Version Control

EE 107S: Introduction to Linux

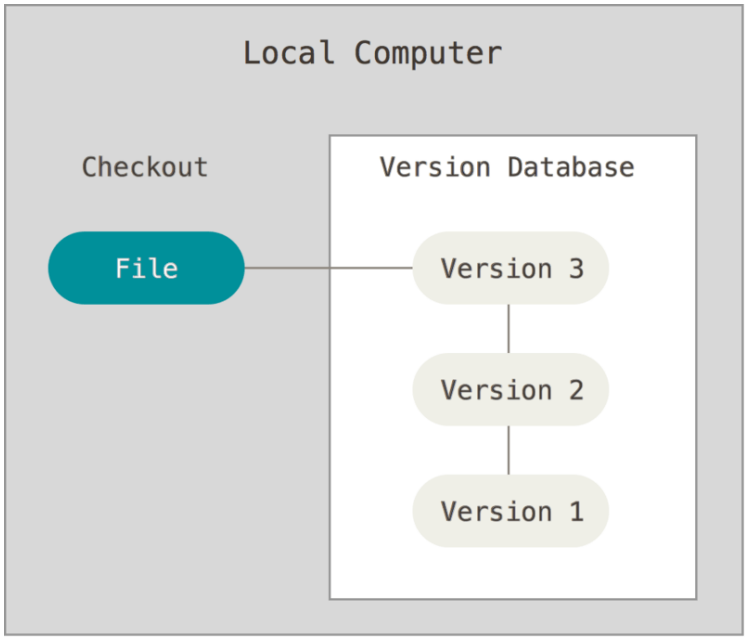
Lecture 5

What is version control?

- A sophisticated backup system (but much more)
  - Maintains a record of changes made to a file
- Common examples: Dropbox, OneDrive, making several copies of a file, emailing yourself, etc.
- Probably every company that maintains code will use version control

Why version control?

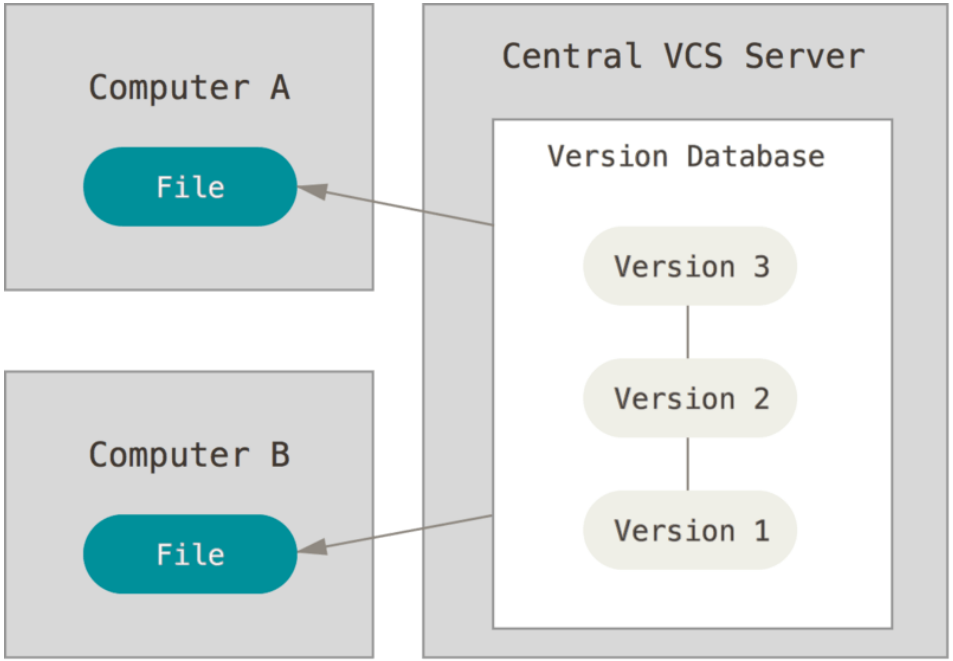
- You don’t want to lose your work
- Keep track of different versions and easily switch between them
- Keep a remote copy of files and their versions
- **Collaboration is much easier**



