

1

IT4490 - SOFTWARE DESIGN AND CONSTRUCTION

1. VERSION CONTROL



1

2

Outline

1. Introduction
2. Models
3. Vocabulary
4. Tools

2

3

Why version control? (1/2)

- Scenario 1:
 - Your program is working
 - You change “just one thing”
 - Your program breaks
 - You change it back
 - Your program is still broken--*why*?
- Has this ever happened to you?

3

4

Why version control? (2/2)

- Your program worked well enough yesterday
- You made a lot of improvements last night...
 - ...but you haven't gotten them to work yet
- You need to turn in your program *now*
- Has this ever happened to you?

4

Version control for teams (1/2)

- Scenario:
 - You change one part of a program--it works
 - Your co-worker changes another part--it works
 - You put them together--it doesn't work
 - Some change in one part must have broken something in the other part
 - What were all the changes?

5

Version control for teams (2/2)

- Scenario:
 - You make a number of improvements to a class
 - Your co-worker makes a number of different improvements to the same class
- How can you merge these changes?

6

Tools: diff

- There are a number of tools that help you spot changes (differences) between two files
- Tools include `diff`, `rcsdiff`, `jDiff`, etc.
- Of course, they won't help unless you kept a copy of the older version
- Differencing tools are useful for finding a *small* number of differences in a *few* files

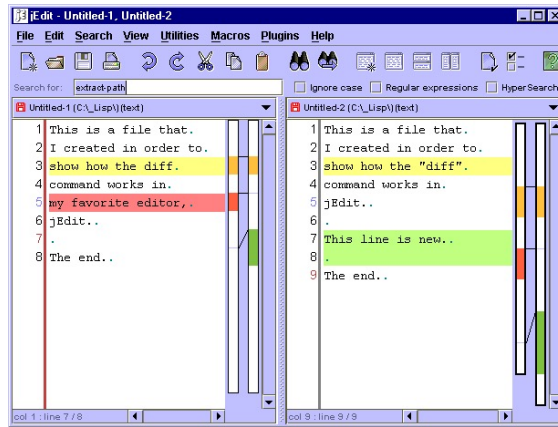
7

Tools: jDiff

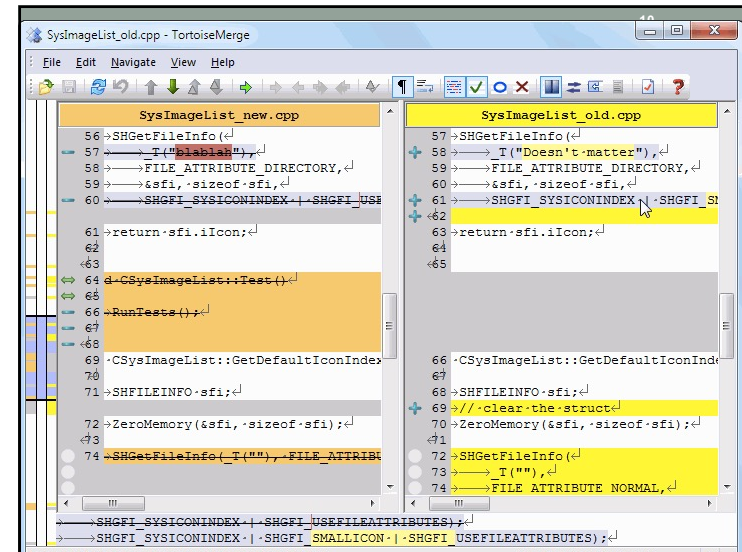
- `jDiff` is a plugin for the `jEdit` editor
- Advantages:
 - Everything is color coded
 - Uses synchronized scrolling
 - It's inside an editor--you can make changes directly
- Disadvantages:
 - Not stand-alone, but must be used within `jDiff`
 - Just a diff tool, not a complete solution

