**Feasibility Study and Project Plan**

CIS 4911 – Senior Project

Virtual Queue

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**ABSTRACT**

The Virtual Queue System will be designed for theme parks and other businesses that have multiple rides or events for which patrons typically wait in line. The idea is that both the theme park and the patron would benefit by the patrons walking around the park (and maybe spending money) rather than standing in line.

The Feasibility Study and Project Plan document gives an introduction to the Virtual Queue System. Chapter 1 gives a basic introduction about the Virtual Queue System, including the problem definition, background on the problem, definition of important terms, and an overview of the document. Chapter 2 introduces the purpose of our system since there is not an actual system, and it will also list the high-level user requirements along with an analysis of alternative solutions to the problem. Chapter 3 includes the Project Plan, which contains project management concepts of the project, hardware and software resources used, and mention the tasks, milestones, and deliverables. Chapter 4 covers different charts and information of the project, a feasibility and cost matrix, and a diary of meetings. Finally, Chapter 5 contains references to any other documents that have been used for reference.

Contents

1. Introduction 5

1.1. Problem definition 5

1.2. Background 5

1.3. Definitions, Acronyms, and Abbreviations 6

1.4. Overview of document 6

2. Feasibility Study 7

2.1. Description of Current System (Limitations and Constraints) 7

2.2. Purpose of New System 7

2.3. High-level Definition of User Requirements 8

2.4. Alternatives Solutions 9

2.4.1. Description of Alternatives 9

2.4.2. Selection Criteria 9

2.4.3. Analysis of Alternatives (See Appendix B – Feasibility Matrix) 9

2.5. Recommendations 9

3.1. Project Organization 10

3.1.1. Project Personnel Organization 10

3.1.2. Hardware and Software Resources 10

3.2 Identification of Tasks, Milestones and Deliverables (work breakdown) 12

 4. Appendix 14

4.1 Appendix A - Project schedule (Gantt chart or PERT Chart) 15

4.2. Appendix B – Feasibility Matrix 22

4.3. Appendix C – Cost Matrix 23

4.4. Appendix D - Diary of Meetings 23

5. References 31

# 1. Introduction

The introductory chapter gives some background information about the Virtual Queue system. In the following sections, the problem definition, and scope of the system will be described. Also, the design methodology will also be given, which will include the software process models and types of models. In addition, definitions, acronyms, and abbreviations of terms used in this deliverable will be provided and explained on this chapter. Finally, the chapter will conclude with a brief explanation of what to expect from the following chapters of the document.

## 1.1. Problem definition

When going to a park, or to any other venue that provides multiple recurring rides or events, customers typically wait in line until is time for them to go into the ride or event. This is definitely time consuming, since one could be doing something else like be walking around, buying souvenirs, or food, or going perhaps to another ride or event. By waiting in line, the venue is making money for that specific ride/event, but is losing potential additional sales by customers being in line rather than walking around the venue visiting other areas of the venue.

The creation of the Virtual Queue system is the proposed solution to the problem explained above. The system will provide customers the benefit of enjoying other amenities offered in the venue (including, but not limited to rides, food) instead of waiting in line. In addition, the system will keep information about ride or event time and capacity and allow the customers to sign in to different events or rides. In this way, customers will not have the need to wait for a ride in line to go to another one. Furthermore, customers will be notified as their time on their rides or events approaches. At the same time, the business will take advantage of this system because of the fact that customers will now have the opportunity to either sign in to another ride, or walk around to buy souvenirs, food, or something else offered at the specific place.

## 1.2. Background

The Virtual Queue (VQ) project is being proposed by Bernard Parenteau with the project proposal affiliation of Florida Logic as one of the assigned projects for the Senior Project class. It is a project that will be develop for the first time this year, in Fall semester of 2014. It will be created with features that will greatly benefit the customers as well as the theme part or other venue using the system. Furthermore, it will improve the quality time is being spend at the park or event by customers, and hopefully the sales of the theme park will increase as expected.

