E-Road Management System

Software Requirements Specification Document

Sri Lanka Institute of Information Technology
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E-Destination Management System

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1 Introduction

This SRS document is created in order to provide the software requirements and a research review on the project we selected for the E-Road Management System. E-Road Management System is the project we intend to develop for the final year Research project.

In here ERMS is divided in to four modules and this SRS going to give a brief introduction about E-Destination Management System (EDMS) which is sub system of E-Road Management System (ERMS)

1.1 Purpose

The purpose of this SRS document is to provide the all of the functional and technical requirements and the product perspective for the E-Destination Management System (EDMS). All the parts of this document are focused on the end users of this application and will provide directions to develop the entire system.

This module is there to formally describe the functions and performance requirement allocated to the system.Within this document we are supposed to give all the requirements and preferred solution.

First two sections of this document will discuss about the primary requirements and the overview of the system. In the overview section it will explain about the use case diagrams, interfaces, special requirements so on. These first two sections basically focus on the end users of the system.

Third section onward it has mainly concerned about the system developers. And it will consist of system requirements, specification using UML diagrams etc.

As the end result, this document will lead the developers to come up with a successful final product.

The EDMS will provide a destination services bus roots and tourist places attentions to the Clients through several ways. Clients can access this system through mobile phones and desktop or laptop computers.

The purpose of this document is to give an outline of the functionality and the technology requirement of the E-Destination Management System (EDMS).
It is ensures that the software requirements of this proposed system are understood by the Research and Development team. Overall Description and Specific Requirements of this document contains details description of the software component which is going to be implemented.

It will help to do works in order, identify risks and do risk management. At the end of this documentation specific deliverables, output components of the proposed project. Supporting information consist with appendix and other supportive materials. This document is intended for several types of readers. Therefore document is writing according to the standard format unambiguously.

1.2 Scope

This SRS document covers certain aspects of the research. Simply it gives the reader an insight to what the actual purpose of this research was, and why we chose to do it. It will also describe the existing solutions available that brings about similar solutions to the problem.

This document covers the user expectation and helps to get a better understanding about the proposed project and the research criteria, and this document expresses all the

requirements, overview, main goals and tasks of the proposed E-Road Management System going to help for all kind of clients. As sub content of E-Destination Management System (EDMS).

Further it defines the product perspectives which compare the system with other related competing products. It also provides product perspectives and details of the design process.

Requirements are categorized in to functional requirements and non-functional requirements.

Functional requirements are associated with specific functions, task or behaviors the system must support. Requirements are categorized in to functional requirements and non-functional requirements.

Tourism is most important in the growing Sri Lankan development. So this destination module will help for any kind of clients.

Another thing is mobile applications can now be developed to deliver any type of data or information to any sought. It is very important to develop that kind of mobile phone based traffic controlling system for motorist, because in real time it way helps the user in many ways.

The E-Road Management System broken into four different modules they are:

E-Destination Management System (EDMS)

E-Statistical Analyzer (ESA)

E-Path Identifier (EPI)

E E-Mobile Tracker (EMT)

E-Destination Management System, this module helps to improve efficient transport services and destination management services such as tourism.

Objectives:

- Client can search a place and click on their, the system will provide the place in Google Map and point out all important locations in that place just like Hotels, Schools, Hospitals, Airport, Railway Station, Police Station.
- Transport services shown to user input destination and routes. All shown to the user graphically.
- Mostly in Bus roots and actual distance.
- All Hotels, Hospitals, Railways, Airports, etc… personalities are provided from an authorized web page.So they can update their services and can provide services to our Client such as online reservation. After Client Search the place in Google Map and click on it Clients can view this page or profile.
- Voice tracker also going to identify the places which means When a client speak out in front of the system then system will identify the place and show the actual place. E.g: Colombo.

Goals:

- The goals that are achieved through this module is providing better tourism services, Tourism industry in Sri Lanka largely focused on media based marketing and promotion during and after the tsunami, yet, some innovative marketing promotions were required for recovering the confidence of potential tourists, especially in UK, Germany, and Italy.

Benefits:

- Transport services plays a huge role in a growth of a Country and tourism provides is the major income in our Country.To get gain more income, ERMS provided with a web base system.

E-Path Identifier, This is the module the attention is mainly focus on the reducing the traffic by indicating to the system as soon as it's possible, to meet all requirements our system provide services to Client.

Objectives:

- ERMS provide best path to the Motorist with the help of GoogleMap. By avoiding traffic, accidents and road blocks.
- In real time ERMS will be updated through a mobile base application.
- If any accident happens, after the authorize person update the system. The system automatically looks for nearby Hospitals, Police Stations and send emergency alerts (using auto generated SMS & mails). And direct them to the point with the help of Google Map. All this happen in a short amount of time.

Goals:

- The existing traffic control system in the developed countries is static and it does not have automated response to emergency vehicles .The passage of emergency vehicles are not dynamically controlled and have to be overlooked by the traffic personnel for

faster passage. There is no support for providing a fast passageway for emergency vehicles.

Benefits:

- Optimization of traffic flow by synchronization between neighboring traffic signals.
- Ensuring faster passage for emergency vehicles like ambulances, fire engines etc...

