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What to Expect

- Knowledge about Version Control System
- Be familiar using CLI
- Have good practice of using GIT
- Collaborate with others using GIT
- Working with remote repository
- Explore of Github

Agenda

Day 1

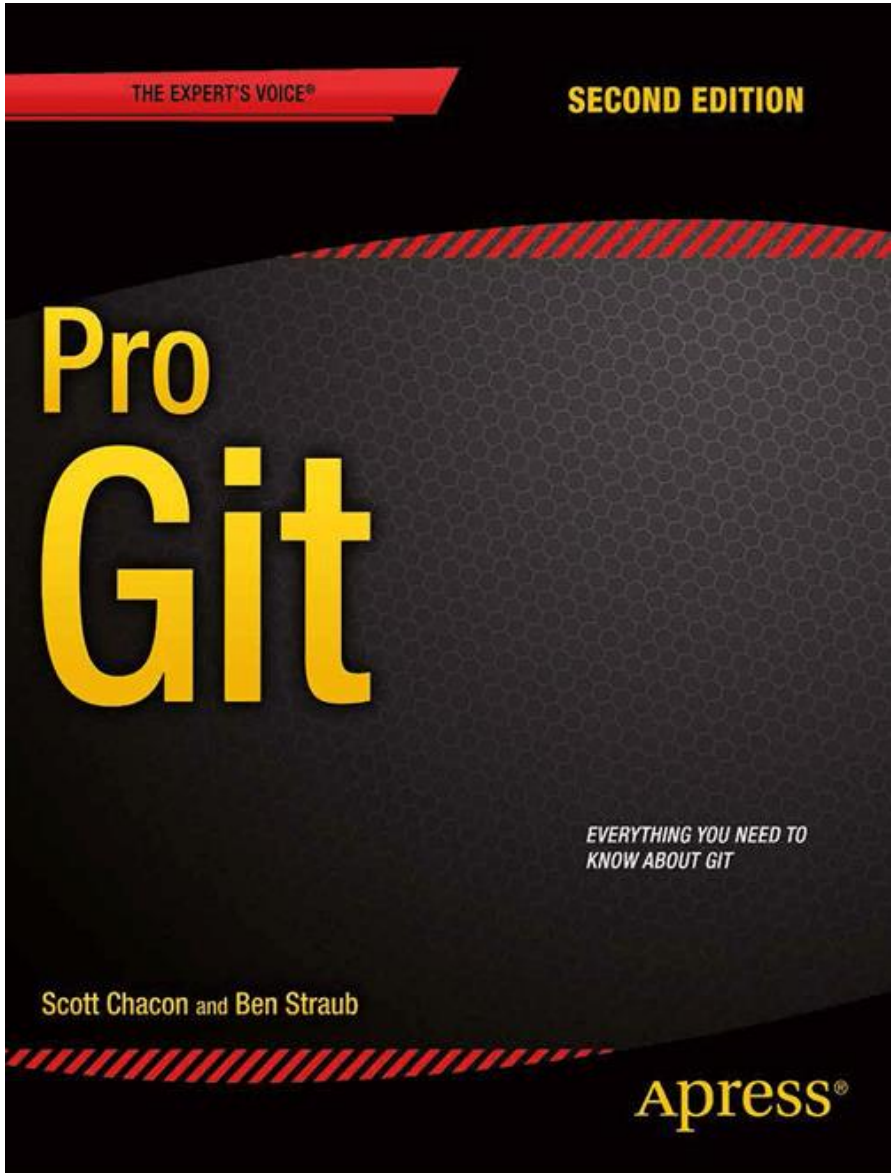
- 09:15 – 09:30: Introduction
- 09:30 – 10:30 : Version Control System (Types – git – how it works)
- 10:30 – 10:50: Break
- 10:50 – 12:30: Dealing with Command line environment

Agenda

Day 2

- 09:15 – 10:30: Git core functionalities
- 10:30 – 10:50: Break
- 10:50 – 11:30: Working with remote (github)
- 11:30 – 12:15: Teamwork
- 12:15 – 12:30: Closing remarks

Reading recommendation & resources



Available online: link

Git: Version Control System (VCS)

- Record changes to directory, files, code
- Essential tool when collaborating with others
- Good-practice to use even without working with others
- Git is the most used VCS
- Created by Linus Torvaldes
- Git is a free and open-source software
- It is simply a file inside your directory

Other VCS

- Apache Subversion (svn)
- Mercurial
- Perforce Helix Core
- Monotone
- Others

Discussion

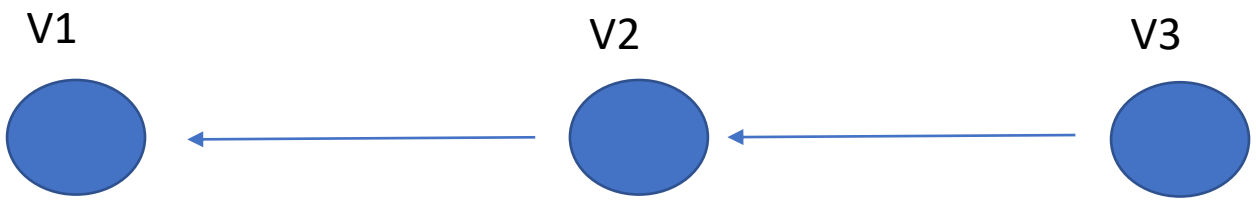
- What are the pros and cons of using a version control system?

VCS Approaches

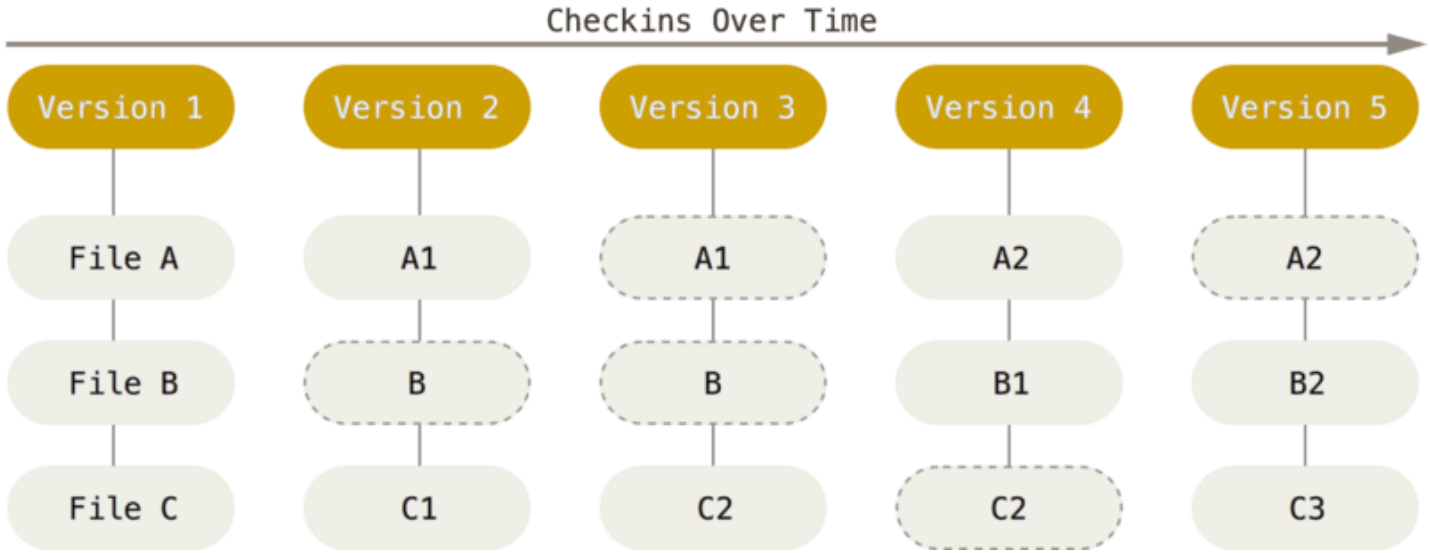
- Basic: make copies of folder with time stamps
- Manually edit changes from others into your code
- Ends up with final copy or version to use