## 1.3. Definitions, Acronyms, and Abbreviations

**Definitions**

- **Customer**: A person or organization that buys goods or services from a store or business.

- **Theme park:** An amusement park with a unifying setting or idea.

- **Alternative:** A possible manner by which a given problem may be resolved.

- **Task:** A piece of job that serves as a unit of work.

**Acronyms**

- **VQ**: Virtual Queue

- **FIU:** Florida International University

- **SCIS:** School of Computing & Information Sciences

**Abbreviations**

As of right now, there are no abbreviations for this project.

## 1.4. Overview of document

The Feasibility Study and Project Plan covers several aspects of the Virtual Queue project. Chapter 1 covers general information such as problem statement, background information and definitions for this project. Chapter 2 encloses the feasibility study with an overview of the system that will be implemented, and the description and limitations of the current system. Chapter 3 specifies the project and hardware and software requirements. Chapter 4 contains the Appendix, in which miscellaneous information, such as charts and tables are shown. Finally, Chapter 5 contains works used as references.

# 2. Feasibility Study

The feasibility study chapter explores the idea of a virtual queue from a practical point of view. Initially, it considers the fact that there is no system developed in charged of completing the desired tasks. In addition, it describes the purpose of the Virtual Queue, and how the features of the VQ system will improve quality time for customers and improve business for theme parks. Following, high-level user requirements are described. Furthermore, alternatives to certain aspects of VQ system are analyzed.

## 2.1. Description of Current System (Limitations and Constraints)

The current system requires the customers to buy their tickets and wait in line at the venue until it’s their turn for their event or ride. At some theme parks, there is not even the possibility of buying the ticket for the desired ride online; it has to be purchased by the customers at the theme park. There is no mechanism to allow the user to register and sign in to see the available rides and select the rides they want; or to logout when they decide to do so; or to allow registered users to log in and logout. It lacks of a system that allows the user the ability to be added to their selected rides. It does not have a system with the ability to allow the user to see all the queues he/she registered. There is no mechanism for adding/removing registered users from the queue according to the queuing algorithm, or to allow users to remove themselves from a registered ride. There is no system with the capability of notifying the users before their selected rides/events starts.

## 2.2. Purpose of New System

Considering that time spent at a theme park or other venue is sometimes limited due to the fact that customers have to wait in line for rides; the implementation of the VQ system is a good idea.

This new system will provide the customers the ability to see which rides are available and sign in to different ones, as long as there is no time conflict. It will also give the customer the possibility to see all the rides he signed on for and received a notification when their turn is coming on, so they can go to their selected ride. Therefore, providing this system, customers will have a more enjoyable experience at the venue by not having to wait in line, and the venue will also benefit by customers shopping or enjoying other amenities rather than waiting in line.

Overall, the main purpose of the new system is to add functionalities and new features to the current system, which will greatly benefit both the customers and the park/event place.

## 2.3. High-level Definition of User Requirements

The user requirements for using the VQ system are very minimal. The user would be required to have a smartphone, tablet or any other device with web access in order to use the web application. In addition, the new system shall…

Allow users to register.

Allow users to validate their account.

Allow registered users to delete their accounts.

Allow registered users to sign in to their accounts.

Allow registered users to logout of their account.

Allow users to reset their password.

Allow registered users to have access to the available rides/events.

Allow registered users to select their favorite rides/events.

Allow registered users to be added to their selected rides/events.

Allow registered users to see all the rides/events they signed on for.

Allow registered users to delete themselves from registered rides/events.

Allow the system to add and/or remove registered users from their selected rides.

Allow the user to be notified before their rides/events time occurs (i.e: 10 min before).

Allow the system to store and retrieve information regarding to the rides/events.

Allow the system to check for duplicates registration or multiple registrations for same user.

Allow the system to handle network connectivity issues.

## 2.4. Alternatives Solutions

The sections 2.4.1 throughout 2.4.3 describe the alternative implementations for this VQ system project.

