Software Requirements Specification for Mobile Conqueror

Prepared by Çiğdem Avcı, Güliz Seray Tuncay, Hüseyin Ulusoy and Tolga Akın

Middle East Technical University
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1. Introduction

1.1 Purpose

This document includes software requirements for Mobile Conqueror. The purpose of this document is to provide a detailed and complete description of the Mobile Conqueror. This requirement document contains general information about Mobile Conqueror, use cases, functions, features and special technologies. It describes in detail all that Mobile Conqueror needs to work properly and with safety.

1.2 Scope

Mobile Conqueror is a system that can be easily used via mobile phones. Its purpose is to present the user with data about their surroundings, nearby landmarks, and other points of interest by overlaying information on the real-time camera view of a smart-phone.

The intended audience of the product will be people who want to be informed about their surroundings. They will use their smart-phones to get related information via the application by means of taking pictures or videos of their current location. The users will be able to access information any time they like, eliminating the need for a tour guide. The product is not expected to give information except the landmarks.

1.3 Definitions, Acronyms and Abbreviations

See Appendix A, the Glossary

1.4 References

See Appendix B, References
1.5 Team

1.5.1 Organizational Structure

Our team does not have a team leader to lead and control the flow of development. Instead, every member of the group has equal right to state his/her thoughts, put forward an opinion, make a recommendation or object to a decision. All decisions are made on an agreement in the judgment or opinion reached by the group as a whole.

General rules for our team are as follows:

- Every Tuesday, a regular meeting will be conducted at a predetermined time. Every member must attend this meeting.
- All members must be at the meeting on time. If somebody cannot make it to the meeting on time, he/she must have a valid excuse and share it with the rest of the team at least 1 day prior to the meeting.
- Every week, all members must share their work and progress with the team.

1.5.2 Member Roles

- Çiğdem Avcı Initiator, Optimist
- Hüseyin Ulusoy Time Keeper
- Tolga AKIN Devil's Advocate
- Güliz Seray Tuncay Devil's Advocate, Time Keeper

1.5.3 Process Model

Our project combines different topics into one. We will need to use a lot of different technologies such as GPS, Image Processing, Mobile Communication and so on. This makes the project harder and more prone to errors. Because of that, we will need to identify requirements, do prototyping, coding and testing again and again. The process model that best fits our requirements is the “Spiral Model”. The spiral model starts with defining system requirements, creating a preliminary design
and constructing a first prototype. The following prototypes are constructed by evaluating the previous prototype, defining the requirements of the next prototype, planning and designing the next prototype and building and testing the next prototype.

### 1.6 Overview

This requirement document contains general information about Mobile Conqueror, main classes and use cases, functions, features and special technologies. It describes in detail all that Mobile Conqueror needs to work properly and with safety.

**The rest of the document is divided into chapters for better understanding.**

- In chapter 2 an overall description of Mobile Conqueror is provided. First product perspective is presented with product features and main functions. Then follow user classes and characteristics, operating environments that Mobile Conqueror supports as well as design and implementation constraints. After all that user documentation is presented and will provide you with more details about each feature’s technology.
- In chapter 3 most important features are presented with detailed description, use cases and requirements.
- In chapter 4 user and communication interfaces are described.
- In chapter 5 requirements about safety and performance are presented.

**This document is intended for**

**Developers:** in order to be sure they are developing the right project that fulfills requirements provided in this document.

**Testers:** in order to have an exact list of the features and functions that have to respond according to requirements and provided diagrams.

**Users:** in order to get familiar with the idea of the project and suggest other features that would make it even more functional.

**Documentation writers:** to know what features and in what way they have to explain. What security technologies are required, how the system will response in each user’s action etc.

**Advanced end users, end users/desktop and system administrators:** in order to know exactly what they have to expect from the system, right inputs and outputs and response in error situations.
2. Overall Description

2.1 Product Perspective

Mobile Conqueror is a self-contained product that is, it is not a component of a larger system. Apart from using GPS information to determine the location of the user, it will use information extracted from the DB which makes it a unique product in its way of supplying the user detailed information by using image processing techniques within the DB provided by the administrator of the system.

2.1.1 External Interface Requirements

2.1.1.1 User Interface
Interfacing of the system with users can be categorized in two subtopics.

2.1.1.1.1 User interaction on the client side
Clients will interact with the system by means of a mobile device running Google Android OS or Apple iPhone OS. The graphical user interface on the mobile device will let the user take a picture, send it to the server and browse through the local image files easily. The user interface will also let the user to upload and store her files on the server. This way, the constraint of having low storage capacity on the client side can be overcome.

2.1.1.1.2 Administrator Interface
The system administrator is a privileged user who has permissions to access the system server. The system on the server side will provide an easy to use interface for the system admin to view, modify, save and back up the database.

