Version Control with Git

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15-441 Computer Networks

Recitation 3

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

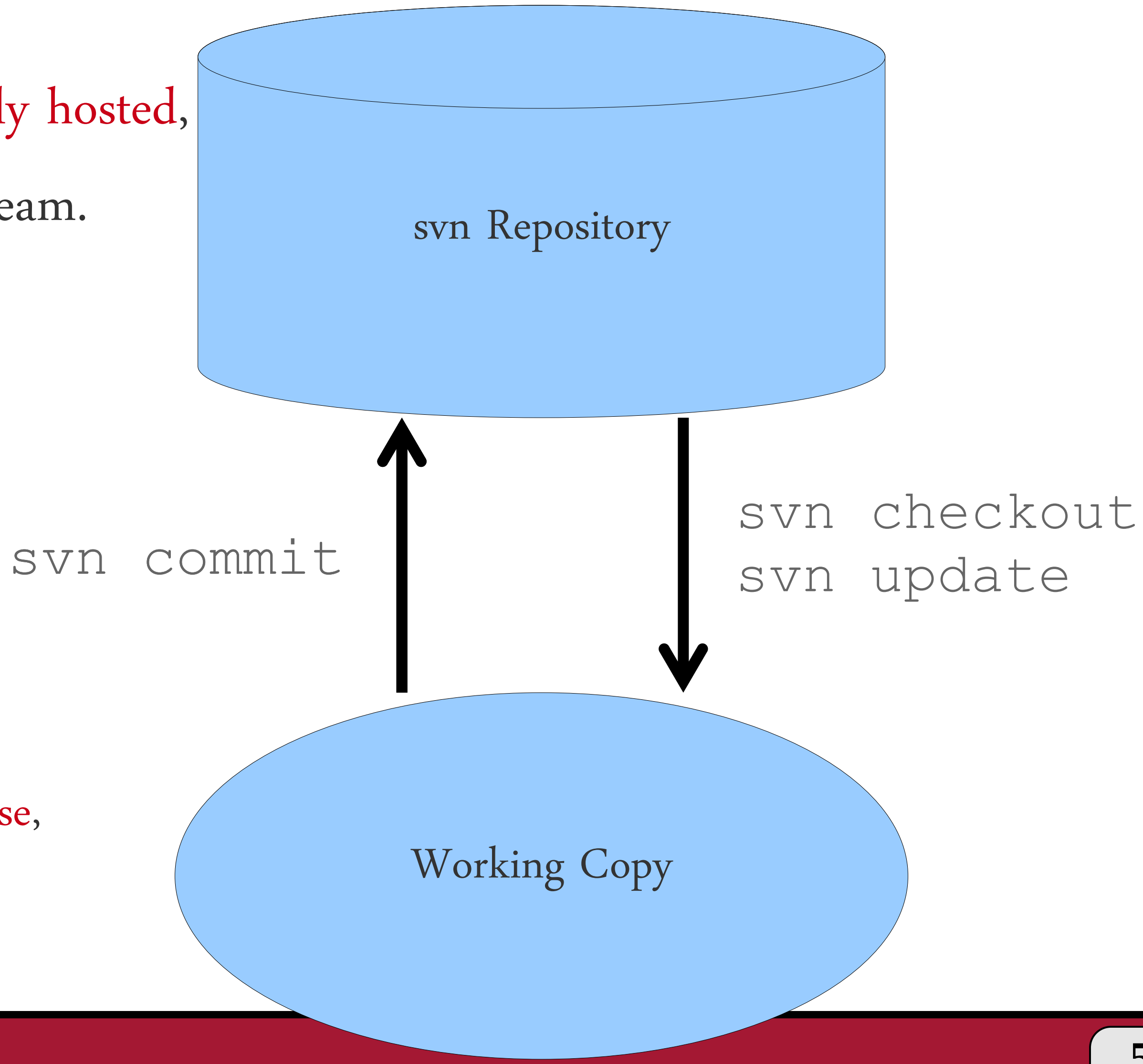
Options

- Git
- Subversion (svn)
- Mercurial (hg)
- Bazaar (bzr)
- CVS
- ~~Dropbox~~
- Others…

