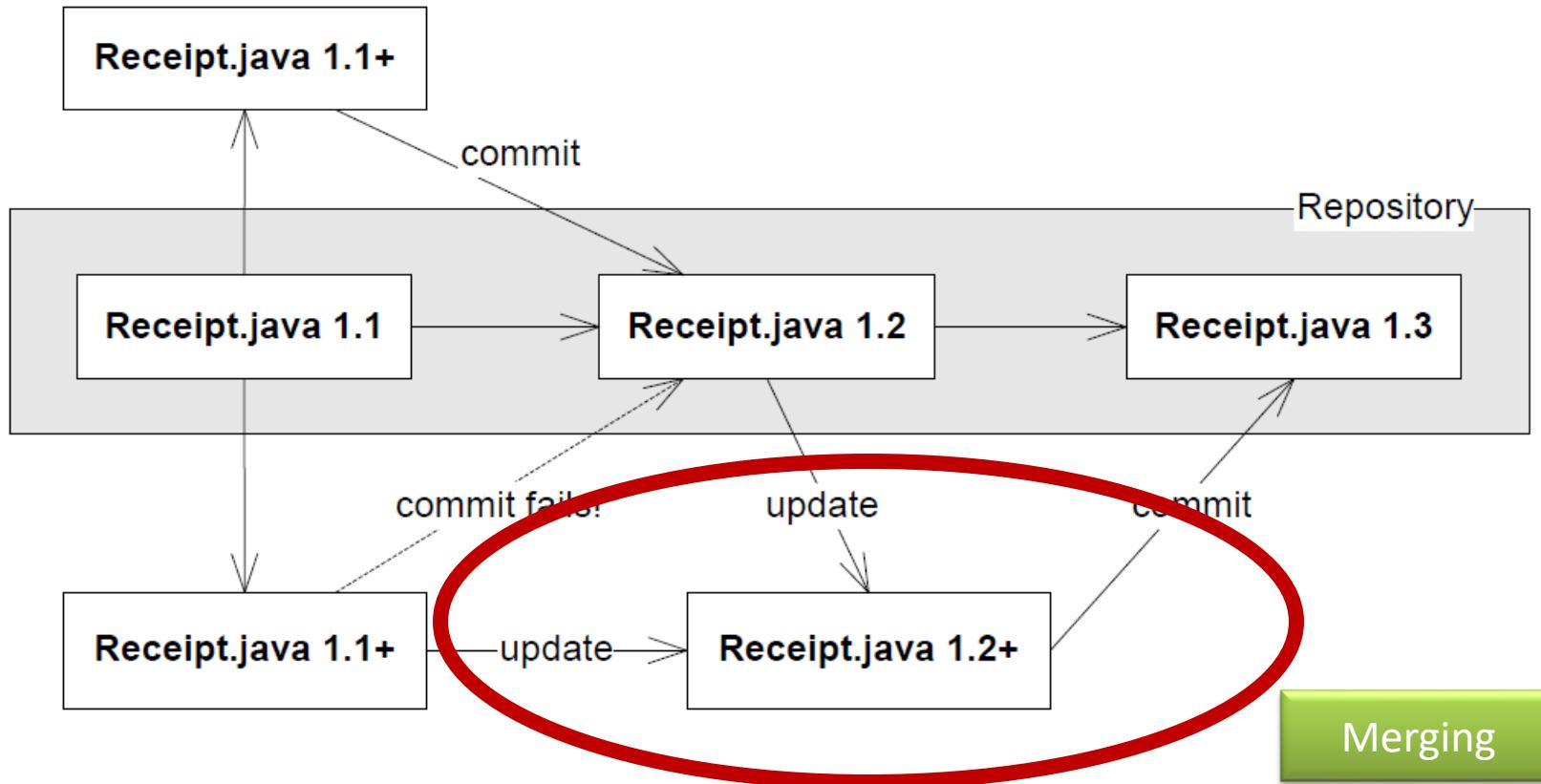
## Definition: Optimistic concurrency

Allow for parallel modification and handle conflicts by merging.

