Programming in C++
Git Basics

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Objectives

Objectives:

- ► Understand purpose of version control.

- ► Install and configure git.

- ► Create and clone remote repository.

- ► Add/update files to git repository.

- ► Sync with remote repository.

- ► View push action results.

Purpose of Version Control

Version Control

- ▶ Track changes over time.
- ▶ Facilitate collaboration.
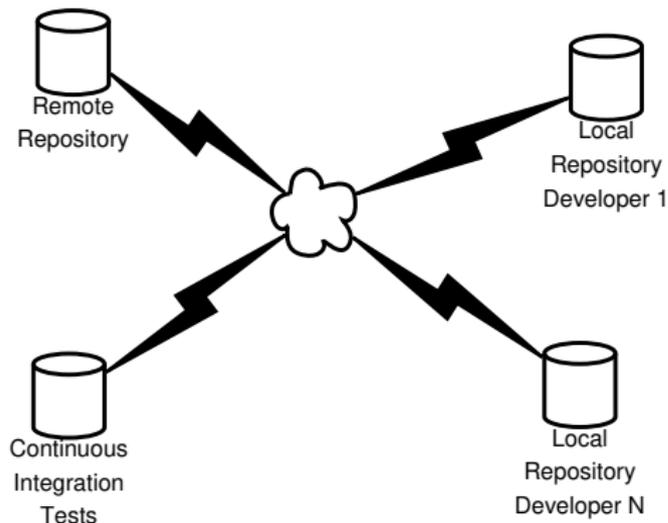
Installing and Configuring git

Windows

Windows users will need to install the Windows Subsystem for Linux (WSL).

How to install Linux on Windows with WSL

After this installation, they will have the ability to launch a Linux terminal.

See the Linux instructions for installing git.

Linux(Ubuntu)

Open a terminal and execute the following commands:

```
sudo apt install git
```

Mac OS X

On Mac OS X, download and install the Xcode command line tools. These tools include the compiler, linker, debugger, git, and more. The following guide is one of many you can find on the web.

Guide to Install Xcode Command Line Tools

Configure User Information

Every commit is associated with user. This information is stored in the repository. You can configure this once and not have to worry about it again.

Open a terminal and execute the following commands:

```
git config --global user.name "Your Name"

git config --global user.email "Your@Email.Address"

git config --list
```

Create GitHub Account

If you already have a GitHub account, use that one. Otherwise, go to github.com and create a new *free* account. Be sure that the email address associated with the account is one that you will actually monitor.

SSH Keys for GitHub

If you are a Windows user, open a Linux terminal, and treat yourself as a Linux user. If you are a Mac OS user, open a terminal, and treat yourself as a Linux user.

GitHub Documentation on SSH Keys

My Just Enough Git instructions

- ▶ ls -l ~/.ssh/
- ▶ ssh-keygen
- ▶ ls -l ~/.ssh/
- ▶ cat ~/.ssh/id_rsa.pub
- ▶ Add GitHub SSH key

Creating and Cloning Remote Repositories

GitHub Classroom

Click the link provided in the assignment description. This will cause your repository to be created.

GitHub General

To create a new repository, from your dashboard, select "New", and complete the form.

Cloning Repository

Find the repository URL. This can be done from the repository's web view by clicking on the "Code" button, and selecting the "SSH" option. The URL should have the form:
`git@github.com:git-user-name/git-repo-name.git`.

In your terminal:

```
git clone git-ssh-url
```

Adding Files and Changes to Repository

Adding a File

Use your favorite editor to create a file in the working directory of the repository. (Most students use VS Code these days.) Add content to the file and save it.

In the terminal, from the root of the repository:

git status

git add path/to/file

git status

Should see staged files now.

Changing a File

Use your favorite editor to change the content of a file in the working directory of the repository and save it.

In the terminal, from the root of the repository:

git status

git add path/to/file

git status

Should see staged files now.

Removing a File

In the terminal, from the root of the repository:

`git rm path/to/file`

`git status`

Should see staged deletion now.

Committing Changes

In the terminal, from the root of the repository:

git status

git commit -m 'Commit Message to Describe Changes'

git status

Should see no staged changes now.

Syncing with Remote Repository

Pushing Changes

To send all changes from the local repository to the remote repository.

In the terminal, from the root of the repository:

git status

git push

git status

Should see no commits to be pushed.

Pulling Changes

To fetch all changes from the remote repository to the local repository.

In the terminal, from the root of the repository:

`git status`

`git pull`

`git status`

Should see no commits to be pushed/pulled.

Viewing Push Action Results

Repository Web View

You can check if your push was successful, and look at other repository meta data on the web page.

NEVER, NEVER, NEVER commit code via the web interface.

Actions Tab

There are many tabs across the top of the repository web page. The "Actions" tab will contain all of the automatic grading information for the repository. The most recently pushed commits will be at the top of the page.

Course Grader Results

The grader results will be short if the code is passing, and long if it is failing. It is important to check the information in the report for why it is failing.

Summary

Command Summary

- ▶ git config --global user.name "Your Name"
- ▶ git config --global user.email "Your@Email.Address"
- ▶ ssh-keygen
- ▶ cat ~/.ssh/id_rsa.pub
- ▶ git clone git-ssh-url
- ▶ git status
- ▶ git add path/to/file
- ▶ git rm path/to/file
- ▶ git commit -m 'Commit Message to Describe Changes'
- ▶ git push
- ▶ git pull