### 2.4.1. Description of Alternatives

The alternative for this project is to build a new system from scratch. This will give the ability and control required over the architecture of the system. Furthermore, all features will be implemented from the beginning. There will be no need of modifying any existing code, which will increase the efficiency of programming.

### 2.4.2. Selection Criteria

The selected criteria that is going to be used for the consideration of the environment software suite alternatives are mentioned and explained below:

● **Operational Feasibility**: Ability of the users, developers and those involved with the project to use and support the proposed system.

● **Technical Feasibility**: Reliability of the software and hardware and its capability to provide the intended functionality of the system

● **Schedule Feasibility**: How long the system would take to be designed and implemented

● **Economic Feasibility**: Ability of the system to cover its development and maintenance costs after its completion

### 2.4.3. Analysis of Alternatives (See Appendix B – Feasibility Matrix)

The alternative described above is the only option available for this project. Taking into account this is the first version of this system, there is no other platform that was provided to modify or extend. Therefore, starting this project implementation from the beginning is the only and best option to develop the system and implement all new functionalities.

## 2.5. Recommendations

Taking into account the solution provided, the conclusion is to start building the project from the beginning. Since there is no previous platforms implemented that can be take into consideration, the only and best solution is to start from scratch. The implementation of the new system will provide functionalities that will make the new system easier and better.

**3. Project Plan**

This chapter introduces the VQ system a project management perspective. First of all, the project organization that is going to be used will be described, with all roles listed. Following, hardware and software required in order to develop the project will be listed. Finally, tasks, milestones, and deliverables will also be listed.

## 3.1. Project Organization

For this project, I will be in charge of all functionality and roles of the system.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Roles | Tasks | Periods required | Key Phases |
| Kely Cid | * Project Manager * Developer * Test Engineer * Document Editor | * Project Status * Schedule/Tasks * Test Results * Implementation Integration * Project Documentation (Deliverables) * Any other additional tasks | 9/1/14  to 12/12/14 | All |

### 3.1.1. Project Personnel Organization

All sections of this project will be assigned to the only member of the group, which will be in charge to develop all the components needed to support the different functionalities.

### 3.1.2. Hardware and Software Resources

**Hardware**

The following are the specification of the computer that will be used for the development of this project:

**Laptop with:**

**- Processing Power:** 1.8 GHz Intel Core i5

**- RAM Memory:** 4 GB 1600 MHz DDR3

**- Available space on hard drive:** 128 GB flash storage

**Other Devices**

- **Input devices**

a) Keyboard- Standard keyboard

b) Mouse- Trackpad mouse

- **Output devices**

a) Monitor display- 13-inch (1440 x 990) Intel HD Graphics 4000 graphics

**Software**

1. **Safari 7.0.6:** last, most updated version of the Safari browser that will be used to test Virtual Queue.
2. **Google Chrome 37.0:** last, most updated version of the Google Chrome browser that will be used to test Virtual Queue.
3. **Spring Framework 4.0:** last, most updated version of Spring Framework, an MVC-based, Java framework used for development. It will be used to develop the front-end and back-end of Virtual Queue.
4. **Spring JDBC template**: make database call access to MySQL database.
5. **MySQL**: database that will be used to store data for the Virtual Queue system.
6. **StarUML:** UML software platform that will be used to create diagrams for the document.
7. **VMWare:** virtual machine software that will be used for the deployment of the software.
8. **Eclipse Luna:** IDETool software used to write the java classes for the Virtual Queue system.
9. **JBoss 7.1.1**: Java J2EE Application Server used to deploy and run the Virtual Queue system.

