Computer Systems Organization Recitation
CSCI-UA 0201-007

R01: Introduction & Environment Setup

Many slides are based on John Westhoff's Fall 2019 CSO recitation

Logistics

Important things you should know

What is this recitation for?

- Help you better understand the course contents, including but not limited to:
    - Reinforce this week's lecture content
    - Review previous week's assessment
    - Some exercises meant to help with the labs/assessments
- Make us all suffer by making us get up early

Where we release course materials

- Course website
  - https://nyu-cso.github.io/
  - Recitation slides also on the course schedule page
- NYU Brightspace
  - Zoom recitation links/recording
- CampusWire
  - It's your responsibility to read Instructor's Note on Campuswire
  - You are encouraged to ask questions on Campuswire
- GitHub
  - All labs are released on GitHub
  - You will submit all labs on both GitHub and Gradescope
- Gradescope
  - Weekly mini-quiz on Gradescope

How to contact us

- Don't be afraid to ask questions!

- If you have general questions about course contents or labs
  - Ask on Campuswire
  - Come to office hours
  - Register the in-person recitation

  If you want more personal question answering

- If you want to send us a private message
  - Email cso-staff mailing list at cso-staff@cs.nyu.edu

Getting Started

Important things you must do

Today's Topics

- Setting up your git repositories

- Basic Unix commands

- Program development
  - Editor (Nano)
  - Version control (Git)

Basic Commands

- Some useful commands to know:
  - man
  - ls, cd, pwd, mkdir
  - cp, mv, rm
  - echo, cat
  - wc
  - grep
  - ctrl-c,ctrl-d, ctrl-z, fg, bg
  - |, >, <, >>
  - apt install/search
  - history, ctrl-r

Basic Commands

- Whenever you want to find out how to do something using command line, ask Google first

- Here are some useful links:
  - A one-pager: https://nyu-cso.github.io/labs/linux_cheat_sheet.pdf
  - A more descriptive source: https://github.com/jlevy/the-art-of-command-line

Editor

- You need a good editor to code with for productivity
- Popular editors used by programmers:
  - vim
  - emacs
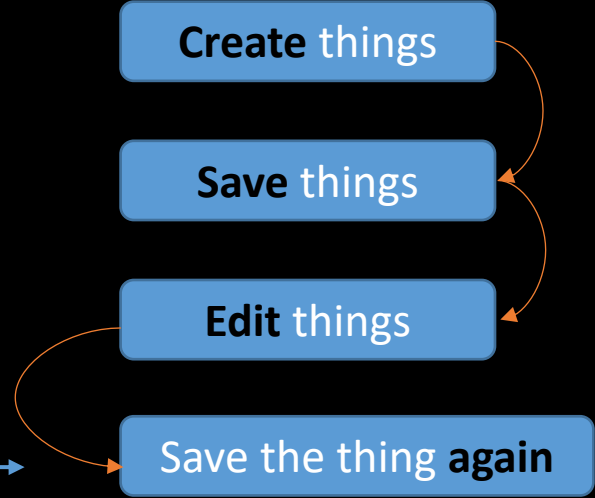 - vscode
  - sublime
  - nano

Brief Intro of Nano Editor


```
GNU nano 2.0.6            New Buffer

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Text^T To Spell
```

- To create/edit a file
  - nano <Path to (Save) the File>
  - Edit
  - Hit Ctrl+O to save your changes (^ means Ctrl)
  - Hit Ctrl+X to exit

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Setup GitHub/lab1 repo

- Create a GitHub account if you don't have one

- We have created for you a corresponding private lab repository on Github.com

- Enroll yourself in the GitHub classroom
  - Create your lab-1 repository by following the link posted on Campuswire
    - Select your NYU NetID
      - Very important!
    - Don't select someone else's NetID!

- If you cannot find your NetID, let me know!

