



EzFare –Transport 4 You Design Description

Version 1.0

EzFare – Transport4You Team 2	Version: 1.0
Design Description	Date: 2010-11-20

Revision History

Date	Version	Description	Author
2010-10-04	0.01	Initial Draft	Kaushik Mohanraj, Shamsul
2010-11-20	1.0	Diagrams with more details incorporated.	Kaushik Mohanraj
2011-01-17	1.2	Detail of diagram	Faiz UL Muram

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1. Introduction

In today world Transport is the most essential part of any metropolitan management authority. Public Transport constitutes to major part of Transportation development for any administrative body. Thus in an effort to make Transportation/Commuting smoother for their consumers, an innovative ticketing procedure is been introduced.

This project aims in making the ticketing process user friendly and hassle free for the customers. The project incorporates features such as Ticket issuance just by click button and notifications if you are a regular traveller, and so on and so forth. Hence, the name of the project is now 'EzFare'.

1.1 Purpose of this document

The purpose of this document is to provide an insight into the EzFare (Transport4you) project design, to describe the project's architecture and to give a broad prospective of the design of the entire system.

1.2 Intended Audience

The Intended Audiences of this document are:-

- The Team members to use as a reference during the Implementation phase of the project.
- The customer so as to understand the project scope.
- Team supervisor to have an overview of the project work.

1.3 Scope

The document serves to provide an understanding of overall system flow and overview of the design of the system and its intended functioning. The reader referring to the document will have a complete understanding of the system.

1.4 Definitions and acronyms

1.4.1 Definitions

Keyword	Definitions
VU	Vehicle Unit
MU	Mobile Unit
MF	Mainframe
TM	Transaction Manager
WA	Web Application
MC	Model Controller
DM	Domain Model

1.4.2 Acronyms and abbreviations

Acronym or Abbreviation	Definitions
GPS	Global Positioning System
GPRS	General Packet Radio Service
Wi-Fi	Wireless- Fidelity

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1.5 References

- Project Homepage:
 - <http://www.fer.hr/rasip/dsd/projects/transport4you2>
- Project Proposal:
 - <http://score-contest.org/2011/Projects.php#dinitto>

2. External interfaces

2.1 Vehicle Unit

The Vehicle Unit is the main interface between the Mobile Unit and the Mainframe. The VU will be Bluetooth and Wi-Fi enabled to communicate with the MU. At the same time it will be enabled to communicate with the MF with the aid of the Transport Manager. The data that will be sent using the TM will be in the format that would be easily interpreted by the MF to log data relevant information into the database.

2.2 Transport Manager

The Transport manger is aimed to aid communication between the VU and the MF. The TM is makes communication possible using the WCF REST services.

2.3 Web Application

The Web application provides the users of the system an interface to interact with the system. The system is intended to be used by users of two types, the Passengers (Frontend) and the administrators (backend) of the system. Hence a logical division of the web application was done as mentioned.

Frontend: The passengers will be using this WA to provide details pertaining to the individual and other relevant details regarding the MU that would be used by the passenger and to fill in details to by credits to be used for travelling.

Backend: The system administrators are provided with an interface to monitor the system and to make changes related to the system such as search passenger, delete passenger, send SMS to passengers of one line and inclusion of new routes or editing of existing routes.

2.4 Mobile Unit

The Mobile Unit is the application that has been developed (restricted to Android OS) and is at the disposal of the passenger for interacting with the system when on the move. This application helps the passenger to connect to the system and perform transaction.

2.5 Mainframe

The mainframe is the Think-Tank of the system that performs all the logical operations, handles and manipulates the data that flows within the system. Hence being the brain of the system all communication happens through the Mainframe at some point of time.

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3. Software architecture

3.1 Conceptual design

To provide a vivid prospect of the design of the system and its workflow we have taken the aid of a Sequence Diagram.

Here the following figure will give you a broad view of the events that occur in the system.

