Practical Work Report

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Summary

I worked at Gentrack in a team of 3 interns for 2019 Dec - 2020 Feb of 12 weeks. Gentrack is a large airports and utility company based in New Zealand, with satellite offices in the United Kingdom and Poland. The office in the Auckland CBD is large and spacious, with around 150 employees. There are many amenities such as courts, kitchens and meeting rooms.

My internship consisted of working on two extra pages for the Veovo application, the largest product in the airport's division. These were Tax Code Maintenance and Financial Code Maintenance. Our internship team was situated in the same area as the primary team to allow easy interaction. We also had a mentor Fernando, who helped onboard the interns and helped with any issues or problems.

The team worked in an Agile environment, so there were daily standups, sprint reviews and retrospectives. Our development process was managed by the Atlassian suite, which handled the creation and tracking of tickets and the git repository and branches.

As my first internship, I learned a lot from this experience. Communication with team members and colleagues was a meaningful experience. This included gaining the confidence to talk at the daily standups and communicating delays and issues that I discovered. Technically, I learned about an enterprise development process and new technologies. The new technologies I learned were Angular, Typescript, and Cucumber. I also learned about various testing terminology and techniques such as manual, unit and integration test suites.

Acknowledgement

I want to thank Grieg, my temporary manager, for helping even though he only started a few weeks earlier than I. He was understanding of our problems and considered all opinions.

I want to thank my mentor, Fernando, for always being diligent in helping us interns learn. He answered our questions quickly, no matter how ridiculous.

Sannan and Annie were part of my intern team and were great friends for the internship. I enjoyed working with them and had lots of laughs.

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1 Introduction

Gentrack Ltd is a large utilities and airports software company which has locations around the world. Their business is split into the utilities and airports sides.

I worked for the airport's side under the brand Veovo. We specified requirements in a team of three, developed, tested, and debugged the main web product using Angular and Typescript over 12 weeks. I was guided by my teammates and mentors, who taught me the workflow, pair programmed with me, and helped me feel like a part of the team.

2 Company Profile

2.1 Layout of Office

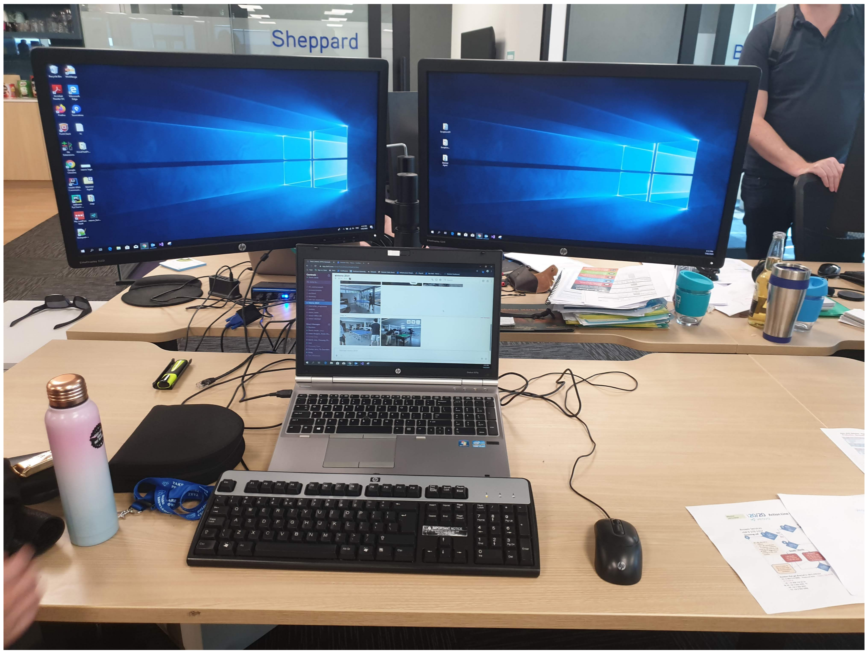

Figure 1: Desk Setup at Office

The Gentrack office is located at 17 Hargreaves Street, St Marys Bay, Auckland. It is located near Victoria park and very close to the Auckland Police Station. The New World nearby was a common place to buy lunch. The general office layout is very open, with enclosed rooms reserved for meeting rooms and the CEO's office. There are two types of meeting rooms; small cubicles which could fit 1-2 people and used to relax, and larger general-purpose meeting rooms often used for standups and presentations.

Another fixture of the office is the use of plants around the office. This improves the atmosphere within the office and relaxes the employees. There are many glass windows which allow light and fresh air inside on hot days. The office building has two levels, the bottom floor occupied by the utility teams and the top floor occupied by the airports and accounting teams. I worked on the second floor within the airport's development team. We, interns, had a row to ourselves, and I sat in the middle seat with Annie on my left-hand side and Sannan on my right-hand side.

Both the upper and lower levels have kitchens, although the upper level's kitchen is mainly used for coffee and is smaller than the ground floor. The ground floor kitchen contains microwaves, sinks, coffee machines, a fridge for employee lunches and drinks. It is the area that most employees go to for lunch.