VCS Approaches

- Take a linear snapshots of the tree history



Git: Snapshots of changes

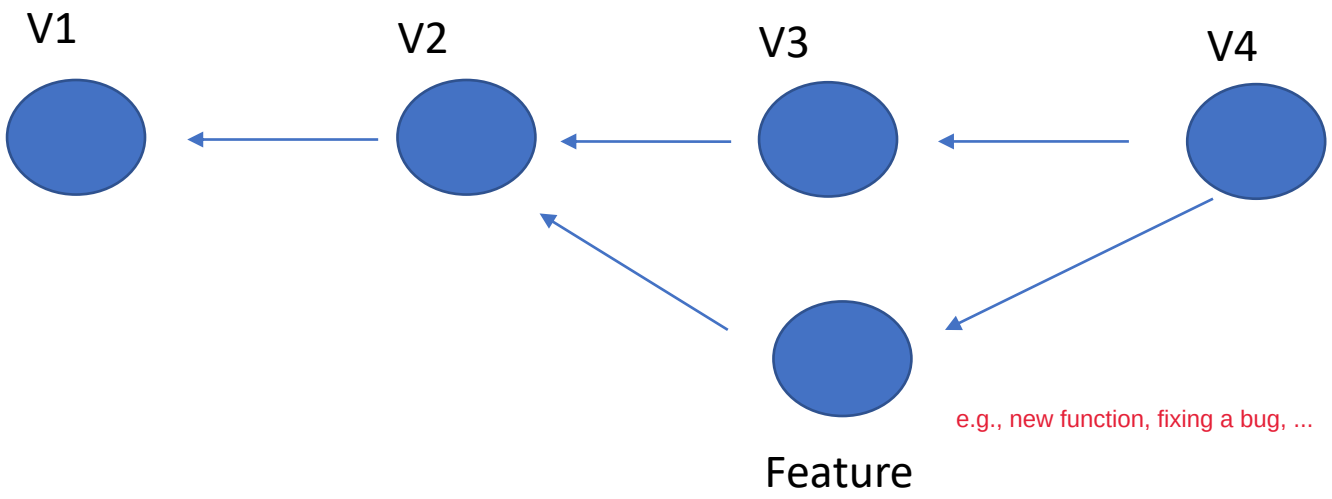


doesnt update files that hadnt any changes

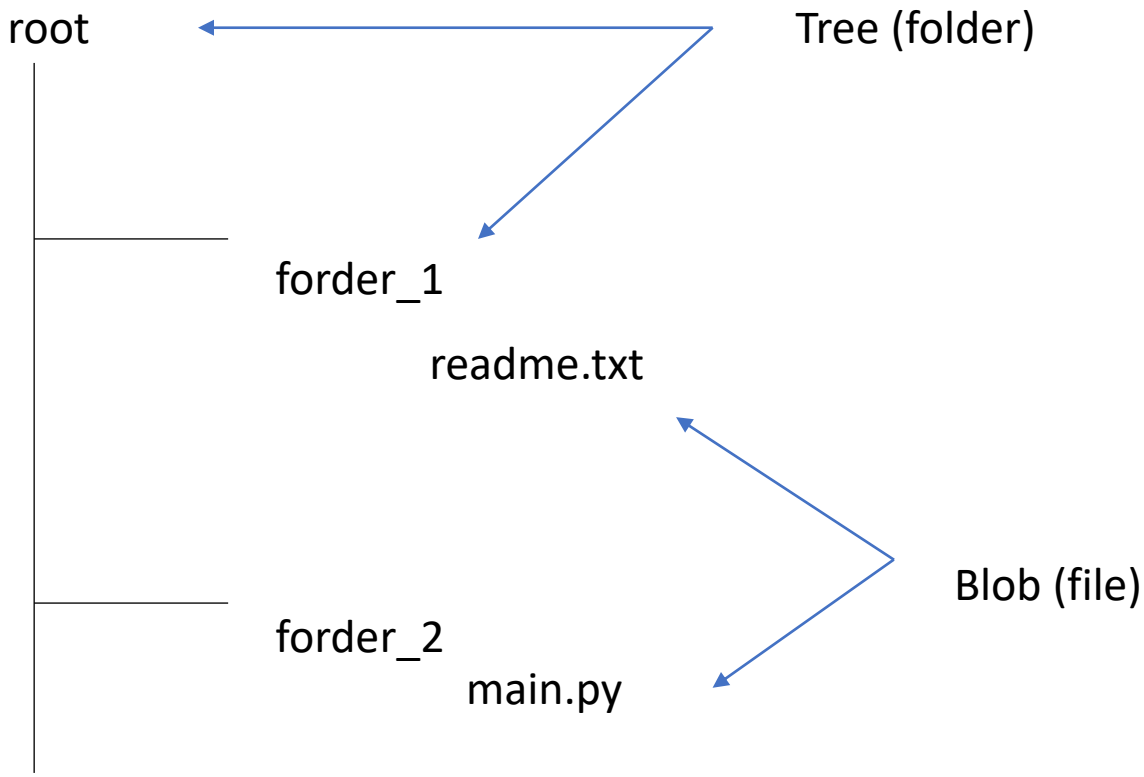
Credit: Pro Git book, Git Documentation

VCS Approaches

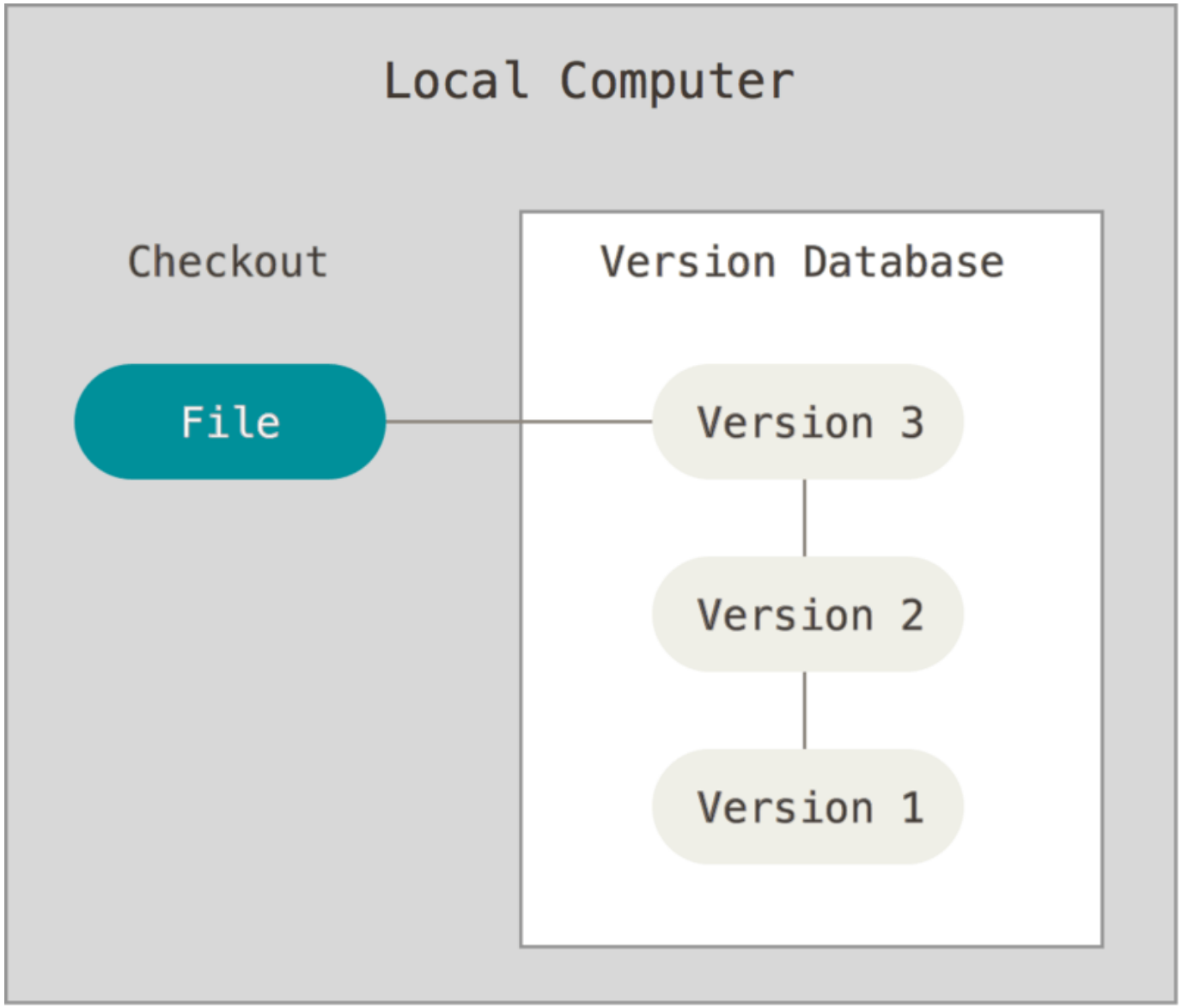
- Git: Directed acyclic graph history



Directory structure

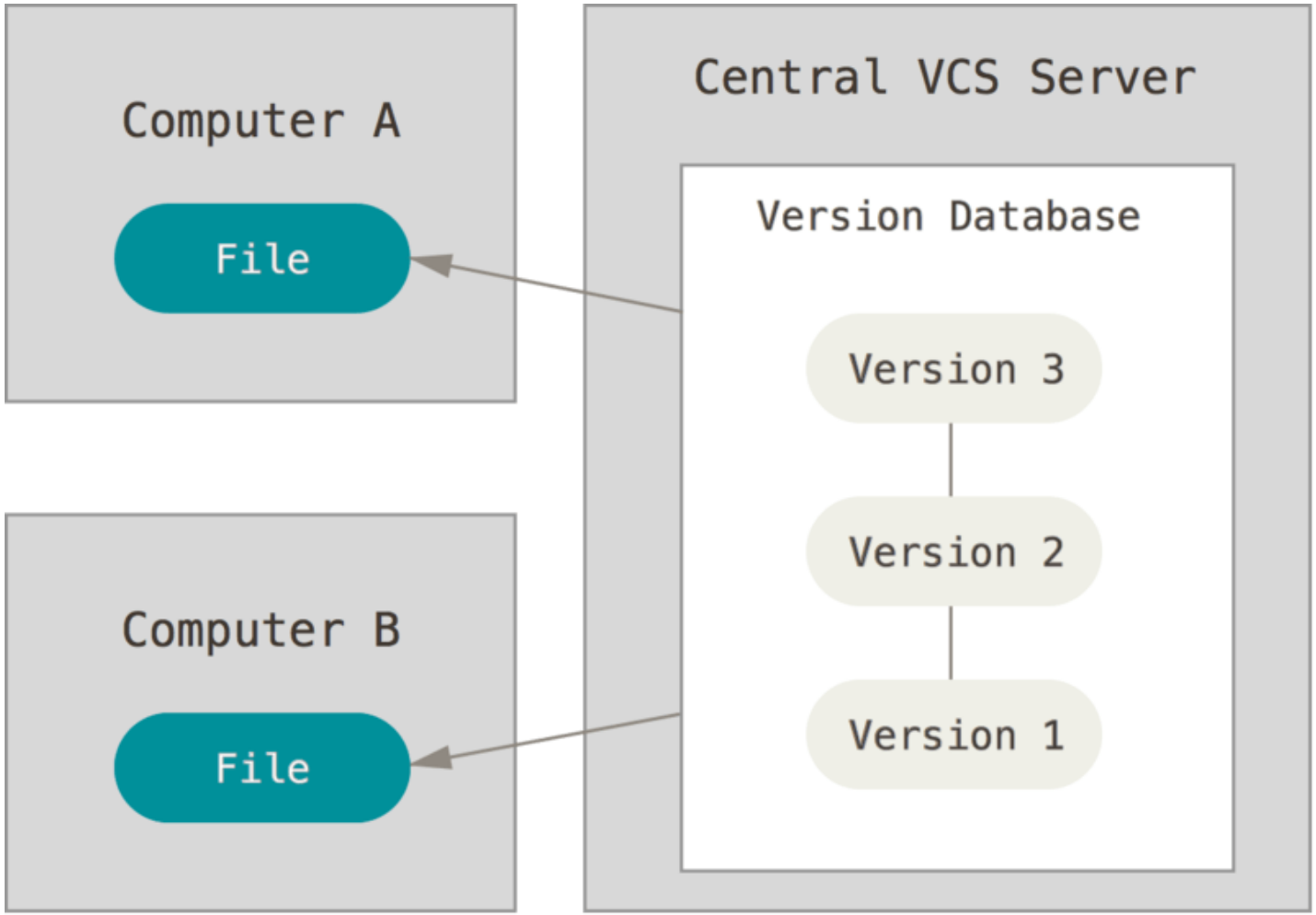


Local VCS



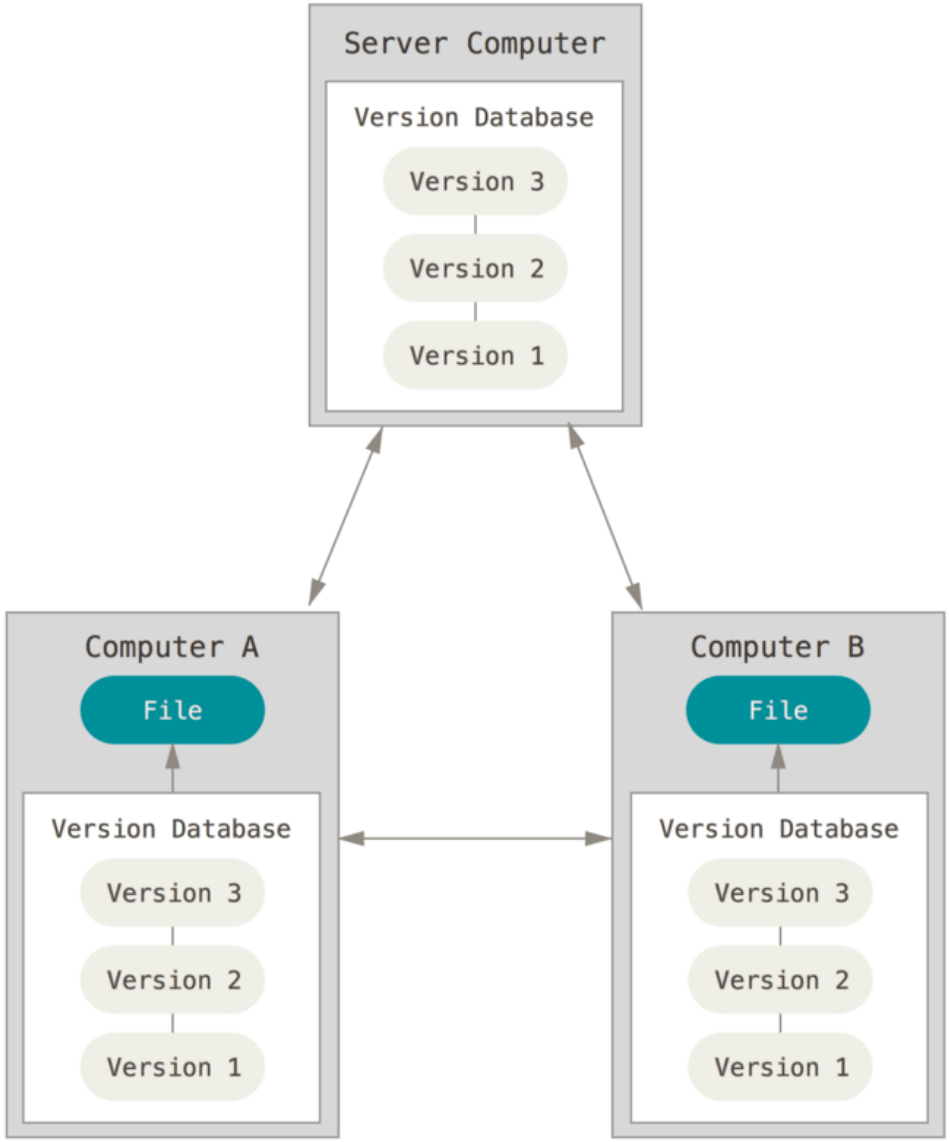
Credit: Pro Git book, Git Documentation

Centralized VCS



Credit: Pro Git book, Git Documentation

Distributed VCS



server version is always mirrored --> everybody has a clone of the project

Credit: Pro Git book, Git Documentation

The Command Line with Git

Why the command line?

1- Can run **all** git commands and functionalities

2- If you can use git in command line, you will probably know how to use it in GUIs and not vice-versa

Useful commands

- pwd: Print working directory
- cd: Change directory (cd /mnt/c/users/example/desktop)
- Cd .. : One level up
- ls: «List» It lists the content of directory
- ls -h: list the content of directory in human readable format
- ls -a: list all files and directory (includes hidden)
- cat example_file: see the content of a file
- mkdir dir_name: create a new directory in your working path
- man command: gives the documentation of a command
- command --help: also displays information about certain command
- Check the cheat sheet for similar commands on Windows terminal