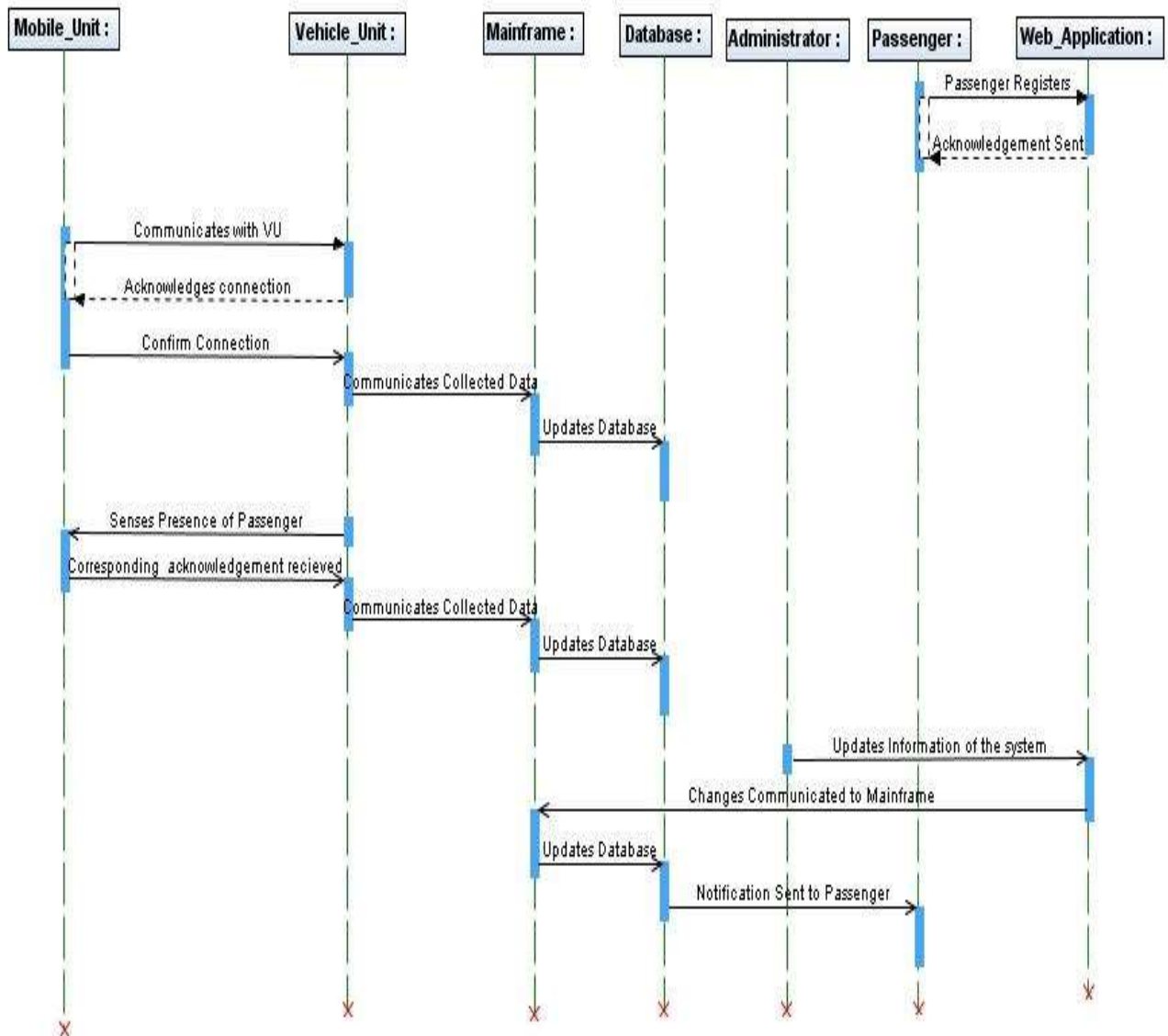


Figure 1

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3.2 System specification

The Project would be developed by means of varied Programming Languages. As there are various different independent applications that would be communicating with each other using various protocol that have been listed out in the table below:

Element	Description	Intend of using it
Web Application	Visual Studio .NET 2010	The WA to be used by Admin and Customer
Mobile Application	Java	
Mobile Unit		This element will be used to detect the Passengers in the vehicle and communicate with the MF.
Vehicle Unit		Provide an interface for communication between the MU and MF
GPS		To determine the positioning of the vehicle
GPRS		To make possible the communication between the MF and the VU
Bluetooth/ Wi-Fi		To establish communication between the MU and the VU

3.3 Error handling

Error	Action
Detection of user even if not on board	Perform continues checks when the vehicle is in motion and ensure only the users on board are charged for their trip.
VU Crash	In this scenario the VU will restart and initiate the process, and will not continue from where it crashed. Data inconsistency will not occur, as when the data received by the MF is not in the correct format or incomplete it just discards the data and will not send an acknowledgement to which the VU will resend the same information.
Hardware Failure (Bluetooth or Wireless Adapter)	These Failures cannot be handled programmatically.

