LUMS Campus Navigator

Software Engineering Course Project

Project Plan Document

Group 3

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Instructor

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Contents

1. Project Plan Document

1.1. Project Type

Our Project is a mobile App developed on Android Operating System.

1.2. Process Model

We will be using a Waterfall process model. This is because we have enough time to properly plan our project, design it first, and then implement it.

1.2.1. Project Deliverables

- SRS Document
- Project Plan
- System Design Document
- Test reports
- Final code
- Software manuals i.e. User, Installation.

1.3. Project Tasks

- Tasks to determine product statement:

1. Identify needs and benefits
2. Coordinate with customer i.e. LUMS university in our case.
3. Identify needs and project constraints
4. Define project purpose and scope
5. Identify user characteristics

Milestone: Product statement defined

- Tasks to determine functional specification:

1. Define desired input/output
2. Input functions/output functions
3. Review with Course Instructor, Dr. Hamid Abdul Basit
4. Review with team members

Milestone: Functional specification defined

- Tasks for scheduling:

1. Group meetings schedule with the advisor i.e. Course TA, Shamsa Abid
2. Group meetings schedule of developing team
3. Time-line Chart

Milestone: scheduling accomplished

- Tasks to determine estimation:

1. Cost estimation
2. Software model specified
3. Project based estimation
4. FP calculations
5. Use of empirical cost model COCOMO used
6. H/w and s/w cost estimations
7. Customer meeting
   Milestone: estimations calculated

- Tasks for designing phase:

1. Creating a State Chart
2. Identifying Objects and Classes
3. Identifying their inter-relation and display them with a Collaboration Diagram
4. Identifying sequence of events and display them with a Sequence Diagram
   Milestone: final design

- Tasks for coding/implementation

1. Designing the database in SQL
2. Designing forms in VB.net
3. Connectivity handling
4. Coding of all modules searching, circulation
   Milestone: coding accomplished

- Tasks for risk management:

1. Meeting with LUMS admin
2. Risks identified
   Milestone: risk control achieved

- Tasks for testing:

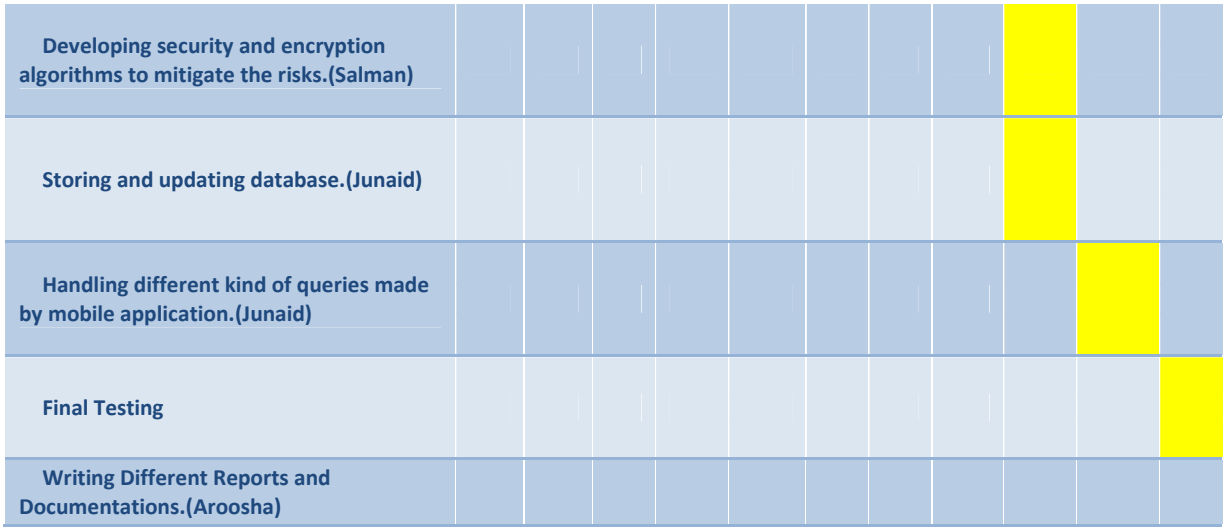
1. Devising test cases
2. Test cases run
3. User response recorded
   Milestone: system tested

1.4. Project Scheduling

The plan for the scheduling covers the entire life cycle of the project. It entails all the activities that must be performed before starting the development work. Later this schedule can be used for monitoring the progress of the project.