manual
doesnt work on git bash

Useful commands: Tasks

- List the files of a directory & sort them by size
- Find the usage of –r flag in rm and use it
- Use head or tail commands to display certain number of lines (5 or 7 or any number)

Git: Getting started

- Check the following link to download on your OS: https://git-scm.com/downloads
- Debian / Ubuntu: sudo apt-get install git

```
ahmad9090@LAPTOP-RTERJCFR:~$ sudo apt-get install git
[sudo] password for ahmad9090:
Reading package lists... Done
Building dependency tree
Reading state information... Done
git is already the newest version (1:2.37.1-0ppa1~ubuntu20.04.1).
The following packages were automatically installed and are no longer required:
  libfwupdplugin1 libllvm11
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
ahmad9090@LAPTOP-RTERJCFR:~$
```

- Check if installation went well: # git --version

```
ahmad9090@LAPTOP-RTERJCFR:~$ git --version
git version 2.37.1
ahmad9090@LAPTOP-RTERJCFR:~$
```

Git: Getting started

Set up account username, email & password

1- Username

```
# git config --global user.name “Example user”
```

2- Email

```
# git config --global user.email
“example.user@email.com”
```

3- Password

```
# git config --global user.password “some password”
```

Git: Getting Help

- # git help command

  Example: git help config

- Shorter help page: # git command –h

  Example: # git config –h

Find the command to display all your global configurations.