E-Mobile Tracker, portability and mobile phones usability in this modern environment force to develop and inherit all the features that carries in EPI and EDMS.

Objectives:

- Using a mobile phone also Clients can get to know or identifies best path by entering the destination point.
- If Client needs the system will provide alternative transport services pointing in Google Map such asBus stands, Trainstations and flight services. After having a look whether our Client like to reserve tickets they can reserve tickets through our system.

Goals:

- Improvement and development of new business models requires mobile providers to accurately understand their subscribers' usage.

Benefits:

- Third-generation (3G) mobile networks are opening the way for access to an ever-expanding array of high-bandwidth applications and data services to mobile subscribers.

- Mobile operators, the need for service differentiation is urgent.

E-Statistical Analyzer, The best idea to plan the future is get to know the past. And this is the module carries out the research in past motor ways.

Objectives:

- Auto generated statistical graphs between population, accidents, vehicles and more.
- Simulator, this is use to get to know how it will look like if any change happens in population, vehicles, etc. When the Client input some values in any of those the following outcome will arrives by studying the past stored data in the system.

Goals:

- Traffic flow is difficult to predict. It is influenced by a multitude of factors, including the behavior of individual drivers. This makes management of the traffic flow an uncertain business. It is impossible to predict the traffic volume, as drivers' destinations are unknown and their plans may change depending on the road situation.

Benefits:

- Manage a variety of input files for multiple scenarios.
- Compare output results from multiple simulation runs.
- Generate nicely formatted reports, and charts for inclusion in reports and presentation slides.

1.3 Definitions, Acronyms, and Abbreviations

This section contains definitions, acronyms and abbreviations that are used throughout this document.

The following table lists the common abbreviations, which come throughout this document, in order to improve the maximum references of the readers.

Term	**Explanation**
ERMS	E- Road Management System
ESA	E- Statistical Analyzers
SRS	Software Requirement Specification
EDMS	E-Destination Management System
EMT	E-Mobile Tracker
RRD	Research Review Document

API	Application Program Interface.
GSM	Global System for Mobile communication
GUI	Graphical User Interface.
MB	Mega Bytes – Capacity measurement unit.
MHz	Frequency measurement unit
PC	Personal Computer
RAM	Random Access Memory
SMS	Short Message Service.
SRS	Software Requirement Specification
VRAM	Video Random Access Memory
Windows XP,	Microsoft versions of windows operating systems.

Windows 7	

1.5 Overview

To implementing a system to monitor the traffic, suggest an alternative paths on a given road traffic, auto graph generation, mobile tracker and destination services are the main goal of the research conducted.

Here path identifier going to solve the road traffics and give an alternative paths at the same time destination services are the way to show the most important places and destination services. These both functions are going to handle over the phone, this will as mobile tracker and finally the graph generator it will show the past traffic details and give the better idea of road management.

The new system is going to totally change the way in road management, administration and services as the orders will be input directly into the computer in this function.
This solution will also provide the following non quantifiable benefits.

- Better relation with motorist.
- More accurate history and information.
- Improved road management information.
- Faster processing of staffs & services details.
- This solution will provide e-mail and internet facilities to all staffs.

2 Overall Descriptions

E-Destination Management System going to play roll of roadtraffic, transport service, guiding the easiest path or alternative path for user and tourist.
When the tourist search a place our system going to provide a place which the client actually go to, And it will pointing the place of the name and other important places. This

will easy to identify the places by the users. When they click on the particular place it will show all about the place with important details as well.

Other important thing is transport services, when the tourist needs a transport it will take over a big role and guide tourist which place they are to be. This means transport services is going to be a user friendly for tourist and the clients, and this services are very helpful to all kind of users.

If the tourists select a place then that will played as audio voice and image format it'll appear. This will most help to tourist to get a clear idea.

Other alternative solution is bus root suggestions it will more helpful for tourist which means bus roots shown in Google map when a client searching for a place and accurate distance where tourist stand.

It majorly users of the system are tourist and some other Clients. This will be controlled and guide by Admin of ERMS.
There are number of services that are to be through the **E-Destination Management System**.

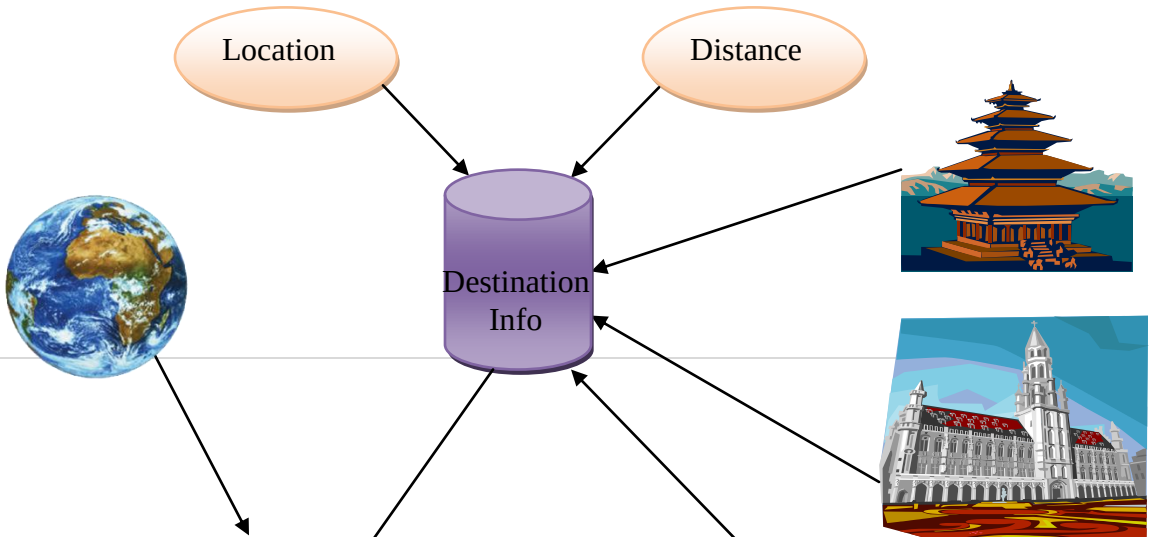
Some of them are indicate tourist guide, road blocks, traffic in Google map and root which can easy to ride in short while, an alternative path to the Client by using the Google place map.