1.4.1. Timeline Chart

Planned Starting Date for a task	25-Mar	28-Mar	1-Apr	4-Apr	8-Apr	13-Apr	15-Apr	17-Apr	21-Apr	25-Apr	30-Apr
Planned Duration for a task (Days)	3	3	3	4	5	2	2	4	4	5	2
Tasks											
Developing algorithm for indoor position detection (Salman)											
Developing algorithms for finding the location for the given GPs coordinates.(Salman)											
Developing Algorithms for traversing and finding indoor destination and creating a guiding map for it.(Salman)											
Mobile phone application development that will consist of creating all the GUI.(Nauman)											
Writing Programs to get GPS co-ordinates of a location.(Nauman)											
Writing Programs to get MAC addresses and signal strength of the available Wi-Fi routers.(Nauman)											
LUMS indoor map generation that will include creation of a comprehensive graph and associating it with the indoor detailed image and synchronizing it with the GPS coordinates.(Aroosha)											
Server Side Development.(Junaid)											
Setting up server.(Junaid)											
Designing schemas for our database.(Junaid)											
Creating the Database.(Junaid)											
Handling communication between http and database servers and mobile application.(Junaid)											



1.5. Team Structure

Role	Responsibility	Person
Porject Manager	PM makes sure that team is working good to reach a milestone on time. PM also makes the proposals for the projects which include the timeline, resources, milestones, technical and functional requirements and any related information.	**Aroosha Ahmad**
Lead Developer	Lead Developer is responsible for the development of the project. Lead Developer coordinates and aids the team of developers working on the algorithms used and coding of the project.	**Hafiz Salman Asif**
Developer	Works on implementation and coding.	**Muhammad Junaid Khalid**
Developer	Works on implementation and coding.	**Muhammad Nauman Minhas**

1.6. Task and Member Assignment Table

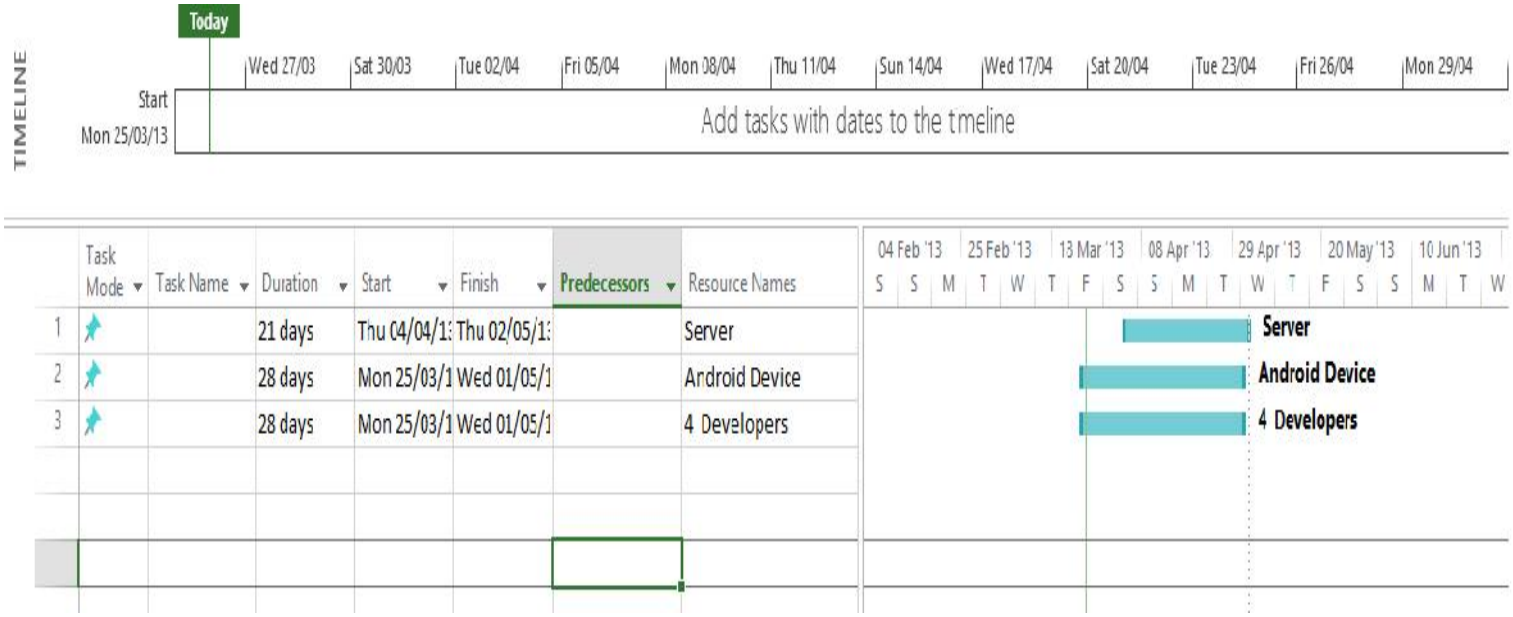
1.6.1. Allocation of People to Activities

