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Theme

Design and Development Of a Tourism Mobile Application

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Abstract:

This thesis explores the development of a tourism phone application that aims to enhance the tourist experience by providing comprehensive information on tourist attractions, restaurants, and hotels. The application enables tourists to access information on these key components of travel, as well as contact local tourism agencies directly for further assistance. In addition, The application uses location based services to provide tourists with accurate information about the locations of tourist places, hotels and restaurants as well as complete information on tourism agencies. The study focuses on the design and development of the application, as well as its usability and user satisfaction. The findings of this study provide valuable insights into the effectiveness of such applications in enhancing the tourist experience, and the potential for future development and innovation in this area.

Key words :

mobile application , flutter , firebase , tourism , restaurants , hotels , Facilitate , Screen , wilaya , places , user

ملخص:

يستكشف هذا العمل تطوير تطبيق الهاتف السياحي الذي يهدف إلى تعزيز التجربة السياحية من خلال توفير معلومات شاملة عن المعالم السياحية والمطاعم والفنادق. يتيح التطبيق للسائحين الوصول إلى المعلومات حول هذه المكونات الرئيسية للسفر ، وكذلك الاتصال بوكالات السياحة المحلية مباشرة للحصول على مزيد من المساعدة. بالإضافة إلى ذلك ، يستخدم التطبيق الخدمات القائمة على الموقع لتزويد السائحين بمعلومات دقيقة حول مواقع أماكن السياح والفنادق والمطاعم وكذلك المعلومات الكاملة عن وكالات السياحة. تركز الدراسة على تصميم التطبيق وتطويره ، بالإضافة إلى قابليته للاستخدام ورضا المستخدم. تقدم نتائج هذه الدراسة رؤى قيمة حول فعالية مثل هذه التطبيقات في تعزيز التجربة السياحية ، وإمكانات التطوير والابتكار في المستقبل في هذا المجال.

الكلمات المفتاحية :

تطبيق جوال ، فلاتر ، فايربيس ، سياحة ، مطاعم ، فنادق ، تسهيل ، شاشة ، ولاية ، أماكن ، مستخدم

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INTRODUCTION:

Currently, the inclusion of technology in all fields is very important, as the ICT(Information and Communication Technology) sector is considered the engine of the economy in our time. One of the most important of these fields is tourism, as it is of great importance for any country in the world, and especially for a country like Algeria because of its rich and it has a great potential for tourism, due to its diversity, whether cultural or natural diversity, as well as historical cities and desert areas, It has both , chance to become a destination of coastal tourism with 1200 km of coastline, sunny all year round and about thirty capes and so many beaches, a destination of green tourism with plains, forests, peaks and high plateaus, an exotic destination with the second largest desert in the world and some sand dunes (oasis).
Tourism is also an important industry because of its great importance in supporting comprehensive economic and social development.

It has also become an important economic sector in the economy of countries , and it has become an alternative to the post-petroleum stage and has become a factor of competition as well , and it is subject to continuous development, the most prominent of these developments is e-tourism, which forms a combination of Tourism and information and communication technologies, that is, the effective use of the tourism sector of information and communication technologies .

E-tourism at the present time has become an imperative necessity imposed by the nature of tourist services on the one hand and the competition between other tourist destinations and for what is imposed by the nature of this era in which we live and also for the services and benefits it provides to producers of tourist services and consumers(tourists).

That is why, wishing to help the development of e-tourism in Algeria, we as students have developed an application that helps tourists manage all aspects of their vacation, from planning to implementation to access all information about their destination and so on. Our goal is to:

- Facilitate the management of trips.

- View all information related to the most important areas.

- Providing the most important services to users such as: (the restaurants, hotels…)And so on.

Our work entitled: < Design and Development Of a Tourism Mobile Application>

Firstly We started with **PRELIMINARY STUDY** for our project , After that We talked about **THE CONSTRUCTION PHASES** , finally We ended our report with **CONCLUSION & PERSPECTIVES**

1. PRELIMINARY STUDY:

In this section, We will present the most basic concepts about our work, followed by a full description of our future project and its characteristics.

1.1 Concepts and Definitions :

Okay, let's define the basic concepts of our work.

1.1.1 MOBILE APPLICATION:

A mobile app (or mobile application) is a software application developed specifically for use on small, wireless computing devices, such as smartphones and tablets, rather than desktop or laptop computers.

Mobile apps are sometimes categorized according to whether they are web-based or native apps, which are created specifically for a given platform. A third category, hybrid apps, combines elements of both native and web apps [1].

1.1.2 PHONE APPLICATION TYPES:

Let's talk about the types of mobile applications

- **Native Mobile Apps:**

Native mobile apps are designed to be “native” to one platform, whether it’s Apple iOS, Google’s Android, or Windows Phone. The native platform can be advantageous because it tends to optimize the user experience. Because it was developed specifically for the platform, it can operate more quickly and intuitively [2].

- **Hybrid Mobile Apps:**

These apps can be installed on devices just like native apps, but they run through web browsers. All hybrid apps are developed through the HTML5 programming language. Though hybrid apps are not as fast or reliable as native apps, they have a greater capacity for streamlining the development process. Because you don’t have to build and maintain apps for separate platforms, your business can save on time and resources. It’s ideal for apps that primarily deliver content [2].

- **Web Apps:**

Responsive websites switch to a different design when they are accessed from a mobile device. Adaptive web applications, on the other hand, scale to fit the different screen sizes of mobile devices. For these apps, the design doesn’t change. Web apps are built using the

most popular programming languages, but they can't use hardware on mobile devices or be sold in any app store [2].

- So after these definitions, we classified our application as a hybrid application because " its construction is much faster and more economical than the original application. They also load quickly, are ideal for use in countries with slow internet, and give users a consistent user experience.

  Finally, since they use one code base, there is much less code to maintain".

1.1.3 Mobile Operating Systems :

An operating system (OS) is a program that acts as an interface between the system hardware and the user. Moreover, it handles all the interactions between the software and the hardware. Before knowing different mobile OS [3].

There are four most well-known mobile operating systems:

- **Android :**

Android is a mobile operating system based on a modified version of the Linux kernel and other open-source software, designed primarily for touchscreen mobile devices such as smartphones and tablets. Android is developed by a partnership of developers known as the Open Handset Alliance and commercially sponsored by Google. It was disclosed in November 2007, with the first commercial Android device, the HTC Dream, launched in September 2008.

