SMART TRAFFIC IDENTIFICATION SYSTEM

ITRAFFIC

Vehicle detection and informing process

Project ID: 19-127

Software Requirements Specification(SRS)

Author: K.C Gunawardhane(IT16145276)

Bachelor of Science Special (Honors) Degree in Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

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(Dissertation submitted in partial fulfilment of the requirement for the Degree of Bachelor of Science Special (honours) In Information Technology)

Author: K.C Gunawardhane(IT16145276)

Ms. Shashika Lokuliyana

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Name of the Supervisor

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Declaration

I declare that this is my own work and this proposal does not incorporate without any acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text

Name: K.C Gunawardhane Signature:

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1. Introduction

1.1. Purpose

This Software Requirement Specification Document' s purpose is to provide a detailed description of all the requirements and process of the features."Reduce traffic congestions in specific areas" in the project "itraffic".This document will provide a detailed description about the user requirements and the system requirements.It will also give a detailed description about the functional and non-functional requirements.

This document will explain the purpose and features of the system,interface of the system,the constraints for operating the system,how the system will be reacting to various conditions and objectives and the basic functionalities of the system.

This **SRS** document will be acting as a legal contact between the client and the developer and on the other perspective it will serve as a software validation document for the customer and the developer.

1.2. Scope

“Itraffic” is an online mobile application, this aim for reducing traffic congestion in user given areas. This research project is focused on developing an application for vehicle drivers and passengers to go their destination without any inconvenience.Our system has give them to different type of new services.

This specific feature is basically focus on the “Reduce traffic congestions in specific areas” .In this feature is mostly focus on vehicle drivers who drive with road traffic.First vehicle driver register through “**itraffic**” app then all registered data synced to the server side with gps location with driver’s location.As a result of that we can identify the how traffic congestions happen ahead junctions.

Although, there are some feature for vehicle driver such as predicting weather forecast in ahead,alternative route suggestions when traffic congestion occured in coming junction as well as friends follow option.Vehicle drivers can rate and provide comments for the service provides. Although vehicle drivers can get intelligent answers for their questions using the chatbot system.

1.3. Definitions,Acronyms and Abbreviations

Definitions

Table 1 Definitions

Terms	Definition
itraffic	Name of the proposed service
Software Requirement Specification	A document that completely describes all of the functions of a proposed application and the constraints under which it will operate

Table-01

Abbreviations

Table 2 Abbreviations

MB	Mega Byte
GB	Giga Byte
DB	Database
FCD	Floating Car Data
GPS	Global Positioning System
GSM	Global System for Mobile Application
API	Application Program Interface

Table-02

1.4. Overview

The main goal of this application is to reduce road traffic congestion and reach to the destination safely and quickly.Using this application drivers or passengers will be able to get their particular work correctly and efficiently.

Task of this system is to first drivers should register their vehicles using our mobile application,drivers informations are store into our database after that drivers can communicate with our server.As well as some mobile app features enable after previous scenario done.

Users of our application will be able get emergency vehicle detection near their vehicles,alternative routes suggestion,weather forecast in coming junction,fuel station,suggestion,supermarket suggestion etc.

This document will describe the details of the software requirement, functionalities,]constraints, limitations and additional features of the application that will be implementing.

2. Overall Descriptions

This app will provide to reduce big traffic congestion and reach driver's particular destination with quickly and safely..According to the process of our application both vehicle drivers and passengers have to register using their mobile phone.Drivers can find traffic congestion in ahead junction. The application will suggest alternative route to driver by voice message.Application will suggest how weather is going right now, emergency vehicle detection from app by voice message.There is another feature is chatbot.There are some options for passengers,these are when passengers is waiting for a vehicle if there is traffic on the road the user will get a suggestion showing the best route and the best transport method. If there is a taxi around the user will be able to send request to a taxi driver which is not currently having a passenger. Then taxi driver will see the request with the location and details. So the driver and user can communicate and full fill their needs.

Although,There is a gps tracker to track all vehicles which are in road traffic.This gps tracker helps to identify the vehicles,ambulance and other vehicles.if someone runaway from accident we

can find that vehicle using gps tracker.As well as GPS coordinates will not properly show in the map,as a remedy we use 'Map Matching Algorithm' for reduce gps noises.

