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Kattis Problem Practice Tool

Group B
Final Presentation

COMP 523
Spring 2021

Initial Needs and Expectations

- COMP 222 students need more customized practice problems to prepare for the International Collegiate Programming Competition.

- Functionalities of the practice problem tool must include:
  - Place for administrators to upload new practice problems
  - Library where students can view and select any uploaded problem
  - Place for students to upload an answer file that will promptly be autograded using the Kattis Problem package format.

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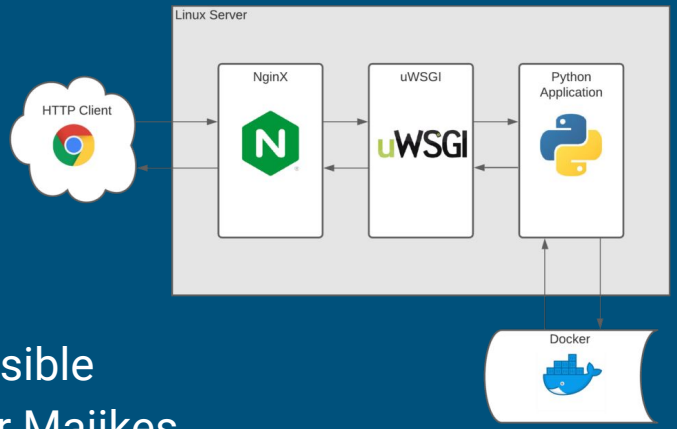
Architecture



- Began working with an existing system
  - UNC IT Services set this system up using Ansible
  - Managed by Professor Bishop and Professor Majikes
- The application is written in python with bottle framework
  - Docker is connected to the python application to handle certain tasks
    - This required UNC IT Services to help
- The existing system uses uWSGI to connect to the application
- The uWSGI component is connected to an NGINX web server which handles HTTP requests

ANSIBLE

Platform

- In order to access the system, we must be on campus or connected to the campus VPN.
- Instructed by Majikes to access system through ssh tunneling
  - Somewhat complicated
- Running ‘make dev’ allows a working view of local changes
- Found a more efficient way through VSCode
- Configured our GitHub repository into the existing system

