An Undergraduate Internship on Complaint Management System at OS IT Solutions Ltd

By

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Attestation

This is to certify that I, Mohammad Yousuf have completed the report titled “Complaint Management System for OS IT Solutions Ltd” and submitted it in partial fulfilment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh. It has been completed under the guidance of my university supervisor Mr Md. Fahad Monir and company supervisor Mr Mohammad Moniruzzaman who is the Managing Director and CEO at OS IT Solutions Ltd. This work has not been submitted as a project to this University previously, neither has it been submitted to any other institution. All the sources of information used in this Project Report has been duly acknowledged in it.

_____ _____

Signature Date

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Name

Acknowledgement

First and foremost, I would like to express my deepest sense of gratitude to Almighty Allah, it is because of His mercy and blessing that gave me the motivation and strength to work hard during my internship.

I would like to thank the company's CEO Mr Mohammad Moniruzzaman for giving me the opportunity to work for OS IT Solutions Ltd as an Intern and also, I want to show my deepest gratitude to him for giving me guidance, advice and motivation to work hard; for which I will be forever grateful. My internship at OS IT Solutions Ltd gave me the opportunity to work with the software engineers there who trusted me with them to work on this project and initially guided me towards how the company deals with software development and the type of engineering knowledge required in this field. The guidance that I received will give me the opportunity to work for this company full time in the future.

Last but not the least, I would like to thank my parents, other family members and friends for their constant support and encouragement.

Mohammad Yousuf
April 2022
Dhaka, Bangladesh

Letter of Transmittal

April 21, 2022
Mr. Md. Fahad Monir
Lecturer
School of Computer Science and Engineering
Independent University Bangladesh

Subject: Submission of Internship Report

Dear Sir,

It is with a great pleasure that I am presenting the internship report on the project "Complaint Management System". This project was made for the Bangladesh Tourist Police to assist them in their daily tasks of helping tourists that travel from all over the world as well as from various places in the country. I am happy to inform you that I have successfully completed my internship for 12 weeks at OS IT Solutions under the supervision of Mr. Mohammad Moniruzzaman, CEO and MD. This project gave me an opportunity to apply the theoretical knowledge gained at my university.

I am hoping that this report will be interesting, unique and informative. I also hope that this meets your expectations. I have tried my best to avoid my mistakes and deficiencies and hope that this report will satisfy you. I would like to end by thanking you again for helping me and giving me the chance to submit this report to you.

Sincerely,
Mohammad Yousuf.

Evaluation Committee

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Signature

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Name

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Supervisor

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Internal Examiner

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Signature

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External Examiner

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Convener

Abstract

The primary objective of my internship was to build a Complaint Management System to assist the Bangladesh Tourist Police in their complaint collection and resolution process. This project aims to reduce the hassle tourists face when they have to lodge complaints in order to get help for their problems. The main duty was to come up with the ideas for the functionalities of the system and we did this by placing ourselves in the shoes of tourists and understanding the problems we might be facing when we visit a place we have very less idea of. The complaints will be collected using online data collection forms and through verification process the data will be checked against database. The station heads will receive the complaints and will assign the complaints to field agents for them to start working on the investigation.

The project was built using Laravel, HTML, CSS and Tailwind CSS. The users will have to register to create accounts and thus proceed forward with the steps mentioned in the web page. The complaints will be assigned to stations according to the location, meaning they will be assigned to the nearest station to the location of the complainant. The station heads will have a dashboard that will show all the notifications for the new cases and also be able to print out reports for the complaints after they are resolved. Charts will be present to show the overall success rate of the complaint resolution process. The tourists will also be able to check the progress of their complaints and also send feedback to the system to show how satisfied they are with the complaint resolution and if they do have any problems they can also state those.

During my work at OS IT Solutions Ltd, I have learnt many things and develop skills that will benefit me greatly in my career. I have learnt Laravel, a framework that I have not used before and as daunting as the task was, the process was very educational. I have learnt several things that will help me with learning new languages and frameworks and utilize them in projects to the full extent.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

Bangladesh is a country famous for its various tourist spots, it has multiple tourist spots across the country and every year people from all around the world and even citizens of the country travel from various districts to these tourists spots every now and then. Since there are many places for sightseeing and things to try out there is hardly a time when these tourist spots are empty. A huge concern for these people travelling into these places is security. Since a large number of people who travel to these spots are unaware of the dangers and places to avoid. Criminals take advantage of these situations to rob them or commit crimes to take things from the tourists. The tourists, both foreigners and citizens alike, do not know where to go to report these crimes and ask for help. The General Police do not take responsibility for the tourists, and it is actually the Tourist Police that are in charge of the problems regarding the tourists. The tourists do not have this knowledge and even if they have, they do not know the locations of those Tourist Police stations. It could also be that the nearest station is very far from the location of the crime.

All of these problems pose a huge danger for the image of the country. The tourists travelling to these spots help bring in additional foreign currency and lots of income. The hotels, products everything sold in these spots have significant contributions to the economy of the country. So, if the tourists keep suffering this way and they do not receive help, they will have an impression that this country is not safe. Thus, we will no longer visit Bangladesh in the future. They will also recommend against visiting the country if their friends and family members ask them about it. This way not only will the country lose credibility, but they will also be losing income and even future prospects of income. That is why it is crucial to make sure their problems and concerns are addressed and resolved quickly and efficiently.

This is where the Complaint Management System comes in. The Complaint Management System will give the tourists a hassle-free way of filling out complaints. They will simply have to enter into the system and complete the online complaint form with accurate information. The Tourist Police can then view these complaints and keep track of them. This system will enable tourists to lodge complaints from wherever they are, and the Tourist Police can check the complaints and act quickly to resolve it. They can also keep reports and records of the complaints so that they can take measures to ensure such offenses do not happen again in the future.

