SOFTWARE REQUIREMENTS SPECIFICATION

for

Transport Company Computerization Software (TCCS)

Version 1.0

Prepared by : Soukhin Nayek (21CS10062)
Raj Pajesh Parikh(21CS30039)
Sukhomay Patra(21CS30066)

Department of Computer Science and Engineering, IIT Kharagpur

March 27, 2023

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1 Introduction

1.1 Purpose

The purpose of this document is to provide a detailed description of the system requirements, specifications, and features of the Transport Company Computerization Software (TCCS), which is designed to automate the administrative and bookkeeping tasks of a transport company. It aims to outline the functional and non-functional requirements proposed by the client, as well as any system constraints and external interactions with other entities. This document also includes information about the target audience, user interface, and the hardware and software requirements needed for the development of version 0.1 of the application software. The objective is to obtain client approval for the project's development and to serve as a reference for the product developers.

1.2 Document Conventions

This document follows MLA Format. Bold-faced text has been used to emphasize section and sub-section headings. Highlighting is to point out words in the glossary and italicized text is used to label and recognize diagrams.

1.3 Intended Audience and Reading Suggestions

This document is intended for various members of the development team, project managers, testers, and documentation writers, who may need to review it to learn about the project and understand the requirements. The SRS is organized in order of increasing specificity, and it is essential for developers and project managers to become familiar with it thoroughly.

- Company employees need to familiarize themselves with the various product features to operate the product effectively. Testers require an understanding of the system features to develop meaningful test cases and provide useful feedback to the developers.
- Hardware developers need to know the requirements of the device they need to build by reviewing the External Interface Requirements section. The marketing staff also needs to understand the external interface requirements to describe the user-friendly features of the TCCS and sell the product.

- Non-functional and functional requirements are crucial for hardware developers, as they provide a clear understanding of what the system needs to do and how it should perform. All parties involved should review this document to ensure that they have a comprehensive understanding of the project and the requirements.

1.4 Project Scope

The aim of the Products is to automate the primary administrative and accounting processes of a Transport Company, enabling them to be carried out more efficiently, quickly and stylishly. The Software will be installed on a central server and accessed via a URL by various branch offices. It centralizes all data related to consignments, trucks, and employees from different branches of the company into a single master database, facilitating the allocation of trucks, calculation of waiting times for consignments, purchasing of new trucks, monitoring the current status of any truck, placing consignments, and tracking the volume of consignments loaded onto a truck, among other functionalities. By hosting the application on the internet, the potential to incorporate third-party APIs and expand the product's future capabilities is available. The Software has been designed to be lean, agile, and continuously innovated to optimize the company's productivity and increase its throughput, ensuring a user-friendly approach.

1.5 References

1. Prof Abir Das Sourangshu Bhattacharya "Software Engineering Lab Course CS29202" (2023) IIT Kharagpur
2. IEEE Recommended Practice for Software Requirements Specifications (IEEE-830)
3. GeeksforGeeks "How to write a good SRS for your Project" (2023)
4. Wikipedia "Software requirements specification" (2023)

2 Overall Description

2.1 Product Perspective

The aim of this software product is to computerize the operations of a transport company, and it will be accessed by all employees as well as the manager through a website. The website will serve as the primary user interface for all functionalities provided by the product, but it will only be a component of a larger system. The user data will be stored on a cloud server, where all the necessary processing will take place. Users will be able to log in to the website at any time to use the product. Whenever new consignments or trucks are received, the relevant data will be stored in the database. The manager will have access to the real-time status of any truck or consignment. All the consignment and truck details will be maintained on the cloud server.

2.2 Product Functions

The purpose of this software is to streamline the management and administrative processes of a Transport company, making them faster and more efficient. The software will provide the following functionalities:

- Store consignment details
- Calculate transport charges
- Generate bills for consignments
- Automatically allocate the next available truck
- Store truck details
- Display truck status
- Display consignment status
- Calculate the average waiting time for consignments
- Calculate idle time for trucks
- Use passwords and user IDs to secure employee and manager accounts.

