SCHOOL BUS TRACKING AND ATTENDANCE CHECKING

Project Plan

By

Thitipun Tojareonvanich 552115018
Puttipong Tadang 552115054

Department of Software Engineering
College of Arts, Media, and Technology
Chiang Mai University

Project Advisor

_____

Parinya Suwansrikham

Document History

Document Name	Detail	Status	Date	Viewable	Editable	Responsible
School Bus Tracking and Attendance Checking-ProjectPlan-V.0.1.docx	-Introduction -Schedule and Milestones	Reviewed	20/7/2015	TT, PT, PS	TT, PT	TT, PT
School Bus Tracking and Attendance Checking-ProjectPlan-V.0.2.docx	-Infrastructure -Identification of Project Risks	Reviewed	23/7/2015	TT, PT, PS	TT, PT	TT, PT
School Bus Tracking and Attendance Checking-ProjectPlan-V.0.3.docx	-Update Schedule and Milestones -Update Introduction	Reviewed	27/7/2015	TT, PT, PS	TT, PT	TT, PT
School Bus Tracking and Attendance Checking-ProjectPlan-V.1.0.docx	-Update Quality Planning -Update Schedule and Milestones	Released	29/7/2015	TT, PT, PS	TT, PT	TT, PT
School Bus Tracking and Attendance Checking-ProjectPlan-V.1.1.docx	-Update Estimated Effort and Cost	Reviewed	25/8/2015	TT, PT, PS	TT, PT	TT, PT
School Bus Tracking and Attendance Checking-ProjectPlan-V.1.2.docx	-Update Schedule and Milestones	Released	27/8/2015	TT, PT, PS	TT, PT	TT, PT

*__TT__ = Thitipun Tojareonvanich, *__PT__ = Puttipong Tadang, *__PS__ = Parinya Suwansrikham

Document Designed by

Mr.Thitipun Tojareonvanich
Mr.Puttipong Tadang

Table of Contents

Chapter One | Introduction 1

1.1 Identification 1

1.2 Project Scope 1

1.3 Document Overview 2

1.4 Objectives 3

1.5 Work Products to be Develop 4

1.6 Acronyms and Definitions 5

Chapter Two | Infrastructure 6

2.1 Software Development Life Cycle 6

2.2 Development Tools 6

2.3 Hardware and Material Resources 7

Chapter Three | Management Procedures 8

3.1 Project Team Structure 8

3.2 Monitoring and Controlling Mechanisms 8

Chapter Four | Quality Planning 9

4.1 Quality Standard 9

4.2 Reviews/Responsibility 10

4.3 Testing 11

4.4 Quality Factors 11

Chapter Five | Schedule and Milestones 12

5.1 Project Schedule 12

Chapter Six | Software Configuration Management 18

6.1 Software Configuration Management 18

6.2 Filename Format 18

6.3 Change Management 18

6.4 Software Configuration Item Table 19

Chapter Seven | Estimated Effort and Cost 20

Chapter Eight | Risk Management 21

8.1 Risk Management Process 21

8.2 Risk Identification and Solutions 22

Chapter Nine | Reference 25

Chapter One | Introduction

1.1 Identification

"School Bus Tracking and Attendance Checking" is an Android application that uses the location service of mobile phone to track the school bus and use the built-in camera to scan the QR code for checking the student attendance. The parent can track the school bus, can see their child attendance record, can get notification when their child enter or get off the bus, and can send the alert sound to alert the driver when they drive the school over the speed limit. For reducing the parent worrying about their children.

This project plan is the document for planning, scheduling activities and evaluating overall of the project so that the project will complete as successfully as possible in spite of all risks. The project plan is to use for track the progress and monitor whether the project follows the plan.

1.2 Project Scope

"School Bus Tracking and Attendance Checking" is a mobile application which uses Android OS. This application can help to improve the school bus system and reduce the parent worrying about their children. The parent can track the school bus position, can see their child attendance record, and get a notification message when their child enters or get off the school bus. In addition, the driver can check the student attendance by scan the QR code and can get the alert sound when the driver drives the bus over the speed limit.

The main features of "School Bus Tracking and Attendance Checking" are as follows:

Tracking system

Parents can track their child by the school bus position. The school bus driver's phone would send the position on to the database and can provide them to the parent.

Attendance checking system

School bus driver can check the children attendance via QR code when they enter and get off the bus. Moreover, parents can check whether their children are on the bus or not.

School bus rides cancellation system

Parent can cancel the school bus ride on the special case. For example, the children get sick, parent wants to pick their child by yourself.

Notifying system

System can notify the parent when their child enters and get off the bus. In addition, system can notify children when the school bus nearby school.

Speeding alert system

System can warn school bus driver when drive over the speed limit that defined by the school bus reasonable speed survey.

1.3 Document Overview

The purpose of the "School Bus Tracking and Attendance Checking" project plan is to guide the project team members during the development of the project.

Progress Report I：

Feature #1: Member System

1.1 Unregistered user can register as school bus driver
1.2 School bus driver can register the parents to the application.
1.3 School bus driver can register the children to the application.
1.4 Registered user can login to the application.
1.5 Registered user can logout from the application.

Feature #2: Checking attendance system

2.1 Parents can check their children's attendance.
2.2 School bus driver can scan QR code for children attendance.

Progress Report II：

Feature #3: Notifying System

3.1 Parents can cancel the ride.
3.2 Children can receive the message when the bus are nearby.
3.3 Parents can receive the message when their children arrive the school or home
3.4 School bus driver can send an extra case message.

Feature #4: Tracking System

4.1 Registered user can view their own route.

Feature #5: School bus rides cancellation system

Progress Report III：

Feature #6: Speeding alert system

6.1 School bus driver can receive alert message from the system when they drive over the speeding.
6.2 School bus driver can turn on the tracking system.
6.3 School bus driver can turn off the tracking system.

1.4 Objectives

1. To develop a mobile application that reduce the parent worrying about their child with the school bus system with the followings:
   - Checking attendance system: sending the message to the parent when their child enters and get off the school bus.
   - Tracking system: a parent can monitor the school bus position to know where exactly the bus is.

2. To develop a mobile application that help to reduce car accidental with Speed Control Alert System for warning the driver when they drive over the speed limit that defined by the school bus appropriate speed survey in 90 people.
3. To offer the features that provide more convenience compared to calling the school bus driver:
   - Canceling the school bus ride in the special case. For example, the child gets sick, the parent wants to pick their child by yourself.

