CMPE-013/L

git

Max Lichtenstein

based on slides from Maxwell James Dunne

Containing images from:

Pro Git book, written by Scott Chacon and Ben Straub

"10 Things I Hate About Git" by Steve Bennett

Roadmap

- Git overview
- Command Line Interface (CLI)
- Using git

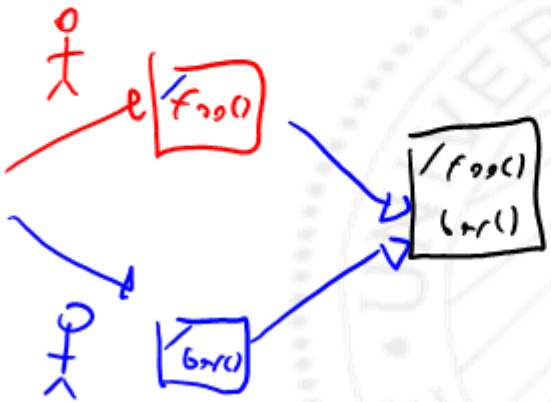
git Overview

Basic Version Control (1/3)

- Need to keep track of changes in a collection of documents
- Keep the ability to “roll back” to previous working code

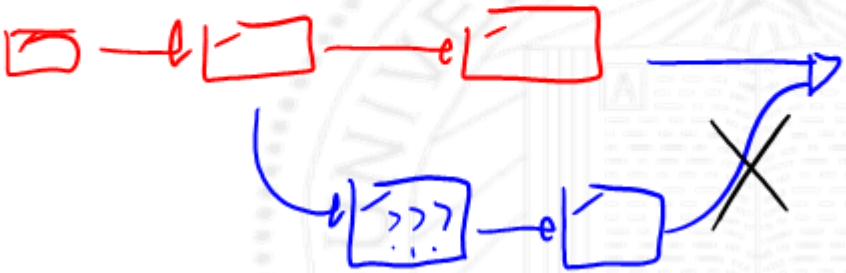
Basic Version Control (2/3)

- Coordinate with multiple programmers working on the same code.



Basic Version Control (3/3)

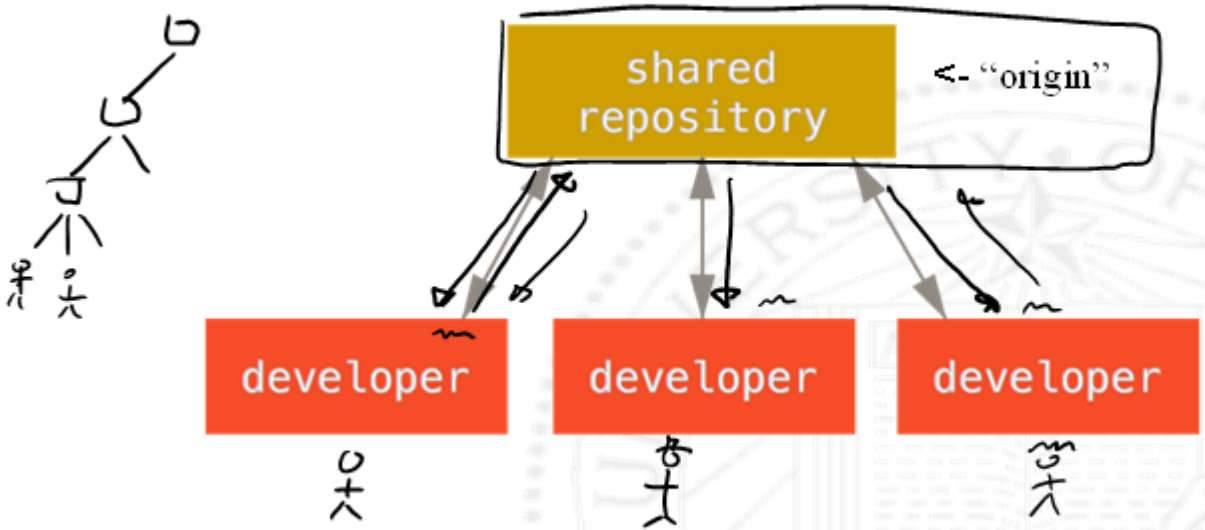
- Try experimenting – make a "branch", and merge back later if it works