2.2 Staff Organisation and Structure

Gentrack is a mid-sized company with around 500 employees. There are two main areas of the business, those being utilities and airports. The utility business was the more significant venture during the internship, although they were experiencing some trouble with Brexit, as the United Kingdom is their largest customer. There is a team in the United Kingdom for utilities and a Poland team for airports. The utility business is split into smaller groups such as Velocity. There are two smaller teams in the airports business, of which I was employed in the main product: Veovo.

Due to the relatively small size of the company and teams, the hierarchy structure is relatively flat. I even had the opportunity of speaking with the CEO on multiple occasions.

Figure 2: Selfie with CEO at Christmas Party

2.3 Technical Facilities and Amenities

On the upper floor, where I was working, there were several amenities. A printer room contained printers, paper, shredders, and free stationery to use at work. A small kitchen used primarily for making coffees and tea in the morning was near the printer room. It also had fruits occasionally to choose from.

The lower floor had a larger kitchen which was used at all times throughout the day. There was a coffee machine, fridge, and microwaves to prepare lunch. This was the most common place that people had lunch or breakfast at work. There were couches and tables to sit and eat at and a pool table and table tennis table to play games. Many functions were also held here throughout my tenure. There was the regular end of month drinks and pizza for the whole office.

Outside, connected to the kitchen, was a large area containing a court that could be used for tennis, basketball and football. There is also an area to play darts.

3 Description of works

The overall aim of the internship was to create two new pages on the Veovo application for tax code maintenance and financial code maintenance. This would be useful to airlines as they could easily update and see the history of tax codes and financial codes. I worked with a team of 3 interns in a larger group of 10 people who managed the development of Veovo.

The main application for Veovo had a large existing codebase, with some autogenerated files being hundreds of thousands of lines long. Therefore, a large portion of time was dedicated to understanding how the components and modules functioned at the start and throughout the internship. Furthermore, the codebase contained many files autogenerated pieces of code, which was custom to Veovo. The product owner had written custom software to generate routes, components, and data management functions from base configuration files.

Most of my time was spent coding in VSCode, working on features, testing, debugging. The second most significant use of my time was in meetings. We had a daily standup for around 15 minutes, along with meetings for designing, operations, estimating, and learning. I also spent some time writing documentation for the code I was writing. At the start of the internship, there was around a week-long onboarding period, where I watched introductory videos about Gentrack and Veovo. These included a business overview, values, culture, and some technical information and setup for the project.

3.1 Requirements

After receiving some design documents, we, as a team, had to break them into features. These features could also be further broken down to understand each task's scope and complexity. From the tasks, estimates can be generated and then used to calculate a deadline. Each design should also have a user requirements list that is part of the test suite.

Features were created on Jira, with the subtasks being made in a meeting with Annie, Sannan, and Grieg to define each feature's scope and what it would entail. The estimates were often disagreed upon. I usually gave higher estimates than my other teammates as I foresaw potential issues arising and extra time needed to test and learn the codebase.

3.2 Agile Process

Each morning at 8:45 AM, there was a standup meeting, where each member of the team discussed what they had done the day before and what the plan was for the rest of the day. A team member from Poland would often be present to share what was being worked on for their team. It was also an opportunity to announce what blocking issues there were, which would be resolved by other team members helping to unblock that task.

Our team held sprints that lasted two weeks long, with a new release of the application being deployed at the end of the sprint. We also held sprint retrospectives at the end of each sprint to determine what went well and what could have gone better. This aligns with the values of agile, preferring to respond to change rather than following a plan.

One primary tool we used to track progress and code was the Atlassian Suite. Specifically, we used Jira, Bitbucket, and Confluence. Jira was used to track tasks and link them to code changes. Bitbucket was used to hold our source code and perform any source code changes. Confluence was used for documentation for the organisation, containing things like meeting minutes, technical documentation, and other helpful information.

3.3 Angular Web development

The frontend of the web application for Veovo is written using Typescript under the Angular framework. Angular is the largest web development framework used for enterprise products, followed by React and Vue. The existing code base is extensive and quite complicated, so it took a while to get accustomed to the style and implementation decisions. To develop the project, I used the editor VSCode to make code changes. To see the results of my code changes, I served the website locally to test and verify the behaviour.

3.4 Manual Test cases

As the projects involved the website, some manual testing had to be completed to verify correctness and functionality. This was extremely thorough in the process, with all aspects of the application needing to be confirmed. For example, testing night mode, verifying data in the database, making sure text is correct, in the right format, in the right place. Two sets of manual tests had to be written for the projects. They were pretty simple to write as there were already examples to work off of.

I wrote many manual tests for both Tax Code Maintenance and Financial Code Maintenance in a shared spreadsheet on the Microsoft Cloud Suite. The tests specified what actions needed to

Figure 3: Standup Meeting Room

be taken (with each test being sequential), the expected outcome of the action taken, and the feature that was under test. These tests were heavily based on existing tests written by the testing engineers on our team Venkat and Harika.

