Building My Own Co-operative: Extending Higher Education into the Software Industry

Capstone Project, 2021

Declan Brady
Computer Science
The University of Virginia
School of Engineering and Applied Science
Charlottesville, Virginia USA
drb6pje@virginia.edu

ABSTRACT

Working at Tatari for more than eight months served as a jumping off point into the industry of software engineering. I was able to continue the development of the skills I learned at the University of Virginia and learn new ones that will aid me in my career as a software developer. I found that a lot of the things I learned at the University translated into helping me learn at Tatari, expanding my skill set, and expanding my general knowledge of computer science. During my time working there, I built an internal metrics reporting system to monitor our key statistics. This project served to nourish my understanding of technology systems and methodologies, both in practice, and while interacting with teams. Overall, I was able to reinforce much of what I learned academically in an industry setting, developing both my technical and non-technical skills as a software engineer.

1 INTRODUCTION

One question that many students have on their mind is "Will I be ready for the real world?" In other words, will the skills that I am learning at college translate into a practical skillset that I can utilize successfully in my career. After all, the purpose of attaining a higher-level education is to be able to have a deeper understanding of a specific field of study. However, it is impossible to fully grasp the applications of that field in the broader working world. I sought to understand how I could take what I learned at the University of Virginia and apply it to the software engineering industry, by interning, and later working part-time at a software development company called Tatari.

I treated this as an extension of my education, recognizing that there are things that I learned at the University of Virginia that I could take into my job at Tatari, and things that I would learn from Tatari that I could, in turn, take back to the University. This experience proved invaluable to me and has helped shape my perspective on computer science in general. I will discuss some of the projects I worked on and their relation between my education and their work. I will further discuss the hard and soft skills that I attained and how they have

given me a more holistic education and understanding of my industry.

2 BACKGROUND

Tatari defines itself internally as a "data and analytics company focused on buying and measuring TV ads across linear and streaming TV." They act as an intermediary between advertisers and advertisement providers for traditional television, and streaming services. They occupy a unique space in this niche of advertising because they are able to effectively report on the key metrics of these ads, something that hasn't been done before. They are trying to democratize television advertising by making it easy for smaller companies to buy spots that reach and engage as many consumers just as well as online ads from companies like Facebook and Google. I worked on several teams there, contributing to many aspects of the product, from the frontend, to the backend, to internal tooling.

3 EXPERIENCE

Throughout my first three semesters at the University of Virginia I learned many of the core principles of computer science. In our degree program we tend to focus more on the theory and abstract cases rather than the hard practical skills that are used in the industry. This is due to the fact that it is hard to teach these hard skills in a university setting. Given that our field is constantly evolving, and very diverse in its applications, it would be impossible to teach every student the technologies they would eventually use in their careers. Instead, a basis for learning computer science is provided, equipping students with the ability to understand the underlying principles and theories, and apply that to the new technologies they go on to utilize.

The project that best summarizes what I learned and experienced at Tatari took place during my first two months there. I began my experience as an intern tasked with developing an internal metric reporting system to report on key metrics for the executive engineering team to look at and track on a daily basis. I began that project knowing very little about how I would implement the system, or even how to begin. However, I learned one very valuable lesson from the start: it is important to ask questions and always be eager to learn. Often I felt as if my lack of knowledge was a detriment, and that I should remedy it by trying to teach myself the systems and programs I was trying to implement. I quickly realized the futility of this method, as the most helpful resources I had were my co-workers who were already familiar with these structures. I began asking any question that I had, talking with multiple people, across multiple teams, and gaining a deeper understanding of what to do and how to do it.

I attribute my ability to quickly learn and utilize this new technology to what I had learned at the University. I was given a foundation of what a programming language is, and how it should perform. Thus, when learning the more specialized languages like SQL, and many of the Python frameworks we utilized I was able to apply that base knowledge and build on it. In implementing this project, I had to learn how to use AWS s3 data buckets, Amazon Redshift database systems, the PostgresSQL interface, and many Python frameworks like pandas, numpy, and others. In addition, I learned how to access remote APIs through Python

and utilize Airflow to schedule daily execution of data loading scripts.

Understanding the importance of planning and documentation, which has been preached throughout my classes, I began the project by attempting to understand all of the technologies listed above. I then needed to understand how they all fit together, and put together a plan to implement the overall process. My final plan was to do the following:

1. Access the remote APIs through a Python script.
2. Load the relevant data from the APIs to an AWS s3 manifest.
3. Transfer the data from the s3 manifest to a Redshift table.
4. Access the Redshift table using PostgresSQL and interpret the data into visual aids and statistics.
5. Email a compilation of charts, graphs, and statistics to engineering management.
6. Repeat this process on a daily basis using an Airflow task.

