National College of Ireland

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BSHCE

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Care4U

Technical Report

Declaration Cover Sheet for Project Submission

SECTION 1 *Student to complete*

Name:
Student ID:
Supervisor:

SECTION 2 Confirmation of Authorship

The acceptance of your work is subject to your signature on the following declaration:

I confirm that I have read the College statement on plagiarism (summarised overleaf and printed in full in the Student Handbook) and that the work I have submitted for assessment is entirely my own work.

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NB. If it is suspected that your assignment contains the work of others falsely represented as your own, it will be referred to the College's Disciplinary Committee. Should the Committee be satisfied that plagiarism has occurred this is likely to lead to your failing the module and possibly to your being suspended or expelled from college.

Complete the sections above and attach it to the front of one of the copies of your assignment,

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The following is extracted from the college's formal statement on plagiarism as quoted in the Student Handbooks. References to "assignments" should be taken to include any piece of work submitted for assessment.

Paraphrasing refers to taking the ideas, words or work of another, putting it into your own words and crediting the source. This is acceptable academic practice provided you ensure that credit is given to the author. Plagiarism refers to copying the ideas and work of another and misrepresenting it as your own. This is completely unacceptable and is prohibited in all academic institutions. It is a serious offence and may result in a fail grade and/or disciplinary action. All sources that you use in your writing must be acknowledged and included in the reference or bibliography section. If a particular piece of writing proves difficult to paraphrase, or you want to include it in its original form, it must be enclosed in quotation marks
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When referring to the work of another author within the text of your project you must give the author's surname and the date the work was published. Full details for each source must then be given in the bibliography at the end of the project

Penalties for Plagiarism
If it is suspected that your assignment contains the work of others falsely represented as your own, it will be referred to the college's Disciplinary Committee. Where the Disciplinary Committee makes a finding that there has been plagiarism, the Disciplinary Committee may recommend

- that a student's marks shall be reduced
- that the student be deemed not to have passed the assignment
- that other forms of assessment undertaken in that academic year by the same student be declared void
- that other examinations sat by the same student at the same sitting be declared void

Further penalties are also possible including

- suspending a student college for a specified time,
- expelling a student from college,
- prohibiting a student from sitting any examination or assessment.,
- the imposition of a fine and
- the requirement that a student to attend additional or other lectures or courses or undertake additional academic work.

ReportReport

1. Executive Summary

Putting your trust in someone to mind and care for someone you love dearly is stressful. The health industry is booming with care services a huge financial burden on most families. Paying for these services your main wish is for the care services to looking after your loved one just as well as if it was you looking after them. Unfortunately this isn't always the case and I have experienced this at first hand.

Care4U is been developed to offer families that piece of mind that their father,mother,child,family member etc are been looked after just how they should be and provided the care they deserve by providing up to date information on the care they have been receiving and any additional information seen fit.

The Android platform will be used to code within Android Studio. An firebase database will be used to store any information. NFC tags will be used to interact with the application. NFC Tools Pro will be used to code the NFC tags. All graphics were designed in Google Docs, Photoshop CS6 or Balsamiq Mockups 3.

2. Introduction

This report will go through the stages in the development of my application Care4U. The appendices will include my Project Proposal, Requirements Specification and my Diaries through the development of Care4U.

2.1 Background

The idea and development for Care4U is a very personal one. My youngest brother is severely disabled and bind meaning he requires full time care. He relies on the help of others to do basic tasks that the majority of us take for granted, like feeding or dressing ourselves. Due to his disabilities my parents receive help from the HSE (Health Services Executive). On mornings my father has been working a home help comes helps get my brother up out of bed, wash, dressed and ready for school. This help is invaluable to my parents. Sometimes a new home helps comes to get my brother ready for school and is unfamiliar with the either his disabilities or just general information about him. For this reason my mother will have to explain all about my brother which isn't a problem other than she works full-time so can spend half her morning explaining all, which can make her late for work. This is one of the reasons why I wanted to develop Care4U. As a new home help came into the house they could log into the application and instantly provided with basic information about my bother saying my mother going through it all.

The second reason is my brother goes to day school. On two occasions under the care of the school and the Special Needs Assistants my brother has his leg broken under their care. This was a heartbreaking moment in my family, not once but twice it happened while he was under the care of others. Who he was under care at the time of the incidents was never discovered, with nobody owning. It hurts greatly to think it happened maybe early in the day with him having to suffer with a broken leg and not discovered until he got home to us. My brother can't speak but we could tell from the moment he got him to us he was clearly in much discomfort. With Care4U the idea is as someone takes care of my brother, they would scan the tag and entering details such as who is with him and from what time so we could keep track of who was caring at any particular time of the day. Hopefully this would also encourage that if he was in an accident it would be reported sooner rather than later.

2.2 Aims

The aim of this project is to develop an application that could provide some piece of mind to families like my own that rely and thankful for the help of others, that it might help prevent accidents been reported later than it should. Also having an application that will provide some helpful information on service helpers of the health system like who help with my brother that they can check something like his medical conditions and medication that he requires.

2.3 Technologies

The development of the application was decided to be done as an Android application. The reasons for this was that I owned an Android mobile phone which would allow me to test the application at different stages of development easily. The other reason was that a higher number of mobile devices like phones and tablets are Android based. In order to develop the application I would use Android Studio which is the official development platform for Android, it's free and is developed/provided by Google which owns Android. Google regularly updates Android Studio fixing bugs and adding new features.

Near field communication (NFC) is an up and coming technology that allows the transfer of information from one device to another through close contact. The aim is for data to be stored on NFC tags which when come in contact will a NFC enabled device like my phone, information will be passed from the tag onto my application which will be installed on the phone.

2.4 Structure

The report has been structured in a way that it will firstly give the general reader an overview of the project and application, what it is and what it can do. It will then move on to give a more technical overview of the project and application in the second part of the report. After the technical reporting the conclusion, evaluation and further development will be provided in the third part. The fourth part will provide the bibliography of the resources that were used. The final part will give all appendices to this report.

3. System

Within this section a detailed overview of the structure and layout of the application will be provided.

3.1 Requirements

Requirements are outlined the start any application development. It gives developers an overview of what the application should do and provide for its users. In order to better understand the requirements for my application, I talked to my family and family members of my brothers school friends to get their views and wishes that they would like to see in the application. This was very beneficial.

3.2.1 Functional Requirements

The functional requirements are the essential functions of the application that it must be able to perform.

R.1 - Application Download
The user must be able to download and install the application to their device from the Play Store.

R.2 - Register
For registering this will be done by the Admin through the Firebase console. Login details will then be provided to users through the Admin.

R.3 - Login
Registered users will be able to log into the application using the details provided by the Admin scanning the NFC Tag provided

R.4 - Password Recovery
If user fails to remember the Admin must change the password from the Firebase console.

R.5 - Service User profile
Successful logged in users can browse the Service User’s profile

R.6 - Medical Information
Successful logged in users can browse the Service User’s medical information

R.7 - Emergency Information
Successful logged in users can access the Service User’s medical information, which may be required in a case of an emergency

R.8 - Read Notes
Successful logged in users can read notes

R.9 Create Notes
Successful logged in users can create notes

R.10 Log Out

Successful logged in users can Log Out when they wish to do so

3.2.2 User Requirements

In order for users to use the application each user must have the following:

- Android Device
- Android version 6.0 or higher must be on user device
- Internet access in order for user to download application from Googles Play Store and also for database access
- Google Play Store must be on user device in order to download application from it

There are three different types of users to interact with this mobile application.

1. Admin.
2. Service Helper.
3. Service User.

3.2.1.1 Admin

The Admin must be able to register both the Service Helper and the Service User into the database. The Admin must also be able to setup the profiles of application users. Finally the Admin must be able to register each NFC Tag with the required data for users.

3.2.1.2 Service Helper

The Service Helper must be able to log into the application. Once successfully logged in they must be able to read data on Service Users that has been entered into the database by the Admin. Finally the Service Helper should be able to leave a note with the application.

3.2.1.3 Service User

The Service User must be able to log into the application. Once successfully logged in they must be able to view their details, read and create notes.

3.2.3 Data Requirements

Without data the application will not be able to function as it has been designed to do so. It is essential that the application can send and receive data. Some of the data requirements are listed below:

- Google's Firebase Database to be integrated into the application
- Google’s Firebase Database to store, send and receive data
- Google’s Firebase Database to store will store user email address and password
- NFC Tag to store user email address and password

3.2.4 Environmental Requirements

In the environmental requirements we outline the requirements that we must have in order to develop the application.

- Macbook, Laptop or PC to run Android Studio
- Android device to test and run application in development and testing phases
- Android Studio to develop application
- Internet access to lookup documentation and other resources
- Photoshop to design logo
- Balsamiq mockups to help development design and style of application
- NFC Tools Pro to write data to NFC Tag
- NFC Tag to store data and interact with application

3.2.5 Usability Requirements

Usability requirements is about how the users will interact with the application. How easy to find to use.

The main focus for usability is the ease of use of the application. From talking to members of the target market the main usability requirement was to be able to easily use the application. In order to achieve this the application has been design for easy navigation, clearly labeled allowing users to know where they are in the application and what they can do from there. Users must be able to seamless go from one function to another if they wish so. Once finished they can successfully log out.The application must also have a appealing design to it.