The main and very useful part is destination for tourist or other user. This is going cover most of the tourist needs. That's means when the tourist clicks on the place that will show the actual place and some other important places. E.g.: Hotels, temple, Tourist spots. This will very useful for tourist when they visit a particular place they can identify the hotels and important places with description.

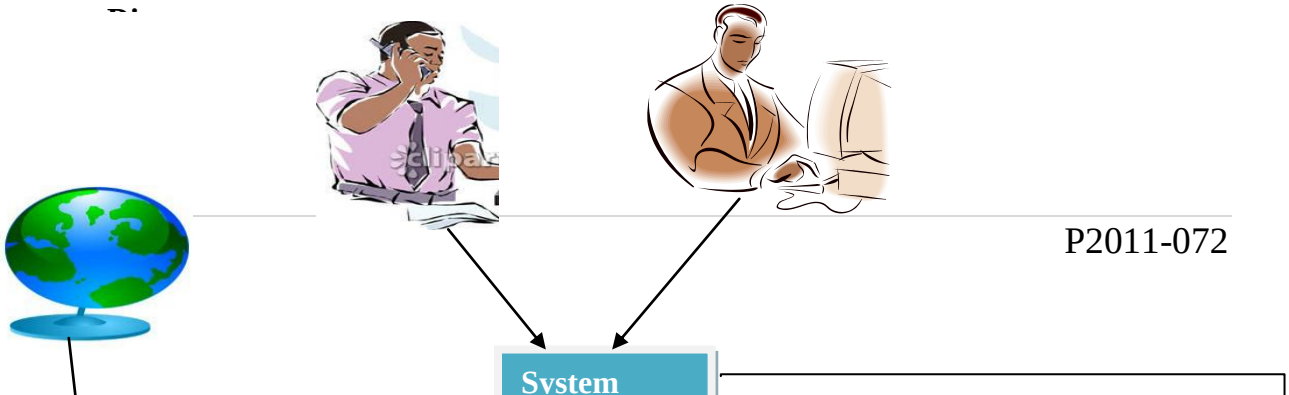
Policing of road traffic in Sri Lanka has become a major task for police. Due to increase in volume of road traffic in the Island the Sri Lanka police facing many challenges to get control of it. But this is a difficult task to manually control it. So the author and the team are planning to create an application to solve this problem. By logging on to this system the user will be able to see the traffic congestions in cities especially during the peak hours and will be able to see the alternative paths to particular places.

This is E-Destination Management system Module Architecture diagram. That means individual module diagram. We can get clear idea of E-Destination Management system from this diagram.

This will go to show how this system going to run as an application. All kind of users can get simple knowledge on it.



Architecture



2.1 Product perspective

Automotive technologies are fast ground in modern road traffic-control systems, since the number of road vehicles and passengers is quickly growing. There is a continuous need for safety-critical traffic automation, and traffic engineering makes the dynamic or static

analysis and the synthesis of automotive vehicle technologies possible. The main goal of engineering is the planning and management of traffic systems.

This is a new concept to have a multipurpose website which contains details that are not exactly related. It is also challenging to gather and manage data through the users of site. So from the beginning the user road management policies and mobile accessibility will be an issue needs priority. Organization of this kind of a website is a complex issue, yet once developed.it is a really useful website.

Further more details there is an online path checking facility and a button to indicate online availability of other users so they can communicate with each other to get better understanding of the destination places. A calendar to indicate special road blocks is also available in path identifier. Some alerts will also appear in ERMS.

The project supports the development of reliable and optimal control structures for traffic and for motorway systems. The intelligent and cooperative set-up of actuation and its linkage to the central control system is vital for avoiding traffic jams and accidents. Moreover, environmental costs (e.g. pollution) can be decreased.

According to the research done on road management, the author found few projects related to it. But those projects mainly used the signal light monitoring and some traffic monitoring concepts. Our system is totally different from the above concepts. This research is going to give an excellent solution for people who suffer from traffic and can avoid the unwanted delays, and inconvenient.

2.1.1 System interfaces

E-Road Management System is an open source product and it has been developed to work with any operating system. Therefore there is no specific system interfaces needed. The plan is to have a machine assigned as a web server and for that machine; Windows

7operating system will be used as the developers are familiar with it.The web site will be supported by any web browser. Therefore there the users of the website are also free from any system interface requirement.