1.5 Work Products to be Develop

1.5.1 Deliverables

No.	Deliverables/Release	Media	No. of Copies	Date
1	**Project Proposal** • Proposal version 1.0	Hard Copy	3	10/6/2015
2	**The Progress Report I** Project Management Plan version 1.0 • Software Requirement Specification version 1.0 • Software Design Document version 1.0 • Test Plan version 1.0 • Traceability Record version 1.0	Hard Copy	3	29/7/2015
3	**The Progress Report II** • Project Management Plan version 2.0 • Software Requirement Specification version 2.0 • Software Design Document version 2.0 • Test Plan version 2.0 • Traceability Record version 2.0	Hard Copy	3	23/9/2015
4	**The Progress Report III (ShowPro)** • Project Management Plan version 3.0 • Software Requirement Specification version 3.0 • Software Design Document version 3.0 • Test Plan version 3.0 • Traceability Record version 3.0 • Video presentation • Poster presentation	Hard Copy File Poster	3 1 1	4/11/2015
5	**The Final Progress Report** • Project Management Plan version 4.0 • Software Requirement Specification version 4.0 • Software Design Document version 4.0 • Test Plan version 4.0 • Traceability Record version 4.0 • Software Source code version 1.0	Hard Copy Software	3 1	25/11/2015

1.6 Acronyms and Definitions

1.6.1 Acronyms

TT	Thitipun	Tohareonvanich
PT	Puttipong	Tadang
PS	Parinya	Suwansrikham
VSE	Very Small Entity	

1.6.2 Definitions

Project Plan	Project plan is part of project management, which relates to the use of schedules such as Gantt charts to plan and subsequently report progress within the project environment**.**
Risk	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives. It is a function of the probability of occurrence of a given threat's occurrence. [1]
Risk Management	Risk management is a software engineering practice with processes, methods, and tools for managing risks in a project. It provides a disciplined environment for proactive decision-making to assess continuously what can go wrong; determine what risks are important to deal with, and implement actions to deal with those risks. [2]
Traceability	In software development, the term traceability (or Requirements Traceability) refers to the ability to link product requirements back to stakeholders' rationales and forward to corresponding design artifacts, code, and test cases. [3]
Unit Test	In computer programming, unit testing is a software testing method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures are tested to determine if they are fit for use.[1] Intuitively, one can view a unit as the smallest testable part of an application. [4]
Configuration Item	Component of an information technology (IT) structure or system under the control of configuration management. [5]

Chapter Two | Infrastructure

2.1 Software Development Life Cycle

Iterative model starts with a simple implementation of a small part set of the software requirements and iteratively enhances the evolving versions until the complete system is implemented and ready to be deployed.

Iterative life cycle model does not attempt to start with a full specification of requirements. Instead, development begins by specifying and implementing just part of the software, which can then be reviewed in order to identify further requirements. This process is then repeated, producing a new version of the software for each cycle of the model.

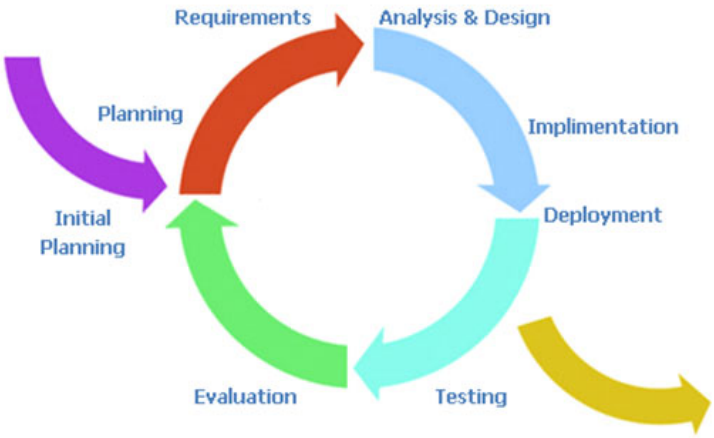


Figure 1 *Iterative model* [6]

2.2 Development Tools

Android Studio

Android Studio is an IDE tool(integrated development environment tool) from Google for developing on the Android, Based on Jet Brains' IntelliJ IDEA software; Android Studio is designed specifically for Android development. [7]

MySQL

MySQL is an open- source relational database management system which. It can create both standalone and server database. Moreover, it also supports many development tools. [8]

Google Maps API

Google Maps API is a programming API that Google provides to developers. It allows developers to embed data of Google Maps into their web or application. And it helps developers provide the location services to users. In addition, Google Maps API not only helps developers to embed maps into their application but also allows developers use JavaScript to expand their applications. [9]

GitHub

GitHub is a Web-based Git repository hosting service, which offers all of the distributed revision control and source code management.

Visual Paradigm for UML

Visual Paradigm for UML is a software for model diagram and it can reverse engineer diagrams from code.

2.3 Hardware and Material Resources

- **Laptops**
  - **Lenovo Y5070**
    Processor: Intel(R) Core(TM) i7-4710HQ @ 2.50GHz
    Memory: 8 GB DDR3
    Graphics: NVIDIA GeForce GTX 860M
    Operating System: Window 8.1 Professional
  - **Dell Inspiron N7420**
    Processor: Intel(R) Core(TM) i7-3612QM @ 2.10GHz
    Memory: 8 GB DDR3
    Graphics: NVIDIA GeForce GT 640M
    Operating System: Windows 7 Ultimate
- **Internet**
- **Mobile Phone**: Android Operating System
  - **Asus Zenfone5**
    CPU: Intel Atom Z2580 Dual-core 2 GHz
    Memory: 2 GB
    Operating System: Android OS 4.3

Chapter Three | Management Procedures

3.1 Project Team Structure

Activities	Participants
Feasibility Study	Thitipun Tojareonvanich Puttipong Tadang
Project Proposal	
Project Requirement	
Project Plan	
Software Architectural Design	
Software Detailed Design	
Implementation	
Testing	
Review	

3.2 Monitoring and Controlling Mechanisms

3.2.1 Project Meeting

Participants	Roles
Thitipun Tojareonvanich	Development team member
Puttipong Tadang	Development team member
Parinya Suwansrikham	Project Advisor

3.3 Change Management

Change Management manages and controls all of the changes that happen during the project development process. The change requests will be recorded into the change management document. Here are the steps of our strategy for change management:

1. Analyze the change request (How necessary it is and the impact to the other part of the system).
2. Set a change request form.
3. Approve the change request by the project advisor.
4. Change the project according to the approved change request.

