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| Imam Abdulrahman Bin Faisal University |
| College of Computer Science & Information Technology  Department of Computer Science |

**CS 411 – Software Engineering**

**Term 1 – 20…./20…**

Software Project Management Plans

For

Railway.Manage();



Version 0.1

CS Year 4, G1

Ms.Wadha Almattar

*October 20,2018*

This Software Project Management Plans (SPMP) was prepared and provided as a deliverable for Software Engineering, CS 411, Term 1, and it will be used by Operator and Passenger.

This document is based in part on the IEEE Recommended Practice for SPMP Descriptions.

Team Members:

|  |  |  |  |
| --- | --- | --- | --- |
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# Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Date** | **Reason For Changes** | **Version** |
| All members | Oct 20, 2013 | Prepared initial version | 0.1 |

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# Project Overview

This section will cover the goal, purpose and objectives of the delivered system. Additionally, it will provide an overview of the constraints, whether they are financial or practical, the schedule of delivering the project and will also contain a plan for the successful fulfillment of the goals needed to execute Railway. Manage(); effectively.  
By establishing these points, it will hopefully provide a clearer understanding of the system’s development progress.

## Purpose, Scope, and Objectives

Railway.Manage(); is a system intended to create a digital environment that eases the organization and maintenance of a train station, by way of enabling passengers to access the time table of any station, book a trip or inquire about their ticket information at any time.  
Additionally, operators are able to edit, delete or add any entry to the timetable through the use of the features offered to them in the system.  
The system is designed to operate on multiple stations across the major cities of the country; any passenger of these stations can benefit from the system, whether they use it to purchase a ticket or to merely check the timetable of the station. Furthermore, by utilizing the functions offered to the operators, organizing the station’s workflow can be straightforward and simple.  
Since the system is intended to provide many features, many technical and elemental requirements must be fulfilled in order to produce a system capable of satisfying these demands.  
For instance, an observational study will be done to examine the previously used systems in this field, maintenance and regular meeting with the operators is also demanded to guarantee that the system is executed efficiently.  
This system is intended to be established from zero, there will be no modifications to any previously made systems, however some existing tools might be used in the development of this project(after getting permission from their developers.).  
Railway.Manage ();’s top priority is to deliver a system that can is very simple to use, easily understandable, and clear to any user. In pursuit of that, the team will work hand in hand with the sponsor to accomplish all the client’s requirements before the deadline.

## Assumptions, Constraints and Risks

Table 1 will cover the team’s assumptions regarding the development of Railway.Manage(); system, the risks that might be faced (Detailed further in section 3.4), and and overview of the constraints that the project is based upon.

Table 1: Railway. Manage();Assumption, Constraints and Risks

|  |  |
| --- | --- |
| Type | Specifications |
| Assumptions | All team members have experience in working with software development, have previous knowledge in programming and database management. |
| Client and sponsor are aware that the team is working remotely. |
| Meeting will be once a week to discuss the progress of the project. |
| The project will operate on PCs. |
| Constraints | Since the team is working remotely, communication will be limited. |
| Team members are working on multiple projects, aside from Railway.Manage();. |
| Development of this project must be finished in the span of four months only. |
| Sponsor is rarely available for face-to-face meetings. |
| Risks | Miscommunication amongst team members or sponsor. |
| Changes to the project’s specifications or requirements. |
| Unavailability of the required tools or resources. |
| Loss or corruption of files during their exchange amongst the development team. |

## Project Deliverables

Table 2 provides the schedule in which the project’s deliverables are conducted, note that any changes made by the client will affect the expected due date.

