

Classroom 50

Teacher Training Session

CS50

<https://edx.org/cs50>

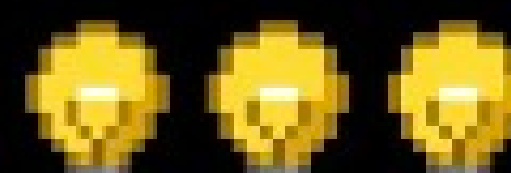
Course





HARVARD
UNIVERSITY

CS50X



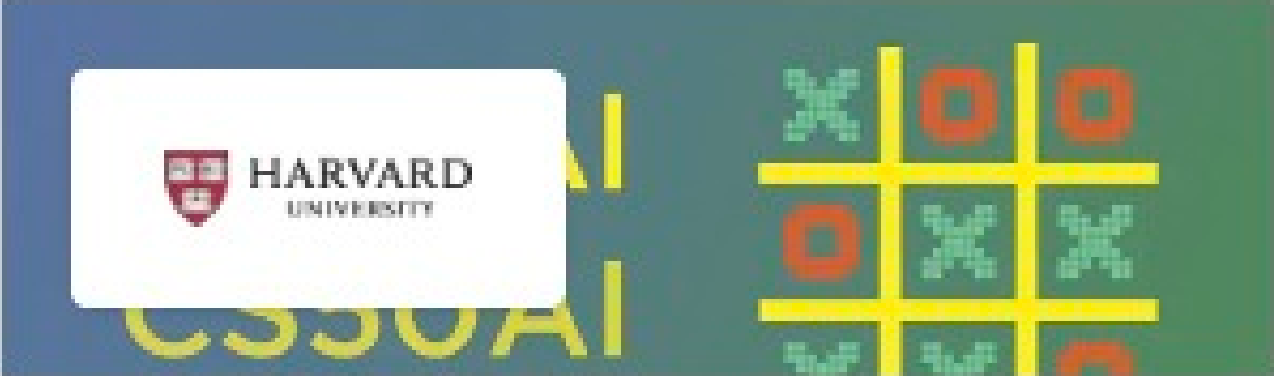
CS50's Introduction to Computer Science

Harvard University

 3 months to complete

 Introductory level

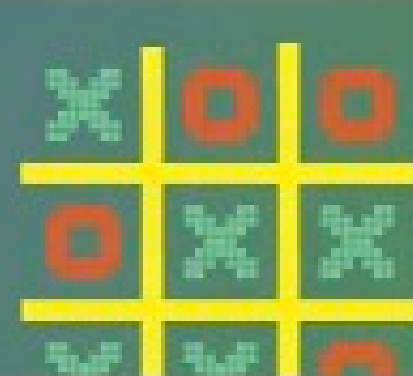
Course





HARVARD
UNIVERSITY

CS50AI



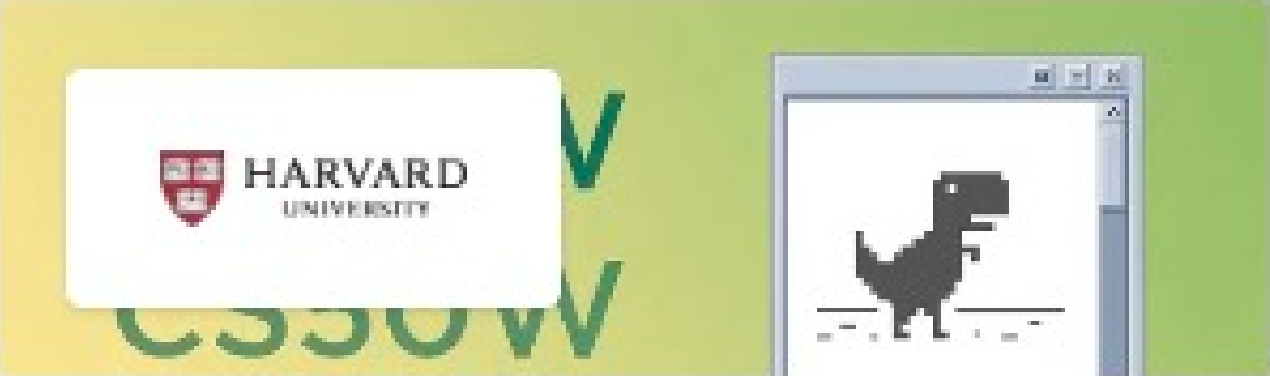
CS50's Introduction to Artificial Intelligence with Python

Harvard University

 7 weeks to complete

 Introductory level

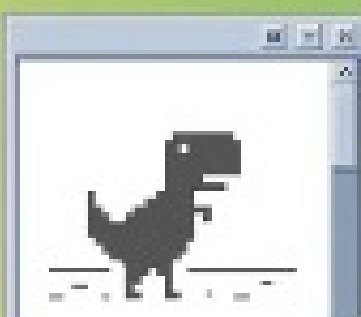
Course





HARVARD
UNIVERSITY

CS50W



CS50's Web Programming with Python and JavaScript

Harvard University

 3 months to complete

 Intermediate level

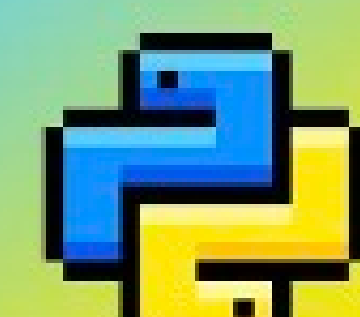
Course





HARVARD
UNIVERSITY

CS50P



CS50's Introduction to Programming with Python

Harvard University

 3 months to complete

 Introductory level

Course





HARVARD
UNIVERSITY

CS50S



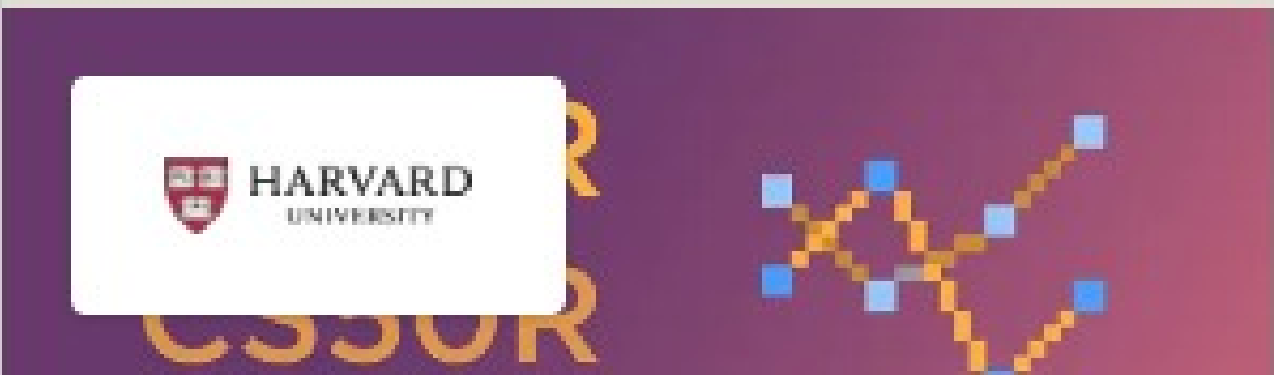
CS50's Introduction to Programming with Scratch

Harvard University

 3 weeks to complete

 Introductory level

Course





HARVARD
UNIVERSITY

CS50R



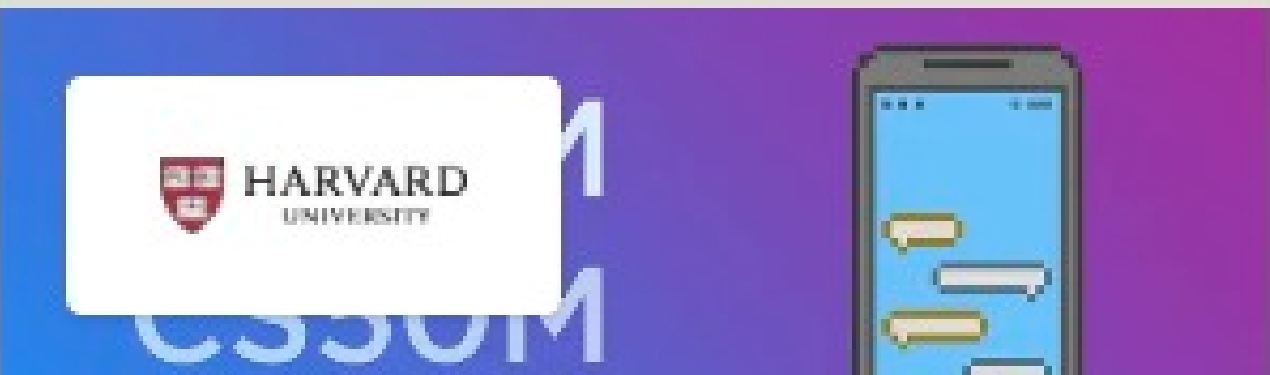
CS50's Introduction to Programming with R

