Course Overview

Introduction

Originated by Database Operating Systems Lab.,
Revised by Software Platforms Lab.

Contents

- What we’re going to?
- About projects
- About Attendance
- What is xv6?
- Environment setting

We’re going to..

- Analyze xv6, a basic operating system, to fully digest about OS architecture
- Make new features that didn’t supported by original xv6
- Be familiar with system programming by implementing on tiny operating system

Projects

- Assignment (Week 3)
- Project 1 (Week 5)
- Project 2 (Week 9)
- Project 3 (Week 13)
- **Missing submissions for 2 or more projects → F**
- **Cheating → F**

Attendance

- 결석
  - 3회 결석 → 1 grade downgrade
  - 총 8회 결석 → F
- 지각
  - 수업 시작 후 15분 후까지 지각 인정
  - 3회 지각 → 1회 결석
- 출튀
  - 1회 출튀 → 2회 결석
  - 2회 출튀 → F

What is xv6?

- Educational operating system developed for MIT's operating systems course
- Reimplementation of Unix v6 for RISC-V architecture (formerly x86)
- Written in ANSI C for multiprocessor systems
- Small size, but includes the core concepts of modern operating systems

Lab Assignment Submission

Install git & Join github classroom

Install GIT

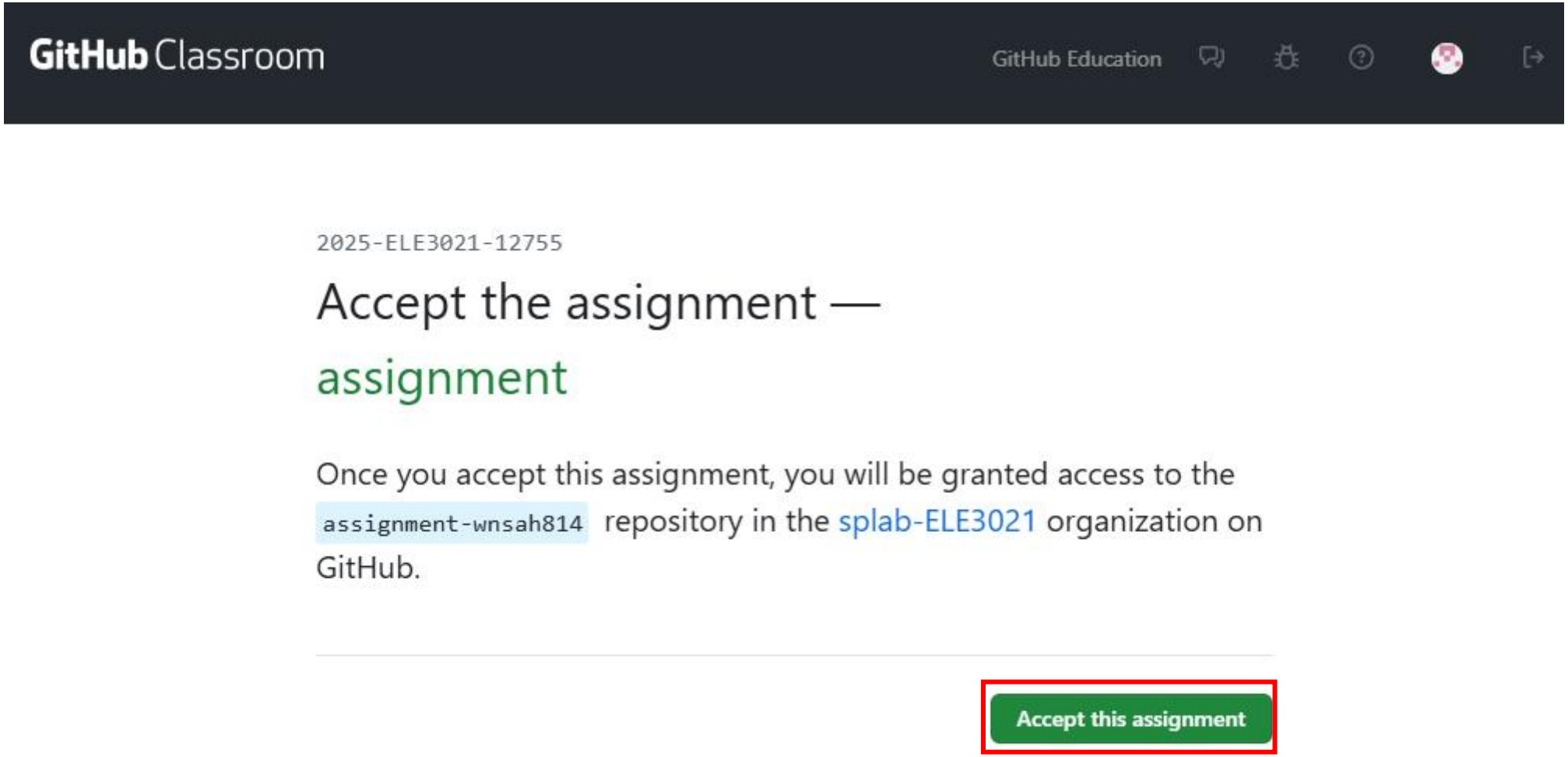
- All lab assignments will be submitted through GitHub
- To clone (download) xv6, we need a Git client

```
$ sudo apt update && sudo apt upgrade
$ sudo apt install git
```