2.1.2 User interfaces

Creating the user interfaces using the E-Road Management System software needs complete knowledge about the software and use of E-Road Management System. Therefore exact look and feel of the web site will not be available with this document. However in section 3.1 sample contents of the E-Road Management System pages is available. It is a must to inform, that aE-Road Management System web site is open for changes and therefore the web pages may slightly be altered in the end product.

2.1.3 Hardware interfaces

There are some special hardware interfaces that E-Road Management System will need as its main input devices are mouse and the keyboard. The main output device will be the computer monitor. However in a special circumstance such as taking a Mobile may require an interface in 3G mobile.

2.1.4 Software interfaces

Visual Studio 2010 software will interact with a relational database- MSSQL. In order to

do so it needs a web server. This product is planned to use MSSQL web server. As the back end coding of the web site is done using C#.

2.1.5 Communication interfaces

As the web site is developed is in a machine acts as the server machine, users of the web sites needs an internet connection to use the web site. Therefore a modem to connect to the internet and an interface for the modem is needed. As the database grows there will be a need for a Database server as well, in that case a high speed network connection between the application server and the web server must be created. So at such a point some more communication interfaces may needed and the least expensive fastest available connection will be used according to that time. Because of this reason a specific communication interface for this purpose will not be suggested in this document.

2.1.6 Memory constraints

The recommended minimum requirements are as follows for a single computer:
RAM - 256 MB
Storage - 60GB

This will not suffice for a busy public site or a site with uploading enabled. Some users have reported running
Hard Disk Drive as external storage. Processor speed must be equal or exceed 1.8 GHz. VGA must be equal or exceed 128MB.

E-Road Management System on computers with as little as 48MB of RAM.

2.1.7 Operations

- The users must have an internet connection and the application server must be connected to the internet.

- Since this is a website the application server Database servers must be available all the time and the server must be connected with each other all the time.

- Users can use the web sites data of the website with being logged-in.
- Users were provided a chatting facility to communicate with other users.
- Users will be provided with sound record about the place description.
- Administrator or the ERMS assistance will update the details on road and traffic by login through their account.
- Pre-planned activities will be automatically mailed to the users.
- System will automatically generate graphs using statistical data which will be stored in the database about road traffics and accident rates.

2.1.8 Site adaptation requirements

E-Road Management System is developed only in English at the beginning as the basic product. However since main focus is on Sri Lanka, so it is better Sinhala and Tamil mediums are also been embedded as soon as possible. (Making other language usability is not a part of the final product that will be delivered.)

2.2 Product functions

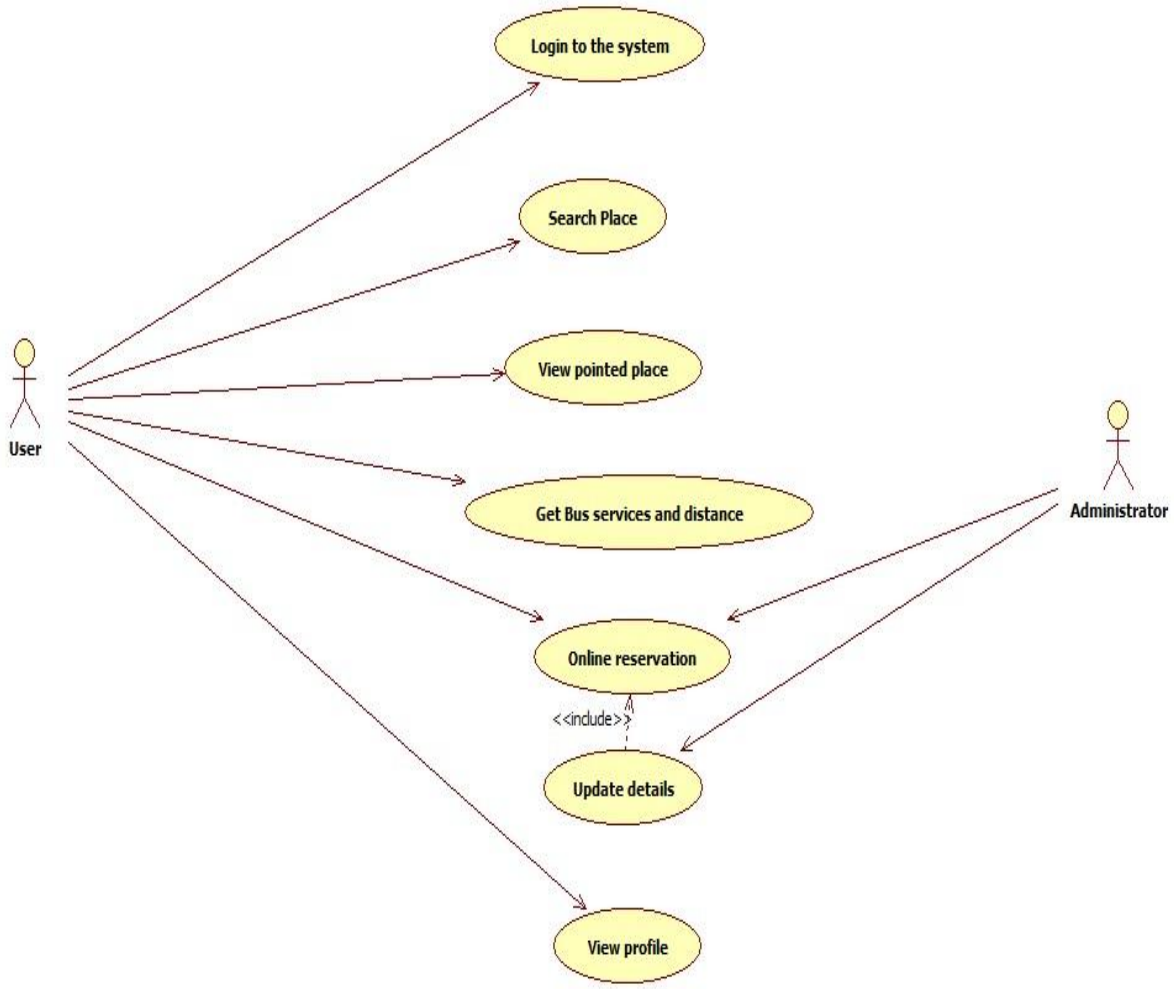
This products basic outcome is a website. However there is a large scope of details to be learned in the practical approach, which must be emphasized.