Git: Create a repository

There are two ways to obtain a git repository:

1- Turn a local directory into a repository
2- clone a git repository from somewhere else

Git Create a repository

Create a local repository:

- Change your path into the directory where you want to create a repository

```
# cd /home/user/my_project
```

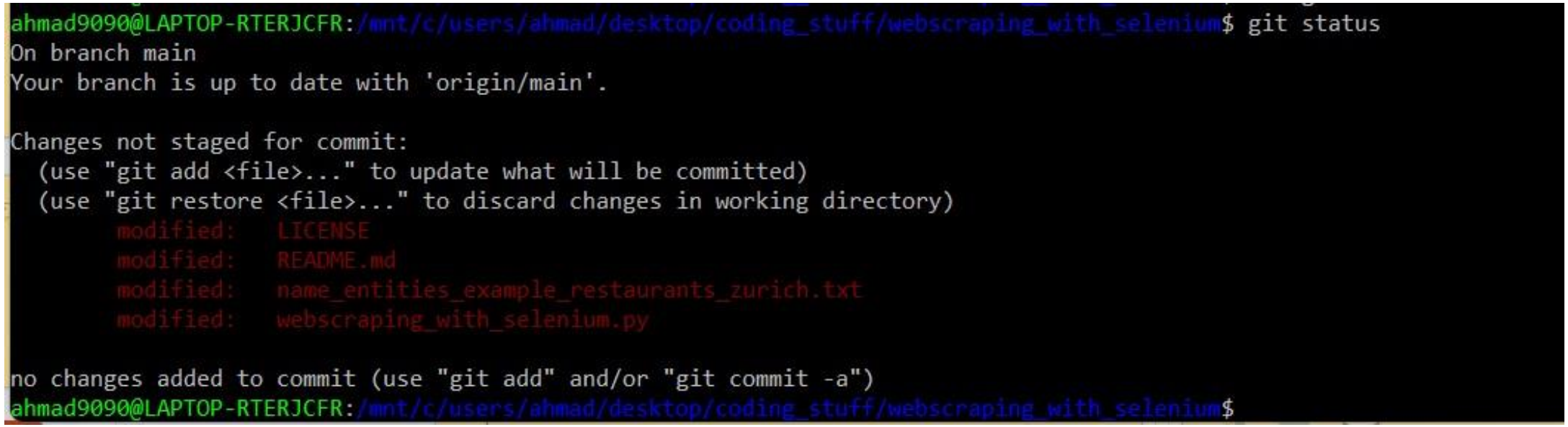
- Type the following command:

```
# git init
```

You can see a new subdirectory created ".git" inside your directory. For more information about the content of ".git": https://git-scm.com/book/en/v2/Git-Internals-Plumbing-and-Porcelain#ch10-git-internals

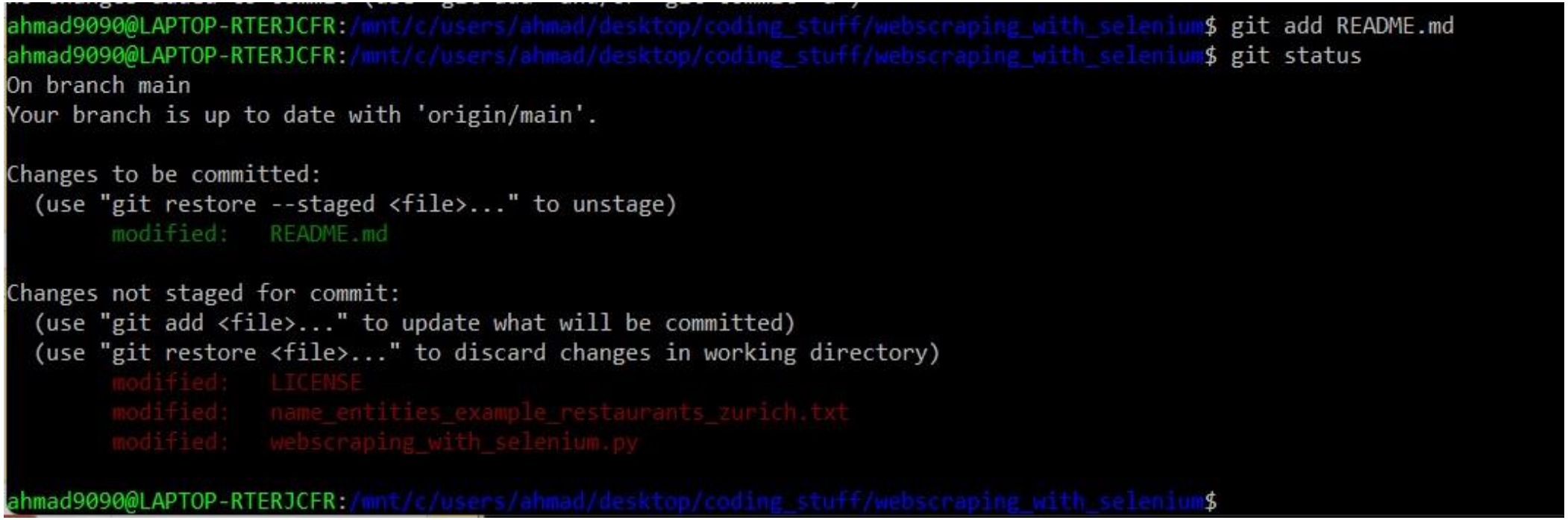
The Three States of Git

Modified (Untracked): Changes to file or directory but not added to git database.



The Three States of Git

Staged: The modified file has been marked for changes to be committed.
git add file_name or
git add . to mark all the files that are modified



The Three States of Git

```
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git status
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git status
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   name_entities_example_restaurants_zurich.txt

no changes added to commit (use "git add" and/or "git commit -a")
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git status -s
 M name_entities_example_restaurants_zurich.txt
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git add name_entities_example_restaurants_zurich.txt
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git status -s
M  name_entities_example_restaurants_zurich.txt
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$
```

git status -s

The Three States of Git

Committed: The changes are safely stored to your local database

```
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git commit -m "version 2, changes to all files"
[main 0336347] version 2, changes to all files
 4 files changed, 221 insertions(+), 221 deletions(-)
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ git status
On branch main
Your branch is ahead of 'origin/main' by 1 commit.
  (use "git push" to publish your local commits)

nothing to commit, working tree clean
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$
```

Skip the staging area by adding -a argument: # git commit -a -m “fix bug in example.py”

Commit: Best Practices

- Commit Related Changes
- Commit frequently
- Keep it short (about 50 characters)
- Don’t commit half-done work
- Test your code before commit
- Use imperative voice “fix bug”, instead of “fixed bug”
- Leave second line blank if writing long commit

Commit: Best Practices

- What is wrong with this stagging / committing?

```
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
        new file:   .DS_Store
        new file:   products.ts
        new file:   registration.test.ts
        new file:   registration.ts
        new file:   validation.test.ts
        new file:   validation.ts
```

```
git commit -m 'Updated various areas such as validation,
registration and products pages'
```

Source: freeCodeCamp.org

Task

- Create a new directory
- Create a git repository inside the diroctory
- Add files into the diroctory
- Commit the changes of the directory into git

Ignore files

to change files in the command line
nano file_name

to access cas_demo folder on desktop with ubuntu:
cd /mnt/c/Users/nilss/Desktop/cas_demo

- Sometimes there are files that you want git to ignore from tracking.
- Create a file inside your repository called .gitignore
  - with linux: # touch .gitignore
  - with winows: # type nul > .gitignore
- Write the name of the file inside .gitignore

```
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ ls -l
total 11517
-rwxrwxrwx 1 ahmad9090 ahmad9090     1093 Jul 27 04:22 LICENSE
-rwxrwxrwx 1 ahmad9090 ahmad9090      608 Aug  5 04:10 README.md
-rwxrwxrwx 1 ahmad9090 ahmad9090 11775488 Jul 27 02:34 chromedriver.exe
-rwxrwxrwx 1 ahmad9090 ahmad9090      253 Sep 26 15:52 name_entities_example_restaurants_zurich.txt
-rwxrwxrwx 1 ahmad9090 ahmad9090      851 Aug  5 04:05 results_18135.json
-rwxrwxrwx 1 ahmad9090 ahmad9090       34 Sep 26 16:14 to_ignore.txt
-rwxrwxrwx 1 ahmad9090 ahmad9090     6889 Aug  5 04:04 webscraping_with_selenium.py
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$ cat .gitignore
to_ignore.txt
ahmad9090@LAPTOP-RTERJCFR:/mnt/c/users/ahmad/desktop/coding_stuff/webscraping_with_selenium$
```

More information on .gitignore syntax: https://git-scm.com/docs/gitignore

Task

- Add .gitignore into your repository
- Add three .txt or .py files into the repository
- Have git ignore these 3 files by writing 1 line into .gitignore
- Add a fourth txt file into your repository but make sure it doesn’t get ignored by git

Git: Show the history of Commits

To list the commits made in a repository use the command log

```
# git log
```

log shows all the commits in a reverse chronological order

log has options. To show the differences introduced in each commit, use the argument --patch or -p. You can also limit the number of commits display by adding -number

```
# git log -p
# git log -p -2   (shows the last two commits)
```

Undoing changes in Git

Img credit: https://devrant.com/rants/1840117/me-using-git

Undoing changes

Reverse changes to modified file until last commit:

```
# git checkout -- file_name
```

or

```
# git restore file_name
```

USE WITH CAUTIOUS!

Undoing changes

Unstaging a staged file:

git reset HEAD file_name

Useful if you want to have different commits for different files

Newer versions of git introduced git restore --staged:

git restore --staged file_name

Undoing changes

You can edit a commit by using the argument --amend

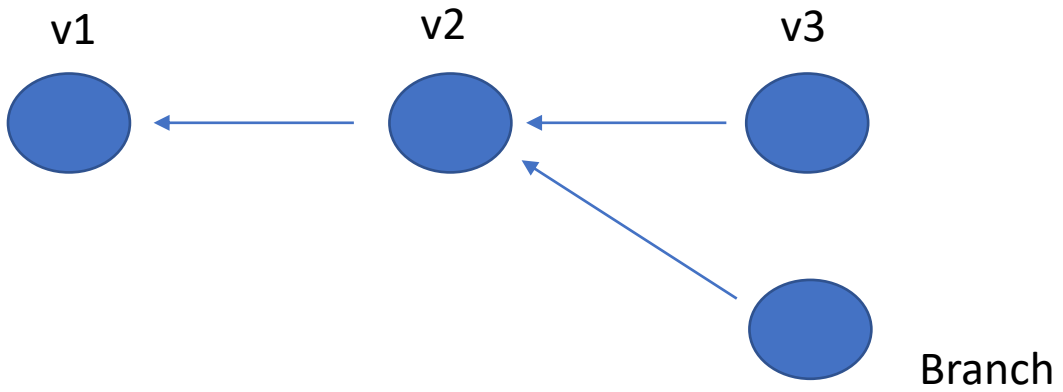
```
# git commit --amend
```

This will allow you to edit a commit. It gives the possibility to stage other files and add them to the commit.