Table 2 : Railway.Manage();Deliverables

|  |  |  |  |
| --- | --- | --- | --- |
| Deliverable : | Definition : | Form : | Expected Date: |
| Project Definition | Track Inc. Mr. Albert Peterson | Soft and hard copy. | October 25, 2018 |
| Project Proposal | Track Inc.  Mr. Albert Peterson | Soft and hard copy. | October 30, 2018 |
| Submit Project Management Plan (SPMP) | Track Inc.  Mr. Albert Peterson | Soft and hard copy. | November 11, 2018 |
| Requirements Analysis Document | Mr. Albert Peterson | Soft and hard copy. | November 20, 2018 |
| Status Report | Track Inc.  Mr. Albert Peterson | Soft copy. | November 27, 2018 |
| Submit Project Design (SDS) | Mr. Albert Peterson | Soft copy. | December 5, 2018 |
| Submit Test Plan (STP) | Mr. Albert Peterson | Soft and hard copy. | December 20, 2018 |
| Delivery of Complete Project | Track Inc.  Mr. Albert Peterson | Soft copy. | January 13, 2019 |

## Schedule and Budget Summary A budget of 23.000 will be allocated to fund this project, finances and hardware equipment will be provided by the project’s sponsor Track Inc., please note that additional charges might be added if the client wishes to have any changes to the initial requirements. The expected date to deliver the complete project is on January 13-2019 ,no more than 3 months will be spent on delivering the system.

## Evolution of the Plan

This is the initial document for the Project Management Plan, which follows the IEEE Standard for Software Project.

If any modifications are required as the team and the sponsor proceed with the project’s development, this document will be updated accordingly with the necessary changes.

No modifications will be done unless they are approved by the client and the sponsor. To ensure that possible changes are incorporated effectively, team members will hold a meeting if major changes occurred to discuss the necessary actions to take.

## References

**Listed below are the references used in this document:**[1] IEEE Standard for Software Project. [Online] 1998. IEEE Std 1058-1998.  
[2] Furia, L. D. (2016, October 04). The Seven Activities of Project Closeout. Retrieved October 19, 2018, from https://www.strategyex.co.uk/blog/pmoperspectives/seven-activities-project-closeout/

## Definitions and Acronyms

Any technical terminology mentioned in this document is specified and explained in Table 3

Table 3: List of Definitions .

|  |  |
| --- | --- |
| Terminology: | Definition: |
| SPMP | Software Project Management Plan is a complete plan for software development that includes standards, methods and tools needed for development. As well as stating the budget and duration of the project. |
| IEEE Standard | A universal standard followed by software developers. |
| Program | A set of instructions for the computer to follow. |
| Github | An application that allows for files exchange amongst a team. |
| Zoom | A software capable of allowing its users to communicate via a network. |
| Object-oriented | A programming method that involves using objects. |
| Waterfall Model | A development model in where phases are followed by each other, with no interleaved phases. |
| STP | A test plan that coordinates any tests made in software development, to make sure that the project fulfils its preconditions. |
| SRS | A document that specifies all the requirements that needs to be completed before the completion of the project. |

Table 4 below defines the acronyms used in this document:

Table 4:lists all the acronyms used in this document.

|  |  |
| --- | --- |
| Acronym: | Definition: |
| IEEE | Institute of Electrical and Electronics Engineers |
| DB | Database |
| E-mail | Electronic Mail |
| SPMP | Software Project Management Plan |
| SRS | Software Requirement Specification |
| STP | Software Test Plan |
| IDE | Integrated Development Environment |
| IAU | Imam Abdulrahman University |
| LAN | Local Area Network |
| WAN | Wide Area Network |
| SR | Saudi Riyal |
| SQL | Structured Query Language |
| PC | Personal Computer |

## Document Structure

This document is broken into 6 sections as described below.