This application is connected via cloud server to connect with inbuilt RESTFUL server in our application.GPS tracker connected via GSM module and it will also connect with RESTFUL server.We use **curl** for support RESTFUL in **php** and we use **HttpClient.h** for support RESTFUL in arduino. **php,mysql,jquery,c++,javascript,react.js**,**Arduino,GSM Module** these are use as technologies and languages.

2.1. Product perspective

Mentionly, there are existing proposed products in the market area, they do not address most of the problems that the proposed system is going to address. The following table shows a comparison of features between the existing products or applications and the proposed solution in 'itraffic' application.

"Waze" and "SYGIC" are existing application product in the market which has limited number of features available. Therefore "ITraffic" is offering various kind of features along with the existing features that were already available.

Features	**Here We Go**	**WAZE**	**SYGIC**	**Proposed App**
Real time traffic details by GPS technology	✓	✓	✓	✓
Show all alternative roads to users	✗	✗	✗	✓
Driver Assistant	✗	✗	✗	✓
Ahead traffic situation by GPS technology	✗	✗	✗	✓
Share friends location	✗	✓	✗	✓

Suggest nearest taxi service for the passengers who use the public transportation.	✗	✗	✗	✓
Send alerts to the drivers who are in ahead when an emergency vehicle coming in their road.	✗	✗	✗	✓
Ahead weather forecast	✗	✗	✗	✓
Promotion features to shops	✗	✗	✗	✓
Co-travel facility for users.	✗	✗	✗	✓

