Git

CSCI 4448/5448: Object-Oriented Analysis & Design

Lecture 6

Task number one

- Get a marker and a piece of card stock
- Fold it in half to make a little tent
- Write the name you'd like to be called on that
- Face the name towards me
- Try to remember to bring that to class for the next several weeks

Acknowledgement & Materials Copyright

- I'd like to start by acknowledging Dr. Ken Anderson
- Ken is a Professor and the Chair of the Department of Computer Science
- Ken taught OOAD on several occasions, and has graciously allowed me to use his copyrighted material for this instance of the class
- Although I will modify the materials to update and personalize this class, the original materials this class is based on are all copyrighted © Kenneth M. Anderson; the materials are used with his consent; and this use in no way challenges his copyright

Learning Objectives

- Students will be able to…
  - Understand Git and related tools used in the class for source control
  - Create Markdown files for documentation
  - Use Git and GitHub for storage of code and markdown files for projects and collaboration with others
  - Graduate students will understand the requirements of the semester’s Graduate Research Paper

Tools for Review

- Git
- Markdown
- GitHub

https://xkcd.com/1597/

Git – A Version Control Tool

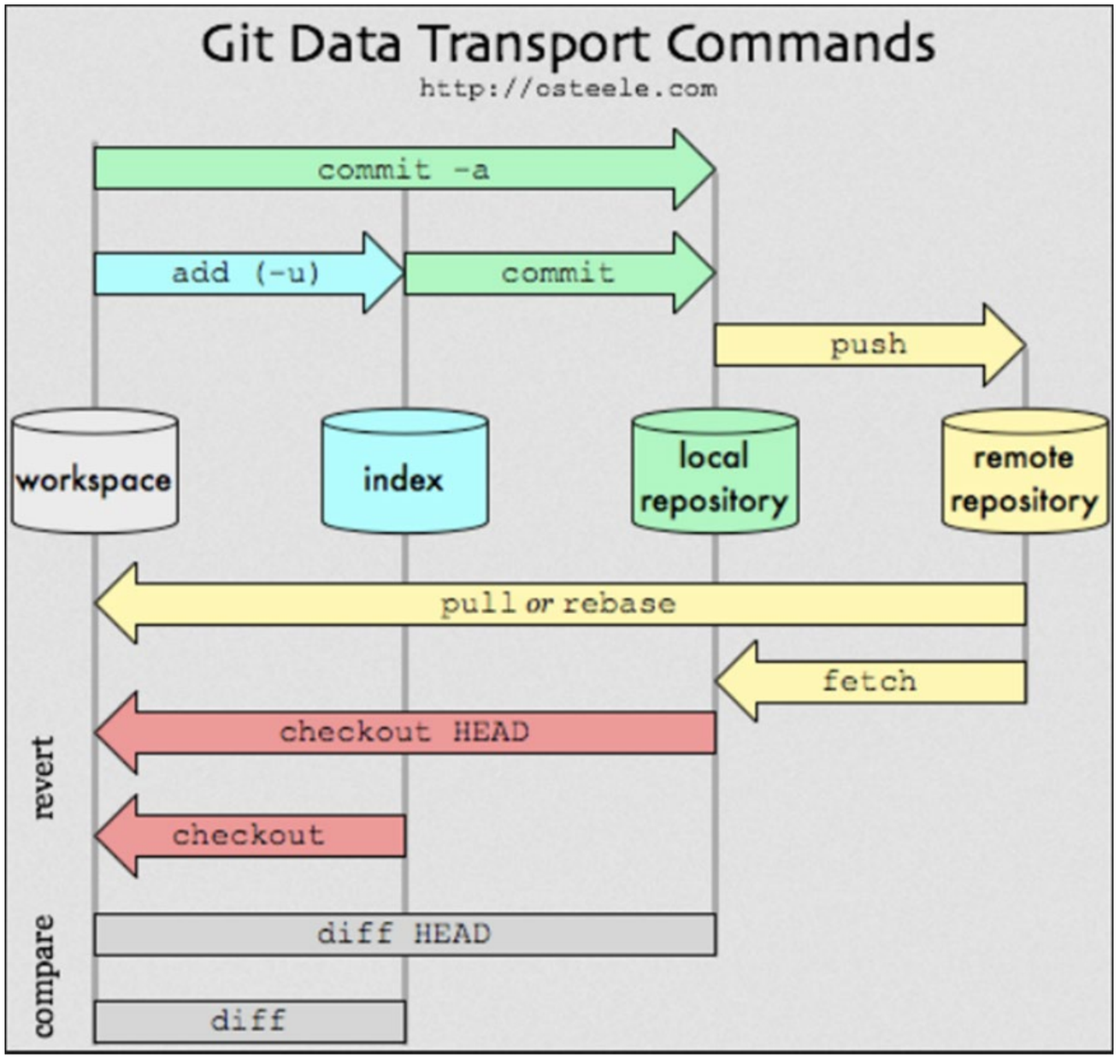
- Version control tools help us manage changes to code and documents, save copies of work, and collaborate with others, sharing/merging code
- Git is a standard and popular Version Control Tool
  - "Git is a free and open source distributed version control system designed to handle everything from small to very large projects with speed and efficiency."
  - There are extensive training documents and videos [1]
  - Also there's an excellent online book, Pro Git [2]
- Git allows you to store code in local repositories (or repos) on your computer
- It's most often operated from a command line – in Git for Windows, this is called Git Bash – but you can find GUI tools for it as well, and it is often integrated into IDEs
  - Generally recommended to learn Git at the command line