1. Section 1: Project Overview.   
   This section of the document provides an overview of the goals, objectives and the scope of the project. As well as the assumptions, risks and constraints of delivering the system.  
   The evolution plan for any modification is also described in this section, alongside the schedule of the arrival of any deliverable, and any acronym or definition needed to understand the document.
2. Section 2: Project Organization.   
   Describes how the project development is organized, the internal structure for its development and the external interfaces of the system.  
   Team members and their respective roles are also identified in this section.
3. Section 4: Managerial Process Plans.   
   This section of the Project Management Plan specifies how the processes will be managed in this project. In addition, it defines the plans for project initialization, risk management, project tracking and project termination.
4. Section 5: Technical Process Plans.  
   In this section, the supporting process plans are stated, alongside the necessary documentation for the completion of this project.
5. Section 6: Additional Plans.  
   States the additional plans the might be necessary to deliver this project.

# Project Organization

This section of the Project Management Plan specifies and defines the project's external interfaces, its internal structure, and the roles and responsibilities that are part of developing this project.

## 2.1 External Interfaces

The communication between the project team and any other external entity (such as the client or the sponsor) is conducted by a selected member of the team, whose responsibility is to conduct any negotiations or to deliver any increment to the client in the dedicated time.  
 Figure 1 shows the external interfaces

Figure 1: Railway. Manage(); and its external interfaces

RTM is the parent organization of the project.   
Track Inc is the sponsor of the project Railway.Manage(); , while Mr. Albert Peterson is the client. There are no other organizations involved in the development of Railway.Manage();

## 2.2 Internal Structure

The development of Railway.Manage(); will be conducted by the following members of our team at RTM: Muneera Alhajri, Reema Alyousef, Rahaf Alzahrani and Tasneem Dosoqi.   
Ms. Wadha Almattar will be the supervisor who is tasked with reviewing the team’s submissions and confirming that all the increments are completed successfully.

Since the team is working remotely, it is difficult to arrange daily meetings in which all the team members are capable of attending. Therefore, most of the communication will be handled via E-mail, Zoom, or GitHub, in addition to a meeting that will be conducted once every week to share the knowledge and progress of every member, discuss the deliverables or plan for next week’s increments.

The structure of the team will be hierarchical as shown in Figure 2. The composition of the team is a combination of different personalities, experiences and skills. It was crucial for the team to have at least one interaction-oriented member who possess the negotiation skill required to interact with any external interfaces.

The team holds other technical skills that will surely be beneficial in delivering any increments throughout the course of delivering the project, such as technical writing, problem solving and critical thinking. Figure 3 shows the project’s organizational structure.

Figure 2: Project Team Members

Figure 3 : Project's Organizational Structure

## 2.3 Roles and Responsibilities

Table 5 introduces the team members of the Railway.Manage (); project and their respective roles and responsibilities to ensure the successful delivery of the increments.

Table 5: Table 5 Railway.Manage(); Project Roles and Responsibilities

|  |  |  |
| --- | --- | --- |
| Name | Role | Responsibilities |
| Ms. Wadha Almattar | Project Supervisor | * Oversees the all the delivered increments and handles any inquiries from the team members. * Assesses the quality of each deliverable. |
| Muneera abdullah alhajri | Project Manager | * Defines the project’s goals and objectives. * Assigns suitable tasks to the team members. * Keeps members motivated during the development course to complete their tasks accordingly and maintain the planned progress. * Analyzes the user’s needs and the developer requirements specification. |
| Leader : Tasneem Hamdy Dosoqi  All members | Testing Team Leader | * Develops and defines the system’s test plan. * Handles testing and modifying systems. * Documents issues, testing methods and expected outputs. * Monitors the testing schedule. |
| Specialist: Rahaf Saleh Alzahrani  All members | Research and Development | * Conducts a research to select the optimal tools, methods and programming language for developing the system. * Generates the development strategy suitable for the project. |
| Leader : Reema Ibrahim Alyousef  All members | Software Design | * Designs the prototype for showing the interfaces, functions and flow of the system. * Designs the databases and the following data models. * Creates the source code for the program and integrates the various system parts. |
| All members | Technical Writers | * Writes the project’s technical documentations. |
| Track Inc. | Deputy Project Manager | * Covers the financial aspects of the project. |

# Managerial Process Plans

This section specifies the project management processes for the project. This section also defines the plans for the project’s start‑up, risk management, project work, project tracking and project close‑out.