- Setup GitHub **ssh-based logins:** https://nyu-cso.github.io/labs/#repo

Git Overview

- Distributed version control system
- What is version control?
  - Manages *changes* to documents, source files and other collections of information
- Why is version control indispensable?
  - History tracking: track code changes
  - Roll back to older version
  - Collaborate with others (*collaborative history tracking*)
- We are going to use the popular "Git" as our version control system

Create things

Save things

Edit things

Save the thing again
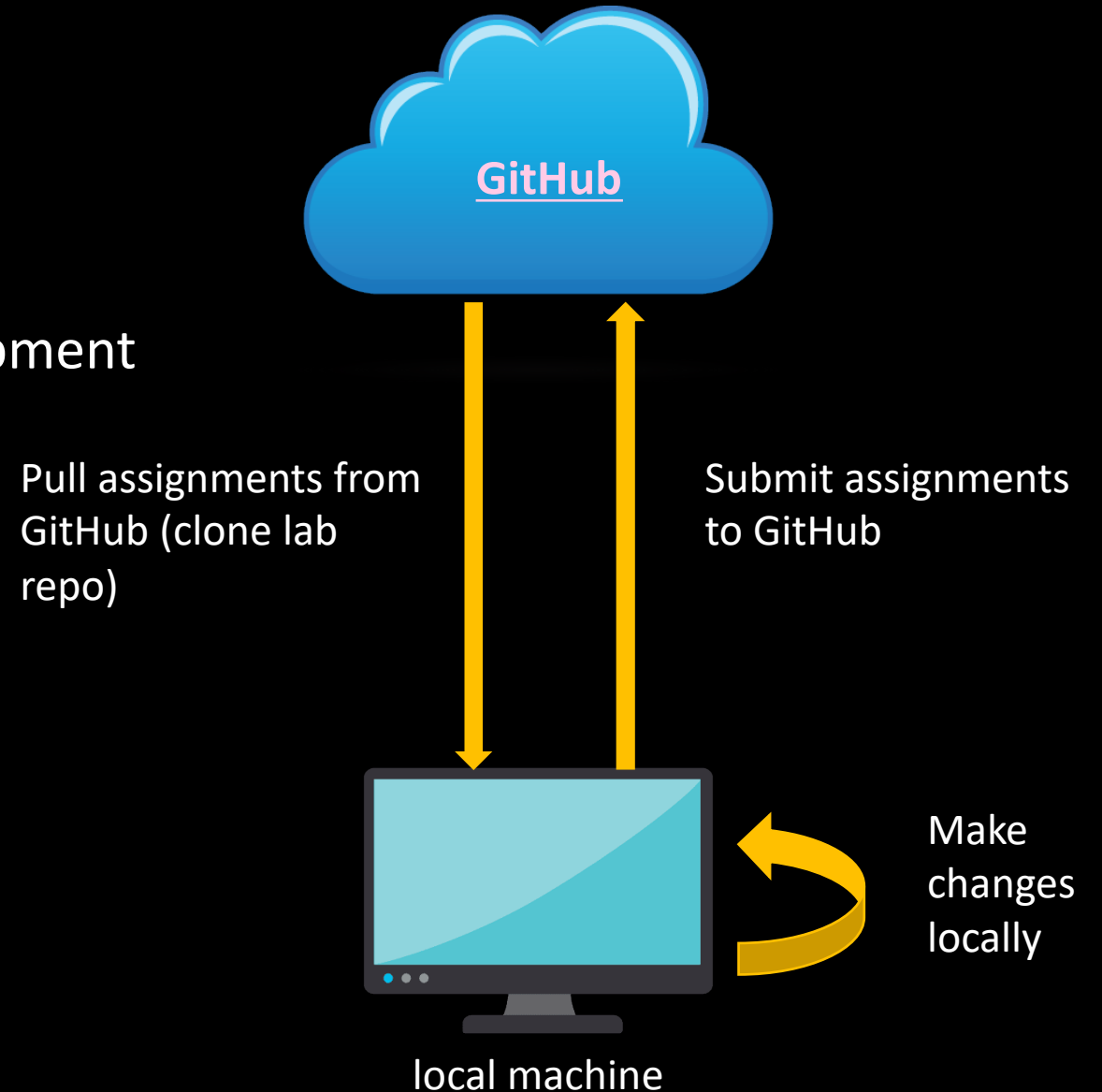
You need to config git first!