In my report I have presented a detailed description of the Complaint Management System and the development of the system. The proposed Complaint Management System is developed using HTML (HyperText Markup Language), CSS (Cascading Style Sheets), Bootstrap, SQL

(Structured Query Language), PHP (Hypertext Preprocessor) and Laravel. The database is made using the relational database model so that there is a relationship with all data and the tables are logically connected.

1.2 Objectives

The objective of this project is to ensure a secure and reliable method of lodging and resolving complaints. The proposed system is going to take away the manual labour of searching for Tourist Police Stations to get help. It will also to some extent reduce the need for use of paper forms thus it will also prove to have a positive environmental impact. Because of the pandemic, Bangladesh has suffered an immense amount of economic losses, especially in the Tourism Sector. To recover from these losses, it is paramount that all sorts of actions are taken to ensure the safety of tourists and make them more inclined to visit Bangladesh for tourism purposes. This system will allow the Tourist Police to increase their productivity and efficiency and thus increase the satisfaction levels of the tourists. The most beneficial factor of this system is that users can access with via their mobile and computer from anywhere as long as they have a proper and stable internet connection.

1.3 Scope of the Project

- Registration for Tourists and Tourist Police
- Maintaining database for the users
- Assigning the complaints to the nearest Stations by checking the location of the complaint
- Tourists will be able to confirm if they are Foreigners or not
- Tourists will be able to lodge complaints using their name and a phone number
- Maintaining database for the complaints
- Tourists will be able to send feedback if their complaints were resolved to their satisfaction
- Date and time of complaints lodged and resolved will be maintained
- Customize Reporting and Dashboard as different user wise
- Registration Approval System
- Approval System and Delegation System
- Reopen the existing case with new case ID
- Notification System (SMS and Email)
- Information Management Portal
- Profile Management
- Detail form with Document attached facility
- Live Chart and Call Centre integration
- Testing and Hosting
- Training with Manual

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies

During my time at Independent University, Bangladesh (IUB), I have gained immense knowledge from various courses as well as certain industry specific skills. All of those have helped me prepare for my role in this project. I have also had to learn certain things to start working on this project and to be able to understand what the organization is asking of me. Some of the courses at IUB that helped me are:

CSE213 Object-Oriented Programming – This course gave me insights into a very different paradigm of programming. After completing this course my entire outlook on how to create applications and write code changed. The use of classes and methods, in short, the use of objects to make it so that we can relate to real life. This way of programming made us understand and finally be able to relate how we could turn human problems into solutions that are also understandable by humans.

CSE303 Database Management – This course was very important in helping me understand what exactly is meant when we say the backend of a system. The way data is stored, edited, and how to interact with the database so that data can be displayed from database to the frontend view. I have learned about rules and ways we can organize the data systematically in ways so that it is easier to process them. Very important techniques and tools to design a project were taught in this course. Some of them are Rich Pictures, System Development Lifecycles, Requirement Analysis, Entity Relationship Diagram, Business Process Model, Normalization and Structured Query Language.

CSE307 System Analysis and Design – This course gave me an understanding of how to develop a project systematically starting from the requirements gathering phase to the development phase as well as making sure all the segments of SDLC are maintained. Tools and techniques learnt in this course includes System Context Diagrams, Information Gathering Methods, Use Case Diagrams, Functional Requirements, Non-functional Requirements, Data Flow Diagrams, Activity Diagrams, Sequence Diagrams, Communication Diagrams, Class Diagrams, State Chart Diagrams, CRUD Matrix and many more.

CSE309 Web Applications and Internet – This course was very important for me and equipped me with all the skills and knowledge I needed to work on this project. This course gave me insights into how web applications are created, web application architectures, and various security concerns for web applications. Tools and techniques learnt in this course includes HTML, CSS, Bootstrap, JavaScript, PHP, and HTTP status codes.

CSE451 Software Engineering – This course was crucial for me as it introduced me to industry standards of software creation and maintenance. I have learned about various software development lifecycles and how to execute them. The pros and cons of all of them and which ones are mostly followed in the industry. I have learned how to handle a project from start to bottom and all the knowledge needed in Project Management to be able to communicate and understand what the Project Manager is asking of me. Tools and techniques learned in this course includes Software Lifecycles, Agile, Requirements Engineering, Project Management, Verification and Validation, Software Testing, ISO Standards and many more.

2.2 Related Works

A Complaint Management System is a means of enhancing productivity and efficiency of their organizational functions [1]. It provides an online method of solving customers' problems by saving time and removing all the obstacles that would otherwise have to be experienced by them during the process. Complaint Management Systems provide the ability to track, coordinate and monitor the status of the complaints and make sure the customers are feeling that they are being heard. Although this project is not for a business, the concepts can still be applied here. The tourists can easily lodge complaints through the use of this system. It has been seen that the use of CMS in various organizations has increased the satisfaction rate of customers [2]. In the case of tourists as well, if the CMS helps Tourist Police solve the tourists' problems effectively and quickly, the tourists will be satisfied and will definitely want to come visit again next time.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

A Work Breakdown Structure (WBS) is a method in Project Management. It is a hierarchical structure that helps breaks down a project into multiple steps to clearly visualize the steps needed to complete a project as well as be able to show team members what their parts are in the project and how their work will contribute to the overall development of the project. The main goal of WBS is to make a project more manageable [3]. The diagram below shows the WBS for the Complaint Management System Project:

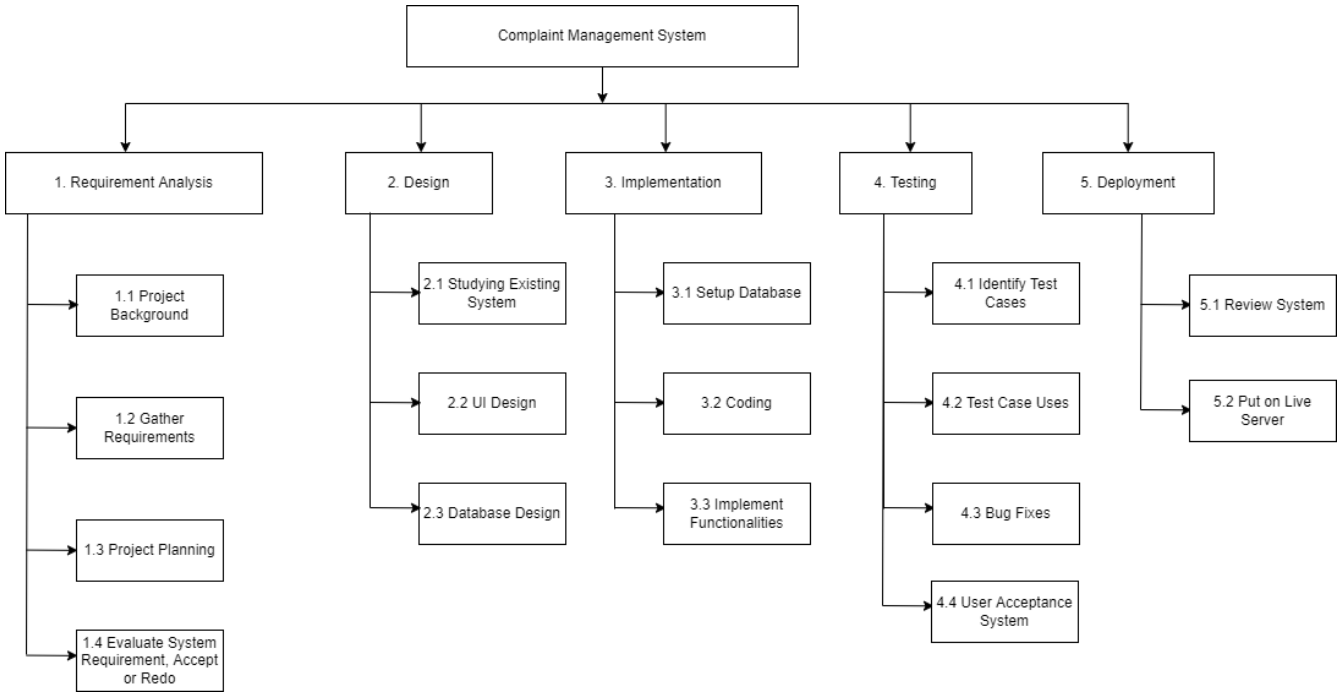

Figure 1 Work Breakdown Structure

The five phases to complete the project are:

Requirement Analysis – This is the phase where the company makes an effort to understand clearly what the client's specific requirements of the project are. This phase contains 4 subphases. In the first step the company will make sure they understand the project background. What the problems are and how much they are impacting the current system. Then in the requirements gathering phase the requirements that were understood will be recorded. After that the project planning will start to produce a blueprint of the entire project lifecycle. The system requirements will be rechecked to see if they are exactly as the clients asked for or else changes will have to be made.

Design – In this phase the company will first study the existing system to figure out how the current process is working and how many problems are present in that system. After figuring out all the problems, the proposed solutions will be listed to make a system that is much more efficient and less error prone. The UI design will start as soon as the proposed solution is planned out. The input, output designs, user interactions as well as UX will be planned and design with coordination with the proposed solution. The database design will also start simultaneously. The tables and the relationships with each other will be constructed. How the data will enter the database, editing of the data, deletion as well as displaying will all be taken into consideration.

Implementation – Then will start the Implementation phase. After the designs and planning, the database will be set up and the front end will be coded. During the entire coding phase, the functionalities that were agreed upon in the previous phases will have to be implemented properly.

Testing – After coding the front and back end, the testing phase will begin. All the test cases will be listed and environment setup will be done to make sure it mimics the actual conditions in which the system will be used. After running all the tests, the bugs will be reported and fixed immediately. The User Acceptance Testing will start after all the previous tests have been completed. The people in the company as well as the end users will all participate in this test to make sure the entire system is working and is in accordance with all the requirements stated earlier.

Deployment – The entire system will be reviewed to make sure everything is okay and working fine. After making sure everything is okay the system will be put on a live server.

3.2 Process/Activity wise Time Distribution

Tasks	Days
Requirement Analysis	7
Design	25
Implementation	60
Testing	7
Deployment	1
Total	100

Table 1 Process/Activity wise Time Distribution for CMS

The above table shows the Process/Activity wise Time Distribution. This shows the set of tasks that have to be completed as well as the time required to complete each task. From the table we can see that the Requirements Analysis will take 7 days, Design will take 25 days, Implementation will take 60 days, Testing will take 7 days and finally Deployment will take 1 day.

3.3 Gantt Chart

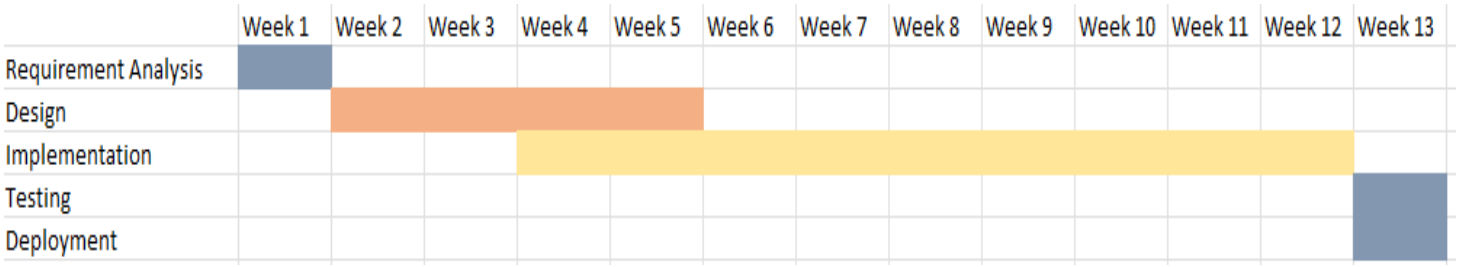

Figure 2 Gantt Chart

The above diagram is the Gantt chart for the Complaint Management System project. The time distribution for every phase is mentioned in the chart.