Git Theory

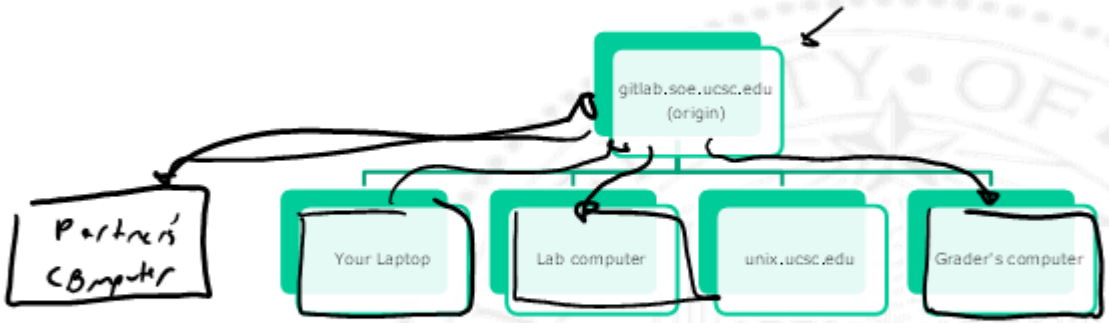
- Like all version control systems, git keeps tracks of *changes*.
- Except Git differs in a major way.
  - Instead of checking in changes to a server automatically, you 'commit' them locally.
  - Only 'push' your changes to server when you want
  - Only 'pull' other changes when you want

Upstream and Downstream



- https://git-scm.com/book/en/v2/Distributed-Git-Distributed-Workflows

In CMPE13:



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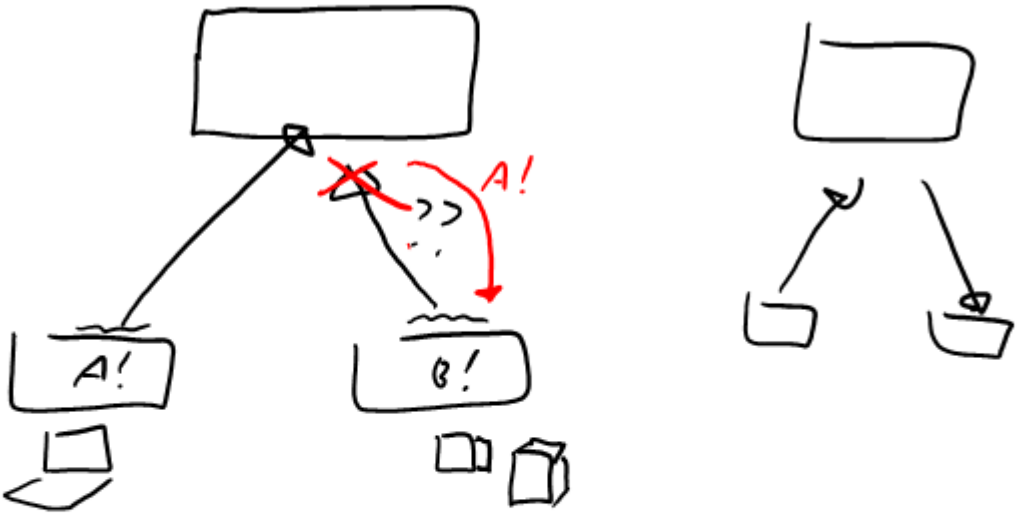
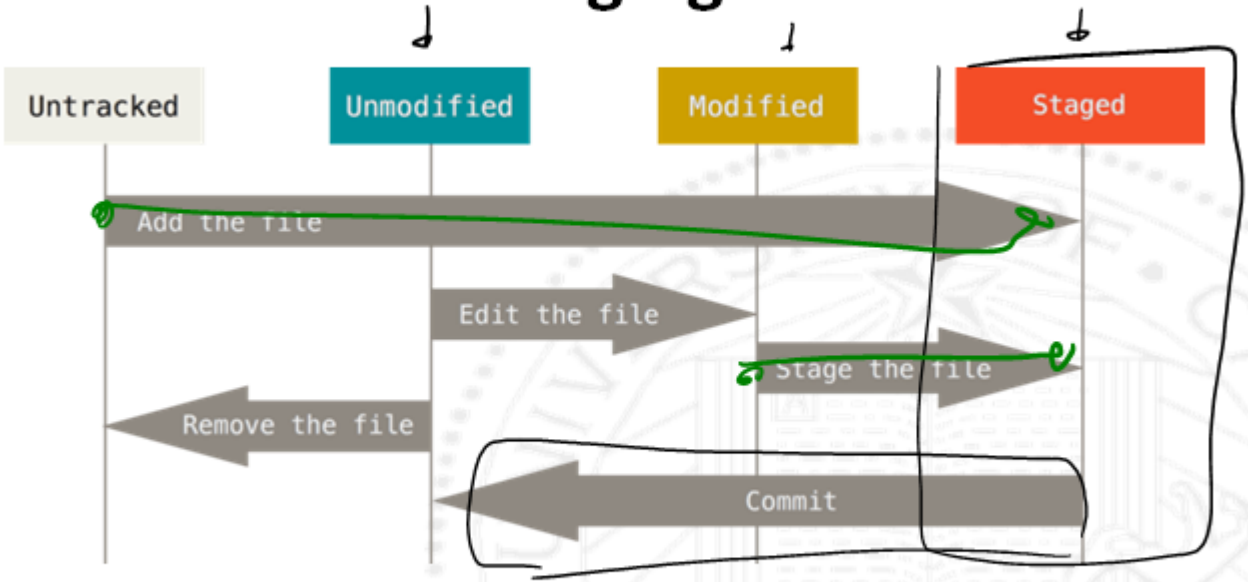
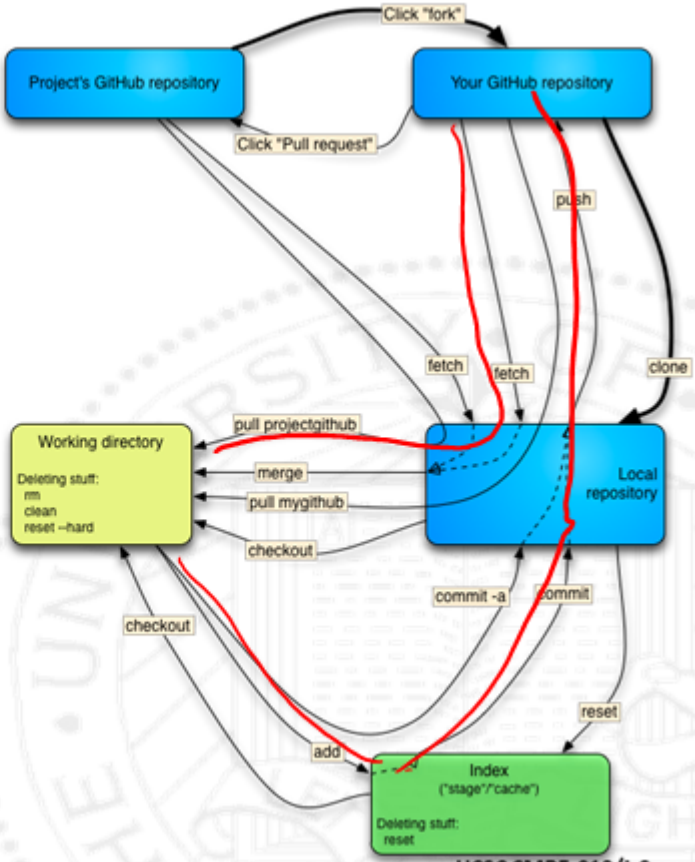

A!
??
A!
B!