It is free and open-source software. Its source code is Android Open Source Project (AOSP), primarily licensed under the Apache License. However, most Android devices dispatch with additional proprietary software pre-installed, mainly Google Mobile Services (GMS), including core apps such as Google Chrome, the digital distribution platform Google Play and the associated Google Play Services development platform [4].

- **iOS or iPhone OS :**

Apple iOS is a proprietary mobile operating system that runs on mobile devices such as the iPhone and iPad, Apple iOS stands for iPhone operating system and is designed for use with Apple's multitouch devices. The mobile OS supports input through direct manipulation and responds to various user gestures, such as pinching, tapping and swiping. The iOS developer kit provides tools that allow for iOS app development [5].

1.1.4 Sales and market share:

Operating Systems are the lifeline of any device. However, the proliferation of smartphones has made mobile operating systems more popular than desktop operating systems over the years. Google owned Android and Apple owned iOS are the two most popular mobile operating systems that are ruling the world (figure 1).

Android emerges as the global leader here for many reasons. Android comes with more device options, more affordable and flexible infrastructure, and the assurance of Google. These are some of the factors that make it the most popular in almost every country across the world.

However, iOS eats up quite a big share of the industry in more niche markets and first-world countries due to its esoteric appeal. It remains within the reach & feasibility of fewer people due to lesser and expensive options in terms of devices, apps, etc.

Therefore, when we look at the global stats, we find that Android alone covers almost three-fourth of the market, whereas iOS covers almost the rest of it. The two operating systems together rule the market with more than 6 billion users spread across the world [6].

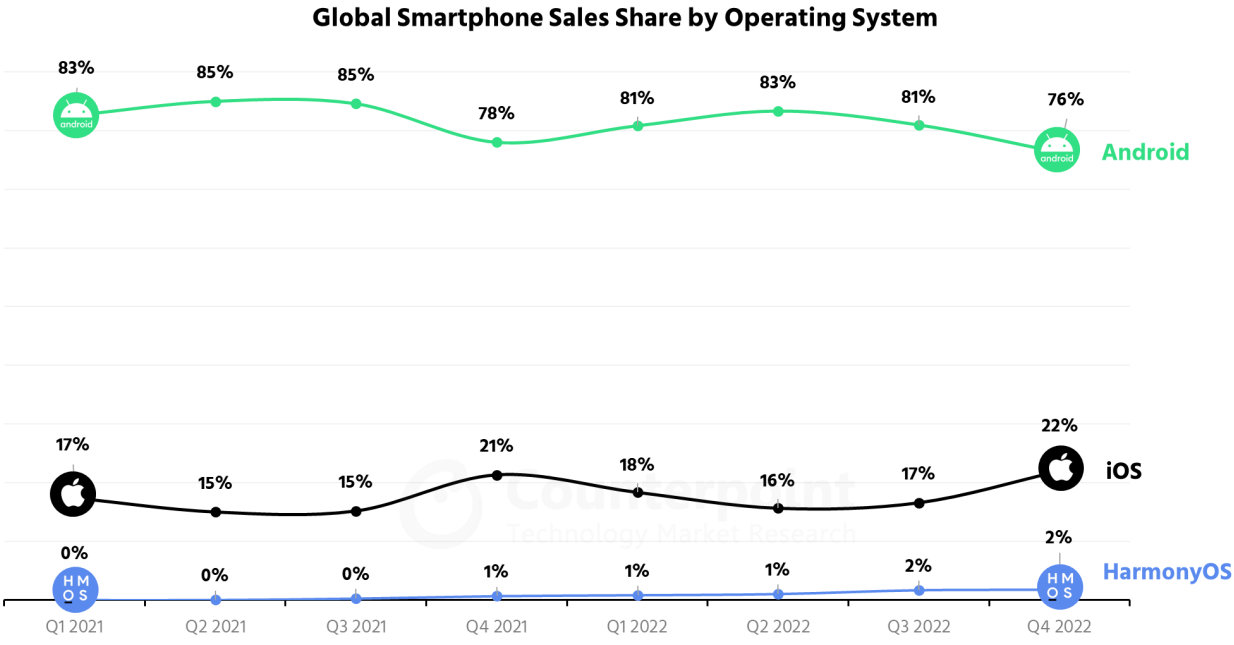


Figure 1 : Global Smartphone sales Share by Operating System [7]

1.2 Description of the future application :

In this part, we will describe our project that we have developed , this tourism application is a comprehensive tool designed to enhance the travel experience for tourists. It provides users with access to valuable information about tourist attractions, restaurants, and hotels, as well as direct contact with local tourism agencies for further assistance. With user-friendly navigation and accurate information, this application is an essential travel companion for anyone looking to explore a new destination with ease and confidence.

1.2.1 The objectives of the application :

The application has many objectives towards tourists, tourist sector , country :

- Facilitate the process of searching for tourist places .
- Facilitate the process of searching for hotels and restaurants .
- Facilitate the process of searching for national tourist agencies.
- Provide the tourists with full description and rating about the tourist places, hotels, and agencies .
- Developing the tourism sector in Algeria.
- Publicity and promotion of tourist places in Algeria.

1.2.2 Application components :

The application consists of :

- Tourists.
- Algerian tourism sector.
- Tourism agencies.
- Hotels.
- Restaurants.
- Admin (developers).
- Google maps.
- Tourism places.

1.2.3 Application Functionalities :

These are the major tasks that the application offers to its different users:

- Tourists can sign up to the app by registration using their full information or sign in to the app if they already have an account .
- Tourists can see all states of Algeria and choose one.
- Tourists can see in each state all the tourism categories of places also restaurants and hotels .
- Each tourism place, restaurant and hotel provided with description and rating .
- Each place, restaurant or hotel provided with location and the tourist can directly see the location in the maps.
- Tourists can add any place or restaurant or hotel to the favorite places so they can easily go back to it.
- Tourists can contact the company if they have any comment or any problem they are facing .

We now need to talk about the building stage after going through the concepts of our work and the description of the application.

2. The Construction Phases :

We have used the Unified Modeling Language (UML) to execute our development process, and this part is devoted to giving the justifications that are required. The primary interfaces of our program are presented after establishing the functions of our system, creating it, and selecting the tools to be used in its use.

2.1 Requirements Analysis:

In this step, we walk through our system's functions utilizing use case modeling and dynamic views:

2.1.1 Use case diagram modeling :

This kind of modeling explains how users and our future system interact.