svn

Usually remotely hosted,

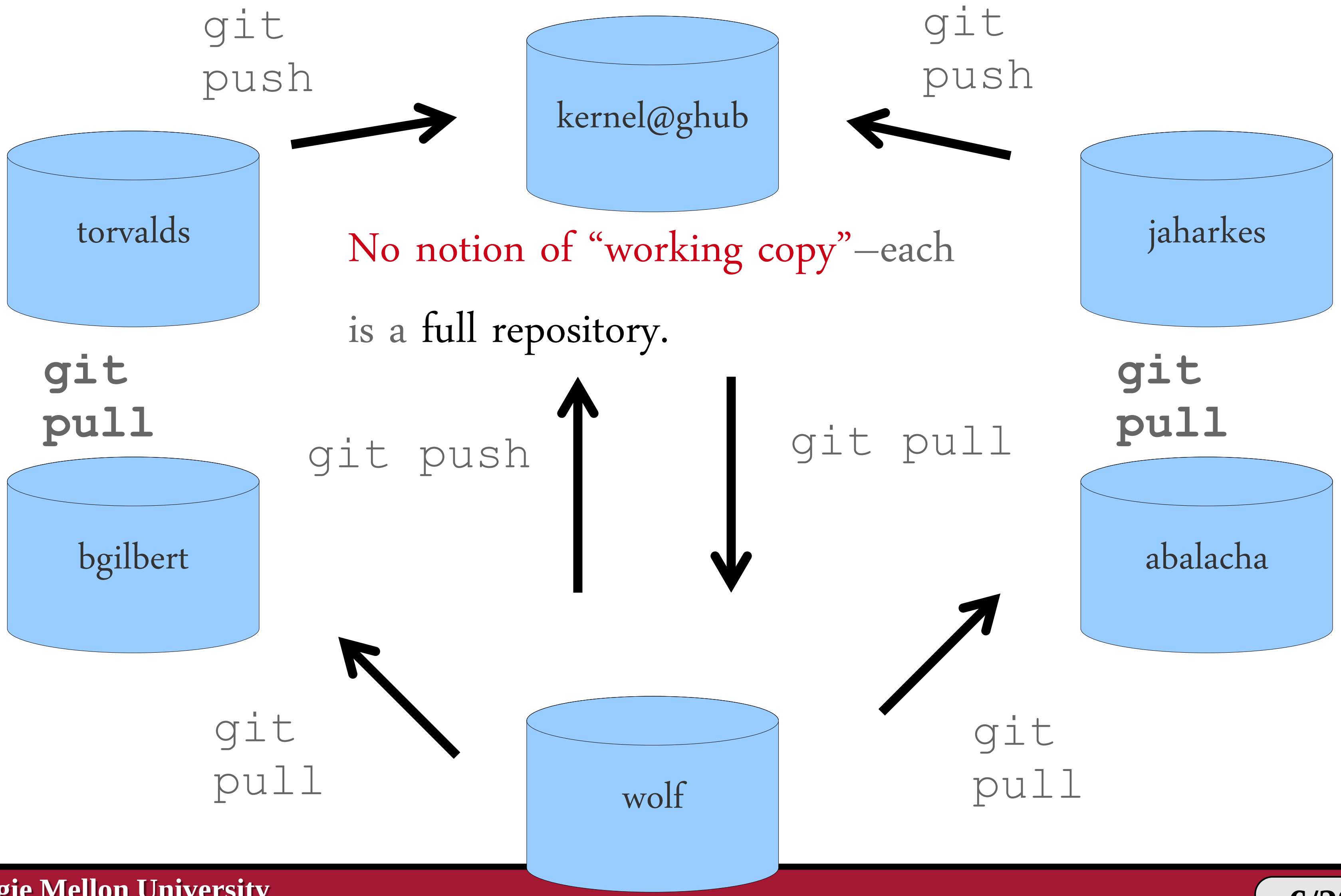
shared with a team.