- git config --global user.email "<Your Email>"
- git config --global user.name "<Your Name>"
- You can issue "git config --list" to check your configuration
- Here, the <Your Email> should be the one associated with your GitHub account

A list of git commands you need

- git clone
- git status
- git remote
- git add <file name>
- git commit -m <commit messages>
- git push origin master
- git pull upstream master

Git Overview

- GitHub:
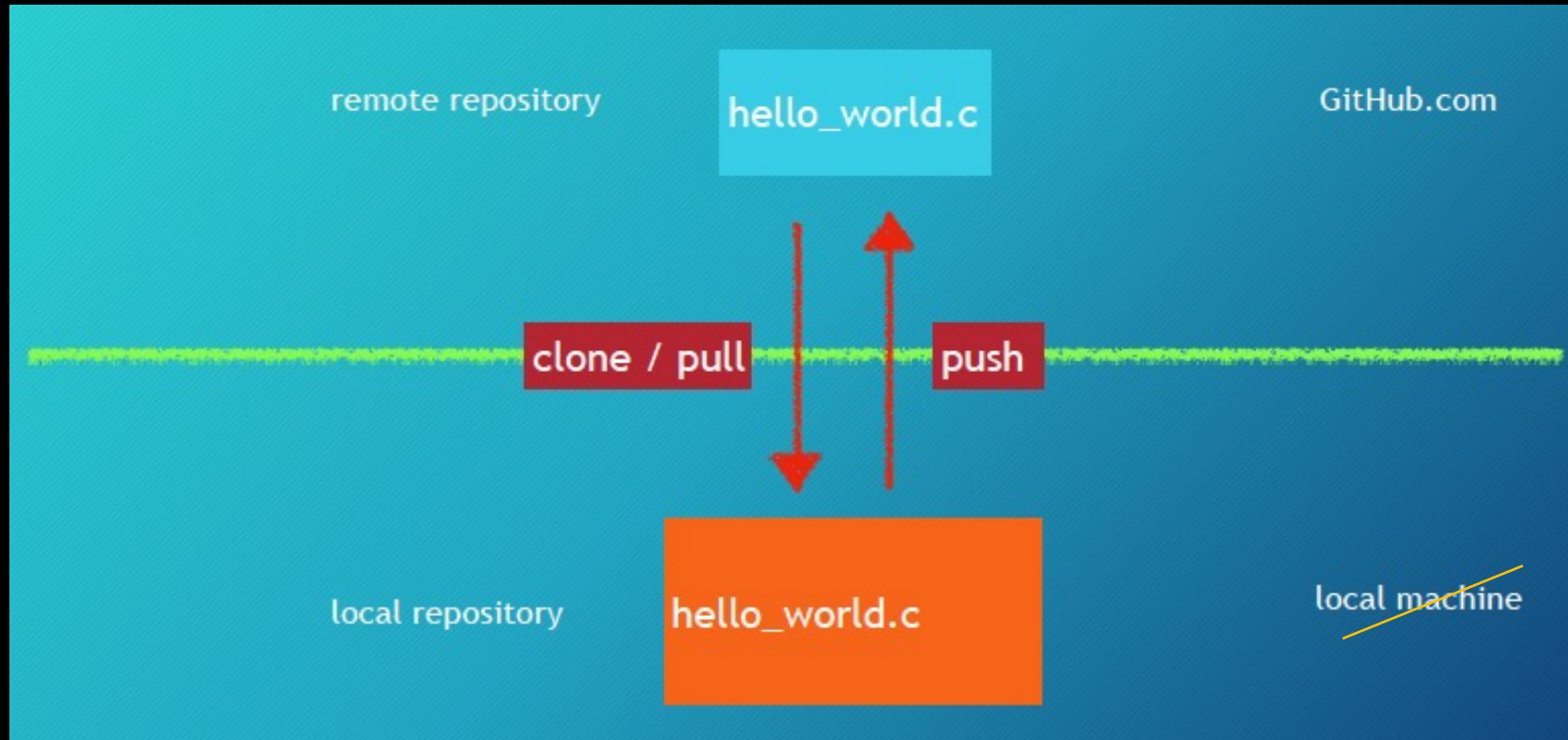 - provides hosting for software development and version control using Git.