- Tourists may join up for the app by entering their complete name and email address, or they can login in if they already have an account.
- Tourists can visit all of Algeria's states and pick one.
- Tourists may examine all of the tourist categories of locations in each state, as well as restaurants and motels.
- Each tourist attraction, restaurant, and hotel is described and rated.
- Each site, restaurant, or hotel is labeled, and tourists may view the location on maps.
- Tourists may save any location, restaurant, or hotel to their favorites list so they can simply return to it .
- If tourists have any comments or problems, they can contact the company directly.

Using a use case diagram, we depict the primary features of our system which is a UML diagram that depicts the interactions between users and a system. It is a high-level representation of the system's functionality from the user's perspective. The diagram consists of actors, use cases, and the relationships between them. Actors are represented as stick figures, and use cases are represented as ovals with labels that describe the user's actions. The relationships between actors and use cases are shown by lines. Use case diagrams are useful in requirements analysis and can help to ensure that all stakeholders have a clear understanding of the system's functionality. They can also be used to communicate with developers and ensure that the system is designed to meet the user's needs.

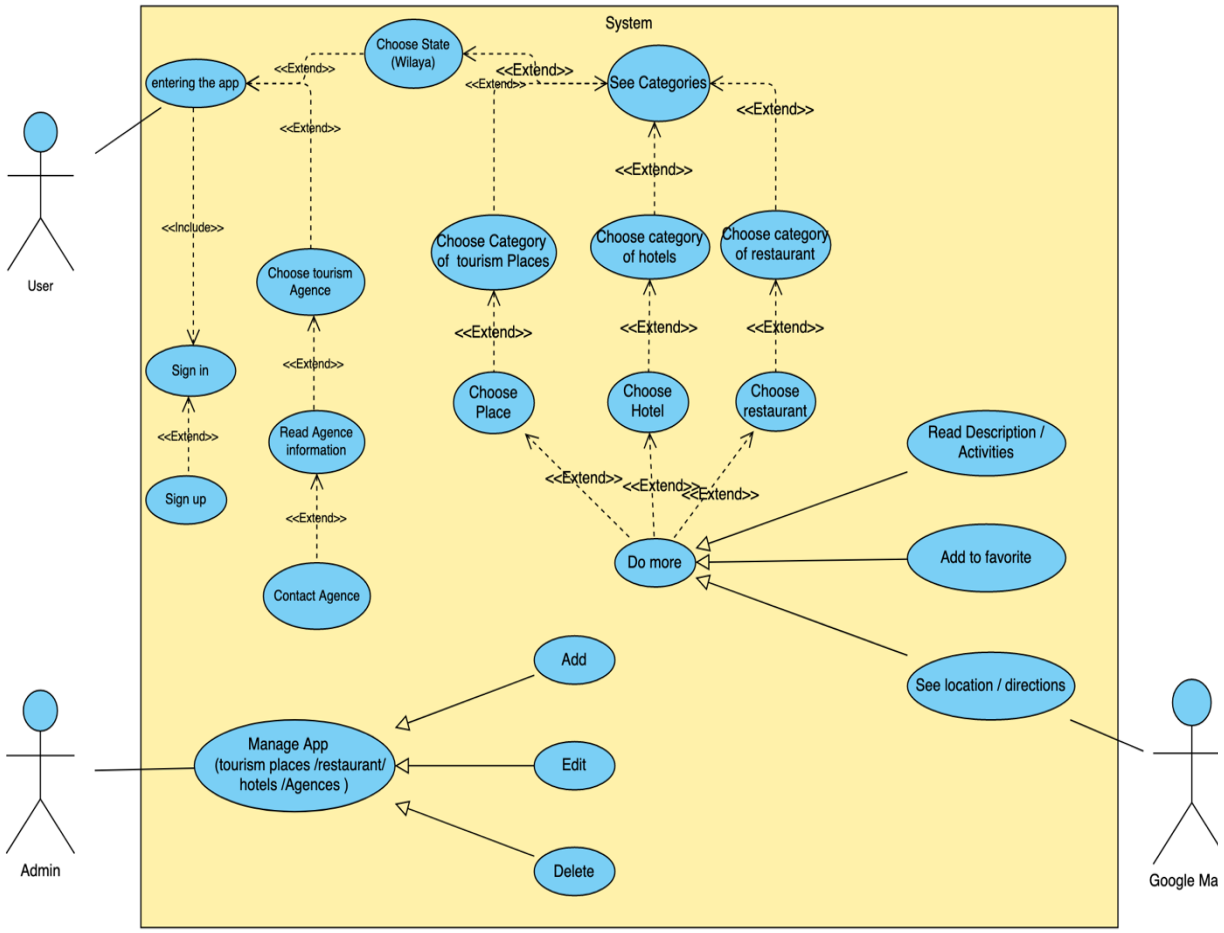


Figure 2: Representation of use case diagram

2.1.2 Class diagram modeling :

A class diagram is a visual representation of the structure of a system that shows classes and their relationships to each other. It is a kind of UML diagram that visualizes the static structure of a system. In a class diagram, classes are represented as boxes containing the class name, attributes, and methods. The relationships between the categories are shown as lines connecting the boxes. These relationships may include associations, inheritance, and other types of connections. Class diagrams are useful in software development because they help developers understand the architecture of a system and identify potential design issues. It is also useful for documenting system architecture and can serve as a blueprint for future development work.