Chapter 4

Methodology

The System or Software Development Lifecycle (SDLC) is a process that is used by many companies in the software industry. It allows software engineers to develop high quality applications with low costs by maximizing output and completing the task in the shortest time possible. It helps to design, develop and test the software and gives a structured flow of phases that help guide the organization throughout development. The phases of the SDLC are - Requirement Analysis, Planning, Design, Development, Testing and Deployment. There are many methodologies of SDLC such as Waterfall, Prototyping, RAD etc. The methodology used in this project in the Waterfall model.

The methodologies have various properties. Some are Sequential, some are Iterative etc. The Waterfall model is a Sequential model. Every activity in this model is divided into phases and each of those phases contain a series of tasks with certain objectives. The key feature of this model is that each phase must be completed before the next phase can start, there can not be any overlapping in the phases, and it only flows in one direction, meaning we cannot go back to the previous phase anytime [4]. Waterfall model was actually the first Process Model to be introduced in the industry [5]. Below is a diagram showing the Waterfall Model:

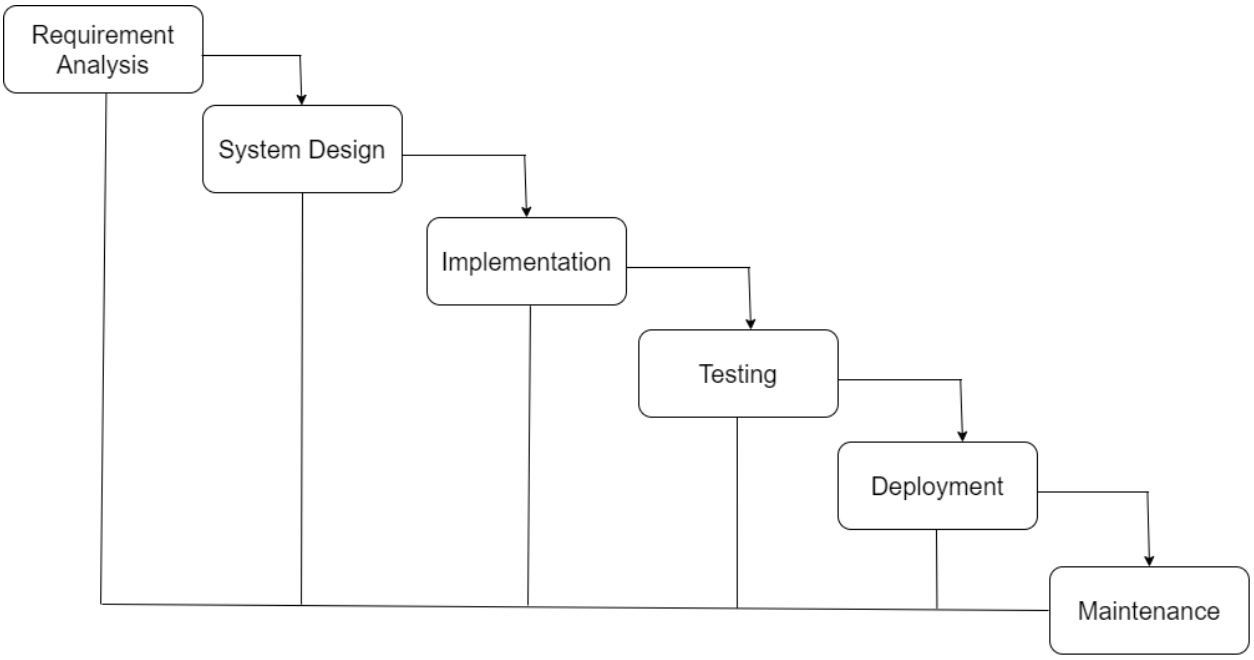

Figure 3 Waterfall Model

The reason why we opted to use the Waterfall model is because of the advantages it possesses. The advantages are:

1) Has clearly defined stages
2) Phases are processed and completed one at a time
3) Easy to manage
4) Easy to understand and use
5) Milestones are well understood
6) Easy to arrange tasks
7) The process as well as the results are well documented
8) Perfect for small projects where the requirements are well understood

Chapter 5

Body of the Project

5.1 Work Description

OS IT Solutions Ltd is a Software Development Company that specializes in making software solutions and automating manual business functions to create a more efficient system overall. The idea behind the development of this system was to eliminate the arduous task of searching for a Tourist Police Station and also the filing out complaints manually. The Tourist Police is the subsection of the Bangladesh Police that is responsible for helping the tourists that come to visit the various tourist spots of Bangladesh. The Complaint Management System will be responsible for helping tourists lodge complaints with little to no hassle. The UI design of the system, including the actual complaint form, has been kept very minimal so that users can lodge complaints and can clearly see in which sections they must add the specific information that is asked of them. All the data will be stored in the MySQL database. My contribution in the system was to understand the project requirements and build a solution that will contain all the specified attributes to carry out the processes efficiently. I was responsible for both the frontend and backend design.