Task

- Make changes to a file in your git repository
- Undo these changes until the last commit
- Make several changes and corresponding commits to file then undo these changes to a certain commit (not last one)

Branching



- A pointer to one of your commits
- Most VCS have branching support
- Git is unique in handling branching (Less expensive, lightweight)

Create New Branch

- Check the branch name of your repository:

  # git branch

  by default, called master or main

- Create new branch:

  # git branch name_of_branch

- See the last commit in each branch

  # git branch -v

- Move to work in a certain branch:

  # git checkout name_of_branch

  Git does not switch to new branch automatically after creating it!

Check Branch changes

- Git log will only show the commits history for the main or master branch when you are in it. To show commits in other branches:

  # git log branch_name

  or

  # git log --all

- Use the argument --oneline to display less information when having too many commits:

  # git log --all --oneline

git log --oneline --all --graph

Git: Switch

- Newer versions of git (2.23) uses switch command to instead of checkout:

  # git switch branch_name

- Delete a git branch:

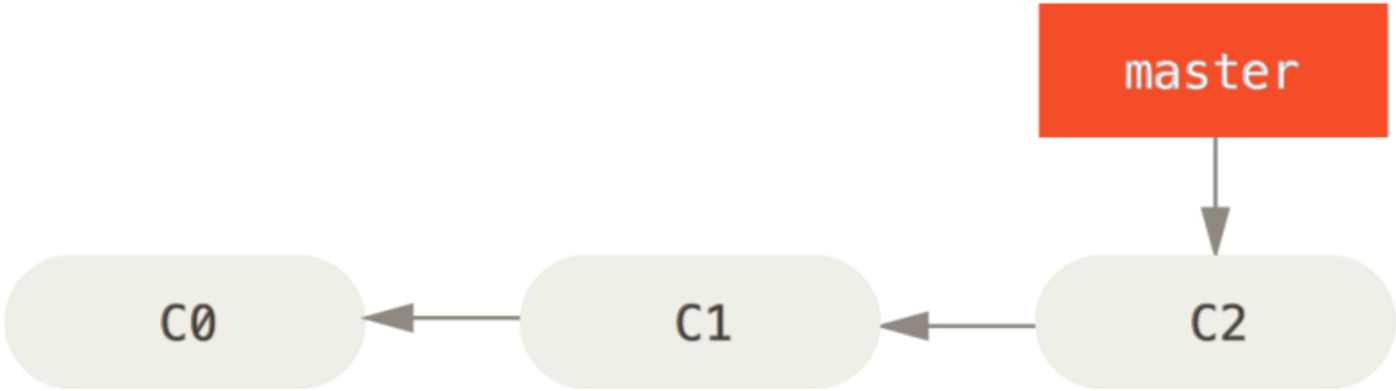
  # git branch -d branch_name

  -D if there are unmerged elements

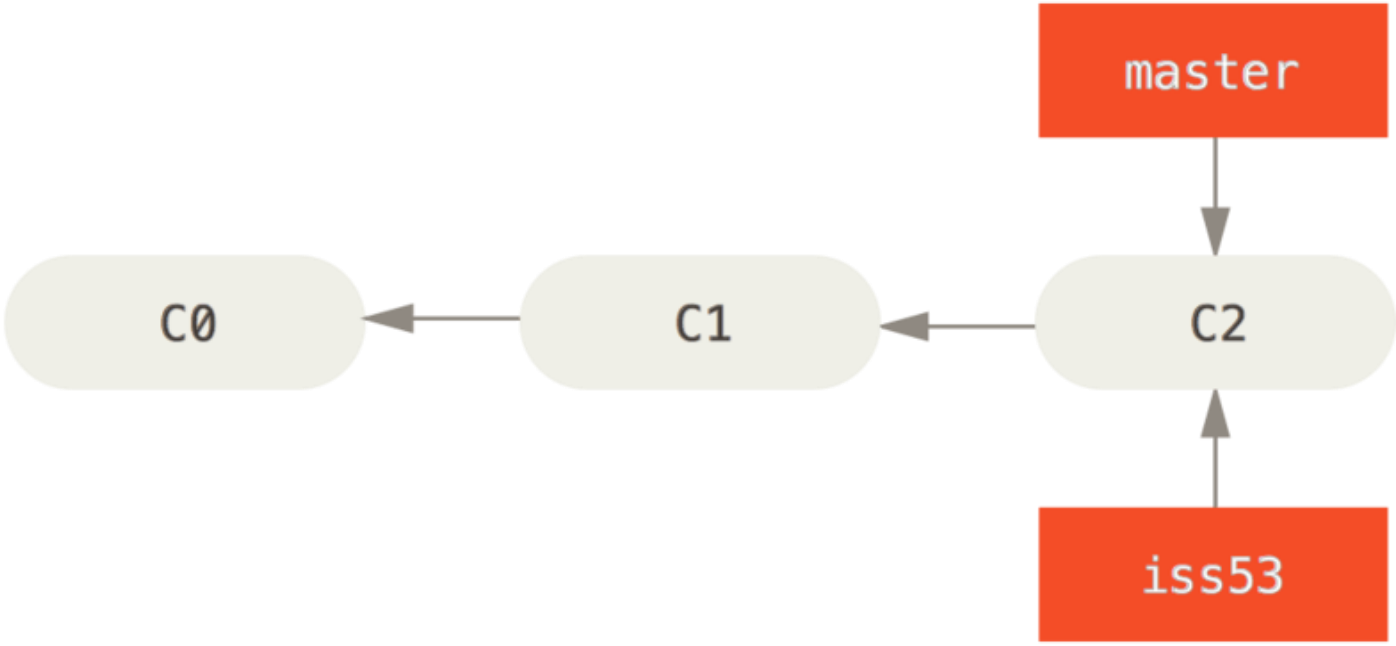
Discussion & Task

- Why branching is useful?
- Create a new branch and switch to it in one command (there are 2 possible ways)
- Do changes in that branch then try to delete it