Chapter Four | Quality Planning

4.1 Quality Standard

ISO 29110 for Very Small Entity (VSE)

ISO 29110 is a software processes and guidelines for very small entities. A very small entity is mean an enterprise, organization, department or project having up to 25 people. The guide are based on subsets of appropriate standards elements, referred to as VSE profiles. The purpose of a VSE profile is to define a subset of ISO/IEC standards relevant to the VSE.

4.1.1 Basic Profile Guide Processes

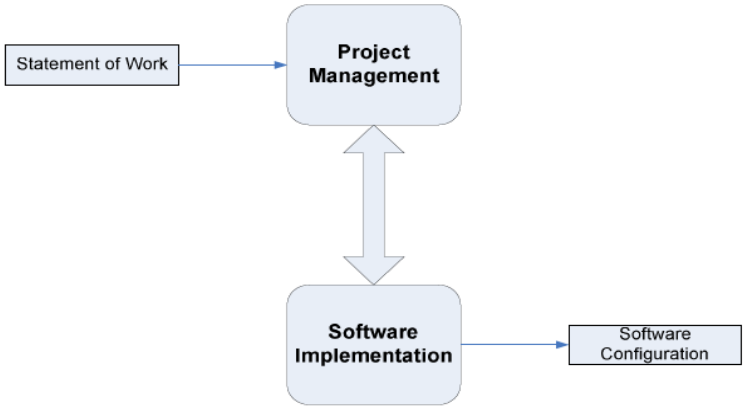


Figure 2 *Basic Profile Guide Process*

Project Management *(*PM*)* process uses the customer's statement of work to elaborate the project plan. The PM project assessment and control tasks compare the project progress against the project plan and actions are taken to eliminate deviations or incorporate changes to the project plan. The PM project closure activity delivers the software configuration, produced by SI and gets the customer's acceptance to formalize the end of the project. A project repository is established to save the work products and to control its versions during the project.

The execution of the Software Implementation (SI) process is driven by the project plan. SI process starts with an initiation activity of the project plan review. The project plan will guide the execution of the software requirements analysis, software architectural and detailed design, software construction, and software integration and test, and product delivery activities.

4.1.2 Project Management Process

The purpose of the project management process is to establish and carry out in a systematic way the tasks of the software implementation project, which allows complying with the project's objectives in the expected quality, time and cost.

Selected processes

4.1.2.1 Project planning process
4.1.2.2 Project plan execution process
4.1.2.3 Project assessment and control process
4.1.2.4 Project closure process

4.1.3 Software Implementation Process

The purpose of the software implementation process is the systematic performance of the analysis, design, construction, integration and tests activities for new or modified software products according to the specified requirement.

Selected processes

4.1.3.1 Software implementation initiation process
4.1.3.2 Software requirement analysis process
4.1.3.3 Software architectural and detailed design process
4.1.3.4 Software construction process
4.1.3.5 Software integration and test process
4.1.3.6 Software delivery process

4.2 Reviews/Responsibility

Stage Exit Review			
No.	**Stage**	**Software Items**	**Responsibility**
1	Requirement gathering	Project Proposal, Survey	Thitipun Tojareonvanich Puttipong Tadang Parinya Suwansrikham
2	Project Planning	Project Plan	
3	Requirement Analysis and Specification	Software Requirement Specification	
4	Architecture and Detailed Design	Software Design Document	
5	Software Implementation	Source Code	

4.3 Testing

No.	Test	Responsibility
1	Unit Testing	Thitipun Tojareonvanich Puttipong Tadang Parinya Suwansrikham
2	System Testing	
3	User Acceptance Test	

4.4 Quality Factors

4.4.1 Product Operation Factors

Correctness

The software should provide more than 90% of data as the user requested correctly.

Usability

The software should provide understandable and easy-to-use GUI and language.

Reliability

The software should perform with more than 80% of usual activities, and with less than 10% of failure.

Integrity

The software should be able to identify between authorized and unauthorized users, and also between each type of users

4.4.2 Product Revision Factors

Maintainability

The software should contain 20-30% of comments from the total LOC to support furthermore maintenance.

Testability

The software should be 100% tested.

4.4.3 Product Transition Factors

Reusability

More than 50% of the complete software should be able to be reused in the future.