Table-03

2.1.1. System Interface

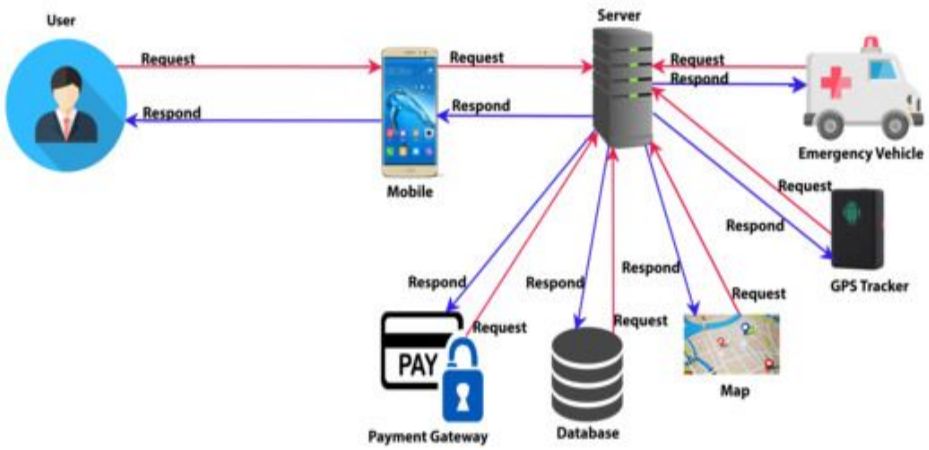
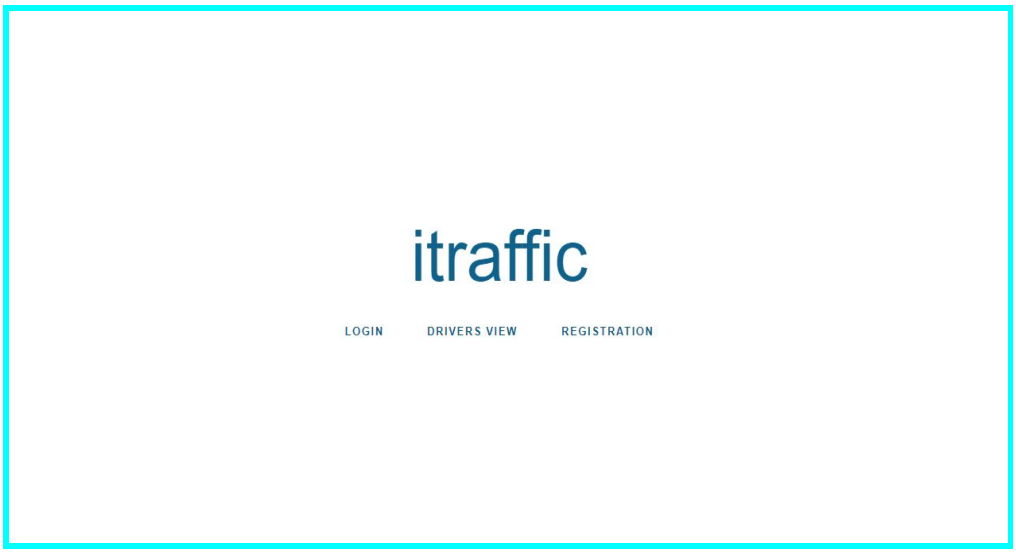
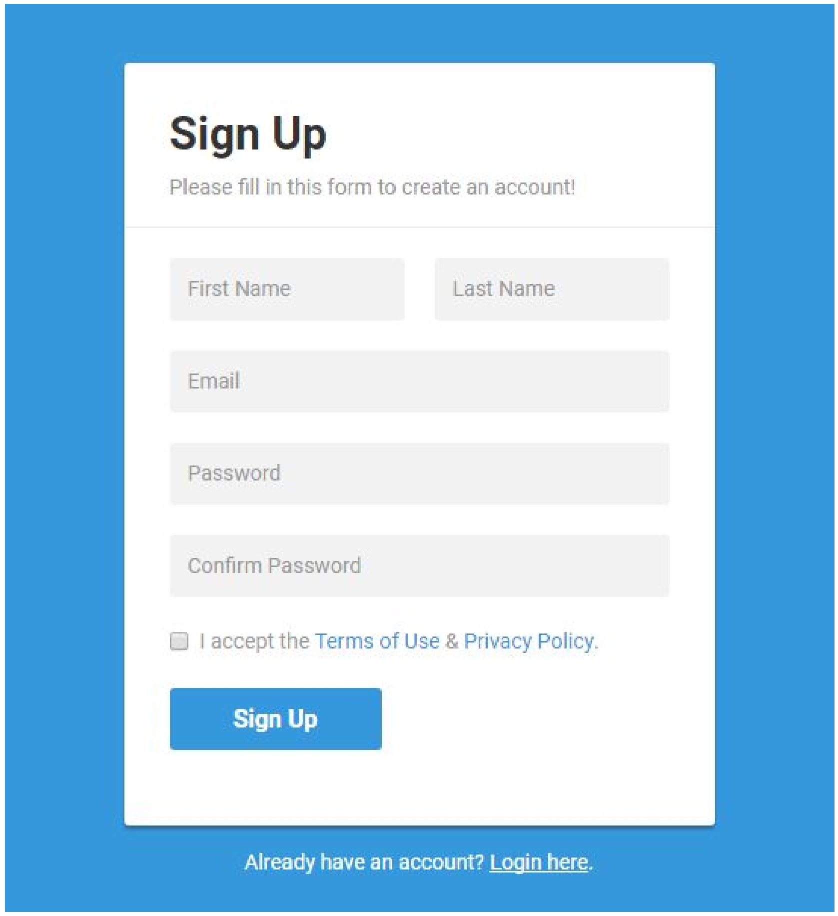
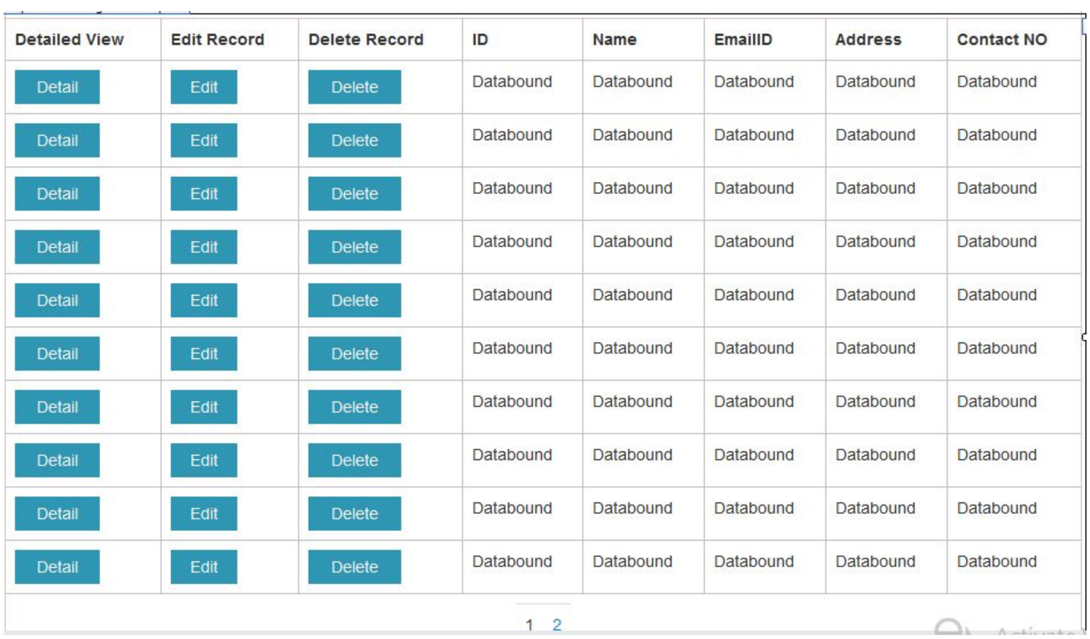