2.1.1.2 Communications Interface
The first system interface that is to be handled is communication interface between the mobile device and the server. This provides the framework for transporting the product input data and the pricing result data.
The server side and client side software will be connected to the internet in order to facilitate communications. The server will be connected to the internet through a local network via an Ethernet connection.

Wi-Fi networks and Blue-Tooth LANs are the technological opportunities of connecting our wireless device (mobile phone) to the Internet.

2.1.1.3 Software Interfaces

There is a link between the system and operating system of mobile device. The purpose of the link is to use some services provided by the mobile device. The system calls of operating system is required to obtain location related informations such as GPS and develop the graphical user interface of client side of the system.

Moreover, the system requires an interface to attain information about the related location. Wikipedia is an alternative for this purpose. The goal of Wikipedia API is to provide direct, high-level access to the data contained in the MediaWiki databases. Mobile Conqueror can use the API to login, get data, and post changes.

Another software interface required by the system is an API of a virtual globe application like Google Earth. The purpose of this interface is to obtain map information about the related location. By means of the Google Earth API, Mobile Conqueror will login to the Google Earth system and extract data. This data will be used to recognize the pictures taken by Mobile Conqueror.

2.1.1.4 Hardware Interfaces

Camera – the user will use the camera of his mobile device to send images to the system server via the software.

GPS Navigation Device – the software will get related GPS information from the GPS device to determine the present location.

Built-in Digital Compass – the system will know the way which the user is facing by using the information supplied by the digital compass

Monitor screen – the software shall display information to the user via the monitor screen of the mobile phone. Additionally, the software will interact with the user in the case that the screen is a touch-pad screen.

Keyboard – the software shall interact with the keystrokes of the mobile phone.
2.2 Product Functions

The basic data flow of the software is given by the Figures below:

![Basic DFD of the Application](Figure_2.1.png)

Figure 2.1 Basic DFD of the Application
Mobile Conqueror provides the user with the following functions:

- **Database – New, Open, Close, Save, Import, Export**

Administrator can create a new database which include the images collected throughout the Internet. The administrator can open and close the database whenever he wants. Changes on the data are permitted and the changes can be saved. Last, the database can be imported and/or exported from/to the Internet.
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Not to repeat the same procedure again and again, the data obtained after processing images such as features extracted from the image (histogram etc.), location and name of the place obtained as the result of the procedures will be collected in the database for future use which will increase performance.

• User – Save Picture, Take Picture, Get More Information, Send Message, Install Application, Uninstall Application

A graphical user interface will be provided to the user which embodies the functions listed below:

User can take a new picture which will be used for feature extraction and information representation. After taking the picture, which will appear on the screen together with the name of the landmark on it, the user will be presented with three options; get more information and save picture.

Get more information part will give some details about the landmark which are obtained from web sources like Wikipedia. Save picture enables user to save the taken picture attached with the extracted information in a proper location of his mobile phone. Moreover, the user will send the picture attached with the extracted information to anyone he wants.

In addition to that, user should have enough privilege to install and uninstall the application using the graphical user interface. While install option should appear on the screen the first time application is tried to be installed, uninstall option should be present in the start menu of the application for practicality issues.

• Client – Get GPS & Compass, Get Detailed Information From Web, Send Picture to Server, Send Picture as Message, Save Picture, Take Picture, Get Result From Server

When the user attempts to take a picture, our mobile phone as the client functions to take the picture using related APIs. At the same time, GPS information will be obtained via Internet, then GPS information together with compass data will be sent to the server in addition the picture taken by the user. As soon as the server prepares the answer to the client's request, the client gets the result from the server as the name of the landmark. Also client should be able to save the picture with the location information next to it and send it as a message in case of user request.
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•Graphical User Interface – Save Picture, New Picture, Get More Information, Send Message, Install Application, Re-Install Application, Uninstall Application, Exit From Application, Change Theme, Change Icon, Settings

The Graphical User Interface should provide Re-Install Application Uninstall Application, Exit From Application, Take Picture, Change Theme, Change Icon, Settings options listed at the start menu of it. Change Menu and Change Icon options should be added to the start menu for our application to be user friendly.

Again for usability options our graphical user interface will remain as simple as possible. Through Settings option, user will change color and font of the texts which appear throughout the application. Also it will be used to set a default location for pictures that will be saved in the future. Moreover, the background of the text shown when user asks for more information.

Install Application option will show up at the very beginning of the program.

Once the user presses new picture, he will be presented soly with current image of the surroundings obtained from the device camera. On that image take picture option will appear. If the user requests to take picture, after the necessary information collected from server and web, the save picture and get more information will appear on the image taken together with the name of the location. When those options are pressed, corresponding processes will work out.

