

“WHAT IS THE QUESTION, PROBLEM, ISSUE, OR PERSPECTIVE THAT IS DRIVING YOUR PROJECT?”

“How does a search engine function?”

Before we explore that topic, however, we first have to talk about how we even got to that question in the first place. So, to go all the way back to the very beginning, we have to understand what I had in mind about the class back in January when I first entered it. This consisted of a healthy sense of confusion mixed with dread. What was Project Based Learning? How would such an independent course be graded? Could I really get a grasp on what was happening before my milestones, which were my weekly reports about my progress, were actually due for a grade? This set the tone for the first few milestones: short snippets filled with small tasks that really didn't drive at any real point just yet, only grasping around for more and more ideas and a desperate attempt to evaluate them against each other.

A month into the class though, this changed when I finally decided the basic idea behind the project. This decision was a hard one since I had so many options to pick from- but from all the possibilities in front of me the search engine made the most sense, leading to me picking the question I've already described. Not only was it the most realistic of the options, but it was also the most time effective in terms of learning in a short amount of time. I knew nothing about the functionality of search engines going into the project save for the small amount of what AP computer science principles taught me, and so the range of what I could learn about this subject was broad.

This led to the next phase which played out throughout February- getting ahead of myself. The common theme for the next month or so was impatience, as I tried to plan out the rest of my time in this class without truly thinking things through. Project based learning, the basis of this class, is built upon the idea of taking your sweet time to think things out before you leap into action, so this went about as well as you'd expect. This quickly got shut down as the natural course of this class took its course, and I was forced to plan properly via different assignments we were given to do so.

This all brings us to the final big portion of the project so far, which is the portion where I truly begin to understand exactly what I'm doing and where exactly I am heading with this project. This started about two months into the project in March, where alongside with the direct planning I was doing I did a ton of research to prepare myself to actually begin creating the search engine. This manifested itself in the form of finding the tools I actually needed to make the project. The first big tool is ElasticSearch, which is a data and analytics tool that can be used to parse large amounts of data. The second is Scrapy, a Python library that includes web scraping functionality. Essentially, it's a tool that allowed me to create a Python script that analyzed webpages and the information they contain en masse. Finally, we have NodeJS, which is another topic in and of itself but for my purposes was simply a runtime environment which I

used to run my application. This long research bled into mid March and all the way into spring break where I had the nasty shock of figuring out that something went wrong- namely my understanding of how elasticSearch worked. This error of research is what really lit a fire under me to finish the project as I moved into April with a revised and more cramped schedule to account for the changes

Finally, this brings us to the final part of the final part of the project, since after re-evaluation the following three weeks were a flurry of coding, consulting debugging advice from others on the internet, and running and rerunning code to get the engine, the user interface, and the webspider all running smoothly. This created an end result of a 3 pronged project. The first part was the web spider I built using Scrapy, which was a robot that could collect website titles and URLs in large quantities and return them in a database format. The second part was the search engine backend built on elasticSearch, where this data from the web spider was inputted. This now allowed me to query the database and get results for any searches. Finally, we had the user interface portion for which a dynamic website had to be built. This website, hosted locally after running the app, contains a search bar and a results area for full searching functionality for the user.

This full functionality brings us to today- where I'm left with a functioning search engine, a 15 minute video that explains to the world how I did it, and an infinite amount more knowledge about search engines now than when I started. However, don't let these results fool you to what my experiences overall have taught me, because, in the wise words of Ralph Waldo Emerson, "Life is a journey, not a destination." ASI is no different, and through this small part of my journey of life I've picked up innumerable life skills I'm sure to use on later projects and personal efforts. This class means more to me than just the search engine or web scraping or any other little thing I learned. It means a semester of advice, of careful planning, and of building the skills necessary to do this all again whenever another question catches my eye. So for all of those reading this interested in the class, I have only one thing to say. Advanced Seminars and Investigations is an experience you're sure to never forget, and I hope you choose to join the many students changed by it one day by taking the course.