No.	*Activities*	*Members*
1.	*Developing an algorithm for indoor position detection*	*Hafiz Salman Asif*
2.	*Developing algorithms for finding the location for the given GPs coordinates*	*Hafiz Salman Asif*
3.	*Developing Algorithms for traversing and finding indoor destination and creating a guiding map for it*	*Hafiz Salman Asif*
4.	*Mobile phone application development that will consist of creating all the GUI*	*Muhammad Nauman Minhas*
5.	*Writing Programs to get GPS co-ordinates of a location*	*Muhammad Nauman Minhas*
6.	*Writing Programs to get MAC addresses and signal strength of the available Wi-Fi routers*	*Muhammad Nauman Minhas*
7.	*LUMS indoor map generation that will include creation of a comprehensive graph and associating it with the indoor detailed image and synchronizing it with the GPS coordinates*	*Aroosha Ahmad*
8.	*Server Side Development*	*Muhammad Junaid Khalid*
9.	*Setting up server*	*Muhammad Junaid Khalid*
10.	*Designing schemas for our database*	*Muhammad Junaid Khalid*
11.	*Creating the Database*	*Muhammad Junaid Khalid*
12.	*Handling communication between http and database servers and mobile application*	*Muhammad Junaid Khalid*
13.	*Developing security and encryption algorithms to mitigate the risks*	*Hafiz Salman Asif*
14.	*Storing and updating database*	*Muhammad Junaid Khalid*

15.	***Handling different kind of queries made by mobile application***	***Muhammad Junaid Khalid***
16.	***Final Testing***	***Aroosha Ahmad, Hafiz Salman Asif, Muhammad Junaid Khalid, Muhammad Nauman Minhas***
17.	***Project Proposal Document***	***Aroosha Ahmad***
18.	***System Requirements Specification (SRS) Document***	***Aroosha Ahmad***
19.	***Project Plan Document***	***Aroosha Ahmad***
20.	***Design Document***	***Aroosha Ahmad***
21.	***Installation Manual***	***Aroosha Ahmad***
22.	***User Manual***	***Aroosha Ahmad***

1.6.2. Resource Allocation

- Need an HTTP and database sever for the whole duration of the project.
- Need an Android mobile phone for testing and deploying app for the duration of the project.
- Four developers who will be working for the development of the app.



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1.7. Project/Product Estimates

1.7.1. Project Estimation by Function Point Analysis

External Input:

1. MAC address input references to a file containing mac addresses
2. Signal strength for indoor position estimation refers to a file containing the signal strength map of indoor locations.
3. GPS coordinates for mapping a locations refers to a file containing GPS coordinates and associated location.
4. User input, several activities (defined in xml files)

External Output:

1. Presentation of the shortest calculated and drawn route on the map.
2. The Graphical presentation of different aspects of application for better user experience
3. Estimating and displaying current location of the user.
4. Calculating and displaying a selected location.

5. Displaying of the rout calculated by user for outdoor locations

External Query:

1. Google and LUMS indoor maps presented to user without any extra detail and processing (i.e. not current location tracking etc.).

2. Graphical user interface for the Application

Internal Logic File:

1. A database file containing Mac Addresses of Wi-Fi routers of LUMS and the Signal strength map of indoor locations.
2. A database file containing GPS coordinates and associated indoor locations.
3. 4 xml files that holds the data related to the graphical user interface of the application.
4. A file that will store the routes of indoor maps of LUMS in the form of graph. indoor map of LUMS(images)

External Logic File:

1. File containing data of Google map

2. State maintained by Wi-Fi routers and their MAC addresses

Type of Component	Complexity of Components			
	Low	Average	High	Total
External Inputs (EI)	0 x 3 = 0	1 x 4 = 4	2 x 6 = 12	16
External Outputs (EO)	1 x 4 = 4	0 x 5 = 0	3 x 7 = 21	25
External inquiries (EQ)	0 x 3 = 0	2 x 4 = 8	0 x 6 = 0	8
Internal Logical Files (ILFs)	1 x 7 = 7	5 x 10 = 50	2 x 15 = 30	87
External Interface Files (EIFs)	0 x 5 = 0	1 x 7 = 7	1 x 10 = 10	17
		Total Number of Unadjusted Function Points		153
		Multiplied Value Adjustment Factor		0.98
		Total Adjusted Function Points		149.94