figure-01.

2.1.2. User Interface







Detailed View	Edit Record	Delete Record	ID	Name	EmailID	Address	Contact NO
Detail	Edit	Delete	Databound	Databound	Databound	Databound	Databound
Detail	Edit	Delete	Databound	Databound	Databound	Databound	Databound
Detail	Edit	Delete	Databound	Databound	Databound	Databound	Databound
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Detail	Edit	Delete	Databound	Databound	Databound	Databound	Databound

1 2

figure-02

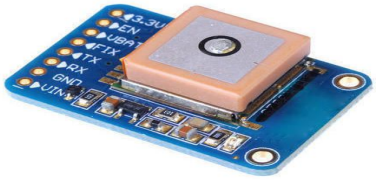
2.1.3. Hardware Interface

There are some hardware components that use for this application.Those hardwa components are used as GPS tracker.Those hardware components are,

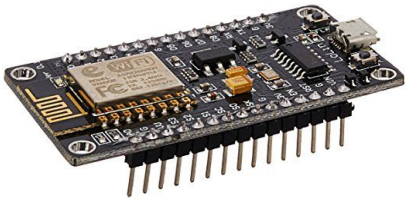
- Arduino
- GSM module
- GPS module
- Connecting wires

Arduino.

GSM Module.



GPS Module.



NodeMcu Module.

figure-03

2.1.4. Software Interface

Several software will be running in our application to produce the expected outcomes.This application required to build our application are follows,

- Visual Studio Code
- Arduino IDE
- Postman - (REST api web service runner)
- GitHub

2.1.5. Communication Interface

Our application is typically do searching,suggesting,recognizing,retrieving data from the internet through the mobile device.The mobile device should be connected before using the application.There is component called GSM module,it used to communicate with computer and GSM-GPRS module.

2.1.6. Memory Constraints

For a better performance In order to implement and run this system efficiently a specific much of RAM space and Memory space is required.

- Minimum 4 GB RAM
- 250 GB hard disk

2.1.7. Operations

User will need to perform normal and special operations in order to interact with our application

Users

- First driver should register thought their mobile phone with vehicle details.
- Show gps maps.

Service Provider

- Confirm the registration.
- Connect to main system.
- Reduce the gps noise using map matching algorithm and pass data to mobile.

2.1.8. Site Adaptation Requirements

System should be successfully connected to main DB server where all vehicle details ,user details, GPS details. Users of the system should have devices that have the necessary requirement. Next concern would be the storage where the customer needs to install the application with enough space in the device.

System users of this application can use the system with minimum help of a guide and get the ultimate benefit out of it.