Change theme option will enable user to change the color, transperancy of the application interface. In addition to that change icon will offer different choices as icons to the user.

2.3 User Classes and Characteristics

•End users/Mobile Phone: Consumers do not need to be technical experts or possess any specific education level other than the basic knowledge of mobile device use. They just use the application with the help of graphical user interface provided.
• **System administrators:** The system administrator uses the admin console to manage the server. The system administrator should have server and database experience to fully understand the server management parameters and server status updates.

• **Other Audience**

### 2.4 Design and Implementation Constraints

Following are the limitations of designing the applications using mobile device:

- Limited processing speed
- Very limited memory for application memory and heap memory
- Small screen size
- Cost of mobile/smart phone
- Issues in Data Security
- It is not very user friendly
- GPRS is cheaper compared to SMS but SMS is more reliable than GPRS
- The availability of wireless hot-spots within the field will be limited

Also, the Mobile Conqueror should be written in an object-oriented language with strong GUI links and a simple, accessible network API. The primary candidate tool chains are Java/Swing, C++/Qt and Python/Qt.

The system must provide a capacity for parallel operation. The end system should also allow for seamless recovery, without data loss, from individual device failure. The system has criticality insofar as it is a live system. If the system is down, then users must not notice, or notice that the system recovers quickly (seconds).

#### 2.4.1 Memory Constraints

**2.4.1.1 SERVER**

2.4.1.1.1 RAM
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Server side is responsible for meeting the requirements caused by image processing computations. Since a limited number of clients are allowed to be connected to the server at the same time (up to 50 clients), the memory that will be spent for their requests will be again limited in parallel to that. Taking that into consideration, for server side minimum 15 GB memory will serve the purpose.

2.4.1.1.2 PRIMARY STORAGE
Actually, Microsoft Server Enterprise Edition will present memory up to 1TB and it will meet our needs.

2.4.1.2 CLIENT

2.4.1.2.1 RAM
The memory usage of our application will obviously have to be constrained by the devices it is intended to run on. Client side will be an ordinary mobile device with GPS and compass support and such mobile devices have memory amounts approximately 128 MB which will fulfill our needs.

2.4.1.2.2 PRIMARY STORAGE
iPhone 3GS and G1 will present memory from 3 to 8 GB and it will meet our needs.

2.5 Assumptions and Dependencies

One assumption Mobile Conqueror software is based on is that the user has a mobile device which has a GPS receiver and a built-in compass functionality. If the device or the operating system of the user does not support GPS, they won't be able to use the system. If the user has a GPS receiver but no compass support, the system might not produce very accurate and reliable results.

The server on which Mobile Conqueror will run would be a small scale server capable of handling a few simultaneous requests. As the system gets larger, the project is to be moved to a larger server. The initial version of Mobile Conqueror software will work with compass information sent from the clients. Support for non-compass devices is not an integral part of the system, and will be delayed for future releases. Portability is another issue which is of secondary importance. Mobile Conqueror
will be designed to run on a specific operating system. Support for other operating systems would be provided with future versions or add-ons.

3. System Features

System features are organized by use cases and functional hierarchy so that the main functions of the system will be understandable.

3.1 Functional Requirements

3.1.1 User Class

![Use case Diagram of User Actor]

Figure 3.1 Use case Diagram of User Actor

3.1.1.1 Install Application

3.1.1.1.1 Description

It is the first thing a new user must do to install Mobile Conqueror.
3.1.1.1.2 Stimulus/Response Sequences

**Data Flow**

### 3.1.1.1.2.1 Basic Data Flow

1. User double clicks on setup icon
2. User is asked if he accepts terms of agreement
3. User selects OK
4. Installation process completed
5. User is asked to close the window
6. User selects OK

### 3.1.1.2.2 Alternative Data Flows

1. User double clicks setup icon
2. User is asked if he accepts terms of agreement
3. User selects CANCEL
4. Installation Window is closed

### 3.1.1.2 Take Picture

#### 3.1.1.2.1 Description

To supply input for the server to extract information about the landmarks, the user must take the photo of his surroundings with the aim of sending it to the server.

#### 3.1.1.2.2 Stimulus/Response Sequences

**Data Flow**

### 3.1.1.2.2.1 Basic Data Flow

1. User enters the application
2. User selects new picture option from the graphical user interface
3. The image taken from the camera appeared on the screen
4. User selects take picture
5. Information about the landmark will be supplied to the user on the picture
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6. Save picture and more information options will be offered to the user.