## 3.1 Start‑up Plan

The start-up plan includes an estimate of the processes needed to complete the project, it also provides enough details about the project’s staff and the needed training to develop their skills.

### 3.1.1 Estimates

Each project phase or deliverable should be regularly amended as the project progresses, which will be estimated in terms of cost, human resources and effort.

The project cost estimation will take hardware, software, training and effort into account. Since the requirements are likely to change during project phases, the cost may be increased. (each task duration is detailed in Figure 4 below)

The whole development of this project will take no more than 3 months, 5 days a week. In case of a time crunch the team will be paid for any overtime that might occur, any other expenses will be covered by the sponsor Track Inc, including transportation, hardware or software.  
  
Before conducting the project, the team will have a meeting to discuss the methods and techniques that will be utilized to complete this project.

### 3.1.2 Staffing

The project team member will be composed of 5 members, who all study at Imam Abdulrahman Bin Faisal University and are from level 7. All the team members must know and agree on the deadline for delivering the whole project, which is on January 2019.   
The team members should be experienced in several programming languages (e.g. C++ and java), they are also required to have basic knowledge about handling databases, be accustomed to both decision-making, and problem-solving to deal with small simple problems as well as significant issues. Alongside being skilled in technical writing to produce the reports and documents necessary for the development of the project.   
All the team members should possess good communicational skills, especially the team leader who is tasked with motivating the members and negotiating with both the client and the sponsor.

Table 6 below summarizes the project’s phases and the necessary duration.

Table 6: Project's Staffing Plan

|  |  |  |
| --- | --- | --- |
| Project phase | Human Resource | Duration |
| Project Definition | Team members,  Track Inc. Mr. Albert Peterson | One Week |
| Project Proposal | Team members,  Track Inc.  Mr. Albert Peterson | One Week |
| Submit Project Management Plan (SPMP) | Team members,  Track Inc.  Mr. Albert Peterson | Two weeks |
| Requirements Analysis Document | Team members,  Track Inc.  Mr. Albert Peterson | Two weeks |
| Status Report | Team members,  Track Inc.  Mr. Albert Peterson | One weeks |
| Submit Project Design (SDS) | Team members,  Track Inc.  Mr. Albert Peterson | Two weeks |
| Submit Test Plan (STP) | Team members,  Track Inc.  Mr. Albert Peterson | Two weeks |
| Delivery of Complete Project | Team members,  Track Inc.  Mr. Albert Peterson | Three weeks |

### 

### 3.1.3 Project Staff Training

Staff training is an important aspect that is necessary to build an expert and cohesive team that leads to a successful development.  RMT makes sure that the necessary skills are found in each member by providing training courses, consultations and mentoring to develop all the skills needed for the Railway.Manage(); project.   
Additionally, the team members have the responsibility to familiarize themselves with using tools like Zoom and GitHub as well as Outlook E-mails, which will be the main mediums for online communication amongst the members. Table 7 below illustrates some of the skills the team members are expected to have:

Table 7: expected skills for project staff

|  |  |
| --- | --- |
| Role | Skills |
| Project manager | * Leadership skills * Team management skills * Decision making skills * Personal skills * Communication skills |
| Interface designer | * Web development skills * Technical skills * Attention to details * Technical knowledge (e.g. Adobe photoshop) * Creativity skills |
| Database designer | * Technical knowledge (DBMS, SQL) * Team working skills * Designing ER |
| Planning team | * Analytical skills * Personal skills * Critical thinking skills |
| Technical writer | * Research skills * Writing skills |
| Communications manager | * Negotiation skills * Problem-solving skills * Speaking skills |
| Risk manager | * Problem-solving skills * Decision making skills * Critical thinking skills |

## 3.2 Work Plan

The work plan will specify how the activities, schedule, resources and budget are allocated.

