

MODULE: SOFTWARE ENGINEERING AND SOFTWARE MANAGEMENT

MODULE CODE: CST2550

COURSEWORK 2 – REPORT

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Introduction

THIS PROJECT WAS SOLELY COMPLETED BY HARRISHKOBI SRILAVAN (M00762244), ASEF TAJWAR TANIM (M00891553) AND MD MAHDUB GOLAM HASAN (M00868561). THE REMAINING MEMBERS NOT MENTIONED DID NOT CONTRIBUTE IN ANY MANNER AND MADE NO EFFORT TOWARDS THIS PROJECT.

This is a project report for group FlreSoft Limited, in this report you will find it commences with the introduction. The introduction briefly describes the project in from our understanding. Secondly, it will be the design section which will highlight the reasoning behind our chosen data structure and algorithms. We will highlight what our project scenario was and the roles of each individual member, including all the work each person contributed to provide a successful outcome. There will be an in-depth analysis of the algorithm that provide key functionalities, also this report will include the approach of any types of testing performed including a table that illustrates all test cases performed. Additionally, we will give a detailed and accurate summary of the work, and all the hurdles and limitations we have had to face as a team. We will discuss what problems we tackled, how it affected us and what we had to do to overcome such difficulties. Furthermore, this report contains a personal reflection on how we would change our approach if we were assigned a similar task in future, and how we can avoid repeating the same mistakes next time. Finally, we will add all references to conclude the report.

The task at hand is a group project that involves the formation of a team to undertake a project, along with the assignment of specific roles within the team. These roles include a team leader (SCRUM MASTER), a secretary, two developers and one tester. Each of these roles have distinct responsibilities that contribute to the success of the project within an agile framework and adhering to the concept of SCRUM methodology. Our task requires us to select and implement an appropriate data structure for our assigned project scenario. The Syndicate and our group ambassador agreed to give us the task of creating a software for an airport flight management system. By implementing the appropriate data structure, we must justify the reasoning behind our choice. Our structure should be able to store search details, accompanied by a time complexity analysis of the key operations. Also, the team is expected to design and implement the data structures and algorithms independently. It is prohibited to rely on third-party libraries or non-standard operating system-dependent resources.

For this project, each member involved has been assigned different roles. Due to unseen circumstances, we have had to make each member hold multiple roles. This is because we have fewer team members than all the other groups, while making numerous attempts to contact them or hope that we would be able to discuss with them in person about the project in lectures or lab sessions. We had no success in doing so as the remaining members not mentioned in this report were unavailable. It is possible they did not attend any lab sessions or lectures, as we were unable to find them, and it is significant to note that those members made no contribution to this project. It would be fair to consider while evaluating our project and report that a project assigned to six people, resulted in only three people doing all the work. Which left us at a disadvantage and had a significant impact as all members had the burden of overloading themselves and holding numerous responsibilities that were meant to be equally divided in a fair manner.

TEAM ROLES/ PROJECT MANAGEMENT

Firstly, our team had a team leader. Harrishkobi Srilavan took up the role as leader, also responsible for writing this report with the assistance of Asef Tajwar Tanim and MD Mahdub Golam Hasan. As team leader, also known as SCRUM master Harrishkobi plays a pivotal role in facilitating and guiding the team in adopting and adhering to SCRUM practices. Harrishkobi ensured that the team were provided with everything needed to carry out their tasks in effectively, organise regular meetings, remove any unwanted obstacles. As well as ensure robust communication occurs regularly between team members. Harrish was required to teach the team about SCRUM practices, ensuring each member understood and knew how to adhere to the principles and values of SCRUM. Providing guidance on how to conduct SCRUM practices. As team leader he did not enforce authority instead he took the approach of providing support, mentorship and the required guidance for each individual to feel empowered to make decisions and take ownership of their work. Another responsibility, he had was to remove any obstacles that hindered the progression of the team, preventing the team from being held back and always choosing the best course of action to avoid conflict. Furthermore, ensuring that communication is strong and that every member is working as hard as they can to pursue a common goal.

Asef Tajwar Tanim took it upon himself to act as the secretary for the team. His role was to provide the team with administrative support, he was very focused on guiding the team through the implementation of SCRUM practices. He made sure he assisted with tasks, organisation and tried his best to ensure that the team's operations ran smoothly. He would do his assigned tasks and provide assistance when needed, he played a big role in the coordination of our team meetings, he would arrange the best times for meetings to occur. As well as always being prepared and invited us to all meetings agreed on. Asef was very good with making sure we kept on track and that each of us were aware of our responsibilities.

MD Mahdub Golam Hasan had been assigned to our team by the syndicate and ambassador at a later stage. But he made a significant impact, at first the tasks were being done by Harrishkobi and Asef alone. MD Mahdub Golam Hasan contributed to the developing of the software as well as a tester. Due to the remaining team members letting us down and not attending any labs or responding to any contact. Harrishkobi, Asef and Mahdub acted as developers and testers alongside their assigned roles. All three of us as a team became developers, we all chose the appropriate data structure, algorithms as well as writing the code whilst confronting any debugging errors that occurred. We would also test our code to make sure it would run without failure, and if it did cause issues, we would try find out the reason for the code not running properly and made attempts to fix any errors. Also, as developers we were also responsible for collaboratively being able to deliver a product at the end of each sprint phase. Furthermore, all three of us were also testers for our code, each of us would ensure that the quality of our code was good and that it was a reliable code. By testing our code, we would identify any risks and fix any defects, this role required us to perform various testing types and address any issues or concerns as we aimed to deliver a high-quality product.

