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OBJECT-ORIENTED PROGRAMMING

1.3 VERSION CONTROL

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Outline

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

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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?

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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?

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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?

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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

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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?

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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

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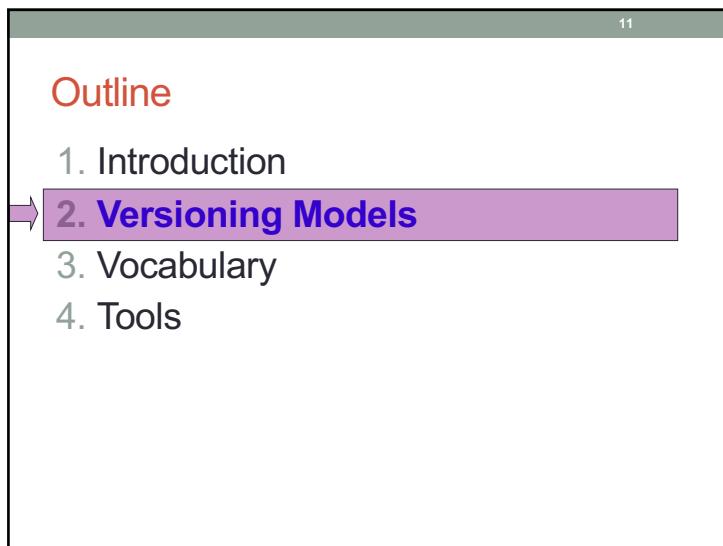
Tools: jDiff

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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

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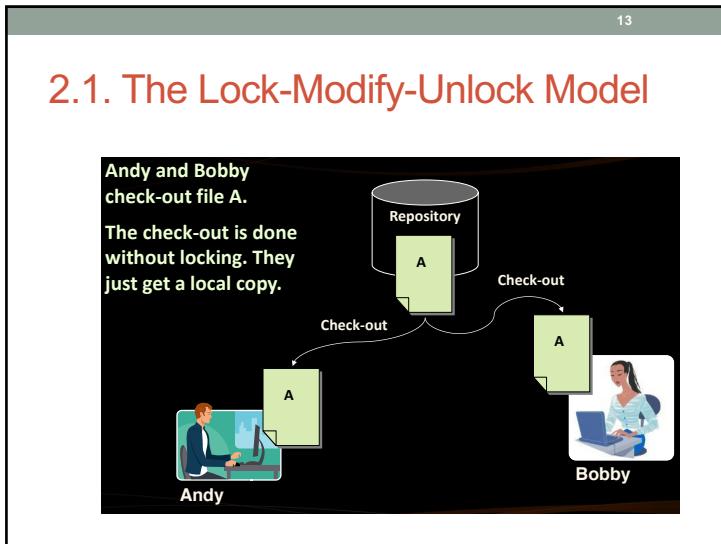


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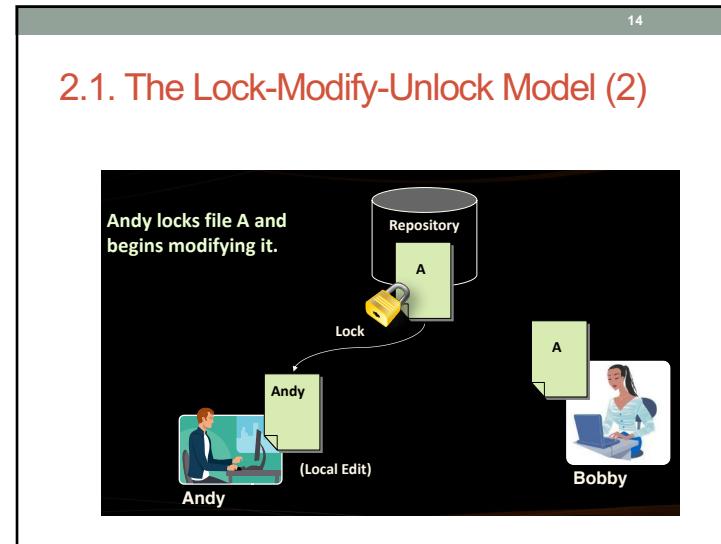
2. Versioning Models

