

A Hands-On Guide to Teaching Programming with GitHub, Travis CI, and Python

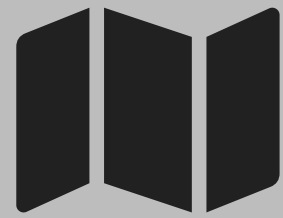
Gregory M. Kapfhammer
July 28 at PyOhio 2018

Hi! My name is

GREGORY M. KAPFHAMMER

 @GregKapfhammer

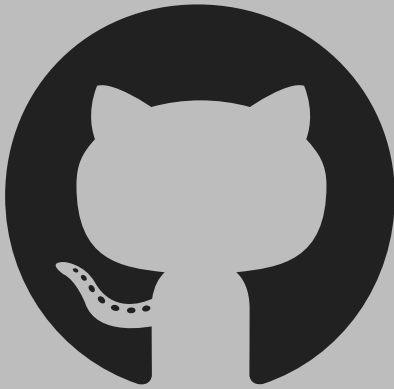
 www.gregorykapfhammer.com



Roadmap for this Talk

Ask and answer questions about
effective instruction in the
programming field

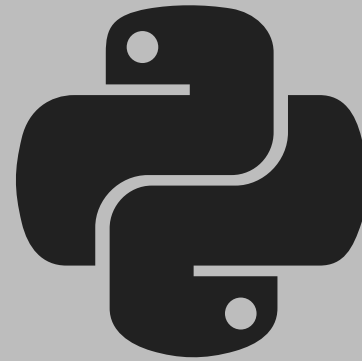
Exploring Technologies



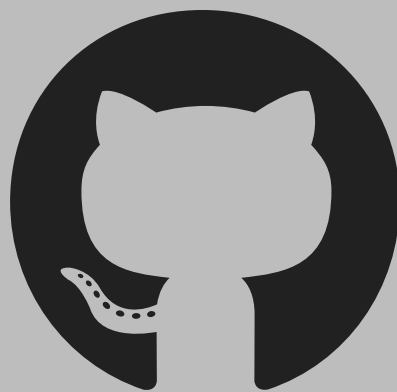
GitHub



Travis



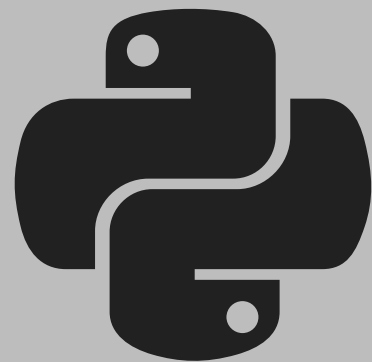
Python



GitHub



Travis



Python



Why would I
DECIDE TO USE
GITHUB AND TRAVIS
CI?

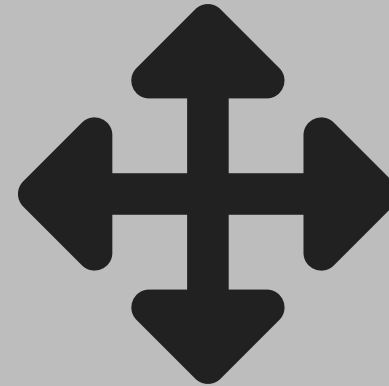
Important Goals



**Clear
Status**



Key Ideas



**Fast
Grading**

**HELP STUDENTS AND
FACULTY EFFECTIVELY
COLLABORATE**

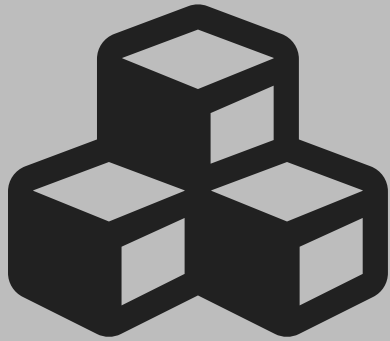
Deliverables to Check

- Source Code
- Technical Writing
- Commit Counts
- Commit Messages
- Program Output
- Data Files

**USE INDUSTRY
STANDARD TOOLS IN
ALL COURSE WORK**

**DEVELOP NEW
SOLUTIONS IN
PYTHON WHEN
NECESSARY**

Benefits of Python



Tools



Options



Testing



How should I SETUP AND USE GITHUB CLASSROOM?