Harvard University

 7 weeks to complete

 Introductory level

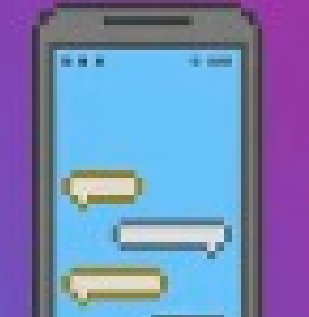
Course





HARVARD
UNIVERSITY

CS50M



CS50's Mobile App Development with React Native

Harvard University

 4 months to complete

 Intermediate level

Course





HARVARD
UNIVERSITY

CS50 Cybersecurity



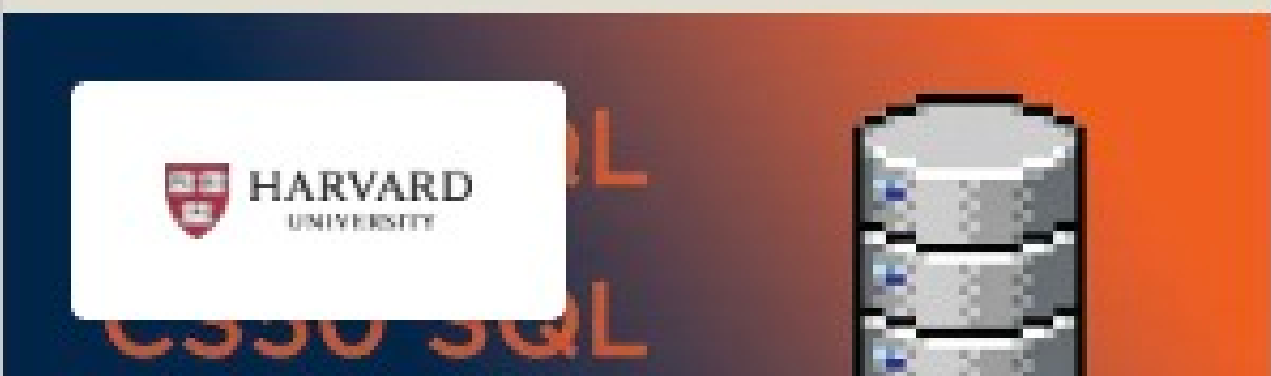
CS50's Introduction to Cybersecurity

Harvard University

 5 weeks to complete

 Introductory level

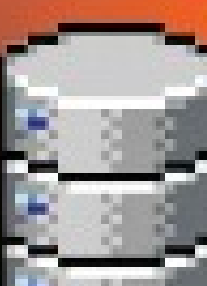
Course





HARVARD
UNIVERSITY

CS50 SQL



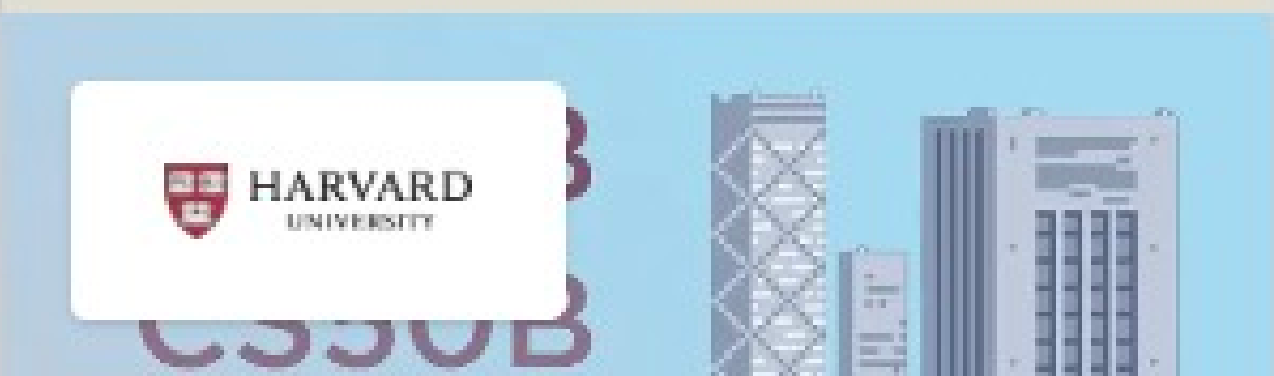
CS50's Introduction to Databases with SQL

Harvard University

 7 weeks to complete

 Introductory level

Course





HARVARD
UNIVERSITY

CS50B



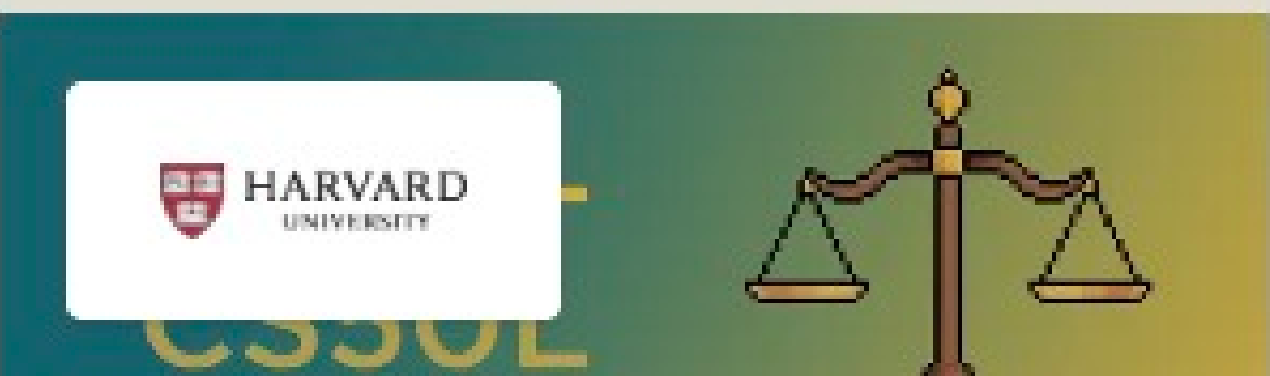
CS50's Computer Science for Business

Harvard University

 8 months to complete

 Introductory level

Course





HARVARD
UNIVERSITY

CS50L



CS50's Computer Science for Lawyers

Harvard University

 3 months to complete

 Introductory level

Course





HARVARD
UNIVERSITY

CS50



CS50's AP® Computer Science Principles

Harvard University

 9 months to complete

 Introductory level

CS50 atop GitHub

- GitHub Classroom for **distributing assignments**
- GitHub Repositories for **storing submissions**
- GitHub Organizations for **organizing submissions**
- GitHub Teams for **managing permissions**
- GitHub Actions for **autograding**
- GitHub Codespaces for **writing code**
- GitHub OAuth for **authenticating**
- GitHub Container Registry for **storing Docker images**
- GitHub Copilot for **developing final projects**
- GitHub REST API for **automating tasks**

CS50 atop GitHub

- `submit50`
- `check50`
- ...