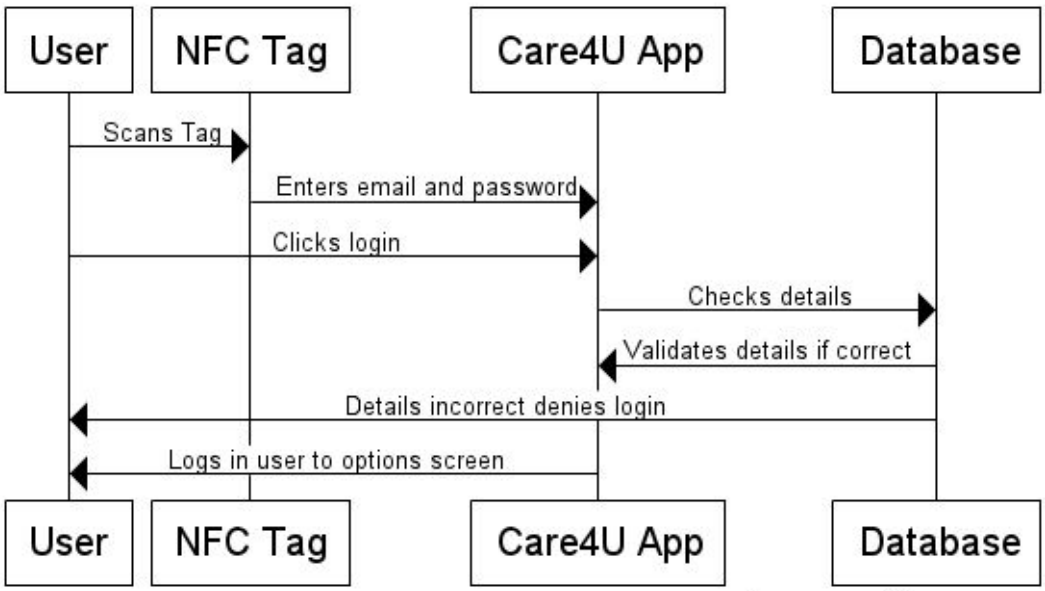
3.3 Design and Architecture

The main development tool used for the application was Android Studio 2.3.1 which uses a combinations of Java and C as its development language for android applications. In order to help with the layout and style of the application xml was used when needed. Originally for the database I had envisioned of using SQLite but that had many drawbacks mainly been that data was stored locally. My application required talking to an online database which is why Firebase database was used. Firebase is housed in the cloud and also when the application is offline it stores data in cache. JSON is used to design the database for Firebase.

In order to programme the NFC Tags, NFC Tools Pro was acquired by me. Along with many functions for programming tasks to NFC Tags it allows you to write and save plain text to an NFC Tag all through the application.

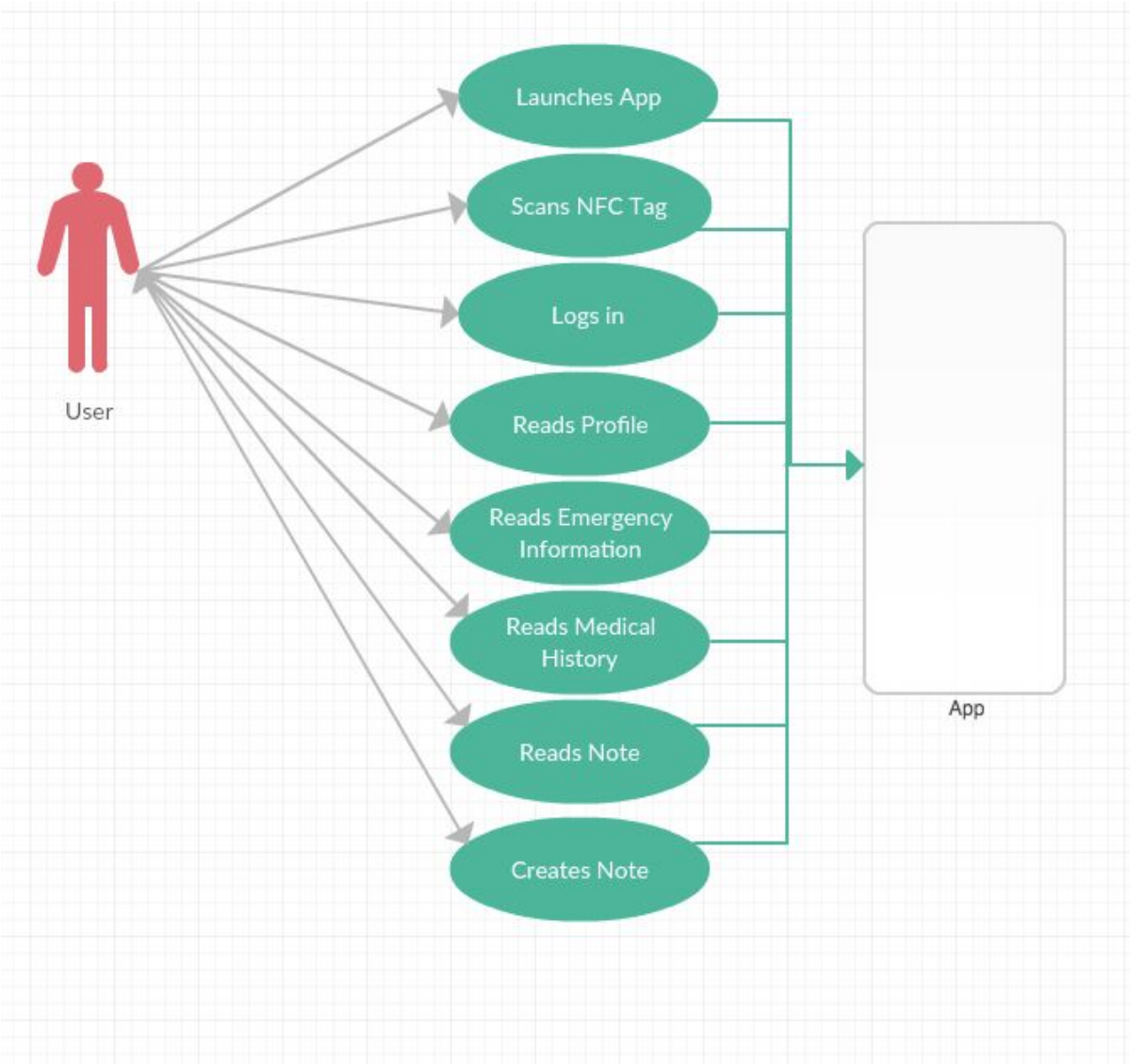
3.3.1 Sequence Diagram

The sequence diagram shows the process of a user logging into the application.

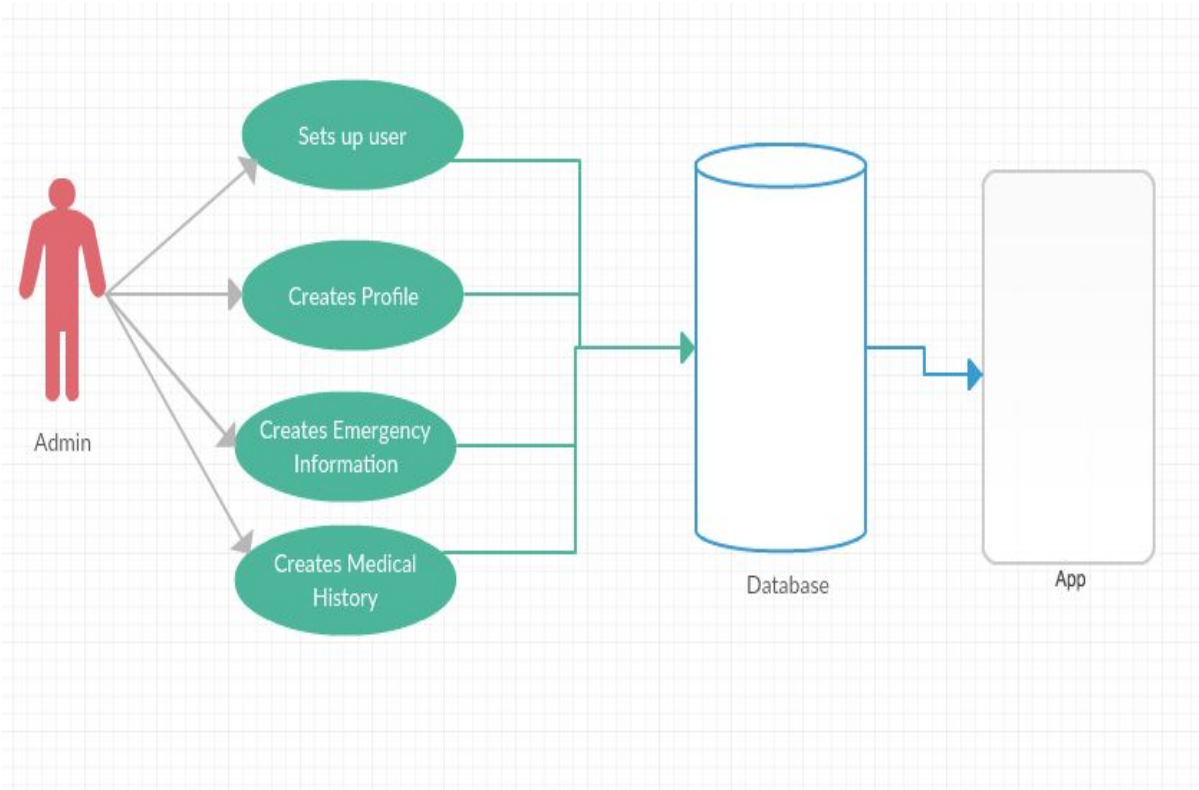


3.3.2 Use Case Diagram

The following use case shows a user interacting with the application and the actions they may accomplish with Care4U.