## 3.2 Identification of Tasks, Milestones and Deliverables (work breakdown)

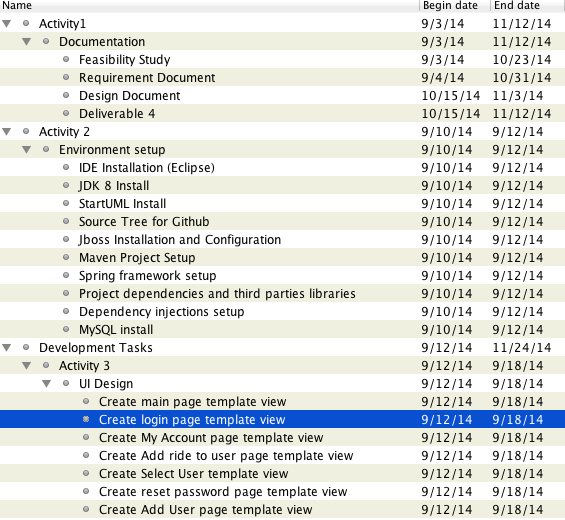
Below is a list of all different tasks, milestones, and deliverables for the project, which can be changed according to the development of the project:

|  |  |
| --- | --- |
| Milestones | Task & Deliverables |
| Documentation | * Feasibility Study * Requirement Document * Design Document * Deliverable 4 |
| Environment Setup | * IDE Installation (Eclipse) * JDK 8 Install * StartUML Install * Source Tree for Github * Jboss Installation and Configuration * Maven Project Setup * Spring framework setup * Project dependencies and third parties libraries * Dependency injections setup * MySQL install |
| * Development Tasks: | |
| UI Design | * Create main page template view * Create login page template view * Create My Account page template view * Create Add ride to user page template view * Create Select User template view * Create reset password page template view * Create Add User page template view |
| Database Design and Implementation | * Create Tables * Create tables relationships and constrains * Create EER diagram |
| Main Page Functionality | * Add dynamic content to main page. (JQuery, Ajax calls) * Add server side implementation to main page. * Create main controller with URL definitions and contracts * Create main service interface/implementation * Create main DAO for data access. |
| Login and Logout functionalities | * Add dynamic content to login page (JQuery, Ajax calls) * Server Side Implementation. * Create login controller with URL definitions and UI contracts * Login controller unit test. * Create user Bean. * Unit test to user bean. * Add user information to session when user log * Create login service interface/Implementation * Login service unit test * Create login DAO to facilitate data access * DAO unit test. * Add logout controller with URL contract * Logout controller unit test. * Remove user information from session data. * Unit test. |
| Add User Functionality | * Add to add user page (JQuery, Ajax calls) * Server Side Implementation. * Create User controller with URL definitions and UI contracts * User controller unit test. * Add User information to session when user log * Create User service interface/Implementation * User service unit test * Create User DAO to facilitate data access * DAO unit test. |
| Reset Password Functionality | * Add dynamic content to user page to reset password (JQuery, Ajax calls) * Server Side Implementation. * Add method User controller with URL definitions and UI contracts for password reset. * User controller unit test. * Add functionality to User service interface/Implementation * User service unit test * Add functionality to User DAO to facilitate data access * DAO unit test. |
| User Ride Functionality | * Add dynamic content to user Ride page (JQuery, Ajax calls). * Add UI data validations. * Server Side Implementation. * Create login controller with URL definitions and UI contracts * Add controller unit test * Create Ride Bean. * Unit test to ride bean. * Add user information to session when user log * Create user ride interface/Implementation * Unit test for service interfaces * Create User Ride DAO to facilitate data access * DAO unit test. * Add User Validator interface when registering for a ride. * Validator unit test. * Add User validator implementation with rule definitions. * Validator implementation unit test for each method. * =================================== * Add Ride Registration Business Rules Interface * Add Ride Registration Business Rule implementation. * Add Unit test for Ride Registration * Add Rules Interfaces * Add Rules Implementations. * Add unit test to Rules implementations. * Add Rule Builder Class. * Unit test to Rule Builder. |

