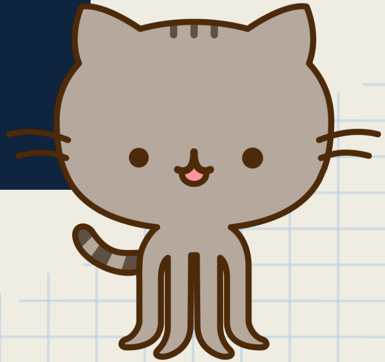
Branching and Merging

by Jonathan Miedel and Alvin Wang



Last Time on Git

- git pull
- git checkout
- git reset
- git blame
- rebase interactive

Pop Quiz!

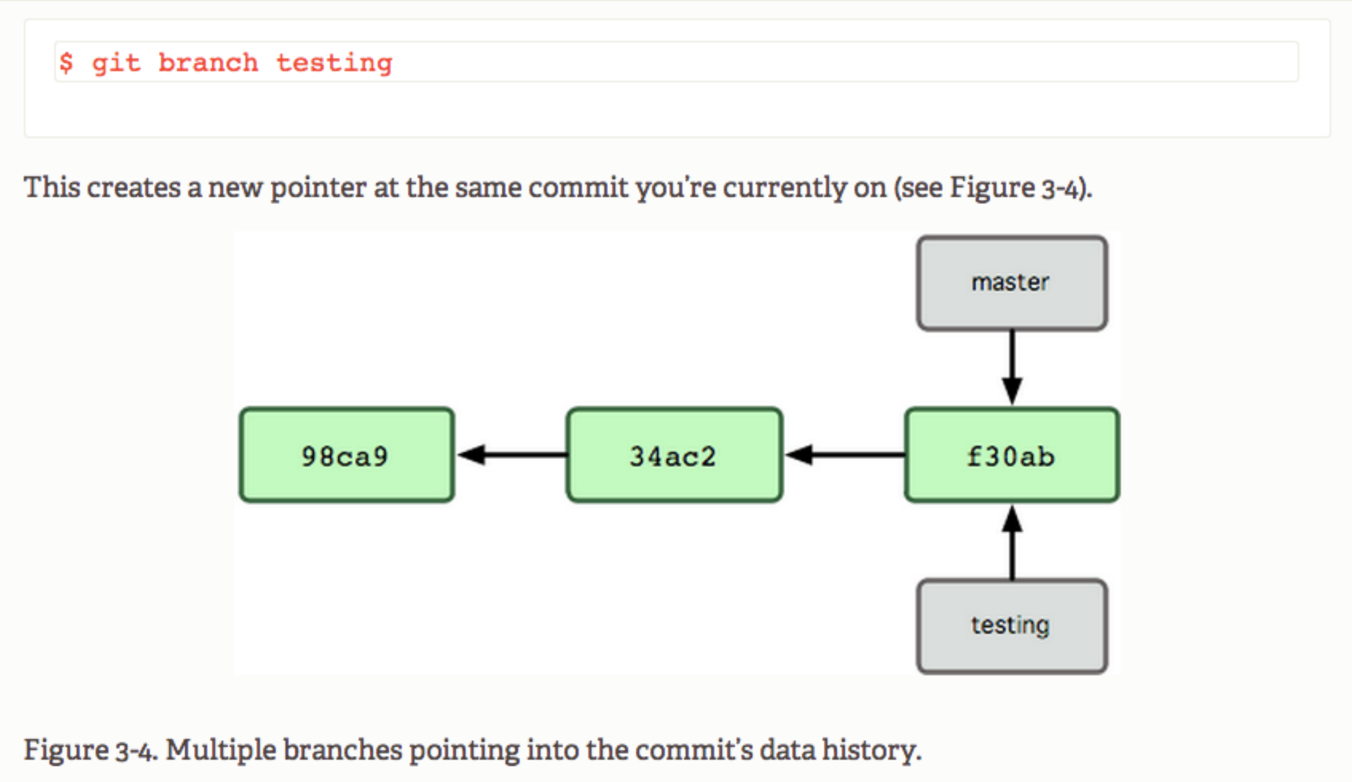
1. What is git pull used for?
2. What is the index?
3. Explain the difference between git reset --soft, --mixed, and --hard?
4. What are HEAD and master?
5. What is the difference between git reset <file> and git reset <commit>?
6. Name a use and danger for git rebase interactive.
7. What is git checkout for?
8. How are commits identified in git?
9. How do you reconcile a detached HEAD?