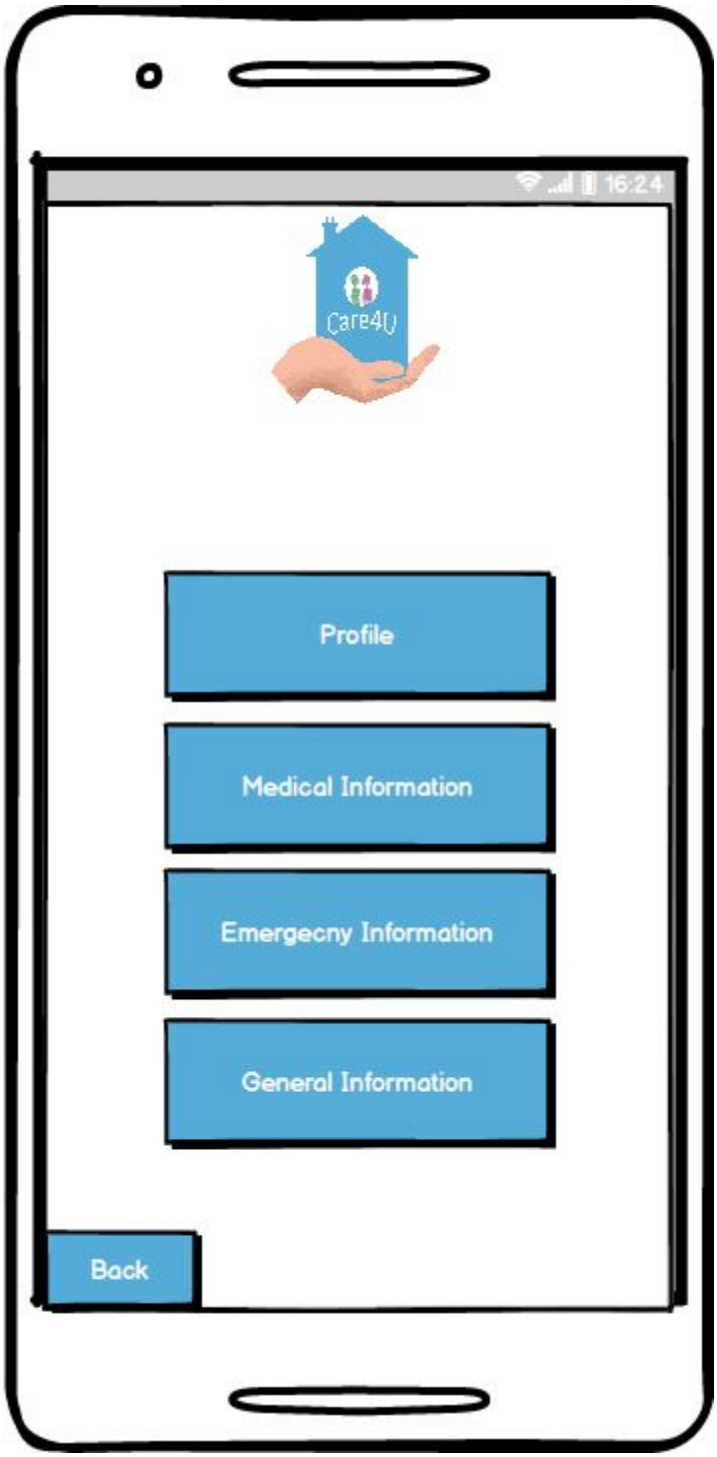
This use case shows and admin using the database in order to setup users and their information which will then be pushed out to the application.



3.3.3 GUI

For the GUI I wanted something clean and easy to and keep to the standards for andriod development. A simple layout was best thought required due for the target market. The back button will be present everywhere other than at login.


15:34
Care4U
Email
Password
Login


16:24
Care4U
Profile
Medical Information
Emergecny Information
General Information
Back

3.4 Implementation

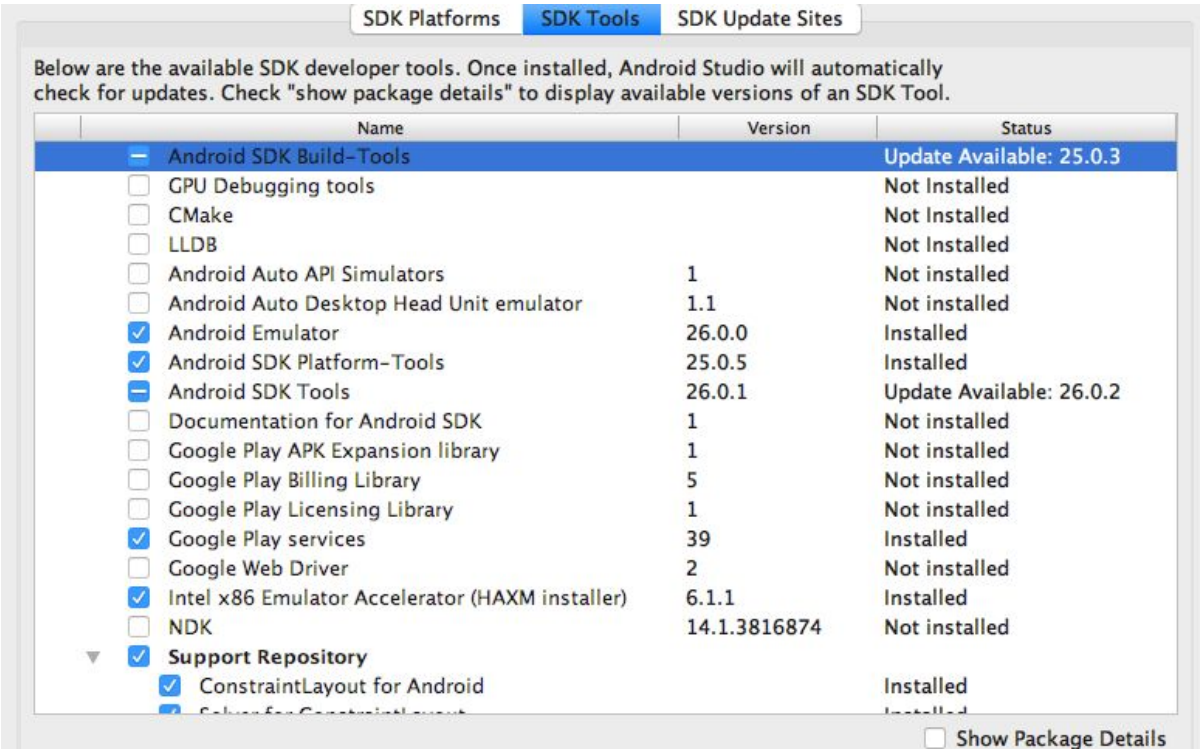
In the implementation section I will cover the development software, technologies used and how I implemented them to create my android application. Starting this development of my android application my knowledge of android development was basic. The aim at the end of the project was for my skills and understanding android to greatly increase and have a application I could be proud of.

3.4.1 Technology

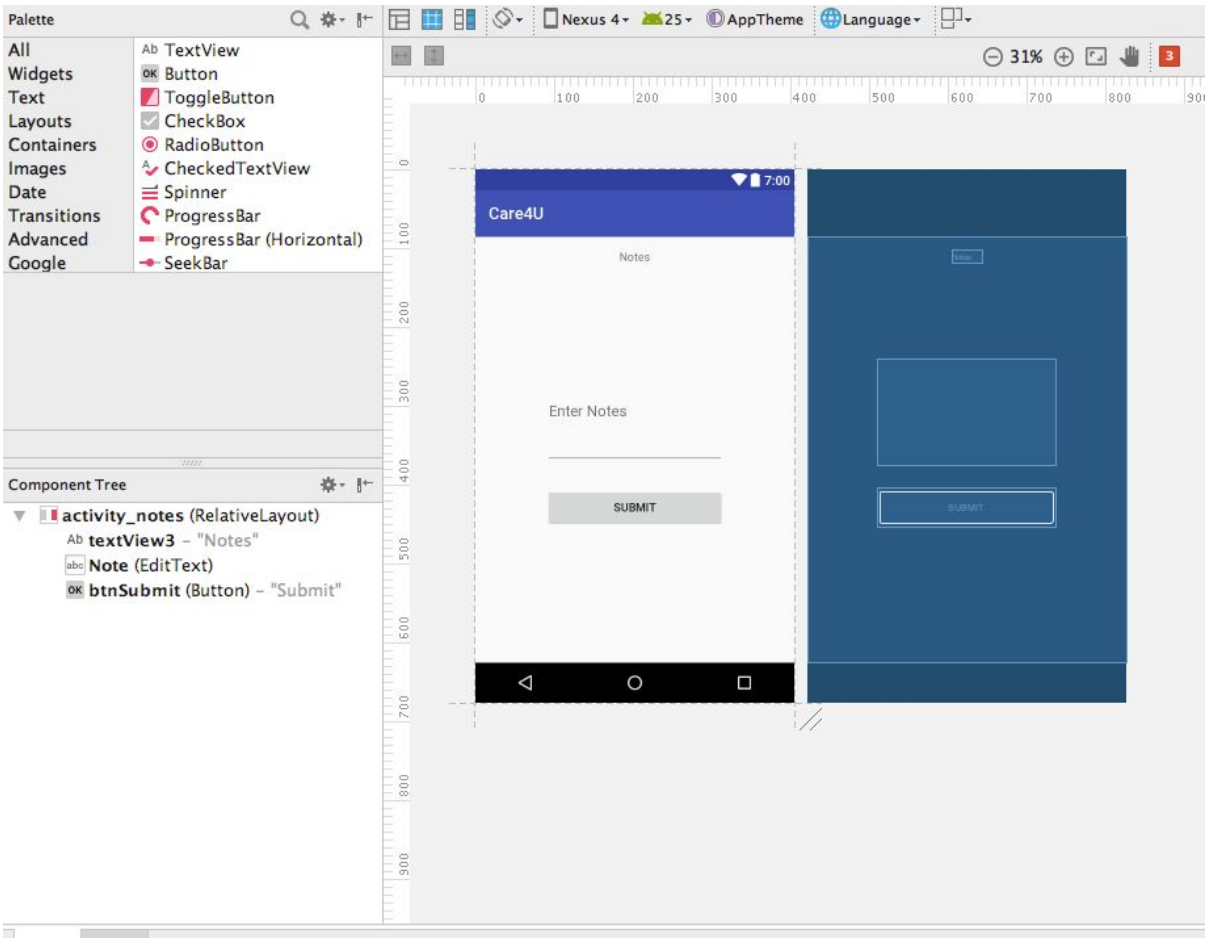
Under technology I will give an overview of what they are and how I used them to

3.4.1.1 Android Studio

Android Studio is the official IDE from Google and is recommended to use for any android development due to the regular updates it receives from the android development team at Google. You can download Android Studio from the official developer site developer.android.com/tools. Once downloaded and installed check for updates was ran. After all updates were installed a new project was created and SDKs were installed that would be need as development progressed like Google Play Services from within the SDK manager you can find under tools. When I started to develop in Android Studio it was at version 2.2 and currently at the time of writing this mine version is version 2.3.1



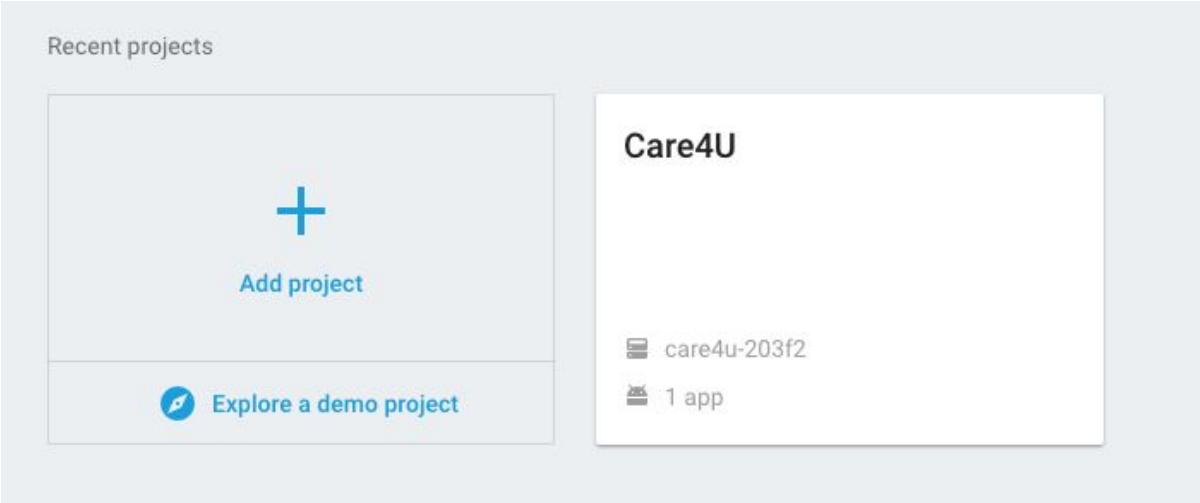
Android Studio allows you create activities. Those activities are what you want your application to be able to do. With an activity you can have a activity layout xml so your users can interact with her application. Here in the layout view you can either use text or a drag and drop feature as shown:



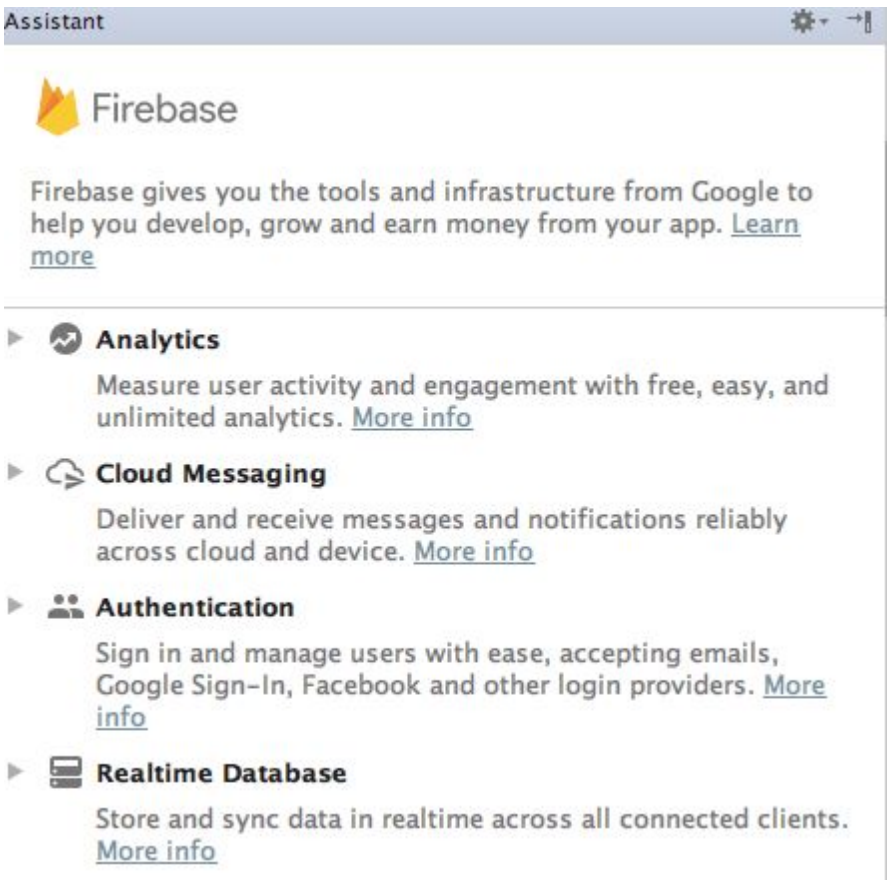
So you can drag and drop items from the Palette, visually designing your application. Once you're happy with the layout you must wire those items through their id in order for them to function how you wish to do so. Examples of this implementation will be provided in other examples.

3.4.1.2 Firebase

It was decided to use a Firebase database due to how well it integrates with androids due to it been a product of Google. You have a real-time database which you can control from the console and also from the console you can set up users that will have access to your application. In order to apply firebase to my application I first had to sign up to an account on their website firebase.google.com. Once signed up I added my application through the firebase console and followed the instructions how to apply it to my project.



In Android under tools you'll find Firebase, if you click on that it will launch a firebase assistant. Here depending on what you would like to add to your application you follow the instructions.



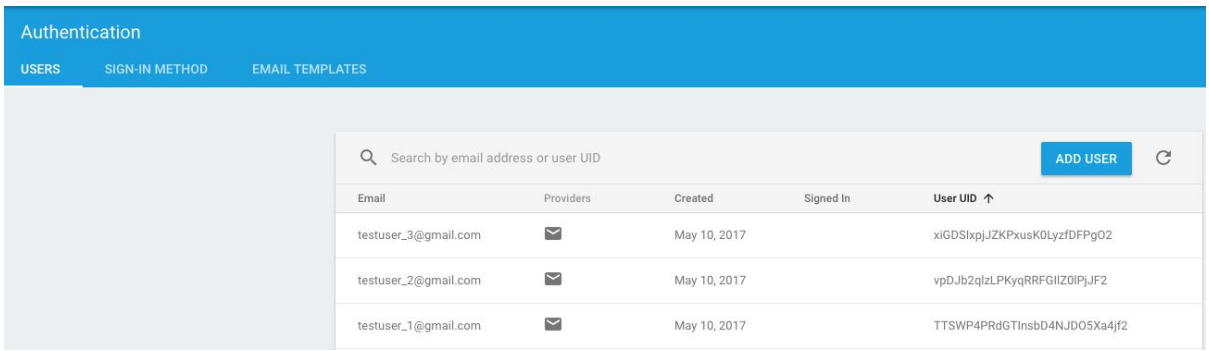
Due to my application holding user data I needed to restricted user access and only allow set users that I have approved. Once you have connected and have your dependencies setup corrected which mine been:

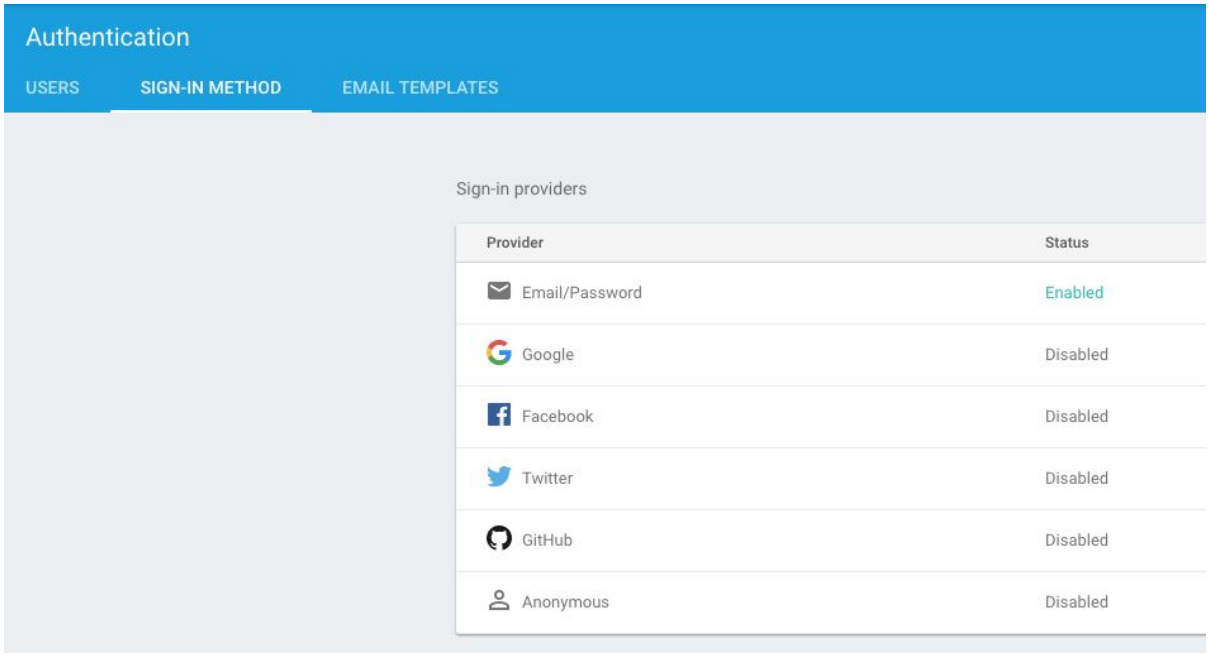
```
dependencies {
  classpath 'com.android.tools.build:gradle:2.3.1'
  classpath 'com.google.gms:google-services:3.0.0'
}
```

You have to declare the FirebaseAuth and AuthStateListener objects in your activity class. In the firebase assistant all the code is provided. I added in my sign in but

btnSignIn.setOnClickListener along with a toast that if the two text fields for login were blank it would alert you, toastMessage("You didn't fill in all the fields.");. A toast was done for if you logged in successful and out.

For the setting up of users from the firebase console you have authentication. Here you can set your users, and how they sign in. Along with adding users you can also delete, disable or reset the password.





I have only email/password enabled due to sign in information been written to NFC Tag for accounts that have been set up by me as the admin.

Firebase stores data in JSON format here is an example of some of the data structure for my application below. As with setting up authentication the firebase assistant provides you with code and instructions of how to send and receive real-time data. I then customized it to fit my application. The data snapshot, takes a snapshot of your data that had been entered into my textfields and pushes it to the real-time database which instantly updates.

Firebase gives you the code below to include in your application for when the data is ever changed a snapshot will be taken and your database will be updated.

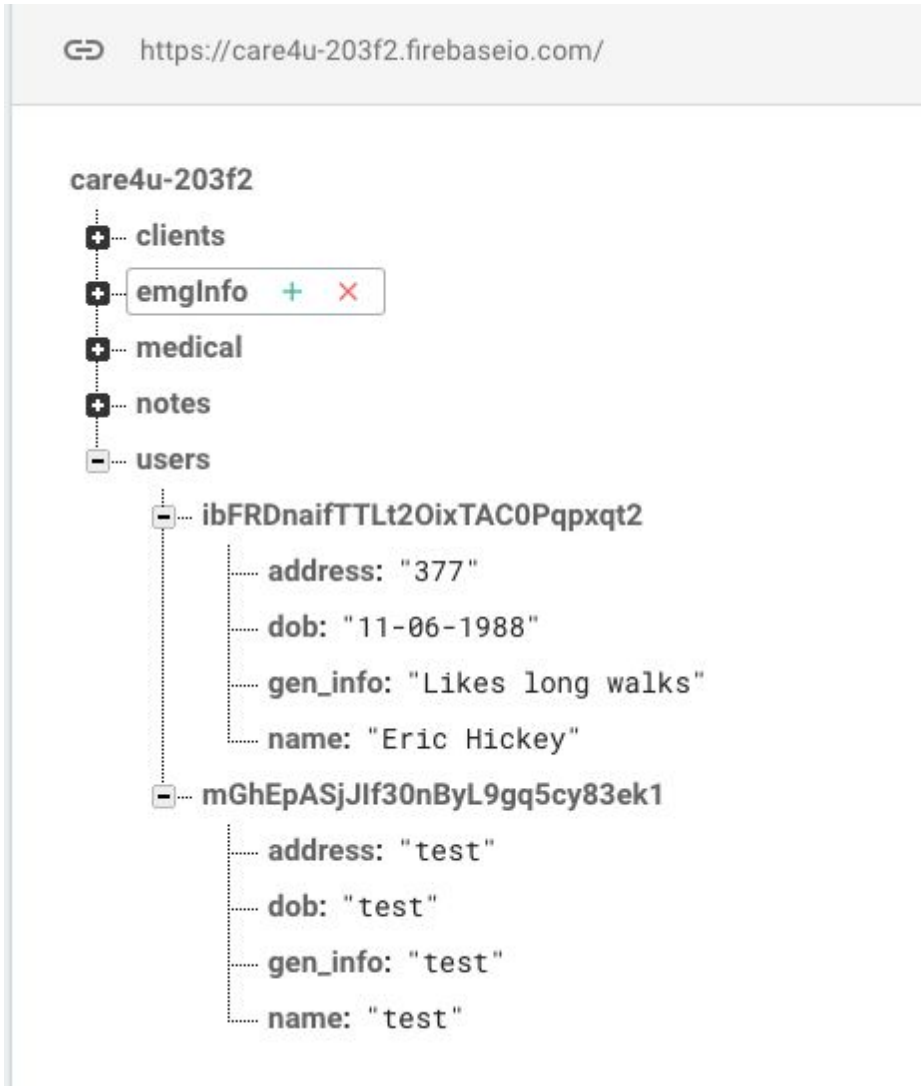
```
myRef.addValueEventListener(new ValueEventListener() {
  @Override
  public void onDataChange(DataSnapshot dataSnapshot) {
     Log.d(TAG, "onDataChange: Created new Profile: \n" +
           dataSnapshot.getValue());
}
```

I display it on the application using an arraylist with a listview:

```
ArrayList<String> array = new ArrayList<>();
array.add(cInfo.getName());
array.add(cInfo.getDob());
array.add(cInfo.getAddress());
array.add(cInfo.getGen_info());
ArrayAdapter adapter = new ArrayAdapter(this,android.R.layout.simple_list_item_1,array);
```

mListview.setAdapter(adapter);

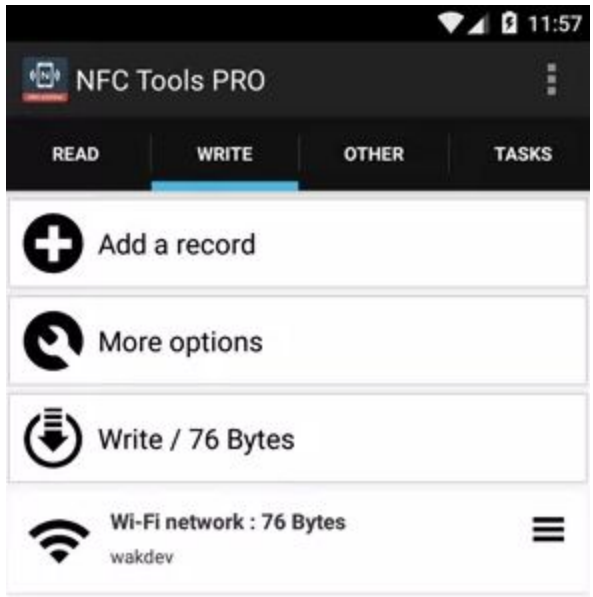
JSON structure of data in real-time database

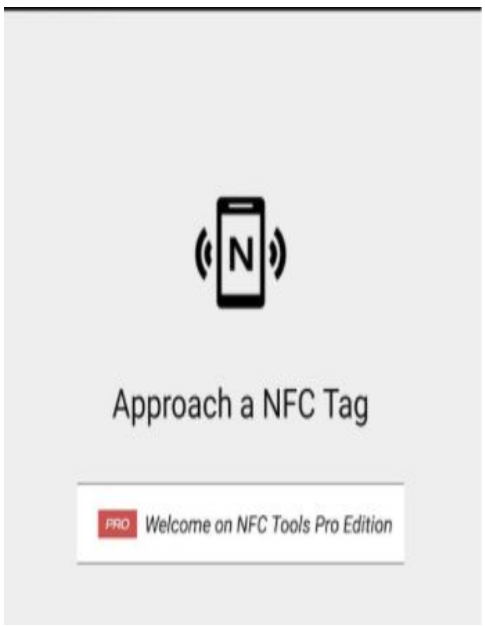


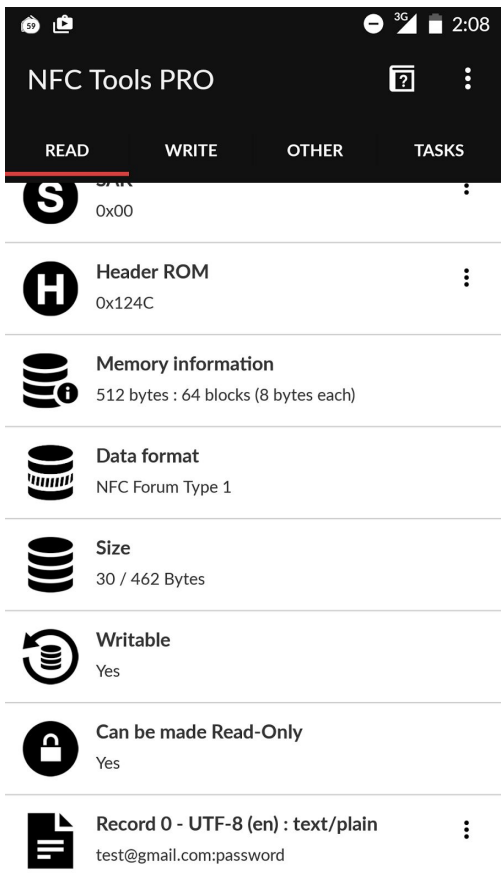
3.4.1.3 NFC

NFC stands for near field communication and allows NFC enabled devices to share data through contact, like the leap card that is used throughout public transport. The idea to use NFC in my application was for and NFC Tag to be encoded with data (email/password) so when a NFC enabled device comes in contact with the tag it will launch the application, read the data and populate the two text fields one for email address and the other for password. I bought NFC blank tags on amazon which I would will be given to service users with the data written on them linking that tag to them and their account on the database. In order to write the data to the tags I purchased NFC Tool Pro from the play store that will enable me to read,write and lock the tags to secure them.


PRO EDITION


11:57
NFC Tools PRO
READ
WRITE
OTHER
TASKS
Add a record
More options
Write / 76 Bytes
Wi-Fi network : 76 Bytes
wakdev


Approach a NFC Tag
Welcome on NFC Tools Pro Edition


2:08
NFC Tools PRO
READ
WRITE
OTHER
TASKS
0x00
Header ROM
0x124C
Memory information
512 bytes : 64 blocks (8 bytes each)
Data format
NFC Forum Type 1
Size
30 / 462 Bytes
Writable
Yes
Can be made Read-Only
Yes
Record 0 - UTF-8 (en) : text/plain
test@gmail.com:password

When writing the data to the tag you use plain text and in the format of test@gmail.com:password, so when the tag is read it will populate the text fields correctly.

For NFC to work with the application you in your AndroidManifest you have to declare NFC permissions to allow the app use nfc. Google has great resources for NFC with its developer guide on NFC.

```
<uses-permission android:name="android.permission.NFC"/>
<uses-feature android:name="android.hardware.nfc" android:required="true" />
```

With the application installed on the phone once you touch the NFC Tag which has gotten data written on it. The application checks to see if the phone has NFC

```
if (hasNFC()) {
Intent nfc = new Intent(this, getClass());
nfc.addFlags(Intent.FLAG_ACTIVITY_SINGLE_TOP);
```

FLAG_ACTIVITY_SINGLE_TOP is if the intent is already running it will not launch a new one and replace the one already running.

Our tag reads ndef NFC Data Exchange Format so the application looks for ndef data on our tag

```
IntentFilter(NfcAdapter.ACTION_NDEF_DISCOVERED);
```

Once discovered it searches for the record and adds it to a dataList

```
NdefRecord[] records = msg.getRecords();
for (NdefRecord record: records) {
  bRecord result = ndef.createRecord(record);
     dataList.add(result);
```

Here from the dataList the data is split from its format emailaddress:password separating the two word and populating them into the text views allowing the user then click the login button

```
String[] split = record.payload.split(":");
if (split != null && split.length > 1) {
  clearFields();
  Email.setText(split[0]);
  Password.setText(split[1]);
```

3.4.1.2 Photoshop

Photoshop CS6 was used to create the logo for the application.

3.5 Testing

Testing is a vital part of software development and can be the difference of a successful application or not. Testing was done through the stages of development. As functions were added to the application. In order to test the application I used my phone attaching it to my Mac through a usb cable that allowed me to test all functions on my phone as I integrated them into it. This was great help as I could see how the application would visually look on a device and also track on crashing by going through the log files on Android Studio.

Before I started my development, I visited my brothers school which after talking to some parents of children who attended the school and explaining my application I asked some general question and feedback of what they thought. This helped me gain a good insight of my target audience's needs. I also consulted with my family throughout all development phases gaining some great advice giving me a different perspective on things.

To help with testing I enrolled the help of the three home helpers that visit to help with my brother at different stages of the week and time of day. Each had an android phone which I installed Care4U on. The NFC tag for my brother was prepared so when Joseph arrived of the mornings to help with my brother I got him to scan the task and login. This was successful. I then asked him to record a note and create in with Care4U eventually successfully logging out. As Joseph was doing this I tracked the activity using the Firebase console. I could he signed in using the account and that the note was added to the database.

Barbara another one of my brothers home helpers who comes in the evening time. I got her to follow the same steps but this time to see if she could read the note that was left by Joseph. She could see the note that was left by him earlier in the day.

Linda comes to help with my brother three mornings a week. As with Joseph and Barbara I got Linda to scan the tag using her phone and login. This time unlike the others I asked her see if she could access the information in Profile, Medical Information, Emergency Information and General Information. Linda could achieve all of this one step after the other.

As part of the testing within the application I enabled the function of users been able to be able to create their own data by filling out the fields within each activity. In order to test this I created a test user with no data on the firebase database. In the layout I added a create feature for each section of the application with a create button added for each activities in their layout. To test I logged in as a test user which was previously setup and clicked on profile. Within profile I clicked the create button. In the create layout I filled in all text fields and clicked submit. This was done in medical history, emergency history and general information. The firebase database was checked and all data was successfully added. The For the same test user I then clicked profile and all the newly added data was displayed. This was also checked on the other sections.

4. Evaluation and User feedback

With testing been done on a number of different devices with different screen size and screen quality it was noticed that look of the application on each device was different but did not affect its performance which was acceptable as users are going to have different devices. User feedback was positive, feeling it would be very helpful to them if they should get assigned a new client having that information on their phone could be very useful.

5. Conclusion

After completing this project I realized how hard android development is and see why would many struggling at it including myself. There's a wealth of resources online with course, video tutorials, documentation and guides there to help you achieve what you wish with your application. The hard part is understanding the fundamentals first before you can code android apps. I learned a lot about android and myself through the help of this project. I do wish to keep developing in android if time allows.

5. Further Development

The main development I would like to add to this application is a clocking tracking system so service users can always come track who is coming and going. Secondly I would like to add is GPS tracking so when the likes of my brother is been brought out we will always know where he is if we should be need to get to for medical reasons or not. Due to admin work been done through the firebase console, I would like to setup a webapp that could control the administrative work of creating users and entering data, that can then been applied to NFC Tags. With further development up to the standards that would comply with the HSE standards I would like to test run Care4U in a medical centre with the clock in system applied.

6. Bibliography

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"NFC Tools - Pro Edition". *Wakdev.com*. N.p., 2017. Web. 3 May 2017.

7. Appendix

7.1 Project Proposal

Project Proposal

Care4U

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BSc (Hons) in Computing Part-time

Objectives:

The main objective of this project, is been able to take Care4U from just been an idea on paper, taking it from paper and developing it into a functional working application. Once Care4U has been developed into a finished product, I wish to think that it will benefit a family who has a loved one that depends on the care of a carer. This will be a huge test on my own abilities.

A second objective is to develop the skills, which are required by any good developer to be able to successfully plan, develop and finally launch Care4U into the marketplace. I must be able to properly time manage all my tasks, stick to their schedules while working under the guidance of my supervisor listening and taking onboard any advice they provide me with. I have to be able to adapt to changing environments, have willingness to learn and implement new technologies. This will help me develop into a better developer and help me integrate into the IT industry easier.

The final objective is delivering Care4U as a working product that is market ready. Care4U is aimed to keep people in need safe and give their families a piece of mind knowing that they're safe and been looked after as they should be.

Background:

My brother Ken is both physically and mentally disabled. Ken requires 24/7 care, he is unable to do the basic things you and I take for granted. Due to his disabilities Ken has carers that either come to our home to help my parents out and at his school. The carers that come to the house must clock in and out after their shift this is done this the house phone, but in his school whoever might be looking after Ken at the time would not be reordered.

A number of years ago Ken arrived home from school. When we went to move him we found him to be in extreme pain. After a visit to the hospital it was revealed he has broken his leg. It was a bad break and caused great distress for all the family. How it happened we could only guess but where it happened we knew for sure was in school. After an internal investigation by the school they admitted the accident happened while Ken was in school and under their care. Accidents happen we as a family accept that but the problem was that who was Ken's carer at the time was unknown and never made known to us as nobody came forward. This was hard to take we couldn't tell how long through the day Ken had to sit and suffer in pain and if the carer know something was wrong but either didn't think much of it or was too afraid to speak up in case they got in trouble.

My idea of having Care4U is protect Ken and others who need the help like him. Having to login using Care4U we will always know who has Ken at any time. This lets us know he's in safe hands and getting the attention he needs. It's also I suppose a deterrent that if an accident happens that someone might report it sooner and not put it off thinking nothing about it. Other benefits are that Care4U will list all Ken's medical history and medication he requires, it also has the information in what to do in an emergency situation as Ken suffers from epileptic fits. If he happens to have one the carer can quickly check Ken's profile and follow the instructions to safely treat him with his medication.

Also at the moment carers record every interaction with Ken through logbooks. Over the years to has created many of them and take up a lot of space storing them. Care4U will have a logbook so carers can record digitally everything that can easily be accessed by my family and also allows for them to leave notes for the carers.

The aim for Care4U is to make families lives easier using it to look after family members while also helping carers and their jobs easier.

Technical Approach:

Description

The purpose of Care4U is for carers to replace logging in through phone call but by logging in through scanning an NFC tag that is registered to the client using a mobile device. The carer enters their pin. Once successful they will be presented with the client's profile. The profile will hold basic information, Name, Medical Condition/History, Emergency information, notes which they can record or read left from client's guardian.

The development of the application will be done for the android platform. Android is the largest OS for mobile devices with a wealth of information available online and through books. Also I have a keen interest in improving my android development skills. An SQLite database will be used to store the data. NFC Task Launcher will be used to program the NFC tag that will interact with the application. Users carers and clients will have to register to be able to use the application and their profiles will be pin protected.

Research and Review

For research and review I sat down with my family and presented them my idea of Care4U. My father thought it was a great idea, my mother's main concern was it going to be easy to use as she wouldn't be very tech savvy. From talking to a number of other parents in Ken's school their main concern has always been that their children are getting the care they deserve and that If an accident happened that someone from quickly come forward and report it and not see what happened to Ken been left until he came home, that having this application and recording who's currently with their child that it will make them think twice of avoiding such an act. As with my own parents they want it to be simple and user friendly.

In order to use the NFC tag there is a number of applications that allow you to program and store information on them and allow the interaction with mobile devices. NFC Task Launcher is a well-known application and the one I plan on using.

Implementations

The project will be implemented in several parts. It will be developed using Android Studio and it will be an Android application with SQLite serving as the database to store out data.

Implementations

- Android Application Development
- SQLite Database
- NFC Tag

Special resources requirements

- Mobile Phone
- Android Studios
- Laptop
- Github
- Market Research

7.2 Project Plan

Project Deliverable	Delivery Date
Project Proposal	Tues 4th
Project Proposal Document	Fri 21st Oct 2016
Requirements Spec	Fri 11th Nov 2016
Project Prototype	Fri 2nd Dec 2016
Mid Point Presentation	19th Dec 2016
Showcase Materials	Apr-17
Final Project Hard Copies Documentation	May-17
Software & Doc Upload	May-17
Project Presentations	May-17

Technical Detail

With the android the largest mobile platform in the world with also having a keen interest in android development I thought using android for Care4U was the best fit. The other options were using meteor or maybe python but I didn't think they were as good as fit as android.

With Care4U been a mobile application and android the largest mobile OS the market potential for Care4U is huge. From doing a quick Google search for active android headsets the numbers you'll read are well over the 1 billion mark. Care4U has a it's target market yes but do to since a high volume of handsets in the world there's a good chance that our potential users have a android device saying costs of having to buy a device. Even if they were required to buy an android device once that has the NFC feature they aren't too expensive so costs again are quite low to use Care4U.

There is a wealth of information available online or in books on android development, it also has a very active development community. Google the creator of android also offers from documentation and tools like android studio to develop android apps.

SQLite is a free database that is used in android apps and I will use to stored data within the application.

Android Studio is the free official android IDE and will be used to develop Care4U.

Github is an online hosting service that will be used to store all the code.

Evaluation

In order to evaluate Care4U a test plan with be drawn up. With the help of family, friends and Ken's carers Care4U will be tested at various stages of its development. The feedback we get back through these tests will be critical to the successfully development and deployment of Care4U.

We will for three types of users. The admin user will register the carer and client onto the system and setup their user profiles. Both will be giving temporary pins that will have to be changed on first logon. The carer must be able to scan the NFC tag enter their pin and gain access to their clients profile. They must also be able to retrieve and submit new notes. When finished they must be able to logout at the end of their shift. The client's guardian must be able to login and gain access to the client's profile. They must be able to update the profile, retrieve and submit new notes and see the login records of the carers. During this stage of development we will be looking for the most feedback. With this feedback I intend to fix and issues that have been highlighted. It will also be used to improve and offer a better user experience. All issues highlighted will be addressed and once fixed will look for this to be confirmed through feedback again.

7.3 Monthly Journals

Reflective Journal September 2016

After reading through Justin Mulhern's reflective journal that Eamon recommended us to do so, I thought it was a great idea like him to start of this reflective journal by giving a little bit of an introduction of myself.

My name is Jason Kavanagh and I'm a final year computing student in NCI. Funny thing about that, back in secondary school I was preparing to fill out my CAO form and the courses I wished to do, computing been my top preference. I had a meeting with our guidance counselor who I thought was there to encourage and point you in the right direction. I told her I loved technology and computers that I wanted to study computer science or a computer related course. What she told me on that day I will never forget and to this day still angers me. She told me I wouldn't be able for it. She informed me that a previous student and school captain that was a year ahead of me went to do computer science and wasn't able for it eventually dropping out. She pretty much told me I hadn't a hope in hell in succeeding at computer science. I was a 17-year-old teenager I listened and trusted her, after all she was a teacher, an adult that knew better than me I presumed so I took her advice and avoided computer science.

What is the point of all this? I listened to someone who really didn't know me, doubted my abilities, compared me to another student and that I wasn't as good as them. She never believed in me and I didn't believe in myself. Nobody knows you better than yourself, if you want something bad enough go get it, believe in yourself and work your behind off. Don't take no for an answer. It has taken me a long time to get to this stage of my life but I've done it. I proved her wrong, I'm proud of myself in what I have achieved and about to achieve.
I'm going to finish up this introduction with a favourite quote of mine:
"Pain is temporary. It may last a minute, or an hour, or a day, or a year, but eventually it will subside and something else will take its place. If I quit, however, it lasts forever."
Lance Armstrong.

Starting back college this month has brought a lot of excitement with a little bit of fear, as I know it's going to be a tough year. I had been thinking all summer about what my final project was going to be. I knew I wanted to base it around something that might help my little brother Ken.

Ken is both mentally and physically disable. I wanted to create, design something that will help him and my family. After a few different ideas I considered by the time it came to our first lecture with Eamon I was pretty set on what I was going to do.

A couple of weeks later we'd to pitch our idea to a panel of 3. I was quite happy with my idea more worried about getting my idea across to them. A weakness of mine would be presentations before going into the room I was fine but once I got in I was a bag of nerves.
I pitched my idea called Care4U. Car4U is an application that would be used by carers who were looking after Ken. Both carer and Ken would have their own profiles on the app.

Using Care4U the carer logged in by scanning an NFC tag that would be linked to Ken's profile and entering their own personal password. Once successful they are presented with Ken's basic information, medical history, emergency information, notes that my parents can leave for the carer and also them to leave for my parents. At the end of each shift the carer would logout. A history of login information would be stored so my family can see who was with ken, at what time, and if they left any notes by logging using Ken's profile.

The idea of Care4U came when while Ken was at school his leg was broken. Accidents happen but his leg break was only discovered to us when he got home and was crying with pain when we tried to move him. After a visit to the hospital it was confirmed his leg was broken.

We have no idea when this happened other than when he was at school. No carer brought to our attention that Ken had an accident and was in pain. We have no idea who had him at the time and nobody owned up.

The idea for Care4U is protect my brother from something like this ever happening again, not the accident these things happen as said but nobody owning up and leaving him in pain for an unknown of hours. With Care4U we'll know who has ken throughout the day and if an

accident should ever happen that carer I sure hope would report it ASAP as they have a duty of care and maybe knowing that they're logged in with Care4U any doubt they might have in saying nothing will squash that.

Also Ken suffers from seizures and requires medication. This information is kept in a book what he requires and how much. In times of emergency people might panic, can't find the book with his information, but with Care4U all this information is available in the app for the carer to access it and what to do if Ken was having a seizure or required any medical attention.

The panel seemed happy enough so now the real hard work starts and putting this all together.

Reflective Journal October 2016

To be honest not much progress has been made with the project. Due to work commitments, college CA's and family life I've found it very tough to find the time required for the project. The project proposal was uploaded on time that's a plus. Eamon has uploaded the project supervisor list, I've to get in contact with my supervisor and arrange a time to meet. I've yet to start on the requirements spec so that has added worry and stress with everything else that has been worrying me. I've really got to sit down and come up with some sort of plan to stay on top of everything before I fall apart.
I have offered NFC tags from Amazon that are due to be delivered very soon. I've looked up some tutorials on programming them and it seems to be straightforward so I hope this true.
I really don't have anything else to report cause honestly I haven't done anything to actually report. There's no point in lying and making up stuff here to report because I haven't done it.

Reflective Journal November 2016

As with last month it's been pretty tough for me due to work commitments and college. The non stop pressure of CA tests and assignments due has really taken it's toll on me, so much that sleepless nights with worry has me considering giving up and dropping out it feels that bad. I really should be filling this journal with ideas and progression but I have very little to report and it actual saddens me as I was so looking forward to this year and the excitement of finally graduating but that excitement has turned to horror and stress that it's a worry.

Something positive I received the NFC tags finally they got lost in transit but finally here. I've done some messing around with them and the odd bit of reading up when I got a chance and how they can be programmed. I downloaded NFC tools from the Android Play store, which allows you to program the tags using my mobile phone. There seems to be plenty of documentation online that should help me code them to interact with Care4U.

When I have had a think about Care4U I've been thinking how can I allow the admin to setup users and their profiles. I have been thinking of either through a web service and database that will sync with Care4U on users devices. This will mean that the user's device will have to access to the Internet. I had thought about this but not well enough and the more I think

about it the more I realize that I really need to revamp and think over how Care4U is going to work.

The idea will not be changing and do believe that it will help my target market, but the whole architecture will have to I fear. With the midpoint presentation coming soon I really need to sit-down and go over things and get a move on. It's extremely hard to do this do when I have an exam tomorrow this journal due in 2 hours, my tech doc due Sunday and I've lost count projects due over the next 2 weeks.

I'm sorry Eamon for this rant but it's the truth how this year has panned out and how the college has organized the modules for us I feel let down by the college.

Reflective Journal December 2016 - March 2017

During these times I was dealing with some personal issues with almost have me give up and leave the course. Battling demons I managed to get through the other course work somehow or another unfortunately with all that pressure trying to get the course work done and keep my head above the water the project took a back seat. I just wasn't dealing with the pressure at all go. The communication with my supervisor was limited due to my own fault I didn't really want to be doing this anymore. I did recently send Catherine an apology explaining myself which she encouraged myself to keep going I'm almost there. I must save a huge thank you to my brother David who talked some sense into me and added the calmness I needed. Also some close friends who also have my back and tried to keep me positive they helped me keep going. Also a thank you to Eamon as I know I caused him a bit of trouble, thank you for been patient with me.

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BSc in Computing
2016/2017

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Care4U

Technical Report

Table of Contents

1 Executive Summary

Putting your trust in someone to mind and care for someone you love dearly is stressful. The health industry is booming with care services a huge financial burden on most families. Paying for these services your main wish is for the care services to looking after your loved one just as well as if it was you looking after them. Unfortunately this isn't always the case and I have experienced this at first hand.

Care4U is been developed to offer families that piece of mind that their father,mother,child,family member etc are been looked after just how they should be and provided the care they deserve by providing up to date information on the care they have been receiving and any additional information seen fit.

The Android platform will be used to code within Android Studio. An SQLite database will be used to store any information. NFC tags will be used to interact with the application. NFC tools and Task Launcher will be used to code the tags. All graphics were designed in Google Docs.

2 Introduction

2.1 Background

The idea for Care4U came from personal experiences. Kenneth my little brother was born with both physical and mental disabilities and requires 100 per cent care from others. It was after a number of accidents that required Kenneth to receive medical attention causing great distress for for Kenneth and the whole family. These accidents happened when Kenneth was in the care of others outside the family. The accidents were only reported to use only after we discovered injuries on Kenneth and not when they happened. The second issue was we didn't know who Kenneth was in the care of at the time so important information of how,why and where he was hurt.

This lead to myself thinking of an application that would help families like mine important information on Kenneth's wellbeing.

2.2 Aims

The purpose of the application is to give assurance to families that care services are providing the services that they agreed upon. That the application is easy to use and navigate. The application will be developed to the standards set by Google and can be downloaded through the Play Store. It must be able to load efficiently and the latest information be up to date on login.

2.3 Technologies

Android Studio is the official IDE by Google for developing Android applications. It has been purpose designed for Android development and is regularly updated by Google to improve Android development.

NFC is short for near field communication and allows two NFC enabled devices to pass information between them without the need for pairing once they are within a certain distance.

2.4 Structure

Brief overview of each chapter

3 System

3.1 Requirements

3.2.1 User Requirements

There are three different types of users to interact with this mobile application.

1. Admin.
2. Helper.
3. Client.

3.2.1.1 Admin

The administrator will register both the helper and the client within the system. The admin will set up their profiles and provide their credentials to be able to login and use the application. The admin will also program the NFC tag that will be provided to each client.

3.2.1.2 Helper

The help will login through scanning the clients NFC tag and entering their pin. Once successfully logged in they now will have access to the clients profile. Here they will find the basic information about the client, name, date of birth, medical information (medication, condition), likes/dislikes, emergency information and notes that have been left by the clients guardian. The helper can read the notes and also leave their own for the client's guardian through the note tab. The helper will logout by scanning the NFC tag and entering their pin. All login and logout times will be recorded.

3.2.1.3 Client

The client’s profile will be set up by the admin. The client will login through scanning the NFC tag and entering a pin. The client can see their profile. They can check the login and out records of the help. They can also leave notes for the helper and read any that has been left by them through select the note tab. The client will log out by scanning the NFC tag and entering their pin.

3.2.2 Data Requirements

The user must be able to add, delete and retrieve data from the local database.

3.2.3 General Constraints

Software limitations: The users must have access to a mobile device that is running the android platform to access to the application.

Hardware limitations: The user must have a mobile device that is NFC enabled.

The user must have enough battery power to run the application.

Network limitations: The user will need internet access in order to download the application.

3.2.4 - Functional Requirements

R.1 - Application Download
The user will be able to download the application through their mobile device on the Play Store.

R.2 - Register
All registering will be done through an Admin with all login details provided by the admin to the user.

R.3 - Login
Once registered the, the user will login using the details provided by the admin, scanning the NFC tag of the client and entering their pin.

R.4 - Password Recovery
If a registered user forgets their pin when prompted with a login request, the user should be allowed to request their pin to be emailed to their supplied email address.

R.5 - Client profile
The user can browse the clients profile.

R.6 - Medical Information
The user can browse the client's medical information.

R.7 - Emergency Information
In case of an emergency the user can read the client’s emergency information.

R.8 - Read Notes
The user and client can read notes.

R.9 Create Notes
The user can create notes.

3.6 - Non Functional Requirements

NFR.1 – Availability
The application should be available 99% of the time with 1% expected for non-user related connectivity and issues. When the application is not available, the user will be notified with a simple on screen message.
TEST: Access app when NFC is deactivated.

NFR.2 – Performance 1: Database requests
The application will access a SQLite Database in-memory database. We expect database requests to be in the region of 0.1 – 1 second. The system will only require current data, and will archive or delete events that have already passed, this is expected to further reduce performance issues.
TEST: Record and calculate average response time over 100 requests

NFR.3 – Performance 2: Throughput
A user should be able to quickly navigate through the app and between pages with little delay.
TEST: Throughput will be measured consistently during the testing phase.

NFR.4 – Security 1
A user will be blocked from the app after 3 failed login attempts. The user must wait 5 minutes before trying again.
TEST: Use incorrect pin to achieve block status.

