School of Science and Engineering

SODEXO

EGR 4402
Capstone Design

Final Report

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Supervised by: Dr. FALAH BOUCHAIB

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Acknowledgement

I would like to express my deepest appreciation to all the people who helped me or supported me, by a way or another, in the completion and realization of this capstone project. I would like also to thank mostly Dr. Bouchaib Falah, my professor and supervisor who assisted me throughout the different steps of the project, either by providing me with valuable information or by clarifying my vision of the project. I faced many obstacles but thanks to Dr. Falah help, I was able to overcome them and keep going on my work. Without his presence, help and guidance, I wouldn’t reach the stage that I have reached today.

I would like also to express my gratitude to Dr. Yassine Salih Alj, who contributed to the achievement of this project by his constant and continuous support and encouragement. He guided me throughout the semester to achieve my capstone project.

I must also thank all faculty members and staff of Al Akhawayn University who made of me the person that I am today. In fact, the past five years were fulfilling and rich of experiences.

Last but not least, I would like to express my deepest gratitude to my parents and family who have always been there for me and without whom I would not be here today. Their assistance, support, and their involvement was of a great help.

5/8/2015

B. Falah
Abstract

Modern hand held devices such as smart phones have truly become increasingly powerful in recent years. Dramatic breakthroughs in processing power along with the number of extra features included in these devices have opened the doors to a wide range of commercial possibilities. In particular, most cell phones regularly include cameras, processors comparable to PCs from only a few years ago, and internet access making them both a powerful tool and an easy one to facilitate users’ lives.

Indeed, Mobile applications can be one of the best ways to keep consumers engaged with a brand or service as they are on the go. With the increase in demand for smartphones and efficiency of wireless networks, the demand for mobile applications has also increased incredibly. Android is one of the most popular open source platforms that offers developers full access to the framework API’s so as to build innovative applications. My project is no difference as the main aim of it is to build an Android based application that will helps users, namely Al Akhawayn University students, order their meals on the move. Moreover, it will greatly facilitate their student life when it comes to sparing time for eating and focus more on their studies.

Key words: Mobile Application, Android, HTML/CSS, Restaurant App, Campus services, Sodexo
1. Introduction

1.1. Scope of the project

1.1.1. Presentation and Background

Presentation of the mobile application designer:

Mohamed Salim Harras, Senior Student, Majoring in Computer Science, Minoring in Business Administration.

The Supervisor:

The project is supervised by Dr. Bouchaib Falah.

Project Details: Project:

Sodexo mobile application for Al Akhawayn University community

Main Task:

Development of the Android interface to test the functionalities.

Location:

Al Akhawayn University
1.1.2. Project Description

This project will address a main issue that most of the student face during their years at the university. This issue is the food disorder, which is caused by a bad time management of the students. In fact, a big number of student prefer to go to Sodexo to get their three meals of the day. However, most of them end up changing their minds, either because they find a long line or because spend a long time waiting for their food to get ready. In fact, I have been victim to this problem.

Sodexo has a small restaurant in the university and it’s hiring few employees due to the space limitations. This is why they provide a slow service. On the other side, every time that they have a lot of orders coming over, the quality of the food decreases while they are trying to deliver those orders quickly.

My project tackles this issue by providing an online service to students. It’s mainly an android application that any student can have on their android devices and which allow them to order their food before going to Sodexo. They will also be able to specify a pick up time during their free time so that they do not need to wait in the line for long durations. This will allow the students to guarantee having a meal even when they have a stressful and full schedule. It will also allow them to save their time since they will not have to wait the same duration as before.

On the other hand, Sodexo will benefit from this mobile application since it will be able to provide a fast and better service. My project will allow them to know exactly the amount of orders that they will have in a specific time, which will allow them to prepare in advance to meet all the orders on time. It will also increase the flow of students coming to the restaurant since most of the students prefer to not waste their time waiting in a long line for their meal.
The project which was made mainly for Al Akhawayn Community and which they can access anywhere through their phone aims to provide this community with a useful and simple way of ordering their food using their phone. It aims also to help Sodexo well manage their restaurant in the campus.

1.2. Description of the mobile application’s features

In this section, a clear description of the different features that will be made available in the mobile application of this capstone project.

Once the application is opened, an interactive page will ask the user whether he is a student or a guest. Then, depending on his choice, he will be directed to the login page if he is a student while if he is a guest, he will then be redirected to a page that shows him the menu of Sodexo restaurant.