- Lock-Modify-Unlock
 - vs. Copy-Modify-Merge
- Central Version Control
 - vs. Distributed Version Control

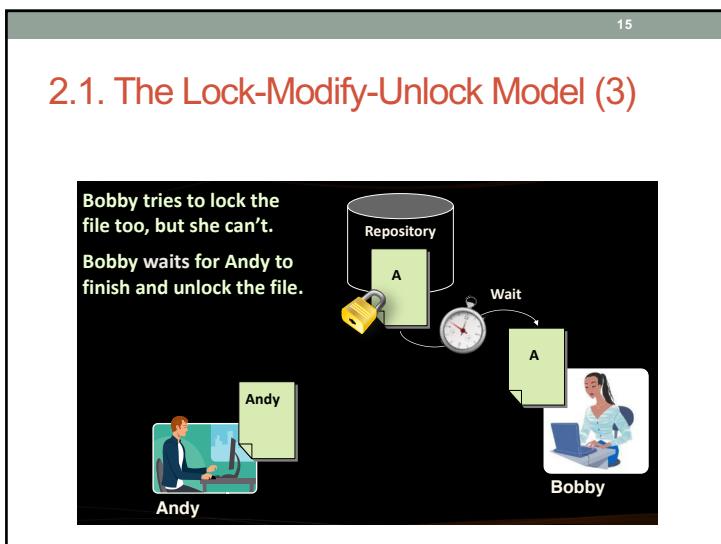
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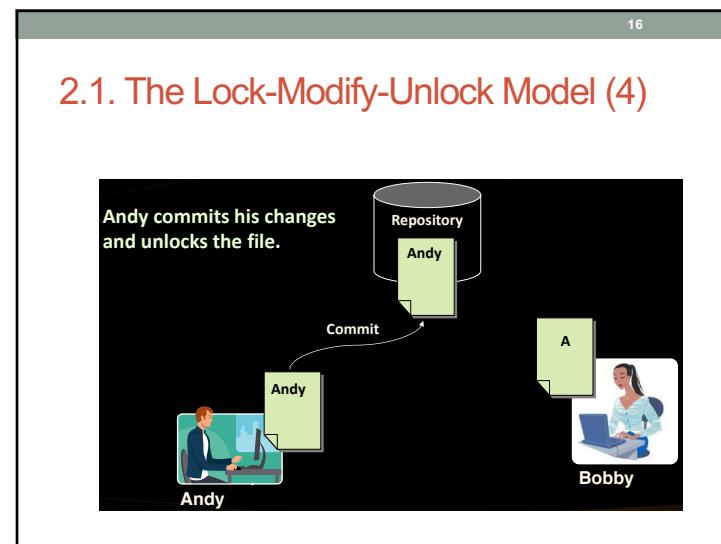
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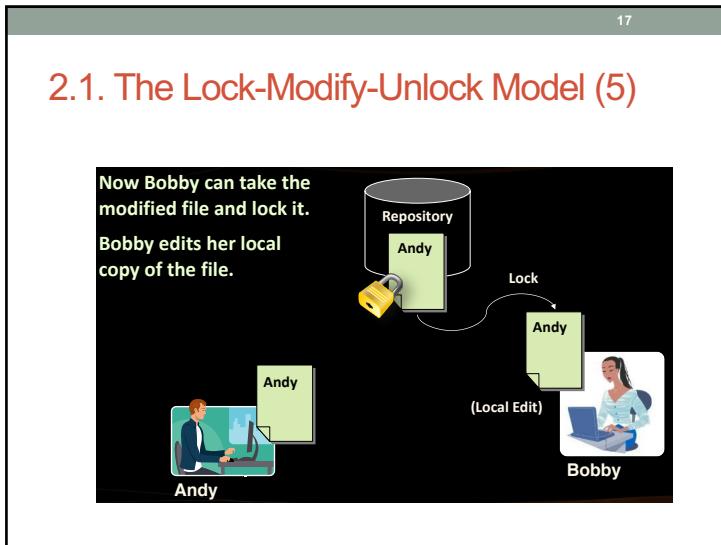
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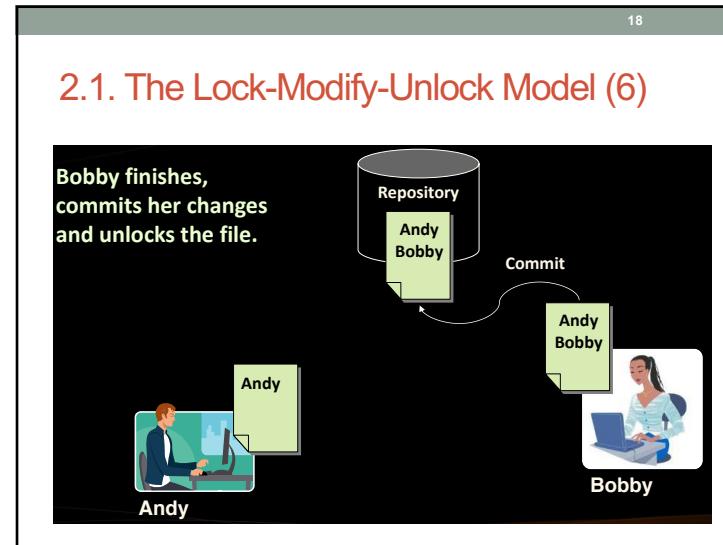
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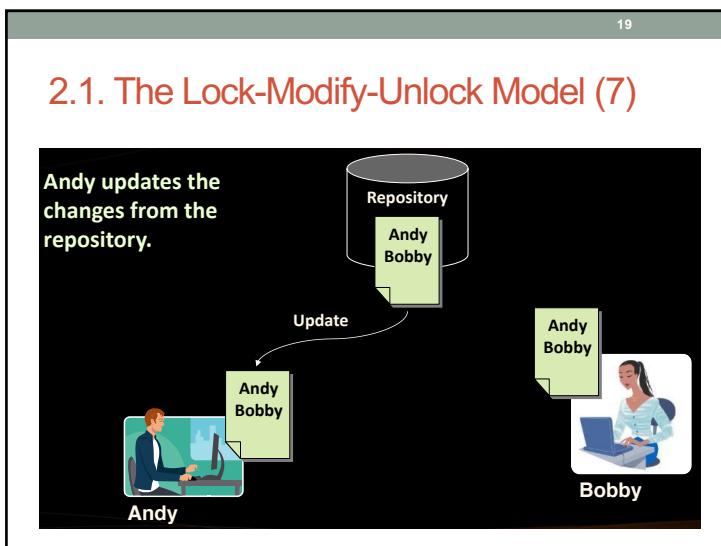