Create a GitHub organization for your course

Sign up your team



Completed

Create personal account



Step 2:

Create organization



Step 3:

Invite members

Create an organization account

Organization name

Allegheny-Computer-Science-111-F2018



This will be your organization name on <https://github.com/Allegheny-Computer-Science-111-F2018>.

Billing email


gkapfham@allegheny.edu

We'll send receipts to this inbox.




Organization accounts allow your team to plan, build, review, and ship software — all while tracking bugs and discussing ideas.


Choose your plan

Now you have an empty organization




[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)


  





Computer Science 111 Fall 2018 at Allegheny College


Computer Science 111 Fall 2018


 Pennsylvania, USA

 **Repositories** 0

 People 1

 Teams 0


 Projects 0

 Settings

This organization has no repositories.

Create a new repository

People 1 >



gkapfham
Gregory M. Kapfhammer

Invite someone

Let GitHub Classroom access the organization

GitHub Classroom

GitHub Education

Select an organization for your new classroom

C1

@Allegheny...

C8

@Allegheny...

C6

@Allegheny...

C3

@Allegheny...

C2

@Allegheny...

Grant access to an organization that is not listed

💡 **ProTip!** Don't see your organization? You need to [grant us access](#) first.

🎓 with ❤️ by **GitHub**

GitHub Classroom is [open source](#).

Create a student roster for the Classroom

GitHub Classroom

GitHub Education

Add students

Next, let's set up a "roster", so you can easily track student progress on your dashboard.

To create your roster, you'll need to share a way to identify your students. These "identifiers" can be:

- Student last names
- Student email addresses
- Any other unique piece of information

You can always come back and complete this step later.

What information would you like to use to identify your students?
(emails, student ID #, etc.)

Paste your list of identifiers below (one per line, please!):

Create an assignment for your course

GitHub Classroom

GitHub Education

Computer Science 111 Fall 2018 at Allegheny College

Allegheny-Computer-Science-111-F2018

Manage classroom

Assignments

This organization doesn't have any assignments yet.

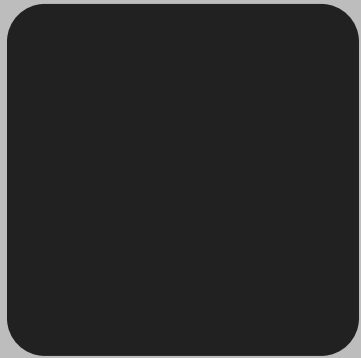
Create your first assignment

with ❤ by GitHub

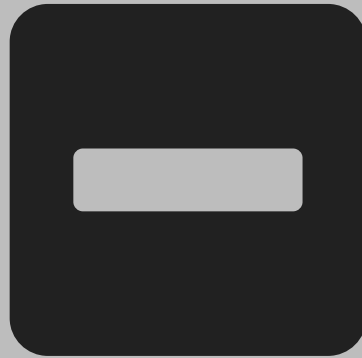
GitHub Classroom is [open source](#).

**CREATE TWO
REPOSITORIES FOR
EACH ASSIGNMENT**

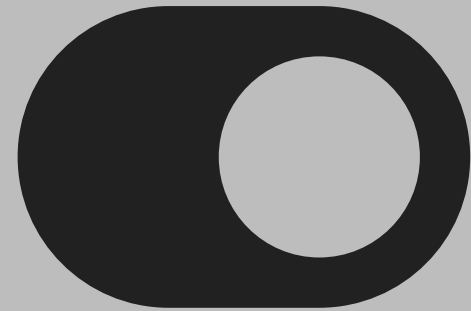
Using Travis CI



Solution



Starter



Check

THE STARTER
REPOSITORY SHOULD
NOT PASS THE TESTS

Create an assignment using the starter

GitHub Classroom

GitHub Education

Computer Science 111 Fall 2018 at Allegheny College

Allegheny-Computer-Science-111-F2018

Manage classroom

New assignment

Individual assignment

Each participant works individually on their own repository.

Create an individual assignment

Group assignment

Participants form teams that work together on a shared repository.

Create a group assignment

with ♥ by GitHub

GitHub Classroom is [open source](#).