# 4. Appendix

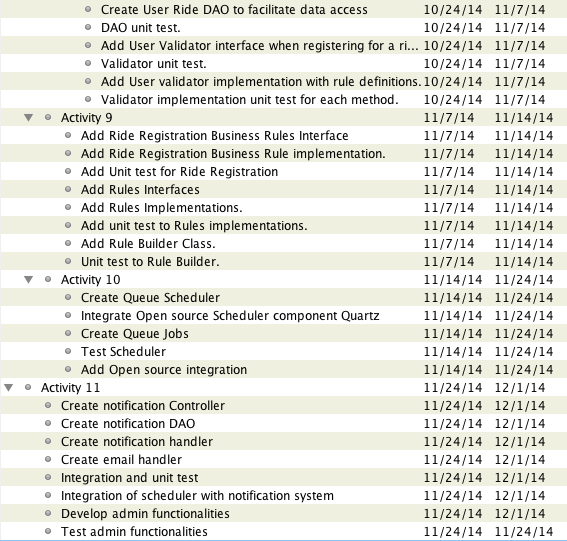
This chapter contains a Gantt Chart with the scheduled time of work for the whole project, a feasibility matrix, a cost matrix that shows the estimate total cost for the project, and a diary of meetings.

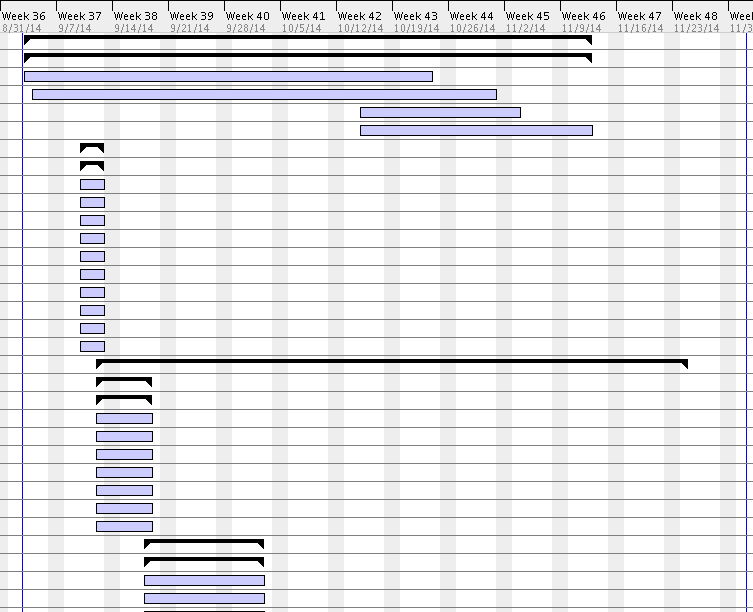
## 4.1 Appendix A - Project schedule (Gantt chart or PERT Chart)