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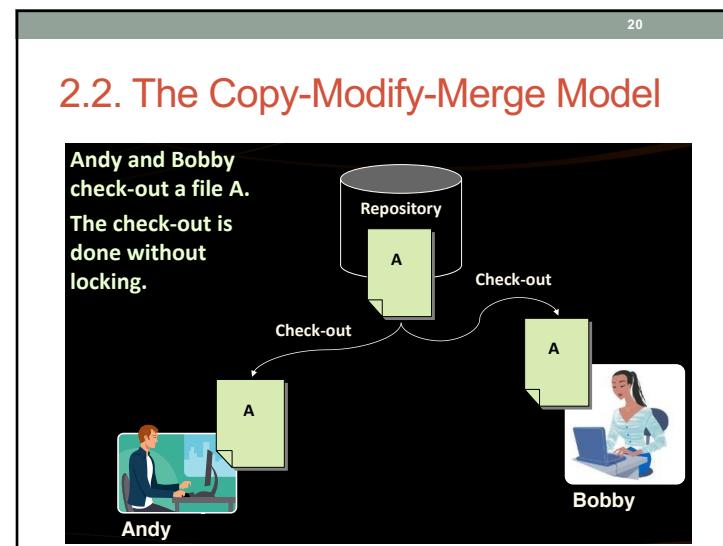
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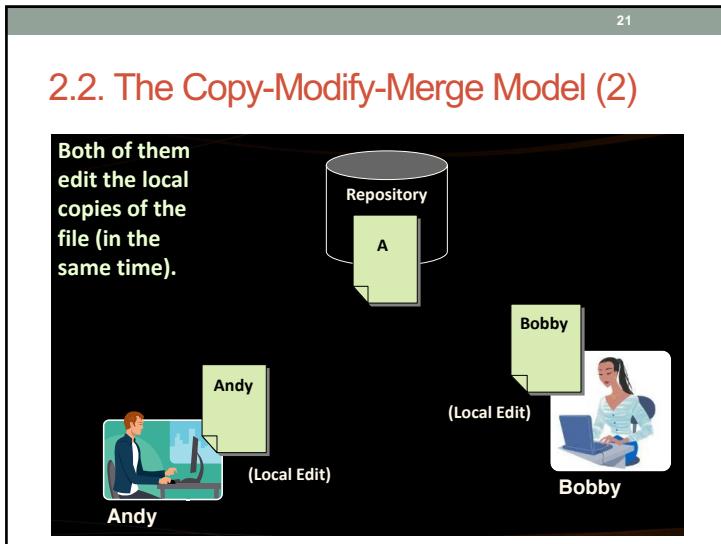
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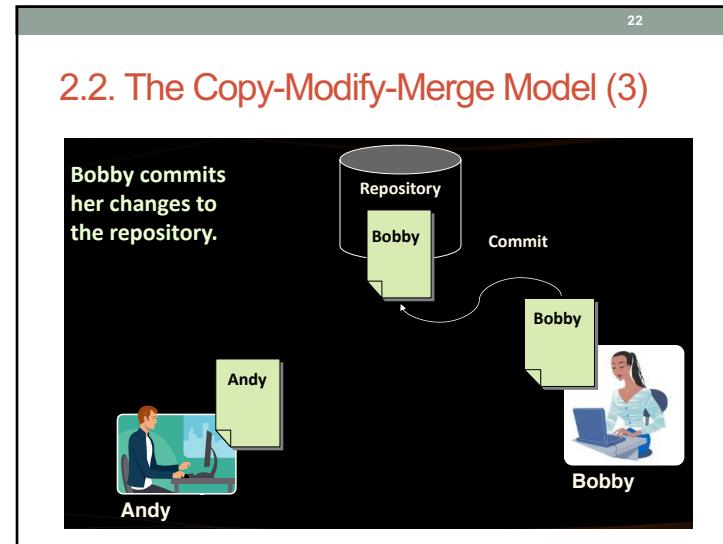
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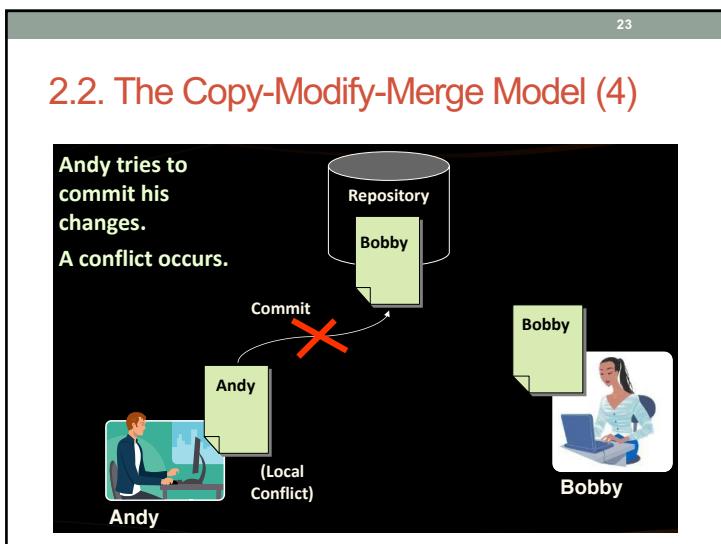
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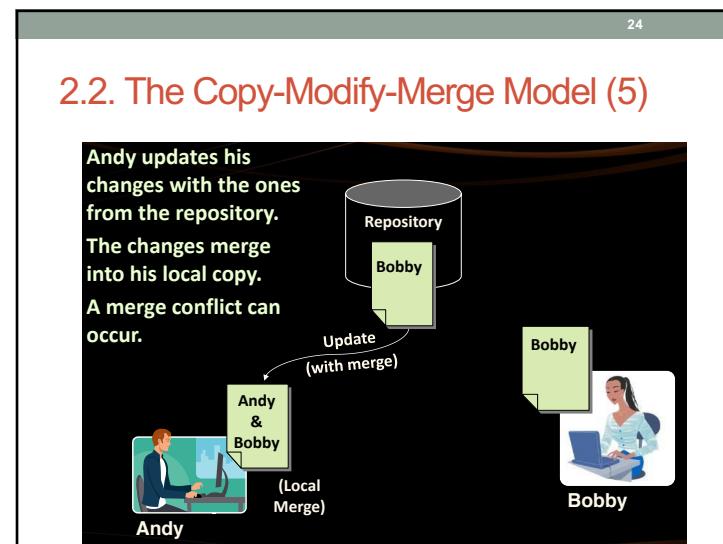