A classroom will contain many assignments

GitHub Classroom

GitHub Education


Computer Science 111 Fall 2017 at Allegheny College

Allegheny-Computer-Science-111-F2017

Manage classroom

Assignments


New assignment



Computer Science 111 Fall 2017 Lab 1
Individual assignment

<https://classroom.github.com/a/Uzf3tjLV>


Copy invitation link



Computer Science 111 Fall 2017 Lab 10
Group assignment for **Computer Science 111 Lab 10 Teams Formed on November 9, 2018**

<https://classroom.github.com/g/G1VJvvkG>

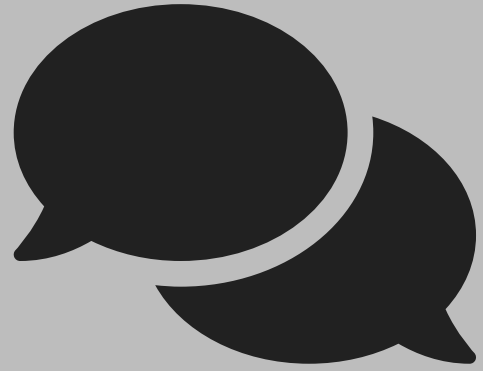
Copy invitation link



Computer Science 111 Fall 2017 Lab 11
Group assignment for **Computer Science 111 Lab 11 Teams Formed on November 16, 2017**

<https://classroom.github.com/g/BNSbcvdC>

Copy invitation link



How do you

**AUTOMATICALLY
CHECK STUDENT
SUBMISSIONS?**

Flexible Checking



Local



Travis

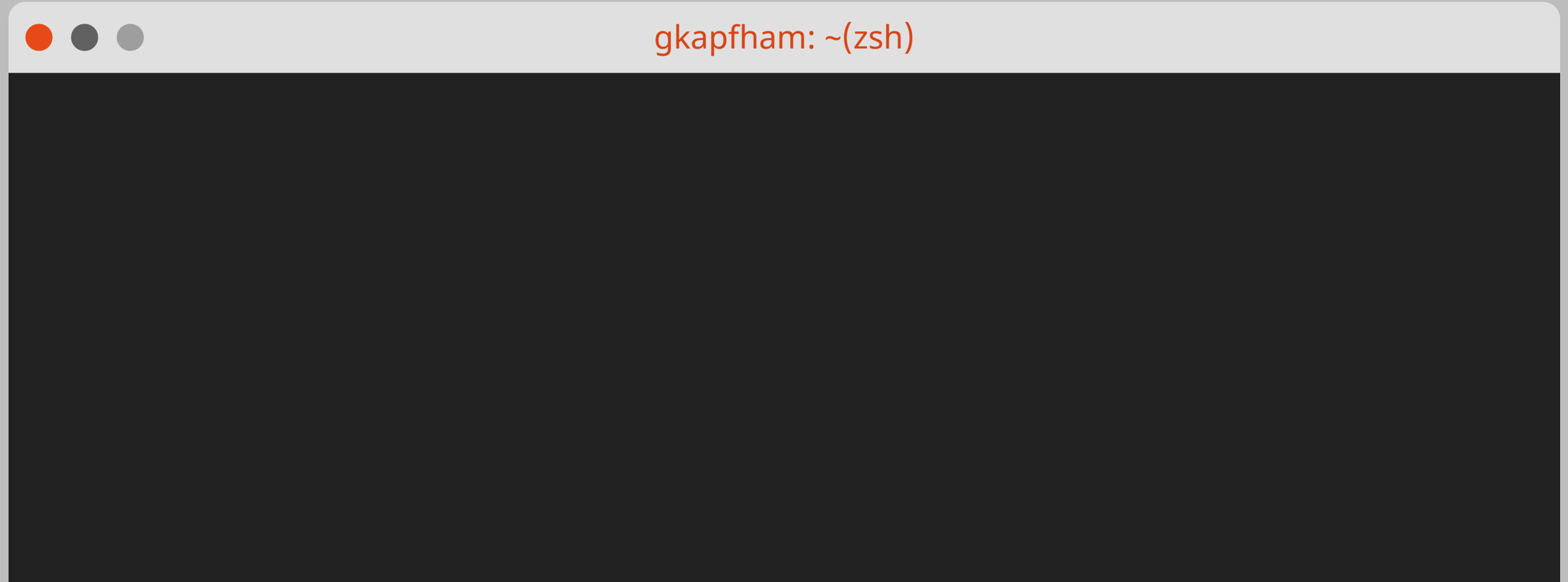
Let's Configure Travis CI

```
1. # use both Python and Java
2. sudo: required
3. dist: trusty
4. language: python
5. python:
6.   - '3.6'
7. before_install:
8.   - jdk_switcher use oraclejdk8
9.
10. # download gradle
11. before script:
```