8

Tools: jDiff



9

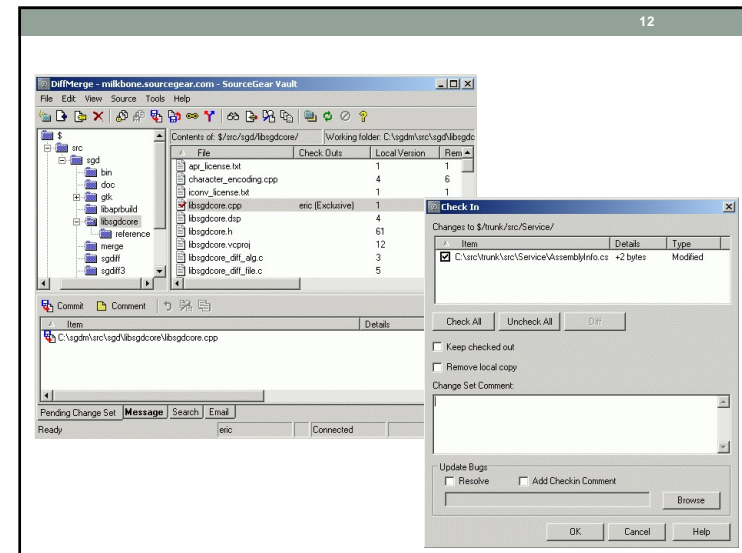


10

Version control systems

- A version control system (often called a source code control system) does these things:
 - Keeps multiple (older and newer) versions of everything (not just source code)
 - Requests comments regarding every change
 - Allows “check in” and “check out” of files so you know which files someone else is working on
 - Displays differences between versions

11



12

Outline

1. Introduction
2. **Versioning Models**
3. Vocabulary
4. Tools

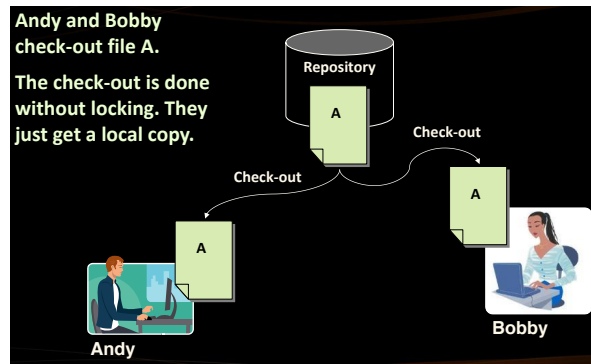
13

2. Versioning Models

- Lock-Modify-Unlock
- Copy-Modify-Merge
- Distributed Version Control

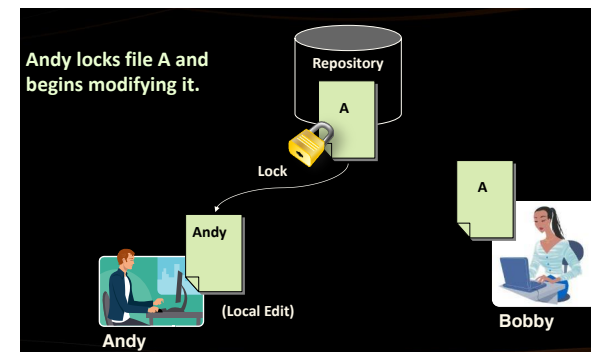
14

2.1. The Lock-Modify-Unlock Model

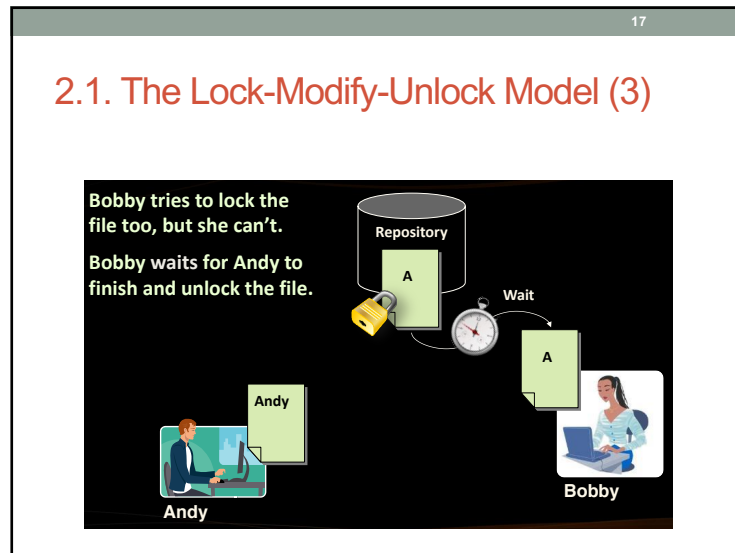


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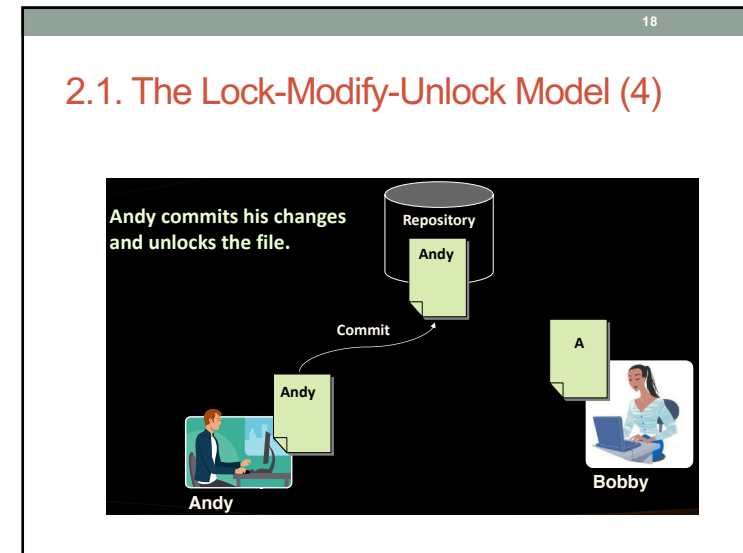
2.1. The Lock-Modify-Unlock Model (2)



