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HONG KONG BAPTIST UNIVERSITY

COMP7940 Cloud Computing

Course Introduction and Git Tutorial

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Assessment Scheme

😄 Good news, no midterm.

- Continuous Assessment (40%)
  - Two individual programming assignments (6% + 12%)
  - One group project with presentation (size <= 3)
- Examination (60%)
  - Covers all topics of the course.
  - Exam date: TBA

Academic Honesty

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- Do not copy any assessment from others
- Do not upload your assessment to any public repository online
- Do not send your assessment to your friends
- Do you copy any work from other website without properly citation.
- If you have doubt, consult your instructor for explicit clarification.

Penalty for Plagiarism

http://ar.hkbu.edu.hk/curr/avoid_plagiarism/

http://ar.hkbu.edu.hk/file/22

What is Cloud computing?

Decide which should be considered as Cloud.

A very rough definition about Cloud

SERVICE

NIST definitions on Cloud

- On-demand self-service
- Broad network access
- Resource pooling
- Rapid elasticity
- Measured service

Learning outcomes

This course introduces the techniques underlying the design and engineering of **distributed systems** and **cloud computing systems**. Topics include distributed system models, computer clusters, virtualization, data centers, cloud computing models, cloud-enabling technologies, cloud mechanisms, and cloud architectures. Students will also acquire **hands-on experience** in cloud computing software.

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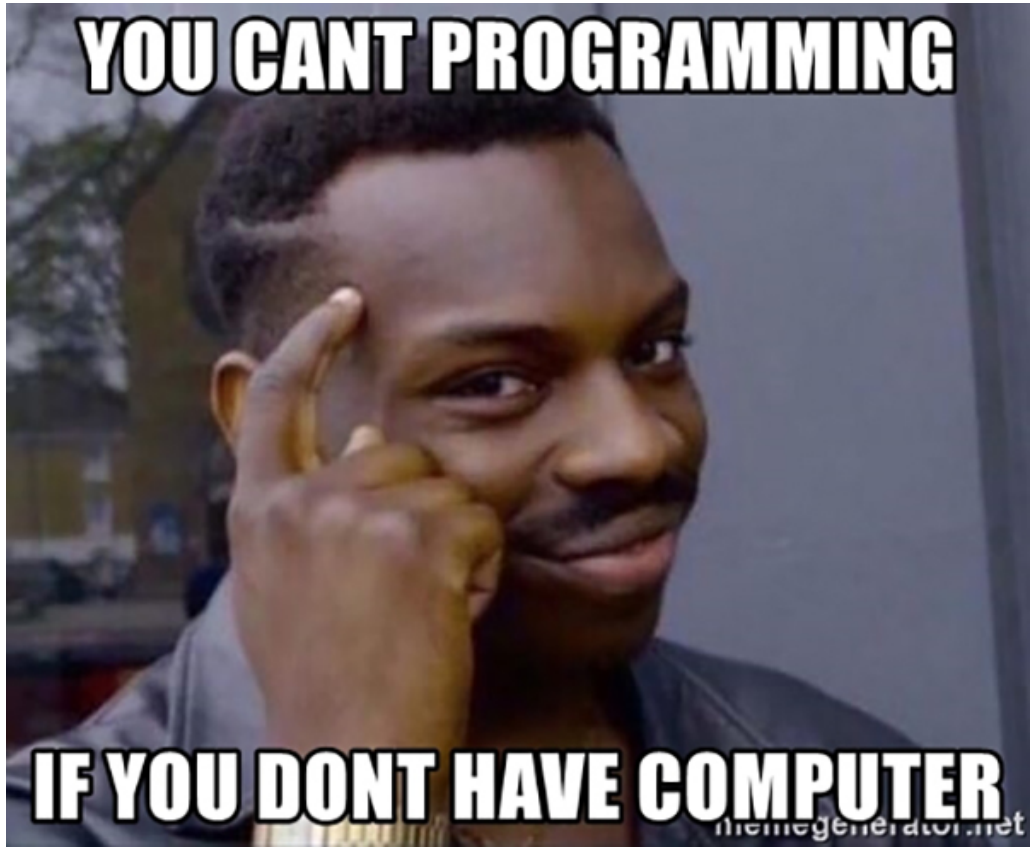
Project - A line Chatbot

Am I right to this course?