5.2 System Analysis

5.2.1 Six Element Analysis

Process	System Roles					
	Human	Non-Computing Hardware	Computing Hardware	Software/System	Database	Network & Communication
Lodging Complaint	Tourists	Complaint Form	Computer/ Mobile Phone	Browser	MySQL	Internet
Resolving Complaint	Tourist Police	Complaint Resolution Report	Computer/ Mobile Phone	Browser	MySQL	Internet
Provide Feedback	Tourist	Complaint Resolution Feedback Form	Computer/ Mobile Phone	Browser	MySQL	Internet

Assign a Case	Tourist Police	None	Computer/ Mobile Phone	Browser	MySQL	Internet

Table 2 Six Element Analysis

5.2.2 Feasibility Analysis

The purpose of the feasibility study is to ensure that a project is sustainable and that it is financially and technically feasible to develop a project. It helps to understand all the factors involved in the development of the project and how they would impact the development of the project. It is highly essential to determine all the necessary factors of feasibility so that the problems that can be faced in the project can be identified and sorted out. It basically assesses whether the proposed solution is practically achievable or not. The feasibility analysis involves analysing everything pertaining to the features of the system and information related to system. It is a good practice to have multiple contingency plans in case of unforeseen problems and in case of the infeasibility of the original project. The feasibility factors for this project are discussed below:

Operational Feasibility: For the Operational Feasibility segment, the project will be considered a success if certain conditions are met. One of them being the primary operation of the project and its maintenance. The system must work when it is properly developed and installed. The assessment will involve analysing how the organization's requirements can be fulfilled by the completion of the project. It is also examined how well the project plan satisfies all the requirements that were determined in the requirements analysis phase of the system development.

Technical Feasibility: The Technical Feasibility assessment focuses on all the technical resources that are at the disposal of the organization, this includes both hardware and software as well as other factors such as having adequate equipment to build the system and the adequate technical knowledge to build the system and solve problems to materialize the ideas into a working system.

Economic Feasibility: This segment oversees the cost and benefits of the project. The assessment help organizations determine all the costs, benefits and practicality associated with the project before the financial resources are allocated. This will help the decision-makers visualize the positive economic benefits the proposed project will able to provide to the organization.

5.2.3 Problem Solution Analysis

This section discusses all the problems that were identified, and the solutions associated with those problems are discussed in detail. The identified problems are as follows:

Lack of knowledge – The tourists, both native and foreign, mostly are unaware of the fact that the General Police do not handle the complaints or problems of the tourists. It is actually the duty of the Tourist Police to take care of matters regarding the tourists. The tourists also do not know where the Tourist Police stations are located so that creates more problems.

Frustration – Frustration builds up within the tourists as they are unable to get help from the Police to resolve their issues. Most of the foreigners end up with more problems such as their passports and money being stolen which leads to them ending up staying longer than what they initially planned to get back what they lost. They also lose more financially because of this.

Time Consuming – Since tourists do not know where to go to get their problems solved, it takes a lot of time before they can actually get help. They do not live in these tourist spots; thus it is highly unlikely that they will know where which places are located. This searching of the station in itself is a rigorous time-consuming process. After finding out the locations they then have to fill out the paper forms to get help.

The solutions to the problems mentioned above are as follows:

Lack of knowledge –The problems regarding this are solved through the system by allowing the tourists to lodge complaints and it will directly reach the nearest Tourist Police Station as their location given in the complaint form.

Frustration – The problems regarding this are solved through the time limit incorporated to add a sense of urgency to solve the problems by the Tourist Police.

Time Consuming – To save the tourists' valuable time the system helps them lodge complaints instantly without having to know where the stations are located. The location that they added in the online complaint form is enough and using it the complaint will reach the nearest station and the tourists will be contacted soon.

5.2.4 Effect and Constraints Analysis

The Complaint Management System will undoubtedly improve the quality of the problem resolution of the Tourist Police. The main goal is to increase the overall satisfaction rate. Tourists are coming from all over the world, this is a huge source of income for the country. To make sure the tourists keep coming back and also recommend other people to travel to Bangladesh, the Tourist Police must ensure safety and quick response to solve their problems. It is a matter of national integrity and our image as a country. The Tourist Police can only resolve their problems, it is not possible for them to allocate their officers to every single place. Thus to ease their problem, and also taking into consideration their limited resources, this system will enable them to get all the complaints quickly and efficiently in a ordered manner so that they can immediately take necessary actions to resolve the issues. It is a simple equation, happy tourists will equal a better image of the country as well as more foreign income.

5.3 System Design

5.3.1 Rich Picture

A Rich Picture is a diagram that helps visualize an entire system or process. It gives the development team a general idea as to how the solution will look like and how the entire system can be implemented. The rich picture for the Complaint Management System is as follows:

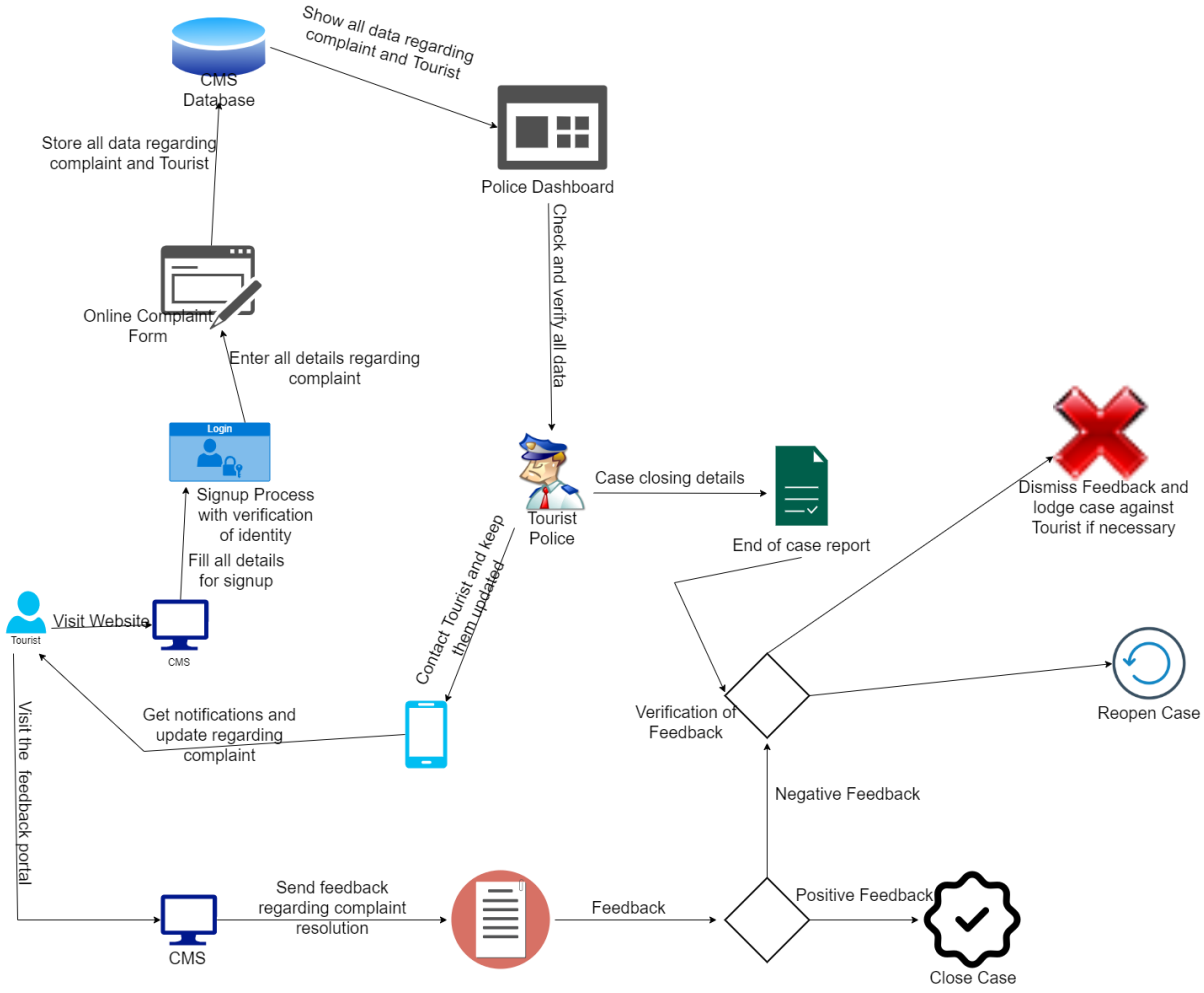

Figure 4 Rich Picture for CMS

5.3.2 Functional Requirements

This section is about discussing all the functionality that the system must possess in order to be viable. Functional requirements are essential to identify because these are the factors that will help make the system a practical substitute for the current ongoing manual process. These functionalities give a sense as to what to expect from the system and also in the process identify the errors in the early stages of development that will help save money which would otherwise be lost in order to fix the errors in the future. The functional requirements implemented in the Complaint Management System are as follows:

Sign up - When Tourists want to lodge a complaint, they must first register for an account. They will have options to choose for signing up. They will use their name and either their phone number or email address. They can add a profile picture if they want to.

Verification via OTP - When Tourists signup, they will be sent an OTP via their preferred choice during signup. If they added their phone number, they would get the OTP through SMS and if they used their email address, they would get it in their mail. They will have to use that OTP to verify their accounts.

Lodge Complaint - Tourists can lodge their complaints by simply typing it in the text box under complaints section and can confirm it by pressing the confirm button.

Complaint assigned to the nearest station - According to the location given as input by the Tourist, the complaints will be assigned to the nearest Tourist Police Station.

Personalized Profile – Users will be able to set up their profile completely to add details regarding themselves in order to get better services.

Check Complaint - Users in the Police Stations can view and check the details of the complaints received in their dashboards.

Resolve Complaint - After successfully resolving the complaints, users can press the resolved button after typing a summary of how the complaints were resolved. After resolving the complaints, they will disappear from the dashboard but will be stored in the central database for future reference.

Time Sensitive - The complaints must be resolved within the short period of time specified in the system as it is a matter of security and national integrity. The station assigned with the complaint will be notified every hour on their dashboard to resolve the complaint as soon as possible. If they fail to resolve it within the specified time, the complaint will be moved to the next level for resolving. The stations who failed to resolve the complaints must specify why they failed.

Maintaining Ticket Number - A ticket number will be assigned to the complaints and Tourists will be able to view the progress.

Complaint Category - Tourists will be able to select the category of the complaints.

Print a copy - Tourists will be able to download a copy of the complaints they lodged.

Verify Identity (For Foreigners) - If the Tourists checks the Foreign Citizen check box, they will need to specify their nationality and visa information. If they do not have the details with them, they must specify the valid reason and the Tourist Police will check it later.

Feedback - Tourists will be able to provide feedback on how satisfied they were with how the complaints were handled and they can also complain if the services of the Tourist Police were unsatisfactory.

Reopen Case - If the feedback provided by the Tourist is negative and upon checking with the end of case report it is verified, the case will be reopened. If the negative feedback is false, the Tourist might face case from the Police.

5.3.3 Non-Functional Requirements

Performance – This is a web application so the overall performance of the application will greatly rely on the quality of the internet connection being used. A better-quality internet connection will help reduce the initial load time significantly. Since the application will be running on the user's browser, the performance will also depend on the hardware components of the device being used.

Security – To safeguard data regarding the users, the application ensures maximum security by enabling authentication and authorization when accessing the backend servers. The databases will be encrypted, and the scope of access will be within the organization.