- **Value Adjustment Factor(General System Characteristics GSCs):**

	GSC	Brief Description	Assessment
1.	Data Communications	How many communication facilities are there to aid in the transfer or exchange of information with the application or system?	4
2.	Distributed data processing	How are distributed data and processing functions handled?	3
3.	Performance	Did the user require response time or throughput?	2
4.	Heavily used configuration	How heavily used is the current hardware platform where the application will be executed?	1
5.	Transaction rate	How frequently are transactions executed daily, weekly, monthly, etc.	3
6.	On-Line data entry	What percentage of the information is entered On-Line?	1
7.	End-user efficiency	Was the application designed for end-user efficiency?	4
8.	Online update	How many ILF's are updated by On-Line transaction?	0
9.	Complex processing	Does the application have extensive logical or mathematical processing?	4
10.	Reusability	Was the application developed to meet one or many user's needs?	3
11.	Operational ease	How difficult is conversion and installation?	3
12.	Installation ease	How effective and/or automated are start-up, back-up,	4

		and recovery procedures?	
13.	Multiple sites	Was the application specifically designed, developed, and supported to be installed at multiple sites for multiple organizations?	0
14.	Facilitate change	Was the application specifically designed, developed, and supported to facilitate change?	1

Value Adjustment Factor (VAF) = 0.65 + (Sum of all 14 GSCs/100) = 0.65 + (33/100) = 0.98

1.7.2. Project Estimation by Use Case Point Analysis

Following information is taken from the SRS document. Refer to the SRS document for details of the Use Cases.

Total number of Use Cases = 6

- **Unadjusted Use-Case Weight (UUCW):**

Use-Case Complexity	Weight	Number of Use-Cases	Product
Simple	5	1	5
Average	10	4	40
Complex	15	1	15
TOTAL			**60**

UUCW = 60

- **Unadjusted Actor Weight (UAW):**

Actor Type	Weight	Number of Actors	Product
Simple	1	2	2
Average	2	3	6
Complex	3	1	3
TOTAL			**11**

UAW = 11

- **Unadjusted Use-Case Points (UUCP):**
  UUCP = UUCW + UAW
  UUCP = 60 + 11 = 71

- **Technical Complexity Factor (TCF):**

Factor	Weight	Assessment	Impact
Distributed System	2	3	6
Performance Objectives	2	3	6
End-user Efficiency	1	4	4
Complex Processing	1	2	2

Reusable Code	1	3	3
Easy to Install	0.5	4	2
Easy to Use	0.5	4	2
Portable	2	5	10
Easy to Change	1	5	5
Concurrent Use	1	5	5
Security	1	3	3
Access for third Parties	1	3	3
Training Needs	1	0	0
Total (TFactor)			**51**

TFactor = 51
TCF = 0.6 + (0.01 x TFactor)
TCF = 0.6 + (0.01 x 51) = 1.11

- **Environment Factor (EF):**

Factor	Weight	Assessment	Impact
Familiar with the Development Process	1.5	3	4.5
Application Experience	0.5	1	0.5
Object-Oriented Experience	1	2	2
Lead Analyst Capability	0.5	2	1
Motivation	1	5	5
Stable Requirements	2	5	10
Part-time Staff	-1	0	0
Difficult Programming Language	-1	3	3
TOTAL (EFactor)			**20**

EFactor = 20
EF = 1.4 + (-0.03 x EFactor)
EF = 1.4 – (0.03 x 20) = 0.8

- **Use-Case Points (UCP):**
  UCP = UUCP x TCP x EF
  UCP = 71 x 1.11 x 0.8 = 63 Use Case Points

- **Deriving Duration:**

➢ The project has 63 Use Case Points
➢ Assuming 28 hours per Use Case (Schneider and Winters Approach)
➢ Iterations will be two weeks long
➢ A total of 4 Developers will work on this project

➢ The project will take (28x63 = 1764 hours) to complete.
➢ We estimate that each developer will spend 28 hours per week on the project.
➢ With 4 team members, this means that the team will spend 28x4=112 hours per week.

- Dividing 1764(Total hours) with 224(No. of hours per iteration) 1764/224=7.8 ~ 8 two week iterations.
  Therefore, the estimated duration of the project is 8x2 = 16 weeks.

1.8. Tools and Technology with reasoning

1.8.1. Front End Tools

Android SDK

Reasons

As we are developing the system on an Android Operating System, using Android SDK as a front-end tool will solve system compatibility issues.

1.8.2. Documentation Tools

Microsoft Word

Reasons

Microsoft Word will be used for documentation and technical writing and compilation purposes.

1.8.3. Modeling Tools

MS Visio 2013

Reasons

Since we are using UML for process modeling, the MS Visio will be useful to give full support for this task. Therefore, it will be important in the analysis and design phases of our project.

1.8.4. Project Management Tools:

Git

Reasons

Git is distributed VCS, in which every user has a complete copy of the repository data stored locally, thereby making access to file history extremely fast, as well as allowing full functionality when disconnected from the network.

1.8.5. Back End Tools

SQL Server or Oracle/ HTTP server

Reasons

We have a choice to use either SQL Server or Oracle. Since, all the team members have a previous experience of working on SQL Server and it will be easier for everyone to work with this language.

HTTP Server is for communication between the mobile app and the server-side of our system.