- Assumption of programming background: none
- Assumption of time required: a lot, if you have almost zero experience.
- You can tell in the interview:
  - Experience in deploying apps on cloud
  - Experience of using NoSQL database
  - Experience of using GitHub



Software to Install

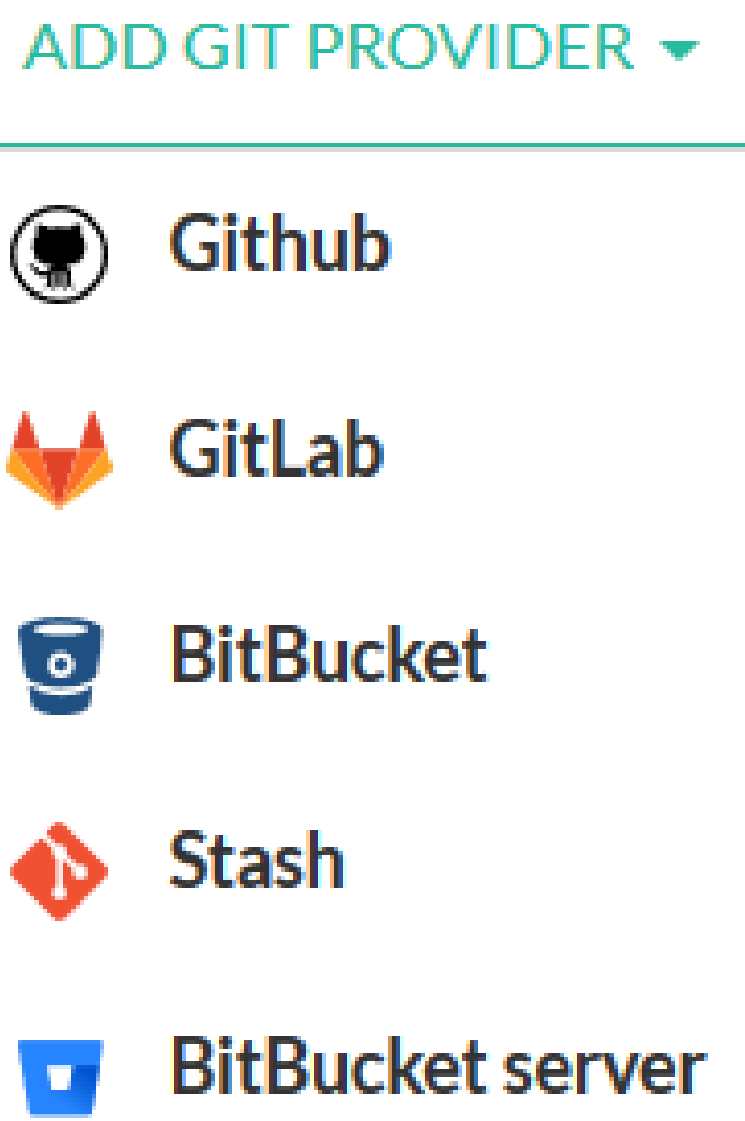
- Python 3 (3.6 or above)
- A Git client (git command line + a GUI)
- An IDE (e.g. VS Code)
- Plus some other software that will be told in the assignments

Git

What is Git?

Git is a software that does version control (like apple Time Machine). It can be executed offline. It can also be synchronized with a Git service provider.