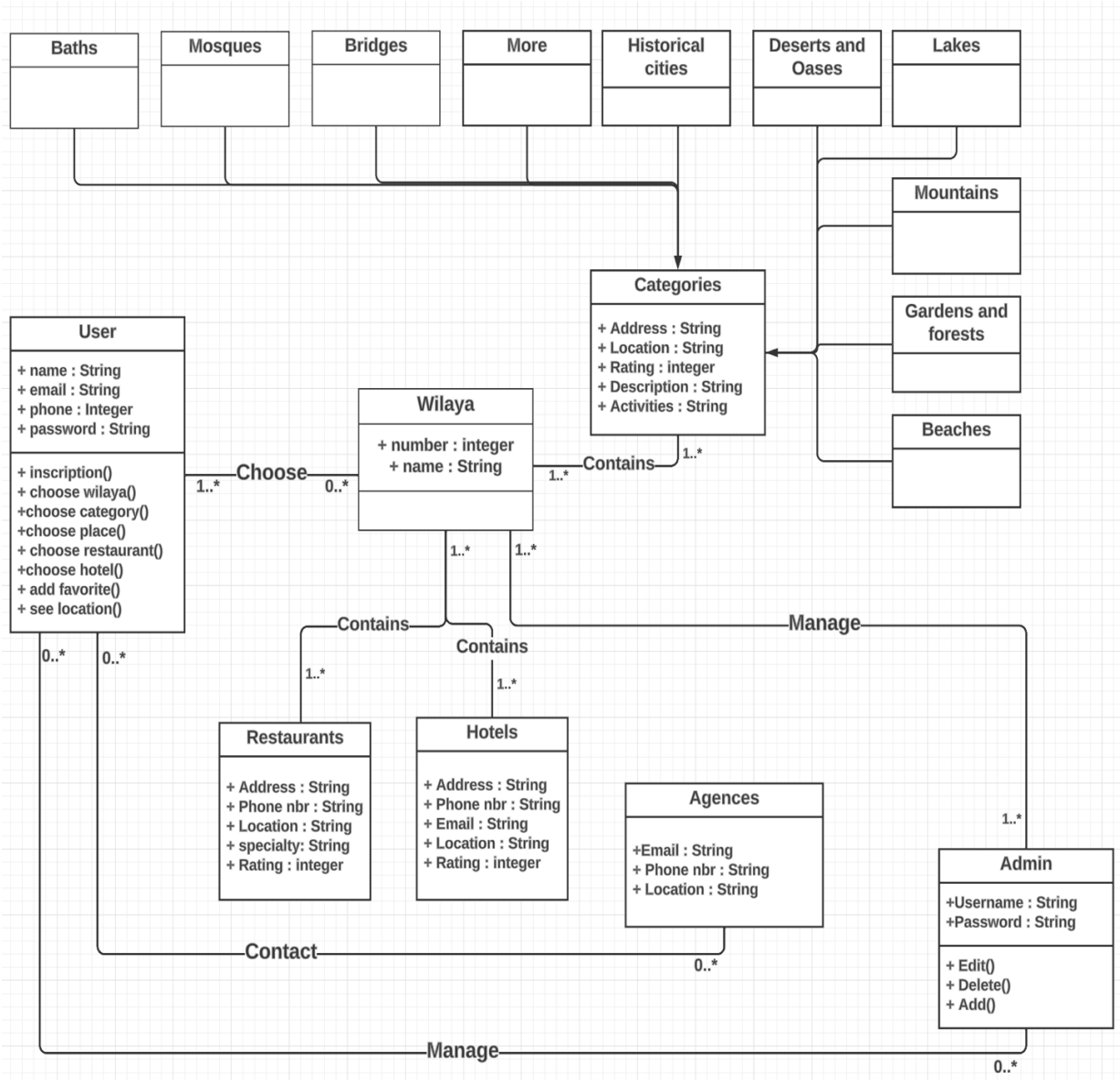


Figure 3: Representation of class diagram

2.2 Dynamic view:

we will express and model the behavior of the system over time by using the detailed sequence diagram which is a type of UML (Unified Modeling Language) diagram that illustrates the interactions between objects or components within a system or process. It shows the flow of messages between the objects and the order in which those messages are exchanged, providing a visual representation of the dynamic behavior of the system.

In a sequence diagram, objects are represented by boxes or rectangles, and the messages exchanged between them are shown as arrows. The vertical axis of the diagram represents time, with each message shown at the appropriate point in the sequence. The sequence diagram is useful for analyzing and designing complex systems, as it provides a clear and concise representation of how objects interact and collaborate to accomplish a specific task or goal. It is often used in software development, particularly during the design phase, to help developers understand the interactions between different components of the system and identify potential issues or areas for improvement.

First, there are two parts to registration. The first is for the first time (sign up), where the user enters his information, the system validates the information, and then retrieves the information from the firebase to ensure that this account does not already exist; if it does not, the user information is saved in the firebase, and he is asked to register again. The second element is connected to login; when the user inputs his information into the firebase, the system obtains the information from the firebase to ensure that the account exists; if it does, the user is permitted to enter; otherwise, he is prompted to register an account. (See Figure 3)

