SOFTWARE REQUIREMENTS SPECIFICATION

for

Transport Company Computerization Software (TCCS)

Version 1.0 approved

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Revision History

Name	Date	Reason For Changes	Version
21	22	23	24
31	32	33	34

1 Introduction

1.1 Purpose

The purpose of this System Requirements Specification document is to give a detailed and verbose description of the system requirements, specifications and features of the Transport Company Computerization Software(TCCS), which would help to manage and automate the administrative and bookkeeping works of a Transport Company.This document is used to convey information about the functional and non-functional requirement proposed by the client. It also explains system constraints, and its interaction with various other external entities describing the project's target audience,user interface and hardware and software requirements. The document is intended to get an approval by the client so that the product developers can get a reference for the development of version 0.1 of the application software.

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 to be read by the development team, the project managers, testers and documentation writers.the finished product, may review the document to learn about the project and to understand the requirements. The SRS has been organized approximately in order of increasing specificity. The developers and project managers need to become intimately familiar with the SRS.
Others involved need to review the document as such:

- Overall Description – Company Employees have to become accustomed to the various product features in order to effectively operate the product.
- System features – Testers need an understanding of the system features to develop meaningful test cases and give useful feedback to the developers.
- External Interface Requirements – The hardware developers need to know the requirements of the device they need to build. The marketing staff also needs to understand the external interface requirements to sell the product by describing the user-friendly features of the TCCS.
- Nonfunctional and Functional Requirements – The hardware developers.

1.4 Product Scope

The Products' purpose is to computerize the major administrative and bookkeeping processes of a Transport Company, so that the administrative works can be done in a more efficient, faster and elegant manner.The Software will be installed at a single central server to be accessed by different branch offices using it's URL . It helps to keep all data related to consignments, trucks and employees across different branches of the company in a single master database and also assists to allot trucks and calculate waiting time of consignments, buying new trucks, viewing the current status of any truck, placing consignments, keeping track of the volume of the consignments loaded on a truck among other functionalities. Hosting the application on the internet provides future opportunities to use third-party API's and extend the product's future capabilities.The Software's design has been made lean,agile and put through continuous innovation to streamline the company's productivity and scale its throughput, thus ensuring a user-comfort first approach.

1.5 References

[1] Prof P P Das "Software Engeering Course CS20006" (2021) IIT Kharagpur
[2] Prof Abir Das & S Bhattacharya "Software Engeering Lab Course CS29006" (2021) IIT Kharagpur
[3] IEEE "Guide to Software Requirements Specifications" (1984)
[4] GeeksforGeeks "How to write a good SRS for your Project" (2016)
[5] Wikipedia "Software requirements specification" (2021)

2 Overall Description

2.1 Product Perspective

This software product is eventually intended for a transport computerization company. Product will be deployed to web site and all employees as well as the Manager of the company will access the product by use of the website. Website will be main user interface where users can operate all the provided functionality. However, this web site will be only a part of a larger system. There will be cloud server where all the user data is kept and all the execution is done. Website will only be the interface for the user data and the execution of provided functionalities. To use product, the employees and the manager can login through the website anytime. Whenever a new user consignment is received or a new truck is bought, all the required data will be created in the database. The manager will be able to view the status of any truck or consignment at any point of time. All of the details of the consignments and the trucks will be kept in the cloud server.

2.2 Product Functions

This software will help to make the management and administrative processes of a Transport company faster and efficient. The functionalities of the software are given below. The software will be able to:

- Store the details of consignment
- Compute the transport charges
- Issue bill for consignments
- Allot the next available truck automatically
- Store the details of truck
- Show the status of trucks
- Show the status of consignments
- Compute the average waiting time for consignments
- Compute the idle time of trucks
- Passwords and user ID will be used to protect the accounts of employees and manager

2.3 User Classes and Characteristics

There are mainly two types of user classes:

- 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.
- 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.

Although the Employee user class uses the product more frequently, Manager is the most important user class since he has access to view details and change some information inaccessible to Employee user class. Also, for future extensions of the product, Manager may add new company classes like Driver, Labourer, etc.