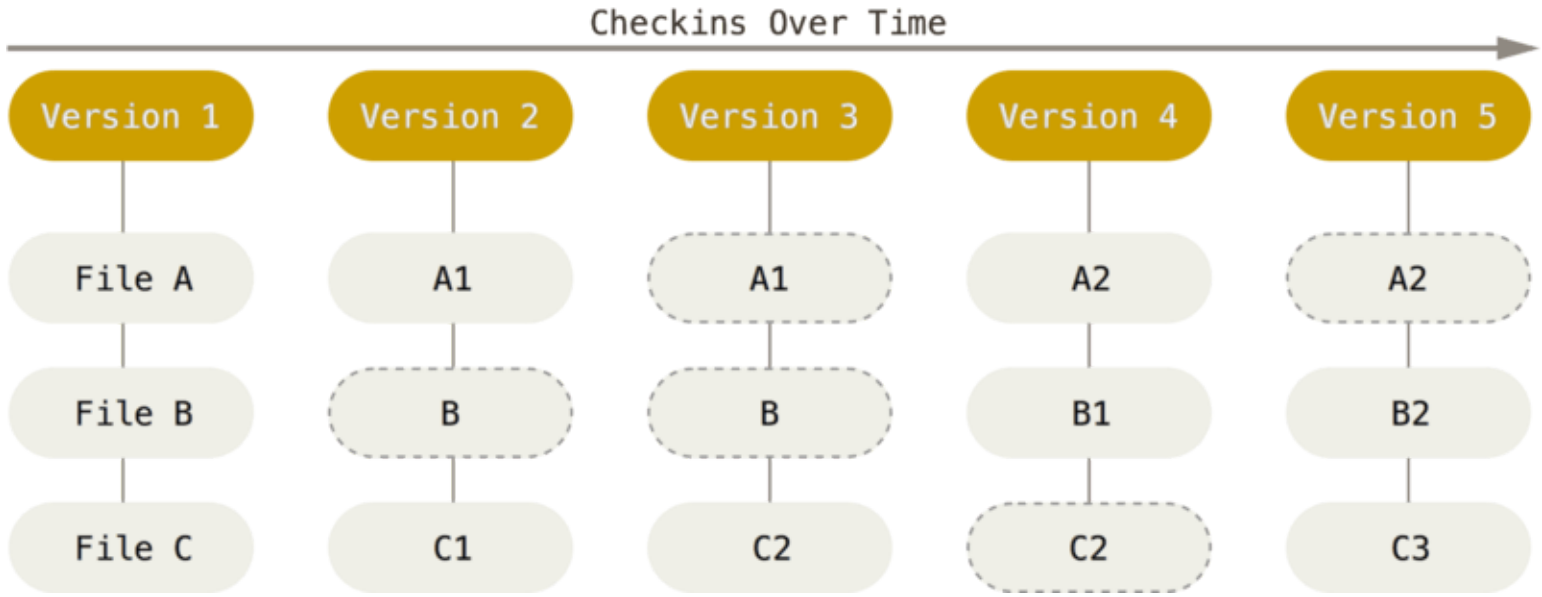
Git ≠ GitHub



A Git System

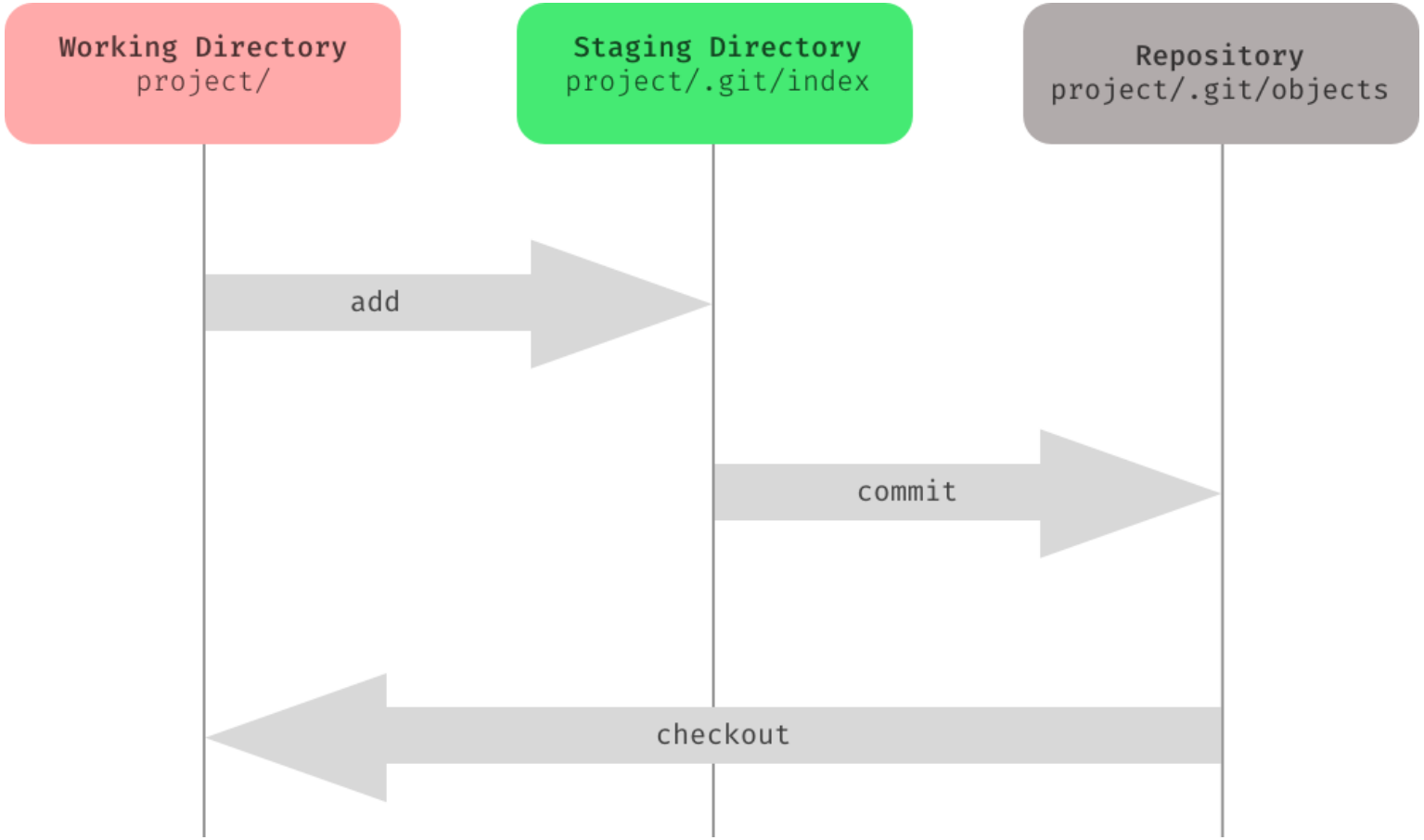
- Each **commit** is a snapshot of file systems.
- Unchanged files will not be duplicated.

https://git-scm.com/



The three trees on Git

https://hackernoon.com/understanding-git-index-4821a0765cf