2.2. Product Functions

2.2.1. Use Case Diagram

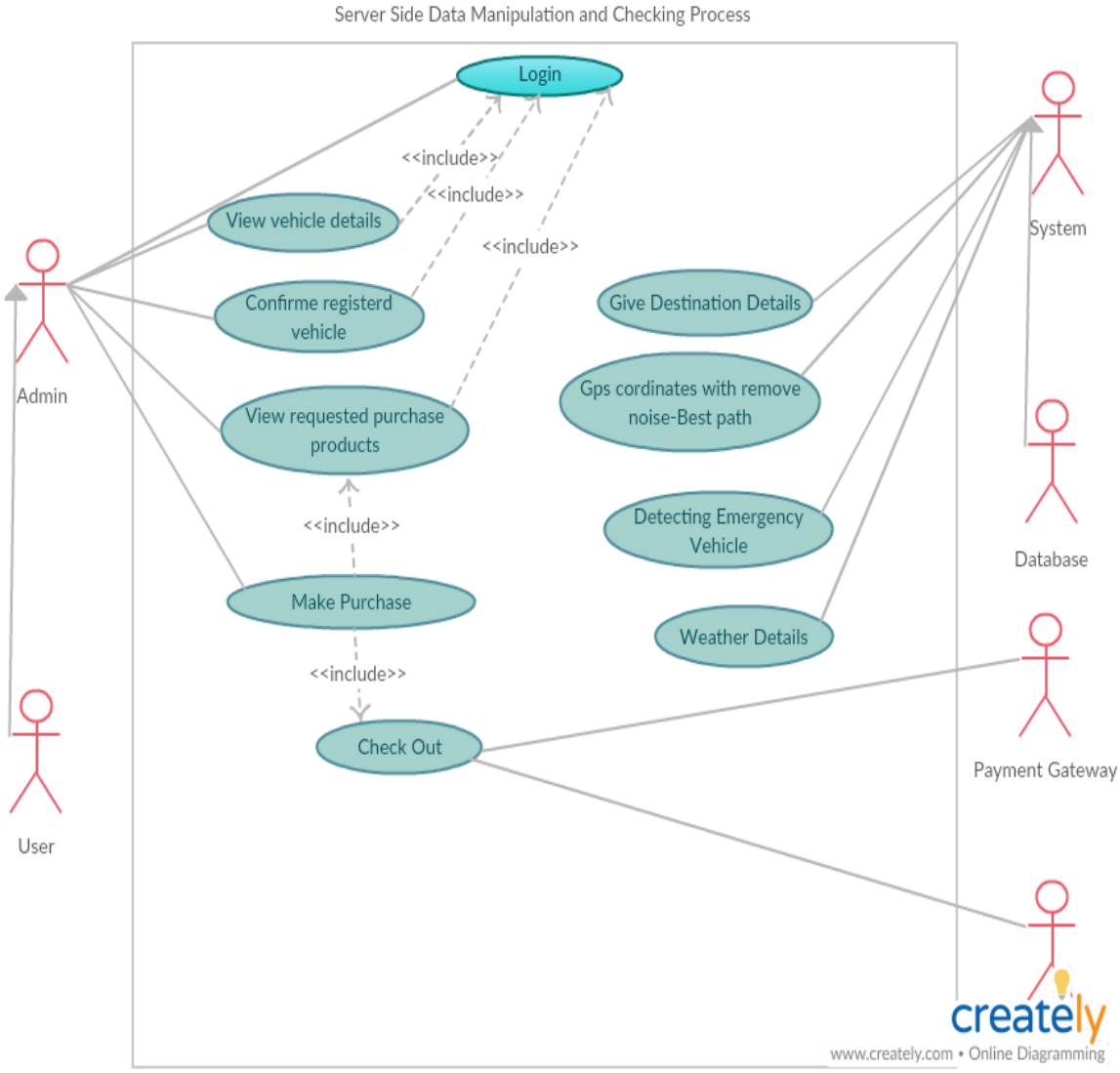


figure-04

2.2.2. User Case Scenario

A Use case scenario how steps by steps use cases are processing.it will show how system admin and system work properly.

Use Case Name	Login
Pre-Condition	Admin should be registered through mobile application
Post-Condition	Logged in admin
Actor	Admin
Main Success Scenario	1. After system launched,it displays home page 2. Then there is three navigations display on home screen 3. Click Login 4. Admin inputs username and password 5. Validated 6. Click on login button
Extension	5.a.User is not validated 5.a.1.System display an error message.

Use Case Name	View Vehicle Details
Pre-Condition	Admin should log into the system
Post-Condition	Get result all vehicle details that registered.

Actor	Admin
Main Success Scenario	1. After system launched,it displays home page 2. Then there is three navigations display on home screen 3. Click login link 4. It navigated login page 5. Admin inputs username and password 6. Validated 7. Click on login button 8. Navigate to drivers view,it on displays navigated page 9. Give filter. 10. Click search button
Extension	5.a.if password doesn't match system gives 'enter the username or password'

Use Case Name	Confirmed registered vehicles
Pre-Condition	Admin should log in to the system
Post-Condition	Get results of all confirmed vehicle details
Actor	Admin
Main Success Scenario	1. After system launched,it

	displays home page 2. Then there is three navigations display on home screen 3. Click login link 4. It navigated login page 5. Admin inputs username and password 6. Validated 7. Click on login button 8. Navigate to confirmed vehicle details.
Extension	5.a.if password doesn't match system gives re-enter the username or password 8.a. If not confirmed that vehicle no longer in confirmed view.