Staging


Untracked
Unmodified
Modified
Staged
Add the file
Edit the file
Stage the file
Remove the file
Commit

Git has a learning curve



Max Lichtenstein

Command Line Interface (CLI)

Basic CLI

- Command Line Interface: a means of interacting with a computer using only text
- Commands often have parameters or arguments added to them (e.g.: ls –a).
- Contrasts to a GUI (Graphical User Interface)
- Powerful and efficient, once you learn it
  - How we will use git

Basic File Systems

- How files are stored and organized by the operating system
- All modern OSes use a hierarchical file system
  - Top level is “root”
- CLI is “in” a directory
  - working directory

Most useful bash commands

- $ ls =list contents of working directory
- $ cd =change directory, try “cd ..”
- $ mv =move or rename a file (careful!)
- $ cat =print contents of a file
- $ rm =delete a file (careful!)
- $ git=

Using git

Git Basics

- The fundamental git object is a "**repo**sitory"
  - Just a folder with some .git files in it (.git, .gitignore, etc)
  - But these files contain a history of the folder's contents

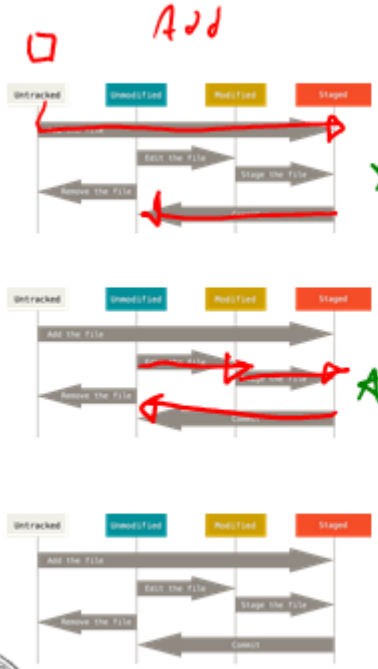
- Git only tracks changes in files that are "added" to the repository.

Git Basics

- At any point, a ‘commit’ can be made. This will take a snapshot of all tracked files.

- Once ‘commits’ have been made, they are ‘pushed’ back to the server as a separate operation

Git Flow


Untracked
Unmodified
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Edit the file
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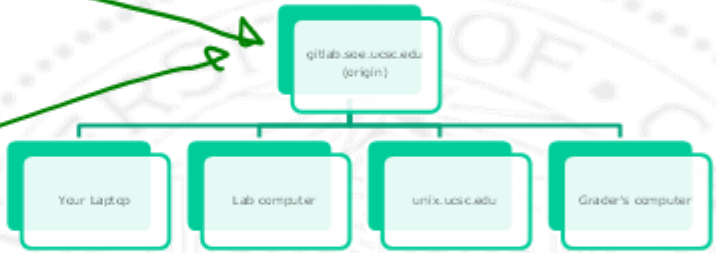
Commit
Add the file


gitlab.soe.ucsc.edu
(origin)
Your Laptop
Lab computer
unix.ucsc.edu
Grader's computer

Git Practice

- All commands prefaced with git, eg
  - git clone < make a local copy of a repo (ie, a folder)
  - git status < see what's going on
  - git add < tell git to track a file
  - git commit < take a snapshot
  - git push < send your changes upstream (to server)
  - git pull < bring your changes downstream (to you)
  - git log < see your history (also, gitk)

Git Commands (clone)

- Copies Repository for the first time. Only used when you do not have a copy of the repository

```
$ git clone git@git.soe.ucsc.edu:/classes/cmpe013/spring16/MaxSampleStudent.git
Cloning into 'MaxSampleStudent'...
remote: Counting objects: 6681, done.
remote: Compressing objects: 100% (6395/6395), done.
remote: Total 6681 (delta 4526), reused 400 (delta 237)
Receiving objects: 100% (6681/6681), 76.70 MiB | 1.98 MiB/s, done.
Resolving deltas: 100% (4526/4526), done.
Checking connectivity... done.
```

Git Commands (status)

- Give status of the repository. Showing state of files within the repo

```
$ git status
On branch master
Initial commit
Untracked files:
  (use "git add <file>..." to include in what will be committed)
      README.txt
nothing added to commit but untracked files present (use "git add" to track)
```

```
$ git status
On branch master
Initial commit
Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
      new file:   README.txt
```

Git Commands (add)

- Either adds a new file to the repository or marks a file for commit. This command has no output. Call 'status' again to verify operation.