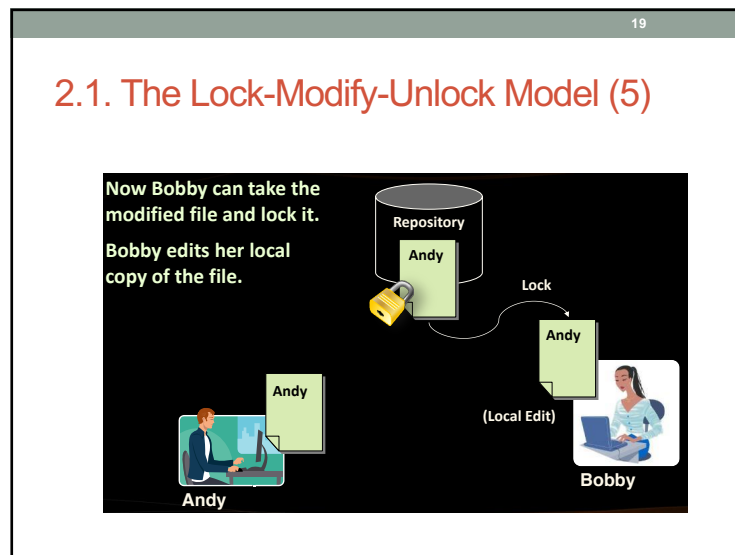
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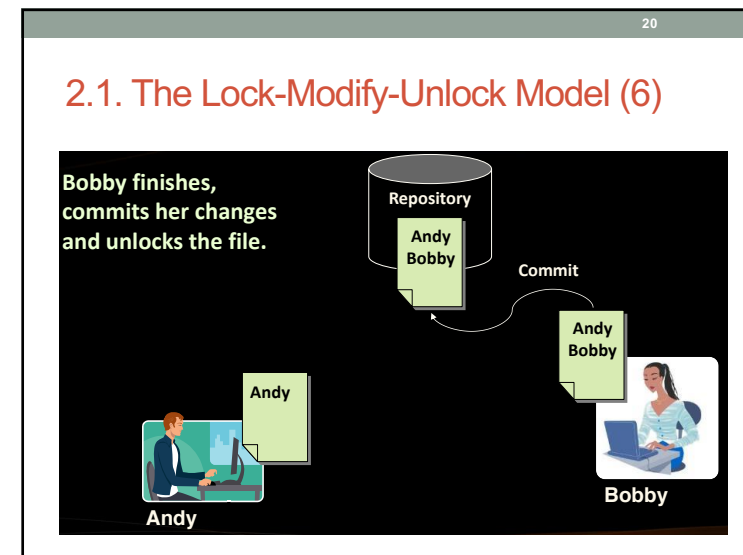
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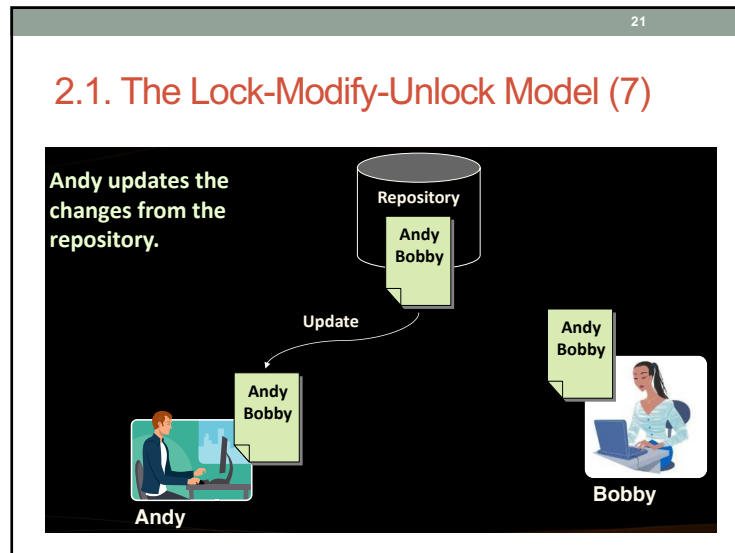
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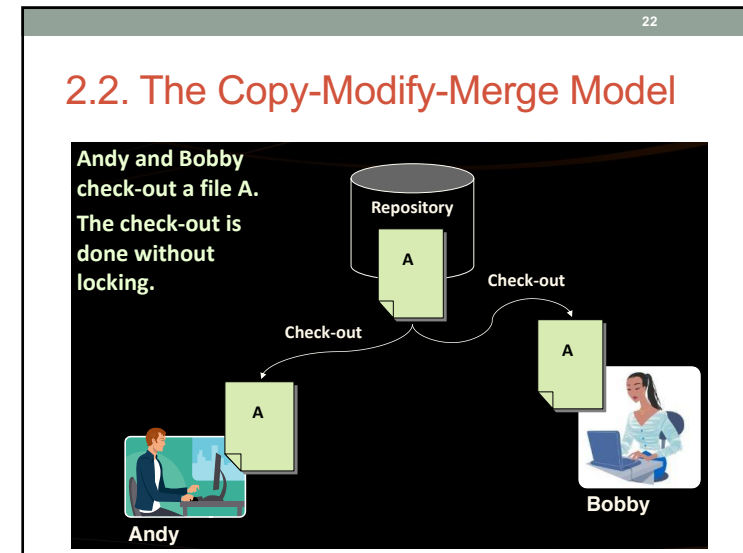
