Technical University of Munich

Tutorial 1: Cluster Access and CLI Basics

Informatik elective: GPU Computing

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In this session

- Version control: principles, git, using github.
- Command line basics in Linux.
- Compiling and running a basic C/C++ program.

Version control

- How do you record changes to a file/project over time ?
  - Copy and create new files for each version.

[xkcd: #1459]

Version control

- How do you record changes to a file/project over time ?
  - Copy and create new files for each version.
  - Use version control

Why Version control ?

	Advantages
Shareability	Easily share state with others
Trackability	Track changes across time
Collaborate	Easily collaborate with people
Workflow	Greatly simplifies workflows

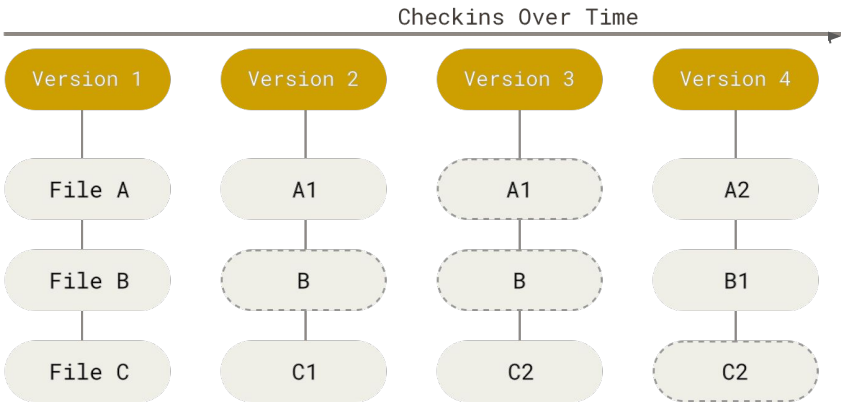
Git: A distributed version control system

```
GIT - the stupid content tracker

"git" can mean anything, depending on your mood.

 - random three-letter combination that is pronounceable, and not
   actually used by any common UNIX command.  The fact that it is a
   mispronunciation of "get" may or may not be relevant.
 - stupid. contemptible and despicable. simple. Take your pick from the
   dictionary of slang.
 - "global information tracker": you're in a good mood, and it actually
   works for you. Angels sing, and a light suddenly fills the room.
 - "goddamn idiotic truckload of sh*t": when it breaks

This is a stupid (but extremely fast) directory content manager.  It
doesn't do a whole lot, but what it _does_ do is track directory
contents efficiently.
```

[Linus Torvalds on git, 2005]

Git: A distributed version control system

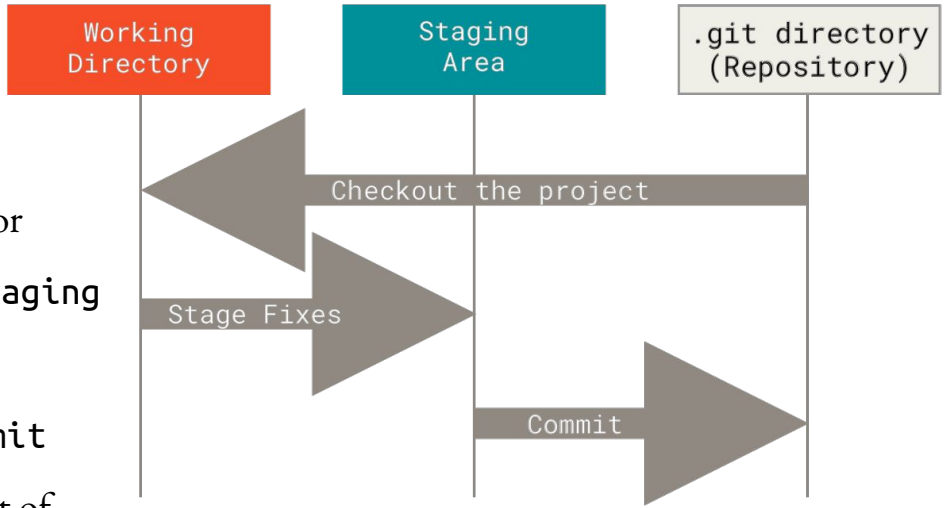
- A stream of snapshots of the entire repository.
  - Store only references to unchanged files.
- Almost every operation is local.
  - Don’t need to fetch data from remote server.
- It only adds data.
  - Almost everything is undoable.