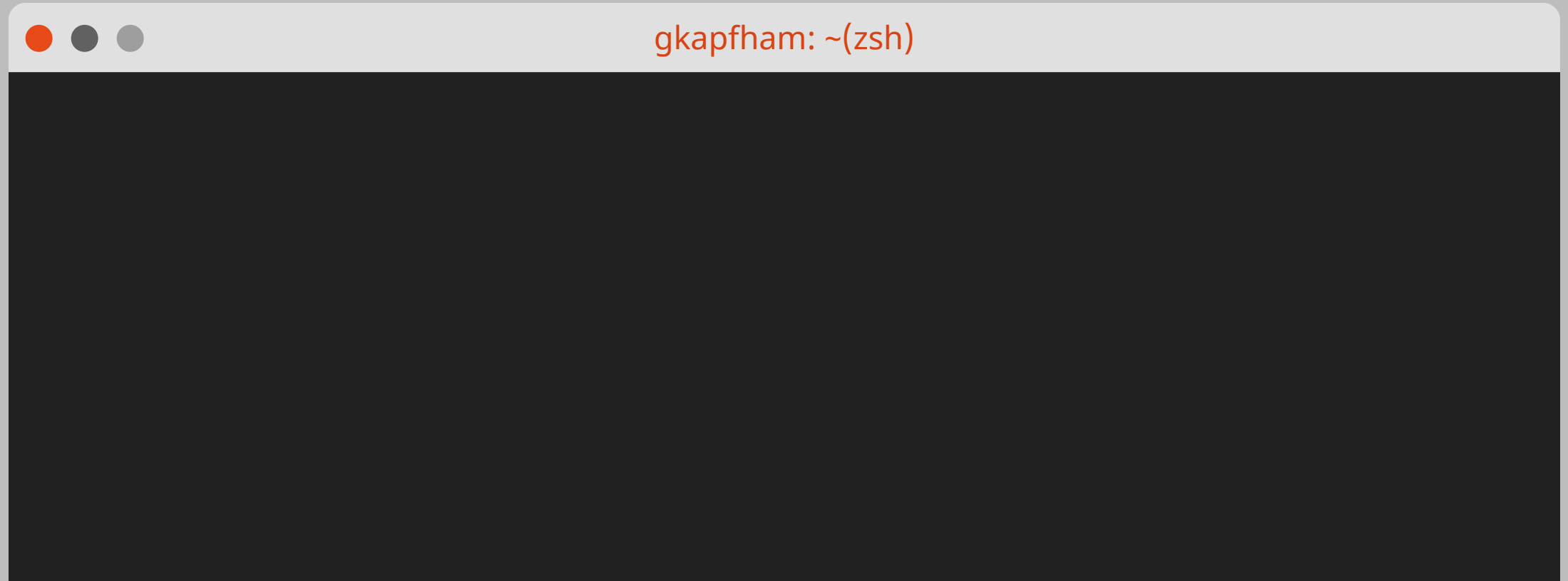
Let's Call GatorGrader

```
1. #!/bin/bash
2.
3. # assume that gatorgrader.py exits correctly
4. GATORGRADER_EXIT=0
5.
6. # assume that the human-readable answer is "No"
7. GATORGRADER_EXIT_HUMAN_PASS="No"
8.
9. # determine if the exit code is always failing
10. determine_exit_code() {
11.     if [ "$1" -eq 1 ]; then
```