3.5 Automation Testing

Manual test cases can take a lot of time to run and are therefore expensive as a team member must meticulously look over each step. They are also unreliable, as humans can have lapses in concentration and may skip steps that they think might not be impacted.

Therefore, to reduce the number of manual test cases, automated testing is implemented for everyday use cases of Veovo. These also had to be created for the new Tax Code Maintenance and Financial Code Maintenance pages. The test code was written in Gherkin using the Cucumber framework. It utilises the page object model (POM), a design pattern that models common UI elements and their interactions.

When running the tests, it would automatically click buttons, fill inputs, and verify that the data submitted to the server matches what is expected. This process is very entertaining to watch but can be run in the background for efficiency.

3.6 Tax Code Maintenance

When airports charge for a service, such as fueling or runway availability, the tax codes in use are very complex. The companies being charged are from various countries with differing tax code applications for different services. These charges also change over time (although not frequently), such as GST or VAT. This system needed to be integrated into the current billing functionality of the Veovo application. Tax codes did exist in the application already, although the users did not have a way to edit these in the application; instead, the operations team made a configuration file for these codes specific for an airport.

The development of this feature required a new page on the frontend, storage in the backend, and integration of these two components. It also had to be thoroughly tested through the testing mentioned above methodologies. The integration between the storage and the frontend was handled mainly through the existing code generation tools. The backend storage had to be adjusted manually with the help of a senior engineer on the team. There already existed an object for tax codes; however, after discussion with the team and Greig, we decided there would have to be some changes, such as adding an “isInactive” field to disabled tax codes when they became outdated.

The most time-consuming aspects of this feature were the frontend and the testing. The frontend consisted of a grid component, with each row containing summary information for a tax code. Upon clicking the row, a sidebar opened with more details and the option to edit any fields. The editing was limited to only those who had permissions for editing tax codes. The Tax Code Maintenance feature was completed within three sprints (6 weeks).

3.7 Financial Code Maintenance

An airport uses financial codes to label billing activities. Again it integrated with the existing billing system in the Veovo application. The implementation of this component was very similar to tax code maintenance as the frontend page was also a grid component. Therefore, from our experience and confidence gained from developing tax code maintenance, the process was completed relatively quickly. Overall it took two sprints (4 weeks) to complete financial code maintenance.

4 Reflective appraisal

4.1 Impressions and performance

Gentrack is a dynamic yet mature software development company that operates in many different fields and countries. The technology being used is constantly updating, although some legacy systems and languages are still being used, such as GenBasic. There is a strong emphasis on testing and robustness of software in the airport’s section, as shown by the unit, manual and automated test suites, and committed test engineers on our team.

Employees are treated with respect, and excellent amenities such as free beers and pizza are provided each month. There is also care taken for clean and effective meeting rooms and events. The lunch break is a time to interact with other company members, even if not in the same team.

There was a missed deadline for Tax Code Maintenance by one week. However, by the end of the internship, I completed both projects. This indicates that my performance was good.

4.2 Lessons Learned

From gaining confidence, I learned to ask for help from my mentors and even reach out to other team members when blocked on an issue. There was a situation where our team discovered that we would not be able to deliver the Tax Code Maintenance page within the specified deadline. At this point, we had to itemise and create estimates of how long the rest of the changes needed were. We discussed these findings with our manager and decided to postpone the release of this feature to the next sprint.

I learned how to work in a team and work together to perform tasks faster and with a better understanding. This comes from listening to and appreciating the different perspectives and opinions in a team. One of the most prominent aspects of being able to code more effectively is debugging. My mentor Fernando showed me how to systematically uncover the area of code in which a bug was present. At each level of the application, the data should be checked against the expected value. If this differs, then the logic at this level of the application is faulty.

I gained communication skills, both with my peers and other team members. If there is a concern about a project or task, it should be brought up to be discussed and solved. The daily standups at the start were very nerve-wracking, but I gained the confidence to speak with my team.

Technically, I learned about many new technologies and processes. The Agile framework utilised by our team meant I was included in the daily standups, sprint reviews, and retrospectives. I learned Angular, Typescript for the frontend code and Cucumber for behavioural driven development testing. The application testing included manual test cases, unit tests, and integration tests, which were new concepts to me. The Atlassian suite taught me the development process in a larger team. This required proper branching, breaking down tasks, and estimates for tasks.

5 Conclusions

My summer working at Gentrack was an exciting experience and my first time working at a software company.

Compared to university or personal projects, working at Gentrack gave me experience working with other software engineers, which is different. To be effective in a team, a software engineer needs to have the skills to communicate well with other engineers. This can help with deadlines, estimates, and collaboration.

I learnt technical skills from my internship, such as Typescript, Angular and Cucumber for testing. I discovered many practical parts of testing, such as manual, unit, and integration testing. Agile was also interesting to learn about in an actual team environment. One of the most challenging aspects was interacting and learning in the context of a large existing application.