Fifty Foundation

<https://fifty.foundation>

Classroom 50

<https://classroom50.org>

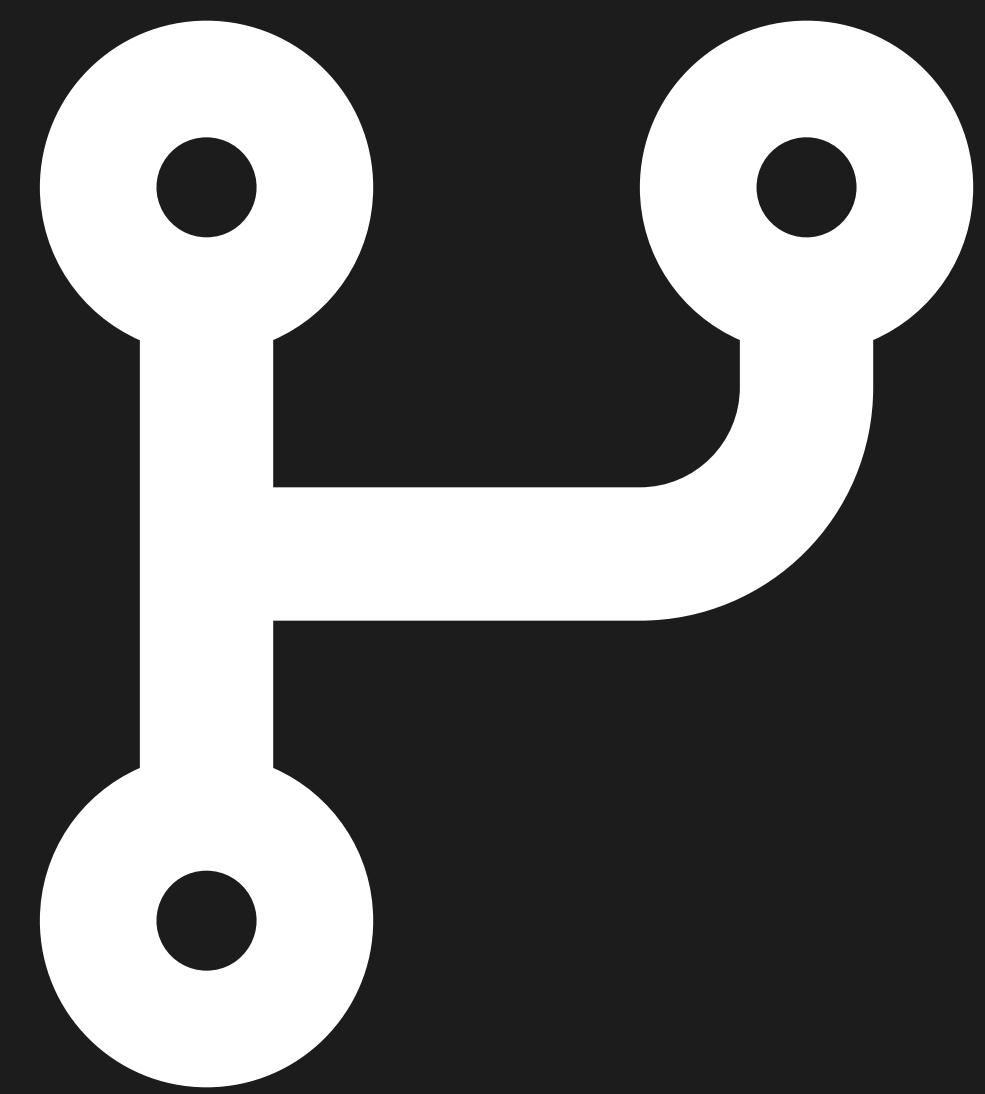
Classroom 50

<https://github.com/foundation50/classroom50>

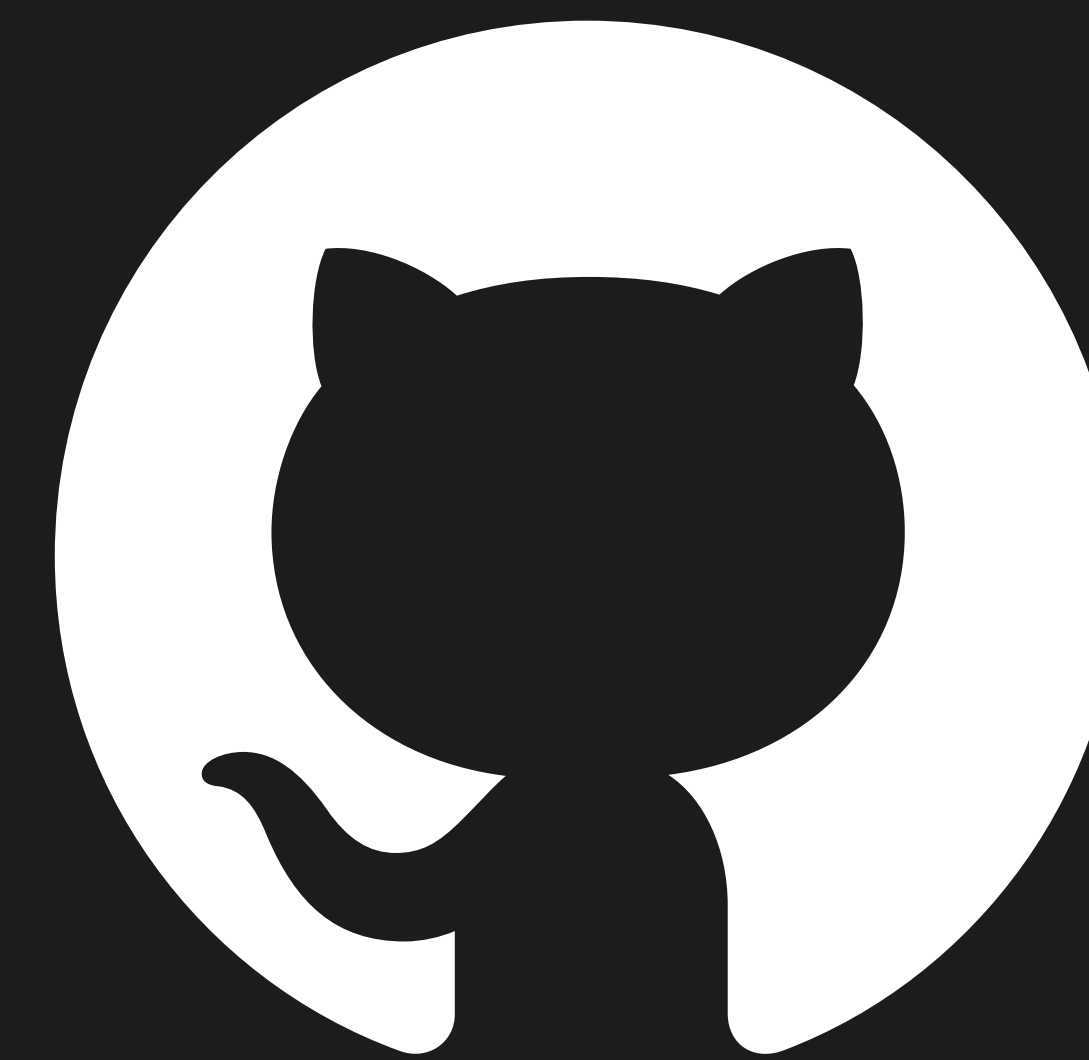
Classroom 50

- Create assignments with starter code
- Define correctness tests
- Distribute individual and group assignments
- Collect submissions
- Autograde submissions
- Provide inline qualitative feedback on submissions
- Manage course rosters and scores