- Create your own repository by accessing the link provided in the announcement
  - A new link will be shared for each project

Before clone...

- Rename the repository according to the format specified for each assignment
  - The rules will be communicated through the README file for each assignment
- Example) assignment-2025123456
- Failure to complete this task will result in zero points


GitHub Classroom
GitHub Education
2025-ELE3021-12755
Accept the assignment —
assignment
Once you accept this assignment, you will be granted access to the assignment-wnsah814 repository in the splab-ELE3021 organization on GitHub.
Accept this assignment

You're ready to go!

You accepted the assignment, **assignment**.

Your assignment repository has been created:

https://github.com/splab-ELE3021/assignment-wnsah814

We've configured the repository associated with this assignment.

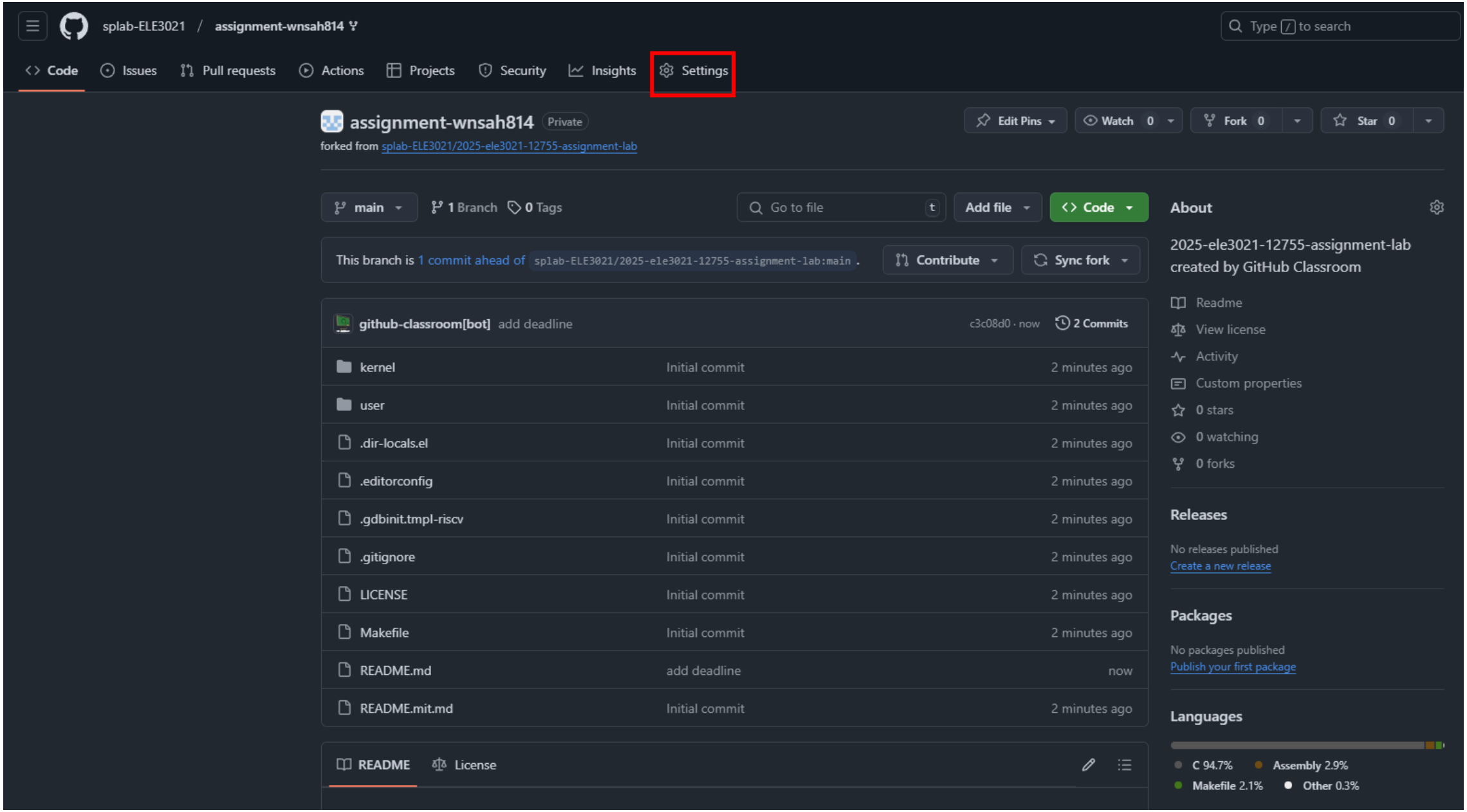
Your assignment is due by **Apr 2, 2025, 14:59 UTC**