Git Commands (commit)

- Creates a snapshot of all files in the repository at the current time. At any point you can come back to this point so commit early & often.

```
$ git commit -m "committing an empty readme for a test"
```

- Adding the –a automatically adds all tracked files

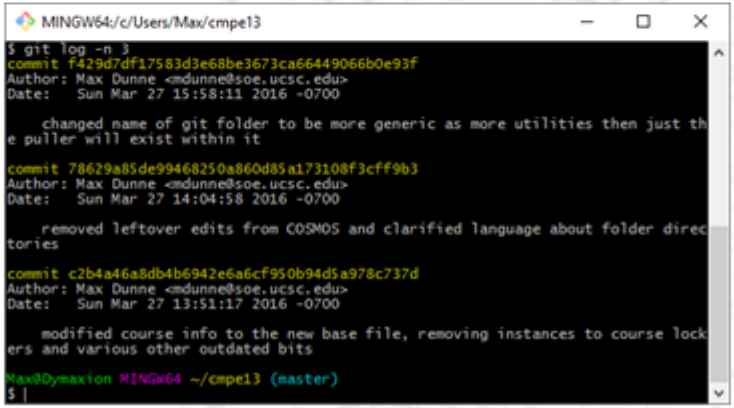
```
$ git commit -am "committing an empty readme for a test"
```

Git Commands (push/pull)

- Synchronizes the local repository with the remote server. Push should be used frequently to ensure server copy is updated.
- Once pushed to the server, the files are safe from any and all catastrophes that happen to your system.
- **WARNING:** pull will overwrite your local files. Use with discretion.
- We are not sympathetic to your data loss.

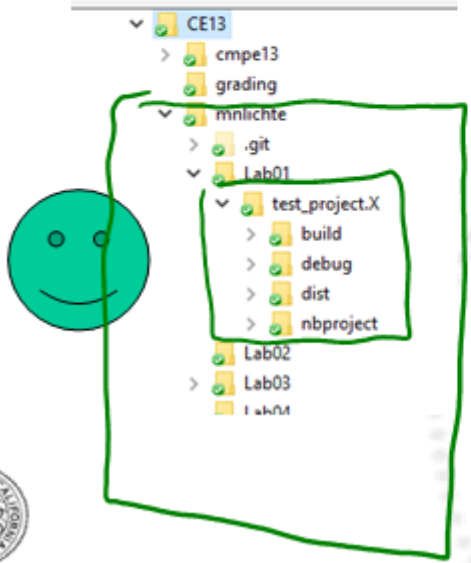
Git Commands (log)

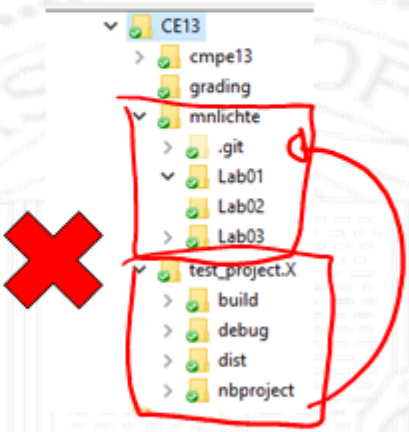
- Gives a history of commits for the repo. Call with argument '–n 1' if only last ID is desired.



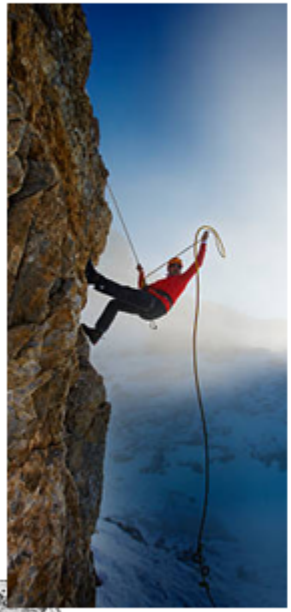
Git Usage in Labs

- Work out of your repository:





Git Usage in Labs



- Commit often – Once per milestone, or ~1/hr
  - Use descriptive commit messages
  - Why not push too?
  - Committing is like saving, but better! You can only lose as much work as your last commit
- Pull when you change computers