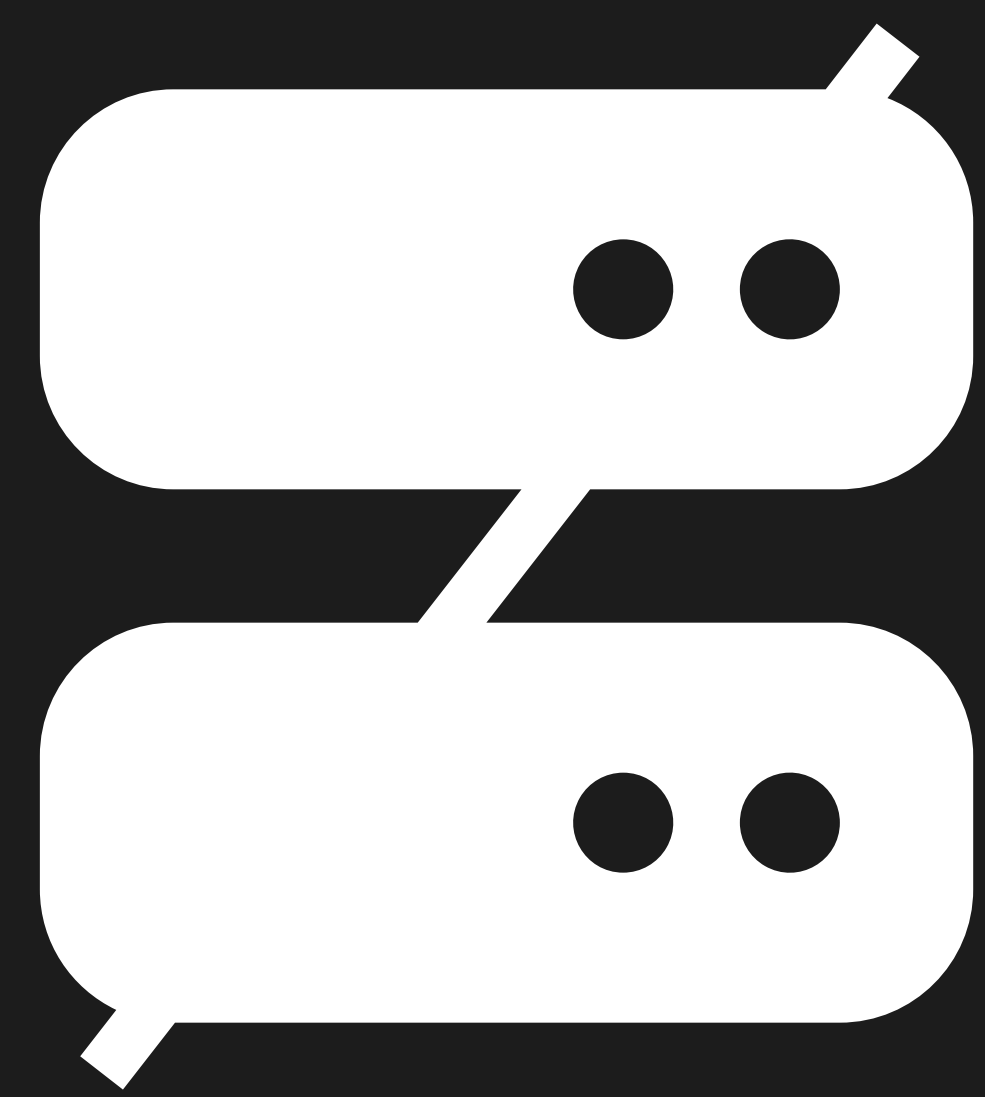
Design



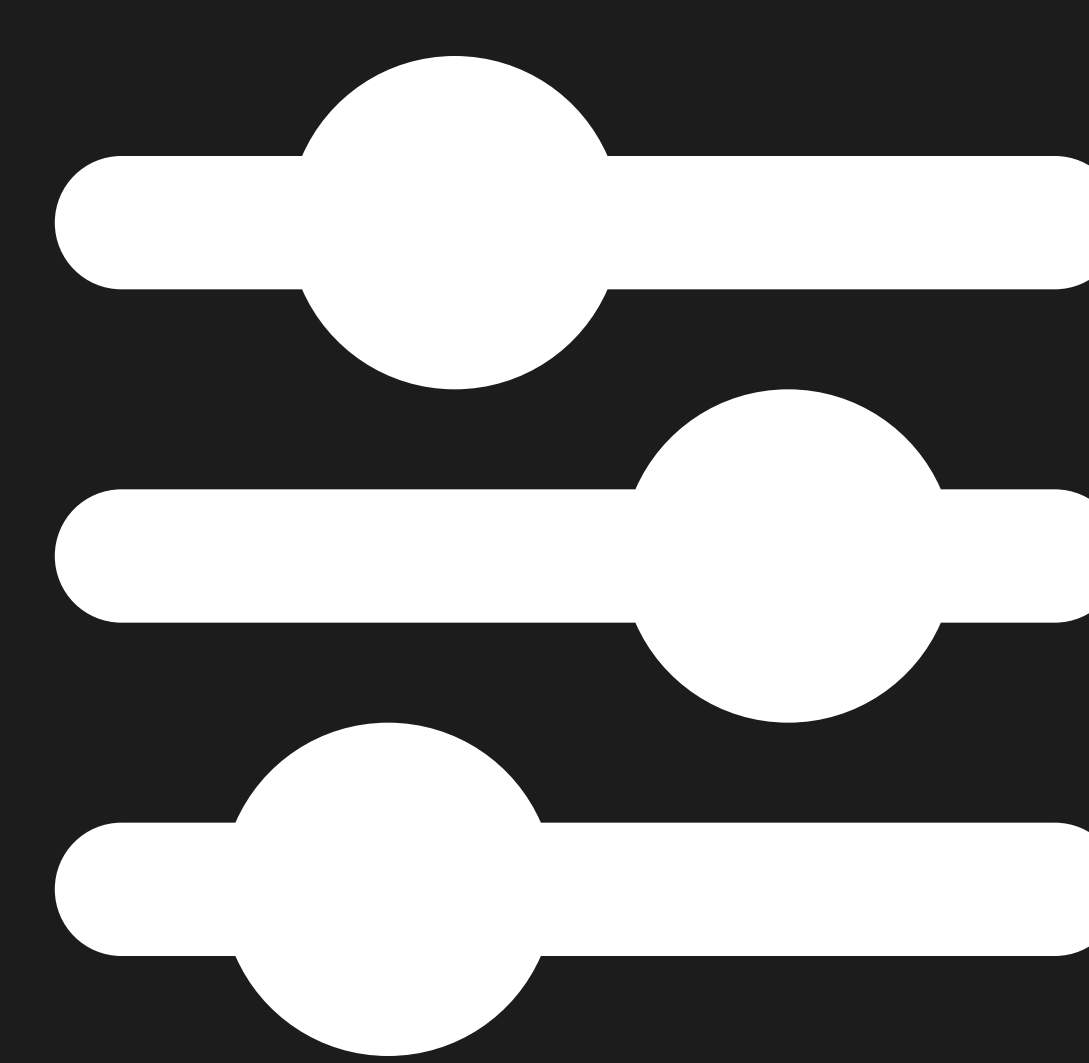
Open-Source



GitHub-Based

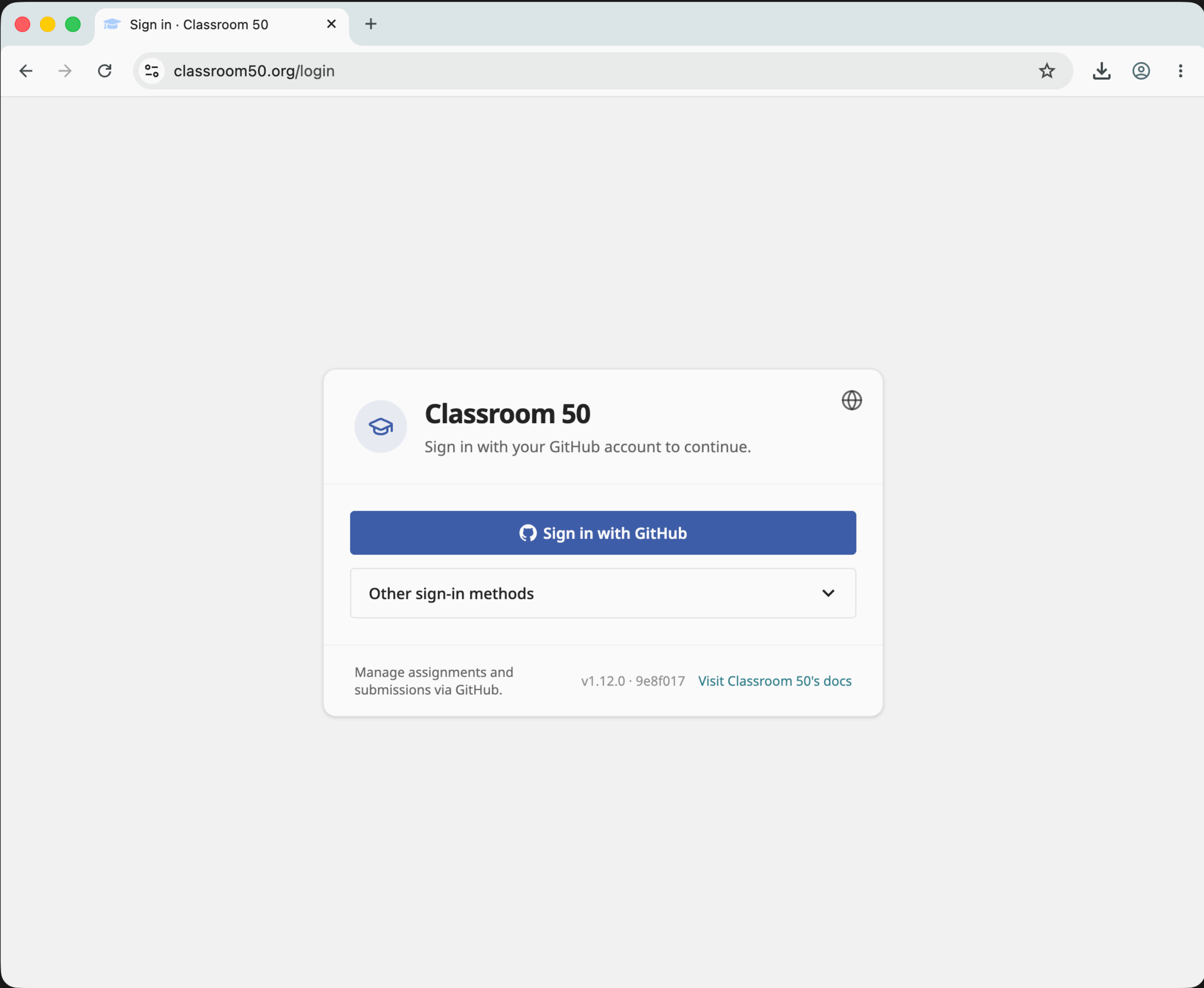


Serverless

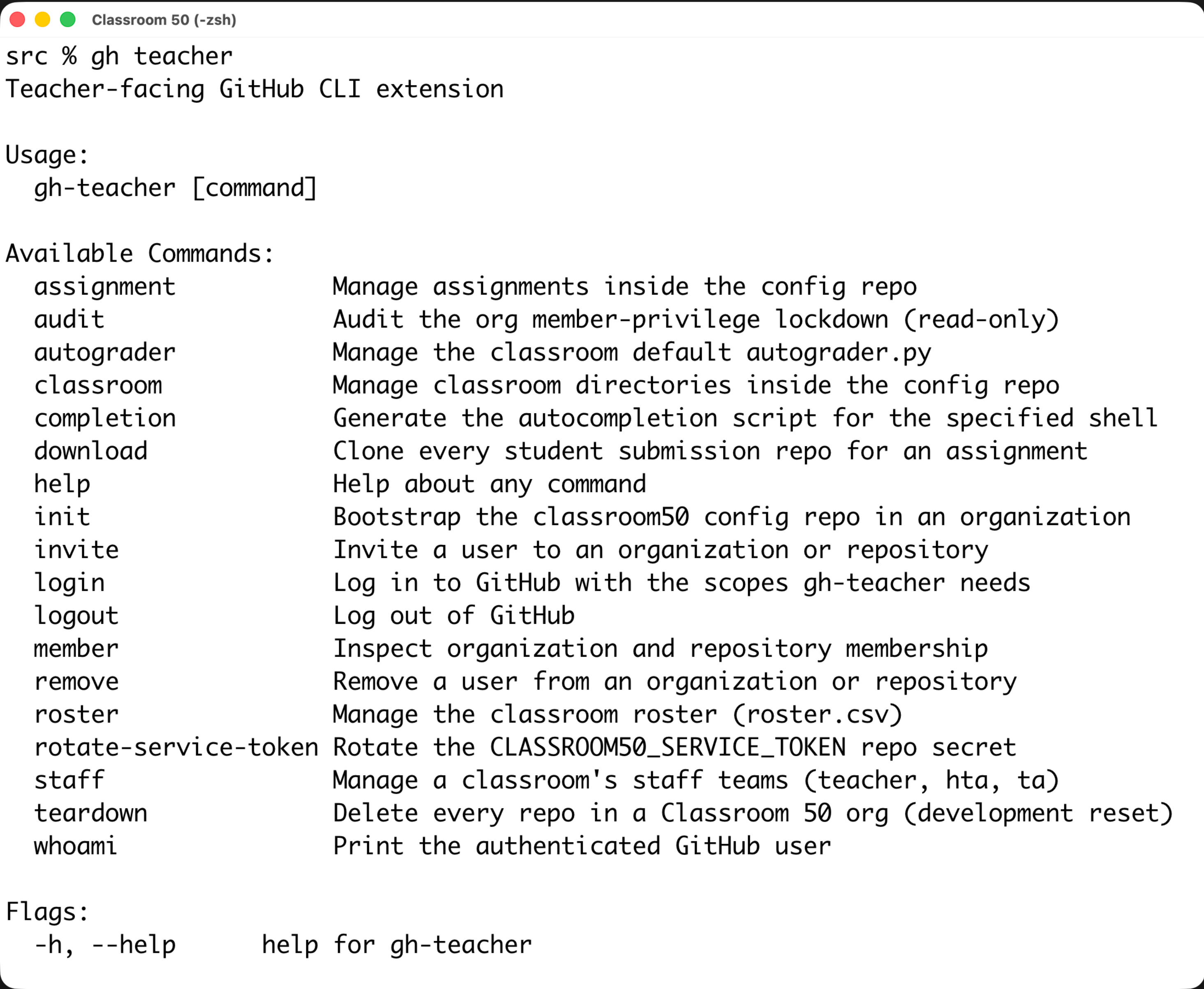


Customizable

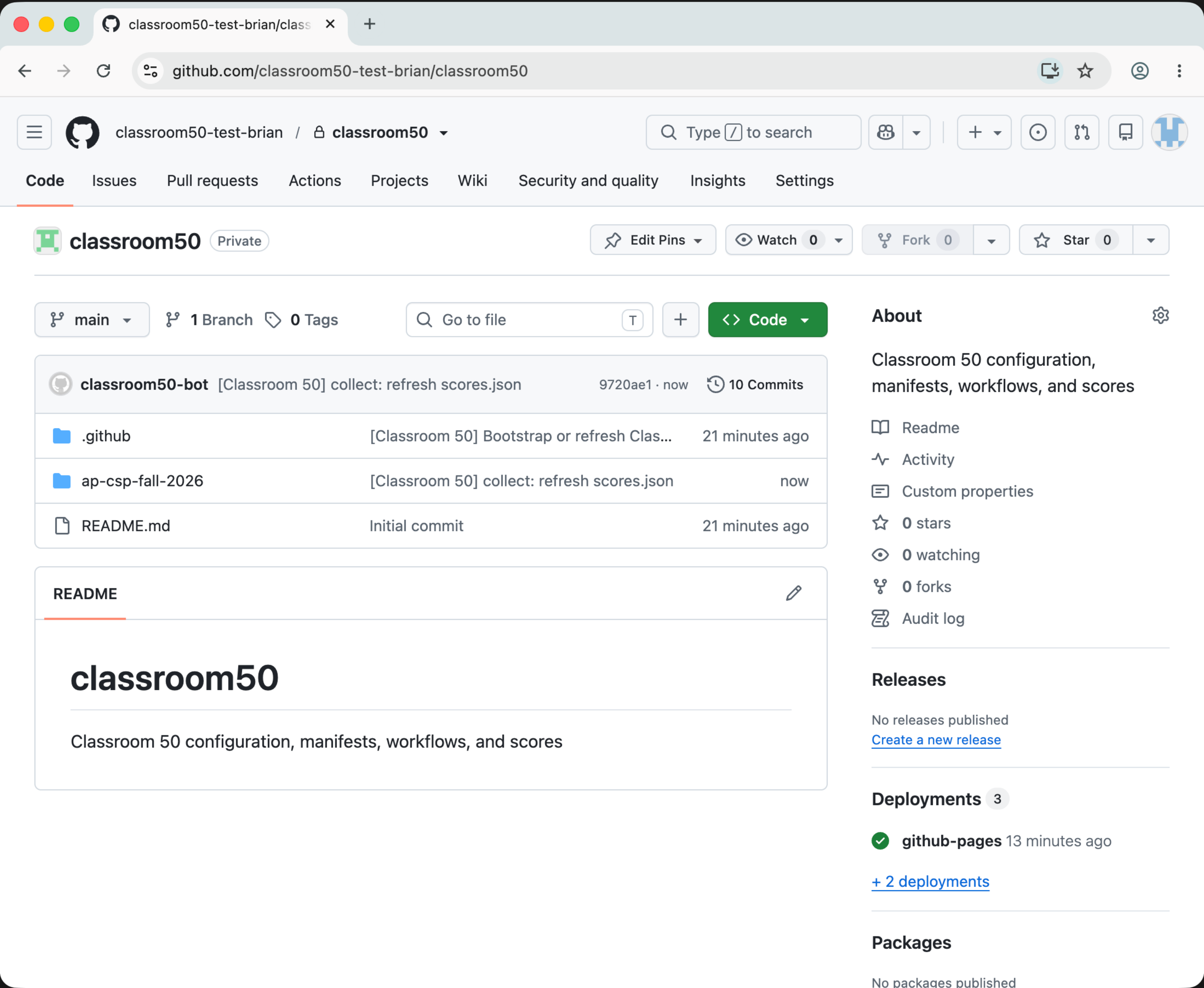
Interfaces



Web



Command-Line



GitHub

What You Need

- GitHub account
- GitHub organization with Team plan
 - Free via GitHub Education for verified teachers

GitHub Organization

Classroom 1

Assignment A

Assignment B

Assignment C

Classroom 2

Assignment D

Assignment E

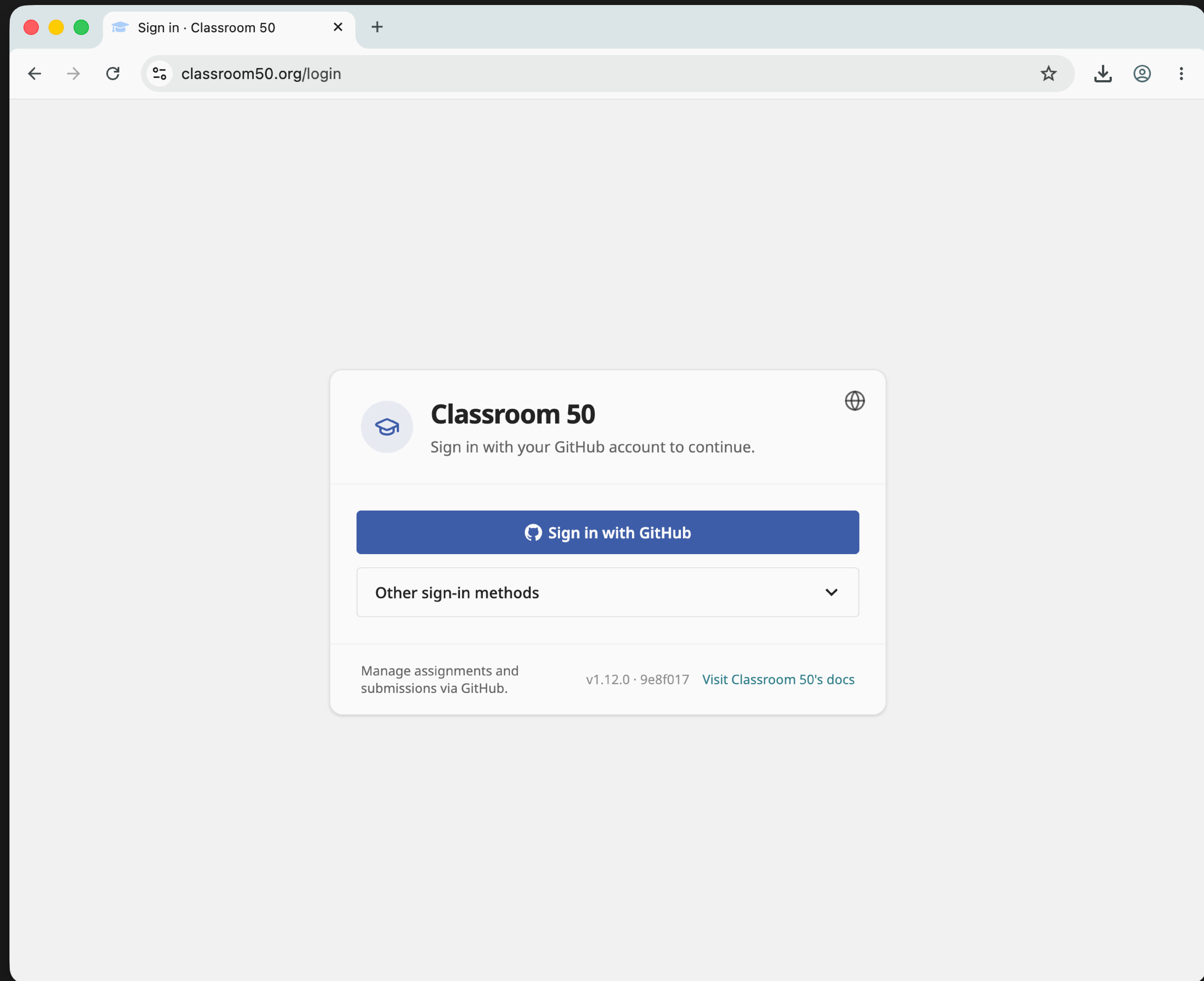
Classroom 3

Assignment F

Assignment G

Assignment H

Sign In



Organizations

Organizations · Classroom 50

classroom50.org

☆ ⬇️ 👤 ⋮

Classroom 50

Organizations

Classroom 50 organizations

Set up your first Classroom 50 organization

You own organizations that aren't set up yet. Configure Classroom 50 to start creating classrooms and assignments.

+ Set up an organization

Set up a new Classroom 50 organization

Pick one of your GitHub organizations to configure Classroom 50 in. Don't see the one you want? Create it on GitHub first.

Not seeing your organization?

Refresh list

ORGANIZATION READY TO SET UP (1)

classroom50-test-brian

Enterprise Plan

Set up

Create an organization on GitHub

Brian Yu

Setup

Setup · Classroom 50

classroom50.org/classroom50-test-brian/setup

☆ ⬇️ 👤 ⋮

Classroom 50 <

My classrooms

Published

Members

Activity

Settings

GITHUB ORGANIZATION

classroom50-test-brian

Brian Yu

Teacher

Setup Classroom 50

This will set up your GitHub organization to use Classroom 50.

1 2 3

Run setup

> Organization safety defaults

Locks down organization member privileges to safe defaults (base permissions, repo creation, visibility changes, and related settings).

> Actions permissions