2.4 Operating Environment

The software is a Python web-application application based on the client-server model that also makes use of a relational database.The GUI of the application will be built using HTML5,CSS and using Javascript frameworks. The backend server built using Python will be hosted on a public domain and will be accessible round the clock.The Software will be deployed on a commercially available server(like firebase,Heroku,AWS etc.).The Service will be accesible to users independent of the Operating System under the assumptions that user is using modern web browser such as Google Chrome or Mozilla Firefox.

2.5 Design and Implementation Constraints

The major constraints in the development of the software:

- All Offices and systems connecting to the server must have good internet connection to access and update the database and utilize the software's functionalities.
- Data Security: The Software must be vary of malware attacks and other cyber-security threats such as SQL-Injection,Cross site-scripting,CORS etc.
- Memory Bottleneck: Since The Application and the database will be competing for similar resources of memory and computation,this might make memory and CPU consumption a bottleneck as the database grows.
- Data Backup: Since the application is based on a one-to-many ideology,any corruption or harm to the Server might eradicate the whole database,hence timely backups become necessary.

2.6 User Documentation

There are no user documentations.

2.7 Assumptions and Dependencies

The software will be made with the following assumptions:

- There are no hardware/OS constraints on the user system as the software is a web application.
- Internet connection is well available in all the branches and the computers there can communicate with each other in real time.
- Each user must remember his password and login ID, failing which, he cannot login into the system.The User can reset his password only with his official work-ID provided by the company
- The user should have a good knowledge about the basic attributes of an object and fill in the details of the consignments properly.Safety checks at all input locations will be provided to aid the user.
- The centers of the Transport Company are well distributed in the map and each center performs well in terms of consignment handling (that is there is no center which only receives goods, but does not send any or vice versa). This ensures equal distribution of trucks at all locations and prevents concentration at one location.

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

- The internet connection should be good enough for the computers to communicate with each other and send data to the central machine of the manager.
- The Python Flask framework and its microframeworks will be used to implement the back-end of the software.
- The Graphical User Interface may include commercially reproducable bootstrap css templates.
- All the tools on which the software is dependent must be working properly.
- The software will also depend on the database and the interaction of web-based application with the database.

3 External Interface Requirements

3.1 User Interfaces

The user interface of the software will be easy to use and interactive. Each person will have to login using his own login id and password. Only after that, he will be able to make any changes to the database or have his/her queries answered.

1. 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.

2. Manager: Manager will be given the 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.
   f) He will give an employee an username and a password and he can also reset the password of an employee.

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

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

This section describes the major functionalities of the software.

4.1 User Registration and Login

4.1.1 Description and Priority

All employees of the company 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

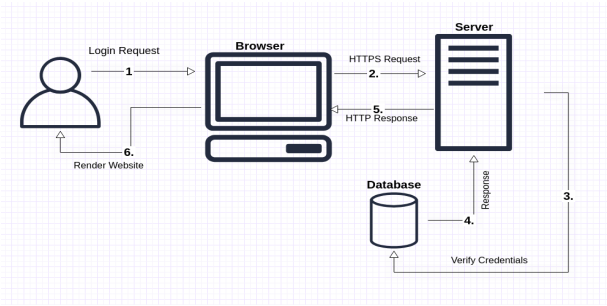

Figure 4.1: Login Sequence

4.1.3 Functional Requirements

1. Manager must register an Employee against a user ID and password.
2. Employees must be able to login only with that user ID and password.
3. In case they forget their password, they must reset it using the company email id provided to them.

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 Stimulus/Response Sequences