NFR.5 - Security 2
A user will receive an email with their password upon requesting the forgot password feature.
TEST: Using 5 test accounts**,** ensure password sent matches the password from test account.

NFR.6 – Security 3
Communications between a user and system should be encrypted to avoid any malicious attempts to access confidential information.
TEST: Ensure any single user cannot access another user's personal information

NFR.7 – Maintainability
The application will be easily maintained should unforeseen errors or defects occur. The application will be administered by the three members of our team.

NFR.8 – Adaptability
The application will be easily adaptable should the need arise to add increased functionality in the future.

NFR.9 – Portability
The application will be operable on Android. We envision no need for this app to incorporate a web based service given the context of its main functionality.

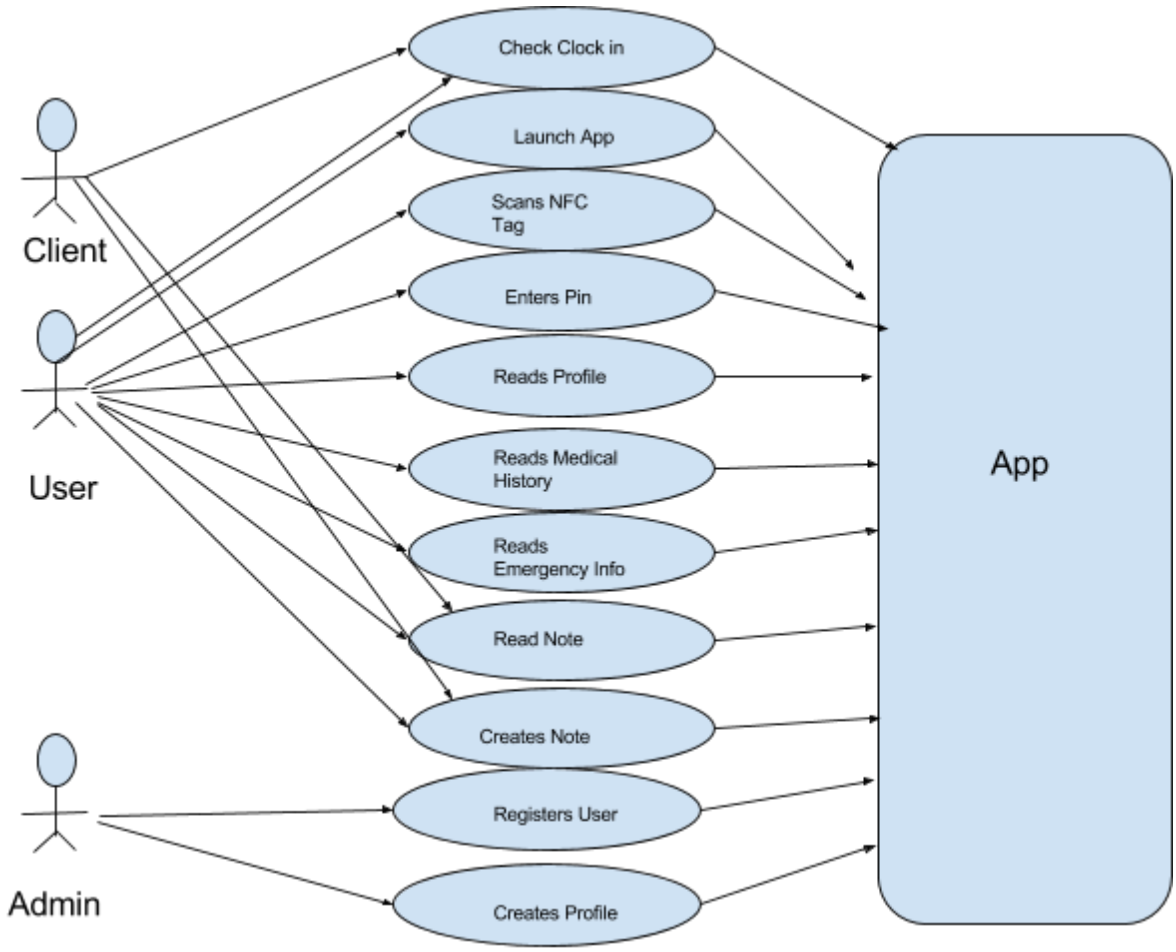
3.3 Design And Architecture

Care4U will be designed in full using Android Studio 2.2. The primary language that will be used will be Java with some xml when required mainly for layout purposes. SQLite will be used as the database with it been stored locally on the user's mobile device. The aim is for the application to be as lightweight as possible as it will be taking up store space on the user once they have downloaded it and begin to use it data will be stored in the database.

With the market that Care4U is aiming for, it is very important that the use of the application is clear, easy to navigate flowing seamlessly through the different sections of Care4U and quick to respond.

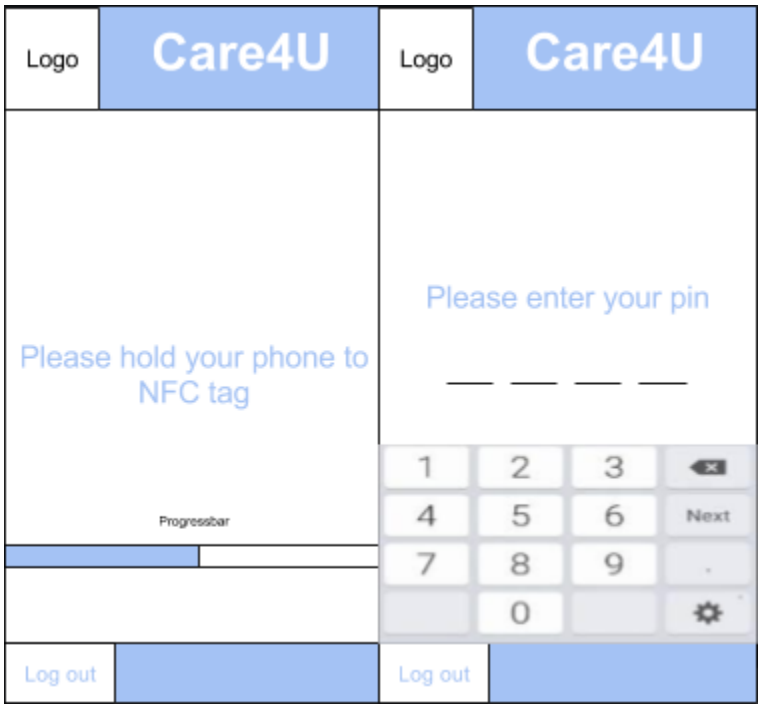
3.3.1 USE CASE DIAGRAM

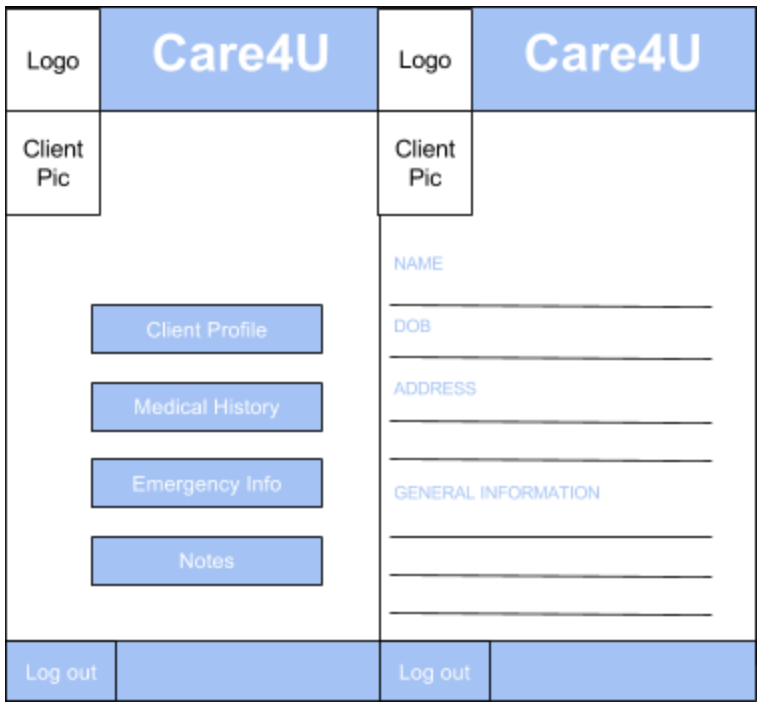
The use case diagram shows how both the user, client and admin will interact when using the application.



3.3.2 GUI

A mockup of a GUI for Care4U is shown below:





3.4 Implementation

The purpose of this section is to give an overview of the technologies that will be used in the implementation of this Android application.

3.4.1 Android Studio 2.2

Android Studio 2.2 is Google's purpose built development platform for Android development. I will use Android Studio 2.2 throughout the entire development of Care4U. It is fast, lightweight and comes with all the development and Plugin tools I may need.

3.4.2 NFC Task Launcher

NFC task launcher is an Android application can allows you to read, write and program tasks onto NFC tags. It will be used to program NFC tags so that they will interact with the application Care4U.

3.4.3 SQLite

SQLite is a free database that is used in android apps and I will use to stored data within the application. All data from Care4U will be stored using this database.

4 Conclusions

Describe the advantages/disadvantages, opportunities and limits of the project.

5 Further development or research

The target market for Care4U is the health sector. The aim is to provide a service for a healthcare organization whereas its employees will be registered through our app along with their patients. When employees interact with the patients they will use Care4U system to clock in and out. Browse any information about the patient using their mobile device, meaning no need to be carrying around charts or folders. The employees can easily read and leave notes about the patients all within a few clicks when using Care4U.

The main aim is to give a patients family and friends some peace of mind where they can check up on them to see if they have been visited by a healthcare worker, leaving them notes and reading any that might be submitted by the worker.

In future development it will be consider to using the GPS system within the mobile devices to keep track of where patients are at all times while under the care of a employee.

6 References

It is recommended that students use the APA, Berkeley, Harvard or other internationally approved style. Here is an example of the APA citation style:

Wilcox, R. V. (1991). Shifting roles and synthetic women in Star Trek: The Next Generation. *Studies in Popular Culture, 13*(2), 53-65.

In the text this article can be cited as “Wilcox (1991)” or “(Wilkox, 1991)”.

References to web sites must include the access dates.

The library provides a study guide on Harvard style referencing.

7.5 Other Material Used

Poster

Logo