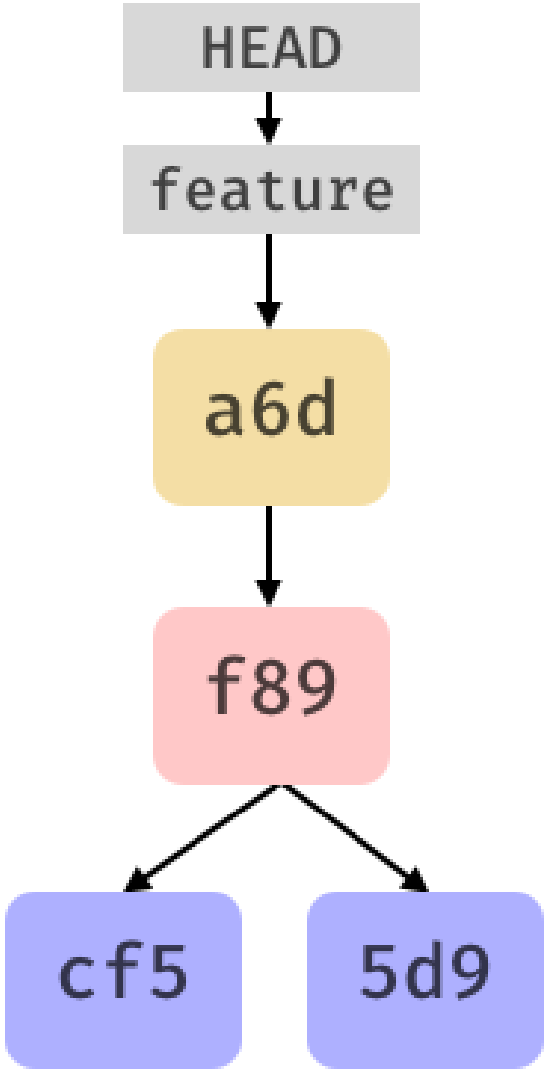


Life Cycle of Git Version Control

0. Init a repo or Clone a repo
    - `init` : create a repo from nothing
    - `checkout` : download a new from existing source.
1. Stage File
    - `add` a file to let git track it.
2. Commit Changes
    - `commit` all changes to build a snapshot in the repo.