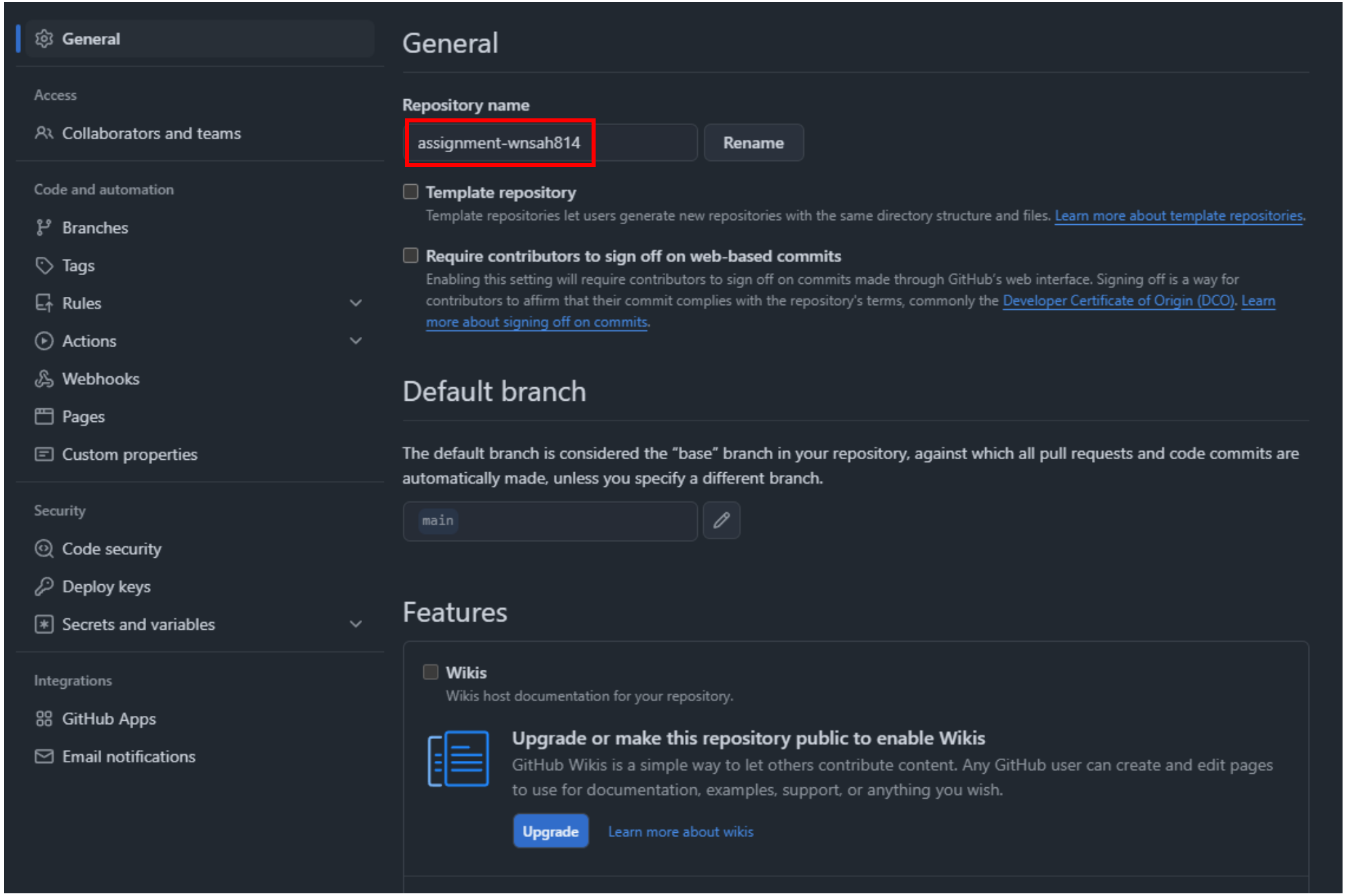
Note: You may receive an email invitation to join splab-ELE3021 on your behalf. No further action is necessary.