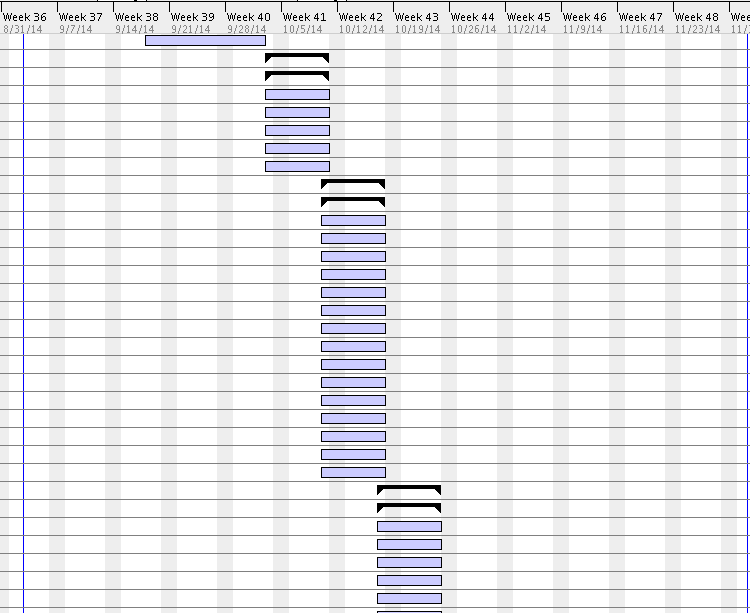


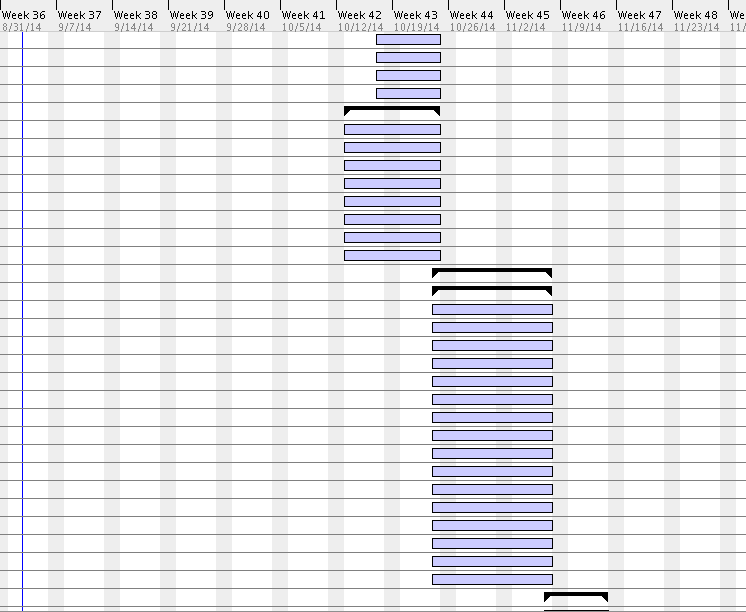


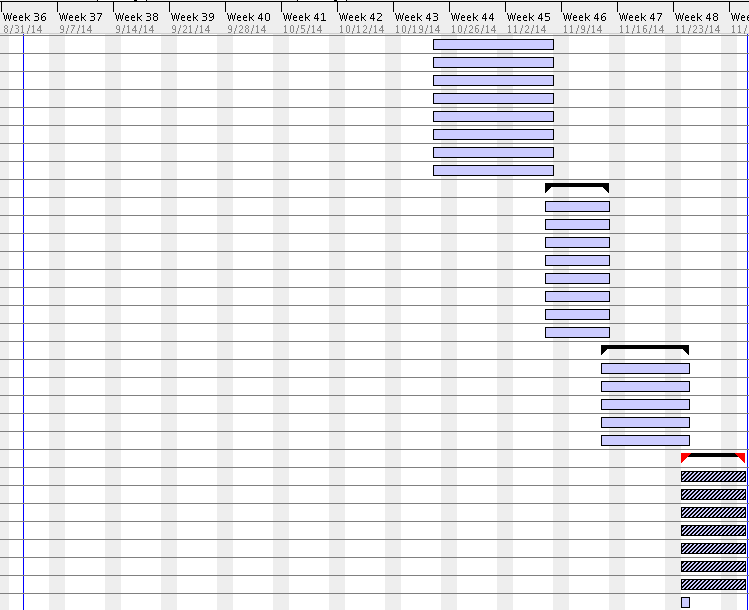












## 4.2. Appendix B – Feasibility Matrix

|  |  |  |
| --- | --- | --- |
| **Feasibility Criteria** | **Weight.** | **Creating New Platform** |
| **Operational Feasibility**: Ability of the users, developers and those involved with the project to use and support the proposed system. | **30%** | Fully supports required functionalities.  **Score: 100** |
| **Technical Feasibility**:  **Technology: An assessment of the maturity, availability, ability to acquire, and desirability of computer technology needed to support this candidate.**  **Expertise: An assessment of the technical expertise needed to develop, operate, and maintain the candidate system.** | **30%** | All platforms would be supported including smartphones platforms.    Bootstrap 3 and JQuery will be the primary language and Eclipse Luna will be extensively used. There is a reasanoble amount of experience using HTML, CSS, MySql, which will be the main technologies in use.    **Score: 85** |
| **Economic Feasibility**: Ability of the system to cover its development and maintenance costs after its completion. | **30%** | The new platform will be built using open resources, self database hosting and school and developer’s resources, which will make the system cost $0. There will no be payback  **Score: 100** |
| **Schedule Feasibility**: How long the system would take to be designed and implemented | **10%** | Based on the experience of the team and questions asked to the client within the project, the project is quite feasible in the timeframe.  **Score: 90** |
| **Ranking:** | **100%** | **93.75** |