Repository
project/.git/objects

Your original repo stores.

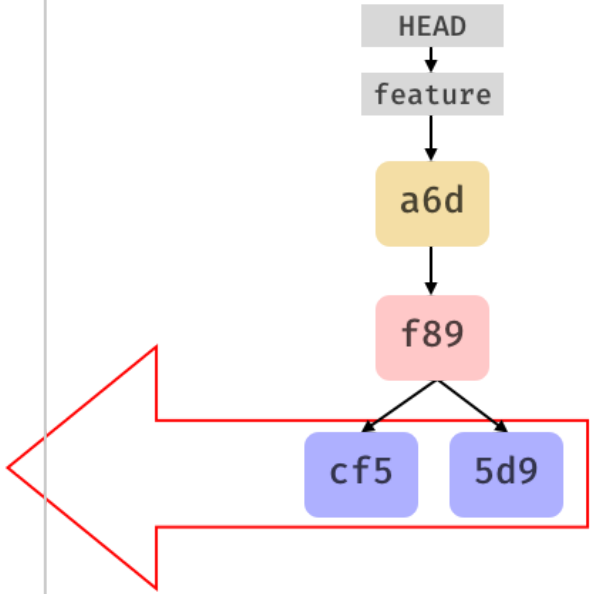


checkout - step 1.1

Index
project/.git/index

mtime	file	wdir	stage	repo
1:20	index.php	5d9	5d9	5d9
1:20	README.md	cf5	cf5	cf5

Repository
project/.git/objects



checkout - step 1.2

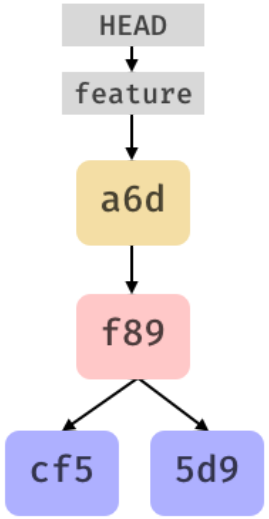
Working Directory
project/

1:20	index.php
1:20	README.md

Index
project/.git/index

mtime	file	wdir	stage	repo
1:20	index.php	5d9	5d9	5d9
1:20	README.md	cf5	cf5	cf5

Repository
project/.git/objects



edit index.php

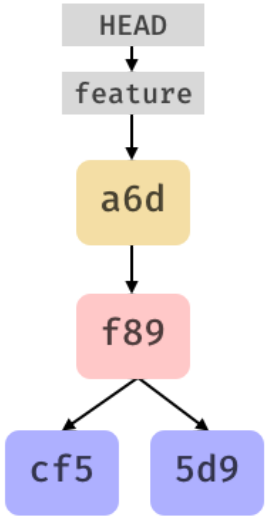
Working Directory
project/

1:21	index.php
1:20	README.md

Index
project/.git/index

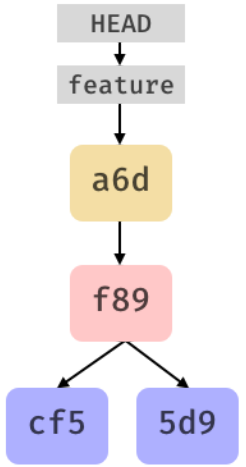
mtime	file	wdir	stage	repo
1:20	index.php	5d9	5d9	5d9
1:20	README.md	cf5	cf5	cf5

Repository
project/.git/objects



`git status` (update the index)