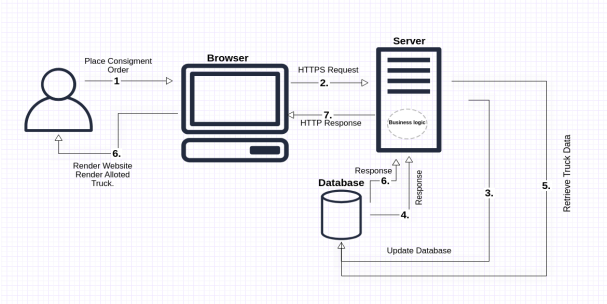

Figure 4.2: Consigmnet Place Sequence

4.2.3 Functional Requirements

1. Each truck must be identified by its unique number.
2. Addition of new trucks must be done only by the manager.
3. An employee may request the manager to send a truck to his branch in case no truck is placed at branch which may be subject to approval.
4. The details of the truck must be entered by the employees at different branches.
5. The manager must be able to get the real time status of a truck as well as a list of all the trucks.
6. The employees must be able to see the truck status at their branch.
7. Besides status, it must have attributes like source, destination, volume consumed, no. of consignments delivered, usage time and idle time.
8. The Employee must be notified when trucks for a particular location gets filled with consignments upto a threshold.
9. The employee may then provide confirmation to dispatch the truck to print documents necessary for the travel which are to be sent to 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 Functional Requirements

1. The details of the consignment must be entered by employees at different branches.
2. The software must store all details of consignment: volume, sender, receiver, status, source, destination and the truck it is being carried on.
3. The software must be able to check the real time status of the consignment (TBD).
4. A truck is allotted to the consignment if the volume consumed by the truck after loading the consignment doesn't increase by a certain limit.
5. More trucks may be allotted automatically to the consignment if it is too large.
6. The software should be able to calculate the waiting time of a consignment as well.
7. The consignment is dispatched once the volume consumed by the truck it's loaded in crosses a certain limit.
8. The Employee must be able to receive a consignment delivered to his branch.

4.4 Account Details

4.4.1 Description and Priority

The manager and employee can perform various tasks in the software.

4.4.2 Stimulus/Response Sequences

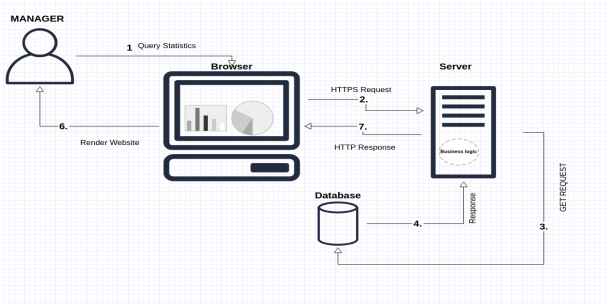

Figure 4.3: Query Statistics Sequence

4.4.3 Functional Requirements

1. The Manager must be able to see the profit/revenue collected from each branch.
2. The Manager can check the waiting time of consignments and idle time of trucks to determine his business strategy.
3. The Manager should be able to view average branch statistics with regards to consignment profits and volume transferred.
4. The Employee must be able to place consignments. Bill for the same is computed, and is issued when the truck is allotted to the consignment.
5. The dispatch details must be printed when the Employee dispatches a truck.

5 Other Nonfunctional Requirements

5.1 Performance Requirements

Software must perform smoothly and efficiently. The website should be hosted on a server that can provide adequate response time. Performance of the software will greatly depend on the speed of the internet, ease and speed of accessing data from the database and the speed of communication among different computers. The software uses a few small computations that are not computationally heavy but are very much dependent on the database and processing and data handling power of the computer.The Software's latency should be very minimal and should avoid unnecessary file retrieval's from the database.Caching mechanisms must be followed to avoid 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.

5.3 Security Requirements

Since this is a web-based application, there might be chances of internet based attacks such as Cross Site-Scripting etc. There is no risk of any threat issued by the software. The software is also protected from unauthorized access to the system and the database. A proper login mechanism is used to avoid hacking.All requests over the internet should go through a secure encrypted network and secure protocols must be followed

5.4 Software Quality Attributes

The software must be easy to use and the application must run without issues at least in popular browsers Chrome and Firefox. It is expected that the user has a proper internet connection. The system developed by the software should be flexible, that is there must be provisions to make changes in the software for future extensions in the Transport Company. The software must also ensure the security and privacy of the Transport Company.The product must be easy-to-use and GUI must be clean and not bloated.

5.5 Business Rules

- It is assumed that valid data is always input by any user.
- Initially, the trucks are uniformly distributed among all the branches.
- The software is to be used only by the employees and the managers of the transport company.

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 minimal.

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.