SCRUM PRACTICES

SCRUM practices are a set of principles and processes that are designed to enable teams to be able to deliver high-quality products incrementally and iteratively. There are a few SCRUM practices that were required to be adhered to and followed for a successful project. The first is Iterative development, our project is divided into iterations called Sprints, with each Sprint typically lasting 2-4 weeks. At the end of each sprint phase, a potentially successful product increment is delivered, allowing for continuous feedback and adaptation. The next adhered

practice are the self-organising teams, the development Team is self-organising, meaning they have the autonomy to determine how to best accomplish their work. The assigned leader supports and empowers the team to make decisions and collaborate effectively. The third practice is Sprint Planning, at the beginning of each Sprint, the team conducts Sprint Planning to select the items from the Product Backlog that they will work on during the Sprint. The leader will facilitate the sprint planning meeting, ensuring that the team understands the objectives and commitments for the sprint. Another phase as a team we need to adhere to is the product backlog, which is a prioritized list of features, enhancements, and bug fixes that need to be implemented in the project. The team leader works with the team to manage the Product Backlog, ensuring that it is up-to-date and reflects the priorities of the stakeholders. By adhering to SCRUM practices, SCRUM practices and leveraging the guidance of the leader, the team can effectively collaborate, deliver high-quality products, and continuously improve throughout the project lifecycle.

DESIGN

The provided code implements an Airport Flight Management System using C++. The program allows users to add, display, book, cancel, and search for flights. The code utilizes the following data structures and algorithms.

DATA STRUCTURE

The code uses a `std::vector` to store the flight details. The `Flight` struct is defined to hold the information about each flight, including the flight number, departure and destination locations, departure and arrival times, available seats, and price. - Using a vector to store the flights is a suitable choice because it provides dynamic resizing capabilities, allowing the program to add or remove flights efficiently. Vectors also offer constant-time random access, which is useful when searching or modifying flight details.

ALGORITHMS

Adding a Flight (`addFlight()`):**prompts the user to enter the flight details (flight number, departure, destination, departure time, arrival time, available seats, and price). Create a new `Flight` struct instance and initialize it with the user-provided details. Add the new `Flight` instance to the `flights` vector using `flights.push_back(newFlight)`.

Displaying Flights (`displayFlights()`): . Checks if the `flights` vector is empty. If it is, print a message indicating that no flights are available . If the `flights` vector is not empty, print a header row with labels for the flight details. Iterate through each `Flight` instance in the `flights` vector using a range-based loop. For each `Flight` instance, print the flight details (flight number, departure, destination, departure time, arrival time, available seats, and price) using formatted output with `std::setw` and `std::left`.

Booking a Flight (`bookFlight()`). Prompt the user to enter the flight number they want to book. Iterate through each `Flight` instance in the `flights` vector using a range-based loop. If the flight number matches the user input and the flight has available seats (`availableSeats > 0`), decrement the `availableSeats` count by 1 and print a success message. If the flight number doesn't match or the flight has no available seats, print an appropriate error message.

Cancelling a Flight (`cancelFlight()`):** Prompt the user to enter the flight number they want to cancel. Iterate through the `flights` vector using an iterator. If the flight number matches the user

input, remove the `Flight` instance from the `flights` vector using `flights.erase(it)` and print a success message. If the flight number is not found, print an error message.

Searching for Flights (`searchFlights()`): Prompt the user to enter the departure and destination locations. Print a header row with labels for the flight details. Iterate through each `Flight` instance in the `flights` vector using a range-based loop. If the departure and destination locations of a `Flight` instance match the user input, print the flight details. If no matching flights are found, print a message indicating that no flights were found for the specified route. The code follows a straightforward approach and utilizes standard algorithms like iterating through the `flights` vector and performing operations based on user input. The time complexity of the operations depends on the number of flights stored in the vector. For example, searching for flights has a time complexity of $O(n)$, where n is the number of flights, as it iterates through the entire vector.

Conclusion

To conclude, a summary of all the work completed, as a team we discussed our objective and created a flight management software. We have had meetings to create a source code, the code for the software, a project report as well as a makefile and a readmefile. We also created a GIT repository to allow the ambassador to publicly view our work for assessment purposes.

Limitations and Critical Reflections

One major impact was the number of members, it was difficult to manage a project with very few people. It was unfortunate that we had team members that made no conscious effort to assist us, because of this we had to add more tasks for each person, causing more workload and each member having to balance time to manage work from different modules. To overcome, it would have been ideal to discuss it with the ambassador to see if we could assistance. However, these situations can occur in the real world and we managed to strongly adapt to it, and complete our task to the best of our ability.

Another challenge was implementing the code and regularly testing it. It required significant amount of time and constant debugging to ensure the code would run without failure. As leader it was important to make the team feel empowered and remind them about the end goal, making sure we did not lose track and keep up with tasks within each phase.

Overall, as a team with few members we did well. The team worked hard and managed to complete a task that is meant for six people. It required a lot of professionalism and dedication, as well as researching and trying to understand code and what we need to put down to execute a successful code.

If we were to do this again in the future, the first course of action is to effectively ensure we can communicate with all team members. If not, then it will need to be taken up to higher executives to come up with the next best course of action. Secondly, more research and time put in to adhere to certain practices more efficiently, now that we have experienced doing this task and understood how it can be. We can be prepared on how to successfully code and understand more about potential flaws while we code, and before we run it. As we can save time and have a more reliable functioning code. We would also dedicate more time in understanding the requirements of the client have to understand their needs and wants, having regular meetings and discussions will allow us to provide a better output.

References

POWERPOINT SLIDES

W3SCHOOLS

YOUTUBE

GOOGLE

INTERNET

<https://www.youtube.com/watch?v=LMIbX85pfao>