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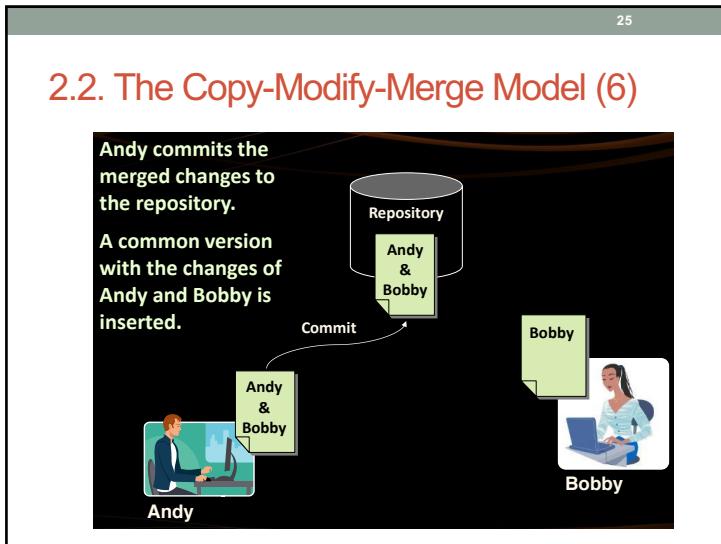
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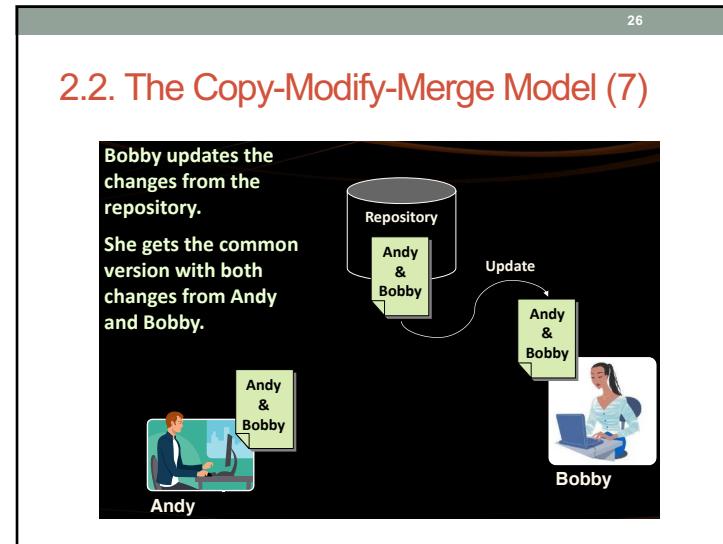
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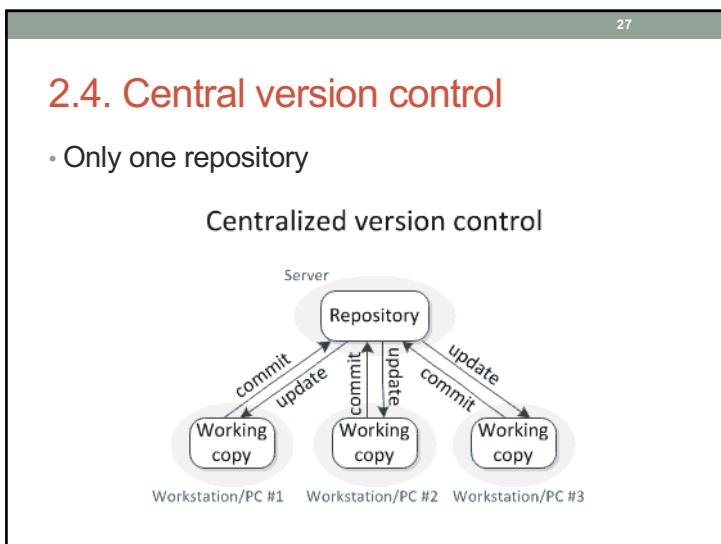
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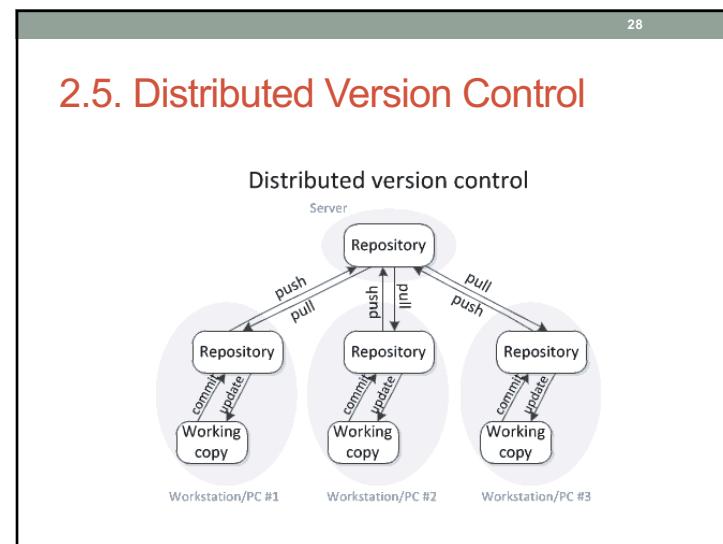
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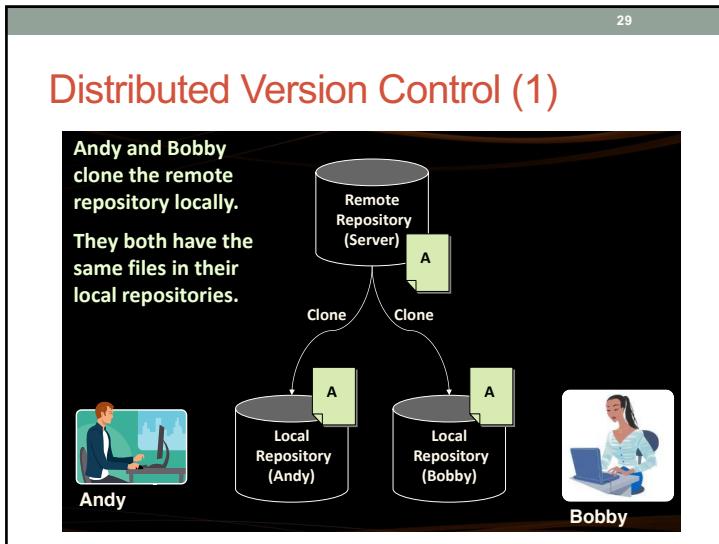
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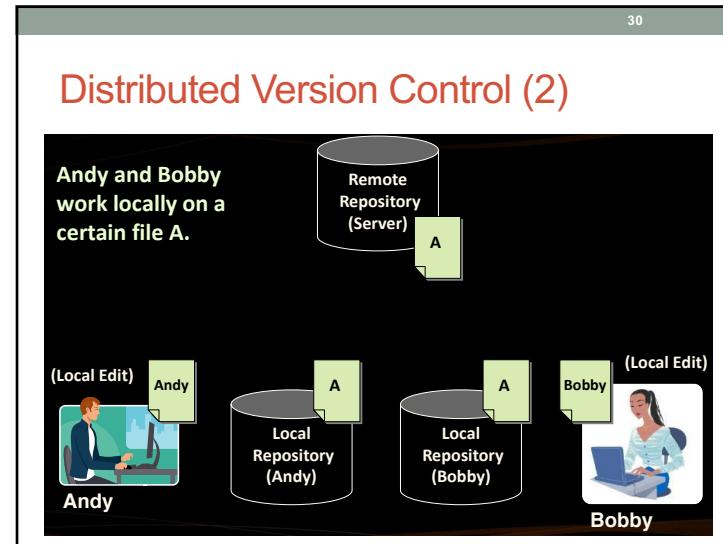