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4. Detailed software design

4.1 Database Design:

Object relation mapper is used for solving the persistence problems and is handled by using NHibernate. As a result of using NHibernate, modifications and testing is easily performed on domain. Microsoft SQL Server 2008 is used as a database but establishing a connection by using connection string is required for configuration with specified system. We write Xml mapping for each entity of domain. Mapping files contain information for mapping, for example, classes and their relationships with each other in the database. Database design is presented in figure 2 below:

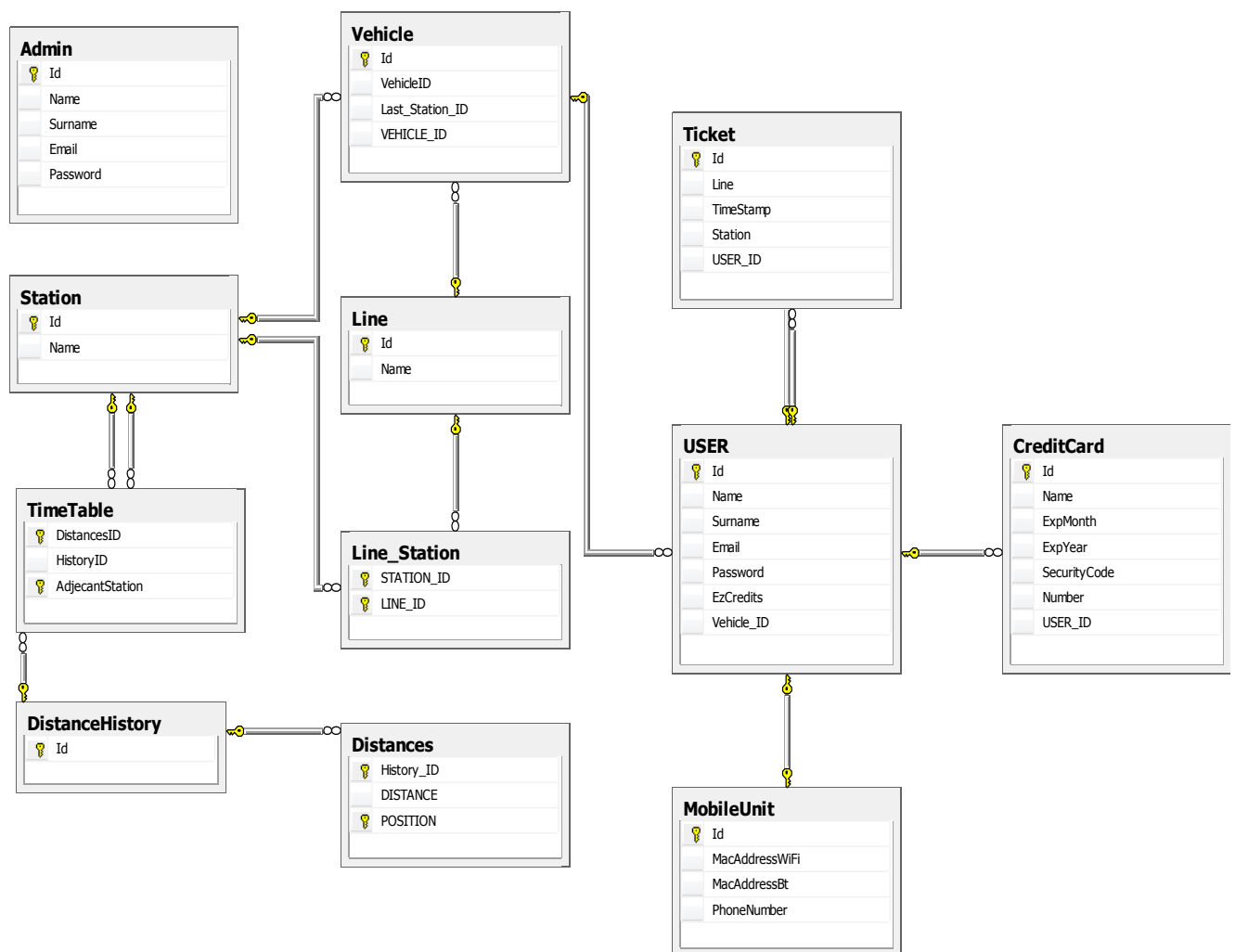


Figure 2