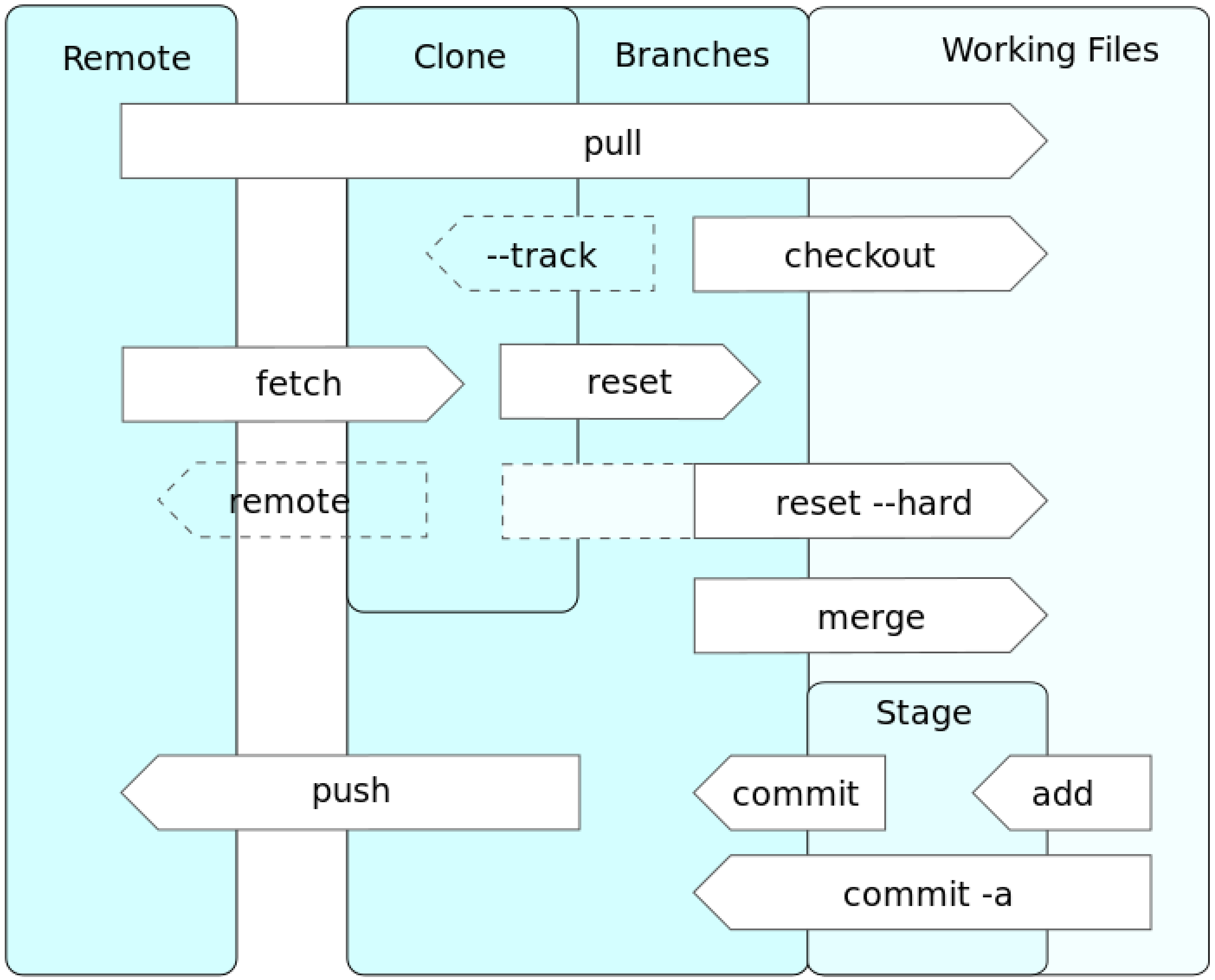
Your private universe,

before commit.

git



No notion of "working copy"—each is a full repository.


