

Mocs-IDE

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Abstract

Engaged learning is the core tenant of any computer science curriculum, starting with the introductory programming course, where students solve upwards of fifteen coding challenges weekly. Even with small class sizes and multiple teaching assistants, providing meaningful and timely feedback to all these submissions is simply not sustainable. In this proposed work, we will research existing solutions and best practices and then develop a web-based application where students can access weekly coding challenges, submit them for auto-grading, and receive immediate feedback from the online judge.

Introduction

In order to accomplish this task, we divided the project into four major sections: Research, Client-side/front-end, Database, and server-side/back-end. The client-side/front-end represents what the user sees and interacts with in their web browser. This is the actual design of the website. The database is our information storage center. It stores all the information for various students, instructors, courses, problems, etc. Finally, the server-side/back-end is responsible for linking the front-end with the database and running user-submitted code.

Methodology

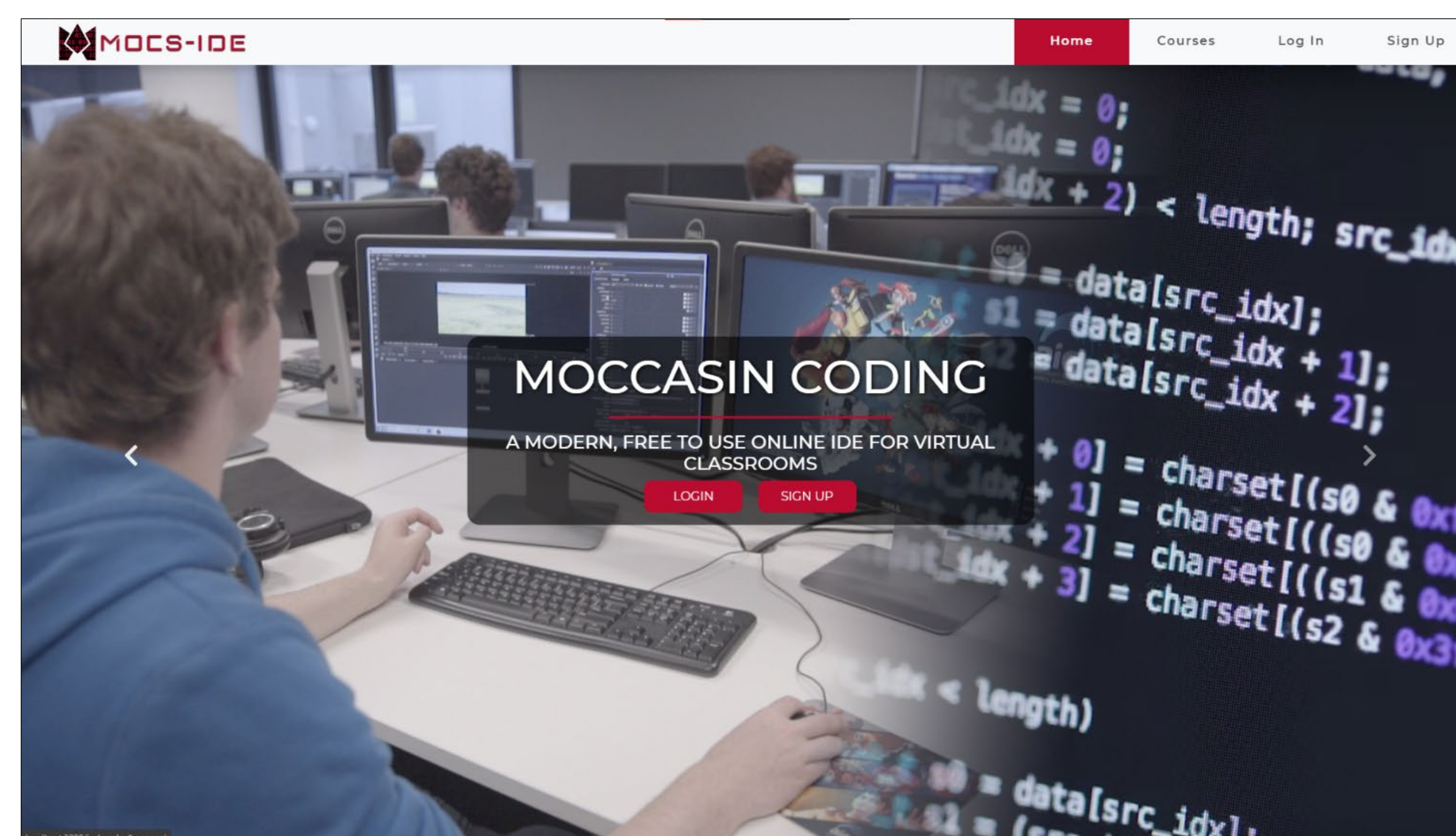
At the outset of this project, we had several questions:

- How is the data saved on the backend?
- What allows the browser to communicate with the database?
- How are student submissions compiled/interpreted and then run?
- How are the results then compared to the expected output and sent back to the front-end?
- What is the value of docker containers and how can they be leveraged for this application?
- How can web sockets assist in the development of collaborative-coding environments?