### 3.2.1 Work Breakdown Structure

Since various activities are needed to be performed in the project, the project manager will be responsible for breaking down these activities into tasks and assigning them to the team members based on their experience in the needed field. As well as defining the effort and dependency of these tasks on each other.  
The overall project plan for the for the Railway.Manage(); team is given in table 8 below.

Table 8: Railway.Manage(); Scheduled Activities

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Task Number | Task Name | Deliverable for the task | Start date | Finish date | Status | Dependency |
| 1 | project proposal | Document | October 30, 2018 | October 30, 2018 | Completed |  |
| 2 | Project Planning (SPMP) | Document | November 11, 2018 | November 19, 2018 | Completed |  |
| 3 | project  requirements (SRS) | Document | November 20, 2018 | November 26, 2018 | Not Completed |  |
| 4 | Status Report | Document | November 27, 2018 | November 11, 2018 | Not Completed |  |
| 5 | Design (SDS) | Document | December 5, 2018 | December 6, 2018 | Not Completed |  |
| 6 | Implementation |  | December 7, 2018 |  | Not Completed | 5 |
| 6.1 | Interfaces | Screenshots | December 7, 2018 | December 9, 2018 | Not Completed |  |
| 6.2 | develop the database |  | December 10, 2018 | December 15, 2018 | Not Completed | 5 |
| 6.3 | connect database with the code | Database | December 16, 2018 | December 18, 2018 | Not Completed | 6.2 |
| 6.4 | Writing the code | NetBeans | December 18, 2018 | December 29, 2018 | Not Completed | 6.1, 6.2 |
| 7 | Test the project (STS) | Document | December 30, 2018 | January 6, 2019 | Not Completed | 6.3,6.4 |
| 8 | final project | Document | January 7, 2019 | January 13, 2019 | Not Completed | 7 |

### 3.2.2 Schedule Allocation

Figure 4 below illustrates the time allocated for each task mentioned in Table 8

from the starting point of the project till its end. Each task will perform in 1 - 3 weeks.

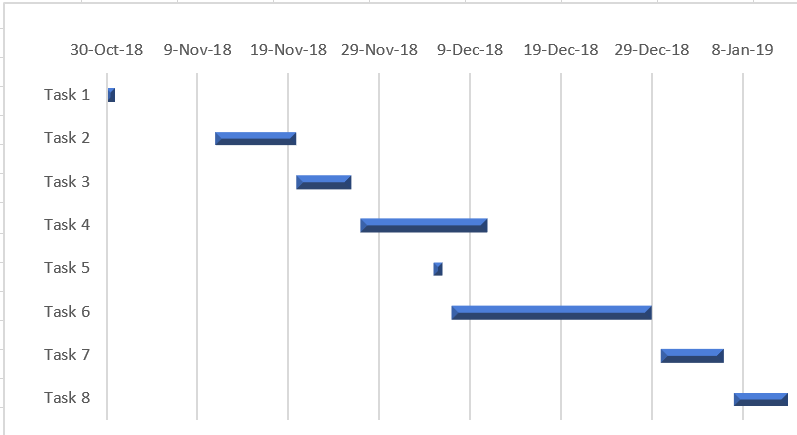


Figure 4: schedule allocation

### 3.2.3 Resource Allocation

table 9 below displays some of the required resources for the Railway.Manage(); project. These resources include both human or non-human.

Table 9: Railway.Manage(); resource allocation

|  |  |  |  |
| --- | --- | --- | --- |
| Task Number | Task Name | Non-human resources | Human resources |
| 1 | project proposal | * Word processor * Excel * Printer | * All the team member * Project advisor: Mrs. Wadha Almattar. |
| 2 | Project Planning (SPMP) |
| 3 | project  requirements (SRS) |
| 4 | Status Report |
| 5 | Design (SDS) | * MySQL * NetBeans IDE |
| 6 | Implementation |
| 6.1 | Interfaces | * GUI components * NetBeans IDE * Photoshop |
| 6.2 | develop the database | * MySQL |
| 6.3 | connect database with the code | * MySQL * NetBeans IDE |
| 6.4 | Writing the code | * NetBeans IDE |
| 7 | Test the project (STS) | * MySQL * NetBeans IDE * Word processor * printer |
| 8 | final project | * Word processor * PowerPoint * printer |