Appendix B: Analysis Models

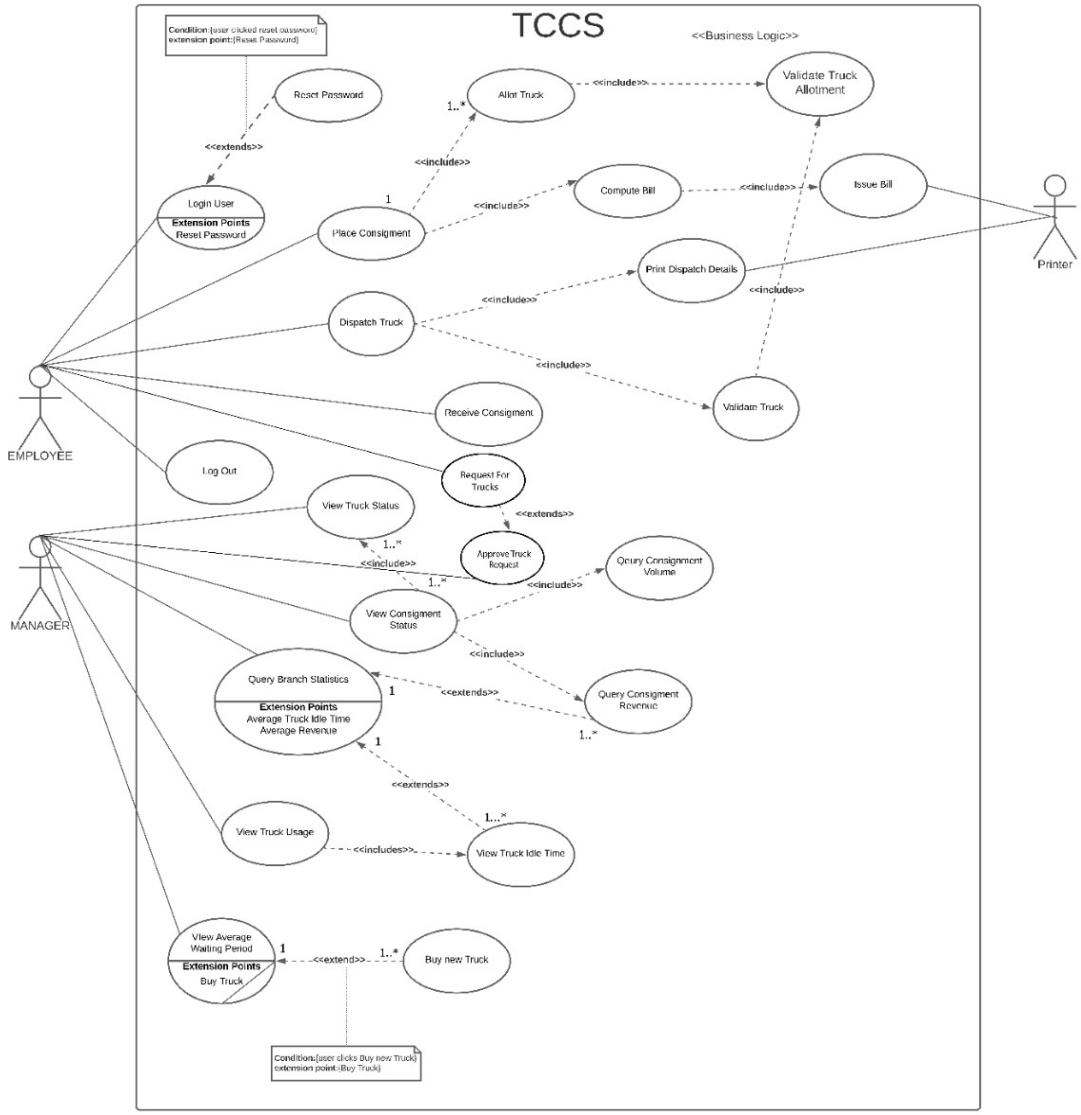

Figure 6.1: Use Case UML Diagram

Appendix C: To Be Determined List

1. Google Maps GPS API's edition to be determined
2. Checking RealTime Status to be determined