Reliability – The reliability of the system is ensured by keeping backups of the database and making sure the system does not stay down for too long for recovery or maintenance.

Maintainability – The MySQL database that is being used will help greatly in the maintenance process. The application server has the functionalities to take care of the web application. The re-initialization of the system in times of failure is also done quickly and efficiently.

Browser Support – It is highly advised to use the most extensively used browsers like Chrome, Firefox and Safari for accessing the system.

Chapter 6

Project Results

Developing this project is very important because of all the reasons mentioned in the earlier portions of this report. This project is still in development, firstly because of the sheer size of the project and secondly the importance of the functionalities of this project. If not developed correctly it will be problematic. The project started with the requirements gathering process, which was pretty straightforward, as we had an idea beforehand what we would have to build. As tourists ourselves, we also know what problems we face and how badly we need proper help in those situations. Our CEO gave all the details from the Tourist Police and after conducting some interviews of foreign tourists, we were able to pinpoint what functionalities we would need to implement.

The scope of improvement this project possesses is immense. Not only will it help to ensure security for the tourists and increase foreign revenue, but it will also prove to increase the productivity of the Tourist Police. Before, they used to store their files regarding complaints and their reports in an in-house storeroom. So, there was practically no data recovery process in the event that the files catch fire, or somebody misplaces them. Now, with the functionalities of the system, data backup will be done frequently, and data recovery will be carried out quickly so that the operations are not halted in any way. The entire process of filing for a complaint and maintaining the progress of the complaints is going to be very efficient. The tourists will be constantly guided when they will be entering their details in the input form. Both the tourists and the Tourist Police will be able to check the overall progress of the complaints resolution. We have also gone a step further by ensuring that the people are genuinely submitting complaints and are not just making fake complaints to harass or waste the time of the Tourist Police. There will be identity verification and there will also be direct communication of the people submitting the complaints with the Tourist Police call centre.

As for the testing and deployment, several functionalities will not be available instantly in the beta phase. We will first have to test the system out using several users and then we have to make sure we are able to make a stable build of all the functionalities. The overall development and deployment process of this project will be longer than usual because of the pandemic situation. Our country has still not made full recovery from Covid, and the vaccines can only do so much. Keeping the health of the developers in mind and letting everyone get ample amount of rest before they are brought back to complete phases of the project is given high priority. For the testing phase, we will be doing User Acceptance Testing and implementing both White-box and Black-box testing methodologies to ensure a bug free project.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

There are various aspects that are taken into consideration when talking about the sustainability of a product/work. By sustainability it refers to the ability of a product to be maintained and updated. Just like certain steps are taken to avoid project failure, an appropriate sustainability plan is also crucial. The sustainability of a product can be categorized into 3 parts:

Community Sustainability - Community sustainability refers to how much the community, i.e., the Tourist Police who will be using the application, will support the project to be sustainable. Having to work efficiently with the availability of the application's services and properly utilizing the technological infrastructural will sustain our service.

Financial Sustainability - The finances that are required to host the website constantly as well as to ensure that the database is running 24/7 and has efficient backup services in cases of failure.

Organizational Sustainability - Our company constantly invests in improving our services with the help of the employees pushing towards improving their knowledge and skill about software development which will help in strategically facing unique challenges in this industry and can keep on competing with other companies.

7.2 Social and Environmental Effects and Analysis

Social Effects

The main goal of this project was to ensure the safety of the tourists as well as making their vacations joyful and hassle free. It also helps in increasing the productivity and the success rate for the Tourist Police in helping the tourists. To come to a different country and face problems is a fearful situation for the tourists. They lack the knowledge of which places are where in this new country that they visited and there is also the language barrier where they are unable to ask for help since the locals are not proficient in multiple languages. Through this application the tourists can now ask for help as soon as they face problems with just a few clicks. They will not face problems like travelling physically to the stations and since the application is in English they will easily understand the process.

Environmental Effects

The maximum efficiency of the system can be seen in this pandemic. Already there are so many problems in the process to ask for help or lodge complaints, the pandemic makes things even more difficult. If the tourists were to physically go to the stations to lodge complaints they would have to take local transport to go there and on the way they could contract the virus. The spread could also continue and affect the police in the stations rendering them sick which is another huge problem as then there won't be officers to help the people in need. So, the use of the application will also reduce significantly the need for physical touch and remove all the ways in which the virus could spread. This in turn also helps the tourists be safe from the virus.

7.3 Addressing Ethics and Ethical Issues

We are now in a world where everything we do has involvements of technology in it to some extent. Most people use smartphones and various other devices and applications as well as connect to the internet 24/7 have no idea about the risks of them giving out their sensitive information to people that could misuse that information and even hurt them with it. Over the last decade there has been many instances where credit card accounts were compromised, and new accounts sprung up of an unsuspecting person using his social security number or even the loss of healthcare data [6]. Even the social media platforms trusted and used by people on a daily basis have had instances of personal data being stolen [7]. Some of these problems were taken into consideration when building this application:

Data Storage – All the data are stored in the MySQL database so there is reduced risk of data loss due to system failure and there is also very good backup in case of those failures.

Data Security – The removal of the physical way of storing data secures the data more now in the sense that the data cannot be physically stolen or destroyed in case of accidents. A master account gives access to the server to manage the accounts and data.

Data Storage Security – Only the lead developer of the application has full access to the backend server database. Since the data in stored in the database and can only be accessed using the lead developer's login credentials the data stored is safe and secure.