Basically the developers must learn the E-Road Management System software and have to develop:

- Providing proper Authentications
- Providing Alert facility.
- Providing E-mail facility.
- Facilitate Communicating.
- Managing articles-Therefore a relational Database creation.
- Creating a search engine which supports free text, efficient search.
- Designing and tuning the database to support the searches.
- Creating supportive help documents.
- A facility to ask for help from other users.
- Proper user management policy.

The development team also has to:

- Make the ERMS user friendly and attractive.
- Manage information at the beginning for a period of time until the ERMS get established.
- Do an ERMS promotion.


Login to the system
Search Place
View pointed place
Get Bus services and distance
Online reservation
<<include>>
Update details
View profile
User
Administrator

2.3 User characteristics

Here anyone who is familiar with internet surfing can use ERMS. Still if some users are new to websites they also can learn how to use ERMS easily by the supplied help documents or the helping facilities.
However to create and edit a page in ERMS user got get registered with ERMS and have to have a considerable computer literacy.

- The system must be simple following the simple steps given in the application.
- The desired users of this software should have experience in running an ordinary application in any platform.
- The intended users should be comfortable with installing the applications in an operating system.
- In our project we have assigned the administrator as a user.
- Client is one of the user of our system
- ERMS assistance also a user of our system.
- **Administrator:** Admin should be a computer operator or a police officer who has specially trained for our system. That person has the full control of the system. if any system crash occurs it can manually run the system.
- **Client:** No need to have much computer literacy. Simply use our mail generation function.
- **ERMS Assistance:**Admin should be a computer operator andshould know how to send a SMS to our special number.

2.4 Constraints

To develop ERMS developers needs Visual Studio 2010 software, c# compliers and MSSQL DBMS. It is must to have a web server like IIS, Apache etc. It is also essential to have the application server to have an internet connection.

The system will be developed on an average performance machine. At the time of this documentation it is about 2.8GHz processing power with 1GB of RAM. C# will be the implementation language for the desired product, but it will also be using library files which contain the implementation of HTK toolkit, which is written in C language. Due to the fewer availability of voice recognition software for the other platforms the product will be produced with the intention of deploying in windows operating system. Since the voice recognition supports much Windows Vista or Windows 7 OS versions it is preferable if the user uses Windows Vista OS or higher.

For the users of ERMS must have a connection to the internet and have to use a web browser.

Criteria	Prerequisite
Processor	Pentium IV 2.8 GHZ or higher
Operating system	Microsoft Windows Vista or above
Hard disk space	1 GB or more
Mouse	Required
Key board	Required

2.5 Assumptions and dependencies

When the user management policy is developed the ERMS's reliability will be maintained. Furthermore ERMS has to depend on users to feed more and more information to ERMS database and users to maintain ERMS, which means an assumption is made that users are familiar and supportive to collaborative web site development concept.

The system that is to be developed will depend on Microsoft Visual Studio environment and all the software that required running this system appropriately. This system will also depend on Microsoft operating systems (XP or later versions) since the Visual Studio Environment depend on it.

2.6 Apportioning of requirements

The basic functionalities described in section 2.2 will be developed. However slight change in the skin of ERMS and the user management policy may be altered in order to provide more user friendliness, security and reliability of data.

2.6.1 Functional Requirements

F1. E-Destination Management System.

Input: -Tourist indicating where they want to go.
Output: - Will show the tourist places with the help of Google Map.
Process: - System auto generate and find out the place.
Description:-.Providing best place to tourist with the help of Google Map. After tourist select where they want to go it will show the best place.

F2.User views the graphs.

Input: - Select form of the graph (Line graphs, Pie Charts, Bar Charts)
Output: - Displaying graph according the selection.
Process: - System produce the graphs by using the statistical data are which is stored in database.
Description:-User can be selecting the form of the graph. The displaying graph will be the bar charts or line graphs or pie charts etc. The graph going to be containing the accident ranges per year in Sri Lanka, traffic data's example traffics time vs. no of vehicles uses a particular road and population vs. vehicles.