Enables GitHub Actions for the organization.

> Actions spending cap

Creates a \$0 GitHub Actions spending cap (only if none exists).

> Actions pull request creation

Allows GitHub Actions to create and approve pull requests in the organization.

> Config repository

Creates the private classroom50 configuration repository in the organization.

> Skeleton files

Commits or updates the workflow and script files Classroom 50 needs in the classroom50 repository.

> Branch protection

Protects the classroom50 repository's main branch.

Create Classroom

Classroom 50

<

My classrooms

Published

Members

Activity

Settings

GITHUB ORGANIZATION

classroom50-test-brian

Brian Yu

Teacher

New classroom · Classroom 5

+

←

→

↺

classroom50.org/classroom50-test-brian/classes/new

🔑

☆

👤

⋮

Classrooms > New classroom

Create classroom

Basic information

Classroom name *

AP Computer Science Principles

Classroom slug *

ap-csp-fall-2026

Classroom term

Fall 2026

☐

Use an unlisted link for this classroom

Publishes this classroom's assignment data at an unguessable URL instead of one anyone can reach by guessing the org name. This is obscurity, not real access control: anyone who gets the link can read it, and links can leak (browser history, referrers, search crawlers). Off by default.

Create classroom

Roster

Classroom 50

<

<

All classrooms

AP Computer Science Principles

Fall 2026

Assignments

Roster

Settings

GITHUB ORGANIZATION

classroom50-test-brian

Brian Yu

Teacher

Classrooms > AP Computer Science Principles > Roster

Roster

5 members enrolled

1 teacher

View roster.csv

Search members

All members

All roles

5 members

+

↑

↗

BY

Brian Y.

@brianyu28

Teacher

>

AF

Anna F.

@student1

Student

>

DG

Dale G.

@student2

Student

>

AF

Sally R.

@student3

Student

>

AF

Shannon L.