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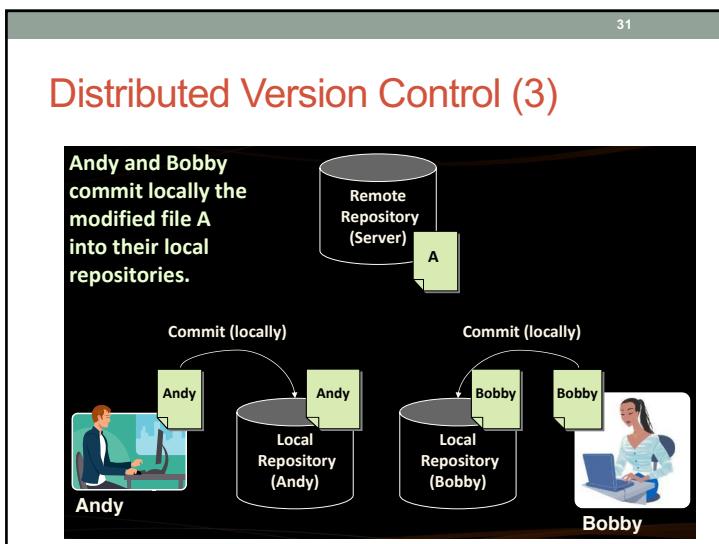
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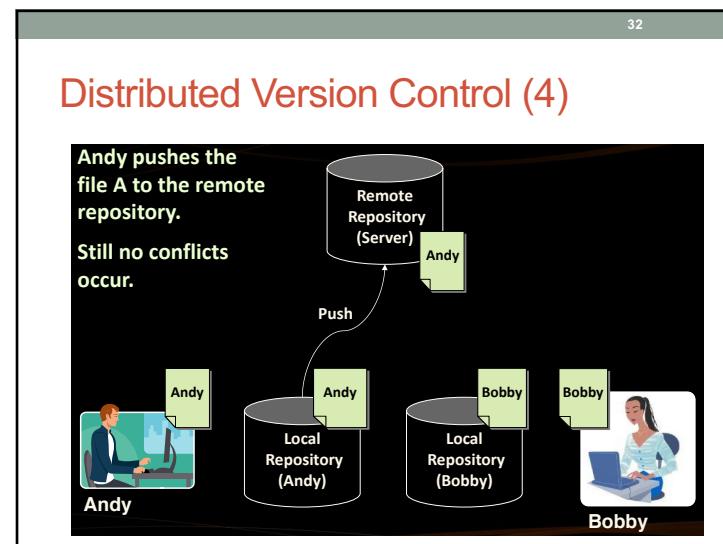
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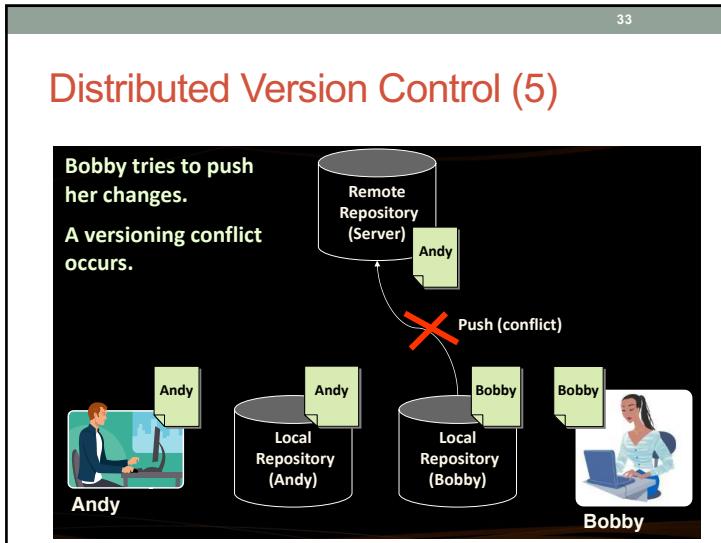
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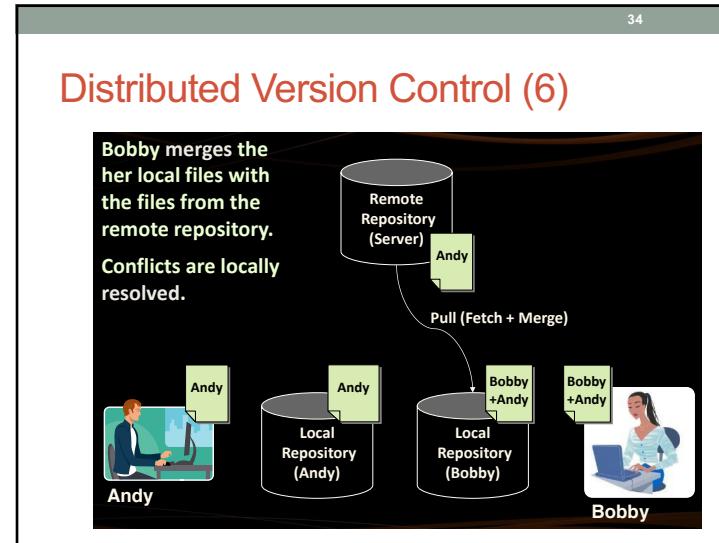
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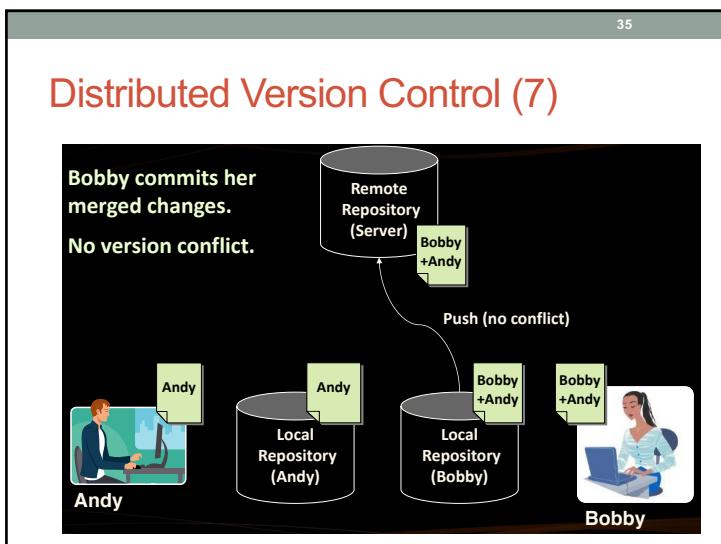
