SWEAT MATES
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Dr. Nasser Assem

16th of April, 2018
SWEAT MATES

Capstone Report

Student Statement:
I, Sara Ouled Hassan, assert that I have applied ethics to the design process and in the selection of the final proposed design. I also affirm that I have held the safety of the public to be paramount and have addressed this in the presented design wherever may be applicable.

______________________________
Sara Ouled Hassan

Approved by the Supervisor

______________________________
Dr. Nasser Assem
ACKNOWLEDGEMENTS

First, I would like to express my deepest gratitude and thankfulness to Dr. Assem Nasser, my supervisor, for accepting to be my capstone supervisor, for his assistance and guidance.

I would like to thank my friends for the moral support that they provided me with during my journey at AUI.

Last but not least, I would like to express my deepest gratitude to my family without whom I would not be here today.
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ABSTRACT

The main objective of this capstone is to develop a finely shaped platform; more specifically a mobile application for sport activists. Sweat Mates will serve its users to search, find and connect with sport mates and groups who match their profiles. The analysis phase will consist of identifying the need of such a service; hence, decide which disciplines as well as geographic areas are going to be available on the platform. This will necessitate the elicitation of the requirements. After completing the analysis, the design phase will begin. This would be achieved by identifying the actors and classes so as to design all the UML diagrams needed. Implementation and testing will be interleaved as unit testing will be performed first then all units will be integrated. Later on, we will proceed with system testing to make sure the mobile application meets all the requirements. And finally, proceed with Alpha and Beta testing in the acceptance stage. Measures will be taken in order to ensure the platform respects some ethical standards by verifying the validity of the information of each user, and protecting it for confidentiality. The application will be developed mainly for Android users.
1. INTRODUCTION

In a world where very few people care about the importance of sports for a healthy life, body and living. Some sports athletes find it hard to motivate themselves to stay sane. Motivation is not something easily attainable. Not everyone received the gift of being an athlete and has the mental and physical abilities an athlete has. This kind of motivation is only triggered if one has someone who he/she is able to trust and who will support them in times of need. When one is feeling low or dull, one of the best ways to resolve the issue is through a good sports session that will appeal to the most to the concerned person. Establishing a healthy lifestyle is not only about the physical activity but also about the mental health. Through sports, we have a chance to take control of our lives and enhance them to the best of our capabilities. The act of practicing a sport activity improves your concentration, reduces stress, boosts your confidence, helps you find your passion and most importantly, makes you happy by releasing endorphins. A self-disciplined person is more likely to be happy and beneficial to the workplace, school or home than someone who does not practice sports. Because sports make up a lifestyle and cannot be forced on someone. Many people are eager about practicing sports; however, they do not enjoy the fact of practicing alone. With more people addicted to their smartphones, the mobile application industry is growing rapidly. We detected the need of such an application in our community. Sweat Mates; an application designed for phones and tablets, will provide a service that many sport athletes need on a daily basis. They would be able to connect with people who share their same passion, schedule and geographic location. The disciplines that will be available as a start are mainly Gym, Soccer, and basketball. The application would also serve in building long lasting relationships between its users through sports activities by providing them with a way of contacting each other.
2. PROJECT SCOPE
   a. Project Overview
   A mobile Application designed for Android devices, it is mainly for people who practice sports and wish to do it with a partner. The application allows its user to check gyms nearby and join sessions they are interested in.

   **Project Name:** Sweat Mates

   **Project Time Frame:** This project is designed for the Capstone Design course for Spring 2018. The delivery of the project will be in the last week of April.

   b. Market Information
   The Moroccan market lacks a platform for athletes or beginner athletes who like practicing sports but do not find a decent partner.