In the Login page, the student will have to enter their credentials in order for the application to access their balance and then proceed with the orders. If the login step is done, the application will redirect the user to the home page where they will have to choose one of the 3 main modules of the application.

The first module in the home page is “order your food”. When clicking on this button, the application opens a page that contains the menu of the day ordered by type of food (Salades, plats, boissons, dessert…). The user will have to select whatever items he wants and proceed with ordering them after specifying the pickup time.
The second module is the “Follow my orders”, which will allow the user to see all the orders that he have made in the past. It will also allow the user to follow the most recent update by checking the status of the order (done, in progress).

The third and last module is the “Follow my balance” which will allow the users to check the different activities affecting the balance. He will then be able to see in every row the transaction that was made, the previous balance, the amount deducted, and finally the new or actual balance.

1.3. Definition, Acronyms, and Abbreviations

ERD: Entity Relational Diagram
SDLC: Software development life cycle
SRS: Software Requirement Specification
GUI: Graphical User Interface.

1.4. Social and Ethical Implications

Mobile technology has become highly widespread in the society where we live today. In fact, Humans started to consider this technology as a tool for enhancing the productivity of their work and facilitating their lives. However, the need to consider and address the ethical and social aspects related to mobile technology use has arisen with this technological revolution.

Consequently, considering the ethical and social aspects of Sodexo mobile application shall be an important step as the application is related to the process of communication between the students of Al Akhawayn University and Sodexo restaurant. The application will also allow
the students to gain their time and will help them not skip the different meals of the day and thus have a healthy lifestyle.

1.5. Development Process

It is agreed that the software development process is the crucial and the main process that every software engineer should follow to deliver a good application. Thus, it is important to follow a model covering all the aspects of the life of the software. For my capstone project, I decided to choose the waterfall model. This model will allow me to guarantee a well-designed mobile application that answers and meets all the requirements specified in the previous section. Figure 1 illustrates the classic Waterfall model.

Development Methodology

![Figure 1: Classic Waterfall Model [1]]
1.6. Overview of the document

In this capstone report, I will go over the different steps of the SDLC. I will first start by specifying the requirements of my project. Then, I will go over the analysis of these requirements and their relation with the different needs of the project. I will then talk about the design phase where I will define the different UML diagrams as long as the ERD and Activity Diagram.

After being done with the design phase, I will describe the implementation by talking about the different technology enablers and technologies used to achieve and develop my mobile application. Last but not least, I will talk about my future work before summing up with a conclusion.
2. Requirements Specification

At an early stage of the project, I should make sure that the application responds to certain requirements that need to be defined in this section. The mobile application is intended to Al Akhawayn University students but can be also accessed by any other guest that wants to see the menu of Sodexo restaurant.

The fact that Sodexo mobile application provides a service to order the food online and also let the user specify the time when he will come to pick up his order makes this project unique and different from any existing similar mobile application.

Requirement Engineering is considered as crucial step of the entire process because it helps define the different services that the application should provide as long as the different constraints that should be respected. Here are some of the requirements to be respected for a healthy fulfilment of the system needs:

Levels requirements

User requirements:

- Sodexo mobile application should enable the users to order their food following simple and easy steps.

System requirements:

- The mobile application requires any mobile device that has Android as an operating system.
2.1. Functional Requirements

- Enable any user to see the menu of the day.
- Enable the students to access their account and check their balance.
- Enable the students to order their food.
- Enable the students to see the different orders made in the previous days.
- The application should guide the user to make the order in the best possible way.

2.2. Non Functional Requirements

The following graph represents the different types of Non-functional requirement, and which I have taken from the software engineering course.
2.2.1. **Product Requirements**

- The mobile application shall be efficient, reliable and must perform any operation in a correct and relatively fast manner.
- User friendliness of the interface shall be taken into consideration.
- The mobile application should ensure portability.
- The user interface shall be implemented in HTML, styled with CSS, and hides all the backdoor functionalities that MySQL offer.

2.2.2. **Organizational Requirements**

- The project shall be developed in a period of three months.
- The project shall be delivered on time as a Capstone project within an academic scope.
- Android Studio will be the SDK used for my implementation.