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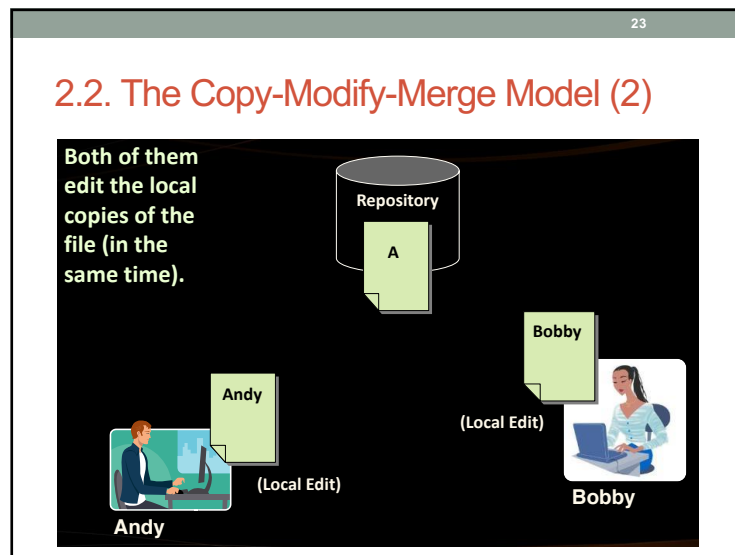
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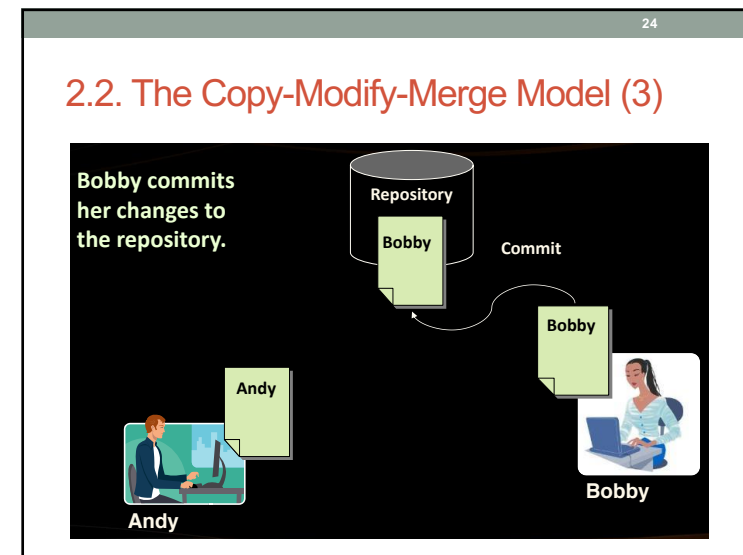
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22