### 3.2.4 Budget Allocation

The project sponsor Track Inc will provide the financial support for the project. The following will be supplied by Track Inc in case of its unavailability:

* PCs for writing reports, designing project and databases.
* Software needed for coding and creating DBs and testing.
* Tools needed to aid in programming or designing the system.
* Printer, to print all the documents and reports needed to complete the project.

Before the final delivery, a beta test will be performed to make sure that the system is delivered successfully with no issues, which will cost approximately 4000 SR.  
Moreover, RMT will give a financial reward (2000 SR) to each member of the team in order to motivate them.

## 3.3 Project Tracking Plan

This section concentrates on requirements management, quality control, reporting mechanisms and project metrics. These subsections are important for managing and controlling the quality of whole project.

### 3.3.1 Requirements Management

When working on the project, every small detail is crucial for developing a successful and powerful software. During the specification stage, the client must explain each requirement clearly and use clear language and expressions to clarify any misunderstanding in the requirement.

The requirement should be written in great detail and be clearly stated. The requirements for Railway.Manage(); project will be documented in the SRS.   
Additionally, there will be a contract between the client and the project team in case of needing a change in the requirements later on.   
If the requirements are changed in the incoming stages, extra costs will be charged on the client, these costs will cover both the cost of the rework needed to be done and the new mythology that will be implemented.

In order to implement these changes, the requirement document must be updated to accommodate the changes and must also be approved by client, advisor and all the team members. Each phase of the project should be traceable back to the SRS during meetings.  
In order to cope with the changing requirements, the team member will conduct the following:

* Software prototyping will be delivered quickly to the client to check the requirement.
* The software system will be delivered as an increment to the client for feedback.

### 3.3.2 Schedule Control

The planning manager is responsible for updating the activity state schedule (stated in 3.2.1) regularly, and reporting on activity that is late. They are also responsible of confirming that the plan is followed smoothly and accurately.  
During meetings, the progress will be discussed with the project advisor to make sure that there are no issues in delivering the increments before the deadline. If any team member wishes to postpone the deadline for any activity, it will be the duty of said member to report this issue to the planning manager to get an approval on extending the deadline.  
Additionally, in case of a delayed activity, certain techniques and methods will conducted to assist the suitable action to take in its regard.

### 3.3.4 Quality Control

Quality control plan plays an important role in each phase of the project. By following this plan, each deliverable is assessed by universal standards to ensure that it meets the client’s expectations.  
Quality control is conducted by each member during the span of the development, either by finding errors, deficiencies and correcting them, or by measuring the efficiency of each action they make.   
The team manager and supervisor are mainly concerned with the assessment of each deliverable.

Note that before each increment delivered, it must be checked, reviewed and tested by generating hypothesis about that particular increment and testing it several times to make sure it works successfully and meets the requirement and expectations of the client.

### 3.3.5 Reporting

For reporting mechanisms and communication, two methods are followed as listed below:

**3.3.5.1 internal reporting**

The communication between team members will be online via e-mail or GitHub to share the progress of each member, or face to face if any network issues arise.  
Team members will communicate informally amongst each other, while increments will be delivered to the team manager before the deadline.

**3.3.5.2 external reporting**

The communication between team members and the project stakeholders will be done by the communication manager who will be responsible for reporting any updates of the project to the various project stakeholders and the advisor. This will be done in a more formal way, either by delivering it directly or using the company’s official e-mail address.

### 3.3.6 Project Metrics

The project metrics’ purpose is to measure the efficiency and quality of the project. The metrics considered in the project are shown below in table 10.

