Employer: Environment and Climate Change Canada(ECCC)

Manager: Deborah Trowsdale

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Acknowledgements:

Throughout my work term, I received various amounts of support that helped me develop my work skills and habits in order to become a better employee. I would like to thank my manager, Deborah, who helped me in understanding the project we were working on in detail and helped us understand the structure of the project. This was done through various meetings where she would show us how certain how the database was laid out and where we could find information we wanted in the database. Another way she helped us was through teaching us how to use Azure DevOps which included updating new and existing requests [2]. She also taught us how to push and pull new changes that were made to the code and showed us how to use Visual Studio 2022. Another person I would like to thank and who helped me out tremendously was Jenny Liu. Jenny is a professional who knows the project we were working on and would help me out when I had an issue while coding. She would make time and create a meeting in which she would answer any questions me and my coworker had. Lastly, I would like to thank my co-worker, Fabrice Mikobi. Fabrice and I worked together on this project and we helped each other when we had issues that were programming related. We grew our knowledge and understanding of the project together through consistent meetings and solving problems.

Executive Summary:

Through this paper, I have discussed what I have done throughout my work term. I have included information about who I worked with, what I worked on, what technologies I worked with, and the overall project. I dive into my struggles as a computer science student who is doing their first work term, and what I did to overcome those struggles. I have talked about how this work term will aid me in my career and what direction I plan to head with this experience. Along with my

experience, I talked about the organization's mission and how my work has aided the organization in taking steps to reach its overall goal.

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1. Introduction:

Through this paper, I will talk about my first co-op term experience which was at Environment and Climate Change Canada(ECCC). In this paper, I will go through the organizational context of the project and my employer's overall mandate/mission statement. I will discuss my work experience and the nature of the work within the organization, what my duties were, and how I contributed to the team. Challenges were met throughout my work term and I had to overcome them through various solutions which I will also highlight in this paper. As I talk about my experience, I will summarize my contributions to the organization's mandate. I will talk about how my experience at ECCC has a relation to my academic studies, and what helped me from previous academic studies during my work term. I will also go through how this co-op term has helped develop my career and what lessons I have learned throughout my experience and the influence it has on my career objectives. Lastly, I will go over a summary of my work and talk about the possible use of my work in the future and what directions might be best taken by an employee who is carrying on the work I have done.

1.1 Organizational Context:

Environment and Climate Change Canada's mission statement is to inform Canadians about protecting and conserving our heritage, ensuring a safe, sustainable and clean environment for the present and upcoming generations [1]. During my work experience, the project I was assigned to work on was VEERR, which stands for Vehicle and Engine Emissions Reporting Registry. This web application consists of a database that collects and stores information about motor vehicle gas emissions, fuel consumption, and engine technology information. This information is captured from companies that are marketing various classes of motor vehicles within Canada [1]. To communicate with the users the information that is captured, VEERR

needed to be user-friendly, fast, consistent, and clear when presenting the information. In order to meet these expectations, our manager, Deborah, held meetings each week to ensure that me and my co-worker, Fabrice Mikobi, were moving in the right direction. We would go over any new changes we have made to the web application, Deborah would also assign our new tasks, and she would go over any questions we may have had. Deborah was also responsible for communicating with the client and ensuring that their needs were met with this application. Following her discussion with the client, she would tell us what the client's likes and dislikes are with the current version of the web application. I would then take this feedback and adjust the application's features to the client's needs. This way, my contributions would affect the project which will allow for better use of the VEERR web application.

2. Work Experience

2.1 Nature of Work:

The work I was involved in over my work term consisted of weekly meetings between me, Deborah, Jenny, and Fabrice, as well as another weekly meeting with the entire ECCC team. The meeting with the entire ECCC team consisted of any updates we needed to be aware of. An example of an update we would have needed to be aware of was when James, our boss, talked about how there's going to be construction going on in the fourth floor so we would need to switch the floor we worked on. The other meeting that was between me, Deborah, Jenny, and Fabrice, consisted of discussing what the client's needs were, any updates on any of the work we have done, and the assigning of tasks. Deborah would also talk to the clients and get them to review the work we have currently done in order to get feedback on the direction we are going in. Once Deborah gets feedback, she tells us what the client said during our weekly meeting. Typically both of these meetings happen every Thursday. Me and Fabrice would then discuss

how we would divide these tasks among ourselves and how we might solve a particular problem. We would assign the tasks that were given to us using Azure DevOps, a software that provides version control, reporting, project management, and requirements management [2]. I would take work on the tasks assigned to me which were coding-based tasks and I would test the code I have done before showing Fabrice and then update Azure Devops to show that I have completed my task [2]. This way my team would be notified that I have completed the work given to me.