@student4

Student

>

Create Assignment

New assignment · Classroom

×

+

←

→

↺

classroom50.org/classroom50-test-brian/ap-csp-fall-2026/assignments/new

☆

👤

⋮

🎓 Classroom 50

⏪

⏪ All classrooms

AP Computer Science Principles

Fall 2026

📄 Assignments

👤 Roster

⚙️ Settings

GITHUB ORGANIZATION

classroom50-test-brian

👤

Brian Yu

Teacher

Classrooms

>

AP Computer Science Principles

>

New assignment

Create assignment

Details

Assignment name *

Fibonacci

Assignment slug * ?

fibonacci

Description (optional)

Describe the assignment objectives...

🔗 Template repository (optional) ?

classroom50-test-brian/fibonacci

Settings

Assignment type

☒ Individual

☐ Group project

☒ Feedback pull request ?

☐ Empty repository ?

☐ Set a due date ?

▶ Advanced settings

Configure Tests

New assignment · Classroom

classroom50.org/classroom50-test-brian/ap-csp-fall-2026/assignments/new

Classroom 50

← All classrooms

AP Computer Science Principles

Fall 2026

Assignments

Roster

Settings

GITHUB ORGANIZATION

classroom50-test-brian

Brian Yu

Teacher

Test name

Test 8

Test type

Input/Output

Run command

Python (pytest)

Run a command, feed it stdin, and compare its stdout against an expected value.

Setup command

optional – e.g., gcc -o hello hello.c

Run command

python3 fibonacci.py

Input (stdin)

8

Expected output

21

Comparison

Exact — output equals expected (surrounding whitespace ignored)

Add test

create assignment

Assignment

Submissions · Classroom 50

classroom50.org/classroom50-test-brian/ap-csp-fall-2026/assignments/fibonacci/submissions

Classroom 50

← All assignments

Fibonacci

Assignment

Submissions

Settings

GITHUB ORGANIZATION

classroom50-test-brian

Brian Yu

Teacher

Classrooms > AP Computer Science Principles > Assignments > fibonacci > Submissions

Fibonacci

No due date [View template](#)

Submission data synced 10 hours ago [Refresh submissions](#)

[Share](#)

[Actions](#)

Student	Submissions	Score	Last submitted	Actions
---------	-------------	-------	----------------	---------

How students accept

Share an invite link or CLI command so students can accept this assignment.

Sharing with **4 students** who can accept this assignment.

https://classroom50.org/classroom50-test-brian/ap-csp-fall-2026/as: [Copy](#)

> Prefer the command line?

Accept Assignment

Accept assignment · Classroo x +

← → ↺ classroom50.org/classroom50-test-brian/ap-csp-fall-2026/assignments/fibonacci/accept ☆ ⓘ ⋮

 Classroom 50

🌐 Language

👤 Individual assignment No due date

Fibonacci

Accept this assignment to get your own copy of the starter code repository.

Signed in as

 Anna F.
🔄 student1

Repository will be created as:
classroom50-test-brian/ap-csp-fall-2026-fibonacci-student1

Accept assignment

Student Repository

classroom50-test-brian/ap-cs

+

← → ↺

https://github.com/classroom50-test-brian/ap-csp-fall-2026-fibonacci-student1

🔒

⋮

☰

🐙

⋮

/

🔒 ap-csp-fall-2026-fibonacci-student1

▼

🔍 Type / to search

🔒

▼

+

▼

🕒

🔗

📄

🌐

Code

Pull requests

Actions

Security and quality

Insights

Settings

🏠

ap-csp-fall-2026-fibonacci-student1

Private

📌 Edit Pins ▼

👁 Watch 0 ▼

🍴 Fork 0 ▼

★ Star 0 ▼

🔗 main ▼

🔗 1 Branch

🏷 0 Tags

🔍 Go to file

T

+

<> Code ▼

🌐 student1 [Classroom 50] Initialize .classroom50.y... 🗨 ● ed69603 · 1 minute ago 🕒 2 Commits

📁 .github/workflows

[Classroom 50] Initialize .classroom50.ya...

1 minute ago

📄 .classroom50.yaml

[Classroom 50] Initialize .classroom50.ya...

1 minute ago

📄 fibonacci.py

Initial commit

1 minute ago

README

📖

Add a README

Help people interested in this repository understand your project.

Add a README

About

⚙

No description, website, or topics provided.

📶 Activity

📋 Custom properties

★ 0 stars

👁 0 watching

🔗 0 forks

📋 Audit log

Releases

No releases published

[Create a new release](#)

Packages

No packages published

[Publish your first package](#)

Contributors 1

🌐 student1 Anna F.

Autograding

Release Submission submit/2

https://github.com/classroom50-test-brian/ap-csp-fall-2026-fibonacci-student1/releases/tag/submit%2F2026-07-22T04-0...

github

...

ap-csp-fall-2026-fibonacci-student1

Type / to search

Code

Pull requests 1

Actions

Security and quality

Insights

Settings

Releases

submit/2026-07-22T04-09-48Z-85d8c24

Submission submit/2026-07-22T04-09-48Z-85d8c24

Compare

Latest

github-actions

released this 3 minutes ago

submit/2026-...

85d8c24

classroom50 autograde: 40/50

Test	Result	Score
Test 0	FAIL	0 / 10
Test 2	PASS	10 / 10
Test 3	PASS	10 / 10
Test 8	PASS	10 / 10
Test 10	PASS	10 / 10

► Failure details

Status: classroom50 autograde: 40/50 (4/5 tests passed)

▼ Assets

3

How It Works

- GitHub Organizations for **organizing submissions**
- GitHub Repositories for **storing classroom state**
- GitHub Pages for **publishing assignments**
- GitHub Actions for **autograding and collecting scores**
- GitHub Releases for **autograding results and feedback**

Walkthrough

CLI

Install GitHub CLI

- Classroom 50 ships as **GitHub CLI** extensions
- Install the GitHub CLI first at cli.github.com

Install Extensions



```
$ gh extension install foundation50/gh-teacher
```

```
$ gh extension install foundation50/gh-student
```

Log In



```
$ gh teacher login
```

```
$ gh student login
```

- Requests the scopes Classroom 50 needs
- Choose a browser (web) flow or a device code

Log In: Teacher

```

$ gh teacher login
? What is your preferred protocol for Git operations on this host? HTTPS
? Authenticate Git with your GitHub credentials? Yes
? How would you like to authenticate GitHub CLI? Login with a web browser

! First copy your one-time code: 819C-E9C3
Press Enter to open https://github.com/login/device in your browser...
✓ Authentication complete.
- gh config set -h github.com git_protocol https
✓ Configured git protocol
✓ Logged in as octocat-teacher
```

Set Up Organization



```
$ gh teacher init <org>
```

Set Up Organization

```
$ gh teacher init github-org-name
```

```
Preflight checks
```

```
✓ auth scopes: admin:org, read:org, repo, workflow present
```

```
✓ org access: organization "github-org-name" is reachable
```

```
✓ org plan: plan "team" supports Pages from a private repo
```

```
✓ org ownership: you are an org owner
```

```
✓ service token: token will be prompted interactively
```

```
[13/13] Done
```

```
CLASSROOM50_SERVICE_TOKEN (input hidden, ends with Enter):
```

The Service Token

Classroom 50 has no server: GitHub Actions is used for async work, including autograding submissions and collecting scores.

Those workflows use this token to reach assignment repositories in the org.

Scope

Access

Repository → Contents

Read and write

Repository → Actions

Read and write

Repository → Administration

Read and write

Repository → Metadata

Read (auto-included)

Organization → Members

Read

Set Up Organization

Service token: validated and stored as the CLASSROOM50_SERVICE_TOKEN secret.

✓ github-org-name: init complete

Setup

config repo (reused): <https://github.com/github-org-name/classroom50>

pages (after first publish-pages run): <https://github-org-name.github.io/classroom50/>

service token: configured (prompted)

feedback PR prerequisites: ready

actions budget cap: in place

Action required – set these by hand (org owner)

[] Set "App access requests" to "Members only"

[] Uncheck "Allow repository admins to install GitHub Apps"

[] Set "Projects base permissions" to "No access"

[] Uncheck "Allow admins to rename org-protected branches"

then run ``gh teacher audit github-org-name`` to confirm

Create a Classroom



```
$ gh teacher classroom add <org> <short-name>
```

Create a Classroom

```
$ gh teacher classroom add github-org-name cs42 \
  --name "CS 42" --term Summer-2026

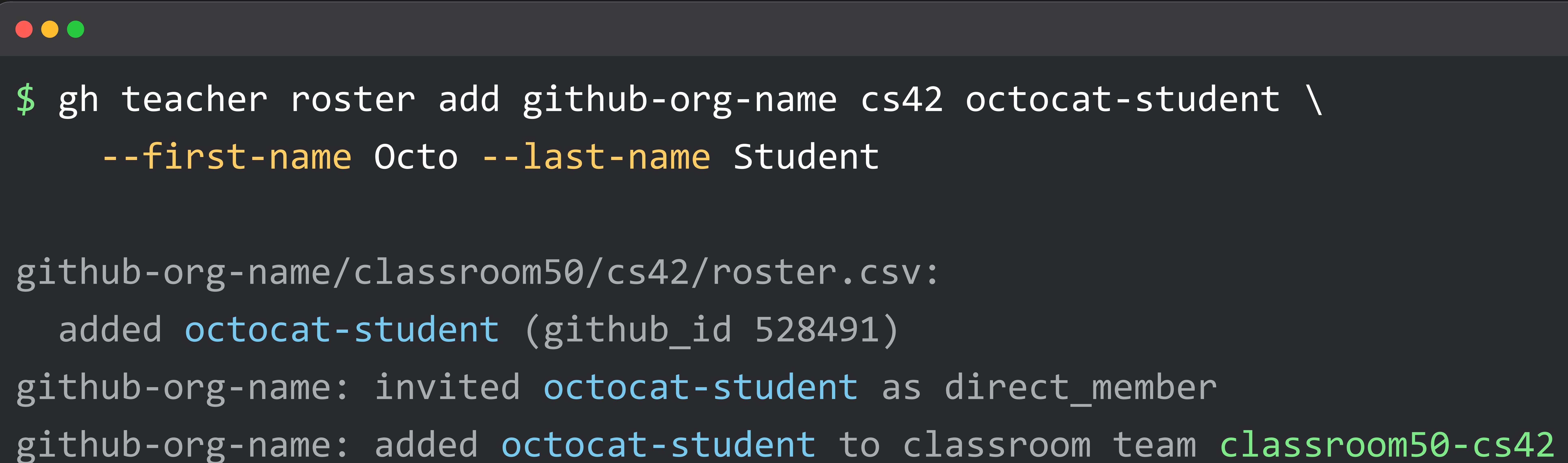
github-org-name/classroom50: added classroom cs42 (4 files)
github-org-name: classroom team classroom50-cs42 ready
github-org-name: staff teams classroom50-cs42-teacher
classroom50-cs42-hta, classroom50-cs42-ta ready
View at https://github.com/github-org-name/classroom50/tree/main/cs42
Next: gh teacher roster add github-org-name cs42 <username>
```