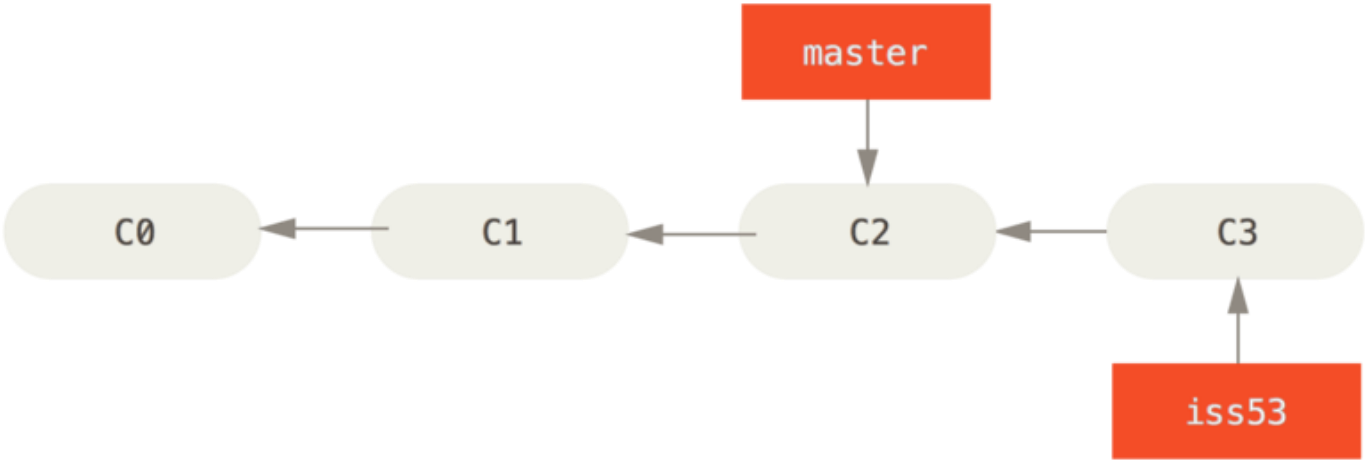
Branching & Merging



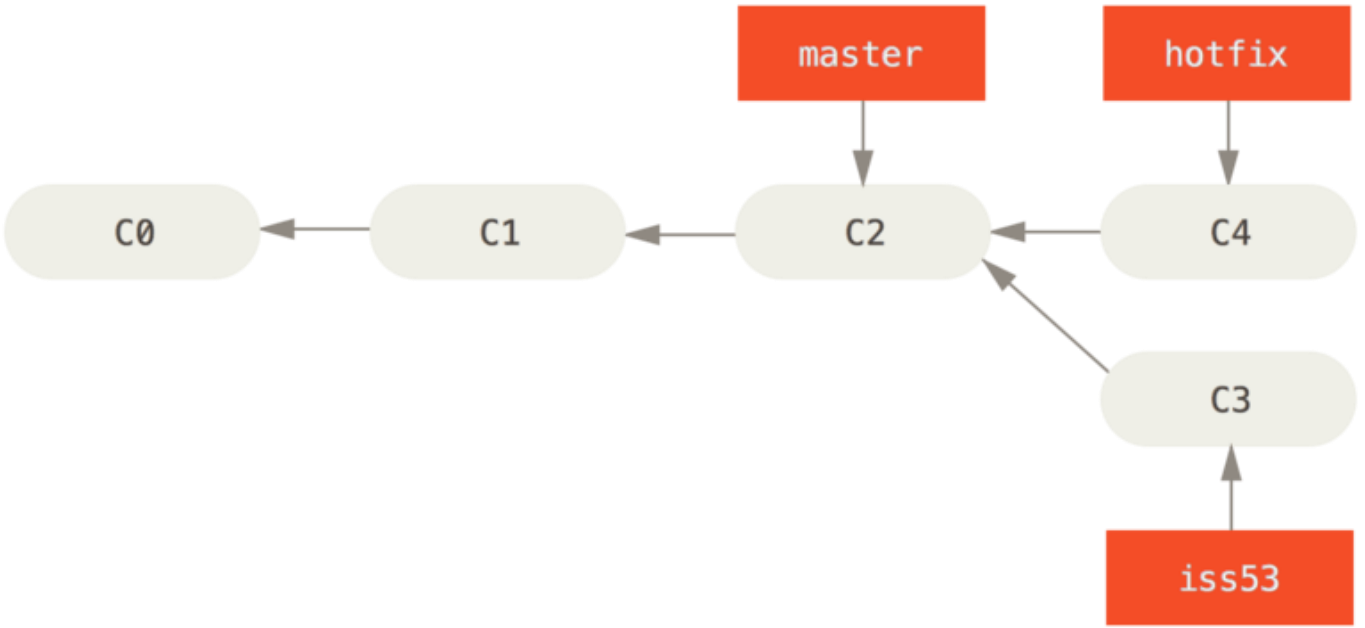
Branching & Merging



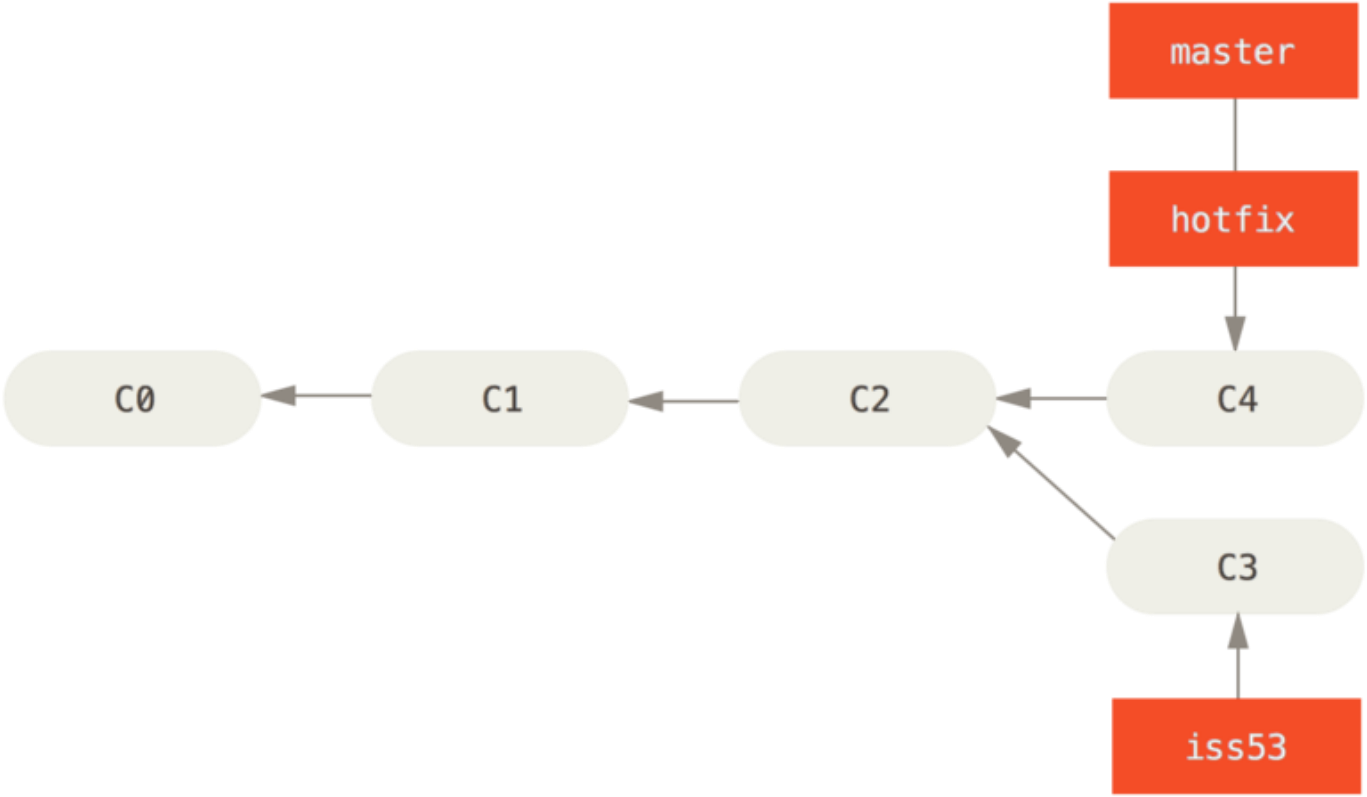
Branching & Merging



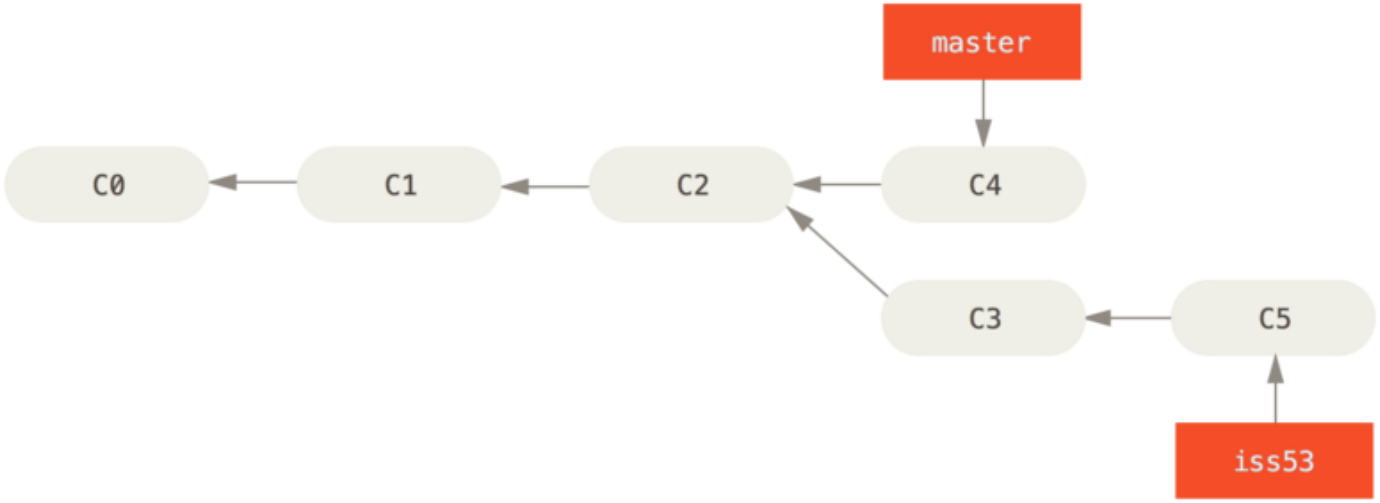
Branching & Merging



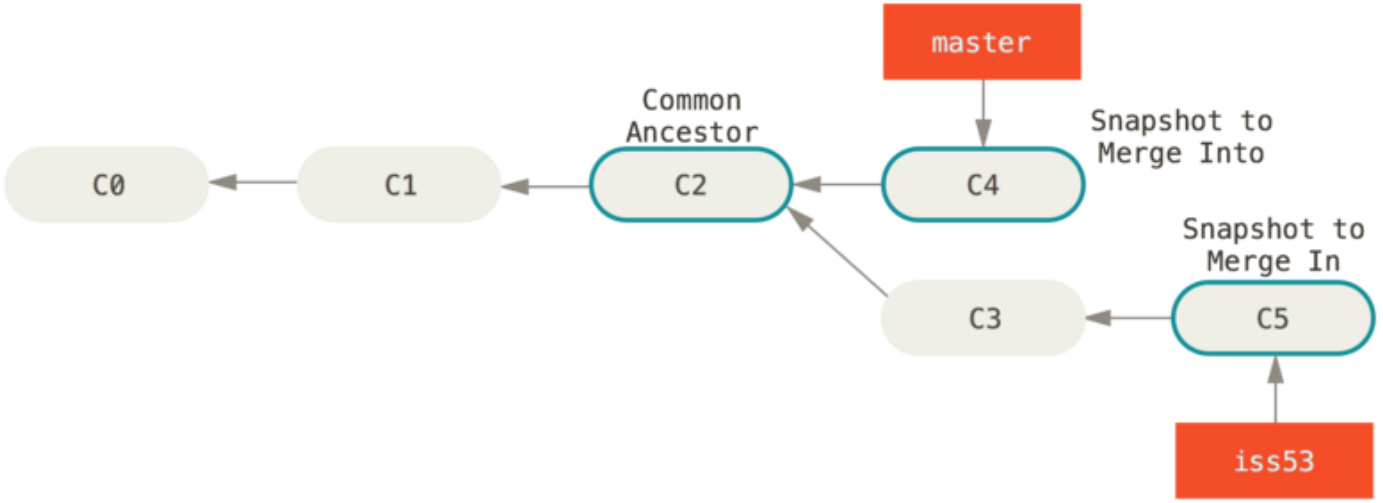
Branching & Merging



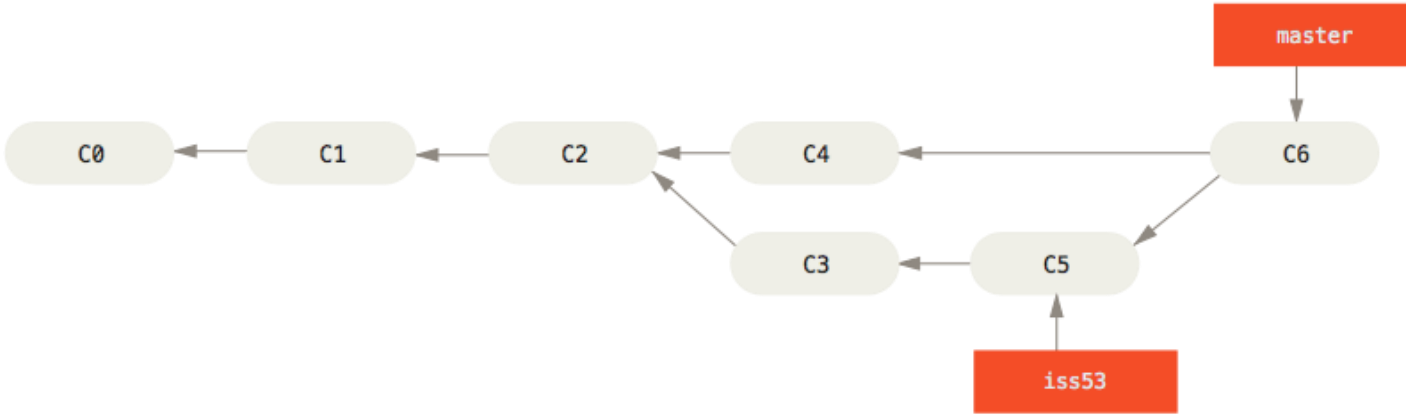
Branching & Merging



Branching & Merging



Branching & Merging



Git: Branching & merging

- Merging branch: Go to the branch you want to merge into:

  # git merge branch_name

- Dealing with merge conflict:

  # git mergetool OR manually

- See which branch is merged and not merged into your current branch

  # git branch --merged

  # git branch --no-merged

- Abort a merge: Sometimes when you have a merge conflict, you want to abort the merge and fix it in a different way. This is done with the abort flag:

  # git merge --abort

- An option would be to go back to the last commit:

  # git reset --hard HEAD

  Use with caution. All changes until last commit are deleted!

Task

- Create new branch and do changes in it and commit them.
- Do changes in your master branch to the same file and the same lines
- Try to merge the branch and resolve the conflict

Git: Branching & merging

- Dealing with merge conflict strategies:
  - -X ours: to accept changes in current branch
  - -X theirs: to accept changes in the merged branch

Git: Branching & Merging

- Useful flags to use with git merge:

- -Xignore-space-change
- -Xignore-all-space

Rebasing

- Alternative to git merge
- Provides linear “cleaner” history
- Use with caution
- Can be done with the rebase command:

```
# git rebase branch_name
```

Git Stash

- If you don’t want to commit certain work but still store it for later use, you can use git stashing.

  # git stash

- You can also add a description of the stash you created:

  # git stash save “changes to file x”

- To display the stashes you have:

  # git stash list

- Apply the first stash changes to your branch:

  # git stash pop

- Reapply certain stash back:

  # git stash apply <stash_id stash@{0}>

Git Stash

- Using stash-apply without specifying the stash id will apply the most recent stash you saved

- You can remove a stash by using drop:

  # git stash drop stash@{0}

- You can create a branch from the stash that you created:

  # git stash branch branch_name

- Clear all the changes but save them into stash:

  # git stash --all

Git Aliases

- For a faster & more sufficient workflow use local aliases
- Examples from Pro git book:

```
$ git config --global alias.co checkout
$ git config --global alias.br branch
$ git config --global alias.ci commit
$ git config --global alias.st status
```

Git: Searching

- You can use git grep to search the content of the files inside your directory. Use the -n or --line-number option to view the line number.

- Use the -c or --count to view only the file containing the searched string

- If you are searching for when rather than where a certain change occurred, use the log -S functionality

Cleaning work directory

- You can use git-clean to remove any unnecessary files or subdirectories that are unneeded:

```
# git clean -f -d
```

- Use git-clean with cautious. It is better to run first –dry-run option to see what would be removed:

```
# git clean -d –n
```

- The previous command will not remove the files that you have in .gitignore. You can include those with the -x flag

- The -i flag allows interactive mode with the clean command as a more safe mesurment.

GIT: GUI

- Git comes with graphical user interface (git-gui). Can run it from the command line:

```
# git gui
```

- Most IDE has extension for using git (VS code, Pycharm, etc)

Github

- What is Github and how is it different from git?

Github

- Largest online host for git repositories
- Central point for collaboration for millions of developer
- Many open-source projects on Github
- Owned by Microsoft (Not part of the Git open-source project)

Github: Usage

- Interaction with local git repository
- Github Pages: Static web hosting service
- Gist: code snippets

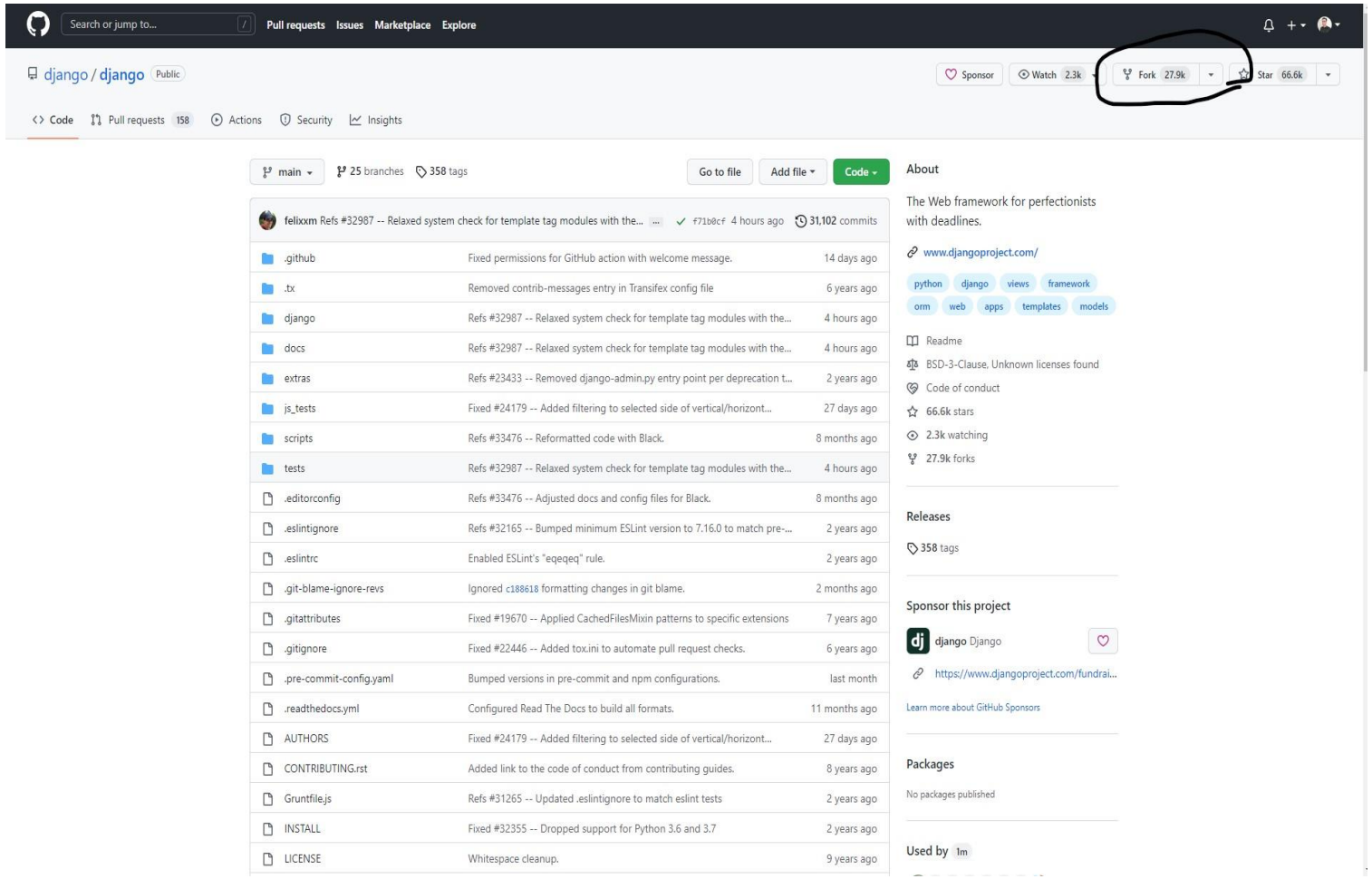
Github: Create Account and SSH Access

- GUI to create account at github!
- Generate SSH public key and add it to your github account from settings
- Key is usually stored at ~/.ssh
- To generate a new ssh key use:
- # ssh-keygen –o
- Paste your public key into github

Github fork

- You can fork a project in github into your private account to work on it. This is usually is done when you do not have push access to that project.