Then came the implementation stage where I put everything together and made sure I was creating the correct product. It was important to verify constantly with the engineering team that I was using the correct data, displaying it as the expected, and serving their needs. Building out this project successfully like this was a seamless way of doing things, allowing me to focus on the minor details of implementation, rather than thinking big picture, as all the planning had been performed.

The University of Virginia established those habits and core skills within me. The higher-level plan was not only a guideline for how I

should execute my implementation, but a good way of monitoring progress and communicating with the management team. Something that is hard to experience in the education space is a leveled working environment, where you have multiple teams working on the same code base, managed by several managers, and all under a vice president of engineering. Communication among these levels is critical for a project's success. By having a common reference plan and layout, I was able to keep up with changing requirements and update all parties involved on my progress.

4 RESULTS

The outcome of this project was a working system that is being used on the engineering executive team to track and monitor Tatari's key internal metrics. An email is automatically sent daily to all people that signed up for it. It is being used as an alert system, where if something seems out of the ordinary, or emblematic of a larger problem, steps can be taken to address it. In the past, to get the statistics and graphs that are included in this report, it would have taken collectively hours of manual data introspection and compilation. Now, there is an automatic system that does it all itself. It takes less than fifteen minutes to compile all the data, construct the charts and statistics, and email it out. It has allowed for a seamless way of checking in on key metrics and ensuring that the company and engineering organization is moving in the correct direction.

This project also served as just the beginning of my work at Tatari, where I have since learned countless systems and methodologies. As I continue to evolve as a

student and employee, I will utilize what I learned there to improve my work and myself.

Additionally, my experience at Tatari helped to reinforce a lot of what I learned at the University. Research has shown that a work and education balance like this one can serve to improve academic performance and gain understanding of systematic patterns [1, 2]. The basics of programming, good practices in projects, planning, communication with teams, and the thirst for knowledge all proved to be invaluable to my success at Tatari and I hope will contribute to my future success. Using Tatari as an extension of my education allowed me to apply and develop these skills, as well as recognize the importance of having them.

5 CONCLUSION

I completed the internal metrics system in March of 2021, and am still tweaking and improving it as of October 2021. The maintenance of the system has taken more time than the initial implementation as it constantly evolves to add new features, and address concerns. This is emblematic of a larger trend: software is an evolving thing, and it is important to keep up with those changes and always learn. This is why it is impossible for any university to teach their students the technology that will be used in their careers. Something that you learn first year might be out of date by the time you graduate. This is why our education at the University of Virginia consists of theory and more abstract computer science. We are provided with a foundation on which to build and expand, and encouraged to never stop learning. While it may seem as though one is not ready to go out and be a contributing software developer, it is

important to understand that learning how to use technology like Redshift was never the point of higher education, instead it prepares students by teaching us how to learn.

6 FUTURE WORK

One other potential outlet for combining real-world experience with higher education is coding "boot-camps" where participants can learn more industry-level hard skills. Universities have considered partnering with these organizations in the past to offer more hands-on skills to their students [3]. These programs are more adaptable to industry norms and could offer an outlet to learn skills that Universities are not equipped to handle. It is evident that colleges recognize the value of real-world experience, and some are attempting to offer it to their students. Though the University of Virginia does not offer these programs, students are encouraged to participate in their own education outside of the classroom. If students recognize the importance of hands-on experience, and pursue outlets to attain it, they will have a better understanding and appreciation of their education.

This illustrates the importance that a diverse form of education should not go unrecognized or underappreciated. As I continue my college and professional career, I will continue to keep these themes in mind. It is also imperative that I continue to keep an open mind and attempt to learn. With the foundation that the University has provided me, and I will continue to expand, I hope to work in more professional environments and expand my skill set. After coming to appreciate the skill set that I have developed I have begun to prioritize its expansion and will look for unique ways to improve myself. This University has provided me

with a once in a life time opportunity to learn amongst like-minded peers and build myself into a productive and well-educated contributor to society. Using this, I have taken advantage of opportunities that have been presented to me and encourage others to do the same. If presented with a similar opportunity I would encourage any reader to take it. Getting a glimpse into understanding your place in the work force before graduating college is a powerful thing to know.

REFERENCES

[1] Barry, B., Ohland, M., Mumford, K. and Long, R., 2016. Influence of Job Market Conditions on Engineering Cooperative Education Participation. In *Journal of Professional Issues in Engineering Education and Practice*, 142(3).

[2] Blair, Benjamin, and Meghan Millea. 2004. Student Academic Performance and Compensation: The Impact of Cooperative Education. In *College Student Journal*, 38(4).

[3] Louise Ann Lyon, Quinn Burke, Jill Denner, and Jim Bowring. 2017. Should Your College Computer Science Program Partner with a Coding Boot Camp?. In *Proceedings of the 2017 ACM SIGCSE Technical Symposium on Computer Science Education (SIGCSE '17). Association for Computing Machinery, New York, NY, USA, 712.*