Add a Student



```
$ gh teacher roster add <org> <classroom> <username>
```

Add a Student



```
$ gh teacher roster add github-org-name cs42 octocat-student \  
  --first-name Octo --last-name Student  
  
github-org-name/classroom50/cs42/roster.csv:  
  added octocat-student (github_id 528491)  
github-org-name: invited octocat-student as direct_member  
github-org-name: added octocat-student to classroom team classroom50-cs42
```

Create an Assignment



```
$ gh teacher assignment add <org> <classroom> <slug> --name "<name>"
```

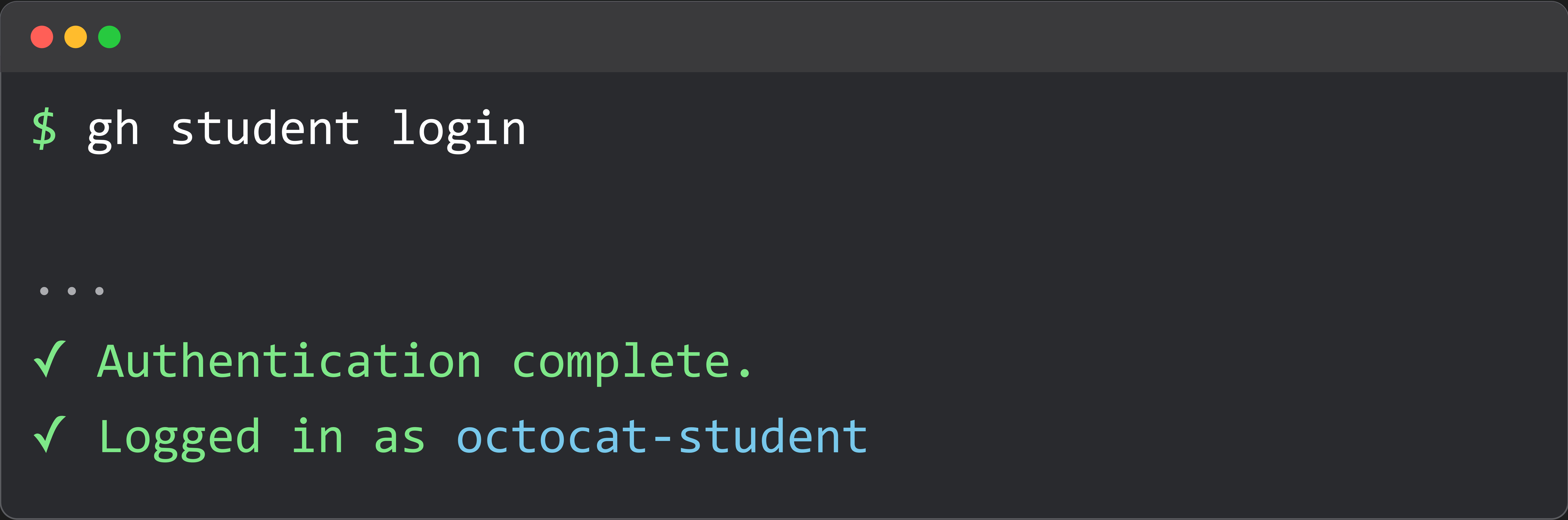
Create an Assignment

```
$ gh teacher assignment add github-org-name cs42 hello --name "Hello" \
  --template github-org-name/hello-template --due 2026-09-15T23:59:00-04:00
```

```
github-org-name/classroom50/cs42/assignments.json: added hello
(template github-org-name/hello-template@main, autograder default)
github-org-name: granted classroom + staff teams read on private template
hello-template
```

Students can now run: `gh student accept github-org-name cs42 hello`

Log In: Student



```
$ gh student login
```

```
...
```

```
✓ Authentication complete.
```

```
✓ Logged in as octocat-student
```

Accept an Assignment



```
$ gh student accept <org> <classroom> <assignment>
```

Accept an Assignment

```
$ gh student accept github-org-name cs42 hello
```

```
Looking up hello in github-org-name/cs42...
```

```
Found assignment hello done
```

```
Creating private repo for hello...
```

```
Created github-org-name/cs42-hello-octocat-student done
```

```
Setting up autograder and metadata...
```

```
Autograder and metadata configured done
```

```
Assignment accepted: github-org-name/cs42-hello-octocat-student
```

```
git clone https://github.com/github-org-name/cs42-hello-octocat-student.git
```

Submit Assignment



```
$ gh student submit
```

Submit Assignment



```
$ gh student submit
```

```
Submitting...
```

```
Submission pushed done
```

```
Submitted assignment "Hello" at 2026-07-24 02:26:02 EDT
```

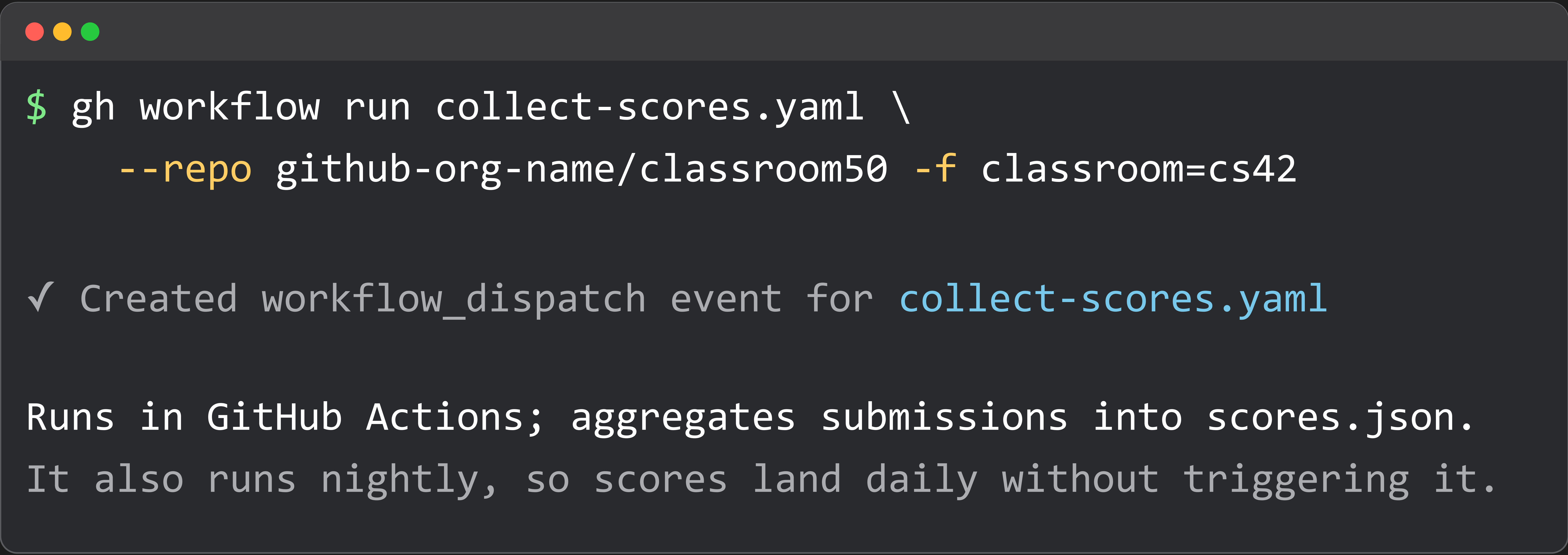
```
View your submission at: https://github.com/.../4bf89e6
```

Collect Scores



```
$ gh workflow run collect-scores.yaml
```

Collect Scores



```
$ gh workflow run collect-scores.yaml \  
  --repo github-org-name/classroom50 -f classroom=cs42
```

✓ Created workflow_dispatch event for `collect-scores.yaml`

Runs in GitHub Actions; aggregates submissions into `scores.json`.
It also runs nightly, so scores land daily without triggering it.

