

Istanbul Aydın University

Computer Engineering Department



Android Chatting System

Harmony

Prepared by

Ömer Kaan Seyman

B1405.010143

**Submitted in partial fulfillment of the requirement for the Bachelor Degree
of Computer Engineering**

January 2019

ABSTRACT

In recent years, with the technological development, people use their mobile phone to communicate, following each other's daily life. At the same time, these actions bring a new need to people that are curious. That need leads to meet and know other people. Thus, social media take an important place in every single person.

A chat system is usually used on mobile application and web application platforms. This system provides people communication privately as a community or between two people. I have designed a chat system called "Harmony" which is an application for Android. Firstly, users can see a login screen when the application starts. This screen provides sign up or login. While users sign up, data like username, name, last name, birth date, e-mail and password are taken from users. After login statement, the screen will be three tabs as "Home", "Match" and "Profile". In Home tab, users can see survey button and their active chats and contacts. The survey is about personality group identification. In Match tab, users can match other users in the same personality group once every three hours. So, a new contact has been created. In Profile tab, users can upload a profile image to show on chat page. In chatting screen, users can see their message, message time and the username of the sender. Users can delete a chat whenever they want.

I have used Android, Java, Firebase Database, Adobe XD CC to develop the application and each of the visual design.

Following is the test analysis section, which discusses whether the proposed system met its objectives.

Contents of Project

1 Chapter 1: Introduction	6
1.1 Background	6
1.2 Project Motivation	6
1.3 Problem Statement	6
1.4 Project Question	7
1.5 Project Objectives	7
1.6 Project Significance	7
1.7 Project Scope	7
1.8 First Steps	8
2 Chapter 2:Literatur Review	9
2.1 Android Chatting System.....	9
2.2 Definition Of Android Chatting System.....	9
2.3 Android.....	9
2.4 Why Android	12
2.5 Android Studio.....	15
2.6 Adobe XD..	17
2.7 Firebase.....	17
2.8 Personality Type	19
3 Chapter 3:Project Methodology	33
3.1 Project Summary.....	33
3.2 Functional and Non Functional Requirements.....	33
3.3 Use Case Diagram.....	35
3.4 Activity Diagram.....	36
3.5 Interaction Overvire Diagram For Registration.....	37
4 Chapter 4:Analysis And Design	38
4.1 Project Description	38

4.2 User Description	38
4.3 Requirements Development	38
4.4 System Requirements	38
4.5 User Requirements	39
5 Chapter 5:Design And Implementation	40
5.1 Design Phase	40
5.2 Building The Software	41
5.3 Building The Hardware	43
5.4 User Interface.....	46
6 Chapter 6:Testing	56
6.1 Testing	56
6.2 Emulator Testing	56
6.3 Mainantance.....	56
6.4 Conclusion	56
References	57

List of Figures

Figure 1: Android Architecture	10
Figure 2: Android Mobile Image.....	14
Figure 3: Android Studio Logo.....	17
Figure 4: Use Case Diagram.....	35
Figure 5: Activity Diagram.....	36
Figure 6: Interaction Overview Diagram for Registration	37
Figure 7: Package Diagram.....	40
Figure 8: Database Relation Table	41
Figure 9: Firebase Database - Screen Shot	43
Figure 10: Login Form – Screen Shot.....	44
Figure 11: Signup Form – Screen Shot.....	45
Figure 12: Home Tab – Screen Shot	46
Figure 13: Survey Form – Screen Shot	47
Figure 14: Profile Photo Changer Form – Screen Shot	48
Figure 15: Profile Photo Changer – Screen Shot	49
Figure 16: Profile Tab – Screen Shot	50
Figure 17: Match Tab – Screen Shot	51
Figure 18: ChatSection – Screen Shot.....	52
Figure 19: Home Tab RecyclerView – Screen Shot.....	53
Figure 20: ChatSection Menu – Screen Shot.....	54
Figure 21: Home Form Menu – Screen Shot.....	55

1 CHAPTER 1: INTRODUCTION

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods. Since the Android mobile platform was first open sourced by Google in November 2007, it has attracted more than 180,000 developers and the deployment of 50,000 mobile applications in the Android Market. Today more than 60 smart phones from major manufacturers run the Android platform. All these numbers show the Android project has gained momentum and has moved forward.

Teleconferencing or Chatting, is a method of using technology to bring people and ideas together despite of the geographical barriers. The technology has been available for years but the acceptance it was quite recent. My Project is an example of a chat system. It is made up of applications the user application which runs on the user's mobile. User can do private chatting.

1.1 BACKGROUND

Real-time chat is virtually any online communication that provides a real-time or live transmission of text messages from sender to receiver. A variety of software programs are available to enable real-time chat between individuals using Internet services. Real-time chat can be any direct text-based or video-based one-to-one chat or one-to-many group chats by means of tools like instant messengers, talkers.

My Project provides to communicate between two random users in the same personality group. In total, there are 16 personality groups. These groups are determined by a survey in the application. The survey includes 28 questions about personality. Users have to take survey before start communication. Communication beginning is provided by a button called "Match". This button brings a user from the same personality group to chat section. Chat section is an one-to-one communication method. All chat messages and user data are in Firebase Database.

1.2 PROJECT MOTIVATION

Nowadays, communication via mobile phones is a requirement which is people interest in. This Project stands for using Firebase Database, Firebase Authentication, Firebase Storage and Android. The Project is a real-time chat application. All the tools in the Android development are free and no special hardware is required. These factors motivated me to practice an instant message application on the Android platform to explore Android's main components and various building blocks, and to acquire a working knowledge of its developing environment.

1.3 PROBLEM STATEMENT

The Project is to create a chat application which is user to user to chat with each other. Real-time should be afforded. The Project should be very easy to use for a novice person.

1.4 PROJECT QUESTION

The focus questions of developing a chat system are:

- How to provide one-to-one chat?
- How to use Real-Time Database?
- How to use Firebase Authentication?
- How to design an application easy to use?
- How to classification users by a survey?

1.5 PROJECT OBJECTIVES

The main objectives of this Project are:

- Successfully providing private one-to-one chat between users.
- Matching users to the same personality group each other.
- Providing live chat speed to users.
- Safer, less error and faster account creation and password reset method with Firebase Authentication.
- Entertain to user simple, easy to read, less complicated user interface.
- Include users in one of 16 personality groups with special personality questions.
- Helping the people who are interested in real-time chat systems.
- Using the latest technology tool on Android.

1.6 PROJECT SIGNIFICANCE

The Project allows users to reach out and interact with users like their personality. It provides fast, safe and simple application to people. This application significance also can be listed as below.

- Interact with users.
- Designing an application easy to use.
- Developing safe and fast account creation system.
- Firebase Database working.
- Real-time chat experience.

1.7 PROJECT SCOPE

The scope of this Project is all people. Any novice user for a mobile user can use this application. Simple, easy, understandable design provides ease of use this application. Thus, I want to reach more user communication and satisfying. Using this application people can meet new people like their personality group. They understand real time chatting systems. This Project offers something new about chat system. People who are interested in developing android chatting system, my Project is really helpful.

1.8 FIRST STEPS

Firstly, in the first week. I researched what is a chat system and requirements. Then, i took a course called “Android Mobile Application” from “Udemy”. Because, i was not sure about how can i build this Project. The first step for me was writing Structured Query Language Lite Database class code. Before the design, i tried to create a new registration system with Sqllite Database. When i tried this method, it worked. But, it brought some errors to me. There was no safe. Writing its code was really complicated. I had to develop new methods for each errors. The last error for it, it had not unique id automatically for each user. So, i decided to change database system to Firebase Database. Using Firebase Authentication, all errors fixed. A new unique id is identified for each every user. It caused to reset password via e-mail sending. So, i could add a new function for account management.

In the design, firstly i researched which tool i should use for Project. I choosed Adobe XD CC. Firstly, i designed the user interface respectively, login screen, registiration screen, home page in three tabs; home, match, profile pages. Then, application icon and tabs icons are designed. After the design part, i researched Firebase from Google. Google is really helpful for me. I reached all documantations and tutorials from Google. Firebase is a free database service. Every attempt for coding i tested it. I built the Project with less error. When i got error, i can understand the error where it is via testing. The course and gooogle are also helpful for Java language. I started to build this Project these steps.

2 CHAPTER 2: LITERATURE REVIEW

This chapter includes a literature review of “Harmony” Android Chatting System, concepts and benefits for user.

2.1 ANROID CHATTING SYSTEM

Android chatting system is divided into three main phases, designing user interface and visual of the Project, software part of the Project visual coding and system coding and testing it is working together.

2.2 DEFINITION OF ANDROID CHATTING SYSTEM

Android chatting system is a real-time chat application. It is an interaction application with users. Every user has a unique account in this application. Thus, they use or upload data whatever they want in application. Users can contact each other once in every three hours by a button called “Match”. Users have specific one-to-one chat area in this application.

2.3 ANDROID

Android is a Linux based operating system it is designed primarily for touch screen mobile devices such as smart phones and tablet computers. The operating system have developed a lot in last 15 years starting from black and white phones to recent smart phones or mini computers. One of the most widely used mobile OS these days is android. The android is software that was founded in Palo Alto of California in 2003. The android is a powerful operating system and it supports large number of applications in Smartphones. These applications are more comfortable and advanced for the users. The hardware that supports android software is based on ARM architecture platform. The android is an open source operating system means that it's free and any one can use it. The android has got millions of apps available that can help you managing your life one or other way and it is available low cost in market at that reasons android is very popular.

The android development supports with the full java programming language. Even other packages that are API and JSE are not supported. The first version 1.0 of android development kit (SDK) was released in 2008 and latest updated version is jelly bean.

The android is a operating system and is a stack of software components which is divided into five sections and four main layers that is

- Linux kernel
- Libraries
- Android runtime

You can see Android Architecture below Figure 1:

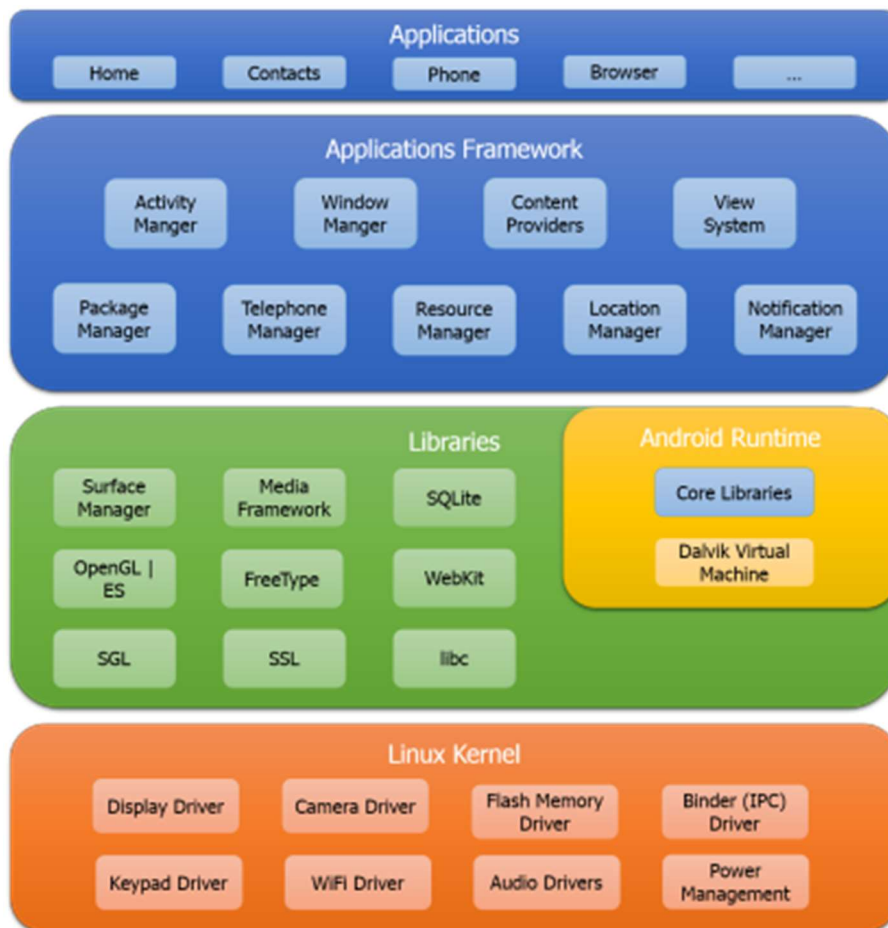


Figure 1: Android Architecture

Linux kernel:

The android uses the powerful Linux kernel and it supports wide range of hardware drivers. The kernel is the heart of the operating system that manages input and output requests from software. This provides basic system functionalities like process management, memory management, device management like camera, keypad, display etc the kernel handles all the things. The Linux is really good at networking and it is not necessary to interface it to the peripheral hardware. The kernel itself does not interact directly with the user but rather interacts with the shell and other programs as well as with the hard ware devices on the system.

Libraries:

The on top of a Linux kennel there is a set of libraries including open source web browser such as webkit, library libc. These libraries are used to play and record audio and video. The SQLite is a data base which is useful for storage and sharing of application data. The SSL libraries are responsible for internet security etc.

Android Runtime:

The android runtime provides a key component called Dalvik Virtual Machine which is a kind of java virtual machine. It is specially designed and optimized for android. The Dalvik VM is the process virtual machine in the android operating system. It is a software that runs apps on android devices. The Dalvik VM makes use of Linux core features like memory management and multithreading which is in a java language. The Dalvik VM enables every android application to run its own process. The Dalvik VM executes the files in the .dex format.

Application frame work:

The application frame work layer provides many higher level services to applications such as windows manager, view system, package manager, resource manager etc. The application developers are allowed to make use of these services in their application.

Applications and Features:

You will find all the android applications at the top layer and you will write your application and install on this layer. Example of such applications are contacts, books, browsers, services etc. Each application performs a different role in the overall applications.

Features:

- Head set layout
- Storage
- Connectivity: GSM/EDGE, IDEN, CDMA, Bluetooth, WI-FI, EDGE, 3G, NFC, LTE, GPS.
- Messaging: SMS, MMS, C2DM (could to device messaging), GCM (Google could messaging)
- Multilanguage support
- Multi touch
- Video calling
- Screen capture
- External storage
- Streaming media support
- Optimized graphics

2.4 WHY ANDROID?

Android App Development is still a great thing to do because there is so much going on in this area. It's a profit-making profession on high demand.

There are many innovative ideas in the mobile applications market, and the growth of new technologies that will improve the mobile environment assure us a great outcome for the investment in these type of careers.

An important aspect of the Android application environment is that Android applications have historically been written in the Java™ programming language. However, you can also write them in a relatively new programming language from Google called Kotlin. This article focuses exclusively on Java, but Kotlin is gaining momentum and you might consider taking a closer look. Between the trend toward “newer is better” in programming languages (for example, Swift is overtaking Objective-C for iOS/Apple development) and the ongoing legal battle over where Java can or cannot be used, Kotlin will likely be the leading language for Android within a few years.

For now, Java is the incumbent technology. If you're just starting out, Java is a safe place to work for a couple of reasons. First, there is a decade's worth of Android resources on the web focused on Java. Second, Java is a language that still has life in it for other platforms particularly server-side web technologies. As a classic object-oriented programming language, Java skills still matter. While it might not matter at this point, there are some interesting details around how Android applications come to life from their underlying source code.

Java source code is compiled and formatted into bytecode, which represents the logic of an application but not the specific instructions for a particular hardware device. Similar to traditional Java environments, early versions of Android operated by converting these so-called bytecodes to hardware-specific executable code. This conversion magic is accomplished by using a Just-In-Time (JIT) compiler and takes place each and every time the application is executed. Once the JIT compiler has converted the code, it is executed in a virtual machine known as the Dalvik VM.

Beginning with Android version 4.4 (KitKat), the Dalvik VM has been replaced. The JIT compiler converts bytecodes to executable code directly on the device at runtime each time the application runs; the new approach is called Ahead-of-Time (AOT) compilation. With AOT compilation, the byte code is converted only once when the application is installed. This slows down the one-time activity of installing the application but gains the benefit of faster execution at run time when it really matters.

With AOT, we enjoy faster runtime experience with lower RAM requirements at the expense of more storage requirements. Considering the incessant decline in the cost of storage, this is an agreeable direction to move in for our mobile applications.

Regardless of the moving pieces of how applications get converted from source code to running code, from a programming perspective, there are some fundamentals to understand when starting out with Android development.

An Android application consists of one or more of the following four classifications:

- **Activities:** An application that has a visible user interface is implemented via an activity. When you select an application from the Home screen or application launcher, an activity is started.
- **Services:** You can use a service for any application that needs to persist for a long time, such as a network monitor or update-checking application.
- **Content providers:** The easiest way to think about content providers is to view them as a database server. A content provider's job is to manage access to persisted data, such as the contacts on a phone. If your application is very simple, you might not necessarily create a content provider, however if you are building a larger application or one which makes data available to multiple activities and/or applications, a content provider is the proscribed means of accessing your data.
- **Broadcast receivers:** You can launch an Android application to process a specific element of data or respond to an event, such as receiving a text message.

An Android application is deployed to a device along with a file named `AndroidManifest.xml`. This file is required for every Android application and is essentially the cheat sheet that tells the operating system exactly how to interact with your application. The `AndroidManifest.xml` includes both the required class names and types of events that the application is able to process as well as the required permissions that the application needs to run. For example, if an application requires access to the network to download a file, this permission must be explicitly stated in the manifest file. Or, perhaps an application needs to access the camera. The user needs to approve that also. This approach of declaratively telling the user what the application is going to use is essential in this day of increasing privacy and security concerns. While you can quickly just accept software licenses, it is important that you pay close attention to what an app is requesting to access.



Figure 2: Android Mobile Image

Android is an open source mobile operating platform. Enterprises today are leveraging this platform for its simplified mobile app development process. It helps solve customer challenges and increase value for their business. Further, it helps boost their revenues and meet phenomenal business growth.hare.

As per reports, Android commands a leading market share of 72% over other OS platforms. Its massive user base is a reason for its choice over other smartphone OS platforms. Our article will share pointers on advantages of Android App Development for any enterprise.

Android App Development Benefits:

- **Open Source:** The Android platform is open source which means the Android Software Development Kit (SDK) can be leveraged without having to worry about the licensing costs or royalty. Developers can interact with the Android developer community for the forthcoming versions which they can incorporate into their app development projects. These benefits make Android a lucrative prospect for enterprises, device manufacturers and wireless operators alike, resulting in rapid development of the applications.

- **Customizable User Interface:** A user interface can either make or break your app. Android-based applications are highly customizable and easier to manage. Google is highly focused on making its user interface customizable to help developers create custom Android apps for business. Being an open source platform, it allows developers to turn their creative ideas into reality and build innovative and interactive apps. It offers a wide array of customization options. Even the data management functions and multimedia tools can be easily updated to the app.
- **Low Investment & High ROI:** Android has a relatively low barrier to entry. Its Software Development Kit (SDK) is available for free to developers which significantly reduces the development costs. However, the app development costs can be bifurcated into three major parts: development, testing, and deployment. Developers are required to pay a one-time registration fee for application distribution. Thereafter, they can leverage any computer device to build and test the product on their smartphones, ensuring low investment and increased engagement among users. Ultimately, users get an interactive app and the enterprise gains a higher return on investment.
- **Multiple Sales Channels:** Unlike other mobile platforms, Android applications can be deployed in different ways. You do not have to rely on a single market to distribute your applications. Besides using Google Play Store and other third-party app marketplaces, you can create your own distribution and sales channels. You build it, you publish it. With your choice of promotional strategy, you can reach your end users through multiple channels.
- **Easy to Adopt:** Android apps are scripted in Java programming language that leverages a rich set of libraries. Any developer familiar with Java can build Android applications easily. As per a developer survey, many Java experts find it easier to write apps for Android as compared to programmers with command over other programming languages.

2.5 ANDROID STUDIO

Android Software Development Kit (SDK) is a toolset that enables developers to create apps for Android OS. It includes the required libraries to build Android apps, a debugger, an emulator, Application Programming Interfaces (APIs) and sample projects with source code, so you can have everything you need to start making your own apps.

Important command-line tools for Android app development are grouped into three packages: the already mentioned SDK tools, Platform tools and the Android Emulator. Let's talk about the main features of each one of them.

Android SDK tools

SDK tools are platform-independent and are required to create any Android app, regardless the version you are developing for. Some of these include: Build tools, Debugging tools and Image tools, among others.

Now, some of the most important SDK tools are Android SDK Manager, which provides you resources, platforms and other useful components needed to build apps and manage SDK packages.

The Android Virtual Device Manager, that provides a graphical user interface to test your app on a virtual device. The Dalvik Debug Monitor Server (ddms) to debug your Android apps. Or the Draw 9-patch, which allows you to create resizable bitmap images for your app.

Platform tools

Platform tools are customized and used to support new features of Android's latest version, but also compatible with prior versions. Some of these tools include: Android Debug Bridge, Fastboot or Systrace.

For instance, Android Debug Bridge (adb) needs to know how to communicate with the Android version hosted on your device, for that it needs the platform-tool component; adb can also be used to install an Android application file on a device.

Besides, additional shell tools can be accessed through adb, like bmgr and logcat.

Platform tools work along with Build tools for encryption, security and file size purposes.

Android Emulator

The Android Emulator lets you develop and test your apps without using any physical device. This package is frequently updated and needed to use the Android Emulator Graphic User Interface (GUI) in Android Studio.

This enables Android app developers to debug and test their apps in a run-time environment.

Android Studio

Now, in order to properly run this set of tools you'll need an Integrated Development Environment (IDE). For Android, that IDE is called Android Studio, allowing you to compile and edit your code, or test your app before releasing it on Google Play. This way, Android Studio allows you to improve your app performance with instant visualization, smart code editor, a fast emulator and a unified environment to help you build apps for all Android devices.

IDE was built to make the development process as easy as possible, helping to improve the app development work by making it faster, smarter and more enjoyable.

Today it is easier for Android developers to get these tools since all of them come with Android Studio, i considered important that you know some of the most significant ones that allow you to build app ideas.



Figure 3: Android Studio Logo

2.6 ADOBE XD

XD empowers designers with the speed, precision, and quality to seamlessly iterate and share interactive prototypes with team members and reviewers across devices and platforms, including Windows, Mac, iOS, and Android.

Adobe first announced they were developing a new interface design and prototyping tool under the name "Project Comet" at the Adobe MAX conference in October 2015. The first public beta was released for macOS as "Adobe Experience Design CC" to anyone with an Adobe account on March 14, 2016. A beta of Adobe XD was released for Windows 10 on December 13, 2016. On October 18, 2017, Adobe announced that Adobe XD was out of beta.

I created on XD all icons and images in Android Chatting System.

2.7 FIREBASE

Firebase is a Backend-as-a-Service that started as a YC11 startup and grew up into a next-generation app-development platform on Google Cloud Platform.

Firebase frees developers to focus crafting fantastic user experiences. You don't need to manage servers. You don't need to write APIs. Firebase is your server, your API and your datastore, all written so generically that you can modify it to suit most needs. You'll occasionally need to use other bits of the Google Cloud for your advanced applications. Firebase can't be everything to everybody. But it gets pretty close.

It's a Realtime Database. Real-time data is the way of the future. Nothing compares to it. Most databases require you to make HTTP calls to get and sync your data. Most databases give you data only when you ask for it.

When you connect your app to Firebase, you're not connecting through normal HTTP. You're connecting through a WebSocket. WebSockets are much, much faster than HTTP. You don't have to make individual WebSocket calls, because one socket connection is plenty. All of your data syncs automatically through that single WebSocket as fast as your client's network can carry it.

Firebase sends you new data as soon as it's updated. When your client saves a change to the data, all connected clients receive the updated data almost instantly.

It has a File Storage. Firebase Storage provides a simple way to save binary files most often images to Google Cloud Storage directly from the client. Firebase Storage has its own system of security rules to protect your GCloud bucket from the masses, while granting detailed write privileges to your authenticated clients.

It has own Authentication system. Firebase authentication has a built in email/password authentication system. It also supports OAuth2 for Google, Facebook, Twitter and GitHub. We'll focus on email/password authentication for the most part. Firebase's OAuth2 system is well-documented and mostly copy/paste.

If you've ever written an authentication system, let's commiserate for a moment. Custom authentication is terrible. I will never write an auth system again for as long as I live. I fell in love with Firebase Auth at first sight, and the flame has never wavered. Sometimes I get frustrated. Sometimes we fight. But I never forget the cold, dark abyss of a custom auth

system. Firebase Authentication integrates directly into Firebase Database, so you can use it to control access to your data.

Firebase includes an easy-to-use hosting service for all of your static files. It serves them from a global CDN with HTTP/2. The Firebase team has integrated a bunch of new and existing Google products with Firebase. I don't plan to cover these features in detail quite yet...

A bunch of these features apply to iOS and Android but not to web.

- Remote Config
- Test Lab
- Crash
- Notifications
- Dynamic Links
- AdMob

Pros

- Email & password, Google, Facebook, and Github authentication
- Realtime data
- Ready-made api
- Built in security at the data node level
- File storage backed by Google Cloud Storage
- Static file hosting
- Treat data as streams to build highly scalable applications
- Don't worry about your infrastructure.

Cons

- Limited query abilities due to Firebase's data stream model
- Traditional relational data models are not applicable to NoSQL; therefore, your SQL chops will not transfer
- No on-premise installation

2.8 PERSONALITY TYPE

According to Carl G. Jung's theory of psychological types [Jung, 1971], people can be characterized by their preference of general attitude:

- Extraverted versus Introverted,

Their preference of one of the two functions of perception:

- Sensing versus Intuition,

And their preference of one of the two functions of judging:

- Thinking versus Feeling,

The three areas of preferences introduced by Jung are dichotomies (i.e. bipolar dimensions where each pole represents a different preference). Jung also proposed that in a person one of the four functions above is dominant either a function of perception or a function of judging. Isabel Briggs Myers, a researcher and practitioner of Jung's theory, proposed to see the judging-perceiving relationship as a fourth dichotomy influencing personality type [Briggs Myers, 1980]:

- Judging versus Perceiving

The first criterion, **Extraversion – Introversion**, signifies the source and direction of a person's energy expression. An extravert's source and direction of energy expression is mainly in the external world, while an introvert has a source of energy mainly in their own internal world.

The second criterion, **Sensing – Intuition**, represents the method by which someone perceives information. Sensing means that a person mainly believes information he or she receives directly from the external world. Intuition means that a person believes mainly information he or she receives from the internal or imaginative world.

The third criterion, **Thinking – Feeling**, represents how a person processes information. Thinking means that a person makes a decision mainly through logic. Feeling means that, as a rule, he or she makes a decision based on emotion, i.e. based on what they feel they should do.

The fourth criterion, **Judging – Perceiving**, reflects how a person implements the information he or she has processed. Judging means that a person organizes all of his life events and, as a rule, sticks to his plans. Perceiving means that he or she is inclined to improvise and explore alternative options.

All possible permutations of preferences in the 4 dichotomies above yield 16 different combinations, or personality types, representing which of the two poles in each of the four dichotomies dominates in a person, thus defining 16 different personality types. Each personality type can be assigned a 4 letter acronym of the corresponding combination of preferences:

- ESTJ
- ESTP
- ESFJ
- ESFP
- ISTJ
- ISTP
- ISFJ
- ISFP
- ENTJ
- ENTP
- ENFJ
- ENFP
- INTJ
- INTP
- INFJ
- INFP

The first letter in the personality type acronym corresponds to the first letter of the preference of general attitude “E” for extraversion and “I” for introversion.

The second letter in the personality type acronym corresponds to the preference within the sensing-intuition dimension. “S” stand for sensing and “N” stands for intuition.

The third letter in the personality type acronym corresponds to the preference within the thinking-feeling pair: “T” stands for thinking and “F” stands for feeling.

The forth letter in the personality type acronym corresponds to a person’s preference within the judging-perceiving pair. “J” for judging and “P” for perception.

Functional Analysis of the ESTJ

Extraverted Thinking

ESTJs are very good at making impersonal decisions quickly, and standing by those decisions. They live in their Extraverted Thinking functioning, thus, their prime directive is in discovering that which is true and logical in the events of the real world. Circumstances calling for product invite the ESTJ to supervise or direct other individuals toward production and productivity. Extraverts are attracted to the "object," the external things and people in observable reality. This bent translates into a natural interest in goods and material objects.

Introverted Sensing

The secondary Introverted Sensing is like that of the ISTJ, but not as strong. Si provides practical form and concept data to the Te head, however, form is not the overriding principle, especially if Thinking has already decided. In times of need, ESTJs are tempted to overlook even necessary information if its absence impedes closure. Secondary sensing sometimes translates into interest in sports. The persistence of primary Thinking gives many ESTJs a desire for discipline and regimen which can be beneficial in skills development in the arena.

Extraverted Intuition

As the ESTJ matures, and as situations arise which call for suspension of criticism, Extraverted iNtuition is allowed to play. Under the leadership of the Te function, iNtuition gravitates toward the discovery of broad categories which at worst amount to stereotypes. Those ESTJs who hone their Ne abilities may find success in academia. (I've encountered ESTJs whose Ne overshadows the auxiliary Si function--for whatever reason--to the extent that there is an appearance of NT radical geekism.)

Introverted Feeling

This function may rarely be expressed. ESTJs who have cultivated, or have been blessed with, a "natural indirect expression of good will by inference," have great prospects of developing genuine friendships (as opposed to ESTJs who merely act out the behavior of Extraverted Feeling). Such a weak, introverted function is best observed in facial expression, eye contact, body language, and verbally only by implication.

Functional Analysis of the ESTP

Extraverted Sensing

These are the ultimate realists. Extraverted Sensors are at one with objects and experiences now, in the only living, pulsing moment that ever really exists. The Sensor is compelled to see, touch, taste, smell and feel all that moves, wafts, tingles, tinkles, scintillates, vibrates or resonates. Some ESTPs are keenly discriminating; only those elements of singular quality and experience will suffice. Others revel in earthiness. If baseness can elicit shock from more squeamish observers, so much the better.

Introverted Thinking

Even a consummate Sensor needs to decide which hand to grasp the gusto with; Introverted Thinking is their preferred yardstick. Introverted, and auxiliary to Sensing, the T function maintains a low profile, keeps its opinions mainly to itself, and readily yields to allow Sensing to savor a special moment. The ESTP preference for mental, physical and emotional toughness surely can be traced to this detached, rational function.

Extraverted Feeling

Though only a minor character, Feeling plays an important role in a favorite pastime of ESTPs. This is not to say that ESTPs don't care deeply for others, yet Feeling is such a ready hand-puppet, expedient in disarming the "victim" and exposing the jugular. Sincere Feeling is tertiary and thus relatively simplistic in this type. As such, it can be the undoing of ESTPs at the hands of those they (perhaps unconsciously) come to trust.

Introverted Intuition

In the inferior (fourth) position, intuition may be virtually absent much of the time. Haziness of inner, symbolic vision is the psychic price of the clarity of sensory awareness. As do other SPs, ESTPs reserve a certain "gut" sense of timing and luck. When repression and stress empower the Shadow, it likely finds expression through intuition in stereotypic perceptions of groups and individuals whom it perceives and hostile or hurtful.

Functional Analysis of the ESFJ

Extraverted Feeling

ESFJs live in their Extraverted Feeling functioning. Feeling, a rational (i.e., deciding) function, expresses opinions easily in the E world of objects and people. ESFJs have the ability to express warmth, rage, and a range of other emotions. Actions are encouraged or rebuked based on how they affect other people, especially people near and dear to the ESFJ. This type's vocal decisiveness predisposes many of its number to facility with administration and supervision.

Introverted Sensing

The secondary Sensing function aids and abets the dominant Fe in that sensate data is collected and at once compared with the inner forms or standards. Data on which decisions are made are thus focused and given a contrast which tends to be stronger and clearer than the original stimuli. The strengthening effect of Si on Fe may be responsible for this type's reputation for wearing their "hearts on their sleeves." At any rate, ESFJs reflect the "black and white" view of reality which is common to the SJ types.

Extraverted Intuition

Intuition is tertiary--as the ESFJ matures, and as situations arise which call for suspension of criticism, Ne is allowed to play. Under the leadership of the Fe function, iNtuition allows for a loosening of the more rigid Si rights and wrongs; teasing and slapstick humor emerge. ESFJs are also capable of discerning patterns and philosophies, but such perceiving is subject to the weakness of the tertiary position, and the results often lack the variety and complexity of connections that more complex systems require.

Introverted Thinking

The inferior Ti function may rarely be expressed. In fact, ESFJs may take affront at the aloof, detached nature of dominant Ti types, or conversely, be drawn to them. Some ESFJs construct rationale which have the appearance of (Jungian) Thinking logic, but under scrutiny are in fact command performances of "Thinking in the service of Feeling," (i.e., Thinking-like conclusions which do not obey the tenets of impersonal logic; they rather construct scenarios from only those "hard, cold facts" which support the conclusion reached by the dominant Extraverted Feeling function.

Functional Analysis of the ESFP

Extraverted Sensing

The dominant function of ESFPs is concerned with the reality that is perceived through the senses. This type's prime directive is to examine the tangible through taste, touch, sight, feeling and hearing. ESFPs' need for new experiences surely results from this function. Feeling gives focus to the collected information, producing the amiable nature of this type. As

perceivers, ESFPs do not linger on moral concerns unless it is in service of a Greater Good and/or a unifying cause.

Introverted Feeling

Feeling, which tends to decision-making in the interest of individual beings, is auxiliary to sensing. As with all introverted functions, feeling for ESFPs has a surreal, cryptic, quintessential nature. It is more often implied than verbally expressed, more apparent in countenance and deed rather than word or creed. Feeling takes care that playful pokes and pranks do no harm to the victim.

Extraverted Thinking

This tertiary function is at the ready to give definitive answers when the world requires them. It provides a measure of balance to Introverted Feeling, allowing the ESFP some level of boundary and protection from those who would take advantage. When overused or overestimated, however, Thinking becomes a liability. ESFPs do well to seek out confirmation of the soundness of tough-minded decisions.

Introverted iNtuition

This function is least visible. As is the nature of the inferior (fourth) function, ESFP intuition lacks a sense of balance. This type seems most successful in deducing patterns and seeing connections only after a thorough examination of the facts (which process appears quite unorganized and haphazard to non-SPs). Although some ESFPs may develop such abilities, the mastery of logic, analysis and abstraction is usually difficult and wearying, and not very much fun.

Functional Analysis of the ISTJ

Introverted Sensing

Si is oriented toward the world of forms, essences, generics. Time is such a form, a quantifiable essence of exactitude, the standard to which external events are held. For both of the IS_J types, the sense of propriety comes from the clear definition of these internal forms. An apple "should" have certain qualities, against which all apples are evaluated. A "proper" chair has four legs, (and other qualities this poor INTP can only guess). Jung viewed introverted sensing as something of an oxymoron, in that the natural direction of senses is outward toward the object, rather than inward and away from it. One has the sense that Introverted Sensors are drawn more to the measure of the concept of the perceived object than to the experience of that perception.

Extraverted Thinking

The moderation of the Te function serves to socialize the expression of these forms. When the Si function is ready to relinquish the data, Te may speak. Otherwise, silence is golden. ISTJs seem to have a few favorite forms (the tried and true) which may serve for most occasions. My ISTJ dad woke me every morning with the same phrase for more years than I care to remember. Asked, "How are you?" he answered with the same stock phrase. ("As well as my age and habits will permit" was used for about two decades.) "It's a good form, a sound form--it's the form for me."

Introverted Feeling

Since Fi is turned inward, it is rarely expressed. Perhaps this enables the ISTJ to resolutely accept that "we are all doomed." When told that Lazarus had died, Thomas said, "Let us go

and die with him." (He could just as well have said something like, "I knew this was bound to happen sooner or later.") Only in times of great distress is the Introverted Feeling expressed (as I witnessed in my dad when a neighbor's son was killed in a hunting accident). Otherwise, feeling is inferred, or expressed nonverbally, through eye contact, or an encouraging smile.

Extraverted Intuition

The Ne function of an ISTJ does not serve them very well. It needs a lot of help. For example, an ISTJ was surprised to find that someone she had talked with only by phone had red hair, because she "didn't usually like" people with red hair! This inferior Ne seems to be a major source of, and a natural breeding ground for, stereotypes. Failure of the banking system is but one bogeyman which arises from the fear which feeds on the ISTJ's mistrust of real world possibilities. The shadow inhabiting the inferior Ne strikes at the precious forms and standards in the heart of the dominant Si function.

Functional Analysis of the ISTP

Introverted Thinking

Thinking, the dominant function, generally keeps its opinions to itself. The inner world of introverted thinkers resembles Plato's rec room, where every untried idea runs the gauntlet of Truth. The personal or political source of the alleged fact matters little to Thinking; each tenet must stand on its own premises. Introverted thinkers focus their directives in on themselves, and would like nothing better than for others to do the same. One ISTP friend displays a poster of an orangutan with the caption, "If I want your opinion, I'll beat it out of you." Suffice it to say that ISTPs are by nature free spirits.

Extraverted Sensing

Auxiliary Sensing provides Thinking with all manner of information about the physical world. ISTPs possess heightened sensory awareness. And as other SPs, ISTPs are energized by responding to their impulses. Sports appeal to many ISTPs for the sheer sensory experience. This combination of dominant introverted thinking and auxiliary extraverted sensing results in no-nonsense realism. The uncanny troubleshooting ability which predisposes many ISTPs to hands-on diagnostics (especially with machinery and computers) or detective work is most probably rooted in this pairing.

Introverted Intuition

Tertiary iNtuition maintains a low profile. ISTPs are prone to consult "gut feelings" that most probably arise from this function unconsciously. As with other SP types, ISTPs generally lack enthusiasm for theoretical and philosophical issues, and less for the endless discussions in which the Intuitive (especially NP) types so frequently engage.

Extraverted Feeling

The inferior (least) feeling function is extraverted and, when operative, quite visible. As with all types, the inferior function is relatively simplistic and often operates unconsciously in an all-or-nothing manner. When operative, Feeling's sensitivity and loyalty has the potential for great benefit and utter peril. It would seem that ISTPs would do well to nourish and cherish Feeling judgement, but to vigilantly supervise and protect it from predators and other catastrophes.

Functional Analysis of the ISFJ

Introverted Sensing

As for ISTJs, the dominant Si is oriented toward the world of forms, essences, generics. Again, "for both of the IS_J types, the sense of propriety comes from the clear definition of these internal forms. ... A 'proper' chair has four legs," etc. (Jung saw IS as something of an oxymoron: sensing, which is a perceiving function, focused inward and thus away from that which is perceived (the "object"). In this light, he described this sensing as something removed from reality, full of archetypes/mythical figures/hobgoblins; sensing of one's own set of forms.)

Extraverted Feeling

A kind of "regression toward the mean" provided by the Fe auxiliary function serves to socialize the expression of these forms. I suppose it's the auxiliary nature of this Feeling, coupled with the balancing effect of {detachment from the internal idiosyncratic view of free-floating data perceptions} that makes ISFJs tentative, conservative, and reticent to boldly state the rights and wrongs in the relational world. (Loosely translated, ISFJs like to keep their perceptions to themselves, and aren't sure enough that what they "see" as Introverted Sensors has any relevance to the outside world. Thus the perception, based on unworldly data, may not be true. The obedient Extraverted Feeling function must therefore refrain from strong statements expressing these opinions.)

Introverted Thinking

Introverted Thinking is turned inward and is largely invisible. It is only with great difficulty, if at all, that the ISFJ could willingly commit anyone to their doom. Perhaps this explains why ISFJs are loyal to the end; there is no sense of purely objective (i.e., impersonal) judgement of anyone but themselves (and that only by their own standards). Here is this type's achilles heel that makes many of them so vulnerable to the scoundrels and ne'er-do-wells who often use and abuse them.

Extraverted Intuition

ISFJs are easily undone by Extraverted iNtuition, their inferior function. Believing in the fantastic, and disbelieving the technologically extant, are errors that may guide the gullible (or unfoundedly sceptical) ISFJ off a precipice of mis-conclusion. (One of our co-workers' mothers adamantly refused to believe that Dave Letterman's mom was actually at the olympics in Norway talking with the athletes and handing out hams! She suspected technological trickery.)

Functional Analysis of the ISFP

Introverted Feeling

Feeling, unbridled by the external forces of society and substance, is the dominant function. ISFPs spontaneously develop their own codes and credos, about which they are quite sober and intense. ISFPs are questors, driven to find the pure and ideal, as personally and individually defined. Feeling may temporarily turn outward, but cannot be long sustained beyond its cloistered home. If the individual has values greater than herself, feeling may

express itself in valiant acts of selflessness. Turned in upon self, however, it becomes an unscrupulous, capricious enigma, capable even of heinous acts of deception and treachery.

Extraverted Sensing

ISFPs keep a finger on the pulse of here and now. They are more adept at doing than considering, at acting than reflecting, at tasting than wondering. As do most SPs, ISFPs keenly sense color, sound, texture, and movement. It is not unusual for ISFPs to excel in sensory, motor, or kinesthetic abilities.

ISFPs cherish their impulses. Some of the most beautiful, graceful, and artistic performances are the result of this drive for physical, sensate expression.

Introverted Intuition

Tertiary intuition works best in the background of the ISFP's inner world. Perhaps this is the source of the "gut feeling" SPs consult in matters of chance. However "lucky" the ISFP may be, intuition as a means of communication is a poor servant, evidenced in spoonerisms, and non sequiturs and mixed metaphors.

Extraverted Thinking

The ISFP may employ Extraverted Thinking in external situations requiring closure. As is the case with inferior functions, such Thinking behaves in an all or nothing manner. Thus, as with other FP types, the ISFP's Extraverted Thinking is at risk for a lack of context and proportion. In most cases, persons of this type enjoy greater facility operating in the open-ended style of sensing, implying the opinions of feeling values in the indirect fashion characteristic of introverted functions.

Functional Analysis of the ENTJ

Extraverted Thinking

"Unequivocating" expresses the resoluteness of the ENTJ's dominant function. Clarity of convictions endows these Thinkers with a knack for debate, or wanting knack, a penchant for argument. The light and heat generated by Thinking at the helm can be impressive; perhaps even overwhelming. Experience teaches many ENTJs that restraint may often be the better part of valor, lest one find oneself victorious but alone.

Introverted Intuition

The auxiliary function explores the blueprints of archetypal patterns and equips Thinking with a fresh, dynamic sense of how things work. Improvising on the fly is something many ENTJs do very well. As Thinking's subordinate, insights are of value only insofar as they further the Right, True Cause celebre.

Extraverted Sensing

Sensing reaches out to embrace that which physically touches it. ENTJs have an awareness of the real; of that which exists. By stilling the engines of Thinking and iNtuition, this type may experience the Here and Now, and know things not dreamt of nor even postulated in iNtuition's philosophy. Sensing's minor role, however, puts it at risk for distortion or extreme weakness beneath the hustle and bustle of the giants N and T.

Introverted Feeling

Feeling is romantic, as the ethereal as the inner world from whence it doth emerge. When it be awake, feeling evokes great passion that knows not nuance of proportion nor context. Perhaps

these lesser functions inspire glorious recreational quests in worlds that never were, or may only ever be in fantasy. When overdone or taken too seriously, Fi turned outward often becomes maudlin or melodramatic. Feeling in this type appears most authentic when implied or expressed covertly in a firm handshake, accepting demeanor, or act of sacrifice thinly covered by excuses of lack of any personal interest in the relinquished item.

Functional Analysis of the ENTP

Extraverted Intuition

ENTPs are nothing if not unique. Brave new associations flow freely from the unconscious into the world of the living. Making, discovering and developing connections between and among two or more of anything is virtually automatic. The product of intuition is merely an icon of process; ENTPs are in the business of change, improvement, experimentation.

The attraction Extraverted iNtuition has toward the real and physical amounts to a cosmic non sequitur: theory is drawn to practice. Such encounters are clearly puzzling. Both parties--the intuitor and the realist--are aware of a xenic quality in their meeting, with reactions ranging from recoil to reverie.

Introverted Thinking

Thinking is iNtuition's ready assistant, an embodiment of the sort of logic found in laws, boards and circuits. Thinking's job is to lend focus and direction to iNtuition's critical mass. The temporary habitations of changeling iNtuition are constructed of Boolean materials from Thinking's storehouse. Ultimately, Thinking is no match for iNtuition's prodigiousness. Systems lie in various states of disarray, fragmentary traces of Thinking's feverish attempts to shadow and undergird the leaps of the dominant function. One can only suppose that Thinking must continue to work during REM sleep pulling together iNtuition's brainchildren into integral wholes.

Extraverted Feeling

To the extent that Feeling is developed, ENTPs extravert Feeling judgment. As a result, it is not uncommon to find affability and bonhomie in members of this species. Tertiary functions are potentially utilitarian. Their limitations appear in their relative underdevelopment, diminished endurance, and vulnerability. ENTPs may harness Feeling's good will in areas such as sales, service, drama, humor and art. ENTP loyalty often runs high and can be hooked by those the ENTP counts as friends.

Introverted Sensing

Like a tail on the kite of intuition, Introverted Sensing counterweighs these beings drawn to nonconformity and anarchy. These shadowy sensory forms, so familiar to SJ types, serve as lodestones which many ENTPs employ Herculean measures to escape. sums up the dilemma in which ENTPs may find themselves by attempting to best the tarbaby Sensing. Occasionally acknowledging awareness of norms and abnormality could, in theory, be potentially freeing. Additionally, I've noticed that ENTPs have the need to have areas of expertise/excellence/uniqueness in which one is second to none. I've never beaten an ENTP at his/her own game not in the final analysis.

Functional Analysis of the ENFJ

Extraverted Feeling

Extraverted Feeling rules the ENFJ's psyche. In the sway of this rational function, these folks are predisposed to closure in matters pertaining to people, and especially on behalf of their beloved. As extraverts, their contacts are wide ranging. Face-to-face relationships are intense, personable and warm, though they may be so infrequently achieved that intimate friendships are rare.

Introverted Intuition

Like their INFJ cousins, ENFJs are blessed through introverted intuition with clarity of perception in the inner, unconscious world. Dominant Feeling prefers to find the silver lining in even the most beggarly perceptions of those in their expanding circle of friends and, of course, in themselves. In less balanced individuals, such mitigation of the unseemly eventually undermines the ENFJ's integrity and frequently their good name. In healthier individuals, deft use of this awareness of the inner needs and desires of others enables this astute type to win friends, influence people, and avoid compromising entanglements.

The dynamic nature of their intuition moves ENFJs from one project to another with the assurance that the next one will be perfect, or much more nearly so than the last. ENFJs are continually looking for newer and better solutions to benefit their extensive family, staff, or organization.

Extraverted Sensing

Sensing is extraverted. ENFJs can manage details, particularly those necessary to implement the prevailing vision. These data have, however, a magical flexible quality. Something to be bought can be had for a song; the same something is invaluable when it's time to sell. (We are not certain, but we suspect that such is the influence of the primary function.) This wavering of sensory perception is made possible by the weaker and less mature status with which the tertiary is endowed.

Introverted Thinking

Introverted Thinking is least apparent and most enigmatic in this type. In fact, it often appears only when summoned by Feeling. At times only in jest, but in earnest if need be, Thinking entertains as logical only those conclusions which support Feeling's values. Other scenarios can be shown invalid or at best significantly inferior. Such "Thinking in the service of Feeling" has the appearance of logic, but somehow it never quite adds up.

Functional Analysis of the ENFP

Extraverted Intuition

The physical world, both geos and kosmos, is the ENFP's primary source of information. Rather than sensing things as they are, dominant intuition is sensitive to things as they might be. These extraverted intuitives are most adept with patterns and connections. Their natural inclination is toward relationships, especially among people or living things.

Intuition leans heavily on feeling for meaning and focus. Its best patterns reflect the interesting points of people, giving rise to caricatures of manner, speech and expression.

Introverted Feeling

Auxiliary feeling is nonverbally implied more often than it is openly expressed. When expressed, this logic has an aura of romance and purity that may seem out of place in this flawed, imperfect world. In its own defense, feeling judgement frequently and fleetly gives way to humor. ENFPs who publicize their feelings too often may put off some of the crowd of friends they naturally attract.

Extraverted Thinking

Thinking, the process which runs to impersonal conclusions, holds the extraverted tertiary position. Used on an occasional basis, ENFPs may benefit greatly from this ability. Less mature and lacking the polish of higher order functions, Thinking is not well suited to be used as a prominent function. As with other FP types, the ENFP unwary of Thinking's limitations may find themselves most positively mistaken.

Introverted Sensing

Sensing, the least discernible ENFP function, resides in the inner world where reality is reduced to symbols and icons--ideas representing essences of external realities. Under the influence of the ever-present intuition, the ENFP's sensory perceptions are in danger of being replaced by hypothetical data consistent with pattern and paradigm. When it is protected and nourished, introverted sensing provides information about the fixed. From such firm anchoring ENFPs are best equipped to launch into thousands of plausibilities and curiosities yet to be imagined.

Functional Analysis of the INTJ

Introverted Intuition

INTJs are idea people. Anything is possible; everything is negotiable. Whatever the outer circumstances, people of this type are ever perceiving inner pattern-forms and using real-world materials to operationalize them. Others may see what is and wonder why; INTJs see what might be and say "Why not?!" Paradoxes, antinomies, and other contradictory phenomena aptly express these intuitors' amusement at those whom they feel may be taking a particular view of reality too seriously. People of this type enjoy developing unique solutions to complex problems.

Extraverted Thinking

Thinking in this auxiliary role is a workhorse. Closure is the payoff for efforts expended. Evaluation begs diagnosis; product drives process. As they come to light, Thinking tends, protects, affirms and directs iNtuitio's offspring, fully equipping them for fulfilling and useful lives. A faithful pedagogue, Thinking argues not so much on its own behalf, but in defense of its charges. And through this process these impressionable ideas take on the likeness of their master.

Introverted Feeling

Feeling has a modest inner room, two doors down from the Most Imminent iNtuitio. It doesn't get out much, but lends its influence on behalf of causes which are Good and Worthy and Humane. We may catch a glimpse of it in the unspoken attitude of good will, or the gracious smile or nod. Some question the existence of Feeling in this type, yet its unseen balance to Thinking is a cardinal dimension in the full measure of the INTJ's soul.

Extraverted Sensing

Sensing serves with a good will, or not at all. As other inferior functions, it has only a rudimentary awareness of context, amount or degree. Thus people of this type sweat the details or, at times, omit them. "I've made up my mind, don't confuse me with the facts" could well have been said by an INTJ on a mission. Sensing's extraverted attitude is evident in this type's bent to savor sensations rather than to merely categorize them. Indiscretions of indulgence are likely an expression of the unconscious vengeance of the inferior.

Functional Analysis of the INTP

Introverted Thinking

Introverted Thinking strives to extract the essence of the Idea from various externals that express it. In the extreme, this conceptual essence wants no form or substance to verify its reality. Knowing the Truth is enough for INTPs; the knowledge that this truth can (or could) be demonstrated is sufficient to satisfy the knower. "Cogito, ergo sum" expresses this prime directive quite succinctly.

In seasons of low energy level, or moments of single-minded concentration, the INTP is aloof and detached in a way that might even offend more relational or extraverted individuals.

Extraverted Intuition

Intuition softens and socializes Thinking, fleshing out the brittle bones of truths formed in the dominant inner world. That which is is not negotiable; yet actual application diffuses knowledge to the extent that knowledge needs qualification and context to be of any consequence in this foreign world of substance.

If Thinking can desist, the INTP is free to brainstorm, calling up the perceptions of the unconscious (i.e., intuition) which are mirrored in patterns in the realm of matter, time and space. These perceptions, in the form of theories or hunches, must ultimately defer to the inner principles, or at least they must not negate them. Intuition unchained gives birth to play. INTPs enjoy games, formal or impromptu, which coax analogies, patterns and theories from the unseen into spontaneous expression in a way that defies their own comprehension.

Introverted Sensing

Sensing is of a subjective, inner nature similar to that of the SJs. It supplies awareness of the forms of senses rather than the raw, analogic stimuli. Facts and figures seek to be cleaned up for comparison with an ever growing range of previously experienced input. Sensing assists intuition in sorting out and arranging information into the building blocks for Thinking's elaborate systems.

Extraverted Feeling

Feeling tends to be all or none. When present, the INTP's concern for others is intense, albeit naive. In a crisis, this feeling judgement is often silenced by the emergence of Thinking, who rushes in to avert chaos and destruction. In the absence of a clear principle, however, INTPs have been known to defer judgement and to allow decisions about interpersonal matters to be left hanging lest someone be offended or somehow injured. INTPs are at risk of being swept away by the shadow in the form of their own strong emotional impulses.

Functional Analysis of the INFJ

Introverted Intuition

Introverted intuitives, INFJs enjoy a greater clarity of perception of inner, unconscious processes than all but their INTJ cousins. Just as SP types commune with the object and "live in the here and now" of the physical world, INFJs readily grasp the hidden psychological stimuli behind the more observable dynamics of behavior and affect. Their amazing ability to deduce the inner workings of the mind, will and emotions of others gives INFJs their reputation as prophets and seers. Unlike the confining, routinizing nature of introverted sensing, introverted intuition frees this type to act insightfully and spontaneously as unique solutions arise on an event by event basis.

Extraverted Feeling

Extraverted feeling, the auxiliary deciding function, expresses a range of emotion and opinions of, for and about people. INFJs, like many other FJ types, find themselves caught between the desire to express their wealth of feelings and moral conclusions about the actions and attitudes of others, and the awareness of the consequences of unbridled candor. Some vent the attending emotions in private, to trusted allies. Such confidants are chosen with care, for INFJs are well aware of the treachery that can reside in the hearts of mortals. This particular combination of introverted intuition and extraverted feeling provides INFJs with the raw material from which perceptive counselors are shaped.

Introverted Thinking

The INFJ's thinking is introverted, turned toward the subject. Perhaps it is when the INFJ's thinking function is operative that they are most aloof. A comrade might surmise that such detachment signals a disillusionment, that she has also been found lacking by the sardonic eye of this one who plumbs the depths of the human spirit. Experience suggests that such distancing is merely an indication that the seer is hard at work and focusing energy into this less efficient tertiary function.

Extraverted Sensing

INFJs are twice blessed with clarity of vision, both internal and external. Just as they possess inner vision which is drawn to the forms of the unconscious, they also have external sensing perception which readily takes hold of worldly objects. Sensing, however, is the weakest of the INFJ's arsenal and the most vulnerable. INFJs, like their fellow intuitives, may be so absorbed in intuitive perceiving that they become oblivious to physical reality. The INFJ under stress may fall prey to various forms of immediate gratification. Awareness of extraverted sensing is probably the source of the "SP wannabe" side of INFJs. Many yearn to live spontaneously; it's not uncommon for INFJ actors to take on an SP (often ESTP) role.

Functional Analysis of the INFP

Introverted Feeling

INFPs live primarily in a rich inner world of introverted Feeling. Being inward-turning, the natural attraction is away from world and toward essence and ideal. This introversion of dominant Feeling, receiving its data from extraverted intuition, must be the source of the quixotic nature of these usually gentle beings. Feeling is caught in the approach- avoidance bind between concern both for people and for All Creatures Great and Small, and a psycho-magnetic repulsion from the same. The "object," be it homo sapiens or a mere representation of an organism, is valued only to the degree that the object contains some measure of the

inner Essence or greater Good. Doing a good deed, for example, may provide intrinsic satisfaction which is only secondary to the greater good of striking a blow against Man's Inhumanity to Mankind.

Extraverted Intuition

Extraverted intuition faces outward, greeting the world on behalf of Feeling. What the observer usually sees is creativity with implied good will. Intuition spawns this type's philosophical bent and strengthens pattern perception. It combines as auxiliary with introverted Feeling and gives rise to unusual skill in both character development and fluency with language--a sound basis for the development of literary facility. If INTPs aspire to word mechanics, INFPs would be verbal artists.

Introverted Sensing

Sensing is introverted and often invisible. This stealth function in the third position gives INFPs a natural inclination toward absent-mindedness and other-worldliness, however, Feeling's strong people awareness provides a balancing, mitigating effect. This introverted Sensing is somewhat categorical, a subdued version of SJ sensing. In the third position, however, it is easily overridden by the stronger functions.

Extraverted Thinking

The INFP may turn to inferior extraverted Thinking for help in focusing on externals and for closure. INFPs can even masquerade in their ESTJ business suit, but not without expending considerable energy. The inferior, problematic nature of Extraverted Thinking is its lack of context and proportion. Single impersonal facts may loom large or attain higher priority than more salient principles which are all but overlooked.

3 CHAPTER 3: PROJECT METHODOLOGY

In this chapter i will describe methodology phases that i will use to accomplish the Project and phases that this methodology consist. Finally, it represents the requiriment engineering methodology followed in the Project.

3.1 PROJECT SUMMARY

The user interacts with the tool using GUI. The GUI Operates in seven forms and three tabs, Login Form, Signup Form, Home Form, Password Reset Form, Profile Image Changer Form, Survey Form. Home Form has those three tabs, Home Tab, Match Tab, Profile Tab. Login Form is an interacting form for login statement. Signup Form is for creating a new account in application. Home Form is for three tabs. Profile Reset Form sends email for password reset process. Profile Image Changer From is for profile image changing statement. Survey Form is for the survey that contains 28 questions to identfy personality type. Home tab has contacts list. Match is for create a new contact. Profile is already logged user information shower.

3.2 FUNCTIONAL AND NON FUNCTIONAL REQUIREMENTS

Functional Requirements

- User Registration

Users must be able to register for the application through a valid e-mail. On installing the application, user must be prompted to register their e-mail and password. If user wants to skip this registraration, user must not see homepage and other sections of the application. The e-mail will be the unique identifier of users account on Chat Application “Harmony”.

- Survey

If a user did not take the survey. It should be caused the no determine the personality type of the user. Users should be reach the survey on “Home” tab or on “Match” tab, the user wants to try the button which brings the new chat section with another user doesnt work for this purpose. The user should be redirected to “Survey” page for determining the personality type of the user.

- Adding New Contact

Users should be able to send instant message to someone, they must be to use the button that is on “Match” tab. This button should finds the same personality type of user for the user to starting a new chat section for each other. When a message sends in this chat section, a new contact should be added to on database. Thus, users should be reach this contact from “Home” tab as a username and a profile photo of the opponnet. They can be able to reach this chat section by touching once on visual block of the contact.

- Send Message

Users should be able to send instant message to any contact on their Chat Application contact list. If a user wants to send a message, the user must be in specific chat section of its contact. Texting should not enough for the sending message. Users must be use the send button for send a new instant message. When the button is touched, the message is sent in real-time.

- Message Status

Users must be able to get information about message time. If a message sent, the message date and the message time should appear next to the message.

Non Functional Requirements

- Privacy

Users informations should be encrypted to maintain privacy.

- Robustness

In case users device crashes, a backup of their chat history must be stored on remote database servers to enable recoverability.

- Performance

Application must be lightweight and must send messages instantly.

3.3 USE CASE DIAGRAM

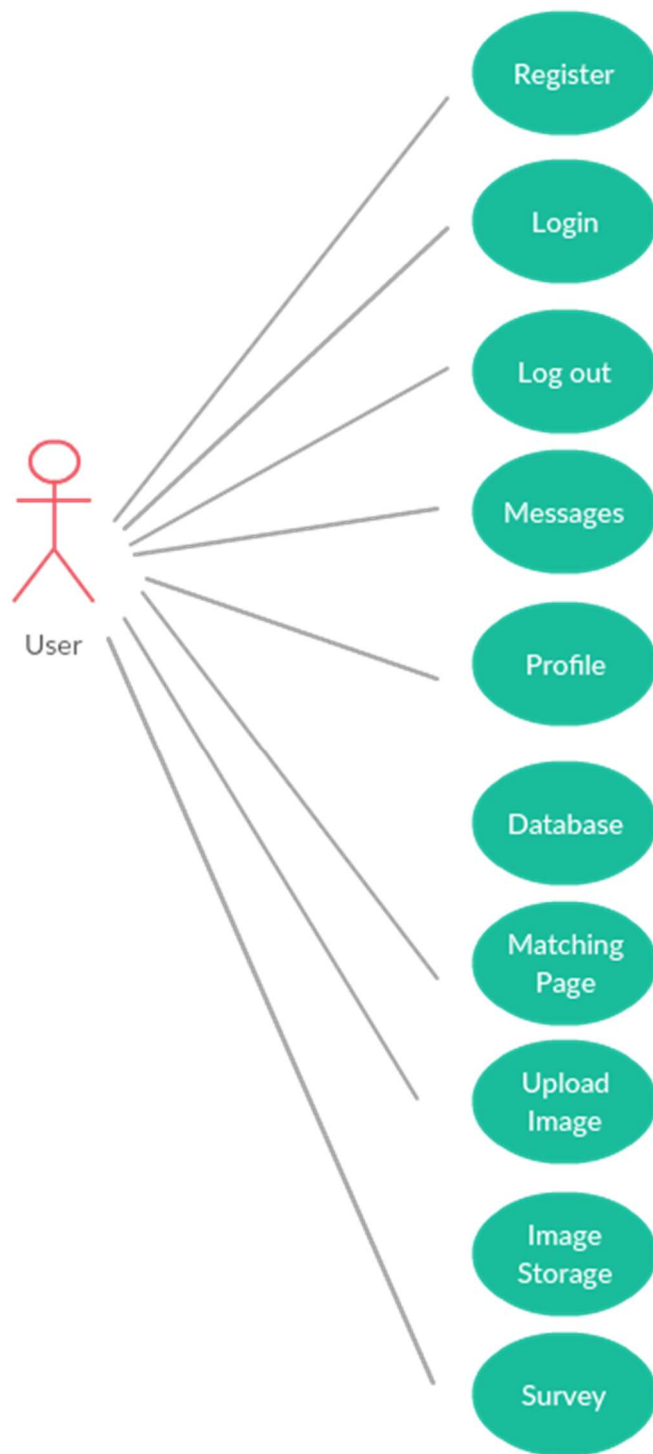


Figure 4: Use Case Diagram

3.4 ACTIVITY DIAGRAM

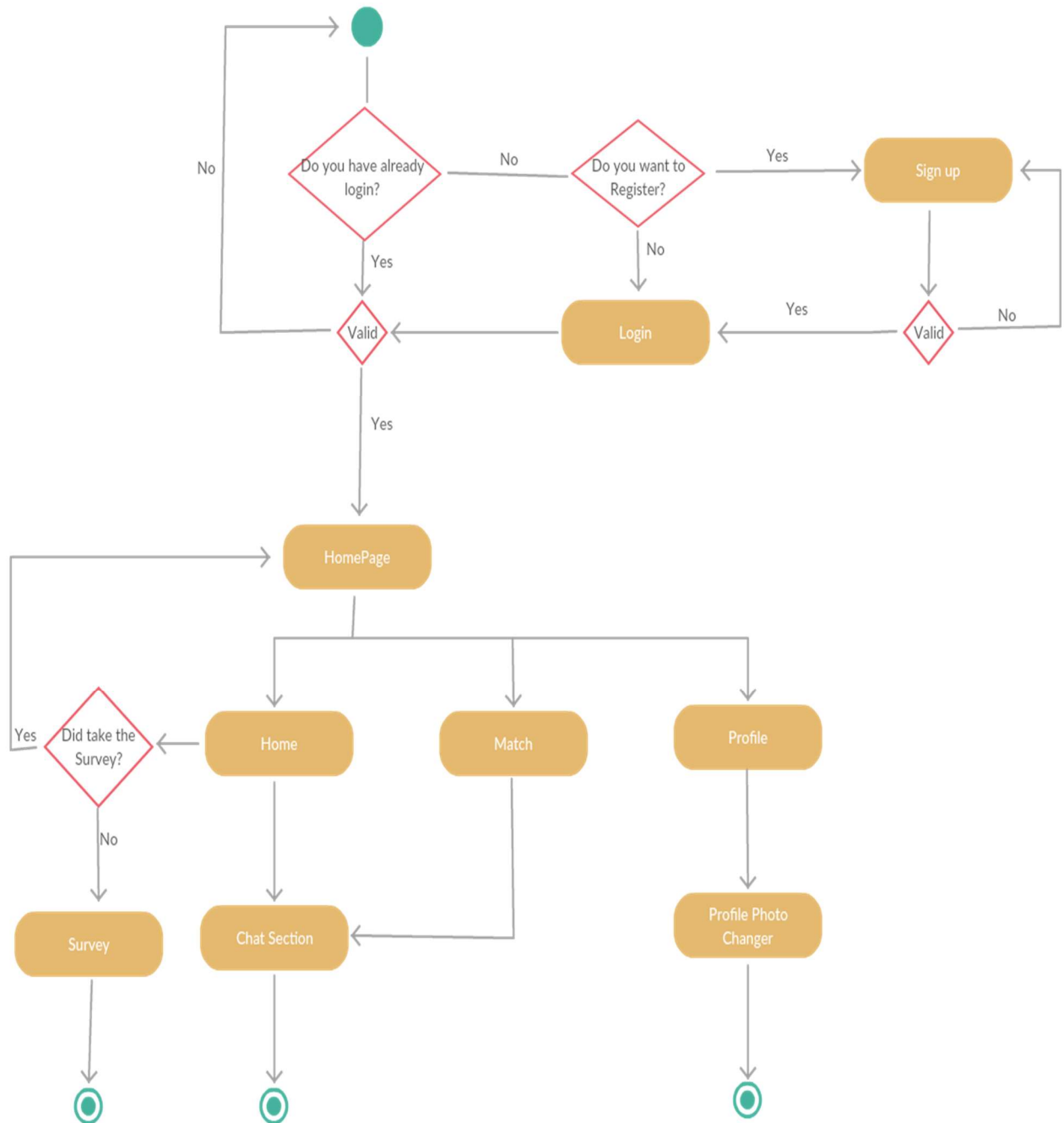


Figure 5: Activity Diagram

3.5 INTERACTION OVERVIEW DIAGRAM FOR REGISTRATION

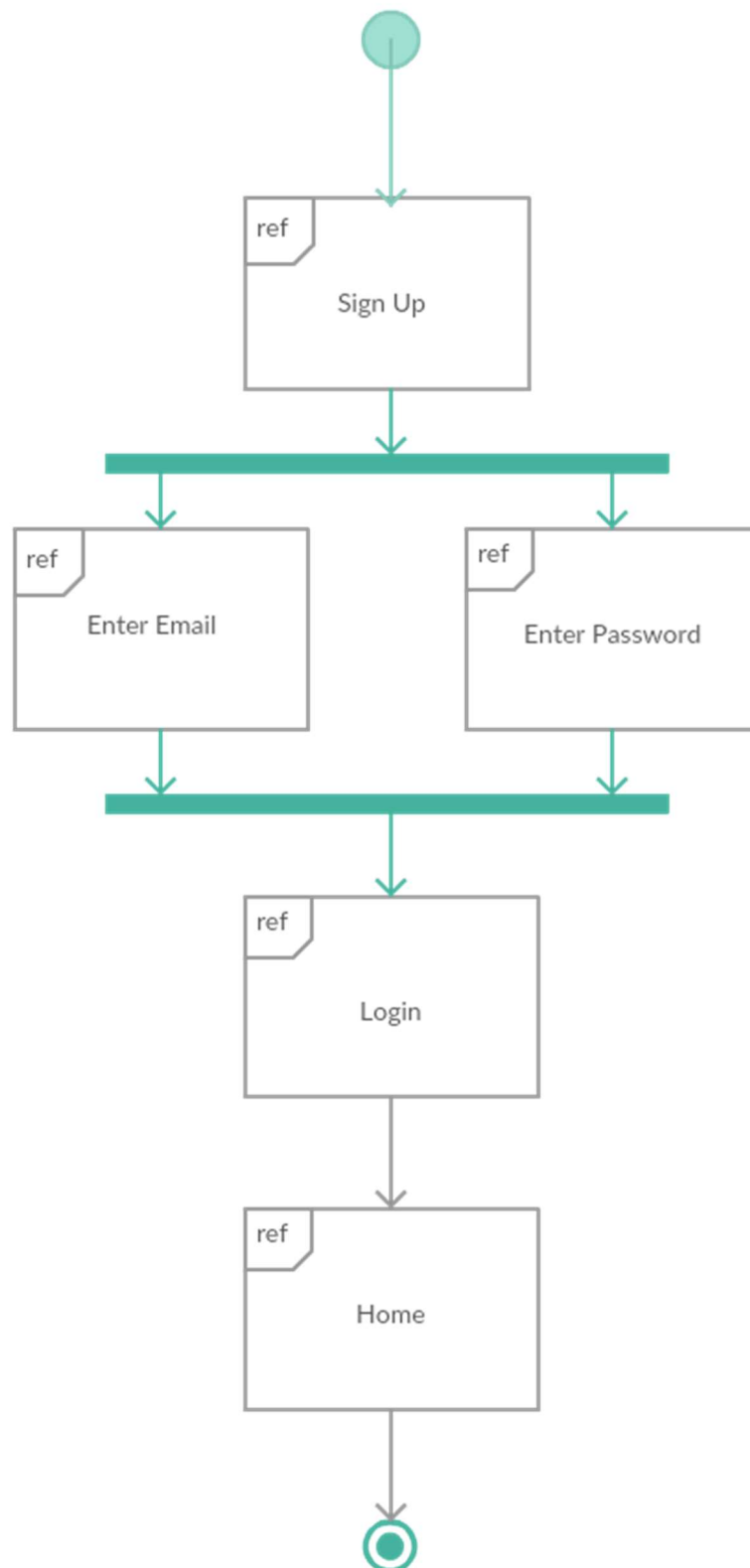


Figure 6: Interaction Overview Diagram For Registration

4 CHAPTER 4: ANALYSIS AND DESIGN

This chapter will provide a full description of the Project and its users. Thus, requirement analysis was adopted using various tools like diagrams.

4.1 PROJECT DESCRIPTION

Android Chatting System “Harmony” Project is a real-time chatting system on Android. The purpose of the Project is creating new contacts to people for people’s personality type. With these contacts, they can chat in real-time privately each other. People the users can chat fast and safe to provide backup support against errors like messages back from stored on database server against android mobile phone’s crashes. The Project was developed more than two months.

Firstly, after researches the visual of the Project is designed. Images, labels, chat background, font colors and icons were created on Adobe XD. Layouts has been created and colored form by form. When this’s done, the registration system was coded. At the start of registration system Sql Lite Database Server was used. But, Firebase Authantication is safer, faster and less complicated. So, I integrated Firebase Authantication on the registration system. This system provided me extra functions like password reset. Thus, i started to use Firebase Database Server. After the coding of other layouts connecting and classes functions, I tested the application. When the application failed, I returned and fixed it. Finally, the application were worked. Thus, the Project was finished.

4.2 USER DESCRIPTION

User have a hardware for using the application of the Project. Hardware details is given 4.5 User Requirements. User have to create an account on the application. If user doesn’t create an account, it cannot login and see other sections on the application.

User have a specific account. Contacts can be different for another user. User can upload an image to show its contact’s home tab. User is able to remove a chat contact and messages. User can send a message as a text to its contact, freely, in real time.

4.3 REQUIREMENTS DEVELOPMENT

To develop the functional and non-functional requirements of the Project, I did many researches from the internet. I brainstormed with some of my friends. I collected these informations and datas. Thus, i generated the requirements.

4.4 SYSTEM REQUIREMENTS

According to my researches, i developed the requirements that are functional and non functional. These requirements are determined for users to ease use. After implemantation these requirements the biggest of developing area is software developing. The Project or the application software system is design, coding, testing, implemantation and operation.

These requirements defined the system requirements.

4.5 USER REQUIREMENTS

The main requirement is a android device. The Project is tested for android mobile phone. User should use a android mobile phone. But, the given below requirements is mandatory:

- Device must be connected to the internet.
- Android Version 5.1 or newer version
- 128 MB mininum RAM
- Processor with Speed of 500 MHz
- The Project Application must be installed

5 CHAPTER 5: DESIGN AND IMPLEMENTATION

This chapter will cover the design and implementation of the project. The implementation phase combines the design phase outputs, requirements and the technology for usage.

5.1 DESIGN PHASE

Designing phase can be described by connecting every part of the system together. ChatListAdapter, ChatMessage, ChatSection, FragmentHome, FragmentMatch, FragmentProfile, HomePage, LogIn, MatchTimer, PasswordReset, PphotoChanger, SectionsPagerAdapter, SignUp and Survey are classes of the Project.

Layouts, menu and values are given with classes below figure 7 as the package diagram.

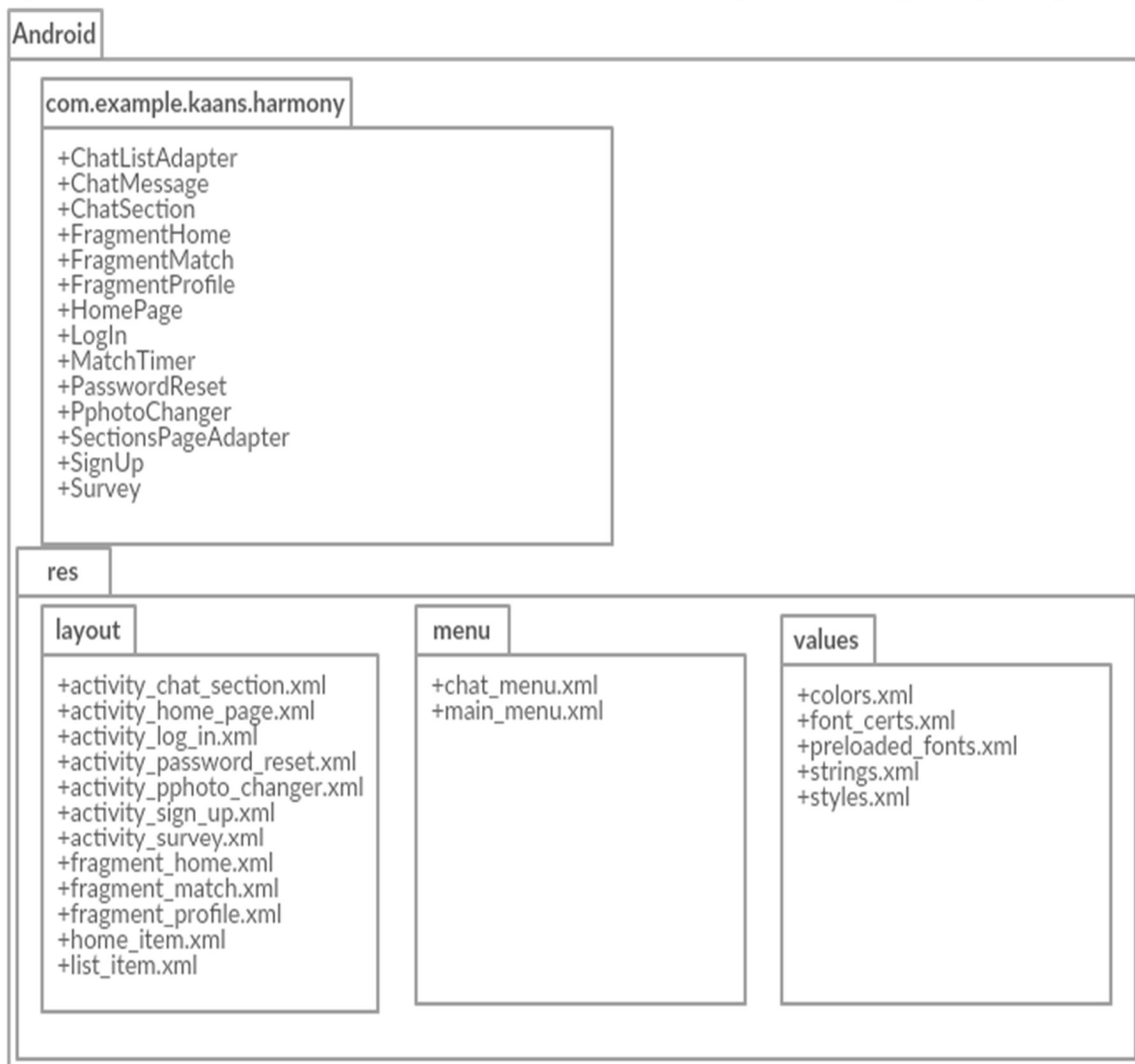


Figure 7: Package Diagram

5.2 BUILDING THE SOFTWARE

I started to develop software part of the Project, after implementation of the design of the Project. Software is built on Android Studio. The Project doesn't contain hardware development. Hardware is a requirement as I told before in 4.5 User Requirements.

First of all, I coded layouts of the Project. Constraints are edited for an android mobile phone (4"-7" inches). Then, icons and labels I built it in Adobe XD are applied on layouts. Classes are created for requirements applying and working. You can see them Figure 7: Package Diagram. Users' information, chat messages and the personality type of users are stored in Firebase Database. So, Firebase Database, Firebase Authentication and Firebase Storage systems are integrated to the Project. Firebase Database relation between children is given below Figure 8: Firebase Database Relation Table and a real screen shot from Firebase Server Figure 9: Firebase Database Screen Shots.

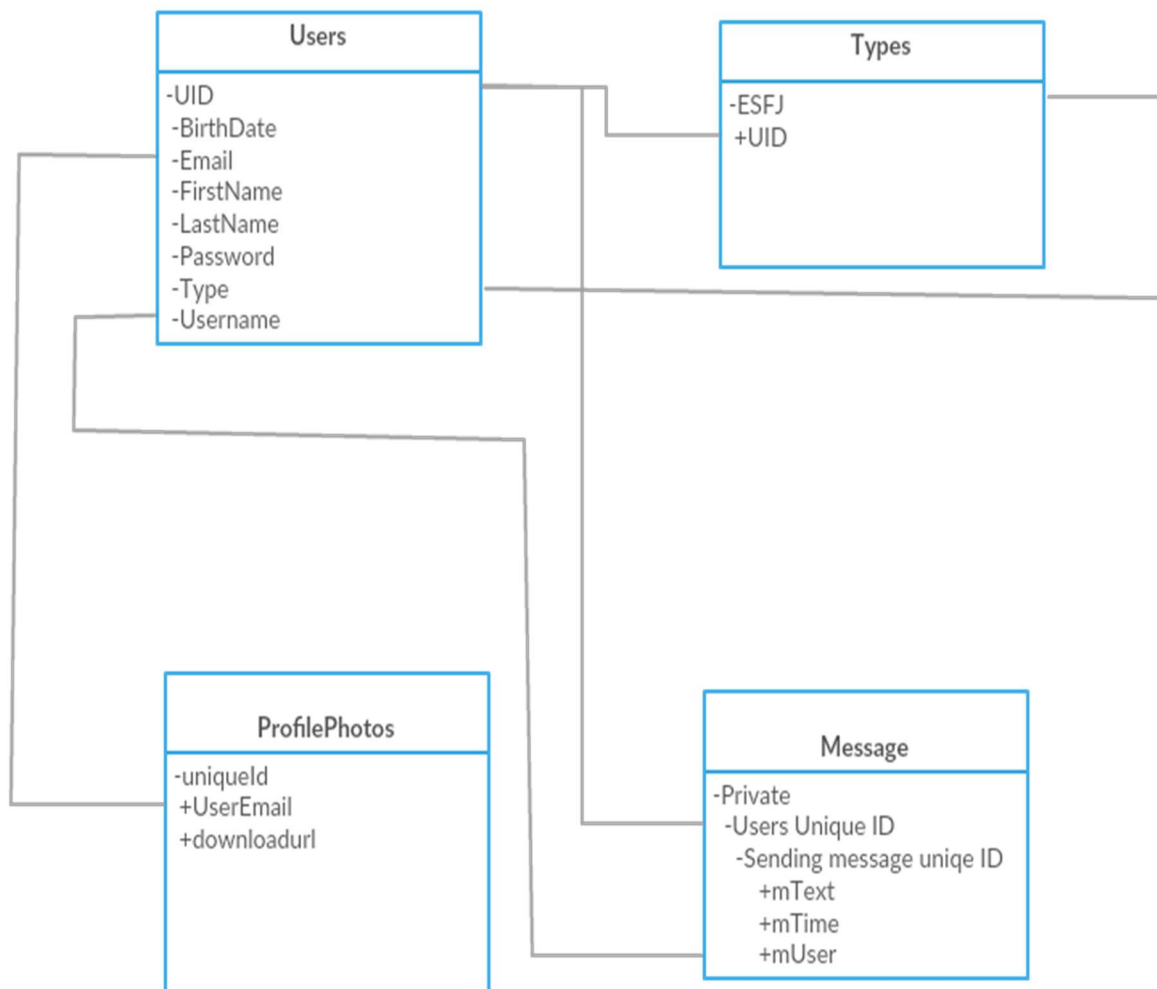


Figure 8: Firebase Database Relation Table

harmonychat-736c5

- + Message
- + ProfilePhotos
- + Types
- + Users

harmonychat-736c5

- Message
 - Private
 - MjQtx4AOJgUoqJHb2xuH4Y2iRRj2hHeOunT2P9cPDaCOi2Q6eUWhwl3
 - LVjVAdJsHanll6XwLu_
 - mText: "444"
 - mTime: 1546985143958
 - mUser: "fake"
 - + -LViYtaU-dYPYGTzr8bO

harmonychat-736c5

- + Message
- ProfilePhotos
 - + 2d869aa0-4681-4230-a805-0b846e2a0af6
 - + 47279438-36d3-44b4-b876-79881c1d274a
 - + 4926f6de-3a22-4419-9927-078eab513350
 - + 5c9551c5-b3f6-445d-8492-ebf2e64ad26b
 - 6e3a6de6-93b9-490a-ab98-94f652db2424
 - UserEmail: "ariasrowland@hotmail.com"
 - downloadurl: "https://firebasestorage.googleapis.com/v0/b/har..."
 - + 841ef84d-f821-48d3-bf53-a78b6e7b308e
 - + 9e66e202-09c8-4c10-84f7-c96679ff1f9a
 - + a9da4bd1-de29-4d4f-b90e-b0c0179eba79
 - + aa81c39a-8231-48c5-a19a-38b88a2c7897
 - + be9a0ef1-7e69-4c25-8c1a-9ba606ed621b
- + Types
- + Users

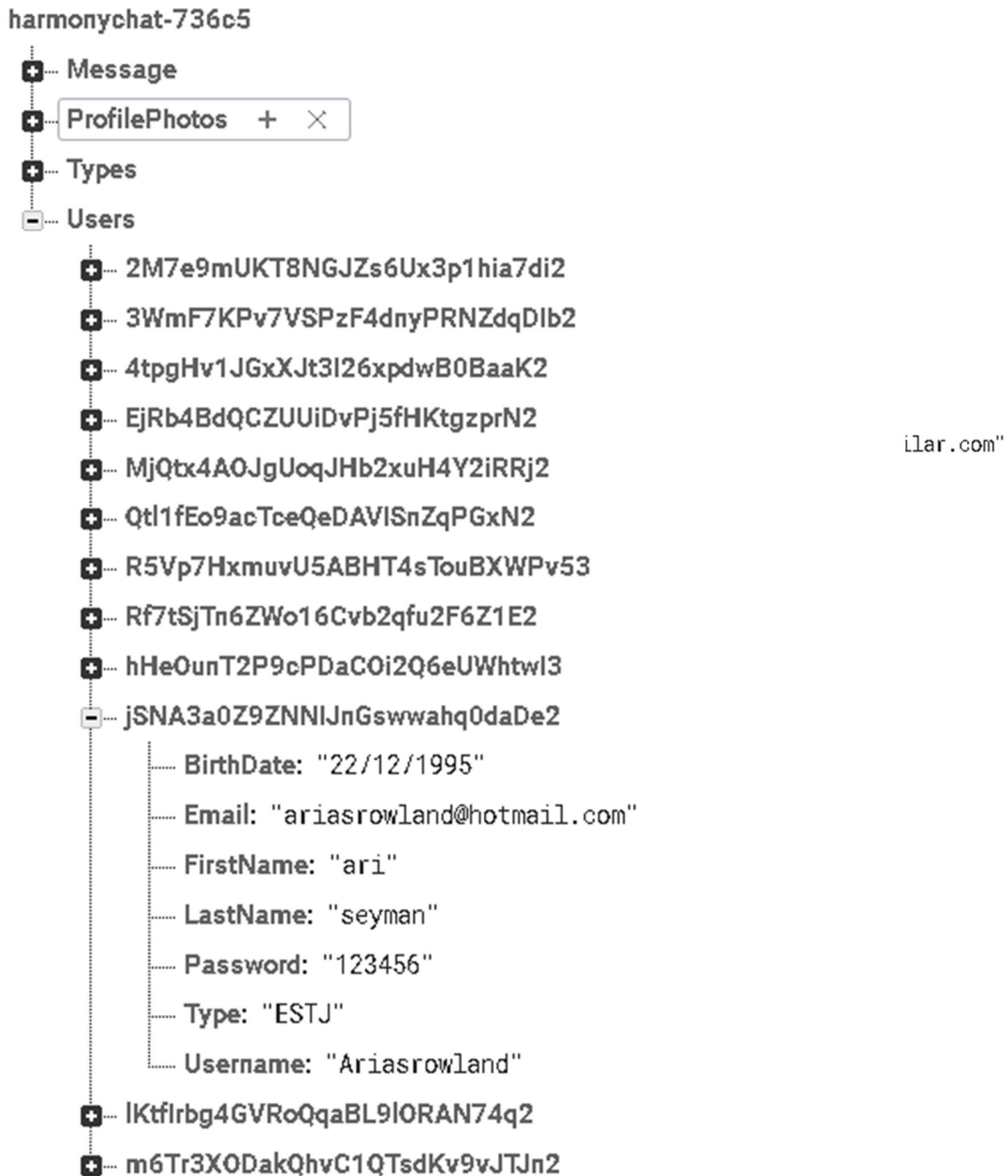


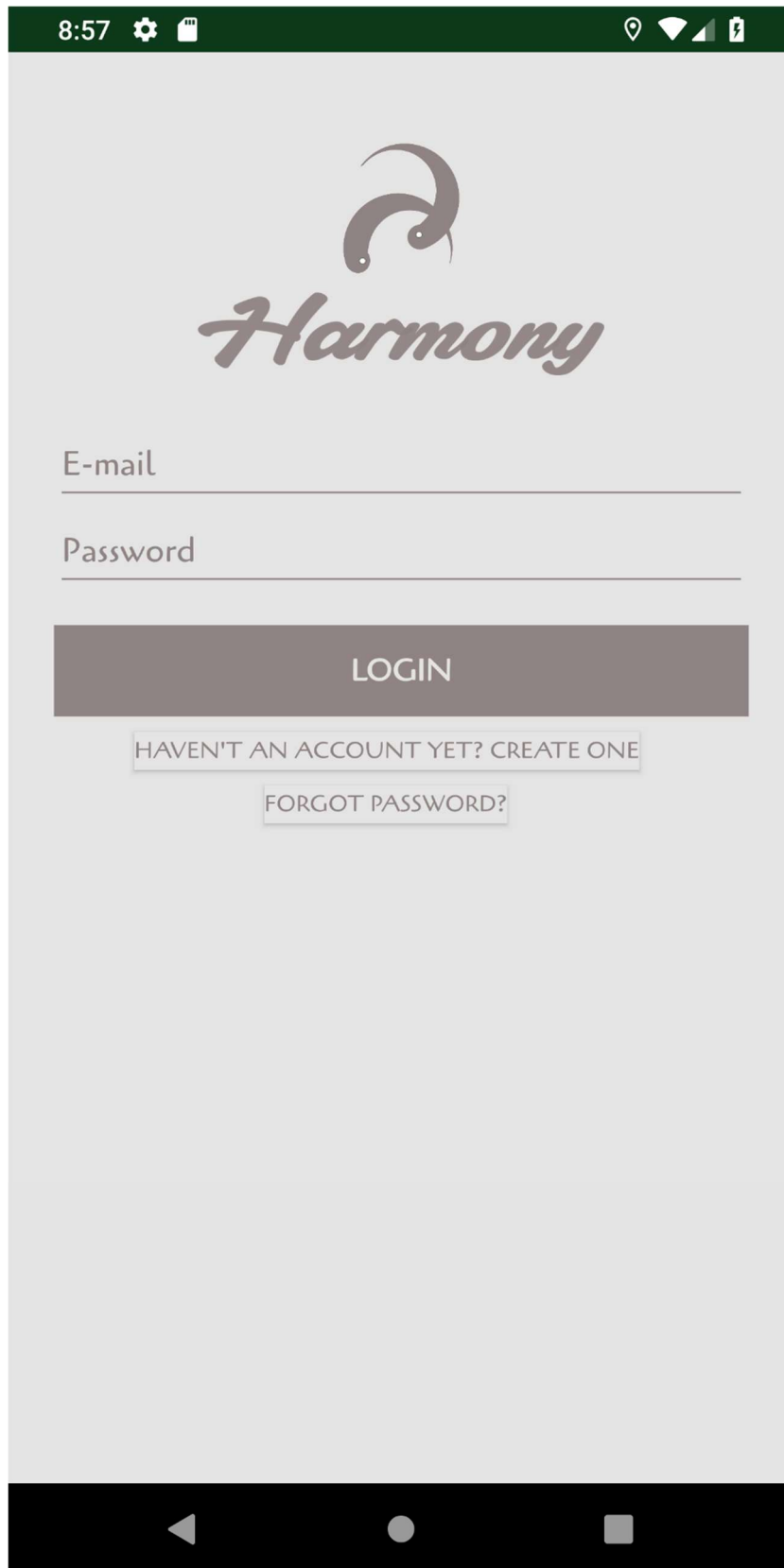
Figure 9: Firebase Database Screen Shots

5.3 BUILDING THE HARDWARE

The Project doesnt contain hardware part. The hardware is only a requirement for installing and using the Project as an application. I explained it in 4.5 User Requirement.

5.4 USER INTERFACE


In this section, you will see user interface of the application on an emulator as screen-shots Figure 10-Figure 21.



The screenshot displays the login interface of an application named "Harmony". At the top, a dark green status bar shows the time as 8:57, along with icons for settings, signal strength, and battery. The app's logo, featuring two stylized fish forming a circle, is positioned above the word "Harmony" in a cursive font. Below the logo are two input fields: "E-mail" and "Password". A large, dark grey "LOGIN" button is centered below these fields. Underneath the button are two links: "HAVEN'T AN ACCOUNT YET? CREATE ONE" and "FORGOT PASSWORD?". The bottom of the screen shows the standard Android navigation bar with back, home, and recent apps buttons.