Working Directory project/		Index project/.git/index				Repository project/.git/objects
		mtime	file	wdir	stage	repo
1:21	index.php	1:21	index.php	9f5	5d9	5d9
1:20	README.md	1:20	README.md	cf5	cf5	cf5




```
On branch feature
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)
modified:   index.php
no changes added to commit (use "git add" and/or "git commit -a")
```

git add index.php

Working Directory
project/

1:21	index.php
1:20	README.md

Index
project/.git/index

mtime	file	wdir	stage	repo
1:21	index.php	9f5	9f5	5d9
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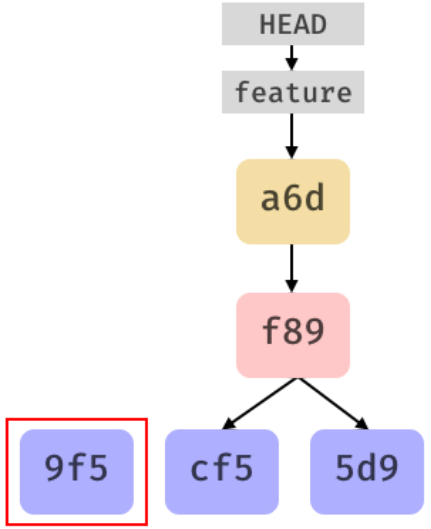
Repository
project/.git/objects



Working Directory project/		Index project/.git/index				Repository project/.git/objects
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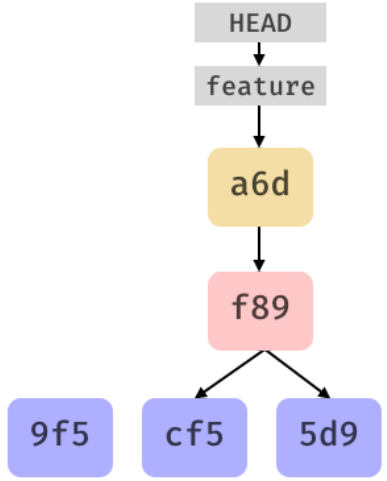



```
On branch feature
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)
modified:   index.php
```

`index.php` is now staged. Ready to be committed.

git commit -am "Message"