Chapter Five | Schedule and Milestones

5.1 Project Schedule

Member System

Feature#1: Registration system

Feature#2: Login system

Checking attendance system

Feature#3: QR code reader

Feature#4: QR generator

Feature#5: Checking attendance system

Notifying System

Feature#6: Parent notifying message system

Feature#7: School bus ride cancellation system

Tracking System

Feature#8: Tracking system

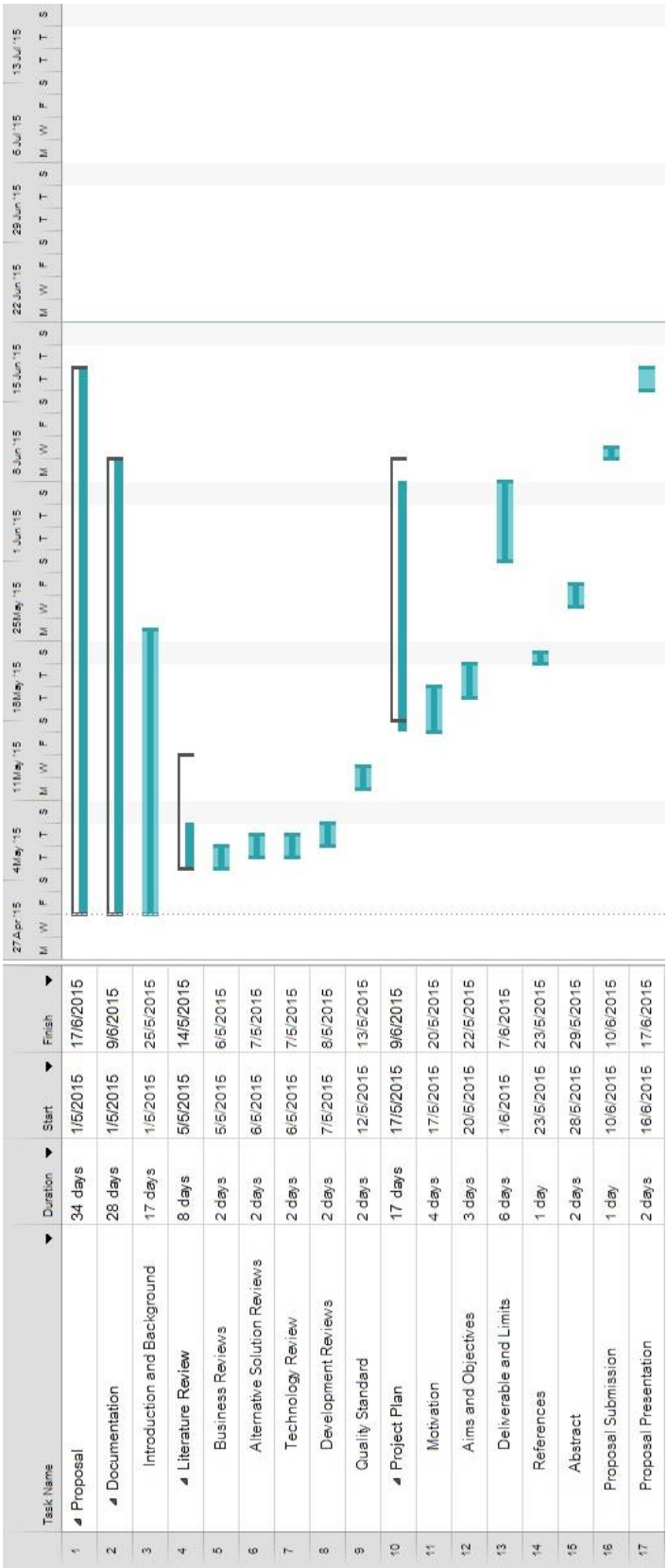
Feature#9: Calculating Approximate arrival time system

Speeding Alert System

Feature#10: Send alert message system

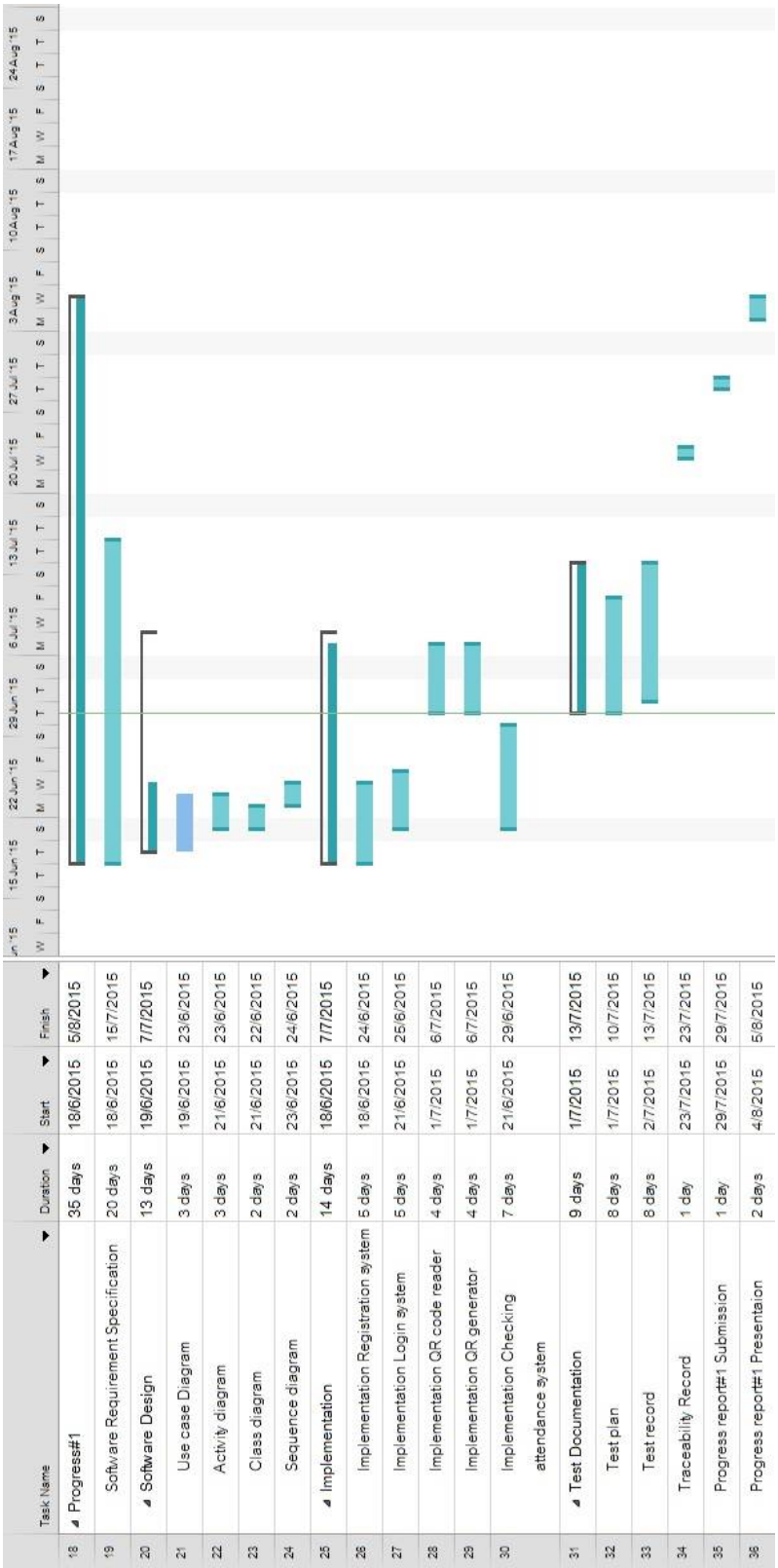
According to the architecture of our project and the time schedule for the senior project, we separated the whole project to five processes. The description is shown below:

1. **Proposal phase**
   Create proposal document.
2. **Progress I**
   Create Development Plan, Quality Plan, Software requirement specification, Software design document and some part of Test document. Start creates member system and checking attendance system.
3. **Progress II**
   Create a notifying system and tracking system, overall of the system should be higher than 65%. And Test document.
4. **Progress III**
   Create a speed control alert system and integrate all features. Overall of the system should be complete or nearly. And Test document.
5. **Final progress**
   Integrate and review all document. Make sure all system and document are complete.