2.3 User Classes and Characteristics

There are mainly three user classes

- Customer: The customer can place a consignment order, view consignments details and view transaction history.
- Manager: The managers use this product to view truck status, consignment status, average waiting time of consignments, truck usage, branch consignment handling and average idle time of trucks, and buy new trucks whenever required, view employee details.
- Employee: The employees are the most frequent users of the product who can enter consignment details, and dispatch and receive trucks. It is expected that the employee has experience of updating information in the database.

While the Employee user class may utilize the product more frequently, the Manager user class holds greater significance due to its ability to access detailed information and modify certain aspects that are not available to Employee users. Additionally, as the product expands in the future, the Manager user class may introduce new company classes such as Driver or Labourer.

2.4 Operating Environment

The software is a client-server Python web application that incorporates a relational database. The graphical user interface (GUI) of the application will be constructed using HTML5, CSS, and Bootstrap frameworks. The server-side component, developed using Python, will be hosted on a public domain and available 24/7. The software will be deployed on a commercially available server such as Firebase, Heroku, or AWS. It will be accessible to users regardless of their operating system, provided they use a modern web browser such as Google Chrome or Mozilla Firefox.

2.5 Design and Implementation Constraints

The development of the software is constrained by several significant limitations, including:

- Reliable internet connectivity is necessary for all offices and systems connecting to the server to access and update the database and utilize the software's functionalities.
- Data security is a critical concern, as the software must be capable of protecting against malware attacks and other cybersecurity risks such as SQL injection, cross-site scripting, and CORS.

- As the application and database will compete for the same memory and computational resources, memory and CPU consumption may become a bottleneck as the database expands.
- Due to the application's one-to-many design, any damage or corruption to the server could result in the complete loss of the database.
- Timely backups are crucial to prevent data loss and mitigate risks associated with any damage or corruption to the server.

2.6 User Documentation

There are no user documentations

2.7 Assumptions and Dependencies

The software is made with the following assumptions

- The software being developed is a web application, and thus, there are no hardware or operating system limitations on the user's system.
- Internet connectivity is assumed to be readily available in all branches, and computers can communicate with each other in real-time.
- Each user is required to remember their login ID and password, as failure to do so will prevent them from accessing the system. To reset their password, the user must use their official work ID provided by the company.
- Users are expected to have a good understanding of object attributes and to fill in consignment details correctly, although safety checks will be provided at all input locations to assist users.
- The transport company's centers are evenly distributed throughout the map, and all centers handle consignments effectively, ensuring that there is no center that only receives goods without sending any or vice versa. This helps to distribute trucks evenly across all locations and prevents them from concentrating at a single location.

The main dependencies of the working and performance of the software are:

- The computers should have a reliable internet connection to communicate with each other and send data to the manager's central machine.
- The back-end of the software will be implemented using the Python Flask framework and its microframeworks.
- The Graphical User Interface may utilize commercially reproducible Bootstrap CSS templates.

- The software's proper functioning is dependent on all its required tools being in working order.
- The software will rely on the interaction between the web-based application and the database, as well as the functionality of the database itself.

3 External Interface Requirements

3.1 User Interfaces

"TCCS WEBSITE" has features that are main and also some are sub. But all the feature is necessary for this software.
The features with priority up to down -

1. Manager: The manager will be given admin rights. He:
   a) Can do all the tasks that an employee can do.
   b) Can view status of all consignments and truck status at a given time.
   c) Can view the corresponding revenue generated in a particular center as well as over all centers.
   d) Can see the waiting time of a consignment.
   e) Can appoint new employees and add them to employees database or remove any employee from the company as well as from the database.
2. Employees: They will be given the access to do the following jobs:
   a) Enter details of a consignment like type, volume, details of sender and receiver, like name, address and a Government ID.
   b) They will be able to see the truck details present at their center.
   c) They would be able to view the allotment of the truck and take a printout of the details of consignment number, volume, sender's name and address and receiver's name and address to be forwarded along with the truck.
3. Customer: They will be given the access to do the following things :
   a) Enter details of a consignment like type, volume, details of sender and receiver.
   b) They will be able to see the Consignment status.
   c) They would be able to view the allotment of the truck.