3.1.1.2.2 Alternative Data Flows

1. User enters the application
2. User selects new picture option from the graphical user interface
3. The image taken from the camera appeared on the screen
4. User selects take picture
5. Picture of the surrounding appears with the text “no information found”

3.1.1.3 Get more Information

3.1.1.3.1 Description
In case of any need for the user to get more information about the landmark, he will choose this option.

3.1.1.3.2 Stimulus/Response Sequences

Data Flow

3.1.1.3.2.1 Basic Data Flow

1. User enters the application
2. User selects take picture option from the graphical user interface
3. Information about the landmark will be supplied to the user on the picture
4. User selects get more information option
5. User is supplied with more information

3.1.1.3.2.2 Alternative Data Flows

1. User enters the application
2. User selects take picture option from the graphical user interface
3. No information is found about the landmark
4. User selects get more information option
5. User is informed that no information will be returned since the application is not able to find any data about the landmark

3.1.1.4 Save Picture

3.1.1.4.1 Description
This option lets the user to save the taken picture attached with the extracted information in a proper location of his mobile phone.

3.1.1.4.2 Stimulus/Response Sequences

Data Flow

3.1.1.4.2.1 Basic Data Flow

1. User enters the application
2. User selects take picture option from the graphical user interface
3. User is informed about the landmark
4. User selects save picture option
5. The picture with proper data on it is saved to the location the user chooses within the application

3.1.1.4.2.2 Alternative Data Flows

1. User enters the application
2. User selects take picture option from the graphical user interface
3. No information is found about the landmark
4. User selects save option
5. Picture with no information on it is saved to the location the user chooses.

3.1.1.5 Send Picture

3.1.1.5.1 Description
This option enables the user to send picture attached with the extracted information to other people.

3.1.1.5.2 Stimulus/Response Sequences

Data Flow
3.1.1.5.2.1 Basic Data Flow

1. User enters the application
2. User selects take picture option from the graphical user interface
3. User is informed about the landmark
4. Send picture option is selected
5. User specifies the mobile phone numbers he wants to send the picture
6. Related picture is sent via MMS to the related mobile phone user/users

3.1.1.5.2.2 Alternative Data Flows

1. User enters the application
2. User selects take picture option from the graphical user interface
3. User is informed about the landmark
4. Send picture option is selected
5. User specifies the mobile phone numbers he wants to send the picture
6. Related picture with no information is sent via MMS to the related mobile phone user/users

3.1.1.6 Uninstall Application

3.1.1.6.1 Description
This option enables the user to uninstall the application.

3.1.1.6.2 Stimulus/Response Sequences

Data Flow

3.1.1.6.2.1 Basic Data Flow
1. User enters the application
2. User selects uninstall option.
3. Application is uninstalled.

3.1.1.6.2.2 Alternative Data Flows
1. User double clicks on uninstall icon
2. User selects CANCEL
3. Uninstallation Window is closed

3.1.2 Client Class

3.1.2.1 Get GPS & Compass

3.1.2.1.1 Description
To provide input for the server side about the location of the user, client class runs get gps & compass method.

3.1.2.1.2 Stimulus/Response Sequences

Data Flow

3.1.2.1.2.1 Basic Data Flow

1. User double clicks Take Picture
2. Client calls get gps & compass method
3. Compass information & gps information obtained
4. GPS & compass information is passed to the server side

3.1.2.1.2.2 Alternative Data Flows

No alternative data flow
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Figure 3.2 Client Class State Diagram
3.1.2.2 Get Detailed Information From Web

3.1.2.2.1 Description

After the server, using gps & compass information together with the picture, extracted the name of the location and sent it to the client, client should use that name to get detailed information from web, to present more information about the place to the user.

3.1.2.2.2 Stimulus/Response Sequences

Data Flow

3.1.2.2.2.1 Basic Data Flow

1. Server delivers the location name extracted
2. Client makes a call to web search APIs using the location name as the input
3. Client receives detailed information through web
4. Client extracts relevant information across the information collected.
5. Information sorted out is passed to the graphical user interface

3.1.2.2.2.2 Alternative Data Flows

1. Server will not be able to deliver the location name
2. Graphical user interface is informed about the lack of the location name.

3.1.2.3 Send Picture to Server

3.1.2.3.1 Description

After the user took the picture and the client got the gps & compass information, the client puts them together then pass them to the server

3.1.2.3.2 Stimulus/Response Sequences
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Data Flow

3.1.2.3.2.1 Basic Data Flow

1. Client puts gps & compass information together with the picture shot
2. Client passes the data brought together to the server side.

3.1.2.3.2.2 Alternative Data Flows

1. Client will not be able to bring gps & compass and picture together because of some failure
2. Graphical user interface is informed about the lack of the input.