F3. Simulator

Input: - Enter the value (user input)
Output: - Will display what will happened in the future when no of vehicles increase.
Process: - System auto generate and the outcome will future analyze data's, using the user input values.
Description:- By using this simulator we can get what will happened in the future when no of vehicles increase, when population increase and when road conditions change what will happen.

F4. Provide best path for the Motorist.

Input: - Motorist's indicating where they want to go.
Output: - Will show the entire best path with the help of Google Map.
Process: - System auto generate and the outcome.
Description:-.Providing best path to motorist with the help of Google Map. After Motorist's indicating where they want to go it may show the entire best path avoiding traffic and road blocks.

F5. In real time System will give an Alternative path when any road or two end points jammed in traffic.

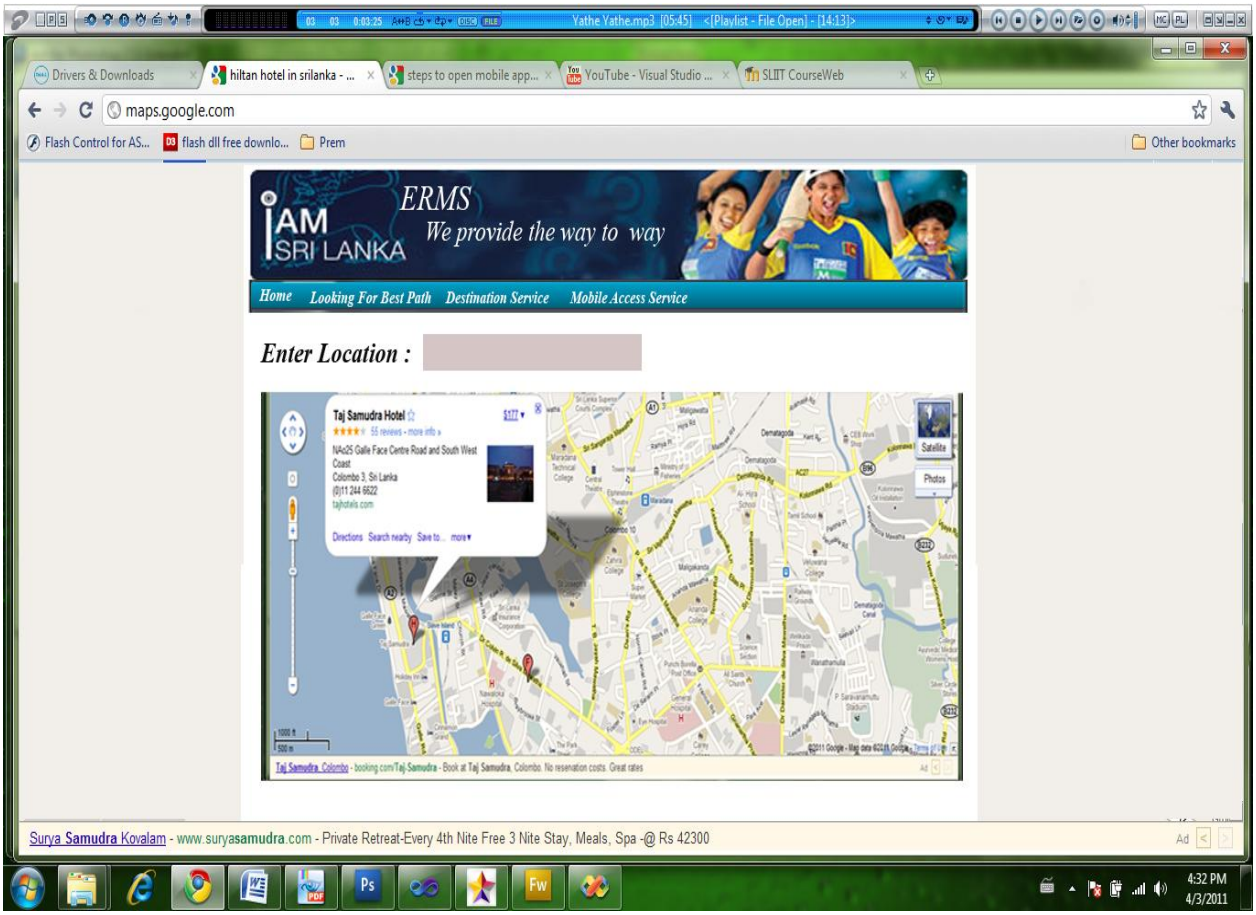
Input: - User will enter the destination place.
Output: - Will automatically show the entire best path without Traffic.
Process: - System automatically generate and show the outcome in Google Map .
Description:-.In real time if any road or two end points jammed in traffic, in a short amount of time it will be updated in the system. After that the system will automatically set the best path between two end points with the help of Google Map.

3 Specific requirements

3.1 External interface requirements

3.1.1 User interfaces

The web pages of EDMS are the interfaces with which the users will interact. The basic structure of each web page will be provided in this section. However the interfaces are not submitted with the use of ASP.NET software because to do so it needs a proper understanding of the software. Basic User Interfaces are as follows. More Interfaces is to be added to make the web site more users friendly. These User Interfaces are better to be re-designed and more web pages are to be added by allowing users to interact with the web site for a while.