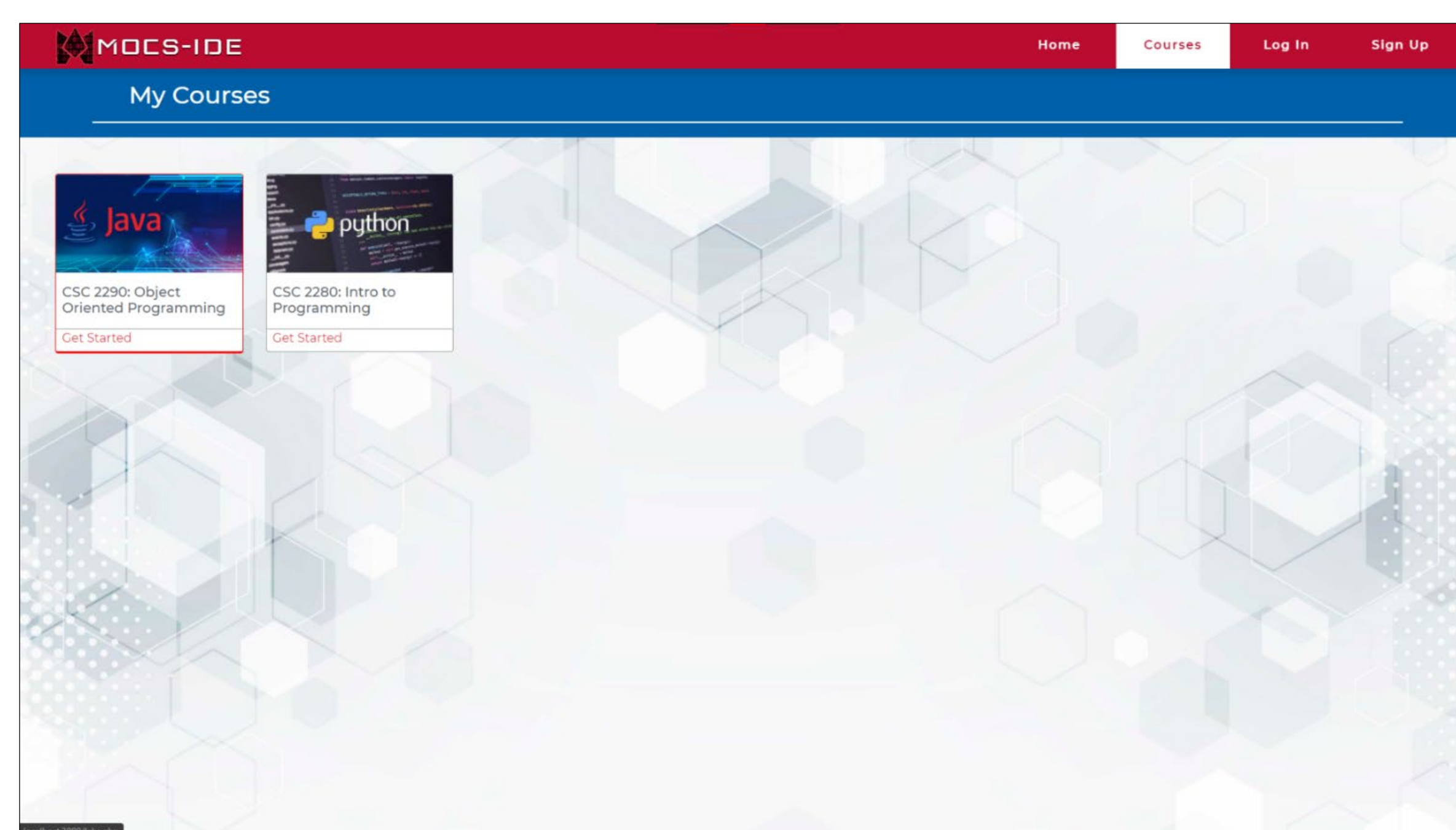
After several weeks of research, we have begun development using the following:

- Front-end: HTML 5, CSS 3, Bootstrap 3, Code Mirror, Vue 3, JavaScript, TypeScript
- Database: MySQL, ORM (?)
- Back-end: PHP/Laravel, NodeJS, Docker

Results



Home page with interactive image slider



Courses Page

Title	# Test Cases	% Successful	Due Date	Last Activity
Problem 1	66%	3	1/24/2021	1/24/2021
Problem 2	100%	5	1/31/2021	1/31/2021
Problem 3	6	100%	2/7/2021	2/5/2021
Problem 4	5	80%	2/14/2021	2/10/2021
Problem 5	8	0%	2/21/2021	
Problem 6	4	0%	3/1/2021	

Problems Page

Future Work

Thus far, we have developed a basic front-end application and database. The layout of the front-end should reflect (for the most part) what the final website will look like. The same applies to our database; the schema/structure of the database will remain relatively unchanged.

Going forward, we need to add Vue into our front-end and complete our database. Next, we must create the backend, which not only handles the exchange of information between the front-end and database, but also oversees logins and text-filtration, and manages user submissions. Once all of this has been completed, the final step is linking everything together.

After we're satisfied with the that implementation, we hope to begin work on more advanced features, particularly real-time collaborative programming using web sockets. This would allow students and professors to work simultaneously on the same project, much like a google document.

We hope to accomplish all these goals during our upcoming 8-week-long summer research, which has been sponsored by Florida Southern College. If all goes well, we will have a fully functioning, completed website prior to the start of the fall semester.

Related Work

The CS department previously made use of Replit's classroom auto-grading functionality. Unfortunately, Replit removed this functionality. This inspired the initial idea for this research.

In place of Replit, the CS department has temporarily switched to using Coding Rooms. Although it is a vast improvement upon Replit, it is a subscription-based service.



Acknowledgements

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