The Development Life Cycle of a FullStack Advising Application

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Introduction

I’ve always considered myself to be decent at writing papers, however, I’ve never thought that English writing was one of my strongest subjects. But after four years at CUNY Lehman College, I’ve t sharpened my skills and developed a passion for writing. I once considered writing to be boring and irritating, but after writing tons of papers and exploring different types of writing I would add it as one of my strongest subjects. Being a Computer Science student, I’m always solving problems logically and mathematically. This is portrayed in my work, for instance, I used to write two conjunction words together, and & or. In computer science, these are commonly used together to represent logic gates, used in boolean problems. If something meets either condition it will proceed to the next. That being said because I am so used to thinking logically I thought it would better suit me to work on a project within my major than it would be to write an entire poem or 20-page paper.

I decided to have a project that utilizes what I've learned in my major. Partnering with Professor Steven Fulakeza I got the opportunity to experience the development lifecycle of an application. More specifically an application for schools where advisors can set up meetings with students and professors can analyze grades from courses they teach. The work done on this project directly translates to what would be done in the real world. The goal is not to have a functional web application but to be able to demonstrate the different practices used in the development process.

In software engineering, you document everything from meetings to design changes. You want to be able to have the documentation so that if someone is added to your team they can have a blueprint telling them exactly what needs to be done. This blueprint is shown and discussed between you and the client to ensure it’s what the client has envisioned. It is the software engineer's job to bring that vision to life. In my development process, I meet with my client and record our meeting with brief notes and tasks for the following meeting. And stored the designs of the website, database, use cases, and user stories on a singular document.

Preparation and Design

To begin the process of creating an application we need to have our development stack, a compilation of software and frameworks that work together to make a program run. For this application, I’ve decided to have VSCode as the editor, HTML5, CSS, and JavaScript are the programming languages. And node.js to host the server and express.js will be the framework. And finally, for the database, I will be using MySQL. With the creation of this development, the stack comes with an issue. It’s very ambitious to be able to utilize all of these during the development cycle as time will be an issue. The majority of a project's development cycle is done in design.

To start designing I needed to figure out what each user needs to accomplish on the website. This process can be recorded by writing user stories. User stories are informal descriptions of an applications function, for instance, “As a student I want to see any meeting notes from my previous meetings so that I don’t forget, to do so I need to click on the meeting notes button that reveals a block with meeting dates and notes for each of them right below (Ureña pg 3)”. Each user story states the user followed by what that user wants to accomplish and then what my application will need to do so that the task is able to be performed. I’ve created roughly 20 for all four users, and all of the user stories are stored in my documentation sheet.

Now that I have the features of my application my next step is to design a wireframe, a graphic showcasing all the pages of my website. During my design process, I created two different designs. The original closely resembles Blackboard however with the addition of the grading analysis feature for professors.

After the initial design, I met with Professor Fulakeza and made note of any functional and nonfunctional requirements of the application, and created a revised wireframe. This design showcases four different types of users: Students, Faculty, Advisors, and Administrators. With an improved color scheme and navigation bar for each user. Students get a light gray navigation bar over a white background while advisors and faculty members will receive a grayish navy blue navigation bar over a white background. The reasoning behind having both users use the same color scheme is because Advisors can also be faculty members or professors. Finally, administrators are given a black navigation bar over a white background. And a plethora of functions, notably the calendar application that will allow advisors to meet with students and for students to see any upcoming meetings.

Functionality

The application lets advisors meet with students for counseling. And after each meeting, students are given notes from the advisor. It’s the student's job to set up a meeting with the advisor, however, if they need to reschedule advisors can make adjustments using the calendar on the homepage. Meeting requests are sent to them from students and can be approved or declined in a separate tab. Advisors have access to student incident reports and advice history along with their transcripts. For faculty members, courses are shown on their webpage. Within those courses, a grading tool can be utilized to see grade statistics such as average grades over time, top and low-performing students, and a comparison of each course. Within those classes, faculty members can submit incident reports for selected students. These incident reports can indicate if a student has cheated or has any severe issues in the classroom.

For students, the webpage will serve as a calendar. Sending reminders of upcoming meetings and setting up meetings with advisors. And finally, the final user is the Administrator whose role is to create other users and attend to any service tickets provided by the different end users. Each user will already have one role, however, there are cases where a user can be two for instance if a faculty member is a professor and an advisor. They will need to have all the functions of a professor and advisor, viewing courses and having meetings with students. Or any one user can additionally be a faculty member or a student!

One of the most complicated aspects of the website that many people might not think of is the search bars! When it comes to the grade analysis it’s a matter of getting the data from the database and computing the calculations in JavaScript. However, a search bar involves lots of database inquiries which are tedious. The easiest would be all the grade computations. These computations pair with arguably the hardest aspect to implement in the project, the grade analysis chart. The chart must show the grades of multiple classes or students at one time and display them in different diagrams and charts like a plot chart or pie chart.