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System Architecture

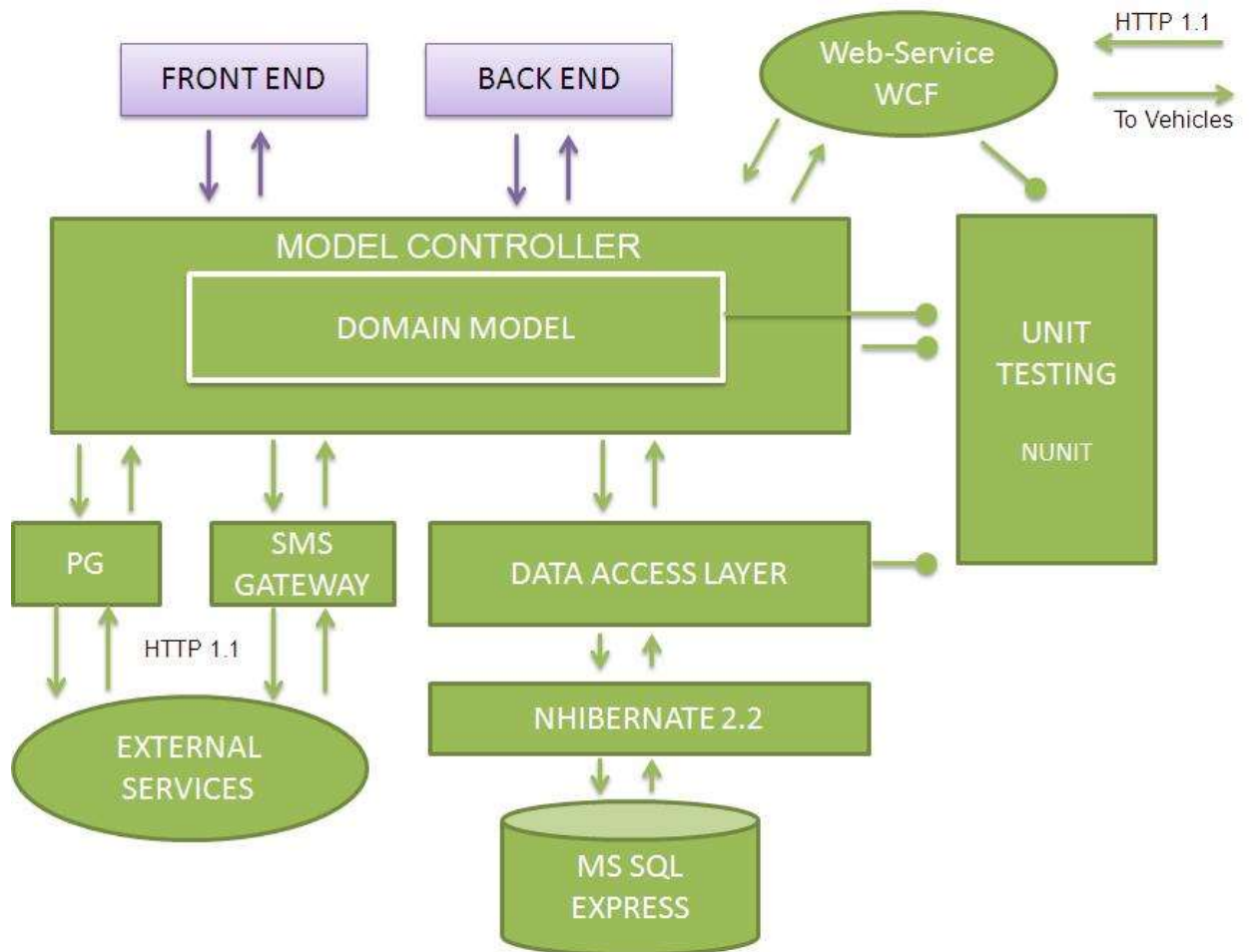


Figure 3

The figure above explains the architecture of the EzFare system. The Mainframe that is the think-tank of the system comprises of the MC and the DM. Other components of the system communicate with the MF to complete their task. As mentioned before you would notice the WA differentiated as *Frontend* and *Backend*. External Services such as notification to users and modes and means of paying are done through the Payment gateway and the SMS Gateway. Communication between the VU and MF is done using the HTTP protocols using REST services.

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5. Approvals

Name	Title	Date yyyy-mm-dd	Signature