The most basic form of version control

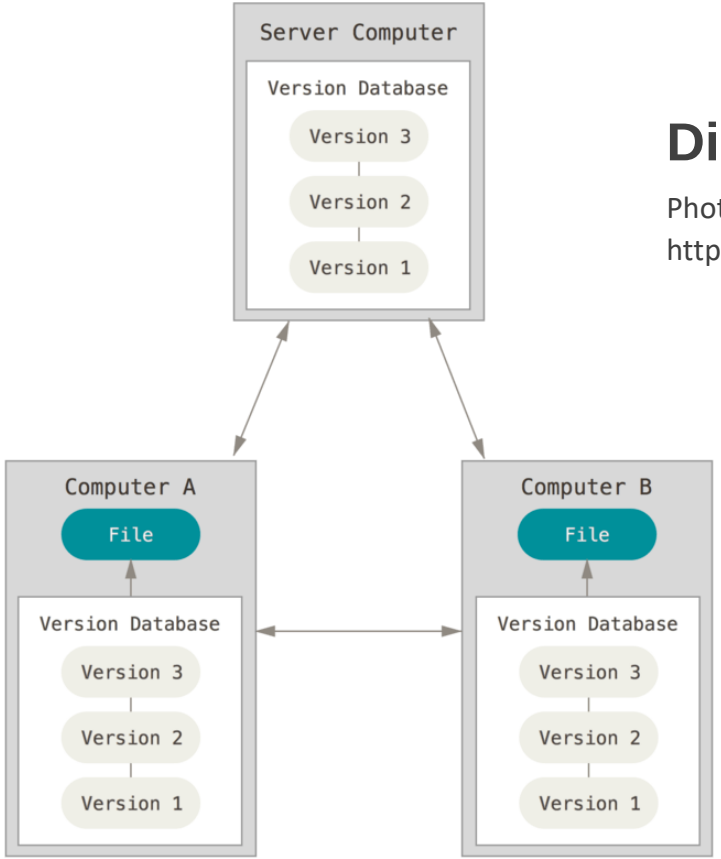
Photo courtesy of git-scm

https://git-scm.com/book/en/v2/book/01-introduction/images/local.png



Centralized version control

Photo courtesy of git-scm
https://git-scm.com/book/en/v2/book/01-introduction/images/centralized.png



Distributed version control

Photo courtesy of git-scm
https://git-scm.com/book/en/v2/book/01-introduction/images/distributed.png

Common version control systems

- Centralized
  - Subversion (SVN)
  - Perforce
- Distributed
  - Git
  - Mercurial

Git

- Created by Linus Torvalds (creator of Linux)
- Treats versions as a DAG
- A set of tools that helps you navigate and modify the DAG

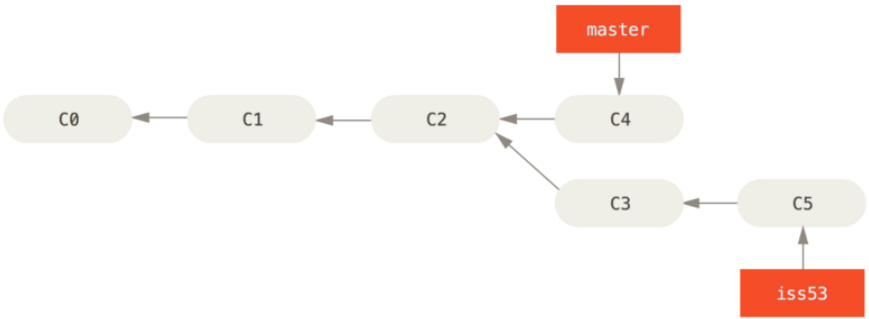


Photo courtesy of git-scm
https://git-scm.com/book/en/v2/Git-Branching-Basic-Branching-and-Merging

Git

- Different ”states” a file can be in
  - Untracked
  - Modified
  - Staged
  - Committed (local)
  - Pushed (remote)
- Each version is called a commit
- Concept of a HEAD (where you are in the DAG currently)
- Branches in the DAG correspond to branches in `git`

Popular remote providers

GitHub

Atlassian
Bitbucket

Typically costs money for private repositories, but you can get unlimited repositories for free as a student. Take advantage of it!

Github account and SSH keys

- Generate SSH keys (so you don't have to use a password)
  - `ssh-keygen -t rsa -b 4096`
- Create Github account and add SSH key

Configuring Git

- Set your name
  - `git config --global user.name \ “Chirag Sakhuja”`
- Set your email address (the one with the Github account)
  - `git config --global user.email \ “chirag.sakhuja@utexas.edu”`

Git status

- Gives you useful information on the status of your repository
- Often gives you verbatim commands to run
- Good practice to `git status` all the time

Create a local repository

```
git init
vim README
```

Creating a commit

```
git add README
git commit
```

Exercise

Add a line to the README and recommit (run `git status` to get help!)

Possible solution

```
vim README
git status
git add README
git status
git commit
```

Version history

- You can get a log of commits (just commit messages)
  - `git log`

Pushing to a remote

```
git remote add origin \
      git@github.com:chiragsakhuja/intro-to-
      linux.git
git push -u origin master
```

Exercise

Add a new file called main.c to the remote repository

Possible solution

```
vim main.c
git diff
git add main.c
git commit
git push
```

Cloning an existing repository

```
git clone git@github.com:chiragsakhuja/intro-
    to-linux.git
```

References

- Cheat sheet
- Tutorials
- Documentation