3.1.2.4 Send Picture as Message

3.1.2.4.1 Description
The user will request to send the picture together with the information extracted about it to a friend using graphical user interface and the client must support that procedure with a function.

3.1.2.4.2 Stimulus/Response Sequences

Data Flow

3.1.2.4.2.1 Basic Data Flow

1. User clicks send picture as message
2. Client makes a call to relevant APIs to sent the picture together with location information

3.1.2.4.2.2 Alternative Data Flows

1. User clicks send picture as message
2. Client makes a call to relevant APIs to sent the picture together with location information
3. Because of a system failure the message will not be sent and the user will be informed about it
3.1.2.5 Save Picture

3.1.2.5.1 Description
The user will request to save the picture together with the information extracted about it to a location in his mobile/smart phone by means of graphical user interface and the client must support that procedure with a function.

3.1.2.5.2 Stimulus/Response Sequences

Data Flow

3.1.2.5.2.1 Basic Data Flow

1. User clicks save picture
2. User is asked to specify the location where he wants to save the picture.
3. User enters the location
4. User clicks ok
5. Picture is saved the location defined.

3.1.2.5.2.2 Alternative Data Flows

1. User clicks save picture
2. User is asked to specify the location where he wants to save the picture.
3. User select to save to the default location
4. User clicks ok
5. Picture is saved the location pre-defined.

3.1.2.6 Take Picture

3.1.2.6.1 Description
The user will request to take the picture of his surroundings with his mobile/smart phone by means of the graphical user interface and the client must support that procedure with a function.

3.1.2.6.2 Stimulus/Response Sequences
Data Flow

3.1.2.6.2.1 Basic Data Flow

1. User clicks take picture
2. Client calls necessary APIs
3. The picture is taken
4. The picture is presented on the graphical user interface
5. Picture is presented to send picture to server function

3.1.2.6.2.2 Alternative Data Flows

1. User clicks take picture
2. Client calls necessary APIs
3. The picture will not be taken because of some system failure
4. The graphical user interface & server is informed about the lack of image

3.1.2.7 Get Result From Server

3.1.2.7.1 Description

The name extracted in the server side should be delivered to the client to enable it to get detailed information about the place and present the image on the screen together with the location name.

3.1.2.7.2 Stimulus/Response Sequences

Data Flow

3.1.2.7.2.1 Basic Data Flow

1. Server extracts the name information and passes to the client
2. Client gets the name information

3.1.2.7.2.2 Alternative Data Flows

1. Server will not be able to extract the name information and informs client about the lack of information
2. Client gets the information

3.1.3 Administrator Class

3.1.3.1 New Database

This feature provides the ability to create a new database.

3.1.3.1.1 Description

It is the first thing the admin must do to begin using Mobile Conqueror.

3.1.3.1.2 Stimulus/Response Sequences

   Data Flow

3.1.3.1.2.1 Basic Data Flow

   1. The admin opens Mobile Conqueror and selects New->Database
   2. The admin enters a name for the database
   3. The main database window opens

3.1.3.1.2.2 Alternative Data Flows

3.1.3.1.2.2.1 Alternative Data Flow 1

   1. The admin selects Help
   2. The help file opens

3.1.3.1.2.2.2 Alternative Data Flow 2

   1. User selects Cancel
   2. Exit from Mobile Conqueror

3.1.3.1.2.3 Functional Requirements

   REQ-1: Mobile Conqueror must be downloaded and installed.
3.1.3.2 **Open Database**

This feature allows the admin to open an existing database.

3.1.3.2.1 **Description**

When choosing to open a database, it is checked whether the database searched by the administrator exists in the database management system. According to result, the database is opened or not.

3.1.3.2.2 **Stimulus/Response Sequences**

**Data Flow**

3.1.3.2.2.1 **Basic Data Flow**

1. The admin opens Mobile Conqueror and selects Open->Database
2. The admin selects a database
3. It is checked whether the database exists
4. The main database window opens

3.1.3.2.2 Alternative Data Flows

3.1.3.2.2.1 Alternative Data Flow 1

   3a. The admin enters a name non suitable for database
   3b. A message “Inappropriate name” appears
   3c. The admin enters another name

3.1.3.2.2.2 Alternative Data Flow 3

   3. User chooses cancel
   4. Exit from Mobile Conqueror

3. Functional Requirements

   No functional requirement exists.

3.1.3.3 Close Database

   This feature allows the admin to close a database.

3.1.3.3.1 Description

   This feature closes an opened database.