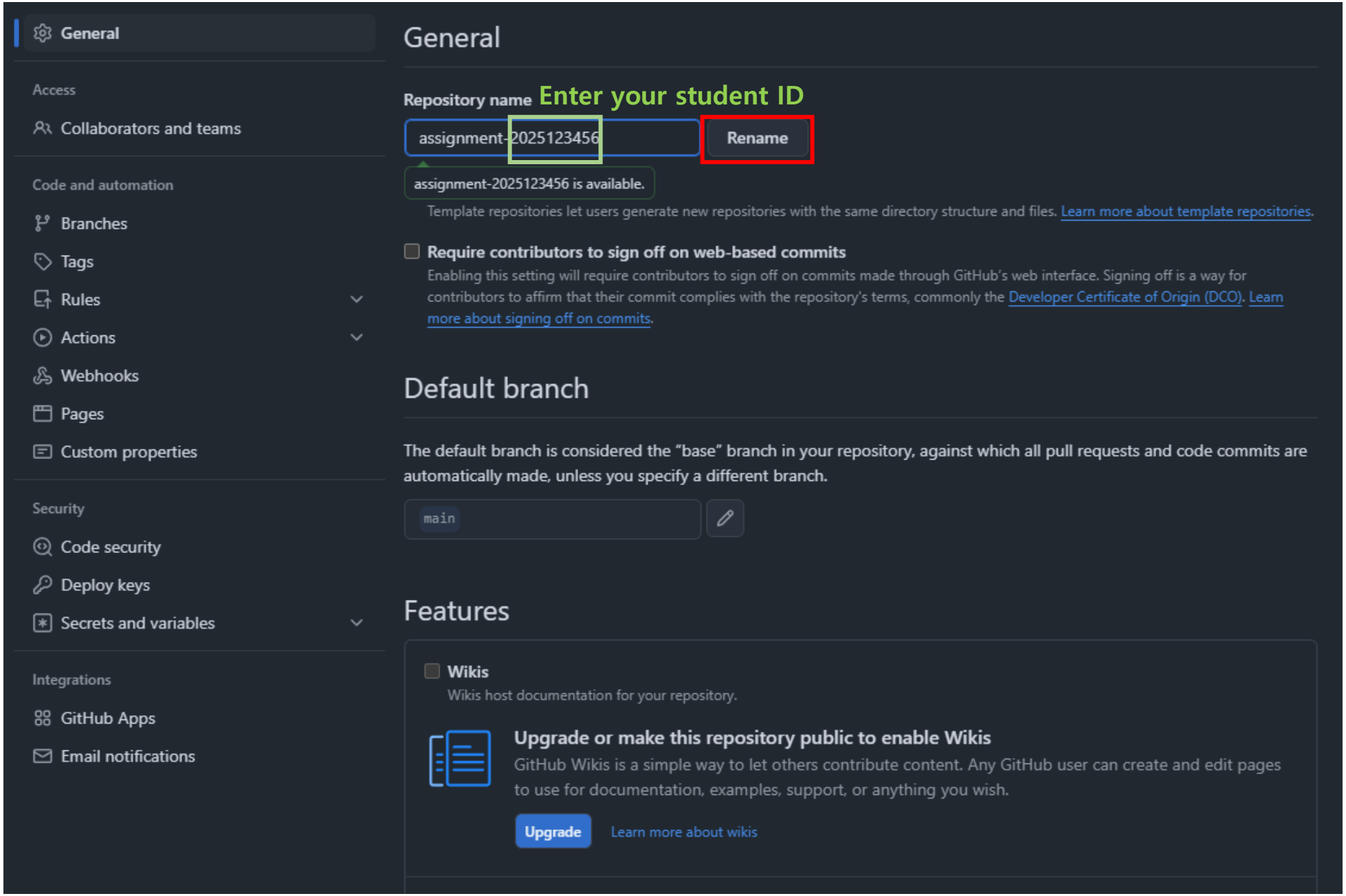
Join the GitHub Student Developer Pack

Verified students receive free GitHub Pro plus thousands of dollars worth of the best real-world tools and training from GitHub Education partners — for free. For more information, visit GitHub Student Developer Pack.