Remote
Clone
Branches
Working Files
pull
--track
checkout
fetch
reset
remote
reset --hard
merge
Stage
push
commit
add
commit -a

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 “Ben Wasserman”`
- `git config --global user.email “benjamin@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/and
rew/course/15/441-
641/ANDREWID/ANDREWID-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

```
git pull
```

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

Commit

- Merge your changes into the repository

```
git add foo.c …
git commit
```

Push

- Don’t push broken code!!

```
git push
```

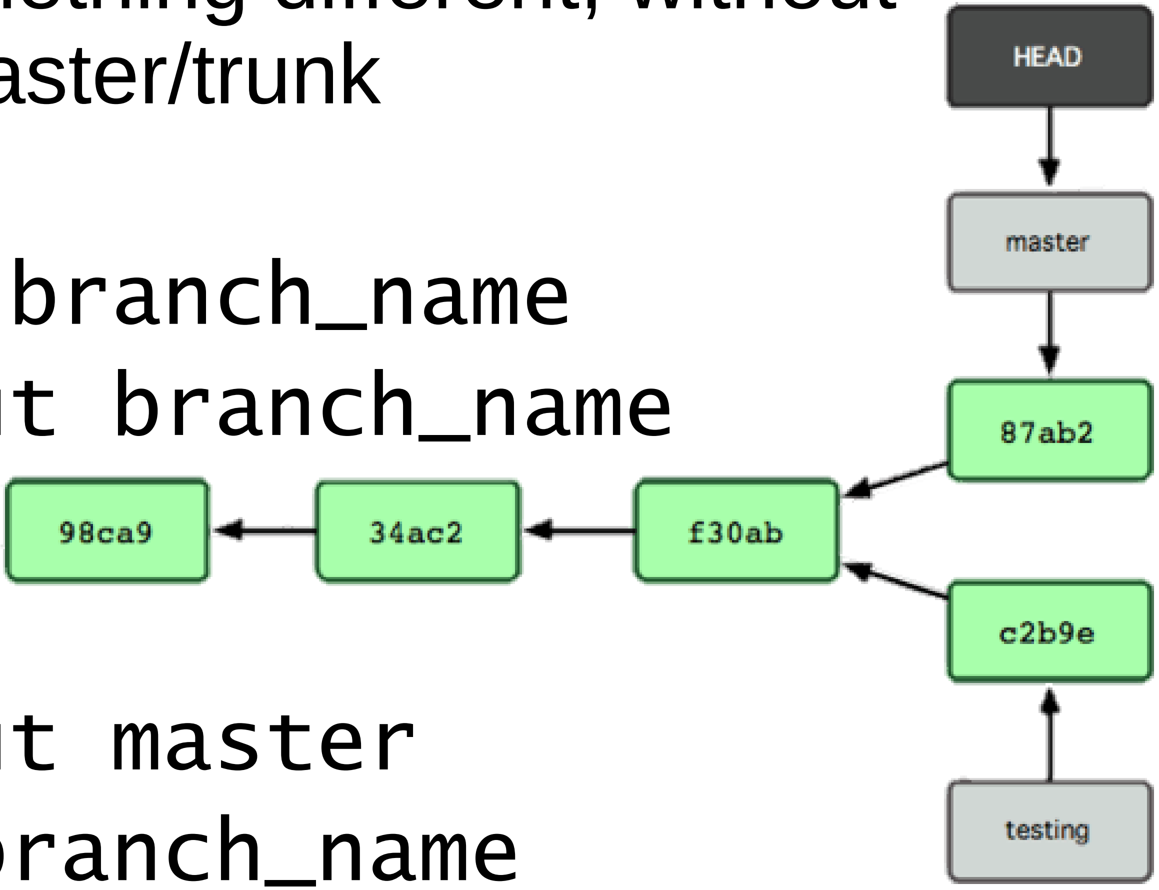
- If this fails, you probably need to pull first

Branch & Merge

- Work on something different, without disturbing master/trunk

```
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”

```
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

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
- Do the Wireshark question on HW1

All questions?