Git – Setting Up

- You can install a version of Git for your environment (Mac, Windows, Linux), including GUI clients [3]
  - Git is pre-installed on some OS distributions (like Raspbian)
- You will need to set your user name and e-mail in your Git instance
- Go to the Git Bash shell (or a Linux terminal prompt)
  - git config --global user.name “Your Name”
  - git config --global user.email “YourEmail@Example.com”
  - git config --list to see changes

GitHub

- GitHub is a web-based Git repository tool
  - Users can push/pull local repositories to web-based repositories
  - Provides a homepage for and backup of web-based repositories
- To set up a free GitHub account, go to GitHub site [5]
- Use the same e-mail used when setting up Git
- Explore the GitHub site, and edit your profile information

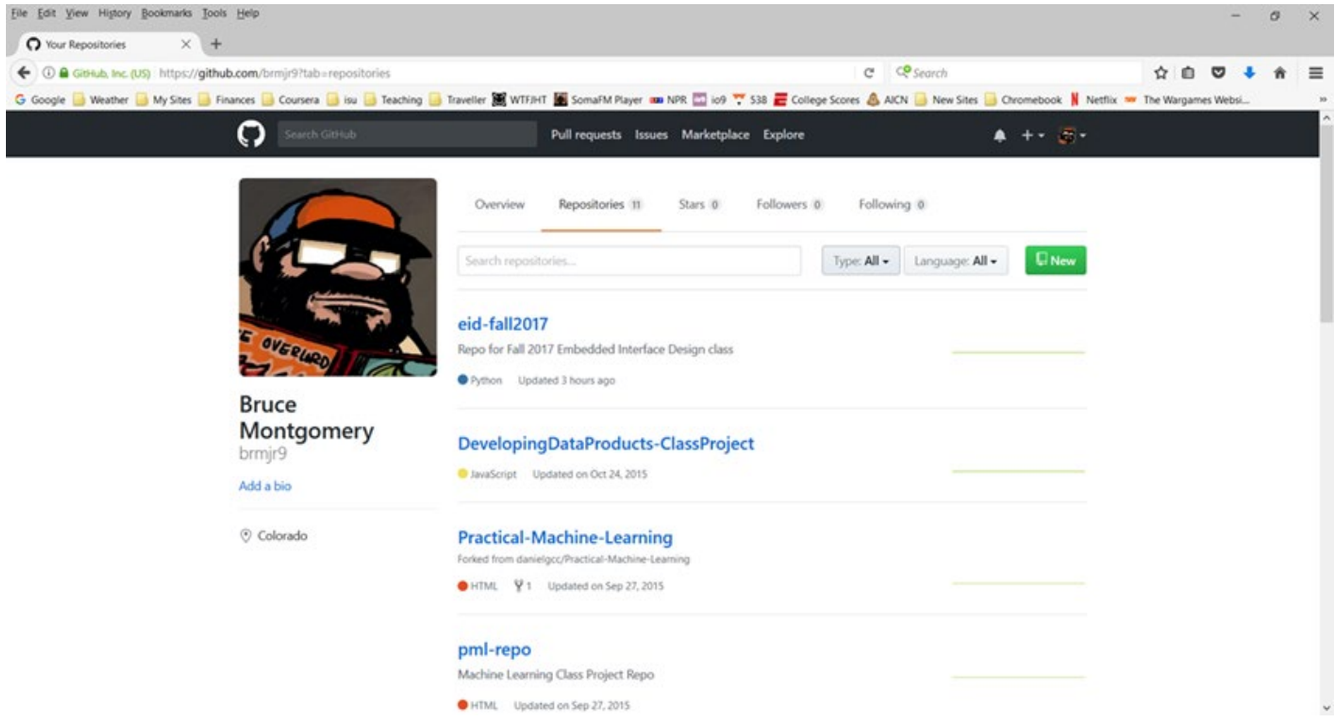


Nice Git Command Summary [4]

Basic Git/GitHub Change Flow

- git add
  - adds your working area or workspace files to your local index
- git commit
  - adds them to your local repo
- git push
  - pushes or sends your local repo to your remote repo (GitHub, GitLab, etc.)
- git pull
  - pulls or reads from your remote repo to your local repo for working on files

- See the Git documentation or the Pro Git book online for step by step examples



Public vs. Private Repositories, GitHub Features

- Public repositories (repos) can be seen by anyone with a GitHub account
- Private repositories can only be seen by designated collaborators
- You can have a mix of Public and Private repos in your GitHub site