3.1.3.3.2 Stimulus/Response Sequences

   Data Flow

3.1.3.3.2.1 Basic Data Flow

   1. The admin selects Close
   2. The main database window closes.

3.1.3.3.2.2 Alternative Data Flows

3.1.3.3.2.2.1 Alternative Data Flow 1

   3a. The admin enters a name non suitable for database
3b. A message “Inappropriate name” appears
3c. The admin enters another name

3.1.3.3.2.3 Functional Requirements

No functional requirement exists

3.1.3.4 Save Database

This feature allows the admin to save any changes or updates he has performed to his database.

3.1.3.4.1 Description

The admin can save the changes made.

3.1.3.4.2 Stimulus/Response Sequences

Data Flow

3.1.3.4.2.1 Basic Data Flow

1. The admin opens Mobile Conqueror and changes his data
2. The admin selects save database
3. Database is saved
4. The admin exits Mobile Conqueror

3.1.3.4.2.2 Alternative Data Flows

3.1.3.4.2.2.1 Alternative Data Flow 1

2a. The admin selects save as
2b. The admin gives a new database name
2c. New database is saved

3.1.3.4.2.2.2 Alternative Data Flow 2

4. The admin continues working after he saves the database

3.1.3.4.2.2.3 Alternative Data Flow 3

2a. User wants to exit Mobile Conqueror
2b. A message is appeared asking if he wants to save the database
2c. The admin selects yes and exits, or no and exits or cancel and return to database

3.1.3.4.2.3 Functional Requirements
REQ-4: Databases must have different names or else the previews one will be replace if selected

3.1.3.5 Import Database
This feature allows the admin to import a database from internet.

3.1.3.5.1 Description
The admin can import a database from internet.

3.1.3.5.2 Stimulus/Response Sequences
Data Flow

3.1.3.5.2.1 Basic Data Flow
1. The admin opens Mobile Conqueror and selects Import->Database
2. The admin selects a database
3. Database is downloaded

3.1.3.5.2.2 Alternative Data Flows

3.1.3.5.2.2.1 Alternative Data Flow 1
2a. The admin selects Import->Database
2b. No database exists
2c. A message “No new database” appears

3.1.3.5.2.3 Functional Requirements
REQ-4: Database management system must have internet access.

3.1.3.6 Export Database
This feature allows the admin to export a database to internet.

3.1.3.6.1 Description
The admin can import a database to internet.

3.1.3.6.2 Stimulus/Response Sequences

Data Flow

3.1.3.6.2.1 Basic Data Flow

1. The admin opens Mobile Conqueror and selects Export->Database
2. The admin selects a database
3. Database is uploaded.

3.1.3.6.2.2 Alternative Data Flows

3.1.3.6.2.2.1 Alternative Data Flow 1

2a. The admin selects Export->Database
2b. No database exists in the database management system
2c. A message “No database exists” appears

REQ-4: Database management system must have internet access.

3.1.4 Graphical User Interface

3.1.4.1 Install Application

3.1.4.1.1 Description

Once the user downloads and executes the software on their device, the software will prompt the user to “Install Application”. The user then installs the application. From that point on, the user will have the options to reinstall or uninstall the application.

3.1.4.1.2 Stimulus/Response Sequences

Data Flow

3.1.4.1.2.1 Basic Data Flow

1. The user downloads the application from the website.
2. User runs the installer.
3. Installation process succeeds.
4. User clicks “Finish” to complete installation.

3.1.4.1.2.2 **Alternative Data Flows**

1. The user downloads the application from the website.
2. User runs the installer.
3. Installation process fails.

![Figure 3.4 Graphical User Interface State Diagram](image-url)

**3.1.4.2 New Picture**

3.1.4.2.1 Description
After executing the program and clicking “New Picture”, the user interface will show the current view of the camera.

3.1.4.2.2 Stimulus/Response Sequences

Data Flow

3.1.4.2.2.1 Basic Data Flow

1. The user clicks “New Picture”.
2. User is presented with the image obtained from the camera.

3.1.4.2.2 Alternative Data Flows

No alternative data flow available.

3.1.4.3 Take Picture

3.1.4.3.1 Description

The user views the world around him and when he clicks the “Take Picture” option, the image, together with GPS location and compass info will be sent to the server.

3.1.4.3.2 Stimulus/Response Sequences

Data Flow

3.1.4.3.2.1 Basic Data Flow

1. The user clicks “Take Picture”.
2. Client software completes the procedures to capture the image.

3.1.4.3.2.2 Alternative Data Flows

1. The user clicks “Take Picture”.
2. If the camera is not present or available, software will generate an error message.

3.1.4.4 Get More Information

3.1.4.4.1 Description
If the user wishes to get more information, he will click “Get More Information”. Upon this request, the client will compile more information about the landmark from a variety of sources.

