Change History:

Date:	Version Update:	Description:
2013/08/22	1.0	Document created.
2013/08/24	1.1	Technical Requirements added
2013/08/24	1.2	Non-Functional Requirements added
2013/08/24	1.3	Technical Specification added
2013/08/24	1.4	System Features added
2013/08/24	1.5	Use Cases added
2013/08/24	1.6	Entity Relationship Diagrams added.
2013/08/24	1.7	Introduction added
2013/08/24	1.8	Purpose added
2013/08/24	1.9	Project Scope added
2013/08/24	2.0	References added
2013/08/24	2.1	System Description added
2013/08/24	2.2	External Interface Requirements added
2013/08/24	2.3	Open Issues added
2013/08/24	2.4	Glossary added
2013/08/24	2.5	Use Cases updated
2013/08/24	2.6	Functional Requirements updated
2013/08/24	2.7	Technical Requirements updated
2013/08/24	2.8	Open Issues updated
2013/08/24	2.9	Class Diagram added
2013/08/24	3.0	Glossary updated

Table of Contents:

1. Introduction

1.1 Purpose

This document is to serve as an agreement between our team of developers and our client Mr. Will van Heerden regarding the requirements for the Latex Chat application which will support users with their communication in a scientific and mathematical environment. This document will ensure that the requirements for this application is clear and agreed upon by all parties involved, and the development processes and phases to follow will be based on the requirements set out herein.

1.2 Document Conventions

- Document Formatting: LaTeX
- UML Diagrams: Diagram Designer, Visual Paradigm

1.3 Project Scope

The aim of the project is to develop an open source android XMPP chat client which supports the embedded LaTeX base equations which are rendered as images. LaTeX based equations will be rendered on the handset to produce mathematical equations. Our system will also provide the ability to edit and correct equations before sending.

The application will provide a similar functionality to yaxim. Exchange of images and mathematical expressions will be possible through our software solution. The TeXchat application will have the ability to show a preview of the entered text and also export conversations accompanied by their mathematical expressions into a LaTeX file.

1.4 References

- Mr. Will van Heerden.
- Android Authors, 2013. Android NDK.
  [Online] Available at: http://developer.android.com/tools/sdk/ndk/index.html
  [Accessed 18 August 2013].

2. System Description

The goal of the application is to provide a chat service that will allow the users to exchange message and also to send mathematical equations in a rendered format. The application is intended to provide a better and more usable mobile version of LaTeX chat applications.

Support for Latex and Mimetex Libraries
The final application will have to make use of a Latex based library for the rendering of equations as images on the handheld device. For this reason we have implemented support for a Mimetex library, through the use of the Android NDK (Native Development Kit), which allows us to embed the native C/C++ code of the Mimetext library, in the source code of this release.

Messaging
Our final goal is for messaging to be possible between multiple clients, and the support for sending Latex based equations, rendered on the client side and displayed as images on the handheld device. In this release however, our server should support two initial users, and have capabilities for them to send plain text messages and display these in a easy to understand manner. These messages should be stored statically on the device for later retrieval. For this purpose a SQLite database was implemented.

Login
A user should be authenticated by some type of login component. This has been implemented during the initial phases of development of this application. The server that our application uses provides the basic functionality for this authentication component, and uses a username and password based authentication method.

3.Functional Requirements

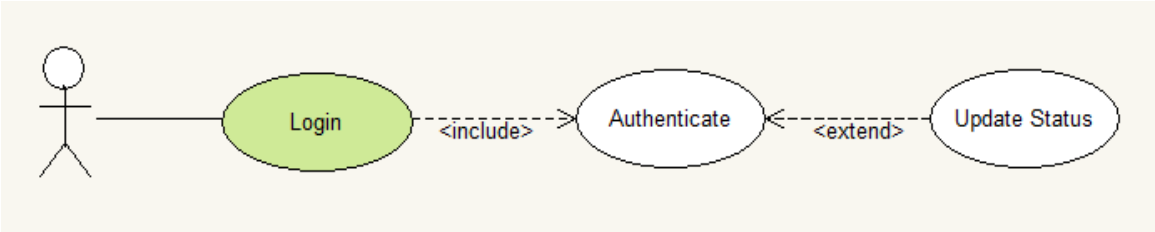
3.1 System Features

Login API
- Logging in to the application, authenticated by the server.
- Can remember your username and password if you activate the feature.
- Can cancel the login.

