Software Requirements Specification

for

EZ Tag System

Version 1.0 approved

Prepared by Isabel Almaguer, Carrie Dumit, Jason Jensen

<ICJ LLC>

February 24, 2016

Copyright © 1999 by Karl E. Wiegers. Permission is granted to use, modify, and distribute this document.

Table of Contents

1.Introduction 3
1.1 Purpose 3
1.2 Document Conventions 3
1.3 Intended Audience and Reading Suggestions 3
1.4 Product Scope 3
1.5 References 3
2.Overall Description 3
2.1 Product Perspective 3
2.2 Product Functions 4
2.3 User Classes and Characteristics 4
2.4 Operating Environment 5
2.5 Design and Implementation Constraints 5
2.6 User Documentation 5
2.7 Assumptions and Dependencies 5
3.External Interface Requirements 6
3.1 User Interfaces 6
3.2 Hardware Interfaces 6
3.3 Software Interfaces 6
3.4 Communications Interfaces 6
4.System Features 6
4.1 Register Account 6
4.2 Log in 7
4.3 Forgot Password 7
4.4 View Account 8
4.5 Modify Account 8
4.6 Add Vehicle to Account 8
4.7 Create Charge 9
4.8 Make Payment 9
5.Other Nonfunctional Requirements 10
5.1 Performance Requirements 10
5.2 Safety Requirements 10
5.3 Security Requirements 10
5.4 Software Quality Attributes 10
5.5 Business Rules 10
6.Other Requirements 10

Revision History

Name	Date	Reason For Changes	Version
Carrie Dumit	Feb 26	Corrections to grammar	Rough Draft 1
Jason Jensin	Feb 27	Additions	Rough Draft 2
Isabel Almaguer	Feb 28	Final Draft	Final

1. Introduction

1.1 Purpose

Our project will be based on the EZ tag system and its functionalities. The program that we create will assume, for simplicity, that an EZ tag account has already been created. Our program structure will contain classes for each phase of the process. The main classes that we have in mind are: a central management class, a class for lanes, and a class for accounts. The central management class will process information from the camera, such as if an EZ tag is present, the EZ tag ID, and the vehicle entrance and exit. The lanes class will set the direction and price for lanes based on time of day or other special events. The accounts class will contain the account and vehicle information, update information on accounts, determine validity of account, and generate transaction numbers.

1.2 Document Conventions

This document uses the following conventions:

Times New Roman
12 point font

1.3 Intended Audience and Reading Suggestions

This document provides design details for our Toll System that may be read from front to back for a complete understanding of the project. Our documentation is intended to be a detailed guide for all readers who are interested in the back end development of an EZ Tag System, and all people involved in the primary functional areas of the system. The overall document is separated in sections, and designed to be read by specific topic to provide rapid access to material as needed. Toll management personnel and the developers in charge of maintenance of the product can read the specific sections, as well as the users who are interested in the details of the software.

Developer: The developer who wants to read, change, modify or add new requirements into the existing program, should consult this document and update the requirements in the proper manner. Therefore in order to properly modify the program, the changes made should be available in all phases of the process where the changes occurred and be stated in this documentation.

User: The user interested in the details of the program can review the diagrams and the specifications presented in order to obtain better understanding. In this manner the user can also determine if the software has all the suitable requirements.

Toll management personnel: The people in charge of the correct functioning of the entire system need this document to guide themselves and to execute the program correctly.

1.4 Product Scope

This project is will be based on the EZ tag system and its functionalities. More specifically, we will be looking at the back end development of said system, which will include lane operations, cash

management, toll schedule and central toll management systems. The project was conceived and will be developed by a team of three throughout the spring semester.

1.5 References

Absolute Java 6th Edition by Walter Savitch.
https://www.hctra.org/ – Harris Country Toll Road Authority (EZ TAG) website.
Antonio Dumit – former employee who was in charge of hardware maintenance.

2. Overall Description

2.1 Product Perspective

The overall system architecture will be based on the functionality of the Houston tolling system. It will process the information of vehicles gathered from the suite of sensors on the toll lanes and allow users to log in to manage their accounts. The lane subsystem will consist of a combination of methods that will allow for the collection of revenue, and file transaction. And the whole system will be managed by a central system manager that will control the interaction of each subsystem. There will

2.2 Product Functions

- Create EZ Tag account.
- Add/Edit vehicles on EZ Tag account
- Add/Edit payment information.
- Apply charges/take payments..