3.1.2 Hardware interfaces

The system should be able to recognize voice, receive voice and show the places whatever tourist select. At the same time voice extraction should be occurred within the system in a great speed. The system will not require any advance sound card, as the standard sound card that comes with the mother board will be able to handle the tasks. But the system will require an average inbuilt microphone which will intake less noise.

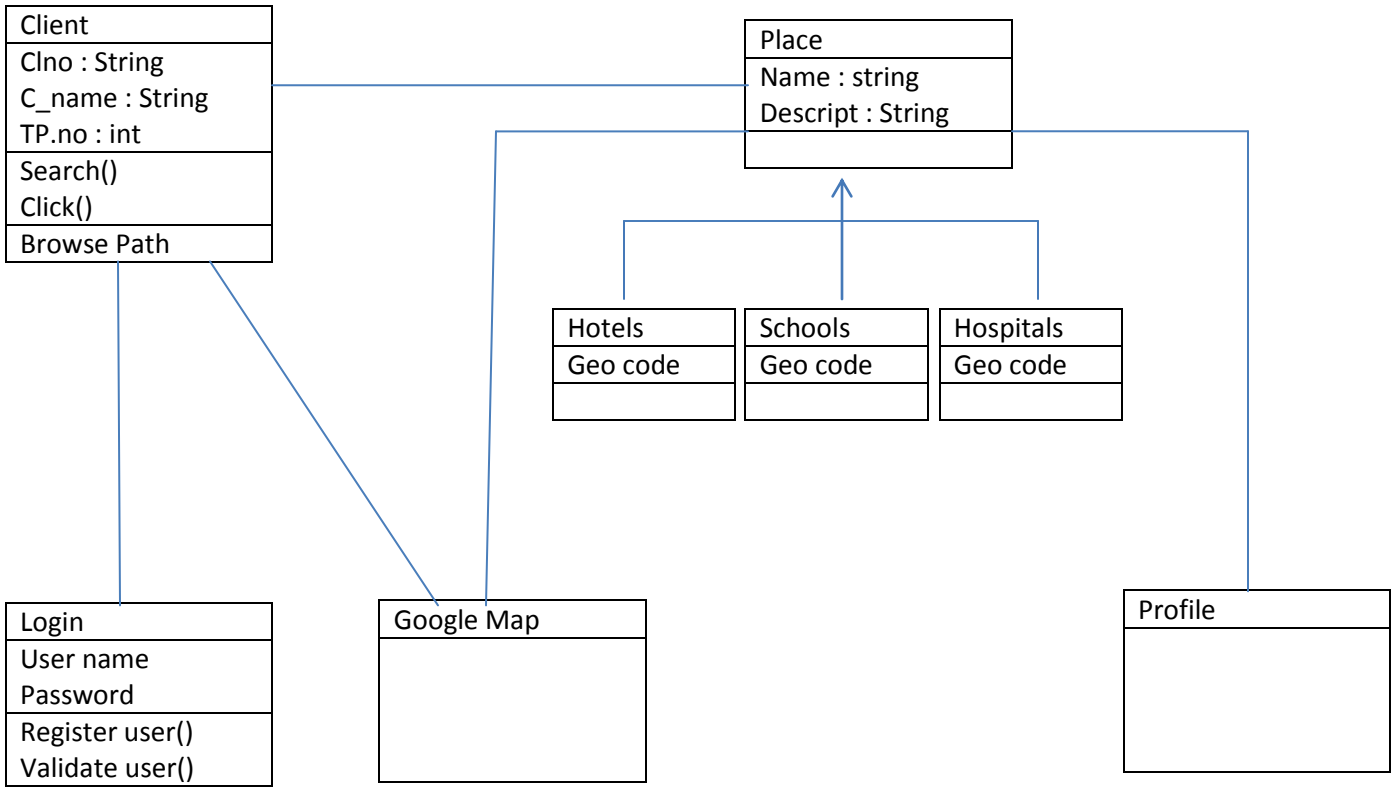
3.1.3 Software interfaces

As developers say our main system is running under server and administration machine. In server developers must to use .Net frame work 4.0, SQL server 2008, Fusion Charts for charting purpose and Flash. In administration machine wants .Net frame work 4.0 and Flash.

3.1.4 Communication interfaces

In communication developers want to use modem, switches or router for networking and surf the internet. Use GSM network to send and receive SMS. Use point to point links to connect each and every junction with the server.

3.2 Classes/Objects



3.3 Performance requirements

Requirement for best performance of the system are a CPU with an 1800MHz speed and 512MB RAM. Because the system will mainly focuses on performing functions by it.

When a client access web page it should be response as soon as possible. So that speed access is must. Also Admin should communicate withthe system as soon as possible and also need to verify the current place and suggest best and nearest destination placesto user.If the Admin state that need immediate attention in a particular location then the location will be show to client very fast.

3.4 Design constraints

The system use Voice Identifier tools to identify the places and destinations for destination services. This will more helpful for all kind of users. It might get proper understand. Therefore, it could be some kind of limitation. Also the quality of the voice of the caller depends on the distance of the user and also background noise.