- Both may modify any file in their workspace
- *First* to check-in does so as usual
- *Second* to check-in are required to *merge* in case of *merge-conflicts*
  - *Review all places where Arne and Bente has made changes in the same code lines*

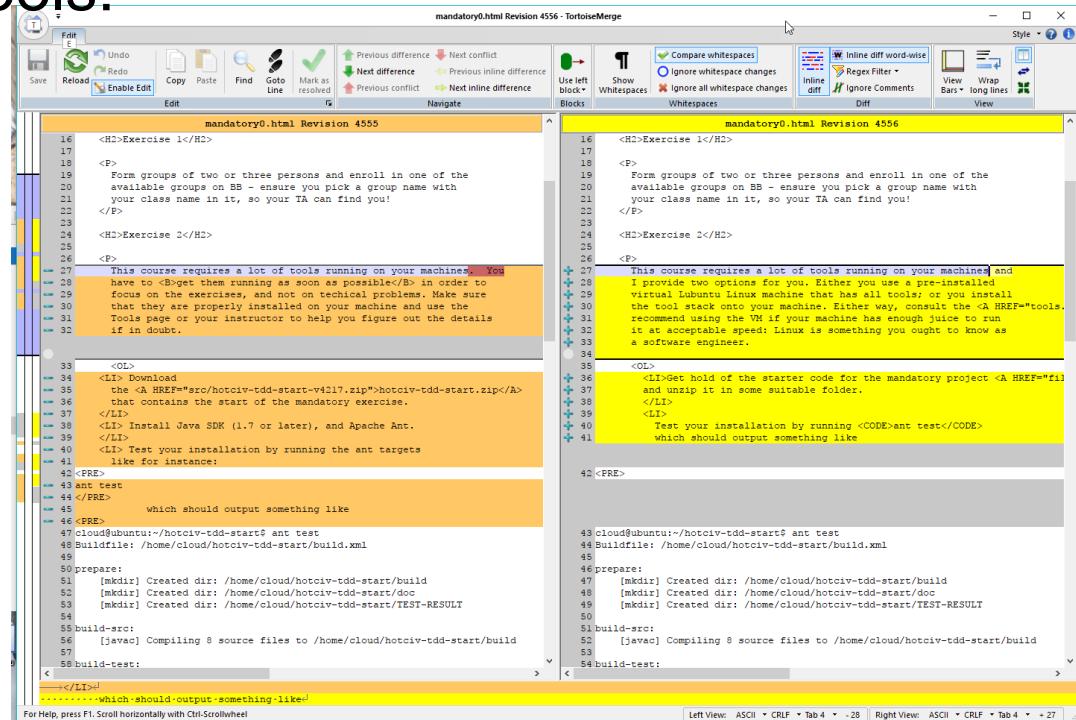
## Definition: Merge

A merge is a operation where the sum of changes since the last common ancestor in the version graph is included in a configuration item or configuration.



# Merging is a Demanding Task!

- In case of many **merge-conflicts**, you need help
- Use graphical merge tools!
  - Built-in
    - Tortoise SVN
    - SourceTree
    - ...
  - WinMerge
- WarStory
  - One man **fulltime** to handle merge in local company!



```
mandatory0.html Revision 4556 - TortoiseMerge
```

mandatory0.html Revision 4556

mandatory0.html Revision 4556

16 <H2>Exercise 1</H2>

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18 <P>

19 Form groups of two or three persons and enroll in one of the

20 available groups on BB - ensure you pick a group name with

21 your class name in it, so your TA can find you!

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24 <H2>Exercise 2</H2>

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26 <P>

27 This course requires a lot of tools running on your machine. You

28 have to <b>Get</b> them running as soon as possible</b> in order to

29 focus on the exercises, and not on technical problems. Make sure

30 that they are properly installed on your machine and use the

31 tools page or your instructor to help you figure out the details

32 if in doubt.

33 <OL>

34 <LI> Download

35 the <A HREF="src/hotciv-tdd-start-v4217.zip">hotciv-tdd-start.zip</A>

36 - that contains the start of the mandatory exercise.

37 </LI>

38 <LI> Install Java SDK (1.7 or later), and Apache Ant.

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40 <LI> Test your installation by running the ant targets

41 like for instance:

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43 ant test

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46 which should output something like

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48 cloud@ubuntu:~/hotciv-tdd-start\$ ant test

49 Buildfile: /home/cloud/hotciv-tdd-start/build.xml

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51 prepare:

52 [mkdir] Created dir: /home/cloud/hotciv-tdd-start/build

53 [mkdir] Created dir: /home/cloud/hotciv-tdd-start/doc

54 [mkdir] Created dir: /home/cloud/hotciv-tdd-start/TEST-RESULT

55 build->:

56 [javac] Compiling 8 source files to /home/cloud/hotciv-tdd-start/build

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58 build-test:

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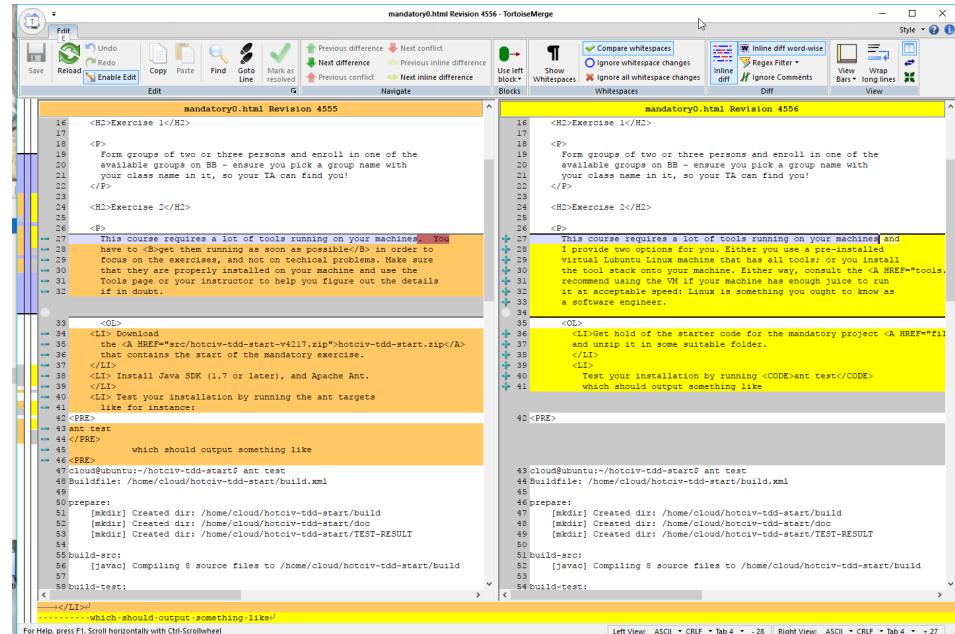
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# Keep Merge-Conflicts Small

- WarStory
  - One man **fulltime** to handle merge in local company!
- Exercise: How to avoid?
- By *taking small steps!*
- Check-in often, merge often !!!
  - Hourly, not monthly!!!



```
<H2>Exercise 1</H2>
<P> Form groups of two or three persons and enroll in one of the available groups on BB - ensure you pick a group name with your class name in it, so your TA can find you!
</P>
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<OL>
<LI> Download the <A href="http://hotciv-tdd-start-v4217.zip">hotciv-tdd-start.zip</A> and extract the start of the mandatory exercise.
<LI> Install Java SDK (1.7 or later), and Apache Ant.
<LI> Test your installation by running the ant targets like for instance:
<PRE>
ant test
</PRE>
which should output something like
<PRE>
cloud@ubuntu:~/hotciv-tdd-start$ ant test
[buildfile: /home/cloud/hotciv-tdd-start/build.xml
[prepare:
[mkdir] Created dir: /home/cloud/hotciv-tdd-start/build
[mkdir] Created dir: /home/cloud/hotciv-tdd-start/doc
[mkdir] Created dir: /home/cloud/hotciv-tdd-start/TEST-RESULT
[build-src:
[javac] Compiling 8 source files to /home/cloud/hotciv-tdd-start/build
[build-test:
[jar] Building jar: /home/cloud/hotciv-tdd-start/TEST-RESULT/hotciv-tdd-start.jar
.....which should output something like]
</PRE>
For Help, press F1. Scroll horizontally with Ctrl+Scrollwheel
Left View: ASCII • CR/LF • Tab 4 • - 28 Right View: ASCII • CR/LF • Tab 4 • - 27
```

- SCM systems must handle *all aspects* of an application
  - Source code, build scripts, image files, sound files, configuration files...
- Which types of files are best handled using
  - Pessimistic concurrency?
  - Optimistic concurrency?

- OK – so what have we got?
  - Collaboration on configurations by either optimistic or pessimistic concurrency – through locking items or through a merge phase
- Basically **collaboration management**
  - The team can work together without overwriting code made by others, and are warned when there are conflicting edits
- *Note: SCM systems can only detect syntactic conflicts!*

## Definition: **SCM system**

A SCM system is a tool set that defines

1. A central repository that stores versions of entities.
2. A schema for how to setup multiple, individual, workspaces.
3. A commit and a check-out operation that transfer copies of versions between the repository and a workspace.
4. A schema for handling/defining version identities for configuration items and configurations.
5. A schema for collaboration/concurrent access to versions.