Continued

What is a branch?

- A branch is essentially a pointer to a commit in your git history
- `master` is the default branch
- Creating a branch is as simple as creating a new pointer to a commit in Git

An Example from Pro Git



```
$ git branch testing
```

This creates a new pointer at the same commit you're currently on (see Figure 3-4).

Figure 3-4. Multiple branches pointing into the commit's data history.

Git Branch

`git branch - shows local branches; -a will show all`

`git branch <branch> -` creates a branch off of HEAD

git status - this will tell you what branch you are currently on

git remote show origin - a lot of useful information about which branches are tracked and which need updates

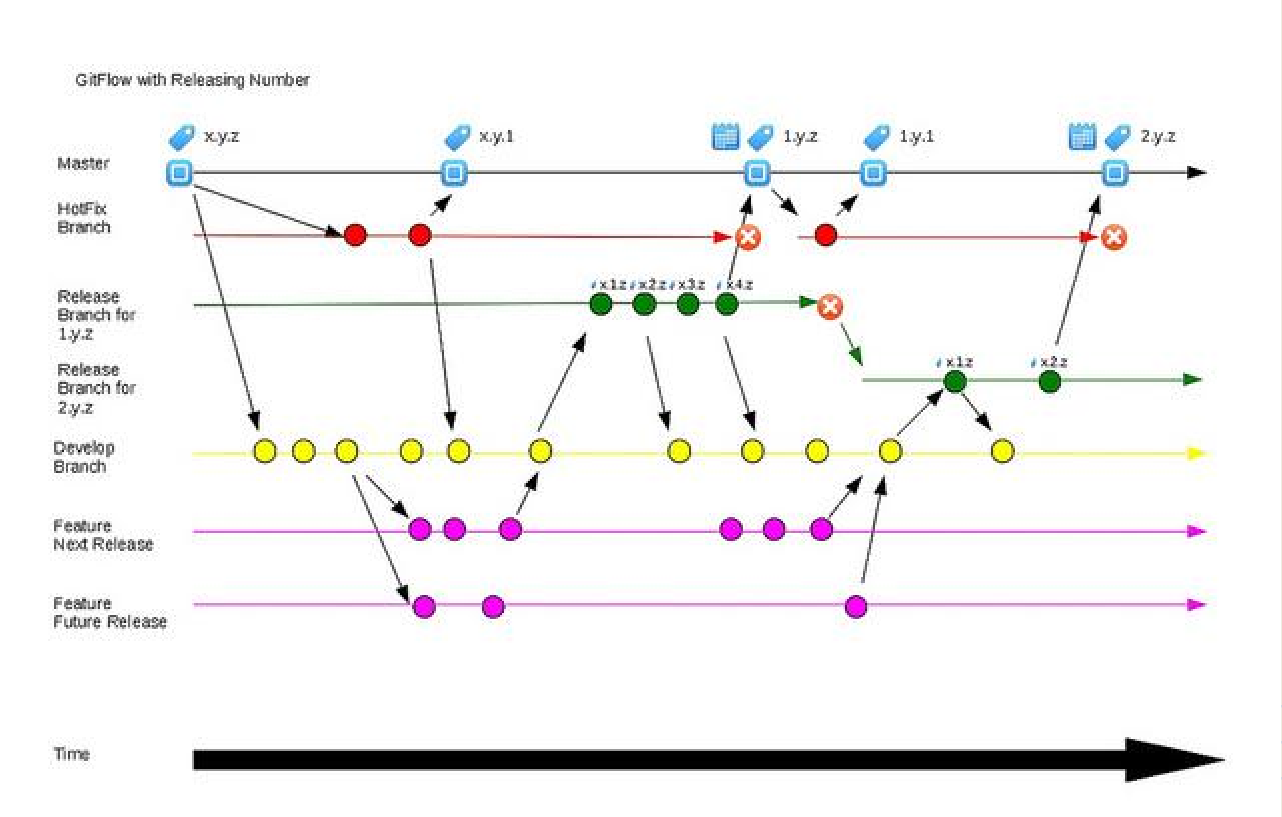
Branching is Good

- Allows for more isolation in workflow
- Allows for feature-based development

Cons:

- More confusing
- commit history get more convoluted
- hotfixes / security leaks are not applied immediately

Example Branch Workflow



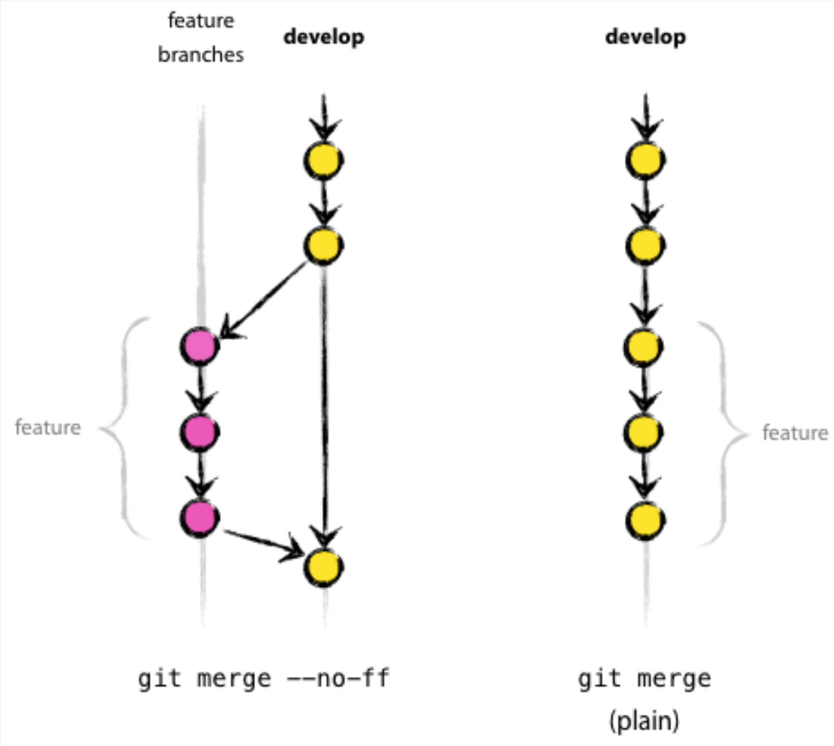
Git Checkout (again)

- git checkout
  - git checkout <branch>
    - checks out a branch
  - git checkout -b <branch>
    - creates a new branch and moves you to it

Merging

- It serves to integrate a branched tree back into a single tree
- Two main algorithms in Git
    - Fast-Forward
        - used by default if the branches have not diverged
    - 3-Way merge
        - uses diff3 to create the merge-commits we saw last time. 3-way refers to local, remote, common-ancestor

The Two Algorithms



Git Merge

- git merge <branch>
- --no-ff
- --no-commit

Merge Conflicts

- Merge conflicts occur when the process of merging does not go smoothly
  - Often happens if two people edit the same line
- Git will mark the file where the conflict occurred
  - You can resolve these manually
  - A wide variety of tools can be used to assist (next week)

Pushing Branches to Remote

- simple (default in git 2.0)
  - pushes only the current branch
- matching
  - pushes all local branches if they already are tracked on remote
- git config --global push.default matching