## 4.3. Appendix C – Cost Matrix

|  |  |  |
| --- | --- | --- |
| Resources | Quantity | Cost |
| PC (Hardware) | 1 | $0.00 |
| MySQL | 1 | $0.00 |
| Spring Framework |  | $0.00 |
| Development |  | $0.00 |
| Testing |  | $0.00 |
| Total Costs: |  | $0.00 |

## 4.4. Appendix D - Diary of Meetings

**Virtual Meeting 1:**

**Date:** September 2, 2014

**Start Time:** 9:16PM

**Participating members:** Kely Cid, Bernard Parenteau.

**Agenda:** Programming Background discussion.

**Virtual Meeting 2:**

**Date:** September 3, 2014

**Start Time:** 12:45PM

**Participating members:** Kely Cid, Bernard Parenteau.

**Agenda:** Agreed on a optimized website development for the Virtual Queue System, and discussed Virtual Queue system requirements.

**Virtual Meeting 3:**

**Date:** September 3, 2014

**Start Time:** 3:48PM

**Participating members:** Kely Cid, Bernard Parenteau.

**Agenda:** Agreed to go forward with project requirements, technologies and tools.

**Meeting 4:**

**Date:** September 3, 2014

**Start Time:** 6:20PM

**End Time:** 8:35PM

**Participating members:** Kely Cid.

**Agenda:** Understanding of the project objectives and goals, and started working on Chapter 1 & 2 of the feasibility and project plan document.

**Meeting 5:**

**Date:** September 4, 2014

**Start Time:** 2:10PM

**End Time:** 5:30PM

**Participating members:** Kely Cid.

**Agenda:** Continue working on Chapter 2 of the feasibility and project plan document, and chapter 1 of requirement document.

**Meeting 6:**

**Date:** September 5, 2014

**Start Time:** 2:00PM

**End Time:** 6:00PM

**Participating members:** Kely Cid.

**Agenda:** Continue working on Chapter 2 & 3 of the requirement document, and chapter 3 of feasibility and project plan document. Created Trello Account.

**Meeting 7:**

**Date:** September 6, 2014

**Start Time:** 1:00PM

**End Time:** 7:10PM

**Participating members:** Kely Cid.

**Agenda:** Continue working on Chapter 3, 4, 5, and part of 6 of the requirement document.

**Meeting 8:**

**Date:** September 7, 2014

**Start Time:** 11:00AM

**End Time:** 12:45PM

**Participating members:** Kely Cid.

**Agenda:** Update Trello Account, create Power Point presentation.

**Meeting 9:**

**Date**: September 14, 2014

**Start Time**: 10:30AM

**End Time**: 7:50PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Discussed and Worked on UI design. Update mentor on project. Uploaded mockups for approval on Trello account of Login, Select Ride, and Reset Password and received feedback for mockups.

**Meeting 10:**

**Date**: September 16, 2014

**Start Time**: 10:30AM

**End Time**: 7:50PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on project. Define views, controllers, models and url end point contracts for server side end points and test it with static data before connecting UI with server side controller. Database design and implementation.

**Meeting 11:**

**Date**: September 22, 2014

**Start Time:** 1:00PM

**End Time**: 10:45PM

**Participating members**: Kely Cid.

**Agenda**: Keep working on UI design. Added dynamic features to pages. Created packages to group controllers (Home Controller, Login Controller), services (Login Service), and DAO's. interfaces and implementation (Login DAO). Create SQl queries, JDBC prepared statements, pull data from db and manipulate data to build domain objects with data return. Posted half of use cases on Trello for approval. Received approval of Use case diagram V2 for VQ system.Uploaded code to GitHub account. Create unit tests for controllers, and DAO’s.