2.2 Experience:

The project I worked on was VEERR. VEERR stands for Vehicle and Engine Emissions Reporting Registry. The work that I did was focused on the front-end part of the application, specifically the look and feel of the project [3]. We were focused on a couple of pages that we had to change to the client's needs. One of the pages we worked on was the secure document exchange page or SDE page. The secure documents exchange page included documents that highlighted the date that the document was uploaded, who it was uploaded by, and the manufacturer that belonged to that company. It also included whether the document was still active or not, any metadata that was associated with it, and if there were any comments added by the user. The secure documents exchange page stored documents that were received by other users and documents that were uploaded by the current user. One of the bugs I went over with my coworker, Fabrice, was how if a user uploaded a file to SDE, the user themselves cannot remove permissions for themselves to view and edit the document. This was done by going through the C# code in the SDE controller file and targeting the function that was changing permissions when the user tries to access all users with permissions to that file [4]. Another bug I had to solve for this page was one where if a user typed many consecutive letters with no spaces, the consecutive letters would exit the text box and it would not look visually appealing. The way

I solved this bug was by adding an “overflow-wrap: break-word;” styling to the CSS of that page [11]. This essentially breaks the word into as many times as it needs and enters into a new line to carry the word over so that the word remains within the text box. Another page I worked on was the Manufacturers Management page. This page was essentially a table that stored all the information that had to do with the manufacturers that the clients worked with. The table stored information about the manufacturer’s name, what date they started, the manufacturer's code, and their current status. I had to ensure that this page was user-friendly and visually appealing. In order to do this, I added a datatables class to the table [12]. This was done within the cshtml file using razor syntax to the ASP.NET web page [13]. With this, I was able to produce a search bar that filters through the manufacturers based on input from the user. This solution also allowed me to add pagination and the number of entries that were shown at a particular time. I also added a light blue background to the table header tag in order to make the table visually appealing to the user. The next page I was asked to work on was the User Management page. This page was a table that contained information about users. Specifically, it contained the id, user name, email address, manufacturer code that belonged to that user, and the name of the manufacturer company. It also contained the current status of a user, as well as an action radio button that allowed the user to enable or disable the user which would then change the current status to either enabled or disabled. Within this page, we were asked to do several things, including switching a two-step filtering process and making it into a one-step filtering process. Originally, there was a modify button which then led the user to filter for the manufacturer that they wanted to look for. I was asked to remove this button and keep the filter. This eliminated the two-step process. I did this by going into the cshtml file that contained the user management code and deleting the modify button code. I was also asked to change the layout of the existing filter and

did so using the flexbox property within CSS [8]. The filter had drop-down menus for the user name, manufacturer code, legal name, and status, then had a filter and clear button. Since there can be many users, manufacturer codes, and legal names, we determined that having a dropdown menu where a user can search for what they want is ideal. I was able to accomplish this by finding the dictionary within the model that included the list of each of the required fields, namely the user name, manufacturer code, and legal name. I then used C# code to loop over these lists and make sure there were no duplicates by using the Distinct function [5]. Once I had the required I had each of the required values for each of the required filter fields, I added them within a datalist as one of the options a user can select in the datalist dropdown menu. This way, the datalist allows the user to search through the dropdown menu for easier and faster access to the information they are searching for [6]. For consistency purposes, I was asked to put an edit link on the users management page where the enabled/disabled radio buttons were. Once a user clicks on the edit link, they are then taken to the user details page which is where I was asked to put the action that contained the enable/disabled radio buttons [7]. The way I did this was by grouping the user and manufacturer's information together and by creating a class that encapsulates the user details and the manufacturer's details [9]. This was done by querying the database to get the user details and the manufacturer details. When a user then clicks on one of the users they want to see more information about, they click the edit button. The edit button passes the user id as well as the manufacturer's id taken from the user details and manufacturer details that were captured and passed through the controller [10]. This then takes us to the required user details page for that user which has the enabled/disabled radio buttons action [7]. The user can then choose to enable or disable the user and save this action. Another page we were asked to work on was the activity log page. This page stored information about the user's

activity along with their manufacturer. Specifically, it kept track of the user log-in and log-out, the manufacturer they were associated with, the model year, and the user name. It also stored information about the type of action this user was committing such as logging in, logging out, and many other actions committed by the user. Lastly, it stored when this activity was going on through the date and time. This page, similar to the user management page, required us to create a filter to allow the user to find the user activity of a particular user or users. Specifically, we added a filter for the user name, manufacturer name, and the start and end date of when they would like to see a user's activity for their requested date. Lastly, a type of action filter was added in order to sort by the type of activity the user was committing. When the inputs are filled and the filter button is pressed, the table is adjusted to the user's requirements. I was also asked to make the page mobile responsive and did this using CSS by adding media queries and changing the font size of the text as the screen got smaller [14]. Another part of my regular duties was to update the queries that I worked on and made sure to add appropriate comments indicating if I resolved the task I was assigned. This was done through Azure DevOps [2].

2.3 Challenges and Solutions:

During the work term, I encountered many challenges. One of the challenges I encountered was learning the programming languages I was supposed to work with since I did not know them prior to the beginning of my work term. In order to learn these programming languages, I had to spend time on YouTube watching tutorials and going through google to understand different functions and algorithms. Another Challenge I had to overcome was learning how to solve problems without being able to ask a senior developer for help as Jenny and the rest of the team members were usually busy. I did this by looking up my problems online and using helpful websites like Stack Overflow, as well as coordinating with my coworker Fabrice. The meetings

with Fabrice were particularly helpful since we both put our minds together and solved difficult bugs together. We would also teach each other different tips and tricks in order to overcome future adversities.