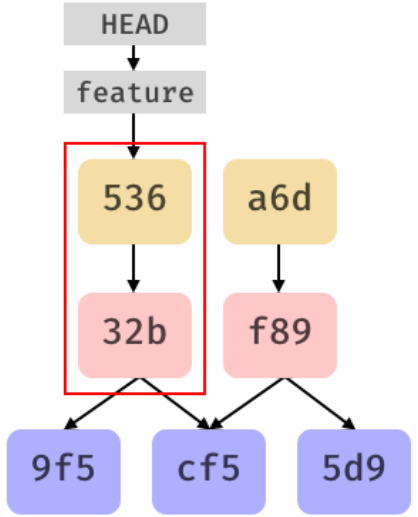
Working Directory
project/

1:21	index.php
1:20	README.md

Index
project/.git/index

mtime	file	wdir	stage	repo
1:21	index.php	9f5	9f5	9f5
1:20	README.md	cf5	cf5	cf5

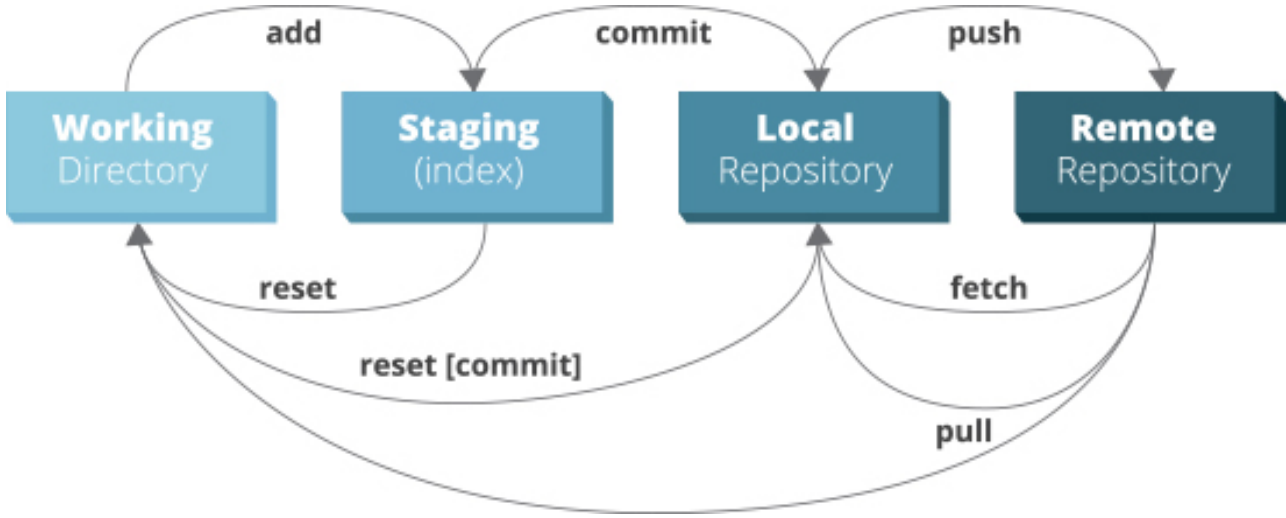
Repository
project/.git/objects



The fourth - remote repo

A remote repository is a service that allow you and your teammate to synchronize your code online.

- Push: to upload code to remote repo
- Fetch/Pull: to download code from remote repo



View your remote repo

```
git remote -v

heroku  https://git.heroku.com/aqueou.git (fetch)
heroku  https://git.heroku.com/aqueou.git (push)
origin  https://github.com/khwang0/COMP3111 (fetch)
origin  https://github.com/khwang0/COMP3111 (push)
```

`origin` is the default remote repo.

Add a remote repo

```
git remote add my_repo https://whatever.com/eg.git
```

```
git remote -v

heroku  https://git.heroku.com/aqueou.git (fetch)
heroku  https://git.heroku.com/aqueou.git (push)
my_repo https://whatever.com/eg.git (fetch)
my_repo https://whatever.com/eg.git (push)
origin  https://github.com/khwang0/COMP3111 (fetch)
origin  https://github.com/khwang0/COMP3111 (push)
```

To remove a repo: `git remote remove my_repo`

A typical workflow

sit down > pull > code and test > pull-commit-push > lunch

- The first pull to update your code with your teammates.
- The second pull is to make sure no one has updated the code before your commit.

`git pull` - To download

```
git pull origin master
```

- `origin` is the remote repo name
- `master` is the branch name

`git push` - To upload

```
git push origin master
```

or

```
git push origin master:branchX
```

push your local branch `master` to remote repo `origin`'s branch `branchX`

History

https://stackoverflow.com/questions/3639342/whats-the-difference-between-git-reset-and-git-checkout

View your history

```
git log

commit 58b1ca14651ad88889d6adf1601528b5f5d893cb
Merge: d8b0018 0f8b162
Author: Kevin Wang <kevinw@comp.hkbu.edu.hk>
Date:   Wed Nov 15 15:34:57 2017 +0800

    Merge pull request #24 from victorkwan/master

    Adds solutions for Lab 6

commit 0f8b1629362bbfc211029ec12cf473c4f22ff291
Merge: 2bc16e3 d8b0018
Author: Kevin Wang <kevinw@comp.hkbu.edu.hk>
Date:   Wed Nov 15 15:34:45 2017 +0800

    Merge branch 'master' into master
```

Navigate

Both `git checkout` and `git reset` do similar thing.
`git checkout` can be less harmful.

```
git checkout 0f8b1629362bbfc211029ec12cf473c4f22ff291
```

or just

```
git checkout 0f8b1
```

or go back one version

```
git checkout HEAD~1
```

If you do a `git checkout`

> Note: checking out 'd8b0'.
> You are in 'detached HEAD' state. You can look around, make experimental changes and commit them, and you can discard any commits you make in this state without impacting any branches by performing another checkout.

A `git branch` gives

```
* (HEAD detached at d8b0018)
  lab3
  master
```

Going back to the latest commit

```
git checkout master
```

or the commit hash directly

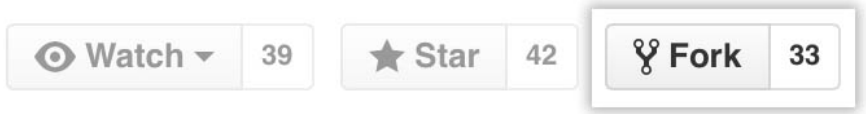
A particular file

```
git show d8b0018:README.md
```