Table 10: project metrics.

|  |  |  |
| --- | --- | --- |
| Metric | Question | Comments |
| Time | How long does it take to deliver an increment by the given deadline? | The progress of the team members will be checked in section 3.2.1. |
| Production | How much work is done? |
| Quality | Are problems solved? | Problems that appear during testing must be fixed before delivering. |
| Risk managing | How was the risk managed? | The risks are managed as shown in section 3.4. |
| Requirement change | Does the change affect the progress? | Different strategies are set for coping with change. |

**3.4 Risk Management Plan**  
This section of the Project Management Plan specifies the risk management plan, which will be conducted in order to identify, clarify, analyze and prioritize possible risk factors that may stop or delay the development. Some of these risk factors are common among all software projects, and some of them are closely associated with Railway.Manage (); .

**1. Unavailable common time between the team member :**

Risk Type: People risk

Probability: Moderate

Effects: Serious

Action: Attempt to find a common time in which all member are free.

Prevention: All members should neglect their other projects temporarily and focus on Railway.Manage();

**2. Miscommunication :**

Risk Type: People risk

Probability: Moderate

Effects: Serious

Action: Confirm the understanding of each team member before conducting an action, and allowing each member to contribute to the team.

Prevention: take the first 15 min of every weekly meeting to perform ice breaking activities for a better communication among all team members.

**3. Absence of team members due the Illness or private issues :**

Risk Type: People risk

Probability: Low

Effects: Serious

Action: Arrange additional meeting if needed.

Prevention: Warning for any member with constant absence.

**4. Missed Deadlines:**

Risk Type: Estimation

Probability: low

Effects: insignificant

Action: in every weekly meeting, every member should list what is done and what is yet to be done to

ensure that the plan is followed successfully

Prevention: Multiple delays from the same member will cause a serious discussion with faculty

advisors and potential removal from the team.

**5. Requirements change :**

Risk Type: Requirements

Probability: Moderate

Effects: Tolerable

Action: Adapt to the new requirement

Prevention: Arrange extra meeting with the client to identify the impact of change in the modified plan.

**6. Lack of knowledge:**

Risk Type: Estimation

Probability: Moderate

Effects: Catastrophic

Action: Seeking knowledge.

Prevention: Further research, or to ask for help from experienced sources.

## Project Closeout Plan

Project closeout confirms that all project activities and increments are completed by January 2018; The aim for the closeout plan is to end the project in a way that reflects favourably upon the team, the team leader and the organization. This phase requires the completion of the seven activities. Approval should be done by both the client, team members and supervisor. [2]

The following should be completed by the final deadline:

* Project proposal
* SMPM document.
* SRS document.
* Status report
* SDS document.
* STP document.
* The final program.

# Technical Process Plans

This section explains the process model, methods, tools, project’s infrastructure and acceptance.

## 4.1 Process Model

After researching the various models used for software development, the team has come to the decision that the Waterfall Model is the most suitable for the Railway.Manage(); project.  
The waterfall model fits the nature of this particular project perfectly, especially since the team is working remotely so as each phase of the development ends, the following is passed to the next sub-team for completion. Requirements and specifications are clearly stated before the launch of the development, and a schedule with its start and due-dates is planned in advance.  
Since the waterfall model is used in this project, its five principal phases will be conducted to assure a successful development:

1. **Requirement analysis:** Stating the specifications, requirements and goals of the project to create a SRS document.
2. **System and software design:** a process where the team manages to understand the structure of the project, which results in an SDS document.
3. **Implementation:** Creating the software itself, and its following databases and models.
4. **System testing:** Testing the system as a whole, then confirming that it meets the requirements of the user.
5. **Evolution:** Constant maintenance and upgrades of the system after its release.

## 4.2 Methods, Tools, and Techniques

The team will consider using an object-oriented approach in this project, as well as many tools and applications to aid in the development. Table 11 illustrates how various tools and methods are utilized during the development.