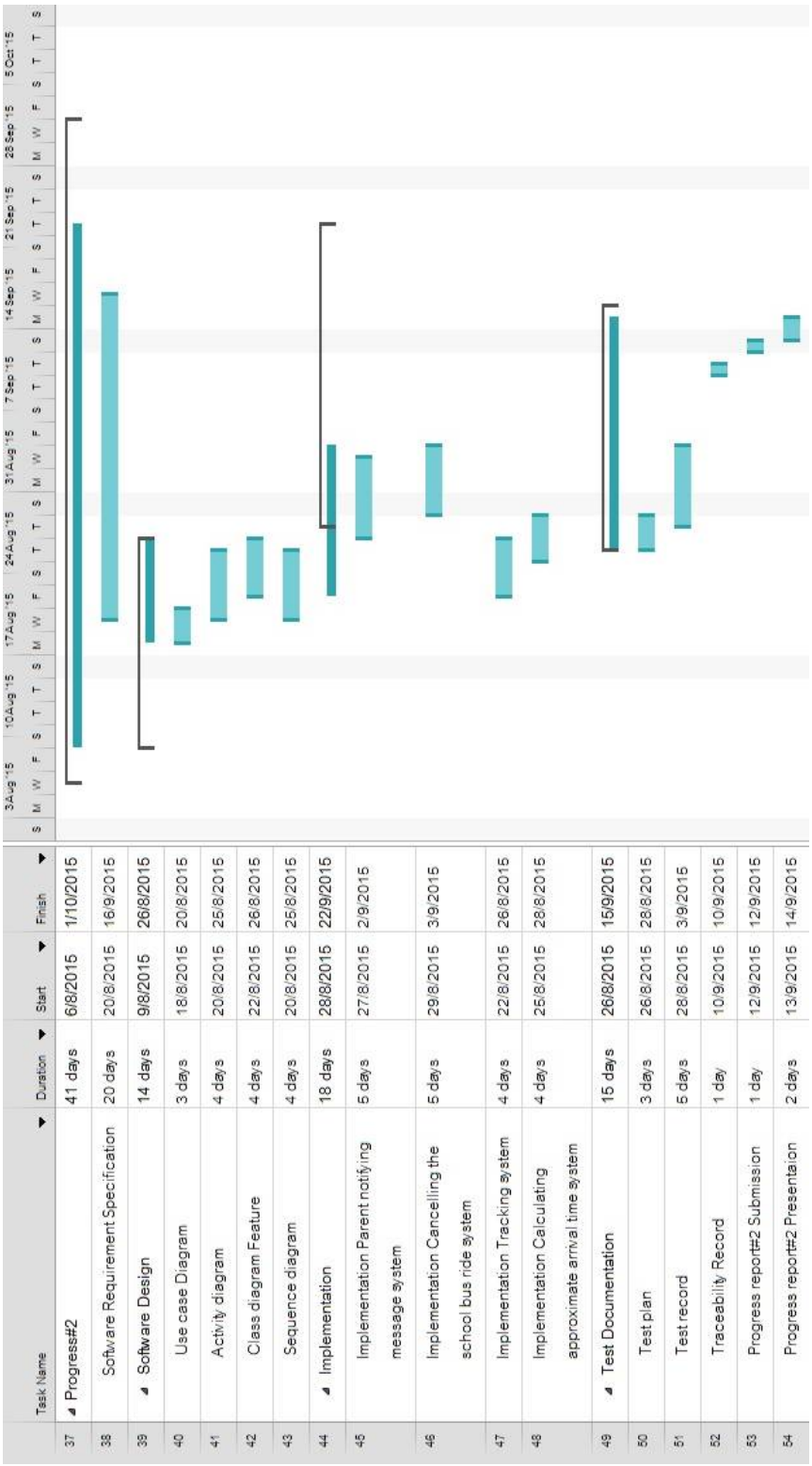
	Task Name	Duration	Start	Finish
1	◢ Proposal	34 days	1/5/2015	17/6/2015
2	◢ Documentation	28 days	1/5/2015	9/6/2015
3	Introduction and Background	17 days	1/5/2015	25/5/2015
4	◢ Literature Review	8 days	5/5/2015	14/5/2015
5	Business Reviews	2 days	5/5/2015	6/5/2015
6	Alternative Solution Reviews	2 days	6/5/2015	7/5/2015
7	Technology Review	2 days	6/5/2015	7/5/2015
8	Development Reviews	2 days	7/5/2015	8/5/2015
9	Quality Standard	2 days	12/5/2015	13/5/2015
10	◢ Project Plan	17 days	17/5/2015	9/6/2015
11	Motivation	4 days	17/5/2015	20/5/2015
12	Aims and Objectives	3 days	20/5/2015	22/5/2015
13	Deliverable and Limits	6 days	1/6/2015	7/6/2015
14	References	1 day	23/5/2015	23/5/2015
15	Abstract	2 days	28/5/2015	29/5/2015
16	Proposal Submission	1 day	10/6/2015	10/6/2015
17	Proposal Presentation	2 days	16/6/2015	17/6/2015