View Scores



```
$ gh teacher download <org> <classroom> <assignment>
```

View Scores

```
$ gh teacher download github-org-name cs42 hello
```

```
Cloning cs42-hello-octocat-student... Done
```

```
Wrote scores.csv
```

```
github-org-name: 1 cloned, 0 already on disk,  
0 missing, 0 failed (of 1 member)
```

```
scores.csv (key columns):
```

```
username,score,max_score,submission_tag,late
```

```
octocat-student,0,0,submit/2026-07-24T06-27-00Z-2105f0f,false
```

Recap

- **Teacher** sets up the org: `gh teacher init`
 - Create a classroom and add students: `classroom add, roster add`
 - Register an assignment: `assignment add`
- **Student** works on the assignment: `gh student accept, submit`
- **Teacher** grades: `collect-scores workflow`
- **Teacher** downloads scores with: `gh teacher download`

Advanced Usage

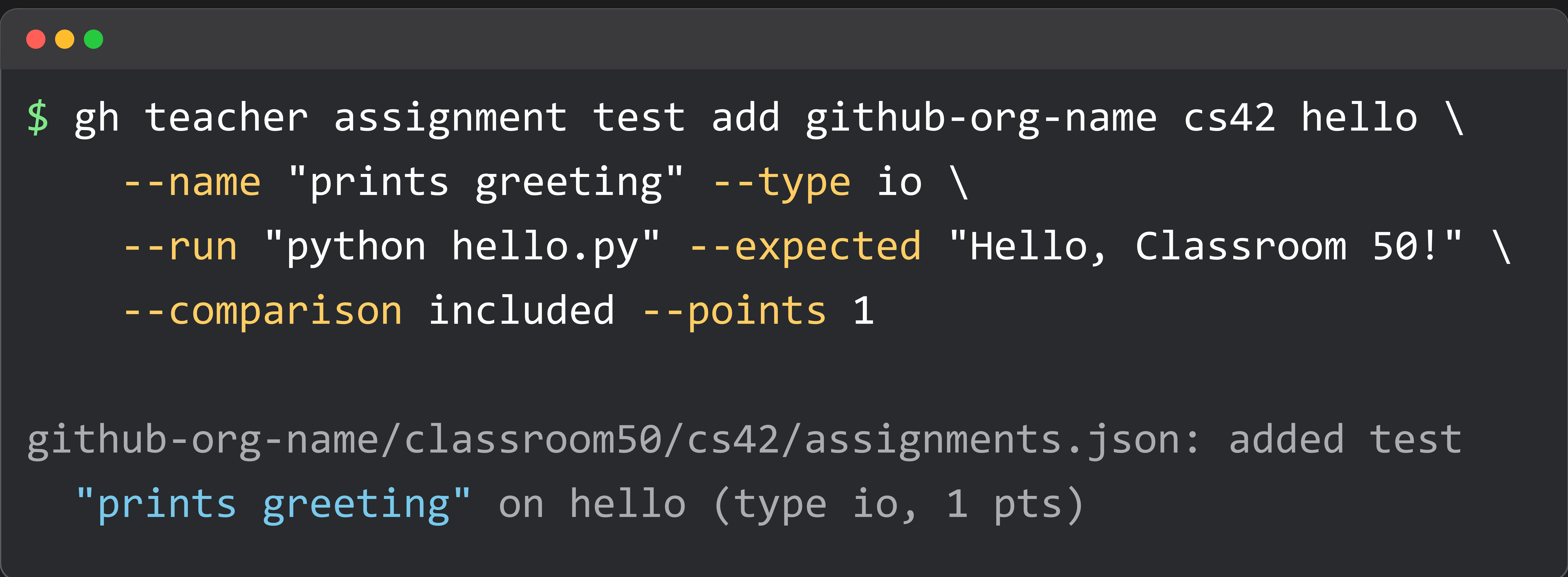
- Autograding tests: `assignment test add`
- Custom autograder: `autograder set-default`
- Runtime & Docker: `--runtime`

Autograding Tests



```
$ gh teacher assignment test add <org> <classroom> <slug>
```

Autograding Tests



```
$ gh teacher assignment test add github-org-name cs42 hello \  
  --name "prints greeting" --type io \  
  --run "python hello.py" --expected "Hello, Classroom 50!" \  
  --comparison included --points 1
```

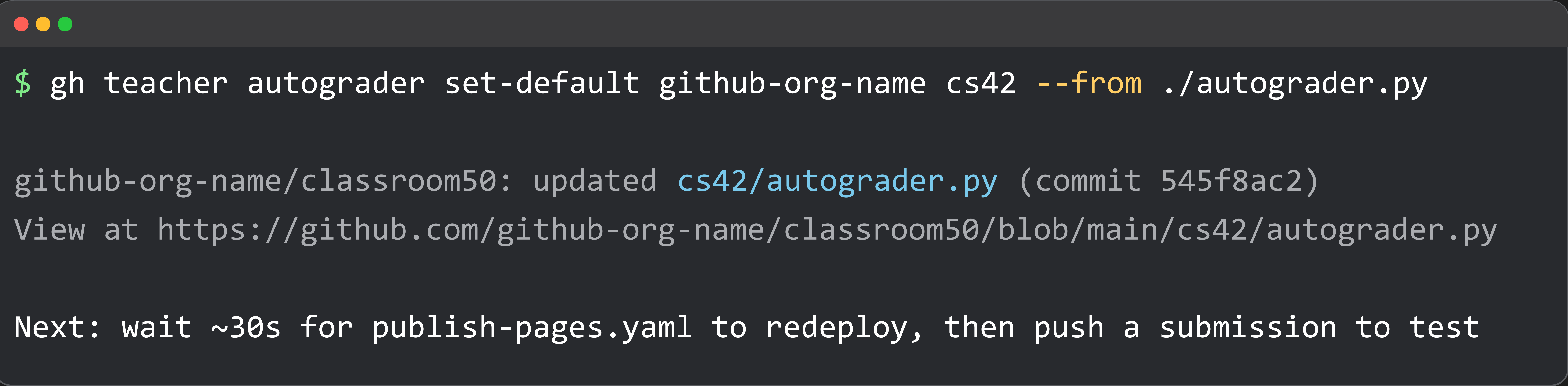
```
github-org-name/classroom50/cs42/assignments.json: added test  
  "prints greeting" on hello (type io, 1 pts)
```

Custom Autograder



```
$ gh teacher autograder set-default <org> <classroom>
```

Custom Autograder



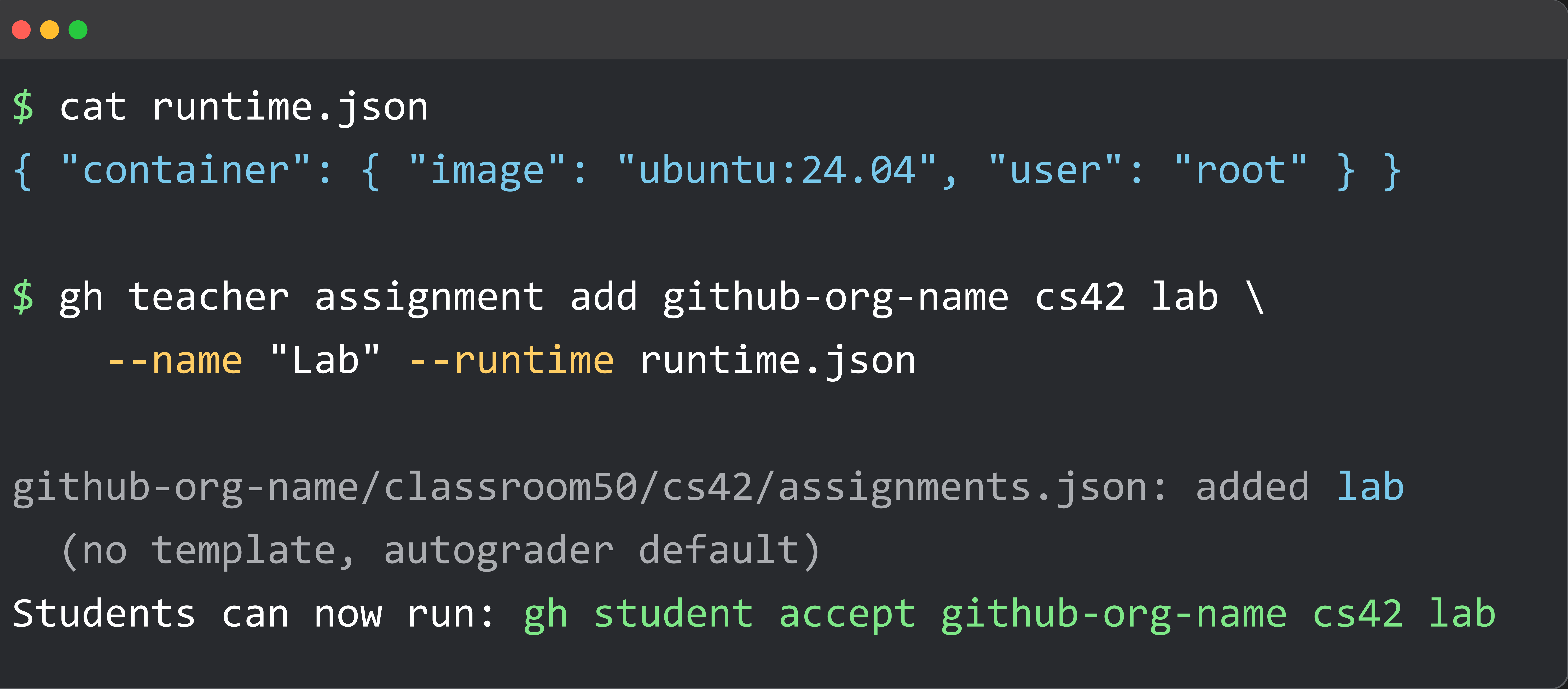
```
$ gh teacher autograder set-default github-org-name cs42 --from ./autograder.py
```

```
github-org-name/classroom50: updated cs42/autograder.py (commit 545f8ac2)
```

```
View at https://github.com/github-org-name/classroom50/blob/main/cs42/autograder.py
```

```
Next: wait ~30s for publish-pages.yaml to redeploy, then push a submission to test
```

Runtime & Docker



```
$ cat runtime.json
{ "container": { "image": "ubuntu:24.04", "user": "root" } }

$ gh teacher assignment add github-org-name cs42 lab \
  --name "Lab" --runtime runtime.json

github-org-name/classroom50/cs42/assignments.json: added lab
(no template, autograder default)
Students can now run: gh student accept github-org-name cs42 lab
```

Language Runtimes

```
$ cat runtime.json
```

```
{  
  "runs-on": "ubuntu-latest",  
  "python": "3.14",  
  "node": "22",  
  "go": "1.23",  
  "java": "21",  
  "rust": "stable"  
}
```

```
$ gh teacher assignment add github-org-name cs42 polyglot \  
  --name "Polyglot" --runtime runtime.json
```

```
github-org-name/classroom50/cs42/assignments.json: added polyglot  
(no template, autograder default)
```

Q&A

Classroom 50

Teacher Training Session