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Basic Git Workshop

TechJI

University of Michigan - Shanghai Jiaotong University

Joint Institute

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What is Git?

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.

When to use Git?

▶ Writing code

▶ Managing docs

▶ Managing projects

▶ Version control

▶ Team corporation

Git Installation

You can go to the official website to download the installation package and refer to *Installation_git* file in the repo.

Where to use Git?

We first introduce shell commands, then we will use Git in the shell.

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What is Shell?

Shell is a program that takes commands from the keyboard and gives them to the operating system to perform. It is also referred to as a command-line interpreter or CLI. Common shells:

- Bash
- Zsh
- etc

A brief history of bash

- Born: 1989
- Probably played Pokémon on the Game Boy
- Is an umbrella term for zsh, fish, …
- Runs on Unix-like environments

A brief history of Unix

- Born: 1969
- Probably listened to Michael Jackson
- Gave rise to Linux, BSD, and Mac OS
- We call them "Unix-like"

Unix: The Good Part

The Unix philosophy (paraphrased):

- ▶ Store data in plain text
- ▶ Hierarchical file system
- ▶ Everything is a file
- ▶ One tool does one thing
- ▶ Tools together strong

Quote

The power of a system comes more from the relationships among programs than from the programs themselves.

— Brian Kernighan and Rob Pike [1]

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[1] The UNIX Programming Environment. 1984. viii

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How to open a Shell?

- ▶ Windows: cmd, powershell
- ▶ Mac: Terminal
- ▶ Linux: Terminal

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Files

Each of these is a different **file**:

▶ a

▶ .a (Hidden)

▶ a.txt

▶ A.txt

▶ A.TXT

Note

The dot and suffix are part of the filename. Windows users please turn on **show file extensions**.

Avoid spaces and special characters (except ._-). If you have to, surround filename in quotes: `Lab Report (3) final FINAL-1.docx'

Directories

Each of these is a **directory** ("dir" for short):

- ▶ hteam-10086/
- ▶ hteam-10086/h1/
- ▶ hteam-10086/.gitea/ (Hidden dir)

Convention

For clarity, we add a slash (/) to the end of a directory in the slides.
However, in reality it often makes no difference.

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cd, pwd: Changing directory

- ▶ cd hteam-10086/
- ▶ pwd

Explanation

- ▶ cd: "change directory"
- ▶ pwd: "print working directory"
- ▶ ../ means "parent directory"
- ▶ ./ means "current directory"
- ▶ ~ means "home directory"

Paths

File $\cup$ directory = **path**. [2]

No paths under the same directory can bear the same name. These **cannot** coexist:

▶ hteam-10086/h1/, a directory

▶ hteam-10086/h/ex1.m, a regular file

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[2]At least in the scope of this workshop.

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Absolute & relative paths

- ► Paths beginning with / are absolute: /usr/bin/cat
- ► Otherwise it is relative: hteam-10086

If you know where you are, you can convert a relative path to an absolute one.

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Some basic git commands

Tell Git who you are:

► git config –global user.name "Your Name"

► git config –global user.email "Your Email"

Some basic git commands

How to use "git add":

- ▶ git add <file>
- ▶ git add *
- ▶ git add .
- ▶ git add -A

use "git status" to check the status of your repo.

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Some basic git commands

How to use "git commit":

▶ git commit -m "commit message"

If you only type:

▶ git commit

then you will enter vim /other default editor to write your commit message.
How to write commit message?

Some basic git commands

How to use "git push":

- ▶ git push origin <branch>
- ▶ git push origin master
- ▶ git push

Some basic git commands

How to use "git rm":

▶ git rm –cached <file>

Then, git will stop tracking this file, but the file still exists in your repo.

Some basic git commands

How to delte a file in your remote repo:

- ▶ git rm <file>
- ▶ git commit -m "remove file"
- ▶ git push

Some basic git commands

How to use "git pull":

- git pull

Some basic git commands

How to use branch in git:

- ▶ create new branch: git branch <branch>
- ▶ create new branch(based on current branch): git checkout -b <branch>
- ▶ go to other branch: git checkout <branch>
- ▶ deleta branch: git branch -d <branch>

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Some basic git commands

How to use "git merge": For example, we are now on branch "master", and we want to merge branch "dev" to "master":

▶ git checkout dev
▶ git pull
▶ git checkout master
▶ git merge dev
▶ git push

If you encounter conflicts, you need to solve them manually. You can use "lazygit" or search for "Git merge tool" online.

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Some basic git commands

How to use "git revert":

- ▶ git revert <commit-SHA>
- ▶ git revert HEAD

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Lazygit

Lazygit is a powerful Git frontend that integrates many git commands. It is written in Go and is cross-platform.

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Why lazygit?

- ▶ Fast, TUI
- ▶ Easy to use
- ▶ Powerful

Other alternatives are Gitui which is written in Rust.

Tasks[3]

- Install lazygit. You may refer to *Installation_Lazygit* in repo.

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[3]Operations with * will rewrite history.

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- ▶ Install lazygit. You may refer to *Installation_Lazygit* in repo.
- ▶ Clone your repository.

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▶ cd into your repo and type "lazygit" in terminal

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- ▶ Navigate the interface (h/j/k/l/[/]/arrow keys).

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▶ Checkout branches (sp).

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- ▶ Commit changes (c).
- ▶ Push files (P).
- ▶ Create/delete branches (n/d).
- ▶ Checkout branches (sp).
- ▶ Merge branches (M).

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[3]Operations with * will rewrite history.

References

- Pro Git. Git - Book
- fakefred/bash-workshop
- linsyking/git-wksp

Reading Materials

- Pro Git. Git - Book
- TheCW-Git *Bilibili*. BV1Yx411f7Cu
- TheCW-Lazygit *Bilibili*. BV1gV411k7fC
- MIT Course
- Learn git online
- Liao Xuefeng's Git Tutorial(Chinese)

Thanks for listening!