GitHub

Pull assignments from GitHub (clone lab repo)

Submit assignments to GitHub

Make changes locally

local machine

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Clone your lab repo

- In command line, type:
  - mkdir cso-labs
  - cd cso-labs
  - git clone git@github.com:nyu-cso-sp26/clab-part1-<Your Github Username>.git clab-part1
    - If you copy the above command to command line, don't let the line break
    - Replace <Your GitHub Username> (including the angle brackets) with your GitHub username.
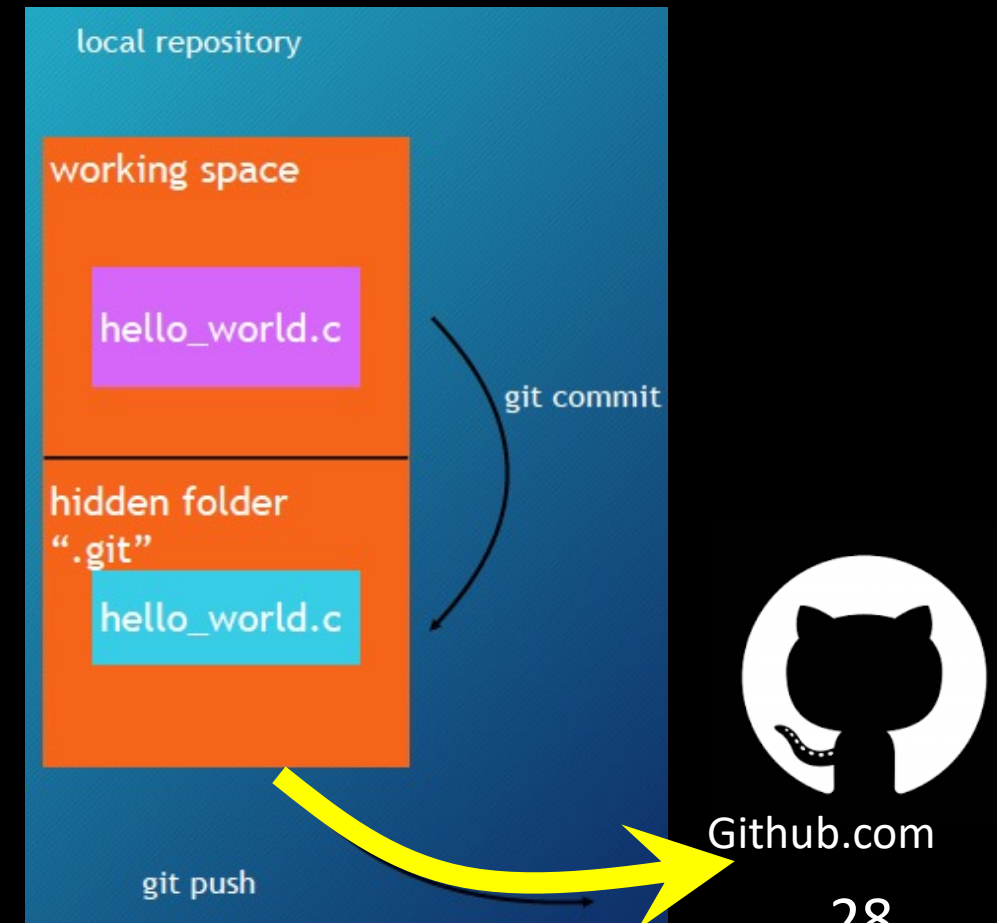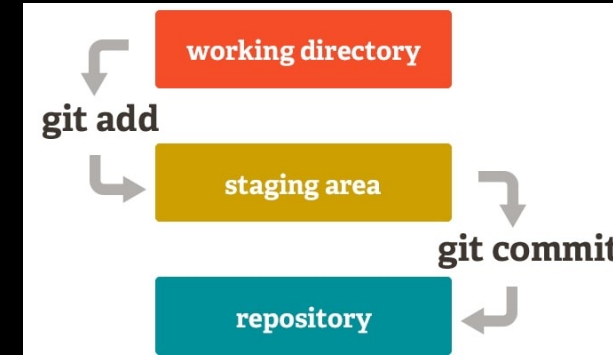 - cd clab-part1

