Up and Running with GitHub, GitHub Classroom, and GitHub Actions

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Traditional Assignment Challenges

- 💡 **Inefficient workflows cause**

  - ■ Version chaos via email submissions

  - ■ Time-consuming manual testing

  - ■ Delayed feedback disconnected from code

  - ■ Limited visibility into student progress

  - ■ Unrealistic development practices

> 🔬 How can we create a workflow that **automates repetitive tasks**, provides **immediate feedback**, and teaches **industry-standard practices**?

Key Solution: GitHub, GitHub Classroom, and GitHub Actions

A complete ecosystem for programming education offering:

- **Industry-standard tools**: Git, CI/CD, code review

- **Good practices**: Commit messages, branching, reviews

- **Task automation**: Testing, style checks, distribution

- **Immediate feedback**: Pass/fail checks and detailed logs

- **Student portfolios**: Real-world projects on GitHub

- **Instructor insights**: Progress tracking and code reviews

GitHub Classroom Benefits

For Students

- Version control
- Immediate feedback
- Clear guidance with `TODO`s
- Portfolio building
- Development environment

For Instructors

- Automated distribution
- Centralized collection
- Automated testing
- Progress visibility
- Consistent environments

⭐ **Summary:** GitHub Classroom bridges the gap between learning and professional development while saving time for students and instructors

Implementation Workflow

✓ Setup Repositories

- Write full solution with tests
- Apply implementation ablation
- Set up CI/CD pipeline

✓ Setup GitHub Classroom

- Link organization and repositories
- Set deadlines and visibility
- Invite students to classroom

✓ Feedback & Assessment

- Track progress via GitHub insights
- Code reviews via pull requests
- Assignment clarifications via issues

✓ Monitor Progress

- Automated test results (✅/❌)
- Detailed logs for error diagnosis
- Student feedback and code review

- Create **solution** and **starter** repositories for each assignment

Implementation Ablation

- **After solution creation, must create a starter repository**:

  - Remove implementation details from your solution

  - Replace with well-documented TODOs as placeholders

  - Leave structure intact for students to complete

  - Keep tests and various checks to guide students

- 🧑‍🏫 **Tests run automatically** on each push to student's repository:

  - ✅/❌ **Status checks** provide immediate feedback

  - 🛠️ **Detailed logs** highlight errors for quick diagnosis

Multi-level Feedback System

Automated

- **GitHub Actions check**: pass/fail status for each check

- **Code quality checks**: PEP8 compliance with Ruff

- **Test coverage reports**: Pytest and Coverage.py

Manual

- **In-line code comments**: specific suggestions on code

- **Pull request reviews**: detailed feedback on approach

- **Issue-based feedback**: high-level design discussions

Integrating with External Tools

GitHub Actions can integrate with tools like

- Pytest for test coverage

- Ruff for style checking

- Chasten for AST-based pattern checking

- Custom grading tool such as ExecExam

- … *And many more*!

🧩 **Integration Benefits**: Automated feedback fosters code quality, adoptions of industry practices, and eases instructor workload

Common Challenges and Solutions

🚀 **GitHub Classroom creates a realistic, automated workflow that benefits both students and instructors. But there are challenges!**

Challenges	Solutions
Git confusion	Provide cheat sheet and office hours
Merge conflicts	Teach basic conflict resolution
Test failures	Make test output student-friendly
Missing setup	Include detailed environment setup
Privacy concerns	Use private repositories

Challenges: Learning curve for Git and GitHub and associated tools

Key Takeaways

- **Streamlined workflow** from assignment creation to grading

- **Industry-relevant skills** that benefit beyond the classroom

- **Automated testing** for immediate feedback

- **Visible progress** through tracking commit history

- **Reduced administrative overhead** with integrated tools

💬 Thank You! Questions?