2.2.3. **External Requirements**

- The data shall be stored and retrieved from a local database.
- The website shall not constitute any harm to its users.
- The user’s data should be encrypted and should be kept safe from any kind of intruders.
3. Application Analysis

The goal of this step is to break down the entire system into small and manageable pieces, which will help in a better analysis of the project. It also involves simplifying the whole view of the project in order to have a clear image of how to reach and define the definite requirements specified before.

3.1. STEEPLE Analysis

The social aspect is among many that are present in this capstone project. The application will affect the social interaction that the AUI community used in the past. In fact, the users of the application will not have to go to Sodexo to order their food. Instead, they will order it through an online application which will diminish the social interaction between the users of the application and the employees of Sodexo. On the other hand, the ethical aspect is also present since the application will allow the clients to save their time and make their ordering process more efficient.

Thus, the results of using Sodexo mobile application will be as follow:

- Saving time by ordering the food in advance
- Help in having a healthy lifestyle by avoiding skipping the meals.
- Help in the management of the Sodexo restaurant

Consequently, the STEEPLE form that will clarify some details of the project will be as follows:

- Social: Reducing the communication process between students and Sodexo.
- Technology: Development of a new mobile application service.
- Economic: Better management of the restaurant.
- Environment: None.
- Political: None.
- Legal: Respect the rule conditions given by the business office.
- Ethical: helping the students to have a healthy lifestyle.

3.2. Use Cases

3.2.1. Use Case Diagram

A Use case diagram, as seen in my previous classes, refers to what the system does from an external point of view. It mainly focus on the WHAT rather than the HOW. This means that the Use case Diagram describes what the system does or needs to do. Below is the general use case diagram of Sodexo mobile application system:

![General Use Case Diagram](image-url)

Figure 2: General Use Case Diagram
3.2.2. Flow of Events of some Use Cases

- View Menu

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>View Menu 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>1</td>
</tr>
<tr>
<td>Actor</td>
<td>Guests and Students</td>
</tr>
</tbody>
</table>
| Description   | - Any user of the application can access this page to see the menu that Sodexo offers with the different prices.  
                - Students, after clicking on the order your food button, can see the menu |
| Pre           | - Home page  
                - Logged in Page |
| Main Flow     | First Scenario:  
                Step 1. User presses the “Guest” button in the home page.  
                Step 2. User only sees the items in the menu of the day  
                Second Scenario:  
                Step 3. After the login phase for students, the button “order your food” is clicked  
                Step 4. The user clicks on whatever item he wants in the menu to proceed after that to the ordering process.  
                Step 5. The system makes sure there is at least one item selected. |
| Alternative Course | Step 5. The system makes sure there is at least one item selected  
                                     Step 6. If no item was selected, the system notifies the user and repeats the step 4. |
| Post          | User can now proceed with ordering his food. |
## Login

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Login</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actor</th>
<th>Students</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>- Students, after clicking on the student button, can login to access their information and proceed with ordering their food.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pre</th>
<th>- Home page</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Main Flow</th>
<th>First Scenario:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 1. User presses the “Student” button in the home page.</td>
</tr>
<tr>
<td></td>
<td>Step 2. Student enters the ID and password, and click on the submit button</td>
</tr>
<tr>
<td></td>
<td>Step 3. The system checks if one of the fields is empty and notifies the user, it repeats the step 2.</td>
</tr>
<tr>
<td></td>
<td>Step 4. The system checks the credentials and notifies the user of either a success or a failure. If failure, repeat step 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative Course</th>
<th>Step 3. The system checks if one of the fields is empty and notifies the user, it repeats the step 2.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 4. The system checks the credentials and notifies the user of either a success or a failure. If failure, repeat step 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Post</th>
<th>Logged in Page</th>
</tr>
</thead>
</table>
- View Transactions

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>View Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actor</th>
<th>Students</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>The students can see the transactions they have made during the last days</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pre</th>
<th>- Logged in Page</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Main Flow</th>
<th>First Scenario:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 1. User presses the “View Transactions” button in the home page.</td>
</tr>
<tr>
<td></td>
<td>Step 2. Users see the details of the transactions that were made before.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative Course</th>
<th>If no transaction was made during the last days, the system notifies the user that no transaction was made.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Post</th>
<th>None</th>
</tr>
</thead>
</table>
# View Balance Activity

<table>
<thead>
<tr>
<th>Use Case Name</th>
<th>View Balance Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID</td>
<td>4</td>
</tr>
<tr>
<td>Actor</td>
<td>Students</td>
</tr>
<tr>
<td>Description</td>
<td>The students can see the activity of their balance in relation to the different transactions they have made during the last days</td>
</tr>
<tr>
<td>Pre</td>
<td>- Logged in Page</td>
</tr>
<tr>
<td>Main Flow</td>
<td>First Scenario:</td>
</tr>
<tr>
<td></td>
<td>Step 1. User presses the “View Balance Activity” button in the home page.</td>
</tr>
<tr>
<td></td>
<td>Step 2. Users see the details of their balance with the transactions that were made before.</td>
</tr>
<tr>
<td>Alternative Course</td>
<td>If no transaction was made during the last days, the system notifies the user that there was no activity in the balance.</td>
</tr>
<tr>
<td>Post</td>
<td>None</td>
</tr>
</tbody>
</table>
3.2.3. Sequence Diagram
4. Application Design

Now that we are done with both the feasibility and the analysis parts, the design phase is crucial and important as it will allow us to define the overall structure of the system. It will involve 3 levels of design which are the Low level, which is how modules of the mobile application relate to each other, the interface level, which is how the mobile application will interact with its users, and the data level, which is how data will be stored and managed in relation with the application. All of the three levels should be addressed in order to make the implementation process much easier.

4.1. Design Pattern: Model View Controller

During the last years, most of engineers opted to the separation of the following three building blocks of the projects. Clearly because it ensures readability and help work separately on the business logic or the graphical user interface. The following is a graph representing the different actions or roles of the three building blocks.

![Model-View-Controller Diagram](image)

Figure 3: Model-View-Controller Diagram [2]
The **Model-View-Controller** is defined as software architecture architectural pattern. In few words and lines:

- **Model**: What to display
- **View**: How it’s displayed
- **Controller**: Formatting the model for display and handling events like user input

Good programming practices are invaluable while working on large projects or with teams. On the phone itself, is the screen that the user interacts with. Layouts in apps are designed in the graphical layout editor and coded using HTML5 and CSS. It is called the **View**. It is the presentational aspect of the app that users view and interact with. Concerning the data that makes an app meaningful, it is modeled as objects in code and it is called a **Model**. Now the guts of the app that get the data, manipulate it and then control how it is displayed within a layout is done by an **Activity**. Let’s call this the **Controller** because it controls how the view operates and how data is added, changed, or deleted. The controller is the main logic or business intelligence of the app. This setup here is a common approach in software development and it has the special name of **Model-View-Controller** pattern because it is used very often. This is a basic architecture setup for most Android apps. The core Android code that is used to develop apps was designed in such a way that it is forced to follow the discussed pattern. How does this help the software developers? This model shines when updates are needed to be made or big changes that only affects one part of this MVC combination. When setup correctly, these three components communicate to each other through clearly defined interfaces. Any of the three components can be swapped out with another component of the same type to bring changes to the app. Also, each component does not know what happens in the other two components, they are independent but necessary for the healthy functioning of the software.
4.2. Entity Relational Diagram

The entity-relationship diagram, also called the ERD, is a graphical representation of the different entities according to the relationships that link them together. These relationships are typically used in regard to the organization of the data within our database. In fact, it allows us to know how the data is shared between the entities of the database as long as the different types of the data attributes of the tables.

Below is the ERD of the Sodexo mobile application which will include mainly three types of relationships which are the following:

1- One to many: This kind of relationship is present between the accounts and the orders. In fact, every account or user can make a number of orders. Thus, there will be a one to many relationship between those two tables.

   This relationship will also be present between the orderline table and the order table since the order should include a number of lines, where each line is related with a one to many relationship with the fooditem table, that represent the food item that was selected while ordering the food.

2- One to one: This relationship will be present between the user table and the account table since every user will have an account where all his information will be stored. These information include the email, the name, their balance and other unique attributes such as the ID.
Figure 4: Sodexo Entity Relational Diagram
4.3. Class Diagram

Figure 5: Sodexo Class Diagram
5. Implementation

5.1. Technology Enablers

In order to meet the requirements cited before, we need tools and APIs to build our mobile Application, and also a way to pull data from the web app.

5.1.1. Android Mobile App Tools and API

Android Studio SDK

The Android SDK provides libraries and developer tools that are required in order to build android apps. The ADT bundle helps to start on development quickly as it includes all essentials component of Android SDK. It facilitates also the configuration of the application when running on an emulator or device. In addition to this, we will need:

Java development kit

Java is the main language for programming in today’s world. Its functionalities are so numerous that it makes it one of the best JDK tools used.

HTML5 and CSS3 for graphic layout design

Before using the HTML5 and the CSS, I started using XML for designing the different layouts. However, since I have a better knowledge of HTML5 and CSS, I decided to adopt it for my design.

Apache Cordova

In addition to all what have been said, I used the Apache Cordova, which is a set of device APIs that allow a mobile app developer to access native device function such as the camera or accelerometer from JavaScript. Combined with a UI framework such as jQuery Mobile or Dojo Mobile or Sencha Touch, this allows a smartphone app to be developed with just HTML, CSS, and JavaScript. [3]
phonegap

I also used phonegap, which is an open source framework for quickly building cross-platform mobile apps using HTML5, Javascript and CSS.[4] This cross-platform will allow my HTML5 code to be compiled on any platform since it wrap the application and deploy it to any mobile platform.

framework 7

Finally, I used framework 7 which is a free and open source mobile HTML framework to develop hybrid mobile apps or web apps with iOS native look and fee.[5] In fact this framework contains design tools that allow my application to run also in the IOS devices.
5.2. Screenshots

- Home Page
Boisson

- CocaCola 35cl—Price: 6
- Fanta 35cl—Price: 6
- Sprite 35cl—Price: 6
- Sidi Ali 0.5l—Price: 5
- Sidi Ali 1.5l—Price: 3.5
- Login Page
Welcome to Sodexo

Name: Salim Harras
Balance: $468

Order your food
Follow your Orders
Follow your Balance
<table>
<thead>
<tr>
<th>#</th>
<th>Quantity</th>
<th>Price</th>
<th>Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>6</td>
<td>2015-04-19</td>
<td>Pending</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>20</td>
<td>2015-04-20</td>
<td>Pending</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6</td>
<td>2015-04-20</td>
<td>Pending</td>
</tr>
</tbody>
</table>
Follow your balance

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Previous Balance</th>
<th>Price</th>
<th>Actual Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>8500</td>
<td>6</td>
<td>8494</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>8494</td>
<td>20</td>
<td>8474</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>8474</td>
<td>6</td>
<td>8468</td>
</tr>
</tbody>
</table>
Salade Menu page

Salade

Salade Cesar Price : 10
Order

Salade Marocaine Price : 12
Order

Salade variée Price : 12
Cart page

My cart

Pick up: 00:00

Salade Cesar (price: 10)

Total: 10

Cancel  Submit

sodexo
-Order confirmed

Order confirmed
Salade Cesar (price: 10)
Total: 10
-Find us page
6. Testing

The last step of the SDLC is the testing, in which I applied the different types of testing on the application with my supervisor. This allowed us to detect the errors and bugs and work on them. It also allowed me to see whether there are requirements that are not met in the mobile application.

7. Future Work

After three months working on my capstone project, and now that I have completed the main part of it, there are still potential modules that can still enhance my mobile application both in term of requirements or design. In fact, having other classes and responsibilities in parallel with my capstone restricted my time and effort toward the development of this mobile application.

The idea behind my project is very unique and it will for sure improve the student’s lives if this application becomes operational. The application can be easily linked to Al Akhawayn University; thus, students will be able to use it to benefit from its services and functionalities. This link can be made by adding the JSON parsing part to the application and remotely access the new database to extract the data with JSON format, parse it, and use it.

Another feature that should also be done is the linking of the application with a desktop application that deals with the manager and employees perspectives. Thus, this service will allow for a better flow of data between the students and Sodexo restaurant.

Finally, since the university have 5 restaurants, the application can, not only be used for Sodexo restaurant, but also to any other Newrest restaurant.
8. Conclusion

This capstone project was a great opportunity to learn about mobile development. I had absolutely no background in the field and always thought of mobile development as a hard and complicated task; however, mobile development turned out to be actually pretty intuitive and easy to master with hard work, patience and perseverance. This experience was the first time where I had to learn technologies by myself. It is extremely risky to choose to build a capstone project with technologies that you are not familiar with, but it is a challenge that I decided to take. I have undoubtedly faced a lot of difficulties the main one being the building of the web service. Web services require a lot of knowledge I lacked and took most of my time while building this project.
References