2.3 User Classes and Characteristics

For conventional reason we name each of the user classes-actors with this format:

Account, Central Processor, Lane Controller, Transactions.

Account:	Name. Address. Vehicles. Payment information. Process transactions: Process fees File transaction Create transaction number
Central Processor:	Processes tag record. Processes input data

	Request status of account. Verify valid tag. *If no tag is associated the toll can still be collected by license plate.
Lane:	Determines fare Lane status (Open/Closed/HOV/Toll/Other)

2.4 Operating Environment

This program will be run on a Linux server and will operate in the following environments for the client:

- Linux /Unix
- Microsoft Windows
- Apple Mac OS

2.5 Design and Implementation Constraints

This program is created using Java programming language and implements various of the integrated libraries. Therefore the major constraint is limited time given to complete the project.

Each individual part of this project has a different level and understanding of Java. And requires us to put in some level of security measures that must be furthered researched.

2.6 User Documentation

EZ Tag provides an online FAQ section that we will be using for the User Documentations. They can be found on:

Official Webpage - https://www.hctra.org/about_faq/?CSRT=1683225753507280354

2.7 Assumptions and Dependencies

For better user experience, everyone using the product has a secure and stable internet connection, and has an operating system that supports the program.

3. External Interface Requirements

3.1 User Interfaces

Our project will use a similar user interface to the existing EZ Tag log in screen. Both users and employees will be prompted to enter a username and password. There will be an option to have that

information reset if it has been forgotten. If a user does not have an account, then they will be able to register a new account.

3.2 Hardware Interfaces

Client side: Mouse, Keyboard, 32 bit color display, 1024x768 standard display, 4GB RAM, 64 bit operating System,
Sever Side: Linux

3.3 Software Interfaces

The EZ Tag system will authenticate employees and customers. Any changes made to their accounts will reflect on the interface.

3.4 Communications Interfaces

<Describe the requirements associated with any communications functions required by this product, including e-mail, web browser, network server communications protocols, electronic forms, and so on. Define any pertinent message formatting. Identify any communication standards that will be used, such as FTP or HTTP. Specify any communication security or encryption issues, data transfer rates, and synchronization mechanisms.>

The connection between the central processor and the

4. System Features

4.1 Register Account

4.1.1 Description and Priority

Allows user to set up a new EZ Tag account.

4.1.2 Stimulus/Response Sequences

Customer will select Register New Account from main menu, the system will ask for account details, such as username, password, and email address. Once all information has been accepted a new account will be created and an account number automatically assigned.

4.1.3 Functional Requirements

REG-1: Unique username
REG-2: 8+ character password
REG-3: Unique email address.
REG-4: If any of the above are invalid, display error and prompt to re-enter information.

4.2 Log in

4.2.1 Description and Priority

Allows user to access account(s) based on access level.

4.2.2 Stimulus/Response Sequences

Customer will select Log In from main menu, the system will request username and password. If valid, the system will grant access to user account, or accounts if employee.

4.2.3 Functional Requirements

LOG-1: Existing account.
LOG-2: Valid username entered
LOG-3: Valid password entered.
LOG-4: If account does not exist prompt to re-enter login information for existing account or to register new account.
LOG-5: If password is invalid, prompt to re-enter up to 3 times or to reset password.

4.3 Forgot Password

4.3.1 Description and Priority

Allows user to reset password if forgotten.

4.3.2 Stimulus/Response Sequences

Customer will select Forgot Password from Log In prompt. Security question will be asked to verify identity.

4.3.3 Functional Requirements

FOR-1: Existing account.
FOR-2: Valid security questions on file

4.4 View Account

4.4.1 Description and Priority

Access user account.

4.4.2 Stimulus/Response Sequences

Will display automatically after customer logs into account or selects My Account from menu.

4.4.3 Functional Requirements

VIE-1: Logged in.
VIE-2: Valid access level.