Use Case Name	Give destination details
Pre-Condition	User should log through the app.give source and destination
Post-Condition	Give all details of destination location
Actor	System
Main Success Scenario	1. User should log in to the app

	2. Give source and destination location 3. Server gives destination details
Extension	

Use Case Name	Remove noise with best path
Pre-Condition	User should log through the app.give source and destination
Post-Condition	Appear proper and best path to the map
Actor	System
Main Success Scenario	1. Use case starts when user launches the app 2. System displays login interface. 3. Users enter username and password. 4. User click on login button 5. User is validated 6. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Name	Emergency vehicle detection details
Pre-Condition	User should log through the app.give source and destination
Post-Condition	Suggest all emergency vehicle details appear to the mobile app
Actor	System

Main Success Scenario	1. Use case starts when user launches the app 2. System displays login interface. 3. Users enter username and password. 4. User click on login button 5. User is validated 6. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Name	Weather forecast details
Pre-Condition	User should log through the app.give source and destination.
Post-Condition	Send weather details to the app
Actor	System
Main Success Scenario	1. Use case starts when user

	launches the app 2. System displays login interface. 3. Users enter username and password. 4. User click on login button 5. User is validated 6. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Name	View Request Purchased Products
Pre-Condition	Admin should log into the system then link to view request purchased products.
Post-Condition	Get results data of all requested purchased products.
Actor	Admin
Main Success Scenario	1. Login in to the backend system. 2. Admin enter username and password. 3. User click on login button 4. User is validated 5. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Name	Make purchase
Pre-Condition	Admin should log in to the system then link to the view request purchase products.
Post-Condition	Get results data of confirmed purchase products,
Actor	Admin
Main Success Scenario	1. Login in to the backend system. 2. Admin enter username and password. 3. User click on login button 4. User is validated 5. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Use Case Diagram	Check out
Pre-Condition	Admin should log into the system then link to view request purchased products after that link to make purchase.
Post-Condition	Check out by payment gateway and purchased
Actor	Paypal, Payment gateway
Main Success Scenario	1. Login in to the backend system. 2. Admin enter username and password. 3. User click on login button 4. User is validated 5. Use case ends when user logged in.
Extension	5.a.User is not validated. 5.a.1.System displays and error message.