Running GatorGrader on a Correct Submission



Running GatorGrader on an Incorrect Project

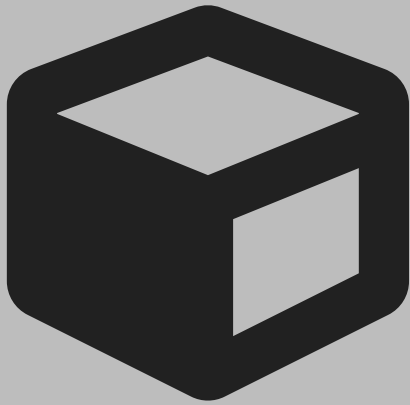


Previous Courses and Topics

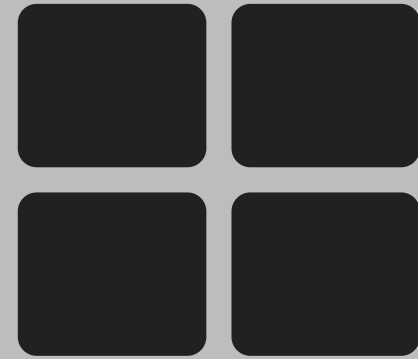
- Computational Expression
- Data Abstraction
- Web Development
- Software Engineering

Different topics, goals, languages, and levels

Exciting New Features



Script



Gradle



What do the
**STUDENTS THINK
ABOUT THIS IDEA?**

This approach ensures that the source code and GitHub repositories are organized. It is easier for me to help the students who are struggling in an introductory course.

- SAEJIN MAHLAU-HEINERT

This tool suite made it easier for me to talk with students about technical requirements. It helped me to make complex assignments more accessible to students.

- MARIA KIM

GatorGrader encouraged me to add better code comments and try out language constructs that I would not have otherwise investigated. The tool was a big help this semester!

- SAMATHA DARRIS

GatorGrader is like having a constant coach! I liked receiving feedback on the quality of my source code and writing before turning in the final version of my lab.

- ANNA YEAGER



How can we
**IMPROVE AND STUDY
THIS APPROACH?**

Ideas for Experiments



Deliverables



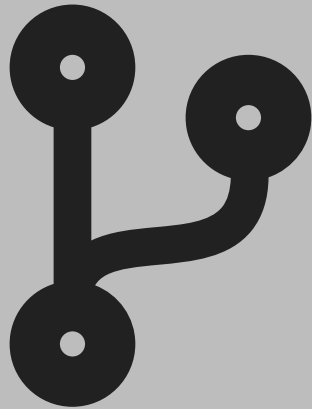
Insights

**WHAT CODE AND
CONCEPTS CAUSE
STUDENT
FRUSTRATION?**

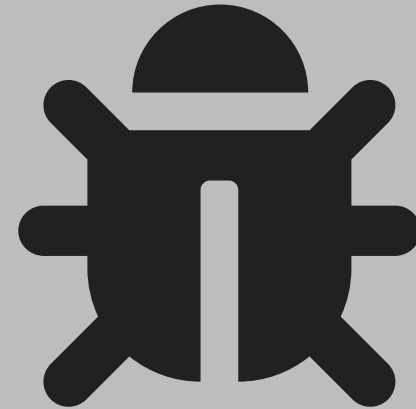
**WHAT FEATURES BEST
SUPPORT EMERGING
PROGRAMMERS?**

**HOW DO TEAM
MEMBERS INFLUENCE
LEARNING?**

Let's Collaborate




Pull Requests







Defect Reports


GitHub Classroom developers are great!




[Pull requests](#) [Issues](#) [Marketplace](#) [Explore](#)


 [education](#) / [classroom](#)

 Watch


71


 Star


831


 Fork


239

 Code

 Issues 61


 Pull requests 17

 Projects 8


 Insights

Internal Server Error 500 When Accessing an Assignment in GitHub Classroom #1117



[Edit](#) [New issue](#)

 Closed

gkapfham opened this issue on Aug 31, 2017 · 10 comments



gkapfham commented on Aug 31, 2017 • edited


 

Hello! Thank you so much for developing GitHub Classroom. So far, my students and I have really enjoyed using the system. In advance of running the laboratory session today, I have tested it repeatedly with small class sizes for our first laboratory assignment and everything always worked correctly.