3. STEEPLE ANALYSIS

   The STEEPLE analysis is a tool that will help evaluate the influence of our application on external aspects. A familiarity with the external environment is crucial to set our functionalities with respect to the risks of what our application might cause on social-cultural, technological, economical, environmental, political, legal and ethical factors.

   a. Social and cultural

   The smartphone industry has been growing rapidly and it has made every individual in our society addicted to having not only a phone, but also internet connection to access applications that most of them require data. This has become a major issue today seeing as children, teenagers and even adults cannot resist the urge to stay away from their phones. For every single task that we need to perform, we feel the obligation of reaching our phone. Even simple tasks have become difficult in the eyes of phone users as they fully rely on their phones for everything. In a world where everyone became connected, the idea of being completely isolated from the digital world has sadly become impossible and scary. Our lives started revolving around technology and even when we practice sports we feel the need to use applications so that coaches track our progress. Today, various applications have been created as well with workout programs
that help individuals better understand which exercises would be most suitable for them for weight loss/gain. It is true indeed that the traditional way is probably one of the best ways to go but now that the modern world has developed so fast, we need to keep up/stay up to date with all the technological progress or else we would be isolated completely from society. In Morocco, it is a different story. The Moroccan society is not famous for practicing sports and maintaining a healthy life style. Sports are not very encouraged and most young athletes who seek to pursue a certain sport are often discouraged by their parents, who strongly believe that their children would have no future in sports as the latter is known to not be very promising in Morocco. In regards to technological progress, it has not been developing as fast as other Western countries, for instance. To be more precise, Morocco has very few applications that are developed for people who practice sports. In this case, Sweat Mates is going to emerge as a great and practical solution that will provide its users with an easy way of finding sports companions which will enhance their social as well as their communication skills, hence building a sense of community and developing a culture where practicing sports should be essential.

b. Technological

For the past decade, technology has been playing an important role in our lives. Throughout our lives, we have been subject to many changes. One major change is the creation and development of technology. The contrast between innovation ten years ago and innovation today is colossal. As much as technology has improved, it has been made apparent to us that the creation of some applications have allowed us to use them to our advantage. With every useful and great creation, however, come the side effects that have impacted many people’s lives. For example, phones and computers are one of the most popular products today. A few years back, no one could have imagined a device that allowed you to connect with people all over the world and contained most of the knowledge of the world and yet today, it is what we rely on most. Many new technologies came to life, some of them giving us a chance at improving the quality of living on a daily basis. Several applications have served a useful role in our lives with just a simple click. We intend on making the search for a sports buddy easier in the blink of an eye.
c. Economical
The application will be cost-free and should be available to anyone since it will be developed using open source tools. It will probably mark the growth of the fitness market if the users choose to practice sports in an indoor environment.

d. Environmental
Sweat mates does not have any consequences on the environment as it will not require any natural resources or raw materials for its creation. When the users will be using the application, it will not increase the many environmental issues that the world is facing today such as global warming or pollution.

e. Political
Developing this application will not have anything to do with any political party. The application should not be affected by any new regulations in politics.

f. Legal
The application will not break any law or violate any legal aspect. It will have a set of conditions that it will meet as well as outline them to the users so that they are made aware of what they are agreeing to when downloading the application. Furthermore, all information inputted in the application will remain confidential.

g. Ethical
The application intends to build a sense of community and not destroy it. Its mission is clear and concise and it does not have any ulterior motive. It will not violate the privacy of the users as its main goal is to help them find a sports buddy in an ethical manner without doing anything that is against the values, norms and beliefs of the society.
4. PROCESS AND METHODOLOGY

Sweat Mates will follow the Rapid Application Development which is a system development methodology that emphasizes on the final product delivered rather than the steps that were taken to complete it. As we were taught in the software engineering class, this approach cares about the involvement of the customer and prioritize its needs. The main reason why I choose the RAD is because it allows you to deliver applications very fast because it is flexible and embraces change. I will go through several prototype cycles before proceeding to testing and implementation of the project.

In order to have a project that is well-documented and has a precise purpose. It is necessary to start with the feasibility study in which leads to an understanding of its feasibility on economical, legal, marketing and technological feasibility. Then, proceed with gathering the functional requirements; in which a clear description of each functionality of the system. In order to produce this application, we will follow a software engineering model which will make developing such an application easier and this will be achieved by dividing the phases of designing the project into several milestones. Since detailed documentation is not the building blocks of RAD development, I will be focusing on the specifications, design and implementation at the same time.
The reason why I chose Rapid Application Development is that we are required to develop the application in a three-month period and RAD development cares about delivering systems really fast.