Viewing Contact List API
- Shows all of your contacts available on the server's contact roster.
- Display's each contact's status
- Allows you to interact with the contact list item and when you click on the contact name, it will open a messaging activity.

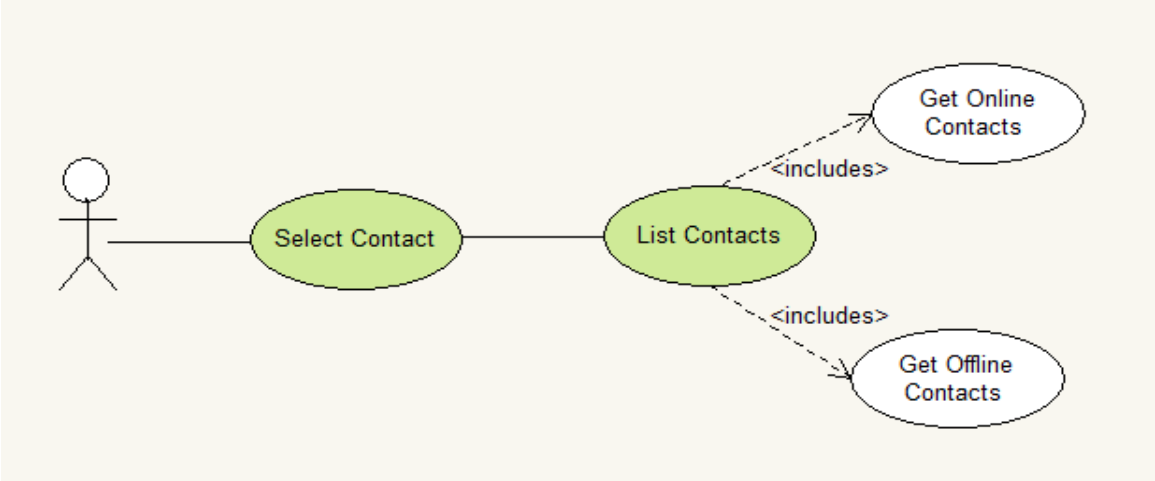
Message Sending API
- This is where the exchange of text messages happen between 2 contacts.
- Retrieves old messages from the database.
- Retrieves messages that were sent while the client was offline and displays them.
- Retrieves new messages sent by one contact to the other instantly.