Git Setup

The remote copy is stored in some efficient format

How to interact with Git

- git add hello_world.c
  - Tell git to track changes to hello_world.c

- git commit
  - Store tracked file to .git

- git push origin master
  - Submit commits to your remote repository

Github.com

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Git commit

- When you issue "git commit", you are required to provide a message which is a short description of the changes you made
- Use "-m"/"--message" option to specify that
- E.g.: git commit -m "my first commit"
- Warning: please remember to add "-m"/"--message"
- If you unfortunately forget:
  - a command line editor will pop up for you to edit the commit message
  - By default, vim, which is not really friendly to beginners (see the short guide in the end)

Double check with "git status"

- Sometimes, you might forget to do some (or all) of
  - git add, git commit, git push
- It's always good to check the status of your repository
- git status tells you
  - What files are going to commit
  - What files are not tracked
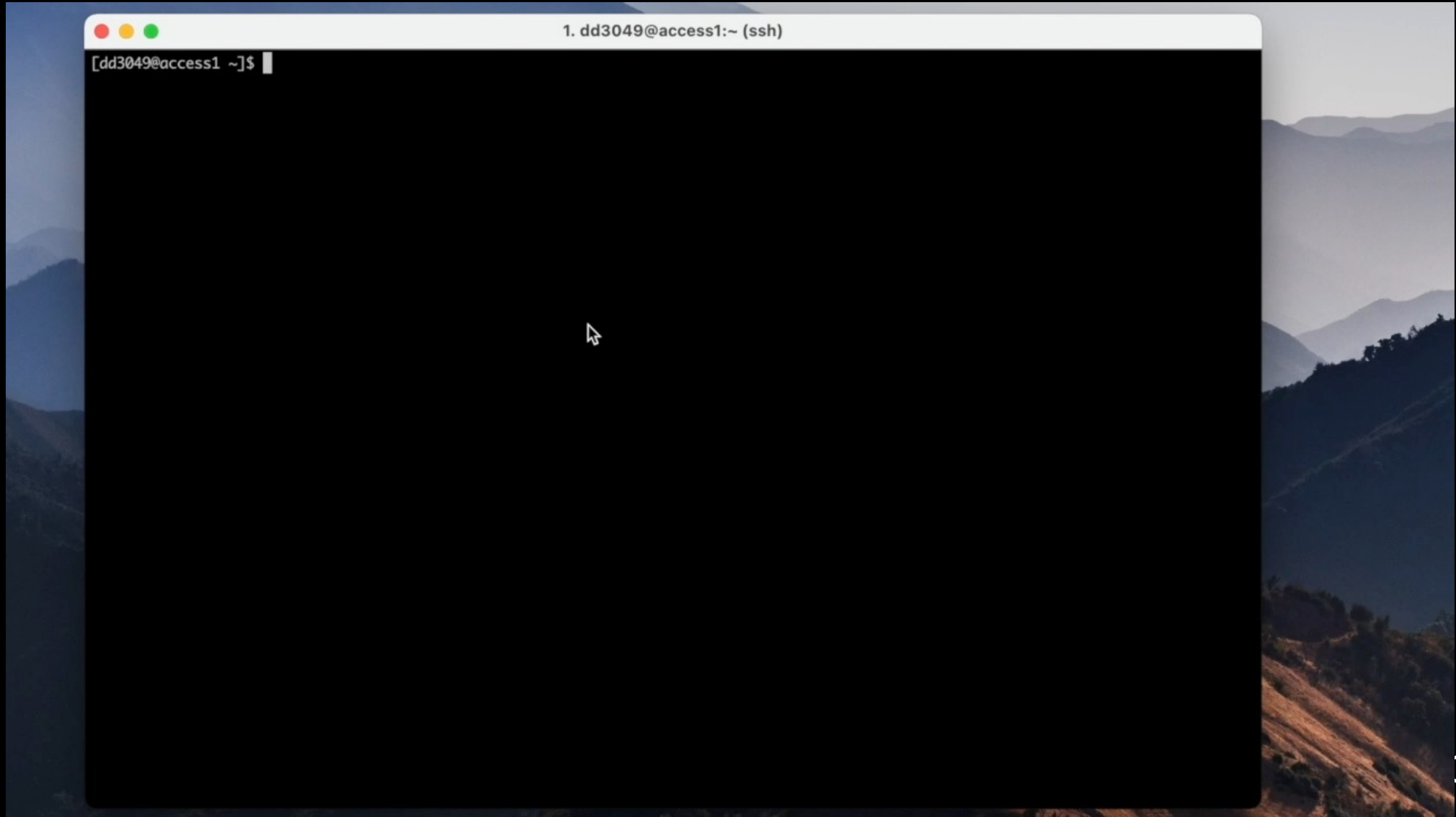 - Whether you forget to push commits to remote