Deleting remote branches

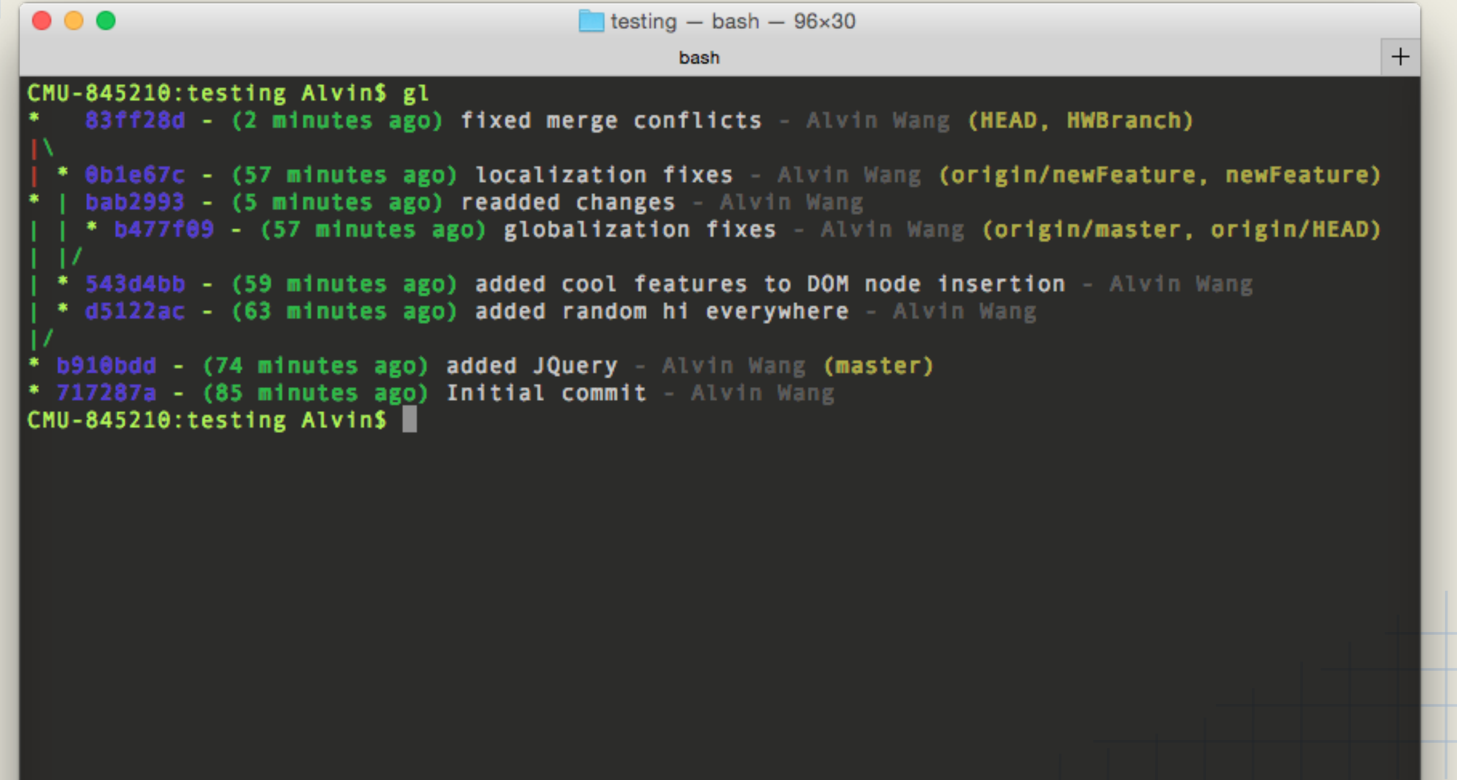
- git push origin --delete <branch>

Forking Demo

Homework

- fork HW3 under your account
- clone it
- on master branch, reset back to the second commit
- create a new branch called “HWBranch” and switch to it
- commit your index to the new branch with the message “readded changes”
- merge newFeature branch into the branch you just created successfully using `git merge origin/newFeature`; make sure you are on HWBranch when doing so
- You will get a conflict, resolve them manually by taking the changes from newFeature branch, commit after you resolve the conflicts with the message, “fixed merge conflicts”
- push only the HWBranch to your repo
- Once you are done, create an issue on Github on the Git-Stuco/HW3 repo with your andrewid as the title and a URL link to your forked repo as the body of the issue.

Complete HW git log



```
CMU-845210:testing Alvin$ gl
*   83ff28d - (2 minutes ago) fixed merge conflicts - Alvin Wang (HEAD, HWBranch)
|\
| * 0b1e67c - (57 minutes ago) localization fixes - Alvin Wang (origin/newFeature, newFeature)
* | bab2993 - (5 minutes ago) readded changes - Alvin Wang
| | * b477f09 - (57 minutes ago) globalization fixes - Alvin Wang (origin/master, origin/HEAD)
| |/
| * 543d4bb - (59 minutes ago) added cool features to DOM node insertion - Alvin Wang
| * d5122ac - (63 minutes ago) added random hi everywhere - Alvin Wang
|/
* b910bdd - (74 minutes ago) added JQuery - Alvin Wang (master)
* 717287a - (85 minutes ago) Initial commit - Alvin Wang
CMU-845210:testing Alvin$
```

Next Week in Git

- More advanced merge conflict resolution
- Tools to aid in the merge process

Extra Topics

SSH git

git gc