[git-scm.com/book]

Git: How does it work ?

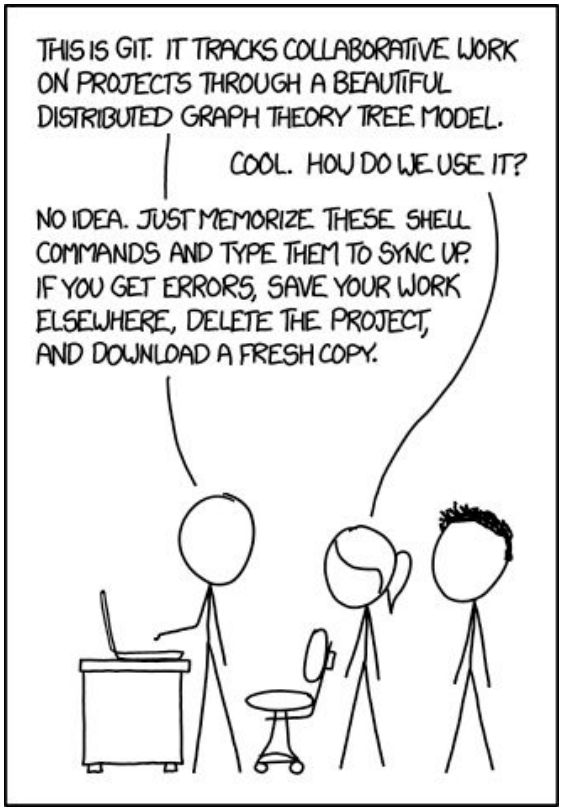
- 3 main states: `modified`, `staged` and `committed`
- The workflow therefore, consists for 3 main steps:
  - Changed files are in the `modified` state
  - You decide which files you want to `commit`, or store a snapshot of, and move them to the `staging` area
  - Once added to the staging area, you can `commit` them, which “permanently” stores a snapshot of the repository at that point in time.



[git-scm.com/book]

[HANDS-ON] Git: Demo

- Initialise a repository with git init
- Create a file, add some text
- Move file to staging area
- Commit the changes
- Look at the repository history
- Clone some public repository and look at its history.



[xkcd: #1597]

`git` good practices

- Commit files frequently, and in a modular fashion.
- If there is a remote, keep it updated.
- Commit messages are very helpful, be descriptive, you'll thank yourself in the future.
- Optimize/personalize your configuration with `git config`
- `git bisect` helps with debugging

[xkcd: #1296]

Github, Gitlab?

- How do we collaborate with others ?
  - Host the repository on the cloud, and all collaborators synchronize through it.
- They also provide additional functionalities:
  - Pull/Merge requests: Collaborative editing
  - Continuous Integration: Testing, benchmarking etc

[HANDS-ON] Github: Demo

- Create a github account
- Push your repository to github.
- Look at the commit history.
- Compare history of some public project.

[HANDS-ON] Command line basics

- Look up documentation:

```
$ man command
```

- Which directory/path are you currently in ?
  - Print working directory (pwd)

```
$ pwd
```

- List current files

```
$ ls
```

- Change directories (cd)

```
$ cd new_directory_path
```

- Copy files

```
$ cp current_file_name new_file_name
```

- Move/rename file

```
$ mv current_file_name new_file_name
```

Platform-independent builds

- Building from source can be frustrating and annoying
- Use platform-independent build tools like CMake 

- Provide necessary configuration, dependencies

  without worrying about platform-specifics.
- Widely used for C/C++ projects.

[HANDS-ON] Build a demo C++ project and push it to github

- Create a file test.cpp
- Add some test function.
- Create a CMakeLists.txt file, and build it.
- Check if it runs as expected.
- Commit the changes and push them to github