Figure10: Login Form - Screen Shot

9:00 [Settings] [Signal] [Battery]



exampleforreport

.....

example@report.com

Example

Harmony

10/1/2019 Pick

SIGN UP

ALREADY HAVE AN ACCOUNT

[Navigation Bar: Back, Home, Recent Apps]

Figure 11: Signup Form – Screen Shot

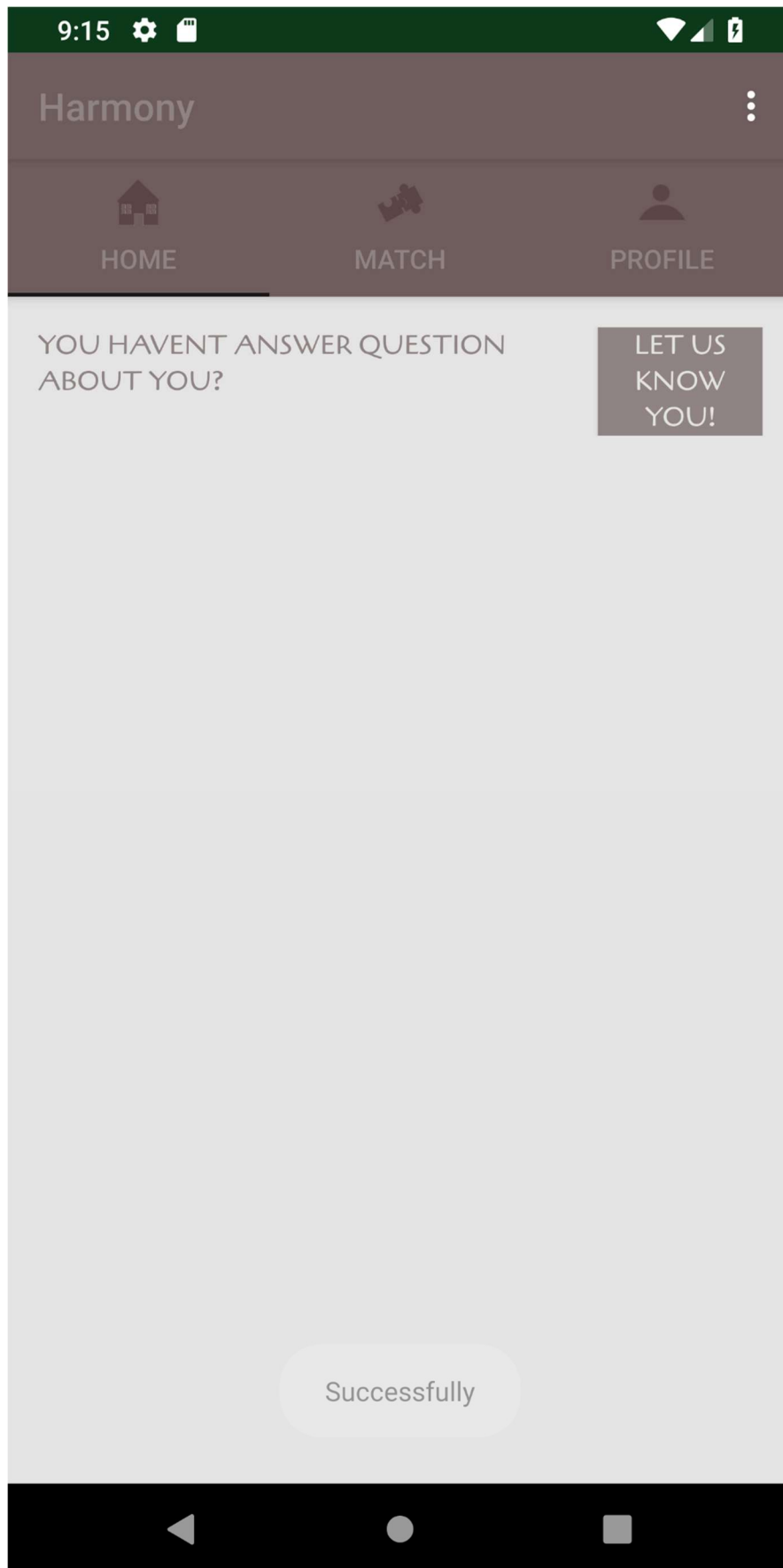


Figure 12: Home Tab - Screen Shot

9:00    

Harmony

Please answer all questions

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

☐ Yes ☐ Uncertain ☐ No

SAVE

Figure 13: Survey Form – Screen Shot

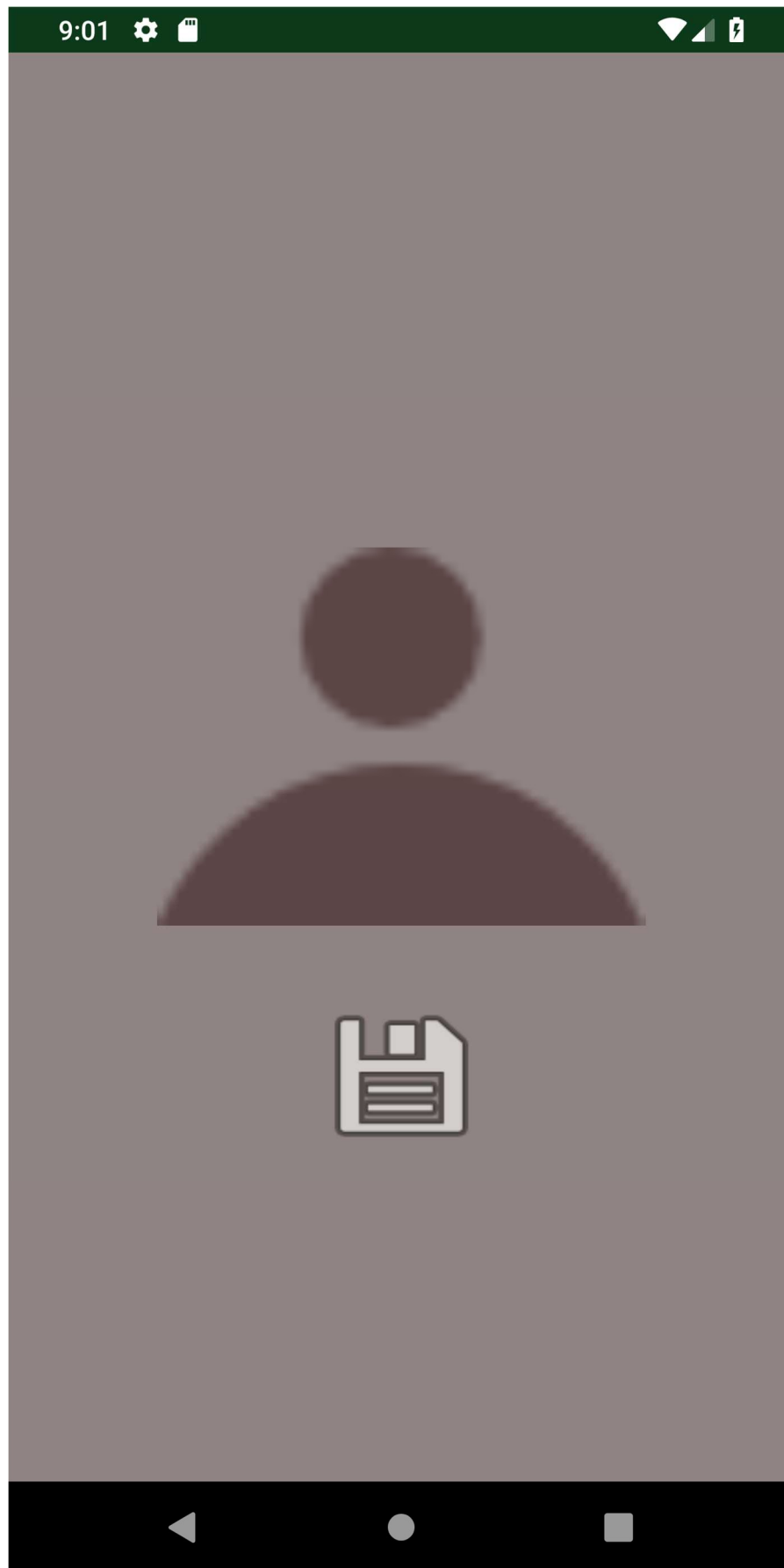


Figure 14: Profile Photo Changer Form – Screen Shot

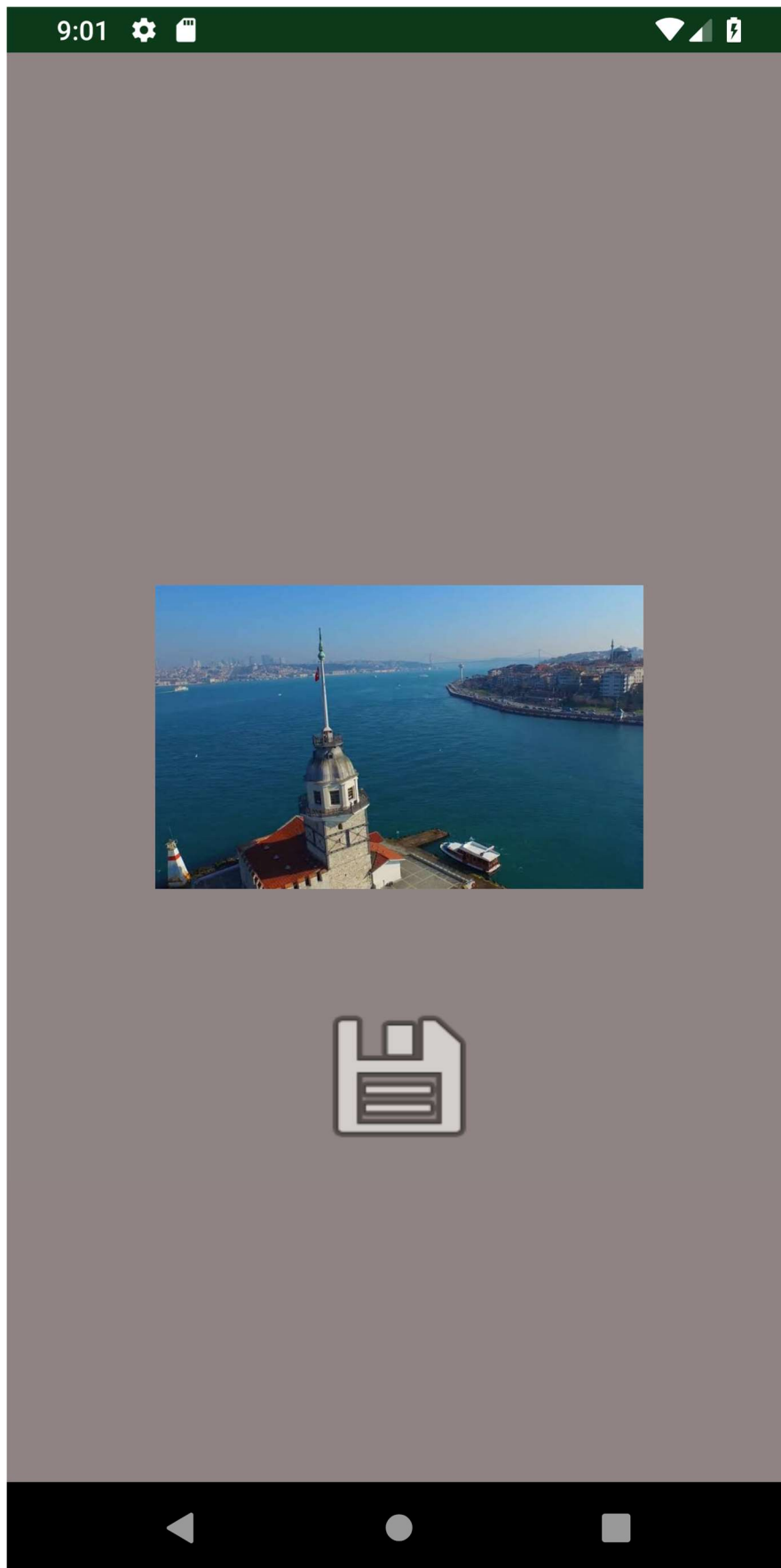


Figure 15: Profile Photo Changer – Screen Shot

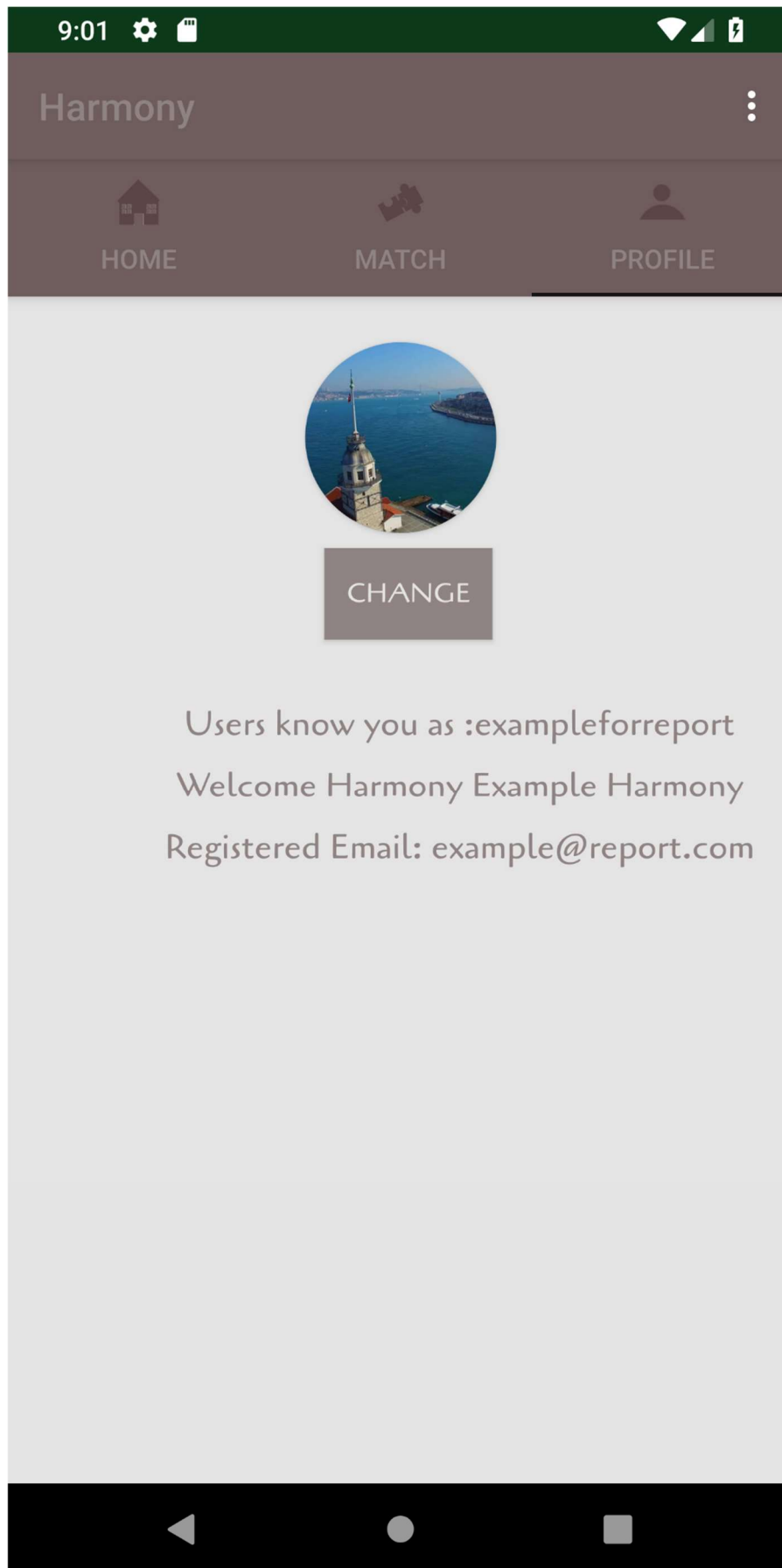


Figure 16: Profile Tab – Screen Shot

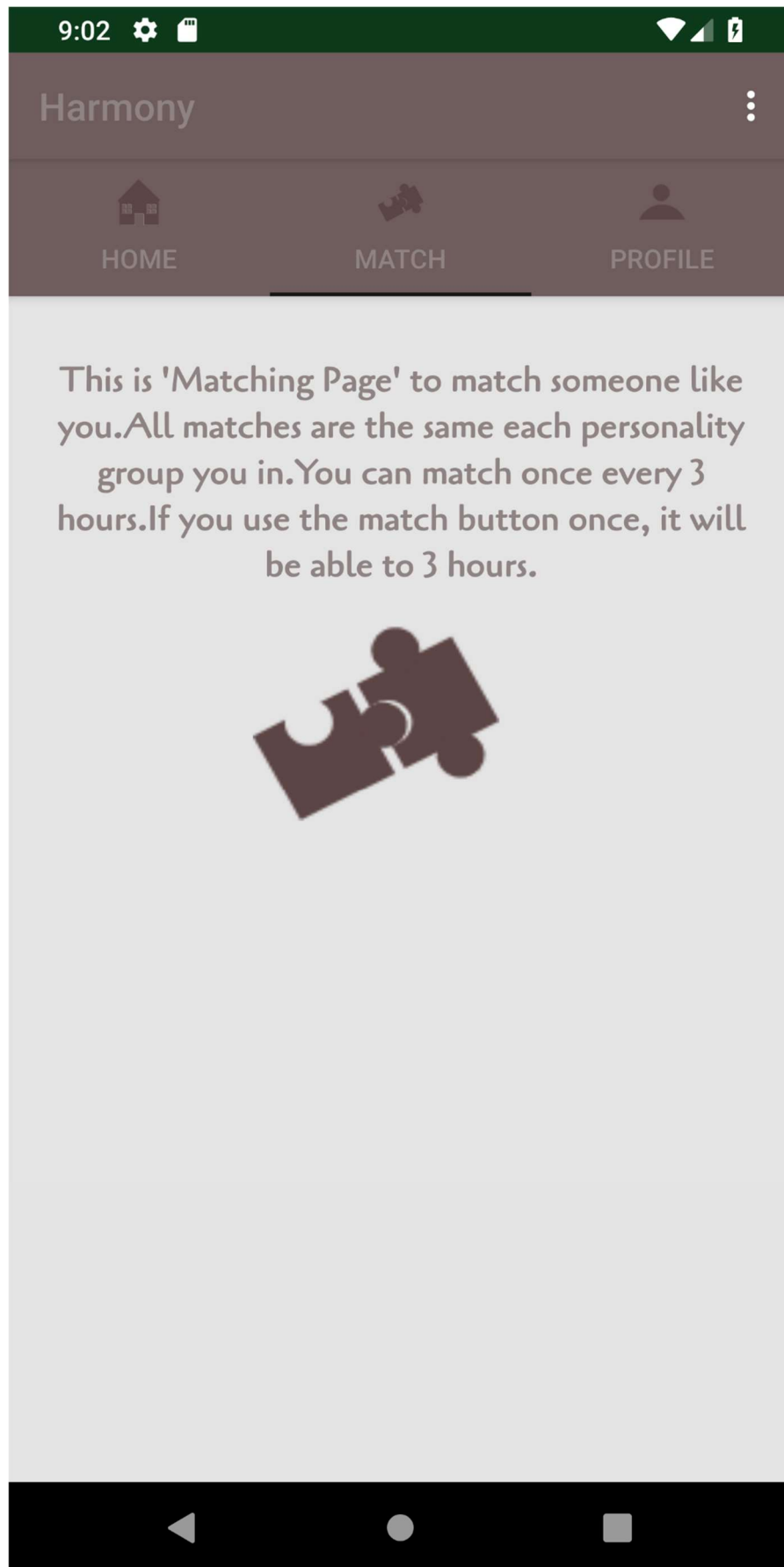


Figure 17: Match Tab – Screen Shot



Figure 18: Chat Section – Screen Shot

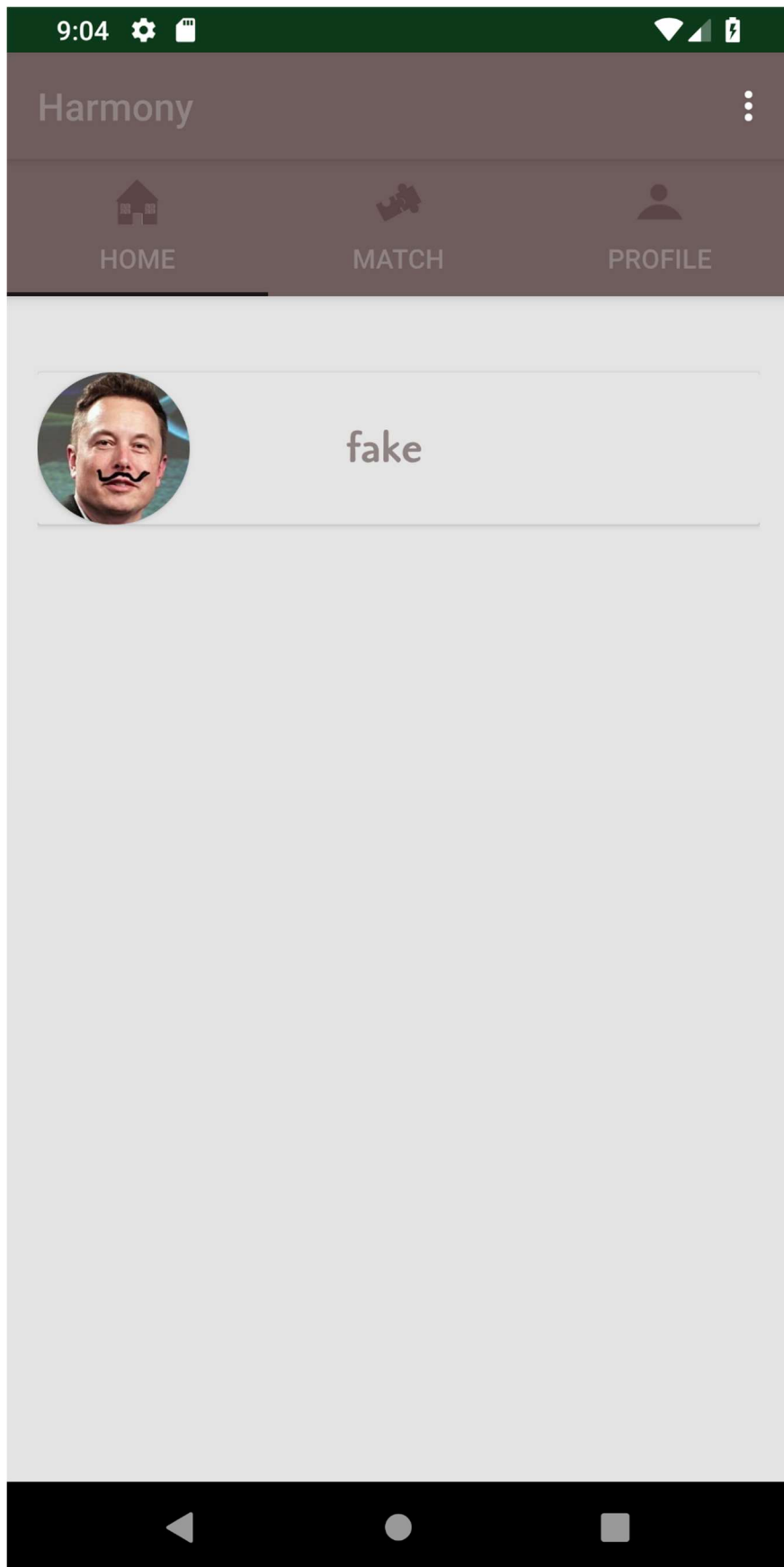


Figure 19: Home Tab Recycler View – Screen Shot



Figure 20: Chat Section Menu – Screen Shot

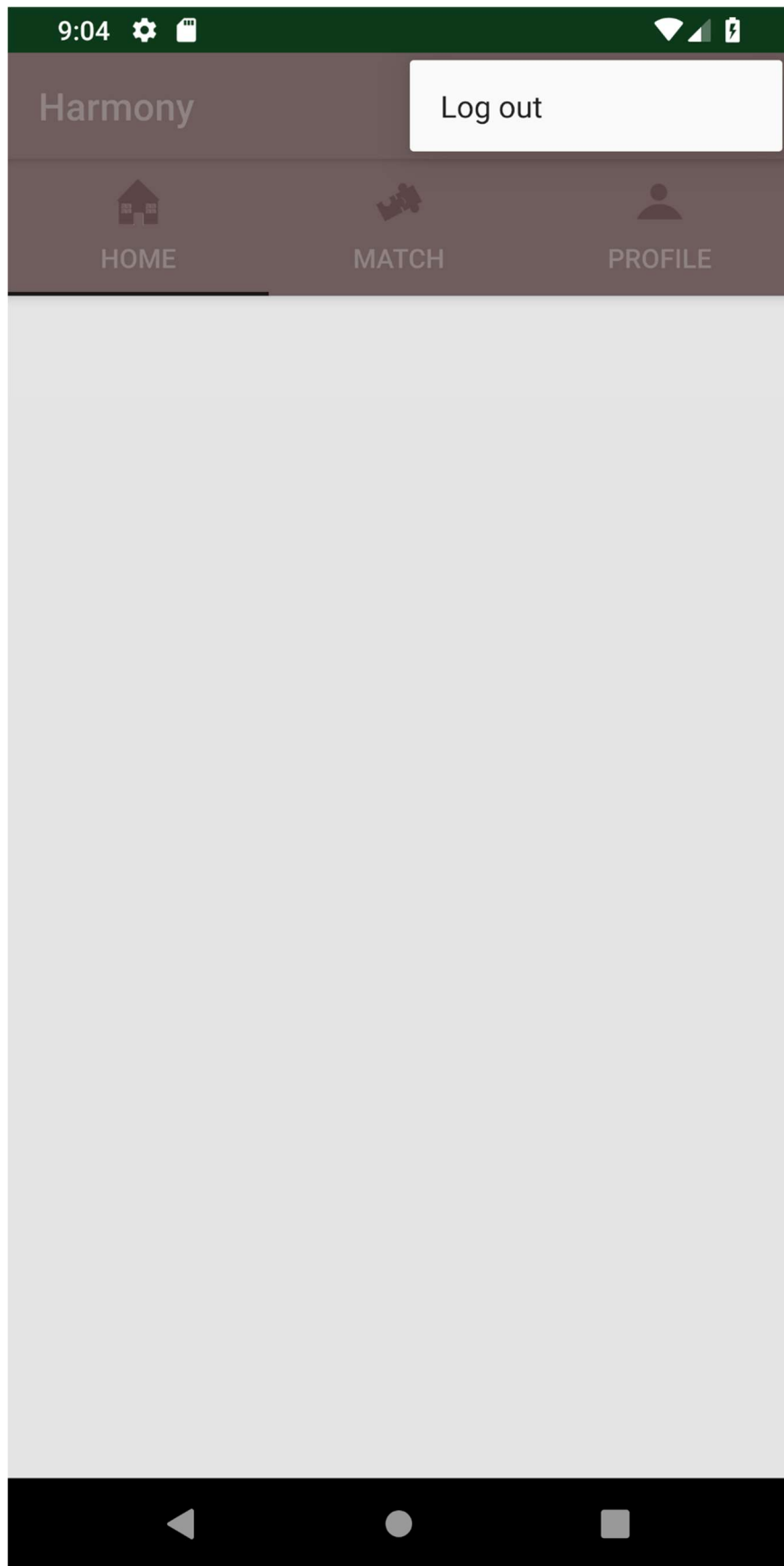


Figure 21: Home Form Menu – Screen Shot

6 CHAPTER 6: TESTING

This chapter will contain the last phase of this project, which is testing and tools. In the testing part, performance and functionality testings were performed.

6.1 TESTING

Two types of testing was done to test the Android Chatting System Project “Harmony”. These test was emulator testing.

6.2 EMULATOR TESTING

After completing a part of the software, I tested it on an emulator on Android Studio at the same time. If I across an error, i fixed it. Android Studio logcat and debug function showed me the error all time. I can understand it via checking object variables. Thus, it was not easy, but it took a progress time for fixing an error or a problem.

The last time, when the Project has finished, I tested it. There was no error or problem. Because, i check statements for all steps of developing. Finally, the Project application is working as expected.

6.3 MAINANTANCE

This is the final stage of this project. At this stage, maintaining, updating and enhancing the system will take place, which contains all the problems and errors that are met through the usage of the completed system which resulted in a updated and enchanced system.

I am maintaining the software components. So I linked all the components together and if anything changes even if it is a simple change, the whole system will be affected. This can lead the need of experience to maintain the components whenever something changes.

6.4 CONCLUSION

