Chordity - Capstone Synthesis Report

Overview

Throughout the Master of Computer Information Systems and Business Analytics (MS-CISBA) capstone course (CIDM-6395), I have developed a project, consisting of a prototype of a web application that I have developed and a portfolio that is used to showcase a feasible synthetic understanding of the foundational topics covered within the MS-CISBA curriculum. This report is meant to elaborate on my knowledge of the four foundational areas of the MS-CISBA curriculum, Software Systems (SS), Business Analytics (BA), Data Management (DM), and Cybersecurity and Networking (CN), alongside the context of my application. I will also elaborate on how these areas fit with each other and how they are realized within my prototype.

Before we elaborate on the different curriculum areas, I need to provide an overview of my application first. During the semester, I created Chordity - a web-based chat platform focused on connecting musicians and collaborating to inspire and kickstart new tracks! This is meant to be a social media application, similar to services like Discord (https://discord.com/) or Reddit (https://www.reddit.com/). I created Chordity specifically because I am also a musician in my spare time, and I wanted this project to showcase something I am passionate about. It was also challenging, but fun for me, since I had to learn a lot of new tools and techniques, and I had to reinforce my existing knowledge on other topics and areas as well.

Software Systems

I would argue that this project has a strong emphasis on the Software Systems (SS) foundational area of the curriculum since most of my time was spent with the technical components of my design. I would also like to add that this does not mean I have disregarded the other foundational areas in any capacity in favor of more elaboration within the Software Systems curriculum area, as I believe I have considered and integrated all curriculum areas into my project to the best of my

ability. This mainly means that this area required more time and attention due to my existing knowledge within the Software Systems knowledge area and due to the requirements I set for myself when creating this prototype.

The Software Systems area of this curriculum focuses on a student's technical ability to develop applications and software based on certain business requirements or needs. The knowledge area also emphasizes the importance of the flow of applications and their modularity, whether that would be with different use cases, scope requirements, business needs, implementations, or design changes that can happen over time. In these classes, we focused more specifically on building web applications using Django (a popular Python framework focused on back-end web development). We also used other languages and tools, like HTML/CSS/JS for front-end markup, Git and GitHub for version control management, APIs like SendGrid for sending emails to users, and SQL for database management.

I produced different artifacts of work showcasing the knowledge and skills developed in this curriculum area. These artifacts can be found in two different repositories, which are mentioned below:

- https://github.com/rexherndon/cidm-6303
- https://github.com/rexherndon/guac-n-roll

For the most part, these are the tools I used in my project as well, since I have been familiar with them due to the classes in this knowledge area, but in addition to these, I also connected an AWS S3 bucket for static file storage, upgraded the database from the default MySQL configuration to a more robust PostgreSQL database, and deployed my application through a cloud-hosted provider (Render, similar to Heroku or Vercel, which I have used in the past). Throughout the development of this project, to contribute further implementation of the foundational qualities of the Software Systems knowledge area, I also tried to focus on a modular design that could allow for ease of access with new features or implementations in the future.

Business Analytics

The Business Analytics area of the curriculum goes through the importance of being able to analyze data with different formats, tools, and scenarios. The

knowledge area provides valuable insight into how data is constantly evolving and expanding at a rapid rate, and it goes through why being able to pre-process and visualize this data can be useful. As an example, Amazon can utilize various sources of data from their website, such as how long customers spend on Amazon, or the click-through rate of a particular product, to predict a customer's interests and incentivize more purchases on the platform. Business analytics can help businesses grow, solve complex problems, and gain an advantage over their competitors through the use of their data.

I produced different artifacts of work showcasing the knowledge and skills developed in this curriculum area. These artifacts can be found in two different repositories, which are mentioned below:

- https://github.com/rexherndon/cidm-6308-artifact
- https://github.com/rexherndon/cidm-5310

To substantiate my efforts in synthesizing the Business Analytics knowledge area in Chordity, I needed to find ways to gather user data on the web application so they could be processed, visualized, and analyzed. I first did this by creating an anonymous user feedback form and registering it with the back end of my application so it can be accessed and viewed. I was also able to integrate and access the metrics and trackers that Render provides on their hosting services as well, such as the time spent on each page of the platform, when users are on and off of the website, and what times they are accessing it. I have also created an API on my platform using the Django REST framework for fetching basic information about chat rooms as well. With these three methods of collecting data in place, once the platform can acquire a substantial amount of data, it can be further processed and analyzed to draw conclusions about how users are using the platform and how Chordity can be improved upon.