Database

For the database, there are many relationships for each user. In the database, there are eight entities which are Student, Advisor, Faculty, Admin, Department, Course, Meeting, and Enrollment. The relationships between each of them consist of:

* One Admin is in charge of Many Departments and Many Departments have One Admin
* Many Faculty members are assigned to One Department and One Department can have Many Faculty members
* Many Advisors are assigned to One Department and One Department can have Many Advisors
* Many Students are assigned to One Department and One Department can have Many Students
* Many Meetings are held by One Advisor and One Advisor holds Many Meetings
* Many Meetings can have Many Students and Many students can have One Meeting
* Many Meetings are held for Many Courses and Many Courses can have Many Meetings
* Many Students are enrolled in many Courses and Courses can have Many Students
* Many Courses are instructed by One Faculty member and One faculty member can instruct Many Courses
* Many Courses are held within One Department and One Department can have Many Courses

Development Process

When designing the application there were many roadblocks from time management to the lack of skills. Starting this large project the first roadblock was learning a ton of skills such as HTML and CSS to gain an understanding of what can I realistically create if I were to finish this project. Researching and enrolling in an online web development course solely for this project I began to fill up my plate. The issue with this was I risked learning something I wouldn’t get to use in the application. Creating an entire functional application would take months and that’s excluding the year it would have taken to design it. Despite not using those skills on the project I would still be able to apply my new skills elsewhere, for instance, on personal projects and in job opportunities.

The second issue had been time management. Both my personal and academic lives were clashing! I had spent lots of time researching and practicing and jumping between the two through the process, and it had slowed me down. For instance, I learned how to create a wireframe and designed one for my application. The initial design didn’t come out the way it should have so I’m back on the drawing board and need to learn how to make it properly using a different software. And this process would continue three more times. Until I have something that I can document accordingly. In my personal life, I have mapped out my weeks so that I can work and have time for school, however, as a soon-to-be graduate I have had lots of interviews from multiple companies. The issue here is those interviews would land on days dedicated to work on this project. I would have to spend an hour on the interview and however long studying and practicing beforehand.

This leads me to my final roadblock, time. Creating an entire application can take years and a majority of the time spent on this is designing and mapping out how you want the application to work. You would spend more time otherwise if you were to create the website initially because you risk having to redesign the entire site and you’d have to scrap all your hard work.

My least favorite aspect of the development process was designing the database, MySQL is not my strongest programming language and I believe my diagrams aren’t perfect however I did enjoy creating all the diagrams. For the most part, I’m used to displaying my creativity through code and writing, and rarely do I get the chance to use tools to show off any graphic designs. Creating all the diagrams was a great change of pace and wonderful skill. Allowing me to directly portray my thoughts without needing to write a lengthy essay.

Setting up meetings and creating due dates was one of my favorite aspects. I enjoy speaking passionately about my work, meeting, and reviewing my progress. Let me create realistic due dates. These due dates motivated me and kept me pointed on the right track throughout the entire project.

Reflection

This project as a whole had its ups and downs and it took longer than I had initially anticipated however I’m thankful that it’s finally over. I’ve learned lots of valuable skills, such as creating wireframes and programming languages like HTML, CSS, and JavaScript. There are a couple of things I would have done differently, one is using a different wireframe software. Although I’ve gotten accustomed to it there is a sharp learning curve at the beginning. I think something more intuitive for someone like me who isn’t great at graphic design would allow me to really express my idea in a shorter amount of time. The difficulty of the tools I was using had also discouraged me from continuing designing and I needed lots of motivation. What motivated me was the goal of finally graduating and the multiple due dates I had created for myself to keep me on track.

Another thing I would do differently is learn the programming languages at the end. I made the mistake of learning something I wouldn’t have had time to use. If I were to start from the beginning the design process would look something like collecting function and nonfunctional requirements from the client, designing the website wireframe, designing the database wireframe, learning the programming languages, and implementing skills as you learn and create a demo. The final step would be creating the database and connecting it with the website. This would allow me to utilize what I already know and save the longer research for the end. This lets me manage time more accurately.

On the topic of time management, trying to manage personal meetings such as interviews was a big issue. As previously stated, These interviews took over my schoolwork time and they were essentially set in stone. I have a personal goal of being employed after graduating and I didn’t want to risk anything trying to move them. This was an issue because I would focus on something pertaining to my future before I even completed the task that would give me that very future I want.

The final thing I would have done differently is to have a single document for all of my notes and work. I had separate documents to hold my diagrams and meeting notes. Having everything in one document would have saved me time jumping around and searching through my files. Despite all the jumping around and obstacles, I enjoyed working on this project because it showed me what I was comfortable with. And sharpened my time management skills.

Work Cited

Ureña, Gabriel, “LSP Senior Capstone Documentation”, Google Docs,

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