Triple check with GitHub

- Still not sure/confident about whether commits was submitted properly?

- Go to github.com, then go to your repo

- Manually check if every file contains the up-to-date information

For each new assignment

- Create lab repo on GitHub (click link, select yourself) (covered)
- Clone your lab repo to your local machine (docker)
  - cd cso-labs
  - git clone git@github.com:nyu-cso-sp26/clab-part1-<YourGithubUsername>.git clab-part1
- Make changes accordingly
  - Tell git to track changes: git add <Changed/Newly-Created Filenames>
- Commit your changes
  - git commit -m "commit messages"
- Push to your remote repository (on GitHub)
  - git push origin master

Git push commit demo

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All the git commands you need for CSO

- For beginners, it's super easy to mess up Git
  - Notably conflicts, typically seen for collaboration, but not for individual usage
- To avoid conflicts, only clone the repo once for each lab
- After setting lab repository, you ONLY need to use the following git commands:
  - git add filenames
  - git commit -m "commit message"
  - git push origin master
  - git clone your-lab-repo lab
  - git status

Warning: unless you know what you are doing, do not use any other git commands or git command flags

Ask the staff for help

- If you really cannot fix conflicts or other git problems, you should ask course staff for help
  - You need to email the staff or attend office hours
  - You should start your lab earlier
- Don't randomly issue commands to further mess things up

Things you should NEVER do

- Don't use git add *, git add .
  - Instead, you should always specify the file names you want to commit
  - Please don't add complied programs to git

- Don't modify any file using GitHub website
  - Instead, you should always make changes on your local machine and then push commits to GitHub
  - Otherwise, there will be conflicts, which will lead to sadness

Git is much powerful than that

- Our git introduction only covers a small part of Git
- Git tutorial:
  - https://www.atlassian.com/git/tutorials/what-is-versioncontrol
  - https://try.github.io/levels/1/challenges/1

How to commit with Vim Editor (Optional)

• The default editor is called Vim

```
# Please enter the commit message for your changes. Lines starting
# with '#' will be ignored, and an empty message aborts the commit.
# On branch master
# Changes to be committed:
#   (use "git reset HEAD <file>..." to unstage)
#
#       modified:   array.c
#
~
~
~
~
```

• To add a commit message from vim
  • First hit Esc (make sure you're in Normal mode)
  • Then hit "i" (entering Insert mode)
  • Then type in some commit message
  • Hit Esc (exiting Insert mode, going back to Normal mode)
  • Then type in ":wq" and press Enter (exit vim)
• If you are lost, hit Esc and start from the beginning