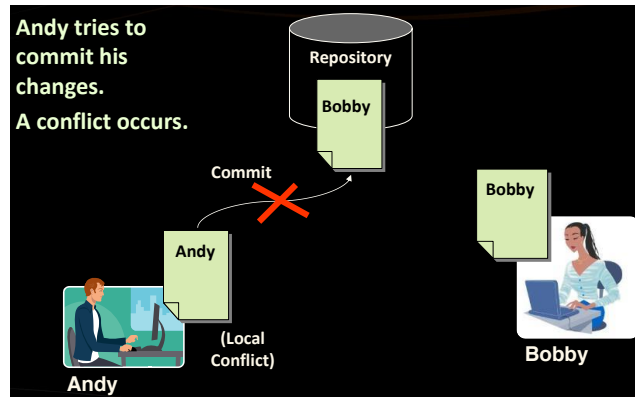


23



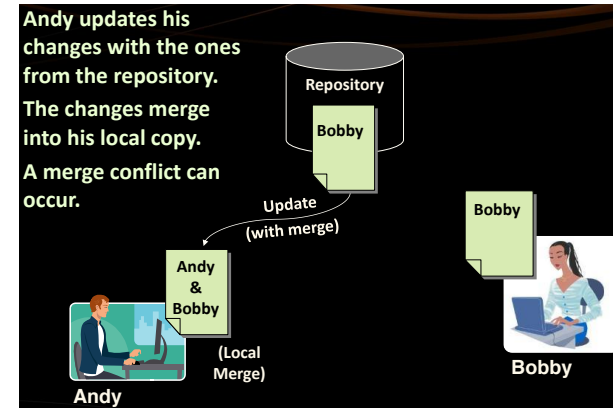
24

2.2. The Copy-Modify-Merge Model (4)



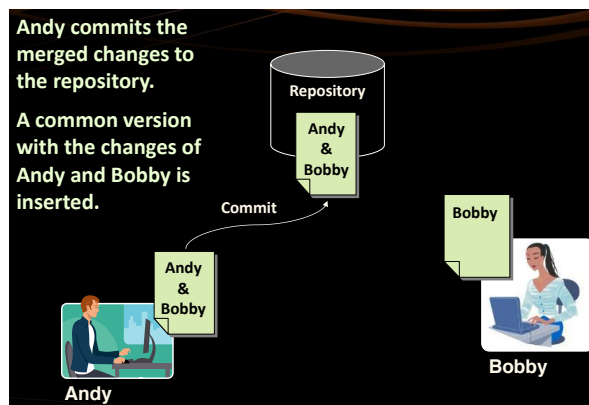
25

2.2. The Copy-Modify-Merge Model (5)



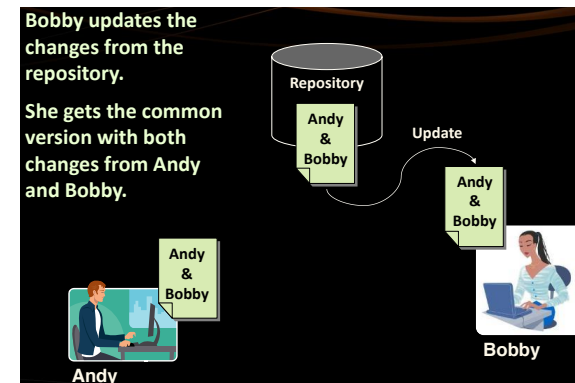
26

2.2. The Copy-Modify-Merge Model (6)



27

2.2. The Copy-Modify-Merge Model (7)

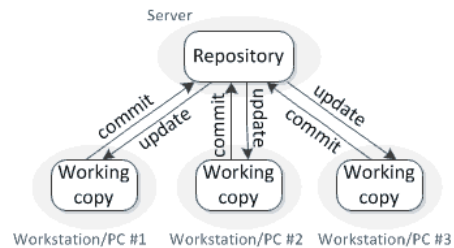


28

2.3. Distributed version control