Apply


splab-ELE3021 / assignment-wnsah814
Type / to search
Code
Issues
Pull requests
Actions
Projects
Security
Insights
Settings
assignment-wnsah814
Private
forked from splab-ELE3021/2025-ele3021-12755-assignment-lab
Edit Pins
Watch 0
Fork 0
Star 0
main
1 Branch
0 Tags
Go to file
t
Add file
Code
This branch is 1 commit ahead of splab-ELE3021/2025-ele3021-12755-assignment-lab:main.
Contribute
Sync fork
github-classroom[bot] add deadline
c3c08d0 · now
2 Commits
kernel Initial commit 2 minutes ago
user Initial commit 2 minutes ago
.dir-locals.el Initial commit 2 minutes ago
.editorconfig Initial commit 2 minutes ago
.gdbinit.tmpl-riscv Initial commit 2 minutes ago
.gitignore Initial commit 2 minutes ago
LICENSE Initial commit 2 minutes ago
Makefile Initial commit 2 minutes ago
README.md add deadline now
README.mit.md Initial commit 2 minutes ago
README
License
About
2025-ele3021-12755-assignment-lab created by GitHub Classroom
Readme
View license
Activity
Custom properties
0 stars
0 watching
0 forks
Releases
No releases published
Create a new release
Packages
No packages published
Publish your first package
Languages
C 94.7%
Assembly 2.9%
Makefile 2.1%
Other 0.3%


General
Access
Collaborators and teams
Code and automation
Branches
Tags
Rules
Actions
Webhooks
Pages
Custom properties
Security
Code security
Deploy keys
Secrets and variables
Integrations
GitHub Apps
Email notifications
General
Repository name
assignment-wnsah814
Rename
Template repository
Template repositories let users generate new repositories with the same directory structure and files. Learn more about template repositories.
Require contributors to sign off on web-based commits
Enabling this setting will require contributors to sign off on commits made through GitHub's web interface. Signing off is a way for contributors to affirm that their commit complies with the repository's terms, commonly the Developer Certificate of Origin (DCO). Learn more about signing off on commits.
Default branch
The default branch is considered the "base" branch in your repository, against which all pull requests and code commits are automatically made, unless you specify a different branch.
main
Features
Wikis
Wikis host documentation for your repository.
Upgrade or make this repository public to enable Wikis
GitHub Wikis is a simple way to let others contribute content. Any GitHub user can create and edit pages to use for documentation, examples, support, or anything you wish.
Upgrade
Learn more about wikis


General
Access
Collaborators and teams
Code and automation
Branches
Tags
Rules
Actions
Webhooks
Pages
Custom properties
Security
Code security
Deploy keys
Secrets and variables
Integrations
GitHub Apps
Email notifications
General
Repository name
Enter your student ID
assignment-2025123456
Rename
assignment-2025123456 is available.
Template repositories let users generate new repositories with the same directory structure and files. Learn more about template repositories.
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GitHub Wikis is a simple way to let others contribute content. Any GitHub user can create and edit pages to use for documentation, examples, support, or anything you wish.
Upgrade
Learn more about wikis