Github: Fork a repository



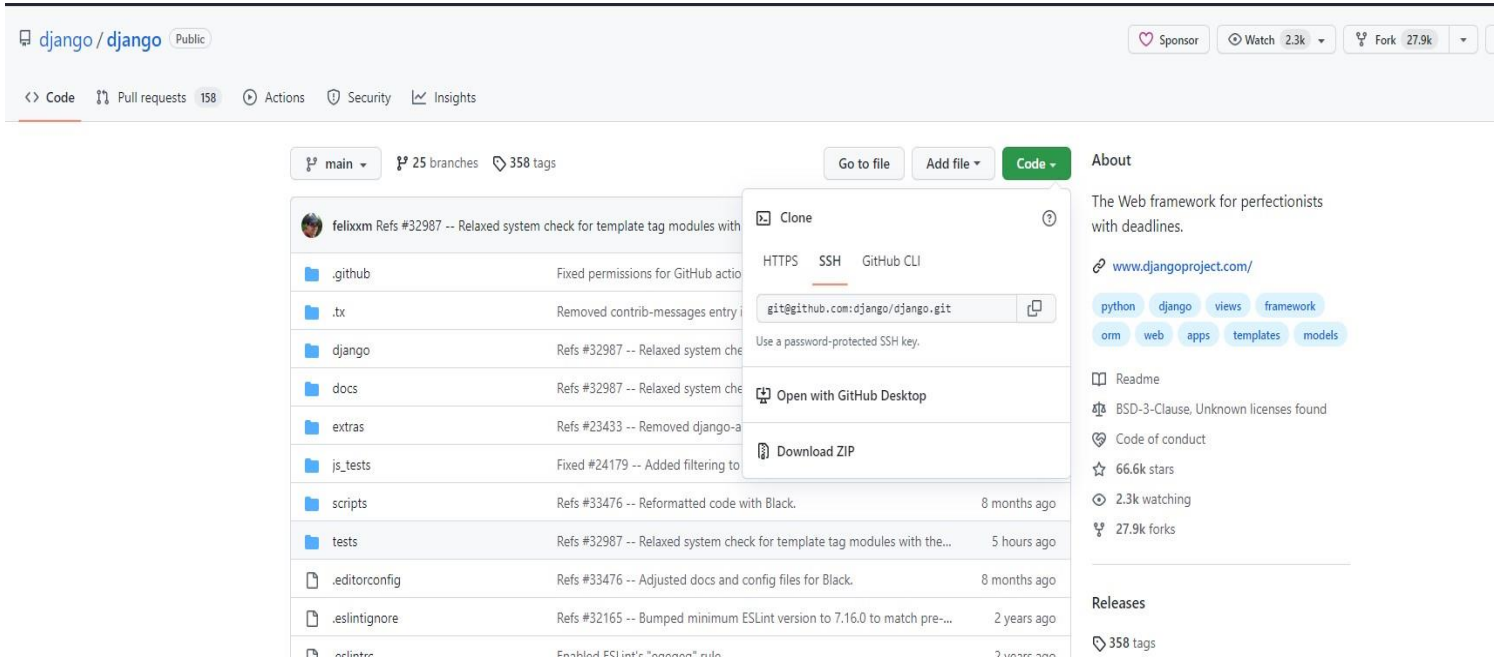
Git & Github: working with remote

- You can clone a repository from github or any remote repository from a different location by using git clone:

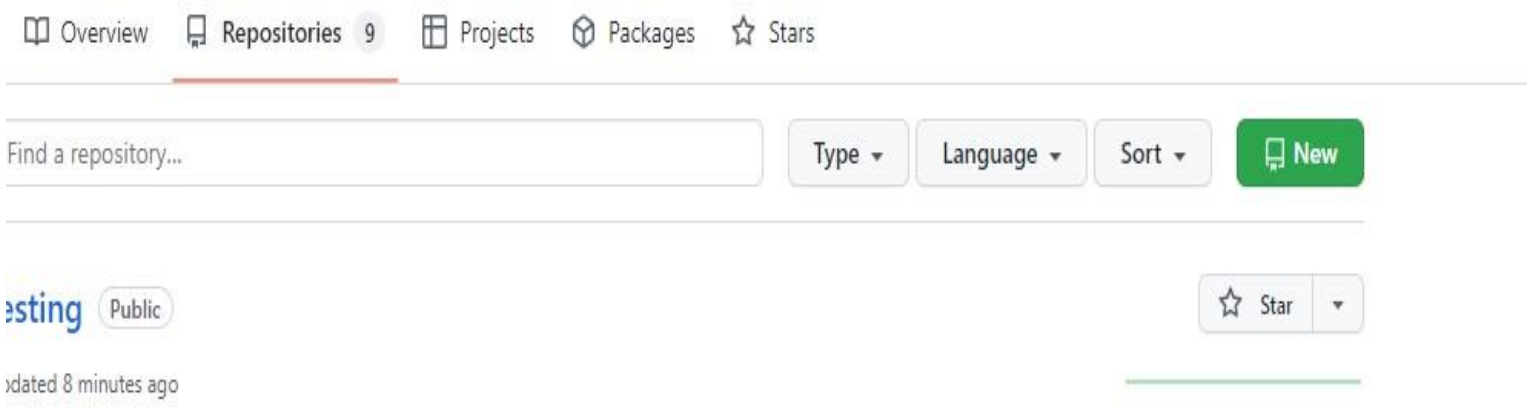
```
# git clone https://github.com/django/django.git
```

- You can use either HTTPS or SSH to clone a repository from github

Git: clone


django / django
Public
Sponsor
Watch 2.3k
Fork 27.9k
Code
Pull requests 158
Actions
Security
Insights
main
25 branches
358 tags
Go to file
Add file
Code
felixxm Refs #32987 -- Relaxed system check for template tag modules with
.github
Fixed permissions for GitHub actio
.tx
Removed contrib-messages entry
django
Refs #32987 -- Relaxed system che
docs
Refs #32987 -- Relaxed system che
extras
Refs #23433 -- Removed django-a
js_tests
Fixed #24179 -- Added filtering to
scripts
Refs #33476 -- Reformatted code with Black.
8 months ago
tests
Refs #32987 -- Relaxed system check for template tag modules with the...
5 hours ago
.editorconfig
Refs #33476 -- Adjusted docs and config files for Black.
8 months ago
.eslintignore
Refs #32165 -- Bumped minimum ESLint version to 7.16.0 to match pre-...
2 years ago
Clone
HTTPS
SSH
GitHub CLI
git@github.com:django/django.git
Use a password-protected SSH key.
Open with GitHub Desktop
Download ZIP
About
The Web framework for perfectionists with deadlines.
www.djangoproject.com/
python
django
views
framework
orm
web
apps
templates
models
Readme
BSD-3-Clause, Unknown licenses found
Code of conduct
66.6k stars
2.3k watching
27.9k forks
Releases
358 tags

Github: Create new repository



From your account -> reposotories -> new

Git: working with remote repository

- Clone your new repostitory into your local device either with https or ssh:

  # git clone git@github.com:<user name>/<repo name>.git

- You can list the name Git gives to the remote repository that you cloned:

  # git remote

  This will give you at least «origin»

- You can also view the URLs which git specify to reading and writing to the remote repo:

  # git remote –v

- Add changes to your remote repository that you did locally:

  # git push

- Pull changes that were made to the remote repository:

  # git pull

Github: Adding collaborators

- You can add collaborators to your repository on github to work with others.
- Is done from settings inside the repository --> collaborators --> add people

Task

- Fork a public repo on github then clone it to your device
- Change the readme file
- Push the changes into github
- Add the person next to you as collaborator
- Change the repo into a private one

Github on the CL

- You can use Github on the command line as well
- To install follow the instructions on this link for your OS:

  https://github.com/cli/cli#installation
- To log in to your GitHub account on the CL:

  # gh auth login

Github on the CL

- Assume you have been working locally on a project and you want to have it as a repository on Github. You can create a new repository on Github from your CL.
- Use the command:

  # gh repo create

  Very user friendly

Task

- Install github CLI & log in to your account with it
- Try to create a new repo on github via gh CLI tool

Github on the CL

- After adding the repo on Github, You can push your local work to it with the following commands:

  # git branch -M main

  With SSH:

  # git remote add origin git@github.com:<user name>/<repo name>.git

  With HTTPS:

  # git remote add origin https://github.com/<user name>/<repo name>.git

Teamwork

- Group in teams of 2 or 3 and choose one of the following tasks: