SOFTWARE PROGRAM EXPERIENCE

By Jennifer Kim, South Torrance High School

As humankind enters the Fourth Industrial Revolution, promising a sci-fi future full of artificial intelligence and automation, society's demand in one specific field of science, one community's demand has been consistently rising: computer software workers. Ranging from software developers to quality assurance testers, the U.S. Bureau of Labor Statistics predicts that employment for these occupations will rise by 22% over the course of the next ten years [1]. The field's growing prominence has caused a rush of initiatives led by both public and private domains to support youths' interests in it. At the forefront of that cultivation stands The Boeing Company.

Offered as a specialized experience of the Boeing High School Internship, the Software Program was directed by Bryce Ockerman and Megumi Telles, supported by four project mentors (Galen Stevens, Matt Elliot, Robert Buttles, and Sam Ryklansky) and student mentor Aaron Guo. Based on interest displayed and capability shown for software, seven students were selected to partake in the experience: Akash Anand, Aman Kumar, Brenton Dunn, Dasha Shevchenko, Jennifer Kim, Raymond Tsai, and Steven Shi.

The program consisted of two main parts -- mentoring sessions and the project.

Over the course of the seven week internship, Bryce Ockerman and Megumi Telles taught five weekly software mentoring sessions covering a variety of topics that would help further students' software careers both in and outside an academic setting. Through conversations about different methods of communication and styles of leadership, interns were equipped with the social tools they would need to succeed as a leader in their field. Through lectures about testing code and development cycles, interns were shown possible career paths. Through instructions about building and giving presentations for the project, interns were given a taste of the industry's fundamental working components. The carefully chosen topics were effectively condensed into one hour meetings filled with crucial information, engaging presentations, and lively discussion. In the time it would take to drive from El Segundo to San Francisco, Bryce and Megumi were able to give interns a solid foundation for their future software endeavors, including technical, non-technical, and soft skills.

Similar to most of the interns, software interns were also expected to complete a project. However, unlike most interns, software interns were given a solution to build in one to two person teams (as opposed to exploring problems and solutions in a three to four person team). The final presentation would be composed of a minimum viable product following the solution for a given problem. These interns would spend their time asynchronously learning and coding using new tools and languages -- varying from SonarQube to JavaScript -- to build a working model under the guidance of their assigned project mentor. Accordingly, a team's process and product differed from another's. Not only was each task unique, but each team's project execution was distinctive.

This article highlights interns,

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"Being part of the software group was definitely one of the most insightful parts of my internship! Learning technical skills regarding software development and testing, as well as professional development skills, is something that will help me throughout college and my future career. I really gained exposure to the mindset that it takes to be an engineer, and the software program has solidified my decision to become one."

—Aman Kumar

Raymond Tsai and Brenton Dunn with their unique experiences.

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Raymond Tsai | CI/CD Pipeline

Coming into the software internship, I had a limited perspective on computer programming. I was only familiar with coding video games, and had never explored outside of that realm. I was unsure if I would enjoy a career in software, because I didn't know what it was like. So upon first entry into the software internship, I was excited, but at the same time I had no idea what was in store for me.

From the get go, it was a challenging yet rewarding experience. My partner Aman and I were tasked with creating a CI/CD pipeline, under the guidance of our project mentor Robert Buttles. We had no idea what a CI/CD pipeline was, so we were in for a seven week rollercoaster ride. Through the internship, as we were going through the process step by step, we were slowly learning about the tools we were using: Docker, Jenkins, Git, Gitea, SonarQube, etc.

The process was in no way smooth; it was hampered with errors that were challenging to fix. The pipeline required us to connect multiple applications with each other, requiring us to configure things correctly. Tokens, URLs, plugins, and commands were all points of failure to consider, and more often than not, the pipeline wouldn't function because of these seemingly little things; a URL missed a backslash or a command was missing a keyword. Robert helped us through all of it, and we learned a lot from how he was able to troubleshoot. He was able to pinpoint where the problem may or may not lie. I remember there was an IP URL error that Aman had, and Robert gave us some tests to run, such as running Jenkins without a volume; if the same error popped up, then we knew it wasn't a problem with the volume. It's like the process of elimination on a test question, which I found really neat.

By the end of the seven weeks, after many hours of scouring Stack Overflow and consulting Robert, we finally had a working pipeline that could scan code and return detailed analyses. From knowing nothing to building a functioning pipeline, it was an incredible feeling!

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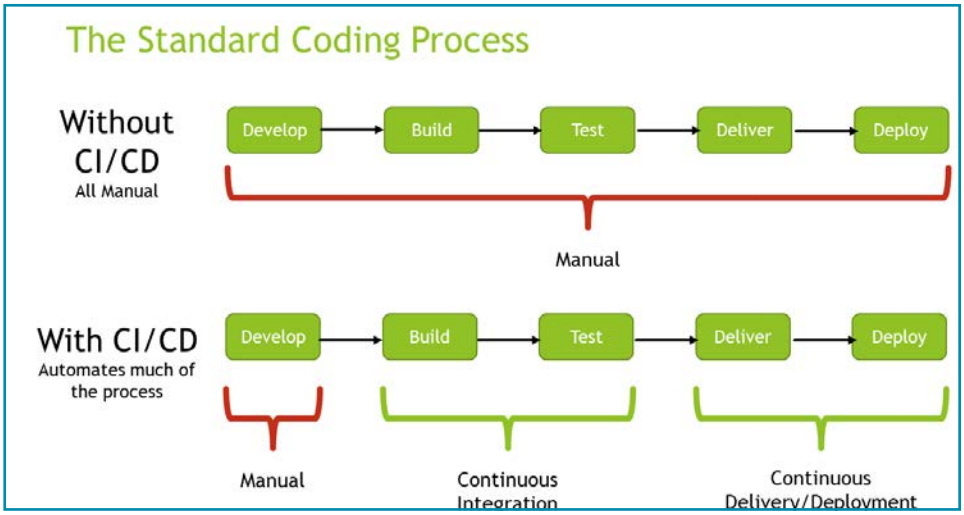
"My favorite part of the program was learning about new software tools and finding solutions to the challenging problems I faced. It was really valuable to work one-on-one with my mentor because I was able to understand the content better and quickly address any issues and questions that came up."

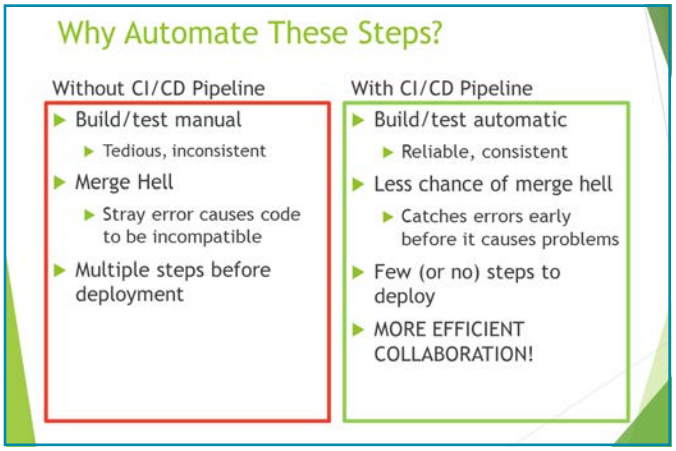
—Dasha Shevchenko

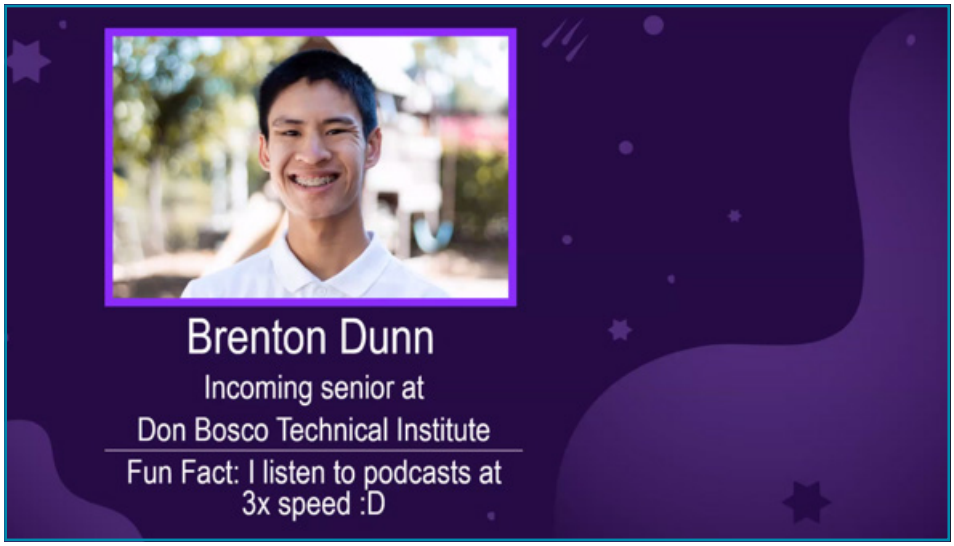
I came into this internship hoping to broaden my perspective on what a career in software would be like, and I definitely got that and more. Learning how to work in teams and think systematically to tackle big problems were both valuable skills



that I gained through the course of the internship. But the biggest takeaway I got from this program was that a professional career in software is just as exhilarating as coding any video game would be. I cannot express how grateful I am to Boeing for this opportunity, it really gave me a lot of new insights into my future career, and I hope to tackle even more software challenges in the future.

[1] "Software Developers, Quality Assurance Analysts, and Testers : Occupational Outlook Handbook." U.S. Bureau of Labor Statistics, U.S. Bureau of Labor Statistics, 9 June 2021, www.bls.gov/ooh/computer-and-information-technology/software-developers.htm





Brenton Dunn | Satellite Operator to Ground Station

The first few days of our internship was full of hustle and bustle--us interns were meeting other interns, meeting our mentors, and figuring everything out. We quickly learned that we were expected to attend both larger group and smaller project team calls. Entering the first meeting with my focal mentor (Sam Ryklansky) was intimidating. I had experience with coding, but the project description that Megumi had provided was nothing like any other task I faced before. Fortunately, that concern dissipated quickly after listening to Sam.

Sam proposed a scenario in which two satellites needed to communicate to ground stations. We needed to create two graphical user interfaces (GUIs), one on the client side and one on the server side, that talked via a central server. He proposed that we use a programming language called JavaScript with the addition of a framework called React.js (or normally just called React). This posed a challenge since neither of us had any experience with JavaScript or React. Learning a new language isn't that hard. It is very similar to the differences between English and Spanish--each language has words that represent objects (nouns), describe those objects (adjectives), and assign accounts to those objects (verbs). Just like the differences in spelling between English and Spanish, different programming languages use different words that, at their core, mean the same thing. In English, the adjective comes before the noun, and in Spanish, the noun comes before the adjective. Similarly, in different programming languages, the syntax can be slightly different but perform the same function. The real challenge for us came in the form of a framework--React. React was created by Facebook and is used to create various user interface components. We got to work learning through various tutorials and walk-throughs.

Seven weeks later, and after many iterations of our designs, we finally presented our work to the two main mentors, who were senior software engineers -- Megumi Telles and Bryce Ockerman -- and an audience of the other Boeing interns. Our product consisted of a GUI for the satellite operators and a GUI for the

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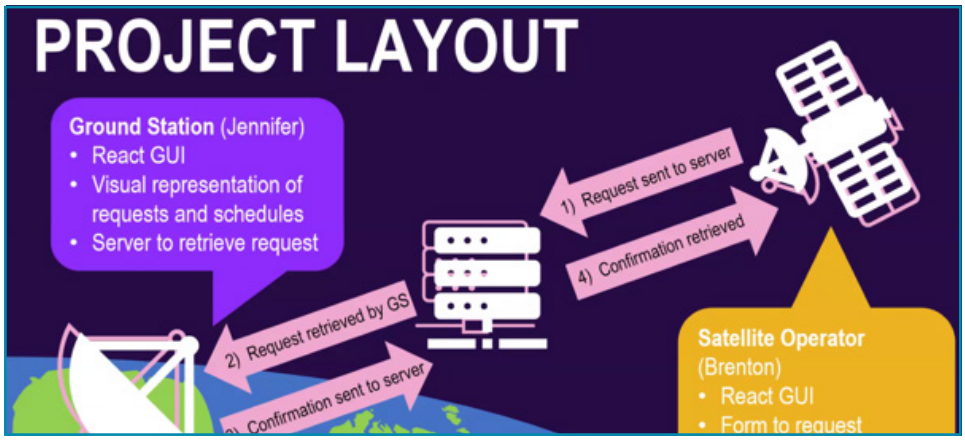

ground station. The GUI for the satellite operators consisted of a short form where they could fill out a few boxes, such as an identification box and a message box. Once they hit submit, it would be sent to a central server, or in our case, a virtual server. On the ground station side, the operator downloads the file, and it auto-populates a timeline. The days leading up to the presentation and the experience I had giving the presentation were extraordinary.

Overall, the entire internship from start to finish has given me skills in the software industry that extend even beyond just coding. Learning Javascript was great, and learning about things like the RAPID framework and communication levels was also incredibly insightful. Thanks to this software experience, I look even more forward to my computer science career.

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"The opportunity to have an engineer who has a lot of software experience in the field critique and give me advice on a large scale coding project has been the most special part for me."

—Steven Shi