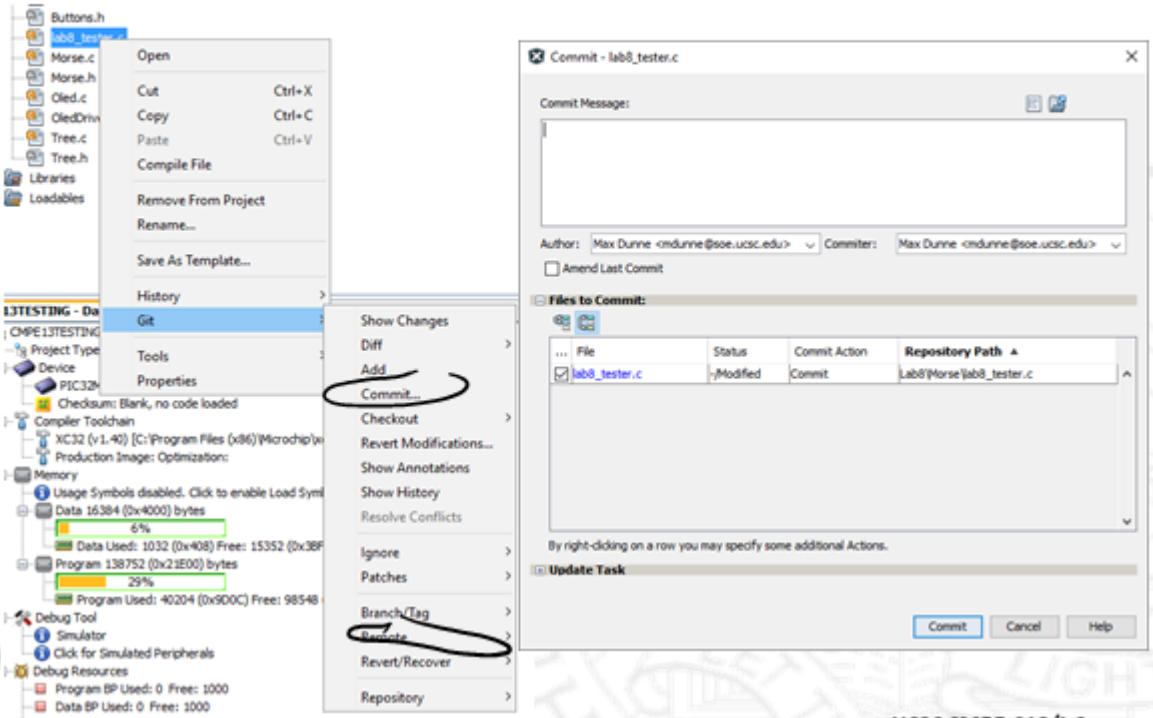
AS A PROJECT DRAGS ON, MY GIT COMMIT MESSAGES GET LESS AND LESS INFORMATIVE.

Randall Munroe, xkcd.com

Git Workflow

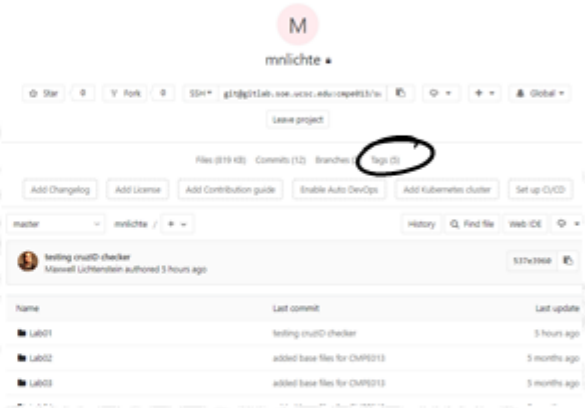
1. Clone the repository or pull if the repository if work has been done in a different location.
2. Do work.
3. Commit your work (and why not push too?)
   a) git add
   b) git commit –m "good message"
   c) git push
4. Repeat as necessary.

Commit through MPLABX



Lab Submission

1. Commit and push your work
2. Go to GitLab server
3. Click “tags”
4. Add a tag named “LabX_submission_Y”
    1. We take the largest Y, so you can resubmit by making a new tag with a bigger Y
5. To verify your submission:
    1. Git checkout <tag> / git checkout master
    2. or download as zip



A few more git Tips:

- git status is your best friend
- git log is pretty good too
- gitk is fun

- Ask for help

- Don’t Panic!