3.2 Hardware Interfaces

The backend server will require a decent processing unit to enable multiple threads for worker processes. The We use TCP/IP protocol for communicating with local hosts.There is no specific hardware requirement for the user under the assumption that he/she has access to a basic computer with decent internet connectivity via a modern web browser.

3.3 Software Interfaces

The backend will be developed using the Python framework Flask and the server will be hosted on Heroku. The Graphical User Interface will be constructed upon HTML5, CSS 6,Bootstrap5. and JavaScript. The product will interface with a Relational Database Management System (RDBMS) to store the employee information, consignment details and truck information in a logical manner using MYSQL .The web-applications must be able to communicate with the database properly. All major internal dependencies should be taken into account. All third-party API's will interact with the Application only with the controller and not the database of the Application.Internet connection is required for the communication of computers at different branches.

3.4 Communications Interfaces

Communication plays a major role in the software performance. All information regarding the trucks and consignments are sent through networks. So the computers at different and the central machine must be able to communicate securely and quickly over the network. Hyper Text Transfer Protocol Secure (HTTPS) will be used as the standard communication protocol for transferring data from the user to the system which connects to the database and vice-versa. This ensures that the communication happens over an encrypted and secure network. For future extensions, Cross Origin Resource Sharing mechanisms may be followed to integrate third-party libraries while maintaining data-security.SMTP protocols will be used for sending emails to the employees.

4 System Features

4.1 User Registration and Login

4.1.1 Description and Priority

All employees and customers have to register themselves to the software using a user ID and a password. The user ID will be unique for all of them. This feature is of High priority as this information will be encrypted and secured in network.

4.1.2 Stimulus/Response Sequences

Customer, Employees, Manager will have seperate pages for register and login where they will fill their credentials and the system will verify the credentials.

4.1.3 Functional Requirements

1. The manager is required to register an employee using a user ID and password.
2. Employees should be able to access the system using only their assigned user ID and password.
3. If an employee forgets their password, they should be able to reset it using the company-provided email address.
4. Customer will be able to login using their user ID and password . After they login , they can place consignment order and view previous transactions as well

4.2 Truck Details

4.2.1 Description and Priority

The managers can check the status of any truck whenever he wants. Branch employees may check the status of trucks deployed from their branch. This is of the utmost priority as the whole goal of the software is to cater to this need of automating truck assignment and Bookkeeping. Future extensions may add GPS API's (TBD) to enable live tracking of deliveries. Statistical analysis may be done on the truck idle time and usage by the manager.

4.2.2 Functional Requirements

1. Each truck should have a unique identification number.
2. The addition of new trucks can only be performed by the manager.
3. If a branch does not have a truck, an employee can request the manager to send one. Approval may be required for this request.
4. The details of the truck need to be entered by employees at different branches.
5. The manager should be able to view the real-time status of a truck, as well as a list of all trucks.
6. Employees must be able to see the truck status at their branch.
7. The attributes of the truck, such as source, destination, volume consumed, number of consignments delivered, usage time, and idle time, must be tracked.
8. An employee must receive a notification when trucks for a particular location reach a threshold of filled consignments.
9. The employee can then confirm the dispatch of the truck to print the necessary documents required for the travel of the truck.

4.3 Consignment Details

4.3.1 Description and Priority

The Consignment is placed by the employee by entering its volume, sender, receiver, source and destination. Future extensions may add GPS API's to enable live tracking of the location.

4.3.2 Stimulus/Response Sequences

Consignment can be generated by customer and then employee will assign the truck according to availability.

4.3.3 Functional Requirements

1. Employees from different branches are responsible for entering the details of the consignment.
2. The software should store all consignment details, including volume, sender, receiver, status, source, destination, and the truck carrying it.
3. The software must have the capability to check the real-time status of the consignment (to be determined).