Table-04

2.2.3. Activity Diagram

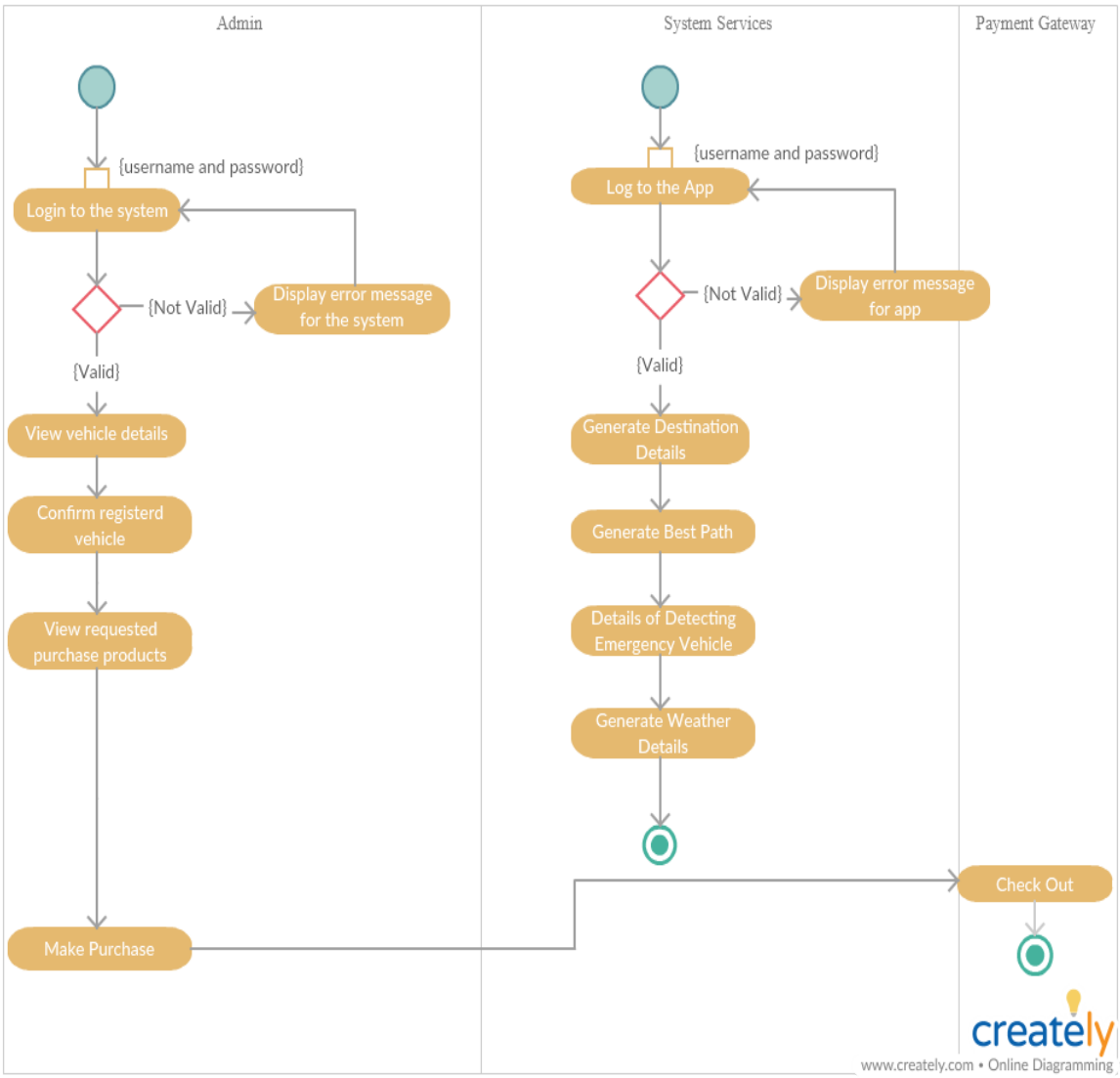


figure -05

2.3. User Characteristics

User of our application will be mostly vehicle drivers and passengers.System admin control the system service . Vehicle drivers are the people who engage with system.

2.4. Constraints

Our system consist of mobile application and web application.So we should consider the constraints in order to work with better level of the quality.Memory limits limited below are needed by the application to work efficiently.

Web Application.

- Should have apache server to run the web application and mysql for connect to database.
- Internet connection is required.

2.5. Assumptions and Dependencies

Assumptions

- Should have network connection.
- Should satisfy the minimum hardware and software requirement from server side and client side.
- Should have a database with secure username and password to prevent the unauthorized access.
- Should be developed with the understanding of both the language and grammar

Dependencies

- “Itraffic” system is depending on the network and GPS connection as it should be a location based model.
- The user should provide correct details to the app for get good result.

2.6. Apportioning and Requirements

3. Specific Requirements

3.1. External Interface Requirements

3.1.1. User Interfaces

Interfaces of our application is shown in section 2.1.2. In that section

3.1.2. Hardware Interfaces

Hardware interfaces of our application is shown in section 2.1.3 in that section.

3.1.3. Communication Interfaces

Our application is typically do searching,suggesting,recognizing,retrieving data from the internet through the mobile device.The mobile device should be connected before using the application.There is component called GSM module,it used to communicate with computer and GSM-GPRS module.