- Private repositories are limited to 3 collaborators without paying support
- You can add bug reporting, feature requests, and other issue templates to your repositories
- See Settings menu in GitHub for more information

Basic Git/GitHub Repo Creation

- Assume URL in Github is https://github.com/myname/my-repo.git for these examples
- Create a New Repo
  - GitHub: Create a New Repo
  - In your Git Bash or Linux Terminal
    - mkdir ~/my-repo
    - cd ~/my-repo
    - git init (to initialize the repo)
    - git remote add origin https://github.com/myname/my-repo.git (point your local repo to the web repo)
- Forking (copying) someone's repo
- Press Fork button in their repo on GitHub
  - In your Git Bash or Linux Terminal
    - git clone https://github.com/myname/my-repo.git

Git Stash?

- If you have some work you…
  - Want to come back to later, but you don't want to commit
  - Want to switch to another task and save work without a commit
  - Don't want to change to another branch because of edit conflicts
- Stash lets you store work in progress without doing a commit
- Any work in progress that is not committed is saved and the staging area and working directory are cleared of changes

Git Stash Commands

- git stash – saves changes from working directory in your stash
- git stash list – shows what's in your stash
- git stash apply A – gets item A, leaves it in stash
- git stash drop A – deletes item A from stash
- git stash pop A – gets the item A, removes from stash
- git stash pop – gets last item you worked on
- git stash clear – clears out the stash

What is a Git Branch?