In today’s World, with the improvement of the technological development, people have become more demanding in terms of quality of life. However, today the usage mobile phones and socail media brought new requirements to people to satisfy.

So I decided to make a Project which will use real time database on Android. The Project is a Android Chatting System. This system or application could provide a chatting experience in real-time. I decided to creation of contacts according to user personality type for better user satisfaction. I started the research according to these requirements.

However, this Project is working as expected. The Project is successful according to requirements. All requirements are fixed.

REFERENCES

- To learn personality type: www.personalityperfect.com/16-personality-types (10.10.2018)
- To collecting more information about personality type: <https://www.16personalities.com/> (11.10.2018)
- To learn personality type: <http://www.personalitypage.com/html/high-level.html> (11.10.2018)
- To learn what android is: <https://www.android.com/play/> (12.10.2018)
- To learn android development <https://developer.android.com/> (20.10.2018)
- Education for android development: <https://www.udemy.com/android-o-mobil-uygulama-dersi-kotlin-java> (25.10.2018)
- Idea about chatting system built <https://code.tutsplus.com/tutorials/how-to-create-an-android-chat-app-using-firebase--cms-27397> (1.11.2018)
- To learn android studio: https://tr.wikipedia.org/wiki/Android_Studio (3.11.2018)
- To learn android studio tools: https://www.tutorialspoint.com/android/android_studio.htm (2.11.2018)
- To learn android studio: <https://developer.android.com/guide/> (20.11.2018)
- To understand android architecture: <https://www.educba.com/structure-of-an-android-operating-system/> (1.12.2018)
- Determining Project Requirements
: <https://www.pmi.org/learning/library/determining-project-requirements-best-practices-7278> (1.12.2018)
- Uml Diagrams: <https://tallyfy.com/uml-diagram/> (5.12.2018)
- Online diagram: <https://creatly.com> (6.12.2018)
- To learn Adobe XD: <https://helpx.adobe.com/xd/tutorials.html> (11.12.2018)
- More Adobe XD tutorial: <http://www.foreverdansky.com/categories/adobe-xd-tutorials> (13.12.2018)

- To create a new Database: <https://firebase.google.com/docs/database/> (15.12.2018)
- To learn Firebase Authentication System:
<https://firebase.google.com/docs/auth/> (19.12.2018)
- Tutorial for integration: <https://www.raywenderlich.com/5114-firebase-tutorial-for-android-getting-started> (20.12.2018)
- To learn error fixing:
<https://stackoverflow.com/questions/16561692/android-exception-handling-best-practice> (22.12.2018)
- To learn error fixing <https://android.jlelse.eu/flexible-way-to-handle-exceptions-in-android-9de236f304ad> (23.12.2018)