3.2 Use Cases Login



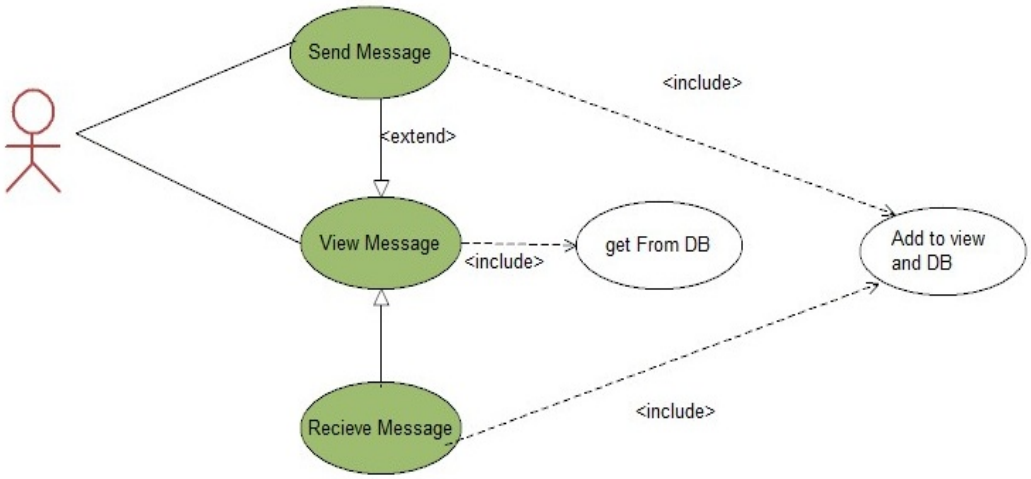
[Figure 1] Login Use Case

View Contact List



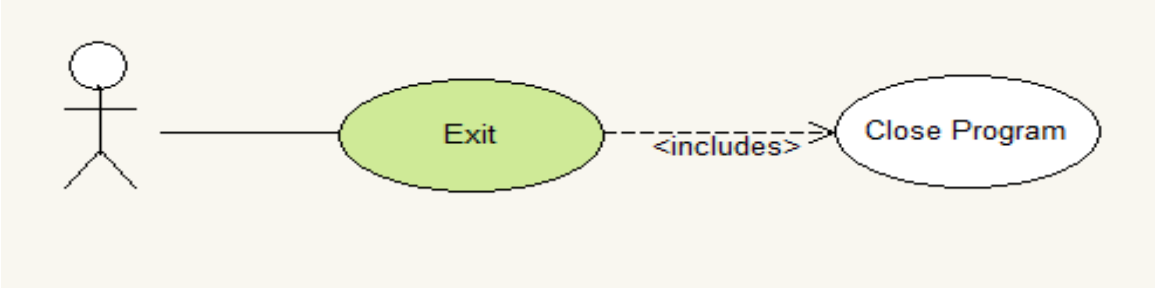
[Figure 2] View Contact List Use Case

Messaging



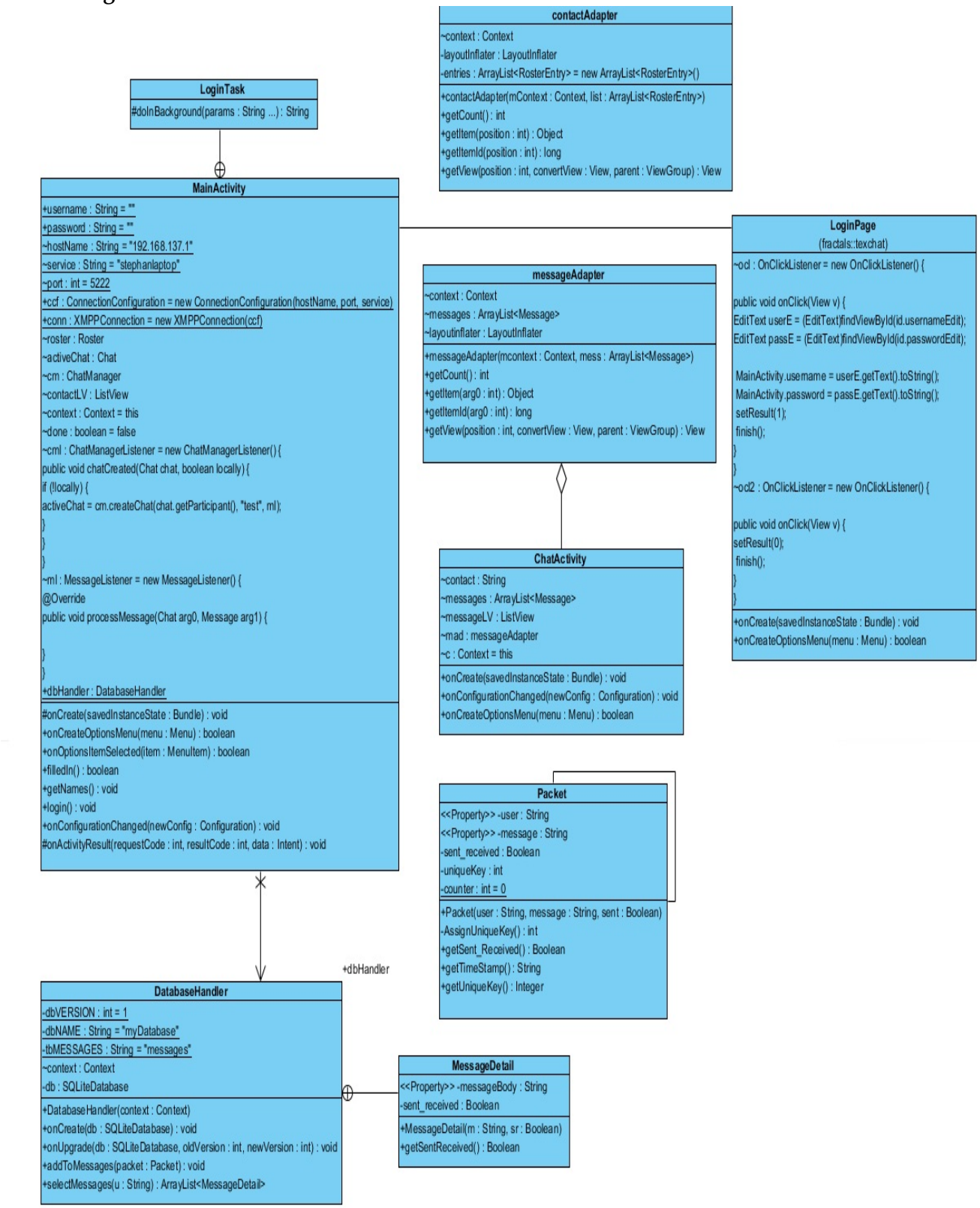
[Figure 3] Messaging Use Case

Exit



[Figure 4] Exit Use Case

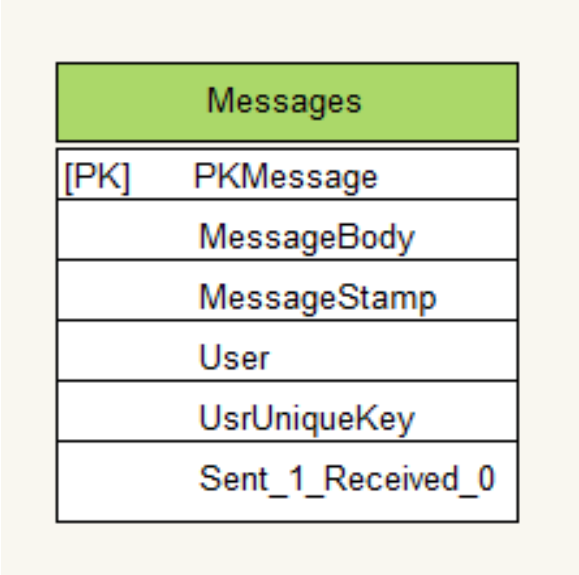
3.3 Class Diagram



[Figure 5] Class Diagram

3.4 Entity Relationship Diagram

The system makes use of one SQLite database on the client side. This database contains one table, namely Messages, that is used to record message histories for a particular client. This release does not include any database cleanup components, and these may expected from later phases of development.



[Figure 6] ERD

4. External Interface Requirements

- There is an external interface with the smack library.
- The mimeTeX library is also an external interface used within the application, the Native Development Kit acts as a bridge between Java and C/C++ when this library is used.
- The internal API uses the smack api to exchange the messages.
- The internal API is used to store data in the database on the device.

5. Technical Requirements(Non-Functional)

5.1 Non-Functional Requirements

Authentication
Authentication happens server side.
A login page is created to allow the user access to the application and its features.
As soon as the user's credentials has been authenticated he/she is logged into the application.

Authirozation
At this point there is no authorization yet.
Scalability
At this point in time the system is developed to handle only 2 users at a time. It will later be scaled upwards to handle a larger amount of concurrent users.

Audit-ability
The messages are logged on the phone's database created by the application as soon as it is installed.

5.2 Technical Specification

Platforms to be supported:

- Android

Will use both Java and C. C will be used as native code. Is developed to communicate with a local server The database is handled with SQLite.

6. Open Issues

- Understanding the MimeTeX library.
- Understanding how to render the LaTeX code using the MimeTeX library.
- Rendering the image inline (with the normal message text before it).

7. Glossary

- SDK - Software Development Kit
- NDK - Native Development Kit
- ADT - Android Development Toolkit plugin
- IDE - Integrated Development Environment
- RUP - Rational Unified Process
- XML - eXtensible Markup Language
- Agile - Development methodology
- MVC - Model View Controller
- UML - Unified Modelling Language
- API - Application Programming Interface
- MimeTex - LaTeX library ported to Android
- C - Programming language.