Spaceport Command and Control System
Software Development

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Nomenclature

NASA   = National Aeronautics and Space Administration
KSC   = Kennedy Space Center
LCC   = Launch Control Center
SLS   = Space Launch System
SSPF   = Space Station Processing Facility
IDE   = Integrated Development Environment
STEM   = Science, Technology, Engineering, Mathematics

I.   Introduction

During the course of this internship, software was developed to ensure the efficient management and allocation of an employee to an area of their expertise or experience that may otherwise have gone unnoticed. This directly affects any future missions prescribed to the SLS by allowing management to easily see where employees can be re-allocated to different mission specific projects or assist a project that may be lacking in a specific field. This software is intended to provide proof of NASA's diligence and deliberation in hiring new employees and in providing training and guidance to employees who may have fallen short of expectations. Allowing management to more easily statistically track and monitor the supply and demand of employees with specific experience will help introduce a beneficial culture where employees are given the ability to grow and hone skills which might otherwise atrophy over time. With this new system in place, NASA can prove the employees they hire and already have are exemplary and will remain exemplary to serve the nation as a whole.

II.   Preparation

In preparation for the tasks assigned, I began the many training courses and security courses required by NASA and the KSC Education office. Before work could begin, I had to complete those security courses that dealt with computer security, network security, and other common security concerns that an organization may face. Adding to this, I took it upon myself to review what kind of programming languages and frameworks would be necessary to have knowledge of before starting the internship. The training and review process began before and at the start of my internship, however a daily preparation was also present during each day of the internship. Every morning the department that myself and my fellow interns fell under had a "tag up" meeting. During this time, all of our coworkers would discuss the tasks that were performed the day prior and the plan they for the tasks to perform on the day of the meeting. While sometimes daunting, these meetings were insightful into the workings of this specific department. Learning the nomenclature and terminology of the agency was very interesting as terms, acronyms, and computer concepts were sometimes brought up that I had never been exposed to before. Learning what all the terms mean and how they work together was a unique experience that I personally enjoyed.

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III.   Approach

The internship began with training, but once that was complete my coworkers and I began writing code for our application. After the framework was laid out for the basic features of the application, we met with our customer and discussed the intentions and reasons for the application we developed. We then spent time researching different methods and techniques on how to implement and create the specific features requested of us.

While most days I worked on software development, there were plenty of other experiences that shaped how I thought and felt about NASA and the space industry as a whole. Throughout this process there were many times where I was fortunate enough to experience some great team building exercises and demonstrations to learn more about NASA and of the missions and research conducted at KSC. Over the course of the internship I visited Swamp Works, the Cryogenics lab, and other areas in the SSPF that were limited access and very interesting. There was also time to help out fellow interns that were working on visualization mechanics and software in the LCC for future missions and collaboration with possible commercial partners. I was also able to participate in an outreach event for young women to promote interest in STEM fields of study such as Electrical Engineering. During this event, we built small circuits to demonstrate and explain the qualities of electricity.

Software development, however, was the primary focus of the internship and learning new ways to accomplish this task was beneficial to my future as a Computer Engineer. Utilizing a command line visual editor, I was able to run benchmarks and tests on different methods of text concatenation and other algorithms to see which method would result in better performance such that it should be used in our application. The application was built using a web framework with which I was unfamiliar, so learning the framework was fascinating to me. I utilized all of my available resources while developing and debugging features of the application such as my IDE, coworkers, and internet research that lead me to the best conclusion on creating test cases and efficient methods to achieve the best result. Additionally, throughout my time here I collaborated with other interns to help them with their own individual projects, as well as helping my coworkers with projects that still have yet to be completed or updated.

IV.   Conclusion

This internship was a fantastic learning experience. During my time at KSC I was able to experience some amazing research projects, technology, people, and of course, rocket launches. I was able to watch multiple launches of space vehicles in closer proximity than most people will ever reach. It is a daunting but exciting feeling to see and feel something so powerful and extraordinary fly into the atmosphere and beyond. I have learned more about myself, the software development process, and the space industry as a whole in these past few months than I have ever before. My interest in space flight and the ground support that goes with it has been piqued in such a way that this will not be the last paper I write on the subject. When I think about the future of the agency and my fellow coworkers I feel a great sense of achievement. The SLS program will launch NASA forward into the future and the software I worked to create is a small piece to a larger, more impressive, puzzle.

Acknowledgments

Throughout this process I have tried my best to excel in my field and be a representative of NASA. I could not have accomplished this without Andrew Davis, my mentor, who spent time to teach me and instruct me in his ways of software development that I'm sure will stick with me throughout my career. Without him I truly believe the outcome of this internship would have been different and that my productivity would not have been where it needed to be. Thanks for dealing with my silly questions Andy! Jamie Szafran was also an amazing person to have met. Her instruction, guidance, and attitude propelled me to strongly desire to be a part of the space industry in any way I can and to keep trying no matter what. Caylyne Shelton was also a great help in determining my feelings towards NASA and the space industry and a great guide to NASA and its inner workings. These three people are a wonderful asset to NASA and it is my hope that it is realized just how great they are.

I'd also like to acknowledge Jacob Moore and Jonathan Mahlin. Our work together on our intern project was fun and a great experience. With both of their help, I believe we have accomplished a lot in these few short months. Their help in debugging and testing is greatly appreciated as without them I'd have been alone in this endeavor. Working as a team on this scale was relatively new to me and it was no less enjoyable with the team I was given.