***Figure 3** Proposal phase*



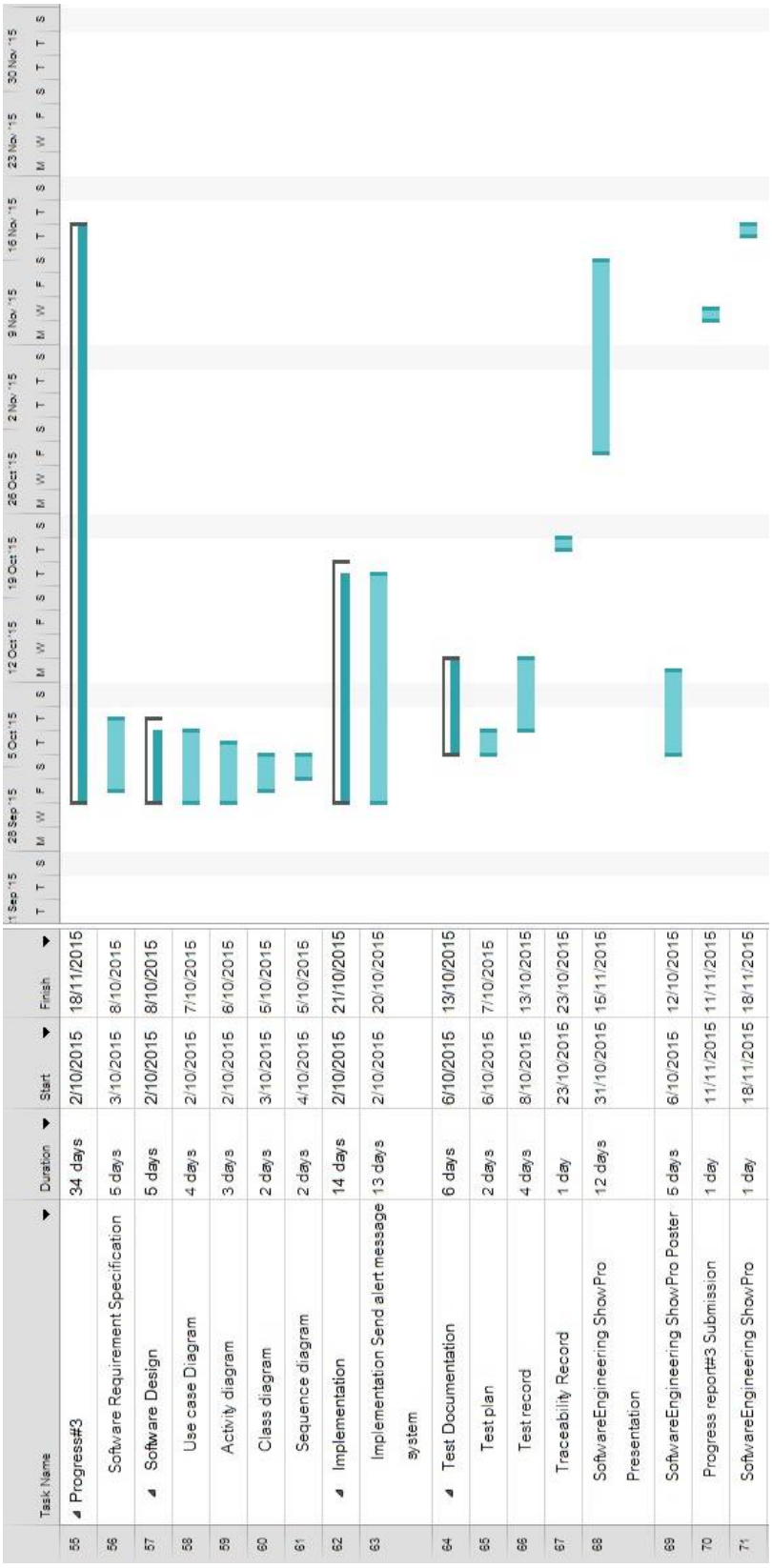
	Task Name	Duration	Start	Finish
18	◢ Progress#1	35 days	18/6/2015	5/8/2015
19	Software Requirement Specification	20 days	18/6/2015	15/7/2015
20	◢ Software Design	13 days	19/6/2015	7/7/2015
21	Use case Diagram	3 days	19/6/2015	23/6/2015
22	Activity diagram	3 days	21/6/2015	23/6/2015
23	Class diagram	2 days	21/6/2015	22/6/2015
24	Sequence diagram	2 days	23/6/2015	24/6/2015
25	◢ Implementation	14 days	18/6/2015	7/7/2015
26	Implementation Registration system	5 days	18/6/2015	24/6/2015
27	Implementation Login system	5 days	21/6/2015	25/6/2015
28	Implementation QR code reader	4 days	1/7/2015	6/7/2015
29	Implementation QR generator	4 days	1/7/2015	6/7/2015
30	Implementation Checking attendance system	7 days	21/6/2015	29/6/2015
31	◢ Test Documentation	9 days	1/7/2015	13/7/2015
32	Test plan	8 days	1/7/2015	10/7/2015
33	Test record	8 days	2/7/2015	13/7/2015
34	Traceability Record	1 day	23/7/2015	23/7/2015
35	Progress report#1 Submission	1 day	29/7/2015	29/7/2015
36	Progress report#1 Presentaion	2 days	4/8/2015	5/8/2015

***Figure 4** Progress 1*



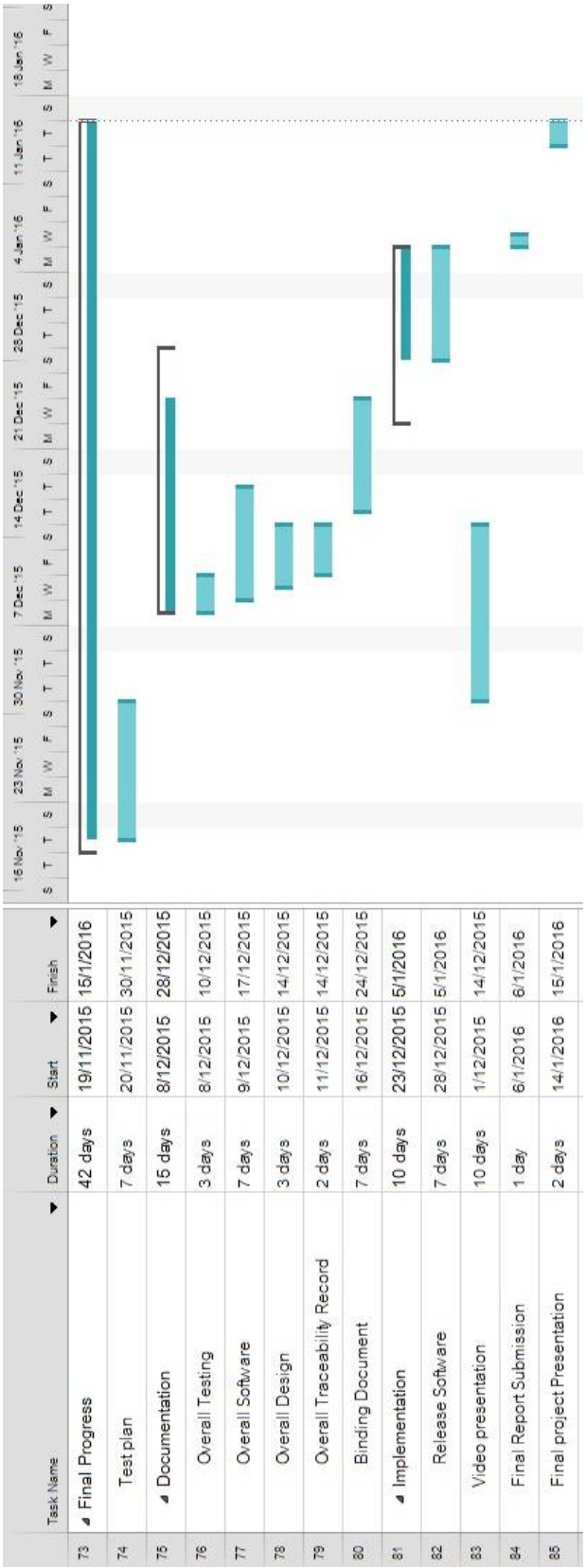
	Task Name	Duration	Start	Finish
37	◢ Progress#2	41 days	6/8/2015	1/10/2015
38	Software Requirement Specification	20 days	20/8/2015	16/9/2015
39	◢ Software Design	14 days	9/8/2015	26/8/2015
40	Use case Diagram	3 days	18/8/2015	20/8/2015
41	Activity diagram	4 days	20/8/2015	25/8/2015
42	Class diagram Feature	4 days	22/8/2015	26/8/2015
43	Sequence diagram	4 days	20/8/2015	25/8/2015
44	◢ Implementation	18 days	28/8/2015	22/9/2015
45	Implementation Parent notifying message system	5 days	27/8/2015	2/9/2015
46	Implementation Cancelling the school bus ride system	5 days	29/8/2015	3/9/2015
47	Implementation Tracking system	4 days	22/8/2015	26/8/2015
48	Implementation Calculating approximate arrival time system	4 days	25/8/2015	28/8/2015
49	◢ Test Documentation	15 days	26/8/2015	15/9/2015
50	Test plan	3 days	26/8/2015	28/8/2015
51	Test record	5 days	28/8/2015	3/9/2015
52	Traceability Record	1 day	10/9/2015	10/9/2015
53	Progress report#2 Submission	1 day	12/9/2015	12/9/2015
54	Progress report#2 Presentation	2 days	13/9/2015	14/9/2015