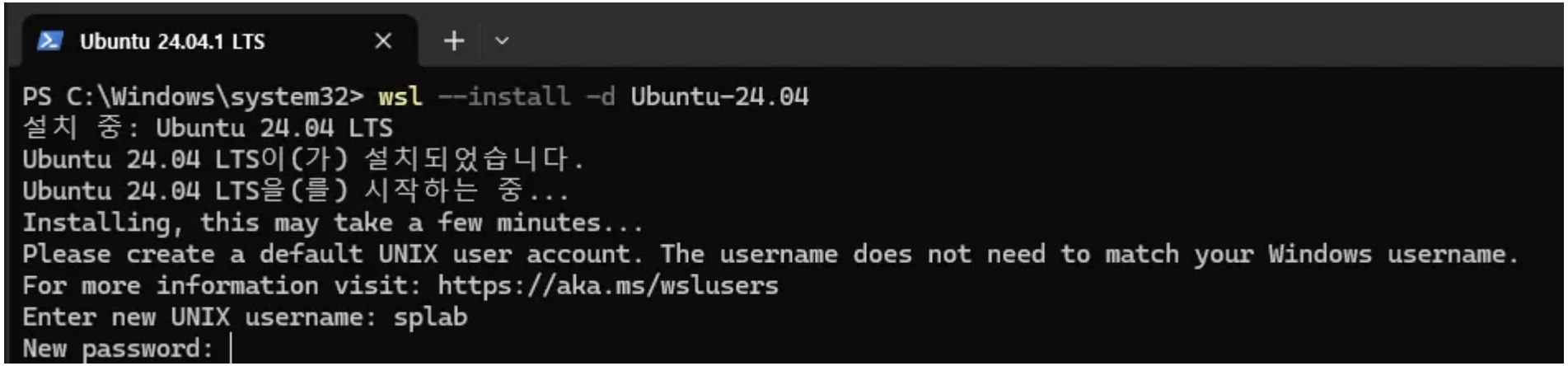
Environment Setting

For Windows

WSL2

- We will use **WSL**(Windows Subsystem for Linux), compatibility layer for running Linux binary executables natively on Windows
- Use powershell to install
  - You must install version **24.04** to run xv6-riscv

```
$ wsl --install -d Ubuntu-24.04
```



QEMU

- We can run xv6 on **QEMU**(Quick EMUlator), a free and open-source hosted hypervisor that performs hardware virtualization
- Install QEMU

```
$ sudo apt install build-essential gdb-multiarch qemu-system-misc gcc-riscv64-linux-gnu
binutils-riscv64-linux-gnu
```

- Check!

```
$ qemu-system-riscv64 –version
$ riscv64-linux-gnu-gcc –version
```

Install GIT

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```

- Create your own repository by accessing the link provided in the announcement
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Install xv6