3.1.4.4.2 Stimulus/Response Sequences

Data Flow

3.1.4.4.2.1 Basic Data Flow

1. The user clicks “Get More Information”.
2. Client software will compile detailed information from the web.

3.1.4.4.2.2 Alternative Data Flows

1. The user clicks “Get More Information”.
   2. If a connection to the Internet cannot be established, software will generate an error message.

3.1.4.5 Settings

3.1.4.5.1 Description

The interface will let the user to customize fonts, colors, icons and themes.

3.1.4.5.2 Stimulus/Response Sequences

Data Flow

3.1.4.5.2.1 Basic Data Flow

1. The user clicks “Settings”.
2. User selects new settings for fonts, colors, icons and themes.
3. User clicks “Apply” to apply the new settings.

3.1.4.5.2.2 Alternative Data Flows

1. The user clicks “Settings”.
2. If no theme other than the default one is present on the client device, the user will be prompted to connect to the product's website to download new themes.
3. User clicks “Download” to download new themes.
3.2 Performance Requirements

- The software should connect to the server and respond to the user in no more than 30 seconds.

- The server should be able to handle up to 50 connections simultaneously.

3.3 Software System Attributes

3.3.1 Reliability

When user wants to use the Mobile Conqueror system over a given period of time, the system should correctly deliver services as expected by the user. The reliability of the system will be satisfying if it delivers services as specified.

3.3.2 Availability

When the Mobile Conqueror server has any request at any given time, system should be available, it should be up and running and able to deliver useful service at this time. The availability of the system shall be good if it delivers services when it is requested. Otherwise, if requests are not responded at any given time then it implies poor availability.

3.3.3 Security

The Mobile Conqueror system should resist accidental or deliberate intrusions, when users operate on the system. If the system should not resist accidental or deliberate intrusions, then important data may be stolen by hackers. Thus, security of the system shall be low and trust of users shall be ruined. So, security of the system is very important for users.

3.3.4 Maintainability

When the system is in use, new requirements may emerge. When these requirements emerge, the system should be changeable to accommodate these requirements for maintaining the usefulness of the system. If the system is not maintainable, then the system cannot be modified for new requirements. In this situation, a new system should be developed for provide new requirements.
The maintainability is important in order to avoid from high cost.

3.3.5 Portability

The application will only be used on mobile phones that support GPS and compass.

4. Requirement Analysis

4.1 Similar Product Analysis

- Wikitude is a world browser that gives the user detailed data about his surroundings, including information such as landmarks and points of interest related to his whereabouts. This platform is augmented by a newly-launched community that adds points of interest along with hyperlinked media.

- Layar is a free application on installed on mobile phone which shows what is around by displaying real time digital information on top of reality through the camera of your mobile phone and it is used by holding the phone in front of you like a camera, information is displayed on top of the camera display view. On top of the camera image (displaying reality) Layar adds content layers. Layers are the equivalent of web pages in normal browsers. Just like there are thousands of websites there will be thousands of layers. One can easily switch between layers by selecting another via the menu button, pressing the logobar or by swiping your finger across the screen.

4.2 Operating Systems Analysis

One of the main components of Mobile Conqueror is worked on a smart phone so that the choice of the operating system for the smart phone is important. There are three candidates. These are Symbian, Android and iPhone OS.

4.2.1 Symbian Operating System

Symbian is an operating system (OS) designed for mobile devices and smart phones, with associated libraries, user interfaces, frameworks and reference implementations of common tools, developed by Symbian Ltd. It runs exclusively on ARM processors, although an unreleased x86 port existed. “Symbian is the world's most popular mobile operating system, accounting for 50% of smart phone sales.”[1]
4.2.1.1 Devices that used Symbian OS
Symbian Operating System is used by Nokia Series 80, UIQ (User Interface Quartz) interface (Sony Ericsson P800 (2002), P9XX and Motorola A9XX), Nokia S60 (2002) interface (Nokia Nseries), Nokia Series 90 interface (Nokia 7710 (2004)) and MOAP(S) interface (Fujitsu, Mitsubishi, Sony Ericsson and Sharp phones for NTT DoCoMo).

4.2.1.2 Developing on Symbian OS
The native language of Symbian is C++. There were multiple platforms based upon Symbian OS that provided SDKs for application developers wishing to target Symbian OS devices – the main ones being UIQ and S60. The SDKs contain documentation, the header files and library files required to build Symbian OS software, and a Windows-based emulator ("WINS"). Up until Symbian OS version 8, the SDKs also included a version of the GCC compiler (a cross-compiler) required to build software to work on the device. "Symbian's flavour of C++ is very specialised. [citation needed]. However, Symbian devices can also be programmed using Python, Java ME, Flash Lite, Ruby, .NET, Web Runtime (WRT) Widgets and Standard C/C++."[2]

4.2.2 Android Operating System
Android is a mobile operating system running on the Linux kernel. It was initially developed by Google and later the Open Handset Alliance. Google released most of the Android code under the Apache License, a free software and open source license.