- A separate track of history, allowing you to work on different tasks/tickets/ideas simultaneously w/ out overlap
- A branch is like a fresh copy of all your files
  - Experimentation
  - Stability
  - Collaborate with others
  - Diverging codebases or bucketing versions
  - Supports deployment workflows
  - They are cheap!
- Rule of thumb: If you're starting something new, do it in a branch

Git Branch, Merge, Diff, and Log

- git branch A – creates a branch called A
- git checkout A – moves you to the branch A (the HEAD pointer will point to A)
- git commit – will now commit to A
- git branch –a – lists the branches
- git log A..B – what commits are in B but not in A branches
- git diff A..B – the difference between A and B
- git diff A...B – changes that would be merged into master if you merged B
- git merge B – merges branch B into the branch you're on
- git log --oneline --decorate --graph --all – will show history as a graph with all commits and branches

Visualizing Git – http://pcottle.github.io/learnGitBranching
Great way to practice these operations

Collaborating on GitHub

- Many possible processes, here's a particularly good walkthrough [8]
  - Create a new repo on GitHub
  - Connect local git repos to remote GitHub repo
  - Push any initial files to GitHub repo
  - Add collaborators on GitHub
  - Collaborators will clone (not fork) the project to local working copies
  - Try to keep the master branch clean and deployable
  - Individuals work on code in their own branches, committing changes as needed
  - All collaborators push to Github and create pull requests
  - One person gets selected to merge (the "merger")
  - Working with the team, the merger reviews the pull requests and decides whether they are ready to merge
  - Once merged, branches can be deleted

Markdown files

- Markdown files are text files with a simple set of formatting commands
- They are often used to create README or similar documentation files that accompany a set of code saved in version control
- There is a basic set of formatting syntax for adding headings, lists, bold/italics, code blocks, links, and images
- There is extended syntax (used on GitHub and elsewhere), that adds tables, footnotes, strikethrough, and more

- Markdown was created in 2004 by John Gruber, with a goal that the syntax would not prevent reading a text file that had not been rendered [6]

Markdown example [7]

The quarterly results look great!

- Revenue was off the chart.
- Profits were higher than ever.

> *Everything* is going according to **plan**

The quarterly results look great!

- Revenue was off the chart.
- Profits were higher than ever.

Everything is going according to ***plan***

Git and Related Resource Links

- Markdown Cheat Sheets/Editor
  - https://www.markdownguide.org/cheat-sheet/
  - https://guides.github.com/pdfs/markdown-cheatsheet-online.pdf
  - Online Markdown Editor – https://dillinger.io/
- Git Cheat Sheets
  - https://github.github.com/training-kit/downloads/github-git-cheat-sheet.pdf
  - https://www.atlassian.com/git/tutorials/atlassian-git-cheatsheet
- Git/GitHub Materials
  - Pro Git 2 Book – https://git-scm.com/book/en/v2
  - Visualizing Git – http://pcottle.github.io/learnGitBranching
  - The Git Parable – http://bit.ly/1isB3K4
- Merge Tools
  - https://www.sublimerge.com/ or https://www.scootersoftware.com/

Free GitHub pro account

- One of your fellow students pointed me at the GitHub student developer pack, which looks like a great tool set
- Remove the limits of a free Git account (unlimited free public and private repositories)
- Also access to many other important/useful development tools

- HIghly recommend this if you haven't seen it before:
- https://education.github.com/pack

Next Steps

- Piazza, Canvas, Get The Book!
- Practice with Git if you need it
- Get project 1 going (is your team together?)
- Go online and post your graduate project topic, get going on the topic paper (is your graduate team together?)
- Class staff is available to help

References

[1] https://git-scm.com/doc

[2] https://git-scm.com/book/en/v2

[3] https://www.git-scm.com/downloads

[4] https://blog.osteele.com/2008/05/my-git-workflow/

[5] https://github.com/

[6] https://www.markdownguide.org/getting-started/

[7] https://www.markdownguide.org/basic-syntax

[8] https://medium.com/@jonathanmines/the-ultimate-github-collaboration-guide-df816e98fb67