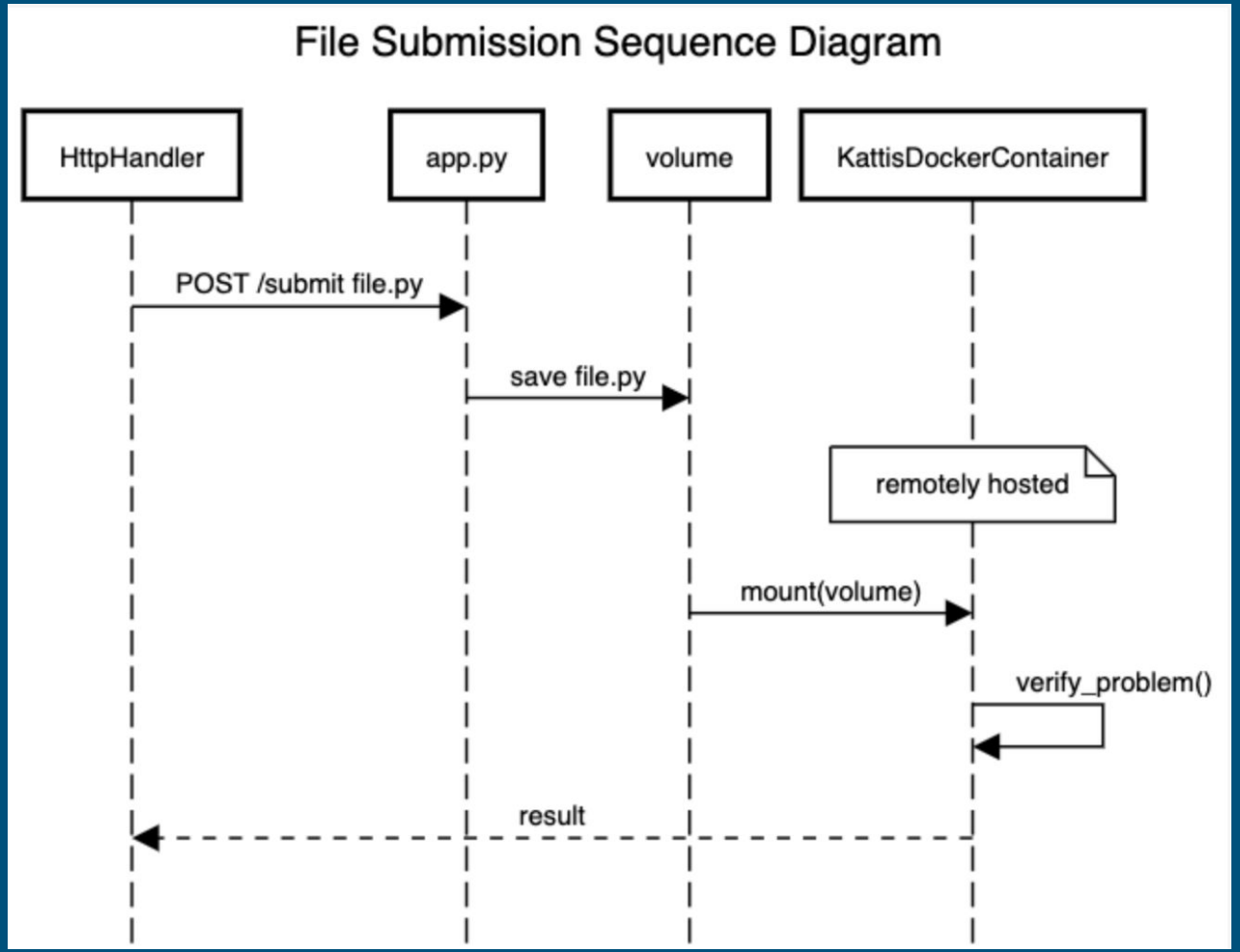
Kattis Problem Package Format

- Kattis Problems are managed online using YAML files with multiple directories
  - Test Data, Validators, Problem Statement, and Submissions
  - Each of these has unique file requirements, including a problem statement in LaTeX
- With the guidance of Professor Majikes, our group decided it would be best to avoid this rigid format.
  - Through a subprocess, we were able to check solutions without having to put problems in this format
  - The site has built-in functionality for mathematical symbols, so requiring a LaTeX file is unnecessary