4.2.2.1 Devices that use Android OS
Android Operating System is used by Dell (Dell Mini3i), General Mobile (General Mobile DSTL1 Imaginary), HTC Corporation (T-Mobile G1, T-Mobile myTouch 3G, T-Mobile G2), LG Group (GW620 Eve), Motorola (Motorola Droid, Motorola Calgary, Motorola CLIQ), and Samsung Group (Samsung Group Samsung I7500).

4.2.2.2 Developing on Android OS
The Android SDK includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator (based on QEMU), documentation, sample code, and tutorials. Currently supported development platforms include x86-architecture computers running Linux (any modern desktop Linux distribution), Mac OS X 10.4.8 or later, Windows XP or Vista. Requirements also include Java Development Kit, Apache Ant, and Python 2.2 or later. Besides,
libraries written in C and other languages can be compiled to ARM native code and installed using the Android Native Development Kit. Native classes can be called from Java code running under the Dalvik VM using the System.loadLibrary call, which is part of the standard Android Java classes. However, it does not have a native X Window System, nor does it support the full set of standard GNU libraries like its system libraries (GNU C Library). This specific modification makes it difficult to reuse existing Linux applications or libraries on Android.[3]

4.2.3 iPhone Operating System

The iPhone OS, known as OS X iPhone in its early history, is the operating system developed by Apple Inc. for the iPhone and iPod touch. The central processing unit used in the iPhone and iPod Touch is an ARM-based processor instead of the x86 (and previous PowerPC or MC680x0) processors used in Apple's Macintosh computers, and it uses OpenGL ES 1.1[8] rendering by the PowerVR 3D graphics hardware accelerator co-processor. Mac OS X applications cannot be copied to and run on an iPhone OS device. They need to be written and compiled specifically for the iPhone OS and the ARM architecture.

4.2.3.1 Developing on iPhone OS

The SDK for iPhone was released on March 6, 2008, and allows developers to make applications for the iPhone and iPod Touch, as well as test them in an iPhone simulator. However, loading an application onto the devices is only possible after paying an iPhone Developer Program fee. Since the release of Xcode 3.1, Xcode is the development environment for the iPhone SDK.

According to the agreement that developers must agree to, if someone purchases an app from the app store, 30% of the price goes to Apple, and 70% to the developer.

As the iPhone OS uses a variant of the same XNU kernel that is found in Mac OS X, the tool chain used for developing on the iPhone OS is also based on Xcode.

Apple has not announced any plans to enable Java to run on the iPhone. Sun Microsystems announced plans to release a Java Virtual Machine (JVM) for iPhone OS, based on the Java Platform, Micro Edition version of Java. This would enable Java applications to run on iPhone and iPod Touch.[4].

4.2.4 Market Shares of Smartphone Operating Systems
Operating systems that can be found on smartphones include Symbian OS, iPhone OS, RIM's BlackBerry, Windows Mobile, Linux, Palm WebOS and Android. Android and WebOS are in turn built on top of Linux, and the iPhone OS is derived from the BSD and NeXTSTEP operating systems, which all are related to Unix.

Market share of Smartphone operating systems as of Q2/2009 by Canalys. (data does not include Palm WebOS, which was introduced in June, 2009)[5]

### 5. Appendix A, the Glossary

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB</td>
<td>Database</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
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<tr>
<td>OS</td>
<td>Operating Systems</td>
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<tr>
<td>MMS</td>
<td>Multimedia Messaging Service</td>
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<tr>
<td>API</td>
<td>Application Programming Interface</td>
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<td>Admin</td>
<td>Administrator</td>
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<tr>
<td>RAM</td>
<td>Random Access Memory</td>
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</table>
6. Appendix B, References

[1] Canalys: iPhone outsold all Windows Mobile phones 2009
http://www.appleinsider.com/articles/09/08/21/canalys_iphone_outsold_all_windows_mobile_phones_in_q2_2009.html

[2] Symbian for Developers
http://developer.symbian.org/


http://www.wikitude.com

[7] Layar
http://www.layar.com
7. Schedule and Work Load Distribution

<table>
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<th>Month/Name</th>
<th>Çiğdem</th>
<th>Güliz</th>
<th>Hüseyin</th>
<th>Tolga</th>
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<td>October</td>
<td>Preparation of the Project Proposal Report and Field Research</td>
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<td>November</td>
<td>Research on server part</td>
<td>Research on relevant OSs</td>
<td>Research on relevant APIs</td>
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<td>Start of implementation of server part</td>
<td>Start of Implementation of GPS and compass</td>
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