***Figure 5** Progress II*



	Task Name	Duration	Start	Finish
55	Progress#3	34 days	2/10/2015	18/11/2015
56	Software Requirement Specification	5 days	3/10/2015	8/10/2015
57	Software Design	5 days	2/10/2015	8/10/2015
58	Use case Diagram	4 days	2/10/2015	7/10/2015
59	Activity diagram	3 days	2/10/2015	6/10/2015
60	Class diagram	2 days	3/10/2015	5/10/2015
61	Sequence diagram	2 days	4/10/2015	5/10/2015
62	Implementation	14 days	2/10/2015	21/10/2015
63	Implementation Send alert message system	13 days	2/10/2015	20/10/2015
64	Test Documentation	6 days	6/10/2015	13/10/2015
65	Test plan	2 days	6/10/2015	7/10/2015
66	Test record	4 days	8/10/2015	13/10/2015
67	Traceability Record	1 day	23/10/2015	23/10/2015
68	SoftwareEngineering ShowPro Presentation	12 days	31/10/2015	15/11/2015
69	SoftwareEngineering ShowPro Poster	5 days	6/10/2015	12/10/2015
70	Progress report#3 Submission	1 day	11/11/2015	11/11/2015
71	SoftwareEngineering ShowPro	1 day	18/11/2015	18/11/2015

***Figure 6** Progress III*



	Task Name	Duration	Start	Finish
73	Final Progress	42 days	19/11/2015	15/1/2016
74	Test plan	7 days	20/11/2015	30/11/2015
75	Documentation	15 days	8/12/2015	28/12/2015
76	Overall Testing	3 days	8/12/2015	10/12/2015
77	Overall Software	7 days	9/12/2015	17/12/2015
78	Overall Design	3 days	10/12/2015	14/12/2015
79	Overall Traceability Record	2 days	11/12/2015	14/12/2015
80	Binding Document	7 days	16/12/2015	24/12/2015
81	Implementation	10 days	23/12/2015	5/1/2016
82	Release Software	7 days	28/12/2015	5/1/2016
83	Video presentation	10 days	1/12/2015	14/12/2015
84	Final Report Submission	1 day	6/1/2016	6/1/2016
85	Final project Presentation	2 days	14/1/2016	15/1/2016

***Figure 7** Final Progress*

Chapter Six | Software Configuration Management

6.1 Software Configuration Management

Software Configuration Management can coordinate the software management, which can minimize the confusion in the development. It is a set of activities designed to control changes by identifying the parts of the development that is likely to be changed, establishing relationships among them, defining mechanisms for managing different versions of them, controlling the changes imposed, and auditing and reporting on the changes made. In a word, Software Configuration Management is a methodology to control and manage a software development with its configuration. It can determine what to change and who to be responsible for the change when something goes wrong.

6.2 Filename Format

For the filename format that we use for all project documents is:
School Bus Tracking and Attendance Checking _ [Document name] _V [Version].file type

6.3 Change Management

Change Management manages all the changes in the software development of the project. All the change requests will be recorded in the Change Request Document. We use the strategy for change management as following steps:

1. Analyzing the change.
2. Designing the change plan.
3. Requesting for the change.
4. Approving the change request by project advisor.
5. Implementing the change as the approved change request.

6.4 Software Configuration Item Table

No.	Item	Filename	File Type	Owner	Path	Baseline Version
1	Project Proposal	School Bus Tracking and AttendanceChecking-ProjectProposal-V.1.2	.docx	TT, PT	School Bus Tracking and Attendance Checking /Proposal	1.2
2	Project Plan	School Bus Tracking and AttendanceChecking-ProjectPlan-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Project Plan	1.0
3	Software Requirement Specification	School Bus Tracking and AttendanceChecking-SoftwareRequirementSpecification-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Software Requirement Specification	1.0
4	Software Design	School Bus Tracking and AttendanceChecking-SoftwareDesign -V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Software Design	1.0
5	Test Plan	School Bus Tracking and AttendanceChecking-TestPlan-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Teat Plan	1.0
6	Test Record	School Bus Tracking and AttendanceChecking-TestRecord-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Test Record	1.0
7	Traceability Record	School Bus Tracking and AttendanceChecking-TraceabilityRecord-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Traceability Record	1.0
8	Executive Summary	School Bus Tracking and AttendanceChecking-ExecutiveSummary-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Executive Summary	1.0
9	Project Status Report	School Bus Tracking and AttendanceChecking-ProjectStatusReport-V.1.0	.docx	TT, PT	School Bus Tracking and Attendance Checking /Project Status Report	1.0

Chapter Seven | Estimated Effort and Cost

Most cost will come from learning materials and the hard copy documents. Because for this project, we develop our application with open source tools. So the most cost will be spent on buying some learning textbooks and printing the documents.