**Meeting 12:**

**Date**: September 23, 2014

**Start Time:** 1:00PM

**End Time**: 10:45PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on project. Discuss Mockups design and use cases for VQ system were uploaded to Trello. Created packages to group controllers (Notification Controller, Queue Controller, User Controller), services (Notification Service, Queue Service, User Service) interfaces and implementations, and DAO's. interfaces and implementation (Queue DAO, User DAO) and interface and implementation handler (Notification handler). Create SQl queries, JDBC prepared statements, pull data from db and manipulate data to build domain objects with data return. Create unit tests for controllers, and DAO’s.

**Meeting 13:**

**Date**: September 25, 2014

**Start Time**: 10:30AM

**End Time**: 7:50PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on changes for Feasibility document and feasibility matrix and updates on provided VM with all tools needed already installed.

**Meeting 14:**

**Date**: September 30, 2014

**Start Time**: 10:30AM

**End Time**: 7:50PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Approval received for Mockups designs. Created packages to group controllers (Ride Controller), services (Ride Service) interfaces and implementations, and DAO's. interfaces and implementation (Ride DAO). Create SQl queries, JDBC prepared statements, pull data from db and manipulate data to build domain objects with data return. Create unit tests for controllers, and DAO’s.

**Meeting 15:**

**Date**: October 2, 2014

**Start Time**: 10:00AM

**End Time**: 8:00PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: reevaluate Register and Login functionalities and update them to finish it. Started working on Design document and discuss and asked for approval of the rest of use cases. Updated Requirement document and sequence diagrams.

**Meeting 16:**

**Date**: October 7, 2014

**Start Time**: 9:30AM

**End Time**: 5:30PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Preliminary UI design approved on Trello.

**Meeting 17:**

**Date**: October 10, 2014

**Start Time**: 9:30AM

**End Time**: 5:30PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Discuss and understand the process of Selecting and Adding a Ride by a user functionalities and all validations to take into account for ride and each user. Created User rules interface and implementations, Rule DAO interface and implementation, rule Builder interface and implementation. Create SQl queries, JDBC prepared statements, pull data from db and manipulate data to build domain objects with data return. Create unit tests for new DAO’s created.

**Meeting 18:**

**Date**: October 15, 2014

**Start Time**: 11:00AM

**End Time**: 6:25PM

**Participating members**: Kely Cid.

**Agenda**: Continue working on the Feasibility document, Requirement document, and Design document and functionalities of the system. Update mentor on project.

**Meeting 19:**

**Date**: October 20, 2014

**Start Time**: 9:30AM

**End Time**: 5:30PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on project. Continue working on the Feasibility document, Requirement document, and Design document to finish them, started first chapters of Final Document. Reevaluate implemented code for logout and reset password and validation rules for adding a ride by a venue user. Created Queue Scheduler to create and schedule queue jobs (Notify user based on ride properties). Create SQl queries, JDBC prepared statements, pull data from db and manipulate data to build domain objects with data return. Fixed and updated some use cases to Trello.

**Meeting 20:**

**Date**: November 7, 2014

**Start Time**: 2:00 PM

**End Time**: 7:20 PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on project. Continue working on the Final Document. Created another job on the Queue scheduler to remove users from the Queue. Refine some code implementation, made some bug fixes, and work on admin functionalities. Test system on those functionalities, and subsystem.

**Meeting 20:**

**Date**: November 14, 2014

**Start Time**: 1:10 PM

**End Time**: 6:00 PM

**Participating members**: Kely Cid, Bernard Parenteau.

**Agenda**: Update mentor on project. Mainly worked on the Final Document. Made some new updates on the UI, made some bug fixes and create new tests for the system.

# 5. References

Images used:

1. <http://www.plan-family-reunions.com/themeParks.html>
2. http://ru.forwallpaper.com/wallpaper/abstract-circles-patterns-dots-light-colors-bokeh-abstraction-172728.html