- Move on to the home directory

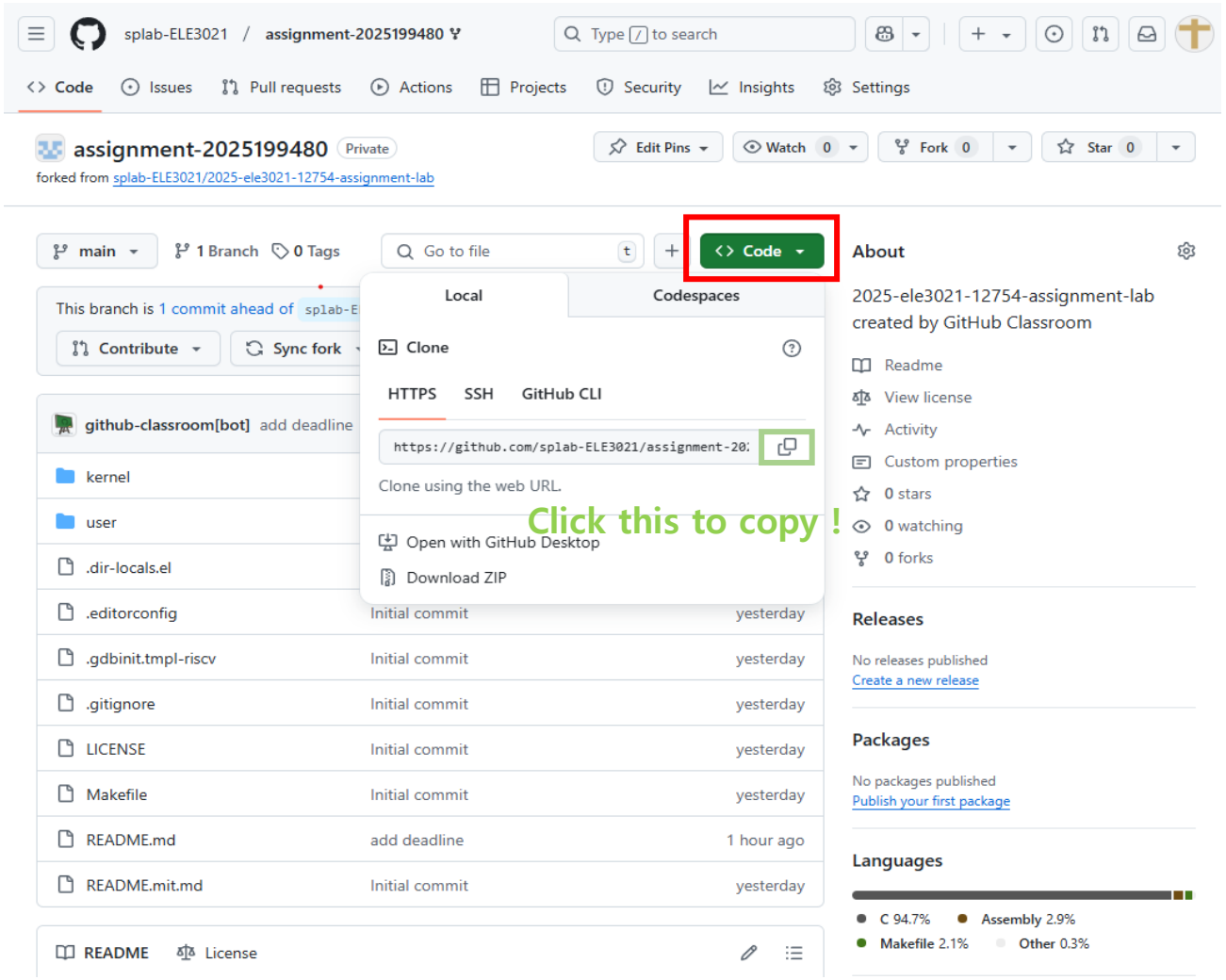
```
$ cd ~
```

- Clone repository from GitHub

```
$ git clone path/to/your/repository
```

- Move on to the xv6 directory

```
$ cd path/to/your/xv6/directory
```


splab-ELE3021 / assignment-2025199480
Type / to search
Code
Issues
Pull requests
Actions
Projects
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Insights
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Private
forked from splab-ELE3021/2025-ele3021-12754-assignment-lab
Edit Pins
Watch 0
Fork 0
Star 0
main
1 Branch
0 Tags
Go to file
Code
This branch is 1 commit ahead of splab-E
Contribute
Sync fork
Local
Codespaces
Clone
HTTPS
SSH
GitHub CLI
https://github.com/splab-ELE3021/assignment-20
Clone using the web URL.
Click this to copy !
Open with GitHub Desktop
Download ZIP
github-classroom[bot] add deadline
kernel
user
.dir-locals.el
.editorconfig Initial commit yesterday
.gdbinit.tmpl-riscv Initial commit yesterday
.gitignore Initial commit yesterday
LICENSE Initial commit yesterday
Makefile Initial commit yesterday
README.md add deadline 1 hour ago
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0 stars
0 watching
0 forks
Releases
No releases published
Create a new release
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No packages published
Publish your first package
Languages
C 94.7%
Assembly 2.9%
Makefile 2.1%
Other 0.3%

Build & Run xv6

- Run xv6 with QEMU

```
$ make qemu
```

- Check out what's in the root directory

```
$ ls
```

- Exit QEMU running xv6

```
Ctrl-A, X
```

Environment Setting

For MacOS

Prerequisites

- Install developer tools

```
$ xcode-select --install
```

- Install homebrew, a package manager for macOS

```
$ /bin/bash -c "$(curl –fsSL
https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"
```

RISC-V toolchain

- Install compiler toolchain

```
$ brew tap riscv/riscv
$ brew install riscv-tools
```

- The brew formula may not link into /usr/local. You will need to update your shell's rc file (e.g. ~/.bashrc) to add the appropriate directory to $PATH.

```
# if you use zsh

$ echo 'export PATH=$PATH:/opt/homebrew/opt/riscv-gnu-toolchain/bin' >> ~/.zshrc
$ source ~/.zshrc
```

QEMU

- We can run xv6 on **QEMU**(Quick EMUlator), a free and open-source hosted hypervisor that performs hardware virtualization
- Install QEMU

```
$ brew install qemu
```

- Check!

```
$ qemu-system-riscv64 –version
$ riscv64-unknown-elf-gcc --version
```

