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CS Senior Design I

Professor Annexstein

Capstone Assessment

The project that I, and my group members, will be working on deals with server monitoring, aggregation of metric data, and displaying of various server system metrics in real-time. The application aims to provide an open-source solution to a problem that plagues system admins: consistent monitoring and notice of issues arising. The application will aim to not only aggregate data in real-time, but also effectively, and clearly, communicate the data to the end user. This project is a delve into the nature of distributed systems via the agents. With this it will allow users to aggregate statistics that they may find tedious to obtain, or don't want to implement proprietary software on their system to achieve having access to the lower-level metrics of their system. Along with the monitoring services, the project aims to give system admins a way to implement custom thresholds through the application along with any generic protective system they may have had implemented beforehand in terms of alerting them to issues.

This project will be utilizing many skills that I have garnered throughout my time in the Computer Science program at UC. One class that is fundamental to the success of truly understanding the problem our project approaches is CS2011 Introduction to Computer Systems. This class not only introduced me to a foundational knowledge of architecture, but how each component in a computing system plays a role in computing technology. This will be essential when developing for the agent to monitor system metrics. Another class that is vital for the success of the overall production of our application is EECE3093C Software Engineering. Software Engineering instilled in me the principles and knowledge to navigate through a production cycle. The knowledge gained in this class will allow for a smoother, (ideally) more refined design and development process. In a more mathematical sense, a class that will be helpful in the final stages of the application's duties is STAT2037 Probability and Statistics I. The application will visualize the aggregated server metric data, and in turn display those visualizations to the end user. To visualize the aggregated data, I will need to understand the analysis performed for determining what statistics might be essential and the most effective way to display those statistics to the end user. Also, any predictive modeling that could be added on to expand the service of the application would be difficult to implement without having foundations in probability. Most of my classes will guide me on my way to be an effective team member for this project, but these three classes are a few that I believe will be the most influential in success.

Along with curriculum helping me in senior design, my Co-op experience during my five years in Computer Science at UC will be extremely helpful. My first Co-op was a Developer within the IT Diamond application team at Cincinnati Insurance Companies. This first Co-op was crucial in my development as a programmer. I gained, and honed, various skills during my time at Cincinnati Insurance. I worked with a team that consisted of four other members, and this taught me how to work within the dynamics of a team structure. There was never a time before that Co-op where I worked in such a professional setting when dealing with release schedules. Effective prioritization and task

management were two traits that working on the IT Diamond team taught me. I also participated in a summer intern project where I designed an Alexa skillset prototype to help the company, so my project experience was varied. I not only worked on a typical release development schedule, but also on a short notice burst schedule for the intern project. I now consider myself flexible to various development environments and timetables. My second Co-op was as an Audit Data Analyst at Fifth Third Bank. The primary skills that this job required and taught me concerned data analysis. My job duties were to perform various analyses and modeling on data stored and used throughout the bank. By working in this role, I became vastly more knowledgeable about how data is collected, how it is used, and how it is displayed. This will be beneficial in terms of one of the key components of this project: data visualization. Along with learning how to visualize the data, I also learned the tools to effectively communicate data. Explanation of what is important in a dataset and any significant parts that should be explored is almost as important as the data itself. This will help in developing the alert system for each metric and determining how to present each metric in the most effective, clear way possible. Lastly, my fifth Co-op was at Children's Hospital as a Biomedical Developer. This Co-op was key in expanding not only my knowledge of programming, but of systems. I had to build various computing systems for various tasks, and my knowledge hardware components and how they interact was expanded as a result. Along with my newly gained system knowledge, I also worked in optimizing and parallelizing various programs used in the statistical analysis of time-series. Since the server data will be time-series data, this experience will come in handy with aggregation and analysis.

This project is something that I've been looking forward to since my group started discussing ideas. As a Computer Science student, and computing technology enthusiast, I always get annoyed when I run into issues. So, the idea of creating an application that will allow for ease of monitoring and alerting whenever an issue may possibly arise is exciting. I also am passionate about working with open-source software, so being part of creating open-source software is very intriguing. With the application being open source, it could lead to great implications with the expansions that potential users may deem necessary that we missed. This fact is extremely fascinating because additions by end users could make the application even more robust and essential for system owners. Along with these reasons is the fact that I have worked with my team members in the past, and those past experiences have been not only successful but very enjoyable.

The preliminary approach to our project is first coming up with the overall architectural design of how the end user's agent application will communicate with the backend and in turn how the data stored will be visualized for the end user. This design will be able to be completed by first deciding on the technologies to utilize for achieving our goals. We will be creating an agent for the end user to place on their system which will communicate with our backend and then eventually display the aggregated time-series data via the web application. The concrete details of the system design will be finalized in this upcoming week 4 of class. We also have discussed various software we could possibly implement for various tasks (GO language for agent, RabbitMQ for messaging, etc.), but the design will first be completed before making any decisions on the development front. My, and others', contributions will be evaluated on a team basis. We will meet regularly to delegate responsibility and measure the performance of the team and the ability to complete tasks in an efficient and responsible manner. We plan on setting the goal of having not only a working demo but expanding upon that working demo as often as possible leading up to the final submission so that we have a fully completed application. We

will know we've done a good job with the application via a set of development goals that the team has decided will be set once the system design is complete and the development process is about to begin.