4. If the volume of the consignment does not exceed a certain limit, a truck will be assigned to it.

5. If the consignment is too large, additional trucks may be automatically assigned to it.

6. The software should be able to calculate the waiting time for a consignment.

7. The consignment will be dispatched once the volume loaded onto the truck exceeds a certain limit.

8. An employee should be able to receive a consignment delivered to their branch.

4.4 Customer Details

4.4.1 Description and Priority

The customer can login to the website and add the details of a Consignment like volume, start address , receive address. He can check the status of the Consignment.

4.4.2 Stimulus/Response Sequences

The customer will be asked to register first and then login . Then customer could place a order by giving the consignment details and bill will be generated according to source and destination branch. After the payment is completed consignment will be generated. The customer will be able to check the status of the consignment . Customer will be able to check consignment history.

4.4.3 Functional Requirements

1. The Customer must be able to add a new order.

2. He should have the access to check live status of the consignment

5 Other Nonfunctional Requirements

5.1 Performance Requirements

In order for software to function effectively, it is crucial for it to operate smoothly and efficiently. To ensure adequate response time, the website should be hosted on a server capable of handling the necessary workload. The performance of the software is contingent upon several factors, including the speed of the internet, the ease and speed of data access from the database, and the speed of communication among various computers. Although the software utilizes a few small computations that are not computationally intensive, its functionality heavily relies on the processing and data handling power of the computer, as well as the database. It is important to minimize latency and avoid unnecessary database file retrievals. Implementing caching mechanisms can help prevent the need for multiple script downloads.

5.2 Safety Requirements

The Software follows a client-server models hence any physical damage to the server or Database may result in loss of data and other important assets stored on the servers.Backup cloud-storage must be used as a fallback for the same.
Basically save working time and pressure.

5.3 Security Requirements

As this application is web-based, there is a possibility of internet-based attacks, including Cross-Site Scripting. However, the software itself does not pose any security threat. To prevent unauthorized access to the system and the database, a secure login mechanism is in place. It is recommended that all internet requests are transmitted through an encrypted network, and secure protocols are followed to ensure data security.

5.4 Software Quality Attributes

The software being developed must possess ease-of-use and run smoothly on widely-used browsers such as Chrome and Firefox. A stable internet connection is assumed to be available to the user. The system should be designed in a flexible manner that allows for potential future changes and expansions within the Transport Company. Security and privacy must be ensured in the software, while also maintaining a clean and uncluttered

graphical user interface for optimal user experience.
Database, logical and also UI test is required.

5.5 Business Rules

- It is presumed that any user will input valid data.
- At first, the branches have an equal distribution of trucks.
- The software is exclusively intended for use by the transport company's employees and managers.

