Version Control with Git

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15-441 Computer Networks
Recitation 2
What is version control?

- Revisit previous code versions
- Backup projects
- Work with others
- Find where things broke
Version Control Workflow

- Check for any remote updates
- Do your work
- Test your work
- Check differences, try to isolate changes
- Check for any remote updates
- Commit your work
Options

- Git
- Subversion (svn)
- Mercurial (hg)
- Bazaar (bzr)
- CVS
- Dropbox
- Others…
Usually remotely hosted, shared with a team.

Your private universe, before commit.

svn

svn commit

svn checkout
svn update
No notion of “working copy”–each is a full repository.
Creating a Repository (repo)

Create locally

git init .

Create remote

git init --bare

Clone local copy

git clone git://path/to/repo
--bare or not?

- No-bare
  - Creates a repository in your working directory
  - Don’t need to create multiple copies of your repo
  - Won’t help if you nuke the directory/disk
  - This is probably what you need if you’ll work in AFS

- --bare
  - Creates a “server copy” for hosting the project
  - Workflow more similar to svn (but still better)
  - Everyone pushes to shared bare repo (like svn)
  - You don’t work in this copy; must clone elsewhere
  - You want this to develop on your PC
Aside: network protocols

- Use different protocols to pull/push to repositories.
  - If on the same computer:
    - git://path/to/repo
  - If hosted on AFS
    - ssh+git://path/to/repo
- No ssh keys for AFS, sorry
Aside: Configure git

- `git config --global user.name "Harshad Shirwadkar"`
- `git config --global user.email "harshad@cmu.edu"`
Clone

Pull a copy of the repo to develop on

git clone git://path/to/repo

git clone ssh+git://unix.andrew.cmu.edu/afs/andrew/course/15/441-641/ANDREWD/ANDREWD-15-441-project-1.git
status

- Which files changed?
- Which files aren’t being watched?
- Which files are stashed for commit?

`git status`
Pull

- Get latest updates from remote copy

```bash
git pull
```

- If this fails, you probably need to commit any unsaved changes
Commit

- Merge your changes into the repository

```bash
  git add foo.c ...
git commit
```
Push

- Don’t push broken code!!

git push

- If this fails, you probably need to pull first
Branch & Merge

- Work on something different, without disturbing master/trunk

```bash
git branch branch_name

git checkout branch_name

do stuff...

git checkout master

git merge branch_name
```
Tag

- Mark a revision as “final” or “ready”

```bash
git tag tag_name

git push --tags
```
Remote Hosting

- github.com
- bitbucket.org
- svnhub.com
- AFS
- Google code
- Sourceforge
Aside: AFS Permissions

- To make a bare repo in AFS that someone else can pull/push from:
  1. Make a new directory in your home dir
  2. `fs sa . ANDREWID rlidwk`
  3. `git init --bare`
Good practices

- Small commits
- Useful messages
- Commit frequently
- Develop in branches
- Tag releasable versions
Small commits

- Only change one thing per commit
- When something breaks, easier to trace
Helpful commit messages

- Say what you changed
- Keep the first line short
- Make commits easy to find
- [www.commitlogsfromlastnight.com](http://www.commitlogsfromlastnight.com)
Commit Frequently

- Make changes, commit them
- When something breaks, go to the commit that broke it
- Only push when ready for others to get the changes
  - Don’t make your teammates hate you
Git questions?
Checkpoint 2

- Add basic HTTP server
  - Read RFC 2616
- Start by parsing and building HTTP headers
- Serve error messages
- Then HEAD requests
- Then GET
- Then POST
Wireshark

- Packet monitoring software
- Install it. Use it.
- You will want this to examine the HTTP headers you’re sending/receiving
All questions?