**Project Management**

The following table represents the management planning of the capstone project:

<table>
<thead>
<tr>
<th>Week</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Project Selection</td>
</tr>
<tr>
<td>2</td>
<td>Initial Specification</td>
</tr>
<tr>
<td>3</td>
<td>Feasibility Study and Analysis</td>
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<tr>
<td>4-7</td>
<td>Interim Report</td>
</tr>
<tr>
<td>8-12</td>
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<tr>
<td>13</td>
<td>Implementation and Testing and Final Report</td>
</tr>
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<td>14</td>
<td>Project Defense</td>
</tr>
<tr>
<td>15</td>
<td>Updated Final Report</td>
</tr>
</tbody>
</table>

*Figure 2: Project Management*

5. FEASIBILITY STUDY

Gratefully, today’s technology is easier to access and more helpful in terms of achieving goals in a shorter amount of time. The feasibility study is the first phase we should go through in the development of the application as it will give us of the pros and cons of the project as well as a clear idea of what the project will be about and if it has any constraints.

a. Economical feasibility

For the economical feasibility, cost will not be a constraint. Users will not pay anything to use the applications, so there is no chance that it will be affected by any economic crisis. Furthermore, even the creation of the application will not require paying for anything. The application will be mainly for Android users. Users need to have a smartphone, internet connection and a Google Play account.
b. Legal feasibility

As for the legal feasibility, no legal obstacle is faced. There will be no use of e-commerce services as well. The application will not advertise any company or product as it is a non-profit application and it will not ask the users to sign or agree to any terms they do not know. So, the application is legally feasible.

c. Market feasibility

The application will be available for Android users since almost everyone owns a phone or a tablet nowadays, they can access it anytime and anywhere as long as they have internet connection or cellular data. Since very few applications offer the features that the application will be offering, I believe there will be a great demand for such an application because it is something new and unique. There are not many applications that will bring this new concept to Morocco so users will be interested in trying something new and accessible for the majority of the people.

d. Technological feasibility

The application will provide compatibility tools to match profiles. The technology enablers that I choose to work on this mobile platform are Android Studio and NetBeans as an IDE. The code will be mainly in Java. Many people would opt for using a mobile application on their phones rather than scrolling websites.

Following this analysis, I believe that developing the application under the supervision of Dr. Assem is feasible. The duration of the project is the Spring semester. And I will first start by the elicitation of the functional and non-functional requirements.

6. REQUIREMENTS SPECIFICATIONS

The first phase of the Software Development Life Cycle is the elicitation of the requirements. Having some clear and unambiguous requirements is very crucial to the SDLC. The mobile application is mainly for Android users but should be available in the future for other operating systems in the future.
a. Functional Requirements

i. About us
A user shall view the about us activity which provides a brief description of the application.

ii. Sign up
A user should be able to sign up by providing their Full name, email and a password. The password should be of a minimum of 6 letters, digits or a combination of the two.

iii. Create a profile
A user shall create a profile providing their picture, geographic location, first name, last name and username once they are registered.

iv. Create a session
A user shall create a session by choosing the sport they want to practice (Soccer, Weightlifting, Basketball, Jogging, Tennis, Volleyball), level (Beginner, Intermediate, Advanced), date and time of the activity, number of players, address and description.

v. View a session
A user shall view sessions available by viewing the owner’s name and participants as well as the session’s attribute.

vi. Join a session
A user shall join a session that was created by another user.

vii. Display locations
A user shall browse locations of gyms nearby.

viii. Forgot password
A user shall change their password once they receive an email activation link.

ix. Delete a session
A user who created a session can delete the session.

x. Sign out
A user shall sign out of the application anytime they wish.

b. Non-Functional requirements
The application should respect the following Non-Functional Requirements:

i. **Usability Requirements**
   The interface should be user-friendly. The components shall be coherent and consistent. The application should be well-documented so as to help the user understand the purpose of the system and how to use it. It should display error messages to guide the user.

ii. **Performance Requirements**
   The application should react instantaneously and the response time should not exceed the industry 8 seconds.

iii. **Portability Requirements**
   The application shall be available for smartphones and tablets only and it shall only be accessed by those who have an Android operating system.
iv. **Reliability Requirements**

The application shall not crash under normal circumstances and should be able to perform requested services without any risk of failure in addition to operating normally.

v. **Development Requirements**

The application shall be developed using Java and should implement an easy graphical user-interface.

vi. **Privacy Requirements**

The application shall protect the user’s information at any cost and shall not share the information with any entity.

vii. **Ethical Requirements**

The application shall not display any falsified information. And all the information about our users will be stored and not shared with any third party.

viii. **Security Requirements**

The system shall be secure and implement a user login so that only registered users can access others’ profiles.
7. APPLICATION ARCHITECTURE

Since the application needs to connect to a backend database, I choose BAAS Database which stands for backend as a service as a service.

Firebase platform that was acquired by Google is a server-less architecture. Firebase is a real time database which processes data in real time and displayed to the client right away. In our application, Firebase takes care of the authentication and the real time database. Two APIs are used for this application architecture. The first one being the REST API which uses HTTP. Firebase is responsible for processing the requests that are sent by the client, and then once it is checked in the Real Time Firebase Database, the result is displayed to the client side.

8. DATA MODELING

The firebase database also known as the NoSQL consists of keys and values which is basically a JSON object. Where the key is an identifier while the values are similar to table. Since the
Firebase database is a NoSQL database, it is schema-less which implies that one does not have to make a decision regarding the structure of the data. The latter allows for a greater flexibility.

A very critical point for every application is security. It is thanks to the Firebase database that we are able to define database security. A JSON file is represented as a series of nodes in which each one can have its proper validation and security rules. It is important to note that some data can only be accessed by authenticated users or those who have created it.

Below are examples of JSON objects for both Gym and Session JSON objects:
9. DESIGN

a. Use Case Diagram

Figure 7: Sweat Mates Use Case Diagram
b. Class Diagram

Figure 8: Class Diagram
c. Activity Diagram

![Activity Diagram](image)

*Figure 9: Activity Diagram*
d. Sequence Diagram
This is the sequence diagram of a successful user login

![Sequence Diagram](image)

**Figure 10: Sequence Diagram**

10. IMPLEMENTATION

In the implementation phase, I first needed to connect my application to the real-time database.

![Firebase project information](image)

**Figure 11: Firebase project information**
This is how I added Firebase to the application by downloading the JSON file and placing it in the src folder.

![Adding Firebase to the application](image)

*Figure 12: Adding Firebase to the application*

Below is the code of the sign in activity

```
import com.github.nkzawa.materialSpinners.models.User;
import com.rogeryan.material/edittext.MaterialEditText;

public class SignInActivity extends BaseActivity {
    Button btLogin;
    Button btSignup;
    MaterialEditText txtLogin;
    MaterialEditText txtPassword;

    FirebaseDatabase database;
    DatabaseReference myRef;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.signin_activity);
    }

    private void initView() {
        setContentView(R.layout.signin_activity);
        setTitle("Login");
        database = FirebaseDatabase.getInstance();
        myRef = database.getReference("User");
        btLogin = findViewById(R.id.bt_login);
        btSignup = findViewById(R.id.bt_signup);
        txtPassword = findViewById(R.id.txt_password);
        txtLogin = findViewById(R.id.txt_login);

        btLogin.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                switch (view.getId()) {
                case R.id.bt_login:
                    login();
                    break;
            }
```
Below is the code for the sign up activity

```java
package com.example.sara.sweetates.activities;

import ...

public class SignupActivity extends BaseActivity {
    Button btnSignup;
    MaterialEditText txtLogin;
    MaterialEditText txtName;
    MaterialEditText txtPassword;
    FirebaseDatabase database;
    DatabaseReference myRef;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView();
    }

    private void initView() {
        setContentView(R.layout.signup_activity);
        setTitle("Signup");
        database = FirebaseDatabase.getInstance();
        myRef = database.getReference(FirebaseUser);  // username
        btnSignup = findViewById(R.id.btn_signup);
        txtPassword = findViewById(R.id.txt_password);
        txtLogin = findViewById(R.id.txt_login);
        txtName = findViewById(R.id.txt_name);
    }

    public void onClick(View view) {
        switch (view.getId()) {
            case R.id.btn_signup:
                signup();
                break;
        }
    }
}
```