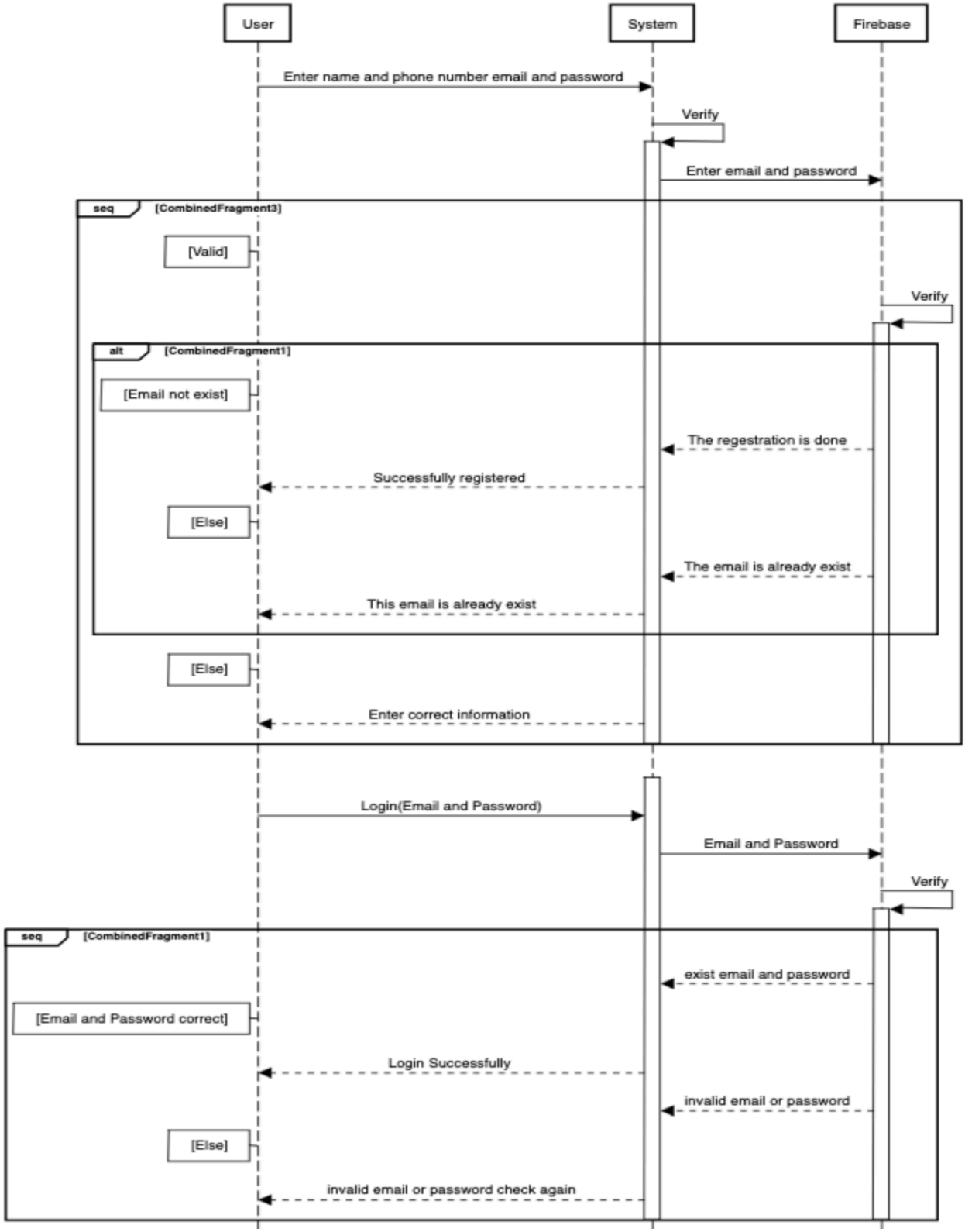


Figure 4:Representation of sequence diagram for sign up and login

2.3 Implementation phase:

At this stage of the process of building our application, the use cases are complete, the problem has been analyzed in depth; we have defined a design that we hope is the most adequate. We can then undertake the last activity of the Unified Process composed of two parts (implementation and testing), with the objective of achieving a final product, executable and exploitable by users. In this chapter we will present the work environment, the technologies and the programming languages that we used, followed by some interfaces of the implementation of the database, then illustrate the tree structure as well as some examples of interfaces graphs of our application, and we will complete the chapter with the test phase.

2.3.1Tools:

And here we will show the tools that we have used.

- **Visual Studio Code**

Visual Studio Code is a free, lightweight but powerful source code editor that runs on your desktop and on the web and is available for Windows, macOS, Linux, and Raspberry Pi OS. It comes with built-in support for JavaScript, TypeScript, and Node.js and has a rich ecosystem of extensions for other programming languages (such as C++, C#, Java, Python, PHP, and Go), runtimes (such as .NET and Unity), environments (such as Docker and Kubernetes), and clouds (such as Amazon Web Services, Microsoft Azure, and Google Cloud Platform).

Aside from the whole idea of being lightweight and starting quickly, Visual Studio Code has IntelliSense code completion for variables, methods, and imported modules; graphical debugging; linting, multi-cursor editing, parameter hints, and other powerful editing features; snazzy code navigation and refactoring; and built-in source code control including Git support. Much of this was adapted from Visual Studio technology.

Visual Studio Code proper is built using the Electron shell, Node.js, TypeScript, and the Language Server Protocol, and is updated on a monthly basis. The many extensions are updated as often as needed. The richness of support varies across the different programming languages and their extensions, ranging from simple syntax highlighting and bracket matching to debugging and refactoring. You can add basic support for your favorite language through TextMate colorizers if no language server is available [8].

Figure 5: VS Code Logo

➢ Flutter

Flutter is a free and open-source mobile UI framework created by Google and released in May 2017. In a few words, it allows you to create a native mobile application with only one codebase. This means that you can use one programming language and one codebase to create two different apps (for iOS and Android).

Flutter consists of two important parts:

- An SDK (Software Development Kit): A collection of tools that are going to help you develop your applications. This includes tools to compile your code into native machine code (code for iOS and Android).
- A Framework (UI Library based on widgets): A collection of reusable UI elements (buttons, text inputs, sliders, and so on) that you can personalize for your own needs.

To develop with Flutter, you will use a programming language called Dart. The language was created by Google in October 2011, but it has improved a lot over these past years [9].

Figure 6: Flutter Logo

2.3.2 Language:

➢ Dart:

Figure 7: Dart Logo

Dart is an open-source, general-purpose, object-oriented programming language with C-style syntax developed by Google in 2011. The purpose of Dart programming is to create a frontend user interfaces for the web and mobile apps. It is under active development, compiled to native machine code for building mobile apps, inspired by other programming languages such as Java, JavaScript, C#, and is Strongly Typed. Since Dart is a compiled

language so you cannot execute your code directly; instead, the compiler parses it and transfer it into machine code.

It supports most of the common concepts of programming languages like classes, interfaces, functions, unlike other programming languages. Dart language does not support arrays directly. It supports collection, which is used to replicate the data structure such as arrays, generics, and optional typing [10].

2.3.3 DataBase:

➢ Firebase:

Google Firebase is a Google-backed application development software that enables developers to develop iOS, Android and Web apps. Firebase provides tools for tracking analytics, reporting and fixing app crashes, creating marketing and product experiment.

Firebase offers a number of services, including:

- Analytics – Google Analytics for Firebase offers free, unlimited reporting on as many as 500 separate events. Analytics presents data about user behavior in iOS and Android apps, enabling better decision-making about improving performance and app marketing.
- Authentication – Firebase Authentication makes it easy for developers to build secure authentication systems and enhances the sign-in and onboarding experience for users. This feature offers a complete identity solution, supporting email and password accounts, phone auth, as well as Google, Facebook, GitHub, Twitter login and more.
- Cloud messaging – Firebase Cloud Messaging (FCM) is a cross-platform messaging tool that lets companies reliably receive and deliver messages on iOS, Android and the web at no cost.
- Realtime database – the Firebase Realtime Database is a cloud-hosted NoSQL database that enables data to be stored and synced between users in real time. The data is synced across all clients in real time and is still available when an app goes offline.
- Crashlytics – Firebase Crashlytics is a real-time crash reporter that helps developers track, prioritize and fix stability issues that reduce the quality of their apps. With crashlytics, developers spend less time organizing and troubleshooting crashes and more time building features for their apps.
- Performance – Firebase Performance Monitoring service gives developers insight into the performance characteristics of their iOS and Android apps to help them determine where and when the performance of their apps can be improved.
- Test lab – Firebase Test Lab is a cloud-based app-testing infrastructure. With one operation, developers can test their iOS or Android apps across a variety of devices and device configurations. They can see the results, including videos, screenshots and logs, in the Firebase console [11].