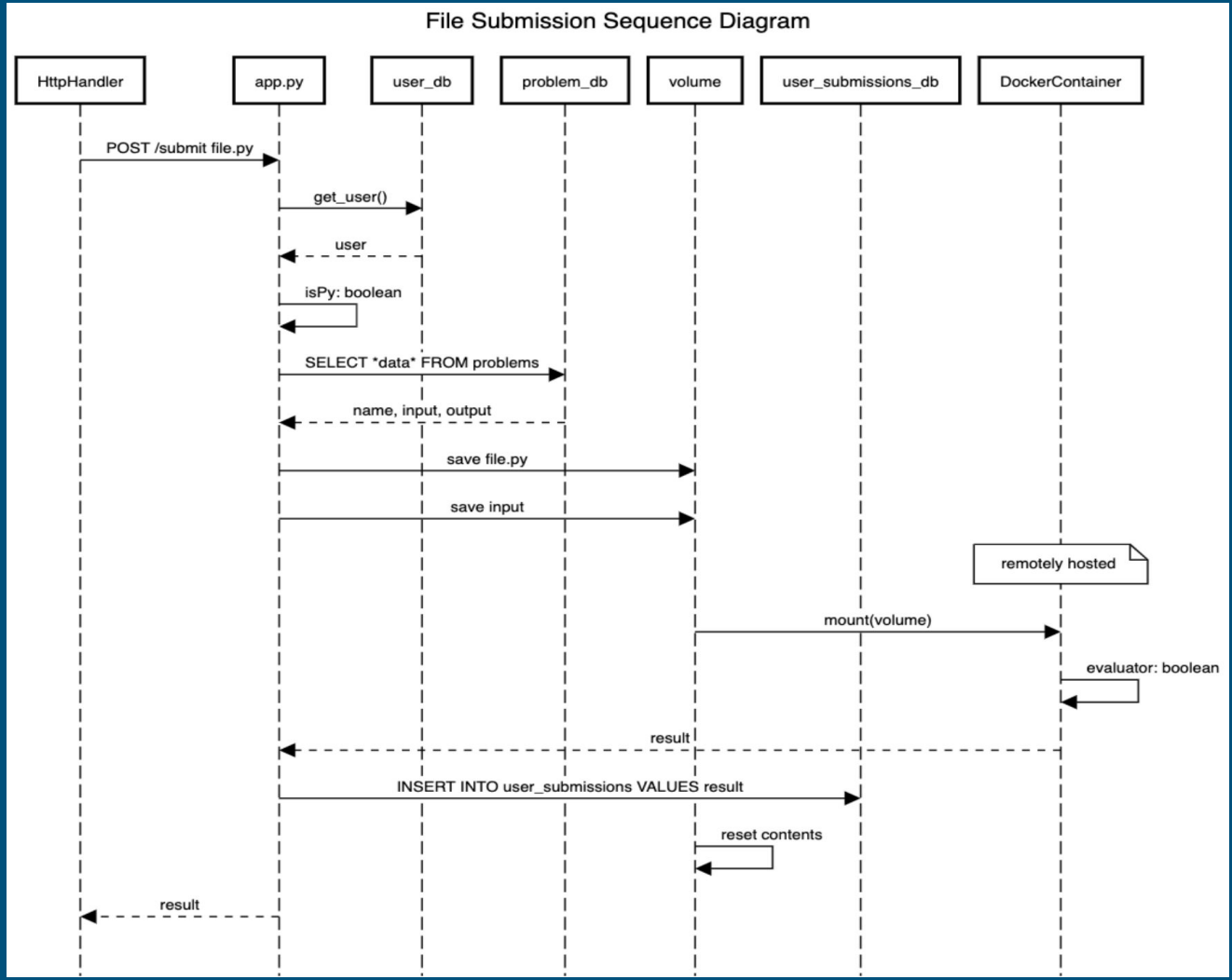
Demo

- Adding a problem to the site
- Submitting a solution to the problem as a student
- Getting the results of your submitted solution

Functionality Expectations

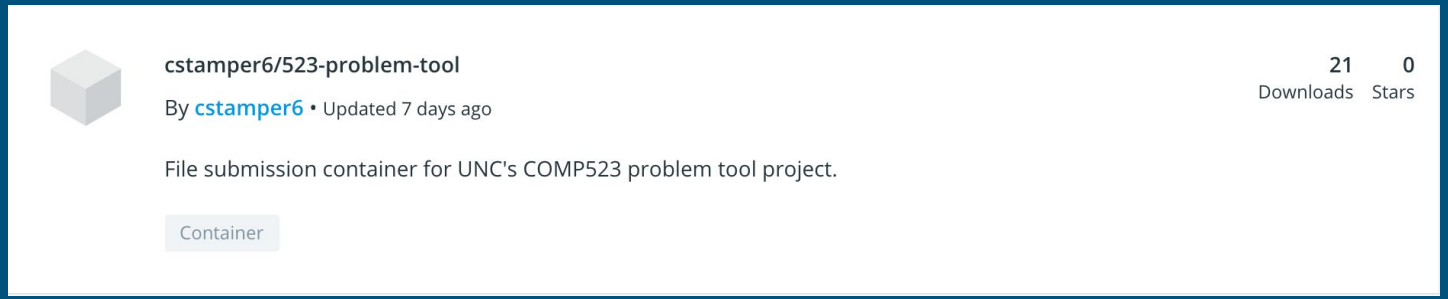


Functionality Reality



Losses and Gains

- Kattis ‘verify_problem()’ supported all ICPC programming languages
- No longer adhering to the Problem Package Format
- Less dependencies
- Learned tons building our own Docker container!



Final Remarks

- Different experience than expected
- Expect speed bumps
- Full stack development and the customaries of GitHub
- Playing to your team’s strengths