- Compared to Central version control
 - Only one repository

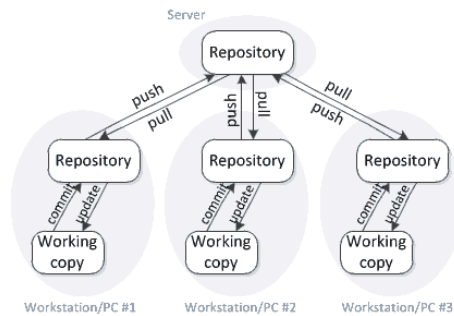
Centralized version control



29

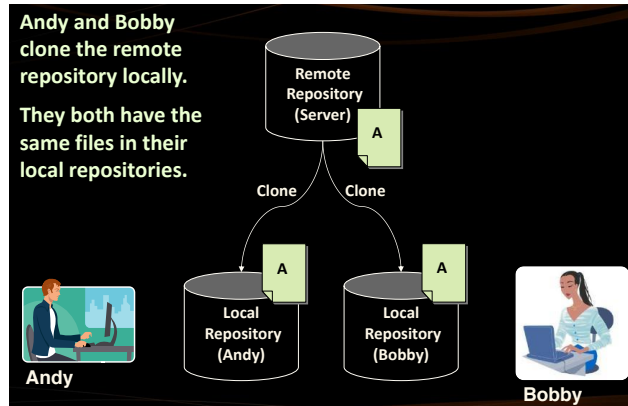
Distributed Version Control

Distributed version control



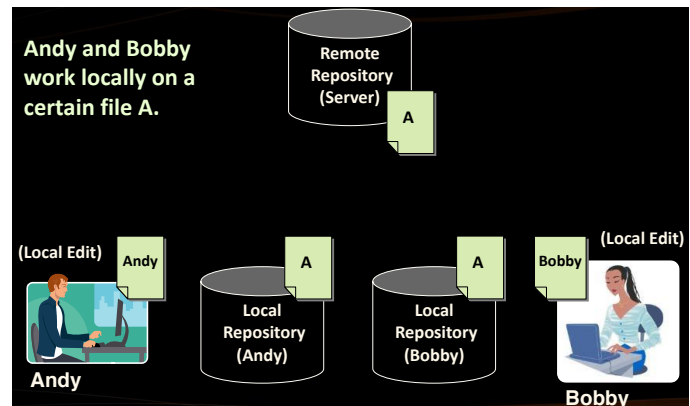
30

Distributed Version Control (1)

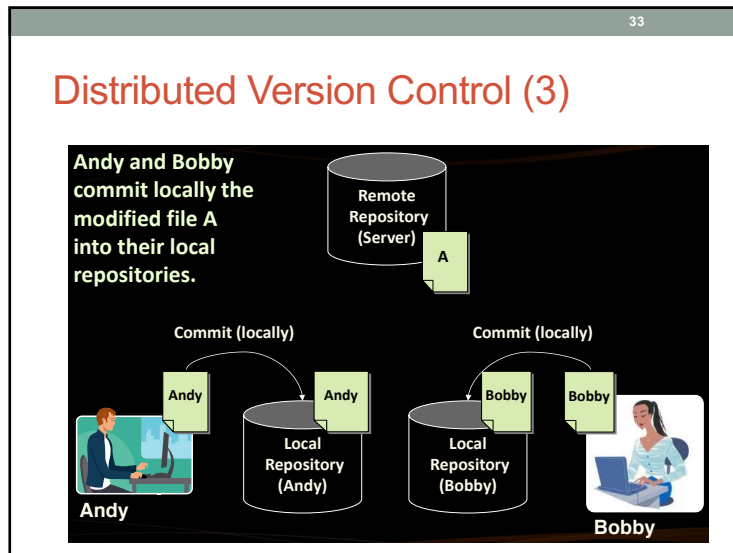


31

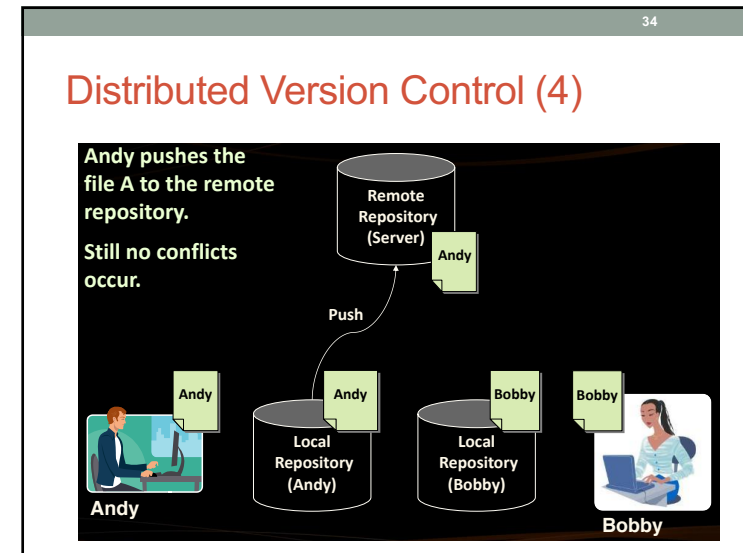
Distributed Version Control (2)