Figure 8 : Firebase Logo

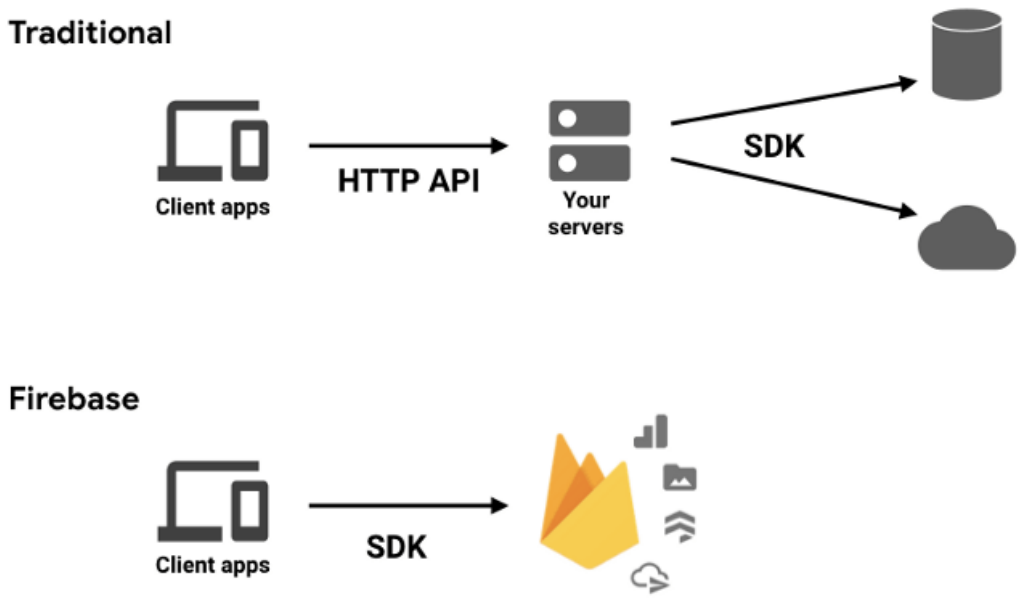


Figure 9 : Firebase work(12)

Personal opinion about FlutterFire:

"In my opinion, making use of **FlutterFire** has an inherent advantage when it comes to **creating mobile applications**. We will be able to make a fully functional mobile app with the same quality as if we were using a traditional server architecture, but with higher performance and **lower development and maintenance costs**.

Another great advantage of **FlutterFire**is that, in most cases, building a Backend will not be necessary, because the functionality provided by **Firebase** is enough to run our app, and also **avoids the need to have your own servers**. Of course, **Firebase** will also take care of the **scalability and availability** of its service. But above all, with FlutterFire, we will reduce the future costs of the project.

How is this reflected in your business? Exactly: more time available for other tasks, the most precious asset, and less expenses.

In short, there a lot more reasons to **create an app with FlutterFire**. Luckily, at Abalit, we have already found them, and we can help you **develop your application in Flutter + Firebase** when you are ready for it. Don't forget to **request your FlutterFire app development** quote to no commitment, and free of charge!" [13].

2.4 Application Presentation:

Now we will describe the views of the application by implementing the most important pages and explaining the main functions in it.

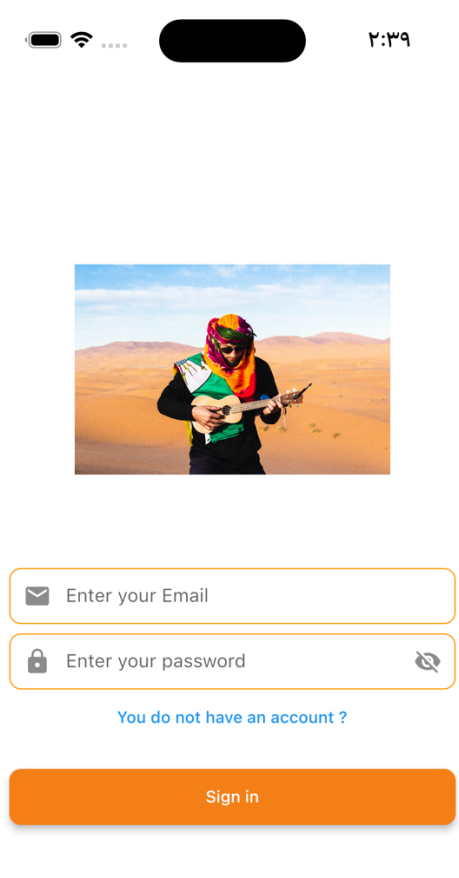
❖ Welcoming interface:

This is the first our application screen , Here the user finds two buttons one for sign in if he has an account and the other one for sign up if he doesn't have account (figure 10).

Figure 10: Welcoming screen

❖ Sign in and Sign up interface:

Figure 11 and 12 shows how the user logs into the app if he has an account after checking the existing of the given information, or he registers if he doesn't have an account using his full information , also we check about all the information starting from the email if it's already exist in firebase and we check the strength of the password .



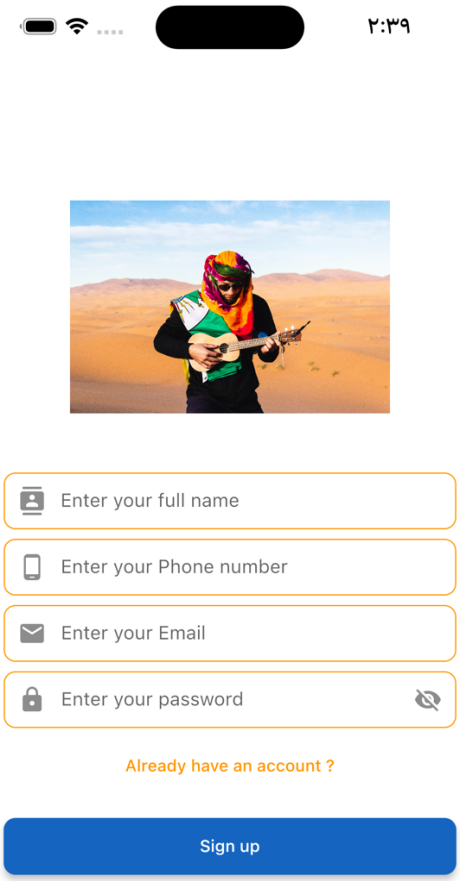


Figure 11 : Sign in

Figure 12: Sign up interface

- **Wilaya Screen:** after the user completing his sign in with correct information a screen will appear to him which contain all the Algerian states (wilaya) and the screen of favorite places that it will empty at the first , in wilaya screen the user can choose the destination (Wilaya) where he wants to spend his vacation (figure 13) .