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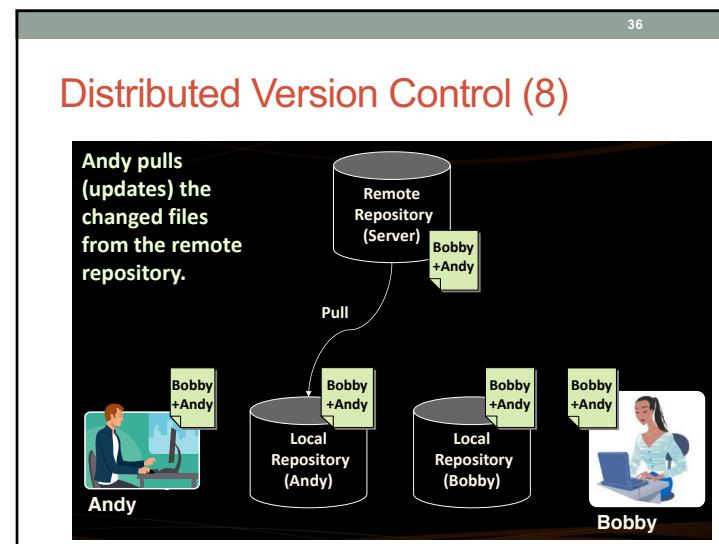
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3. Vocabulary

- 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

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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!

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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

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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

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Tools

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

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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>

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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`

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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]"`

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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]`

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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
```

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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

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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

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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

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