Table 11 lists some below:

|  |  |  |  |
| --- | --- | --- | --- |
| Standard | Methods | Tools | Phase |
| IEEE Std 1058 – 1998 | None | * Microsoft Word | Planning |
| IEEE Std 830 –1998 | * Activity diagrams | * Microsoft word * Smart Art | Requirements Analysis |
| IEEE Std 1016–1998 | * Entity Relationship Diagram * Data flow diagram | * Microsoft word . * Edraw Website . | System Design |
| None | * Design interfaces | * GUI Components * MySQL * NetBeans IDE | Implementation |

## 

## 4.3 Infrastructure

As mentioned before, the team is working remotely so communicational applications will be needed in development of this project, as well as various hardware, and software tools.

Table 12 below displays required development environment:

|  |  |
| --- | --- |
| Infrastructure Plan | |
| Hardware | Each member must have their own PC . |
| Network | * Each member must have an internet to be aware of any update. * High-speed Ethernet LAN and WAN. |
| Communication Medium | * Communication between members will be conducted on the internet , illustrated by using E-mail services. * Team members’ physical meeting will span around 5 - 6 hours per week . * By using GitHub ,Drop Box and Zoom. |
| Operating System | Any operating system would work. However, Windows 10 is preferred. |
| Software | * Microsoft Office. * MySQL . * NetBeans IDE. * Photoshop. |
| Facilities | Each team member must have:   * An internet connection to be aware of each update * Transportation which will be paid by the sponsor. |

## 4.4 Product Acceptance

The team’s greatest priority is to meet client’s needs and to satisfy their expectations, the team will make sure that no phase is moved to unless the previous one is approved by the client.   
In order to achieve that, each requirement must be clearly and explicitly agreed on by both the developers and the client, as well as accepting each milestone of the project formally by signing an appropriate acceptance document.   
Note that an acceptance test must be performed by the client at the end of each phase of document, in order to guarantee that the client views and interacts with the product directly.

# Supporting Process Plans

Documentation of Railway.Manage(); is thoroughly explained in this section

## 5.1 Documentation

There are several documents that will be produced through the timeline of our project. Writing and reviewing the documents is every team member’s responsibility. The list of documents that will be created and maintained and updated include:

Table 13 Railway Manage();

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Document Type | Format Standard | Estimated Page count | Prepare Document | Review Document |
| Defining Project | Provided by supervisor | 1 | All Team Member | Project supervisor: Ms. Wadha Almattar |
| Project Proposal | Provided by supervisor | 3 |
| Project Management Plan (SPMP) | IEEE Std 1058 – 1998 | 24 |
| Project Requirements (SRS) | IEEE Std 830 – 1998 | 11 |
| Project Design (SDS) | IEEE Std 1016 – 1998 | 57 |
| Project Test Plan (STP) | IEEE Std 829 – 1998 | 14 |
| Final Product | Provided by supervisor | 140 |

* **Requirements specification:** a structured document setting out detailed descriptions of the system services written as a contract between the client and the developer.
* **Design specifications:** Describe the design of a system or its component.
* **Test scripts and test results:** Tests that are executed and are essentially recorded in a document.
* **Reviews:** Review documents of all phases of the project.
* **Project Report:** Documents all the work done throughout the development.

# 6. Additional Plans

This section of the SPMP will include the plans for the supporting processes that are part of the software development.

When the development of the project takes off, additional plans might be needed to facilitate some aspects of the project, such as training plans to assure that the client is capable of utilizing the system affectively.   
To achieve that, a workshop will be conducted once the whole system is delivered to the client, as well as sending one of the team members to supervise and oversee the integration of the system in the client’s organization for the first 2 weeks of its implementation.

A user safety manual will be documented separately for the client, to assure that the direct users of this system are following the safety guidelines needed to operate this system.  
Moreover, after the complete development of this project, constant maintenance will be needed which will also be documented in further details in a separate document.