3. Reflections on work experience:

I believe that the courses I took at Carleton University have benefited me greatly in my work experience. Specifically, COMP 1406 and COMP 2406 prepared me for this co-op term since COMP 1406 was based on object-oriented programming and COMP 2406 was based on web applications [15]. COMP 1406 taught me how to work within a model-view-controller environment . This helped me within my work term because the way that the project was structured was in a model-view-controller environment [10]. This made it relatively easy to navigate through the project and made it easy to find what I was looking for. As for COMP 2406, although VEERR was programmed using ASP.NET, it was very similar to HTML along with C# which is almost the exact same as Java which was taught in COMP 1406 [4]. I used C# to create efficient for-loops, get and post information to the database, create and manipulate lists and many other things [5]. Along with this, I used CSS for styling the application and used JavaScript when I could make things easier. Styling and Javascript were used in order to make the application clear to the user as well as make it user-friendly [16]. Both of these skills were also taught within COMP 2406. Within COMP 2406, we were also taught how to get and post information from a database which helped when we needed to get information from the database or post information to it. With this, I was able to use C# and Javascript in order to get all the appropriate information and functionality as well as make it fast and efficient for the user [4]. I also used ASP.NET and CSS to communicate to the user consistent, and clear information on any device they are using [13]. Through these skills that I learned in my University courses, I was

able to contribute to the employer's overall goals for this application and mission statement. This was done by meeting the requirements that VEERR needed to be user-friendly, fast, consistent, and clear when presenting the information. Within the courses I took at university, one of the main aspects that helped me contribute to my employer's overall goals and the mission was teamwork and getting along with others in the workplace. I learned this by communicating with my classmates and helping each other when it came to homework. I also learned how to communicate with my manager and ask effective questions by communicating with my professor in a classroom setting in order to get informative answers. I believe that this work experience will help me with my long-range career goals since I plan to be a web developer in the future and since my position at ECCC is a web developer, this experience will benefit me greatly.

3.1 Contributions:

I think that within the time I was at ECCC I was able to contribute greatly to the organization's mandate as every task that was given to me was worked on and eventually resolved. The tasks I was asked to work on were a handful of pages including the SDE page, Manufacturer Management page, User Management page, and Activity Log page. I was able to have an impact on the project I worked on and made it more user-friendly, clear, efficient, and made the pages I worked on consistent with the other pages that were on the application. Through my contributions to this project, I was able to contribute to the organization's overall mandate.

3.2 Relations to Academic Studies:

Some of the experience I gained within this work term that could not be gained within the classroom is when I worked on projects together within teams and shared ideas and solutions with my coworkers. This is because in a classroom setting, even sharing an idea can be considered plagiarism, so the school does not give you the required experience to work with

others on projects and assignments. Some courses allow you to work together on projects but it's very rare and not something I have yet experienced in my computer science classes. I believe a work term project within a team within one of my classes could have prepared me better for my work experience. This is because I could at least have gotten the experience on how to manage tasks and any issues I could have had with any of my teammates within a classroom setting before I go out into the workforce. Another thing that could have better prepared me for my work term was using version control as part of our assignments. Before this work experience, I had not used version control in a team setting within a class. This made it difficult to get used to the fact that I had to keep my queries that were posted on Azure DevOps up to date with the work I was doing as I would sometimes forget to update them and I had to get used to this process [2].

3.3 Career Development:

I think the main lessons I learned during this co-op work term have to do with teamwork and self-directed learning. I had to learn how to work in a team setting, divide work equally, and schedule and attend meetings. As for self-directed learning, since Jenny was busy working on the project she was assigned, she wasn't always available for help, which meant that I had to mainly rely on my ability to learn and solve problems throughout the work term. My co-op experience has directly influenced my future study and career objectives by identifying what field of computer science I would like to work in. I realized that I would like to work mainly in the web development field since I am a visual person and would like to see what it is that I am building. I also realized that I don't want to be a software tester since I think I don't enjoy it as much and would like more of a challenge. From the ten career competencies, I believe I worked on research and analysis, Innovation and collaboration, and communication. The reason I believe I mainly developed these skills is that I needed to research code and analyze whether or not the

solution I researched would work for my code. I think innovation was used when I tried to make code more efficient through the minimal use of for-loops [5]. I also believe that collaboration and communication between me, Fabrice, Deborah, and Jenny, were key elements to solving issues and working together to figure out the future direction of the project.

4. Summary:

I believe the possible future use for my work at ECCC would be to keep track of important information for motor vehicle gas emissions, fuel consumption, and engine technology information. I believe that my future successor to my work at ECCC could add additional pages to explain the information within the application. I also think that my future successor can make the application more consistent through the use of color and formatting on each page. My own reflection upon this work term is that it has been extremely beneficial to my development as a web developer and understanding as a programmer. I think I have gained valuable experience in a professional setting and have learned various things, from making filters that filter a table, to making design choices, to working with a team and solving complex problems.

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