3.2. Classes/Object<For Software Dev. Oriented Projects

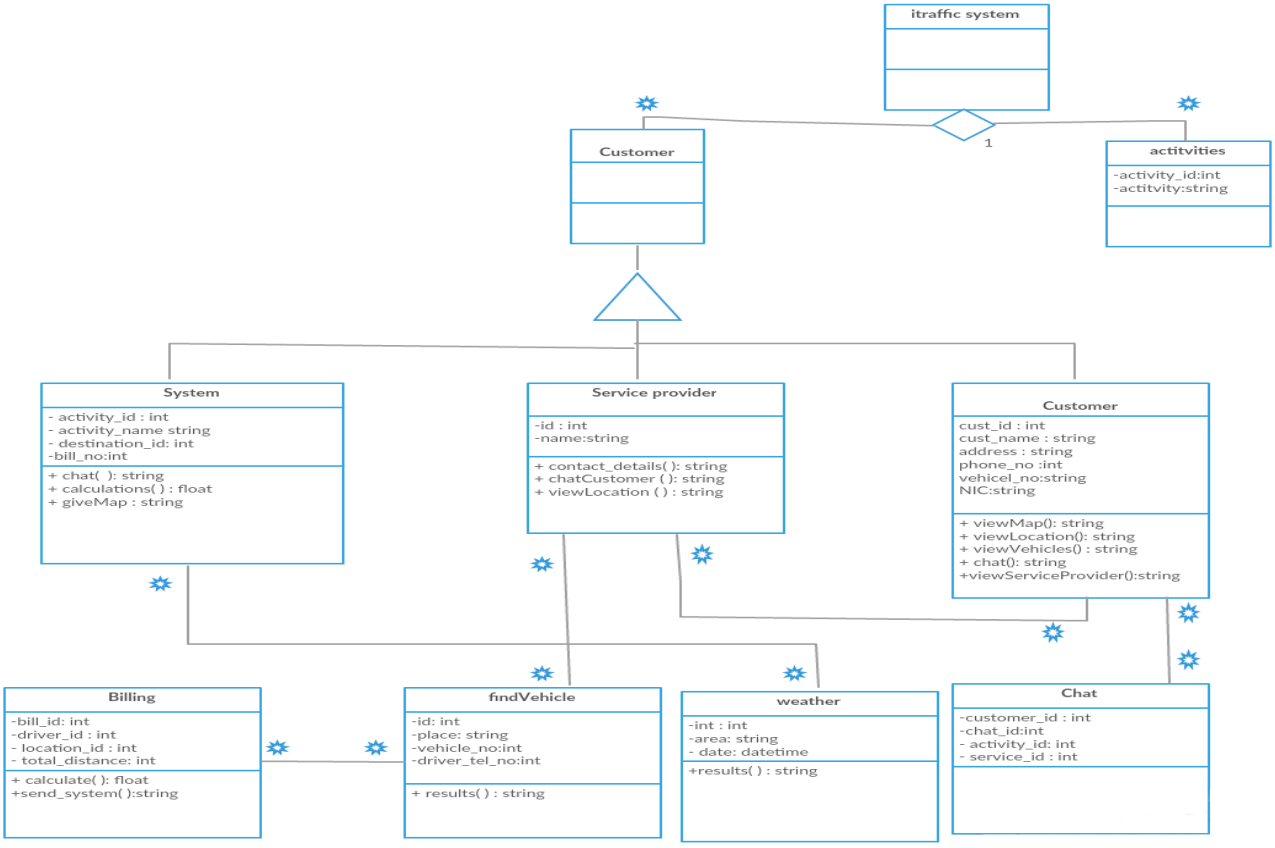


Figure-06

3.3. Performance Requirements

- At single time any number of users can log in to the system
- Payment confirmation message to the app from the system.
- Unknown or accident vehicle detection.

3.4. Design Constraints

Server side data manipulation and checking by admin or other authorities.Therefore while developing the web application main constraint is the external interface.Design should follow a very consistent design throughout the application.Designer should focus to the usability of the system.

3.5. Software System Attributes

3.5.1. Reliability

The application should be reliable as it is used to do payment transtraction.So the details of the transtraction should be properly secured with security methods.It should also safeguard the privacy of the vehicle drivers.We should use secure authentication methods when creating usernames and passwords.

3.5.2. Availability

The system should be available to anytime

3.5.3. Security

Security of a system is very essential as the trust of the vehicle drivers towards the system depends on the security.Security of a system is an attribute which reveal ability to resist unauthorized usage while still providing its services to

3.5.4. Maintainability

Maintainability is defined as the probability of performing a successful repair action within a given time. The proposed application will be easily maintained because application is developed according to the object-oriented principles and modularization. Also, the source code will be well commented and documented for any changes or modifications done in future. That means the proposed system can be maintained easily if it needs some modification without causing any damage or interrupt to other system functionalities. As well as modifications can be done through low cost solutions. It is also a somewhat important feature to having a high

maintainable system. In case of a failure, a re-initialization of the program is recommended.

3.6. Other Requirements

- Reusability: The specified component should be generic such that it should be suitable for use in other applications and scenarios as well.
- Interoperability: This component should be able to operate successfully by communicating with other components of the system such as: web scraping component. Similarly, it should be also efficient to exchange information with external components when needed**.**
- Extensibility & Modifiability
- Adaptability

4. References

- Creately app for create UML diagrams https://creately.com/app/
- Map matching algorithm https://medium.com/driving-to-the-future/map-matching-and-the-processing-of-raw-gps-data-on-an-industrial-scale-599a9475d332