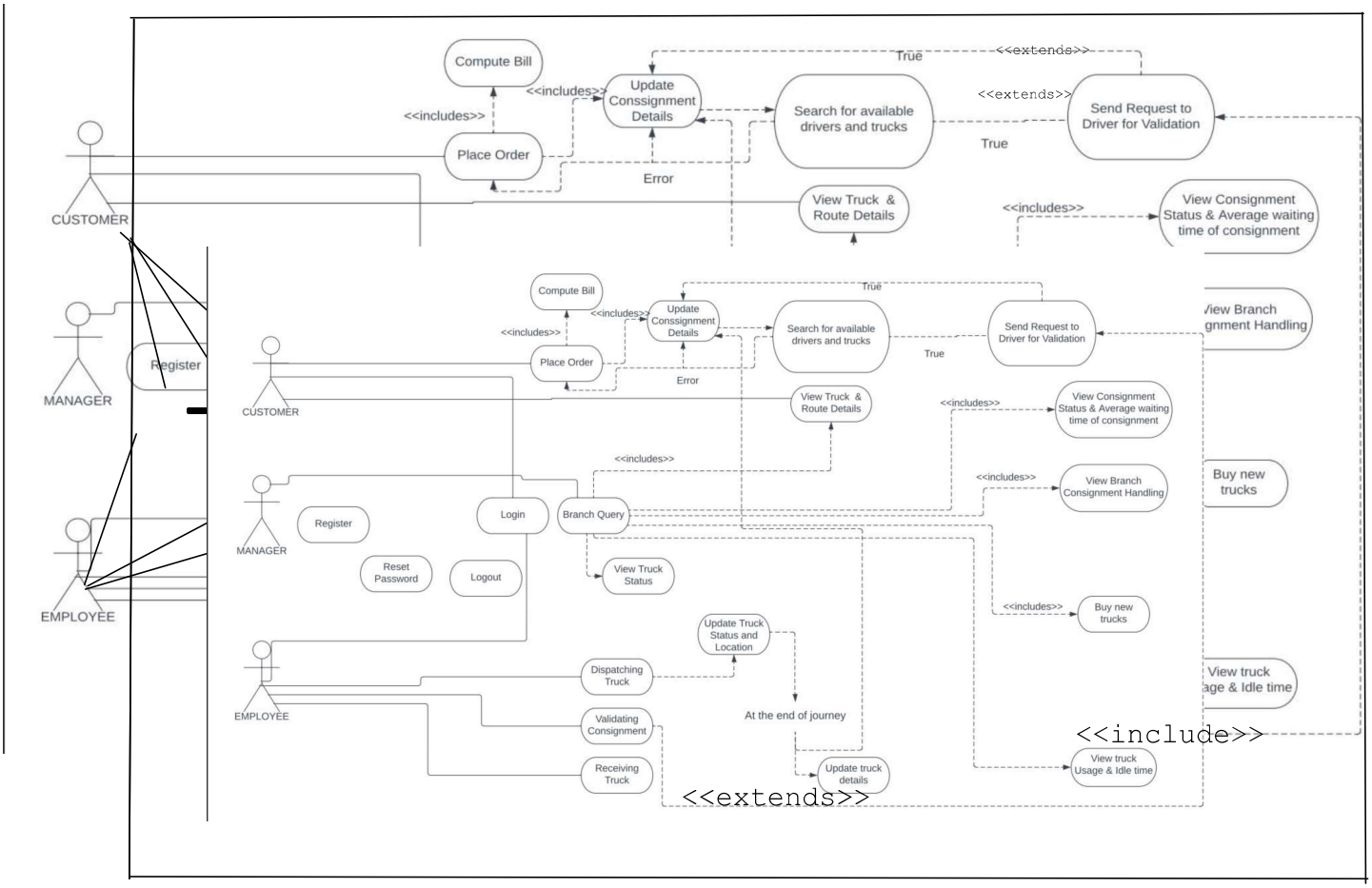
6 Other Requirements

The use of the software will be guided by the rights an user is provided. No legal issues must be there with the use of the software. However, the tools used here have some specific licenses. The license terms must be followed to avoid any legal issues in the future. A user manual will also assist the software so that users can get the best out of this software.The Software's latency should be very minima