Install xv6

- Move on to the home directory

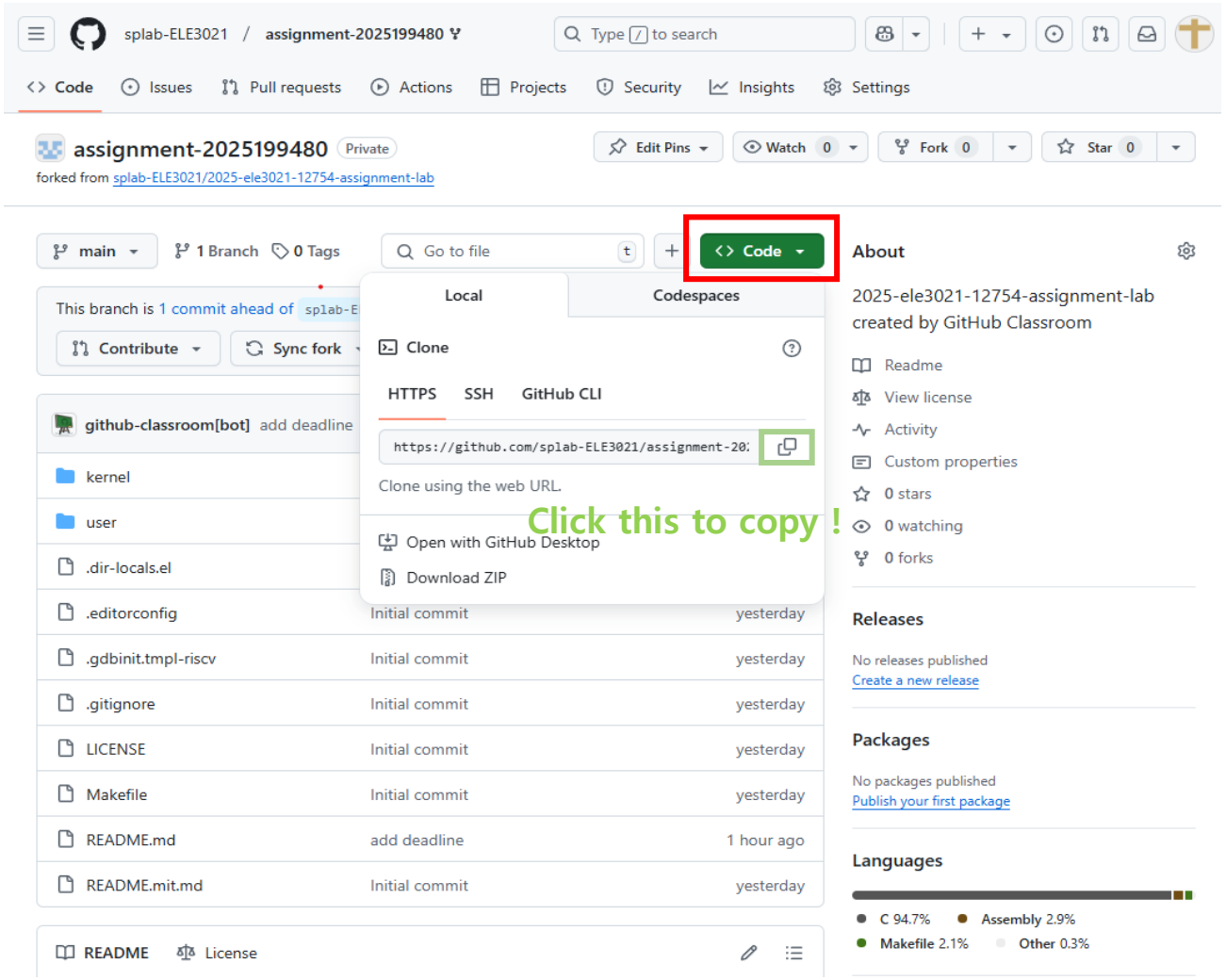
```
$ cd ~
```

- Clone repository from GitHub

```
$ brew install git (if necessary)
$ git clone path/to/your/repository
```

- Move on to the xv6 directory

```
$ cd path/to/your/xv6/directory
```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Go to file
Code
This branch is 1 commit ahead of splab-E
Contribute
Sync fork
Local
Codespaces
Clone
HTTPS
SSH
GitHub CLI
https://github.com/splab-ELE3021/assignment-20
Clone using the web URL.
Click this to copy !
Open with GitHub Desktop
Download ZIP
github-classroom[bot] add deadline
kernel
user
.dir-locals.el
.editorconfig Initial commit yesterday
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- Exit QEMU running xv6

```
Ctrl-A, X
```

Notice

- When you send a mail to TA, please keep in mind following
  - Title should follow format below:

    [ELE3021]_[Class Number]_[Student Number] + Title

    Ex) [ELE3021]_[12754]_[2025123456] About attendance…
  - Text should include name, student number, department and clear question
  - If you need help face to face, send a contact mail
- Please check it carefully. We do not take any questions other than mail.

  (ex> kakao talk, phone call, etc.)
- TA's mail address: hgun1207@hanyang.ac.kr