3.5 Software system attributes

3.5.1 Reliability

Use simple commands to communicate with the system. Eg: Google map, logins. The probability of failing commands is low because the system use GSM and GPS network to communicate. It will be very user friendly and easy to access.

The mobile user should be able to view actual place without having any on time web access. Also the graph generation information provided by the system should be past traffic details and reports. It is essential that the user get clear idea of the accident ratios. Destination services also like an easy way to handle the places.

3.5.2 Availability

The system should be able to provide all over road management services when a client or tourist needs services. E-Road management system should be available as long as a proper mobile service connection with 3G facility available. This will easy to identify the places and destination services. Path identifier is run as a huge roll in this module.

3.5.3 Security

To start the system, it initially needs an authorization. After starting the system user can lock in to the system to avoid unauthorized access. This will prevent unauthorized configuration of the system. When users communicate with the system, it will validate the users. After login in to system if the phone lost, user can logout using another phone. Mobile user's personal information should not be revealed to any other source in any chance.

3.5.4 Maintainability

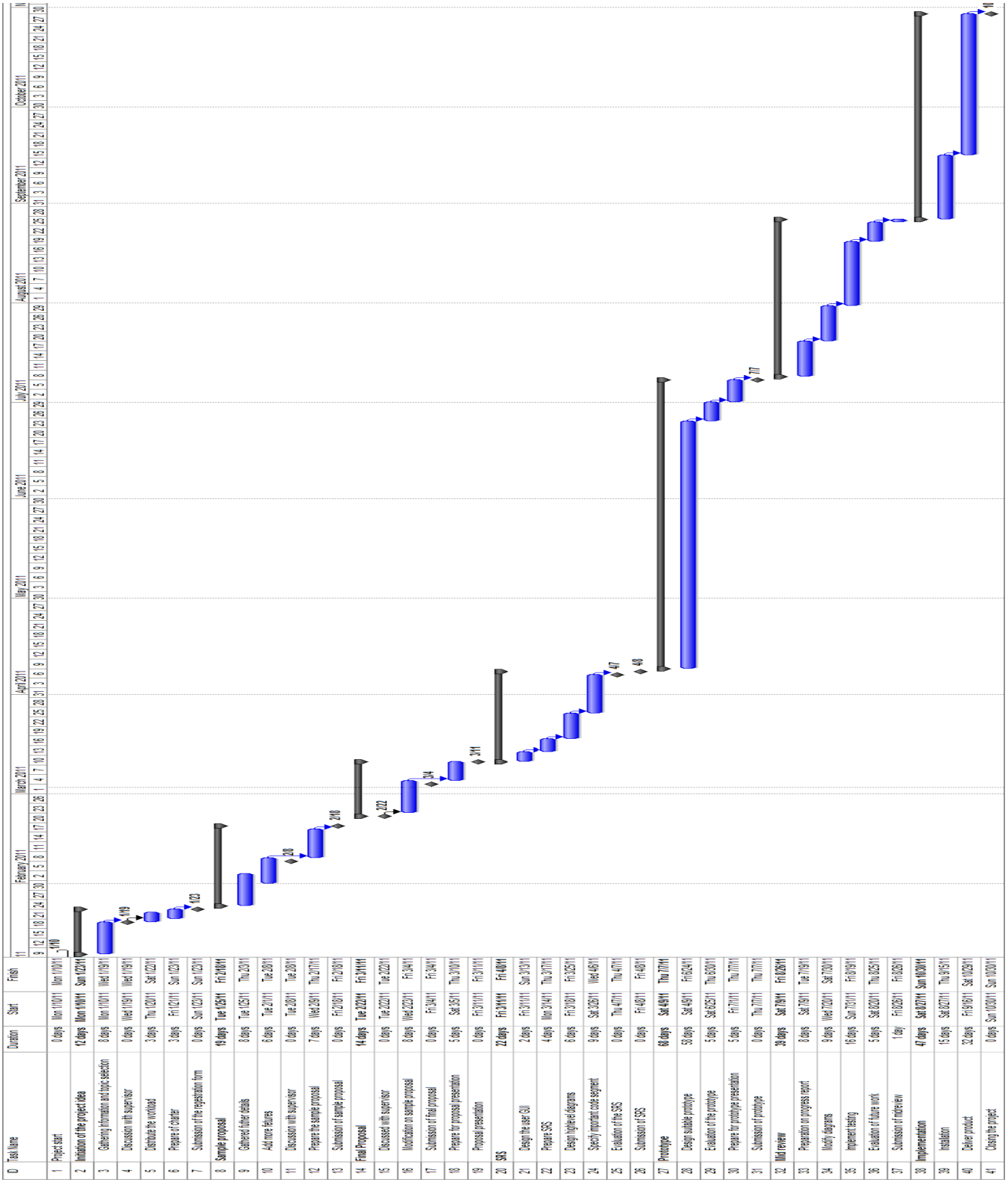
Maintainability is ability to make changes to the system. In order to provide strong maintainability project group will clearly documenting system design and implementation by using standard and well document tools and language. All devices are connected to the system in a simple mechanism. So in a case of failure of a device user can easily replace it with the new one.

3.6 Other requirements

None

4 Supporting information

4.1 Appendices



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