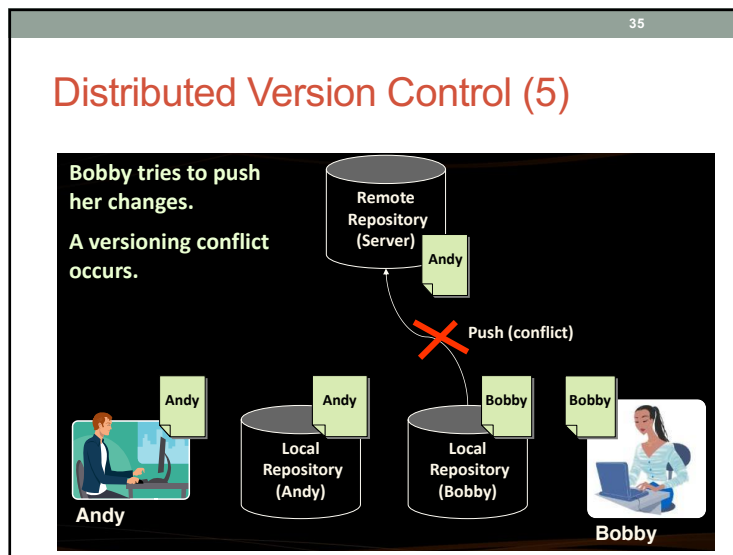
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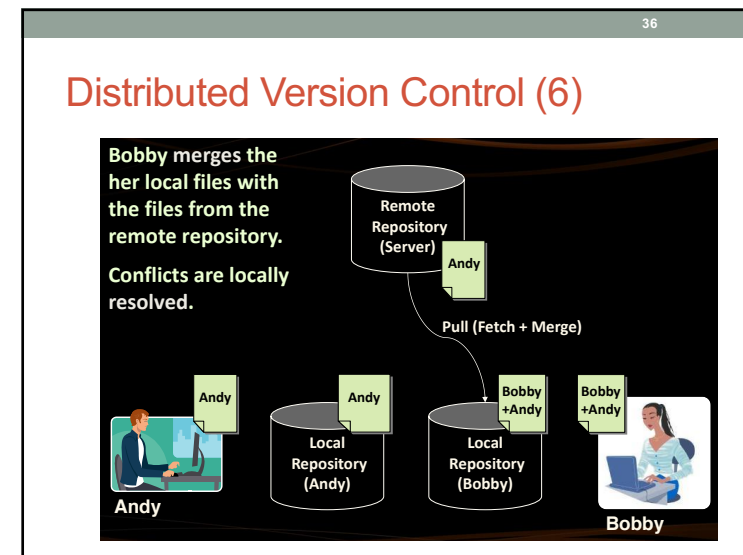
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34

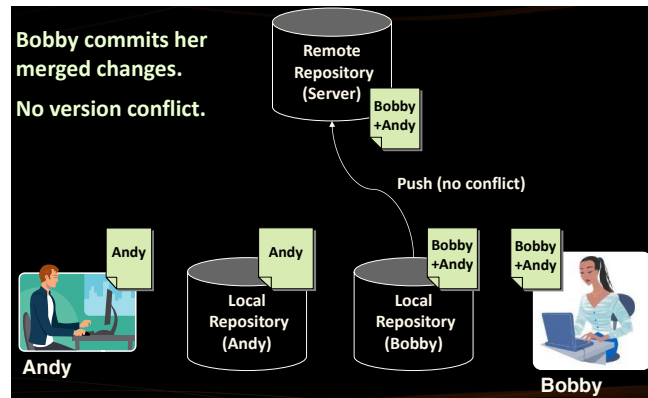


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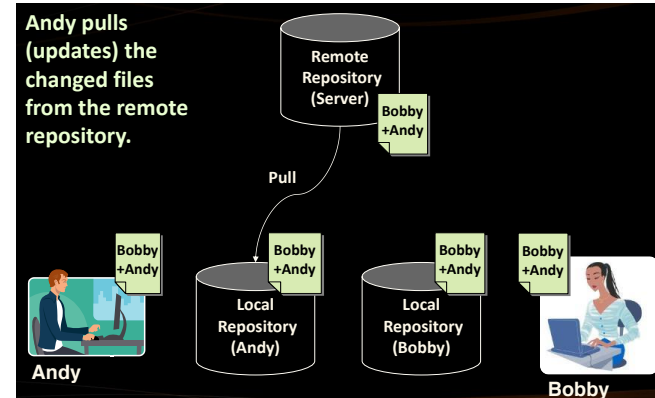
36

Distributed Version Control (7)



37

Distributed Version Control (8)



38

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1. Introduction
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3. **Vocabulary**
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39

3. Vocabulary

- Repository (source control repository)
 - A server that stores the files (documents)
 - Keeps a change log
- Revision, Version
 - Individual version (state) of a document that is a result of multiple changes
- Check-Out, Clone
 - Retrieves a working copy of the files from a remote repository into a local directory
 - It is possible to lock the files

40

Vocabulary

- Change
 - A modification to a local file (document) that is under version control
- Change Set / Change List
 - A set of changes to multiple files that are going to be committed at the same time
- Commit, Check-In
 - Submits the changes made from the local working copy to the repository
 - Automatically creates a new version
 - Conflicts may occur!