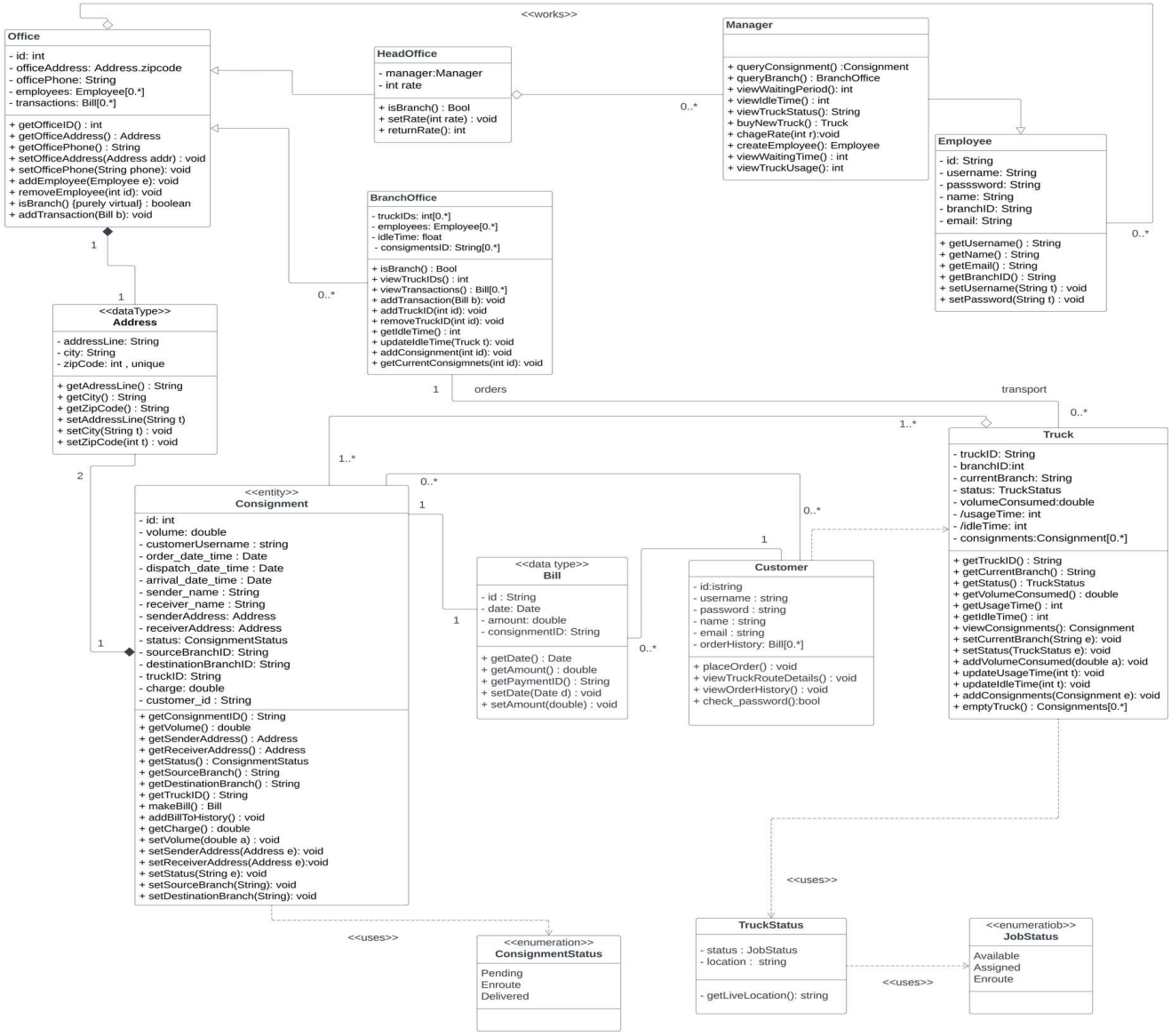
7 Appendix A: Glossary

- MLA :- Modern Language Association. It establishes a system for documenting sources in scholarly writing.
- URL :- Uniform Resource Locator. It is the address of a given unique resource on the Web.
- Third Party API's :- Third Party Application Programming Interfaces. It allows you to access a third parties functionality or data to use on your site or application.
- SQL-Injection :- Structured Query Language-Injection. It is a common attack vector that uses malicious SQL code for backend database manipulation to access information that was not intended to be displayed.
- Cross site-scripting :- A web security vulnerability that allows an attacker to compromise the interactions that users have with a vulnerable application
- CORS :- Cross-Origin Resource Sharing. It is an Hypertext Transfer Protocol (HTTP)-header based mechanism that allows a server to indicate any other origins (domain, scheme, or port) than its own from which a browser should permit loading of resources.
- Bootstrap :- A free and open source front end development framework for the creation of websites and web apps.
- TCP/IP :- Transmission Control Protocol/Internet Protocol, It is the conceptual model and set of communications protocols used in the Internet and similar computer networks.
- RDBMS :- Relational Database Management System. It is a Database Management System designed specifically for relational databases.
- HTTPS :- Hypertext Transfer Protocol Secure. It is used for secure communication over a computer network, and is widely used on the Internet.
- SMTP :- Simple Mail Transfer Protocol. It is a set of communication guidelines that allow software to transmit an electronic mail over the internet.

8 Appendix B: Analysis Model - UseCase Diagram



9 Appendix B: Analysis Model - Class Diagram



10 Appendix C: To Be Determined List

- Payment gateway to be determined.
- Chatbox where user can have conversation with employee to be determined.
- Email messages to be determined.