Figure 14: Sign up Code

**Firebase User Authentication**
For the authentication, I choose the email/password authentication and other sign in methods will be added in the future.
Below is the code for the forgot password activity

```java
public class ResetPasswordActivity extends BaseActivity{
    Button btnReset;
    MaterialEditText txtEmail;
    ProgressDialog mDialog;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.reset_password_activity);
        setUpToolbar();
        setTitle("Reset Password");
        btnReset = findViewById(R.id.btn_reset);
        txtEmail = findViewById(R.id.model_phone);
    }

    public void onClick(View view) {
        switch (view.getId()) {
            case R.id.btn_reset:
                reset();
                break;
            default:
                break;
        }
    }

    private void reset() {
        ...
    }

    private void initView() {
        setContextView(R.layout.reset_password_activity);
        setUpToolbar();
        setTitle("Reset Password");
        btnReset = findViewById(R.id.btn_reset);
        txtEmail = findViewById(R.id.model_phone);
    }
```

Below is the firebase password reset that is sent by email to the user

```
Email
Email address verification

Password reset
When a user forgets their password, a password reset email is sent to help them set up a new one.
Learn more

Sender name
not provided
From: nonreply@sweat-mates.firebaseapp.com

Reply to
not provided

Subject
Reset your password for Sweat Mates

Message
Hello,

Follow this link to reset your Sweat Mates password for your %EMAIL% account:

https://sweat-mates.firebaseapp.com/authaction?mode=action&tools&code=

If you didn’t ask to reset your password, you can ignore this email.

Thanks,
```
Some of the applications screenshots:

The image to the left portrays the first look the user gets when he/she opens the mobile application. As can be seen, there are two options: “login” and “about us”. While the former allows the user to access the application, the latter allows for a better understanding of the purpose behind it.

As was mentioned in the photo above, the “about us” section will briefly explain to the user the objective of the application.
The sign up page that will pop up will indicate to the user that he/she has to provide his/her full name, email and password. This describes the signing up process for new users.

This screenshot displays the signing in page for users who have already created an account. It asks them to put in their email and password, which they originally used to sign up.
After following the steps above, the user will access the navigation drawer activity will allow him/her to view the different options that are provided by the application that will allow him/her to embark on a shared sports journey.

In case the user forgets his/her password, he/she can easily reset it by typing in his/her email address, which will allow the application to send an email in order for the password to be recreated.
One of the beneficial features of the application is allowing the user to have a visibility on all the gyms, especially those within his/her geographical proximity, which makes them easier to access.

In addition to having access to the gyms close by, the user will be able to practice several disciplines such as soccer, jogging and basketball depending on preferences and objectives.
Once the user creates a session, he/she have the option to delete it in order to cancel, for example.

11. TECHNOLOGY ENABLERS

Since I am developing a mobile application designed specifically for android users, I choose to go for **Android Studio Development Environment** as it is the main IDE for Android and the fact that the android market is growing rapidly. This IDE provides with graphical user interface that is user-friendly and makes complete task in a somewhat simple and easy way. Unlike, other IDEs that require a lot of time learning about the way they should be used. Android Studio uses the code completion that I find one of the most important features of this IDE. In terms of organization, **Android Studio** is a great tool as it displays the project files separating the
manifest file, the Java source code files, the XML layouts and all non-code resources and last but not least the Gradle scripts.

Firebase is a cloud service that gives us the structure and the tools we need to build and test applications in a faster time. It is a real-time database where authentication and many features are provided. It is a Back-end system where the data for the mobile application will be stored. Firebase is fully filled with other useful features such as AdWords, AdMob, invites and so on so forth. The database does need to go through a sever as it can be accessed from the client’s device.
Java is the language chosen for this project, it is the language used to develop application in the Android Studio framework.