41

Vocabulary

- Conflict
 - The simultaneous change to a certain file by multiple users
 - Can be solved automatically and manually
- Update, Get Latest Version, Fetch / Pull
 - Download the latest version of the files from the repository to a local working directory + merge conflicting files
- Undo Check-Out, Revert / Undo Changes
 - Cancels the local changes
 - Restores their state from the repository

42

Vocabulary

- Merge
 - Combines the changes to a file changed locally and simultaneously in the repository
 - Can be automated in most cases
- Label / Tag
 - Labels mark with a name a group of files in a given version
 - For example a release
- Branch / Branching
 - Division of the repositories in a number of separate workflows

43

Outline

1. Introduction
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4. **Tools**

45

Tools

- Central version control
 - SVN (Subversion)
 - TFS
 - Source safe (commercial)
- Distributed version control
 - Git
 - Mercurial

46

What is Git?

- Git
 - Distributed source-control system
 - Work with local and remote repositories
 - Git bash – command line interface for Git
 - Free, open-source
 - Has Windows version (msysGit)
 - <http://msysgit.github.io>
 - <https://www.atlassian.com/git/tutorials/setting-up-a-repository>

47

Installing Git

- msysGit Installation on Windows
 - Download Git for Windows from: <http://msysgit.github.io>
 - “Next, Next, Next” does the trick
 - Options to select (they should be selected by default)
 - “Use Git Bash only”
 - “Checkout Windows-style, commit Unix-style endings”
- Git installation on Linux:
 - `sudo apt-get install git`

48

Basic Git Commands

- Cloning an existing Git repository
 - `git clone [remote url]`
- Fetch and merge the latest changes from the remote repository
 - `git pull`
- Preparing (adding / selecting) files for a commit
 - `git add [filename]` (“git add .” adds everything)
- Committing to the local repository
 - `git commit -m “[your message here]”`

49

Basic Git Commands

- Check the status of your local repository (see the local changes)
`git status`
- Creating a new local repository (in the current directory)
`git init`
- Creating a remote (assign a short name for remote Git URL)
`git remote add [remote name] [remote url]`
- Pushing to a remote (send changes to the remote repository)
`git push [remote name] [local name]`

50

Using Git: Example

```
mkdir work
cd work
git clone https://github.com/SoftUni/test.git dir
cd test
dir
git status
(edit some file)
git status
git add .
git commit -m "changes"
git push
```

51

Project Hosting Sites

- GitHub – <https://github.com>
 - The #1 project hosting site in the world
 - Free for open-source projects
 - Paid plans for private projects
- GitHub provides own Windows client
 - GitHub for Windows
 - <http://windows.github.com>
 - Dramatically simplifies Git
 - For beginners only

52

Project Hosting Sites

- Google Code – <http://code.google.com/projecthosting/>
 - Source control (SVN), file release, wiki, tracker
 - Very simple, basic functions only, not feature-rich
 - Free, all projects are public and open source
 - 1-minute signup, without heavy approval process
- SourceForge – <http://www.sourceforge.net>
 - Source control (SVN, Git, ...), web hosting, tracker, wiki, blog, mailing lists, file release, statistics, etc.
 - Free, all projects are public and open source

53

Project Hosting Sites

- CodePlex – <http://www.codeplex.com>
 - Microsoft's open source projects site
 - Team Foundation Server (TFS) infrastructure
 - Source control (TFS), issue tracker, downloads, discussions, wiki, etc.
 - Free, all projects are public and open source
- Bitbucket – <http://bitbucket.org>
 - Source control (Mercurial), issue tracker, wiki, management tools
 - Private projects, free and paid editions

54

Bitbucket demo

- Introduction to version control
 - <https://www.youtube.com/watch?v=gY2JwRfin1M>
 - See Episode 1-> 5
- Bitbucket
 - https://www.youtube.com/watch?v=BtEvnE79jxY&list=PL57RkP_325rLuT3EmFTf3lkoLw93lw1_8

55

Naming convention

- Naming your project and description:
 - Nhóm 1:
 - 2022.2-139315-01
 - Nhóm 7:
 - 2022.2-139315-07
 - Nhóm 11:
 - 2022.2-139315-11

56

Folder Structure

- Homework01
 - All
 - 20257891-NguyenThanhNam
 - 20254173-PhamHuyHung
 - 20252579-TranTienManh
- Homework02
- Homework03
- ...

57

Homework

- Create an account in bitbucket.org
- Create a repository in bitbucket, join with all members in your group
 - Naming your project name (check the previous lesson)
 - Create a sub-directory (Homework01)
- Install Eclipse and the plugin of eGit
 - <http://crunchify.com/how-to-configure-bitbucket-git-repository-in-you-eclipse/>
- Each member in the group does one of the following task
 - HelloWorld.java: Ask a user to enter his/her name, then display hello to that name
 - Implement MVCTutorial example
 - Implement Calculator, using Swing and JavaFX
- Each member must perform all of these GIT actions:
 - add file, remove file, modify, commit, push, pull, merge (resolve conflict), create branch, merge branch
 - Take a screenshot to demonstrate that you have done all actions