or revert to previous version

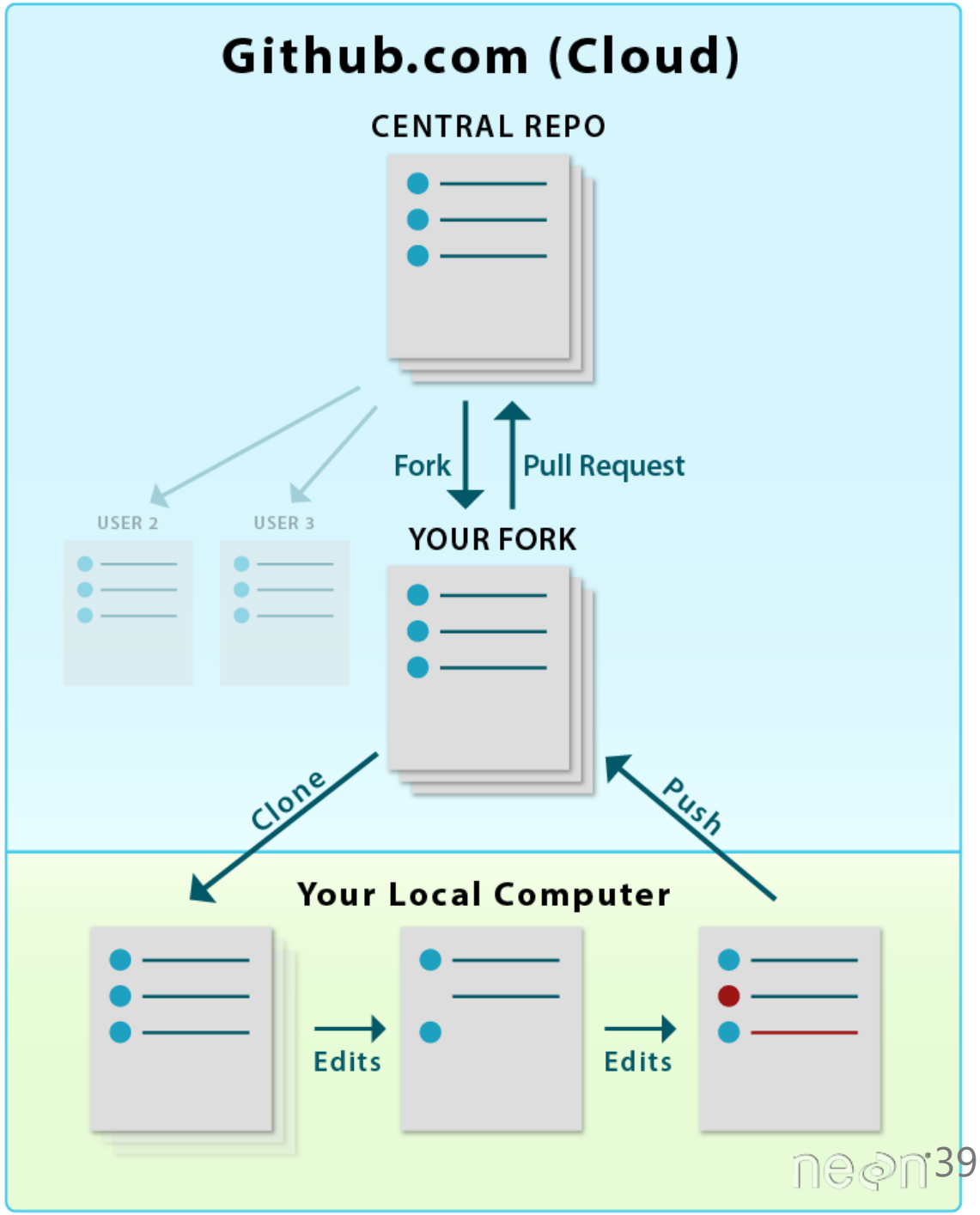
```
git checkout HEAD~1 README.md
```

Fork a project



Sometimes you want to work on a open source project more that just downloading it.

Fork our project today!



Very important Topic but less useful for us

- Branching
- Merging
- Pull Request

What are you expected to do (related git)..

- Fork the project
- Clone it to your local machine
- Commit your code regularly
- Push to GitHub for version control
- Push to Heroku for deployment

Hope you just don't do this, everyday.

Ungraded Exercise

- Apply a GitHub student account.
- Create a remote repo call `cloud-computing` on GitHub.
- Clone the repo to your local hard-disk
- Add the lecture note, commit it, and push it to the remote repo.