Item	Approximately Cost (THB)
Text Books	1,000
Android Device for testing the system	4,500
Document Printing	1,000
Poster Presentation	500

Chapter Eight | Risk Management

8.1 Risk Management Process

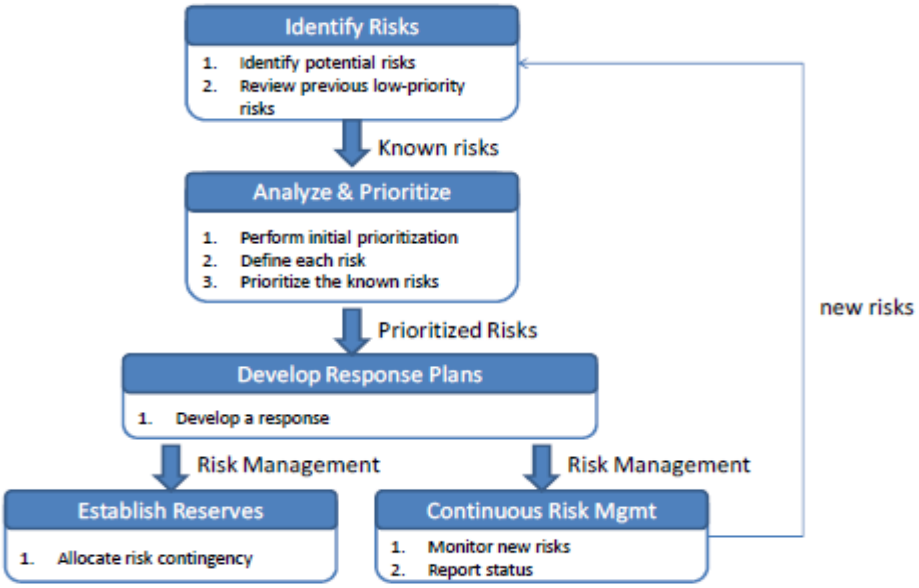


Figure 8 *Risk Management Process*

First step, identify project and business risks that have the potential of affecting the project and documenting the risk's characteristics.

Second step, Identify and assess the probability and impact of the risks.

Third step, come up with plans that will minimize or avoid threats and maximize opportunities.

a. Accepting the risk

b. Avoid the risk

c. Contingency plans

d. Transfer the risk

e. Mitigate the risk

8.2 Risk Identification and Solutions

Three criterion:

L-Low, **N**-Normal, **H**-High

Technology failure

Risk ID	Headline	Description	Priority Level	Impact	Likelihood of Event	Mitigation Strategy
1	Server fail	Some factors lead to the situation where the server cannot provide accurate data.	N	Users may not be satisfied with the application.	Certainty	Exception Handling. Displaying proper messages for the users.

Human failure

Risk ID	Headline	Description	Priority Level	Impact	Likelihood of Event	Mitigation Strategy
2	Lack of responsibility of team's member	A member of the team cannot finish her task on time, or cannot meet the requirement of the project.	H	The project cannot be delivered in time.	Somewhat likely	Report every team member's work at project meetings, and discuss what should they finish before next meeting.
3	Lack of skills	A member of the team does not have experience and skill to do the project. To find/create certain functions,	H	It may lead to the situation where the project cannot finish in time.	Certainty	Practice and training

		developers take a longer time since they need to gather knowledge first.				
4	A team member gets sick or has an accident	A team member may get sick or has an accident, and cannot work on the project.	L	It may lead to the situation where the project cannot finish in time.	Somewhat likely	· Adjust the plans and schedules. · The absent member should assign works to the other member who can continue work on the project

Process failure

Risk ID	Headline	Description	Priority Level	Impact	Likelihood of Event	Mitigation Strategy
5	Project schedule changes.	Some factors may force the project schedule to change.	H	Influence progress	Certainty	Create comprehensive project timeline and adjust the project schedule according to the requirements.
6	The system faces reliability or stability	Users cannot use the application or cannot get complete information because of unexpected external factors.	N	Users may not be satisfied with the application.	Somewhat likely	Manage the application and maintain the system timely.
7	Requirements might change.	New ideas from stakeholders make the project	H	Affect the process of the application development.	Certainty	· Before developing each function, understand the needs as much as possible. ·

		requirements change.				Meet and discuss with other stakeholders.
8	Tasks are not completed in time.	Some factors may lead to the situation where the team members cannot finish their work in time	N	Influence progress, and affect the delivery time.	Somewhat likely	· In project planning, team members should reserve buffer time. · Meet with team members and find solutions.
9	Work cannot be traced.	The change of the requirement may lead us to change our previous work	H	Spend a lot of time to trace back the changes.	Somewhat likely	Create the traceability record.
10	Works do not meet the requirements.	Team members did not understand the requirement clearly.	L	· Spend a lot of time to change. · Cannot deliver the project in time.	Somewhat likely	Have a frequent meeting and share members' understanding of the requirements.

Chapter Nine | Reference

[1] *"A Production Model for Construction: A Theoretical Framework."*[Online]. Retrieved June 21, 2015, from http://en.wikipedia.org/?title=Risk

[2] *Definition of risk management.* [Online]. Retrieved June 21, 2015, from http://energy.gov/sites/prod/files/cioprod/documents/Risk_Management.pdf

[3] *Definition of traceability.* [Online]. Retrieved June 21, 2015, from http://en.wikipedia.org/wiki/Traceability

[4] *Definition of unit test.* [Online]. Retrieved June 21, 2015, from http://en.wikipedia.org/wiki/Unit_testing

[5] Definition of configuration item http://www.businessdictionary.com/definition/configuration-item.html

[6] *Iterative model.* [Online]. Retrieved June 21, 2015, from http://www.voltreach.com/Development_Methodologies.aspx

[7] *Android Studio*. [Online]. Retrieved 5 June 2015, from https://cetatech.ceta-ciemat.es/2015/02/atajos-imprescindibles-en-android-studio

[8] *MySQL*. [Online]. Retrieved June 7, 2015, from https://www.otreva.com/blog/mysql-execute-immediate-solution

[9] *What is the Google Maps API?*. (2015). [Online]. Retrieved June 10, 2015, from http://en.wikipedia.org/wiki/Google_Maps