That is, it was possible to:


- Instructor: Create an organization for the class


Assignees
No one assigned

Labels
 bug


Projects
None yet

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Gregory Kapfhammer

gkapfham

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Focusing on software engineering, software testing, and data science, I program, teach, research, and write.


www.gregorykapfhammer.com

Edit my profile

A Hands-On Guide to Teaching Programming with GitHub, Travis CI, and Python

Gregory M. Kapfhammer

July 28 at PyOhio 2018


 Jul 22, 2018 ☆ 0 👁 0

Using Controlled Numbers of Real Faults and Mutants to Empirically Evaluate Coverage-Based Test Case Prioritization

David Paterson
University of Sheffield Gregory Kapfhammer
Allegheny College Gordon Fraser
University of Passau Phil McMinn
University of Sheffield

Workshop on Automation of Software Test
29th May 2018


dpateron1@sheffield.ac.uk

 May 29, 2018 ☆ 0 👁 24


Using GitHub, Travis CI, and Python to Introduce Collaborative Software Development







Rowan Castellanos, Gregory M. Kapfhammer, Nicholas Tocci










PyCon 2018 Education Summit
May 10, 2018


 May 10, 2018 ☆ 0 👁 110

See slide source code on GitHub





 [gkapfham](#) / [pyohio2018-presentation](#)

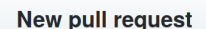
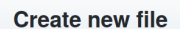
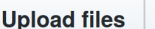


 Unwatch  1  Star  0  Fork  0


[Code](#)  Issues  0  Pull requests  0  Projects  0  Wiki  Insights  Settings







Slides for a Technical Presentation Given at the PyOhio 2018 Conference  Edit

[presentation-slides](#) [javascript](#) [react](#) [spectacle](#) [Manage topics](#)


 136 commits  1 branch  0 releases  1 contributor

Branch: [master](#)  New pull request  Create new file  Upload files  Find file  Clone or download

 **gkapfham** Adding the use of the questionFont variable back to the section slides. Latest commit 24d5bfe 25 minutes ago

 assets	Adding the travis file to the assets/code directory.	an hour ago
 default	Adding the JavaScript files to the default directory.	an hour ago
 presentation	Adding the use of the questionFont variable back to the section slides.	25 minutes ago
 .babelrc	Updating the babelrc to reflect the content from the boilerplate.	an hour ago
 .eslintignore	Adding in all of the JavaScript files and many of the dotfiles.	6 days ago
 .eslintrc	Adding in all of the JavaScript files and many of the dotfiles.	6 days ago

Check out GatorGrader on GitHub!

 GatorEducator / **gatorgrader**

Unwatch 3

★ Star 4

Fork 1

<> Code

! Issues 6

🔗 Pull requests 0

📁 Projects 0

📖 Wiki

📊 Insights

⚙️ Settings

✓ Automated Grading Tool that Checks the Work of Writers and Programmers

Edit

python

python3

pytest

auto-test

Manage topics

🕒 382 commits

🌿 1 branch

📦 0 releases

👤 3 contributors

Branch: master ▾


New pull request

Create new file

Upload files

Find file

Clone or download ▾

 Michionlion Merge pull request #24 from gkapfham/i-20-sentence-count-bug ... Latest commit b3e81a7 on Apr 19

internal/java	Renaming the DisplayOutput file to Sample instead.	11 months ago
tests	added test and check for empty paragraph list in counting words	4 months ago
.coveragerc	Adding the first version of the coveragerc file for pytest-cov testing.	6 months ago
.gitignore	adding .pytest_cache to gitignore	4 months ago
.style.yapf	The yapf style is now using pep8.	a year ago
.travis.yml	fixing flake8 and mdl problems	4 months ago
README.md	fixing flake8 and mdl problems	4 months ago
gatorgrader.py	Added non-existent check error exit code	4 months ago
gatorgrader_comments.py	Fixing a docstring in the gatorgrader_comments.	6 months ago
gatorgrader_entities.py	One more docstring fix in the gatorgrader_entities.	7 months ago

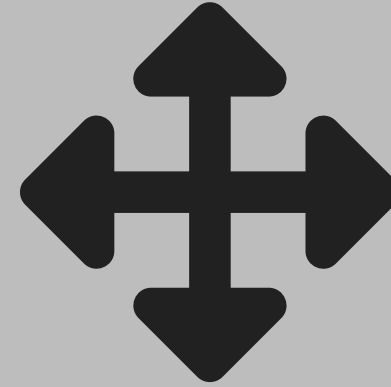
Main Contributions



**Clear
Status**



Key Ideas



**Fast
Grading**

GatorEducator/GatorGrader