4.5 Modify Account

4.5.1 Description and Priority

Allows user to modify account information such as address or payment information.

4.5.2 Stimulus/Response Sequences

Customer selects Edit Account Information from account menu. System provides prompt for new information.

4.5.3 Functional Requirements

MOD-1: Logged in.
MOD-2: Valid access level.

4.6 Add Vehicle to Account

4.6.1 Description and Priority

Allows user to add a vehicle to and existing account.

4.6.2 Stimulus/Response Sequences

Customer selects Add Vehicle from account menu. System prompts for new vehicle information, then generates and assigns a new EZ Tag ID number to account for vehicle.

4.6.3 Functional Requirements

VEH-1: Existing account.
VEH-2: Valid vehicle information.
VEH-3: Generate new EZ Tag ID number.

4.7 Create Charge

4.7.1 Description and Priority

Create charge when customer uses toll road.

4.7.2 Stimulus/Response Sequences

Customer drives on toll road, sensor suite records entry and exit points to calculate toll charge.

4.7.3 Functional Requirements

CRE-1: Input from sensors.
CRE-1: Current toll rate.
CRE-1: If no EZ Tag recorded from sensors, the charge will be generated for license plate.
CRE-1: If license plate is not on an existing account, an extra violation charge will be applied and notification will sent.

4.8 Make Payment

4.8.1 Description and Priority

Allows user to make a manual payment for invoice.

4.8.2 Stimulus/Response Sequences

Customer selects Make a Payment from account menu. System prompts if using payment method on file or to add a new payment method. System processes payment and deducts payment amount from account balance.
Customer selects Pay Violation from main menu. System prompts for license plate number and invoice number, if charge is found system will prompt user to enter payment method.

4.8.3 Functional Requirements

PAY-1: Existing charge
PAY-2: Valid payment method.
PAY-3: Process payments.
PAY-4: Debit payment from balance

5. Other Nonfunctional Requirements

5.1 Performance Requirements

<If there are performance requirements for the product under various circumstances, state them here and explain their rationale, to help the developers understand the intent and make suitable design choices. Specify the timing relationships for real time systems. Make such requirements as specific as possible. You may need to state performance requirements for individual functional requirements or features.>

Consistency: Checking for appropriate control of the information managed between all classes. Have a plan and multiple backups in case of potential loss of information between connections. When a transaction is made save all details on to log file.

5.2 Safety Requirements

This program uses, due to the nature of the information that will be on a user's account, identity theft is a possibility. In order to combat this we are requiring users to log into their account before any information is provided.
For employees, an administrator will create their logins since they will have access to all accounts in the system.

5.3 Security Requirements

This program uses object oriented mechanisms to protect its data passed. In addition to authenticate a user and allow access to the system a username and password which will be required. A user with a regular account will only have access to their own account so will be able to create and modify their login information at will. An employee will have access to all accounts so an administrator will create an account and provide them with their username and a temporary password that will need to be changed.

5.4 Software Quality Attributes

Reliability: Checking that the system is always up and running is very important, as well as to have error messages displayed whenever the program is not implemented correctly.

Re-usability: Making sure that the system can be implemented multiple times, since the program will be used thousands of times a day. Each time somebody uses a toll roll will pass through this system.
Usability: Checking that the system provided is easy to handle and to navigate with no delay. It will also be important to allow easy updates to the system, especially the lanes. The tolls for each lane will change multiple times a day, and if there is a hurricane or other special event the tolls will be removed.
Functionality: Providing the right tools for entering and processing information .Checking that the correct creation of transaction implements the proper attributes.

5.5 Business Rules

No member is restricted to any specific role, however all actions/changes regarding the project must be agreed upon by each member of the team before being implemented.

6. Other Requirements

Appendix A: Glossary

UI: User interface the portion of the program that is displayed to the User.
INTERFACE**:** The program display.
EZ Tag: Name of the Harris County Toll Road Authority system.

Appendix B: Analysis Models

<Optionally, include any pertinent analysis models, such as data flow diagrams, class diagrams, state-transition diagrams, or entity-relationship diagrams.>

Appendix C: To Be Determined List

<Collect a numbered list of the TBD (to be determined) references that remain in the SRS so they can be tracked to closure.>