Cybersecurity and Networking

The Cybersecurity and Networking portion of the curriculum focuses on the foundational concepts of networking, cybersecurity, and how they are implemented in an enterprise environment. It takes us through the policies, procedures, and documentation needed to maintain the network and security posture of an organization, and the curriculum also references popular

cybersecurity frameworks, such as NIST, ISO, PCI-DSS, and SANS. The curriculum also goes over popular tools used for networking and cybersecurity, such as Nmap and Wireshark for network device discovery, along with keyloggers, vulnerability discovery tools, and password crackers, like John the Ripper.

I produced different artifacts of work showcasing the knowledge and skills developed in this curriculum area. These artifacts can be found in two different repositories, which are mentioned below:

- https://github.com/rexherndon/cidm-6340-artifact
- https://github.com/rexherndon/cidm-6341-artifact

Regarding the implementation of the Cybersecurity and Networking portion of the curriculum, there are two areas I knew I needed to focus on after speaking with Dr. Jennex - security through documentation (ie. - legal security) and application hardening. Regarding documentation, there were a few major legal areas I had to consider with my original vision of the application, such as copyright and application misuse. With the original vision of the application (and this is still intended to be a future implementation), I was hoping to integrate an API that had the data of popular songs and their chord progressions. The user would be able to create their chord progression on the website using a wizard or similar service, and the API would show information on how the user's chord progression is similar to certain songs from their database, and the user could customize/export their progression so they could use that as a starting point for a song they would make with a music producer or artist. Since all of this would be happening on Chordity, I could be held liable for any misuse or attempt at copyright infringement, regardless of who is using the platform or misusing the application. Because of this, I limited the scope of my prototype to a chat platform (also since that was another main feature I wanted to implement with this project), and I created a terms of service document that users have to agree to before they finish registering an account to ensure I had security through my documentation. Additionally, I implemented more security features through application hardening. I ensured that all forms on the website included a CSRF token to prevent CSRF/MITM attacks, disabled debug features, restricted API access to certain URLs, and imported my secret variables, such as security/access keys, to Render

so they could be encrypted and unable to be accessed when viewing the source code in an HTTP request.

Data Mining and Management

Finally, the Data Mining and Management knowledge area does have some overlap with the Data Analytics area of the curriculum, but it focuses more on the theory and the process of data extraction, transformation, and loading for visualization. It takes us through the different models a data scientist can use for data mining, such as decision tree models, logistic regression models, or neural network models, and it goes through which data mining techniques would be good for different scenarios, like classification or fraud detection. The knowledge area also teaches us the tools we would use for data mining and data management, such as R, RapidMiner, Python, and SQL for database management.

I produced different artifacts of work showcasing the knowledge and skills developed in this curriculum area. These artifacts can be found in two different repositories, which are mentioned below:

- https://github.com/rexherndon/cidm-6351-artifact
- https://github.com/rexherndon/cidm-6355-artifact

Regarding the Data Mining and Management knowledge area synthesis in my application, I was advised by Dr. Sen to create documentation going over the business rules of Chordity and an Entity Relationship Diagram (ERD) showcasing how the models/entities in my application interact with each other. This was created as another form of application hardening to ensure no data is vulnerable to a leak or exploit. During the development of my application, I started by creating an ERD and then coding the models in my application to ensure they were properly implemented. Also, within this area, I upgraded the database from the default SQLite database that Django provides to a PostgreSQL database, which is more robust for production environments. This database is also currently hosted on the cloud by Render.

Conclusion

During development, I noticed that each of these knowledge areas overlapped with each other and connected in different ways. As an example, I would start with

a theoretical understanding of what I wanted my application to look like, model it in an ERD, create code to implement my design, harden my code, and iterate on it each time to include new features or design changes. Having a foundational understanding of each of these knowledge areas was crucial for me in developing this application so I could understand how it can operate and be expanded upon from different perspectives.