Chapter 8

Lesson Learned

8.1 Problems Faced During This Period

In this section I will be discussing about the challenges that I have faced during my 3-month long internship at OS IT Solutions Ltd. It was my introductory work in a proper software development company, and I was given the opportunity to learn and work simultaneously in a software engineering project the company was building for the Tourist Police. Since it was my first exposure to the real-world scenarios of a software development company, some of the problems I faced were:

Adjusting to Corporate Culture – The culture in any corporate office environment is never fixed. There is no one simple set of rules there. It is very complex and takes time to learn and adapt toward the cumulative behavior of the employees. As I have never been in such an environment before, it was difficult for me to adjust into the learning and working phase of the company. The learning phase in my internship was not entirely about Software Engineering but also about self-educating myself in dealing with different types of people from different departments with different seniority levels.

Requirement Analysis – Requirement Analysis taught in class seemed pretty straightforward and easy. But in reality it is very tricky. It is the most important part of the Software Engineering process and it is the difference between a properly developed software and a poorly developed one. This is why there is a segment called Requirements Engineering in Software Engineering to make sure the requirements are understood and defined properly. In real world scenarios taking requirements is a very complex process. The problem here is that clients often come to software development companies with demands that are unrealistic. This happens because they lack the knowledge on the software development process, so they do not know what is possible and how to define them. Clients also cannot explain their requirements properly at times. They say something but they want something entirely different. To be able to understand these things is a skill in itself. I have observed the senior engineers in how they deal with clients, and it was a very educational experience.

Learning a new Framework – The biggest challenge by far was learning a new framework, namely Laravel. Laravel is a PHP-based framework for backend development. It is a very popular choice among software engineers, but it is not beginner friendly. Learning the file structure and patterns to develop the software is very troublesome. The package management is also not strong enough compared to npm for Node.js and pip for Python. Another big problem is that there are some components in the framework are not well-designed. Dependency injection becomes

pointlessly complex, so we have to learn a lot before starting to create applications. The development compared to the other frameworks is also quite slower compared to other frameworks. When updating the version, it shows many problems so users have to take precautions while updating the versions.

8.2 Solutions to those Problems

With the help of my supervisors and software engineers in OS IT Solutions Ltd, I have tried my best to overcome the problems I faced during my internship period. My internship experience was a simultaneous transition of learning and working. My supervisor introduced me to software engineering methodologies and the ways they conduct the entire software engineering process starting from requirement analysis to development. These tips helped me overcome all the obstacles and problems during the completion of my project.

Adjusting to Corporate Culture – The senior developer helped me greatly to integrate me into their developer group. They helped me give the confidence I needed to open up and contribute more to the project as well as ask for help in topics I had no knowledge of before. They taught me many tips and tricks in building a successful backend application and also gave code snippets that I can use in many projects in the future.

Requirement Analysis – Before starting my work on the project, our team conducted interviews and handed questionnaires to gather data regarding the project and pinpoint what is needed as the system's core requirements. We also had to talk to the Tourist Police officers on multiple occasions to understand how they conduct their regular day to day complaint resolution.

Learning a new Framework – Since Laravel is not beginner friendly and I faced many problems in the development process, I would suggest using something more easier to learn such Ruby on Rails or Python. Those languages have very simple and straightforward syntax as well as their frameworks are extremely simple to use. They also have a great community of developers that help with problems faced during development.

Chapter 9

Future Work & Conclusion

9.1 Future Work

The project is still in development and there is scope for more features to be added. The end goal is to make the website user friendly. The situations the tourists face is very nerve wracking at times. To help them in these situations and make sure they can lodge their complaints without hassle and can properly enter their crucial details for the complaints, the UI will be made as simple as possible. There will be less cluttering, and the UI will be straightforward in the sense that there will be a visual hierarchy that will ensure that the tourists know where to start and which place to go to for input and help. Working at OS IT Solutions as an intern has given me aspiration towards building a career as a Software Engineer. At OS IT I was not only learning and working for a opportunity of employment but also for future work in different areas as a professional [8] such as:

Front-End Engineer – A software engineer who is responsible for making the UI or interface of the application being developed. This includes responsiveness, layouts, aesthetics etc. They also deal with cross browser compatibility to ensure excellent visual presentation of the UI.

Back-End Engineer – A software engineer who is responsible for the underlying logic and performance of the application. They are often responsible for designing the core logic while keeping in mind about the scalability of the application.

Full Stack Engineer – A software engineer who is responsible for both the front-end and back-end of the application. They have the skills required to create a fully functional application.

Software Engineer in Test (QA Engineer) – Software engineers who are responsible for writing software to validate the quality of an application. They create Automated Tests, tools and methods to make sure the applications are designed in accordance with the client requirements.

DevOps Engineer – Software engineers who are familiar with the technologies required for the development of systems to build, deploy, integrate and administer back-end software and distributed systems are called DevOps engineers. They mostly manage the application infrastructure, i.e., the database systems, servers, etc.

Security Engineer – A software engineer who specializes in creating systems, methods, and procedures to test the security of a software system and exploit and fix security flaws is called a security engineer. This type of developer often works as a “white-hat” ethical hacker and attempts to penetrate systems to discover vulnerabilities.

9.2 Conclusion

It was a very educational experience working at OS IT Solutions as an intern. During the entire internship period I have important methods and ways of conducting the entire Software Engineering process. Starting from the interviews with the clients that lead to requirements for the applications in the initial stages to the final stage where we test the entire system. I have learned about many technologies and gained knowledge on topics that are not taught in the classroom. These are the things that really help Software Engineers work in the real world, and these are the factors that are equally helpful for freelance software engineers as well. I have learned many tricks and tips that help Software Engineers greatly in time management and workload management. These things I have not yet implemented to the full extent as I am still just an intern. When I start working full time, I hope these tips will help me greatly. I would like to appreciate once again the people who made my life easier through this entire internship process and helped me grow so much. Their guidance and motivation had given me the confidence to work in this field and hopefully will help me triumph in my future endeavours.

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