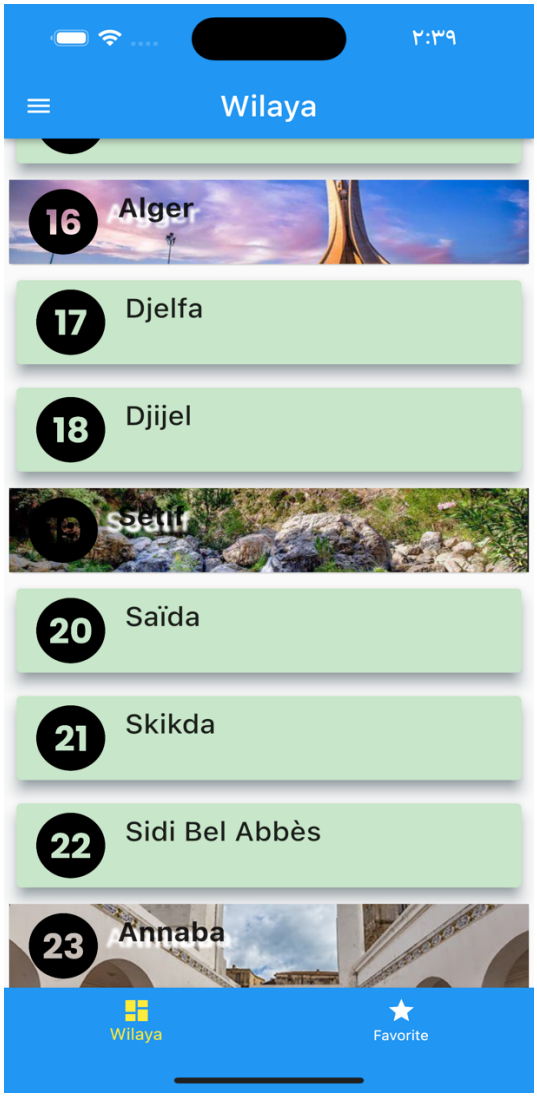


Figure 13: Wilaya Screen

❖ Category Screen (Wilaya):

After the user chooses the state(wilaya) he wants to go to, *figure 14* shows us the most important areas that are in this state, so they are organized into categories. For example, when the user wants to search for historical monuments, all what he has to do is click on the historical monuments category only and he will find what he is looking for with picture for the place and rating also type of the place , as shown in *Figure 15* .

Figure 14: Wilaya Category Screen

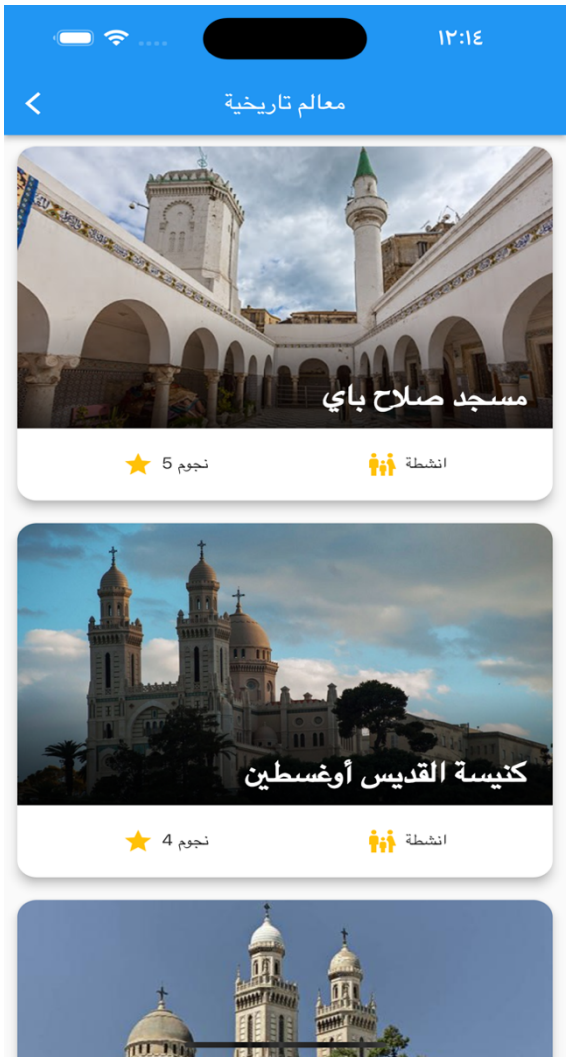
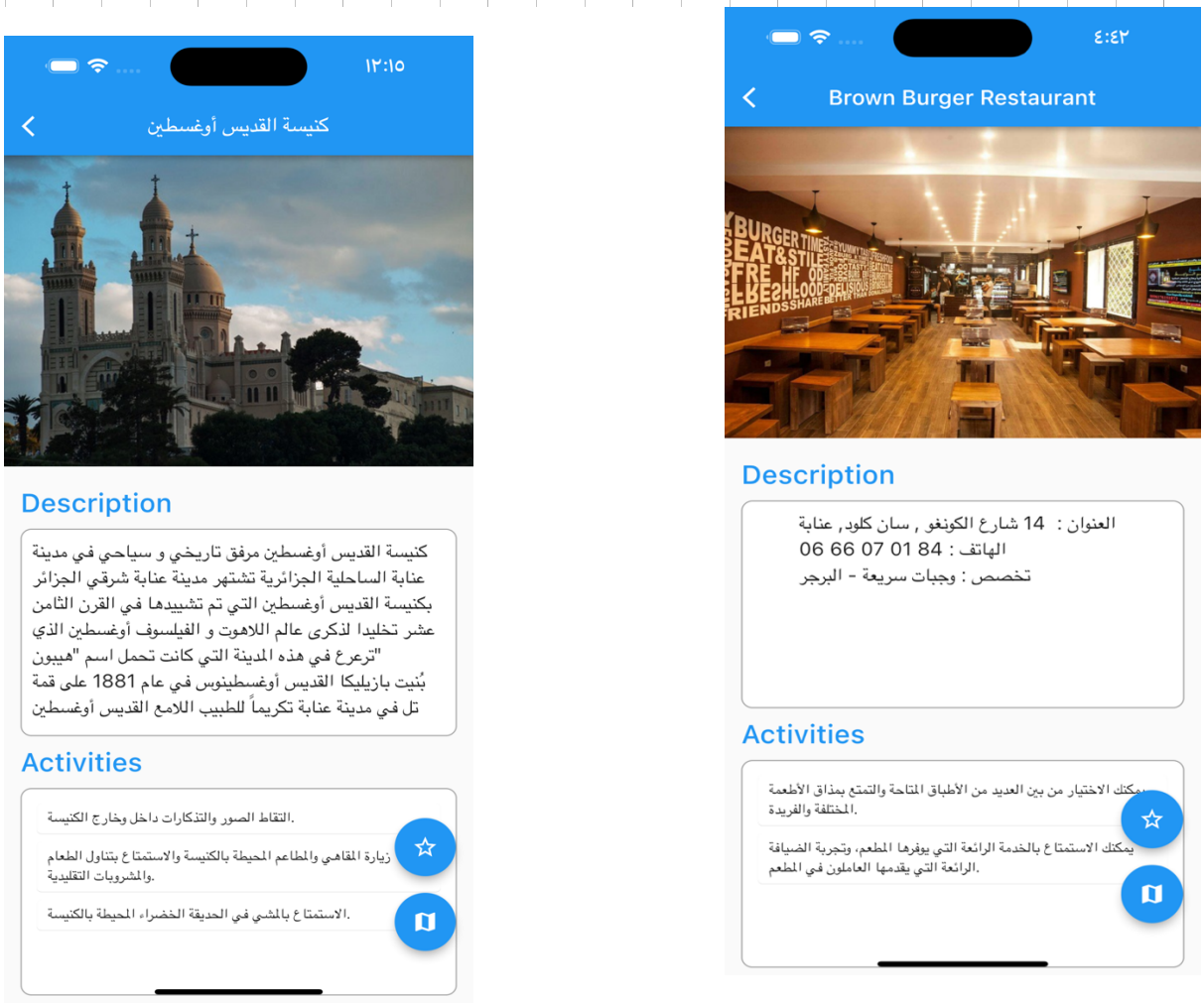