XML, stands for Extensible Markup language, is a markup language which serves in this project to design the user interface. For Android Studio, we have a up-front XML format which corresponds to layouts.

Photoshop is a graphics editor which was used for editing the backgrounds.
12. TESTING

Testing is the last step before deployment in the software engineering process. Since I am following the Rapid Application Development model testing was done in the beginning to see how the user would react with the interface, if it’s easy to use and as well as try different scenarios as to check if the application is responding the way it should. I had to check if the requirements are respected in the implementation phase. The testing of the application consisted of four testing phases.

The first phase was unit testing, in which I tested several activities. The first ones being the signing in and signing up activities check checking the response for a valid email and password, checking for invalid email and password, and when email and password fields are empty.

After unit testing comes the integration testing in which all units are combined and tested as a group. In this phase, we check the interaction between different activities, for example if you are already signed in, once you leave the application, it does not sign you up but rather takes you back to your profile.

The system testing was performed by testing the application as a whole, to make sure it responds to all the requirements that were previously set.

Finally, the acceptance testing which will be conducted in the day of the presentation.
13. CONCLUSION

This project was an opportunity to learn Android app development, a field that will certainly be an added value in the job market. Developing such a project for the Capstone Design class was the most important milestone and I am glad that I took Dr. Assem’s advice to develop such a platform that would gather athletes in a common setting to practice the sports they like. However, three months is a very short period to go through all the phases of a software development life cycle. The first step was conducting the feasibility study in which the economical, legal, marketing and technological feasibilities were assessed. Later on, I worked on several design techniques that led to a better understanding of the requirements in order to be aware of what should be prioritized and what is critical for the outcome versus what can be neglected. Moving on to the before last phase, the latter was the most challenging part as I had limited knowledge about the technology enablers that were necessary for an effective implementation. However, due to the many tutorials watched, documentation read as well as advice and guidance provided by Dr. Assem, I gradually managed to overcome this obstacle, which in turn led to the testing phase. Testing was conducted simultaneously with implementation, following the rapid application development, which creates a more efficient process. On the other hand, if this project was to be conducted with a more flexible timeframe then I would surely have taken different measures, which leads us to the final part of the report: future work.
14. FUTURE WORK

As mentioned previously, had there not been a deadline for the project at hand, then the application would have been more elaborate. The latter implies that the application would for starters, have more features to ensure user satisfaction as more of their needs and wants would be met. One example could be including the possibility of signing up using different accounts, which are generally used by most, such as the following: Facebook, Gmail, etc. This option is usually provided by most applications today, which allows the registration process to be easier and hence, encourages the person to create an account. Another option would be developing an admin platform that would manage reports about users and addresses complaints. Instead of making this application only for amateurs practicing sports, it could also be for professionals who are interested in providing their services to others, i.e. coaches. A user can apply to become a coach and depending on whether he/she meets certain criteria, may be approved by the admin. The coach can then be rated by the users to allow others for a better understanding and judgment of the quality of service that a certain coach provides in order for them to come to a certain decision. The platform could also allow consist of a highly critical option, which is the exchange of messages. This would facilitate the communication process between users and therefore, they would easily be able to set up meetings to practice the sport of their choice. Later on, this application could also become part of the Google Play Store since it initially charges a one-time fee of $25. In order to reach out to a large majority and target those interested in such an application, AdMob could be used to further promote it and attract many. Eventually, the user will also be able to modify his/her profile based on preferences. This will allow for data to be saved and for a history to be created to better enhance the user’s experience. The historical data will permit the application to be aware of the user’s favorite sport as it will be the one that will be most frequently practiced and based on that, he/she will be sent a notification to inform him/her that the sport is being practiced nearby. To conclude, the application holds a lot of potential, but there is still a long way to go for it to become the optimal and go to application for all those addicted to sports and willing to share their passion and experience with others.
15. REFERENCES

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