Figure 15 : Wilaya Category Places Screen

❖ Details Screen:

After the user chooses the place that he wants to go to, a page will appear with picture for the place and description of that place he has chosen or a contact and location information if it's hotel or restaurant and a set of activities that can be performed, we can find in the bottom of screen two buttons one for adding to the favorite places and the other one for seeing the location of the place in Google maps so the tourist can go directly to it as shown in Figure 16.



Figures 16 : Places Details Screen

There are two buttons on the details page, one takes you to Google Maps and the other takes you to the favorites page, as shown in Figures 16,17,18 .

❖ Favorite Screen:

The "Favorite Screen" is where users can save and organize the destinations they love most. This screen allows users to quickly access their favorite places, view details about each location, and easily plan future trips. The "Favorite Places" screen is a useful tool for frequent travelers, as well as anyone looking for inspiration for their next adventure.

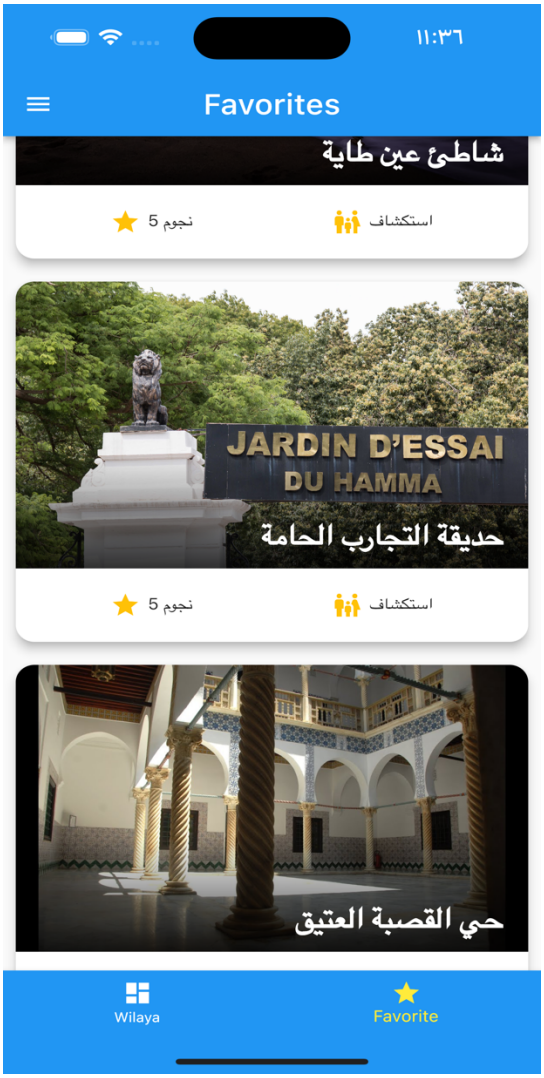


Figure 17 : Favorite Screen

❖ Maps Screen(Location):

When the user presses the maps button, it instantly navigates them to the precise location on Google Maps, facilitating their ability to reach the intended destination efficiently. This functionality offers a seamless transition from the app or website to the Google Maps interface, where the user can access a wealth of useful features. By following the provided directions, the user can embark on their journey directly, ensuring a smooth navigation experience. Additionally, they have the option to explore various aspects of the place they are interested in, such as viewing additional pictures or engaging with other relevant information. This comprehensive integration with Google Maps enhances the user's convenience, enabling them to seamlessly transition from planning to execution, and providing them with valuable insights to further enhance their overall experience. (Figure 18)

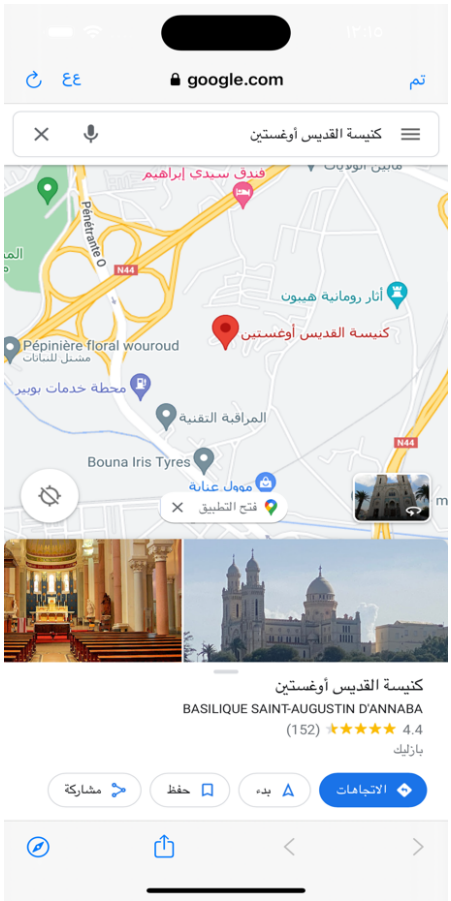


Figure 18 : Location Screen in maps

❖ App drawer Screen:

in this drawer the user will find many other screens that he will need them which are :

My Account , home , Agencies , Contact us.

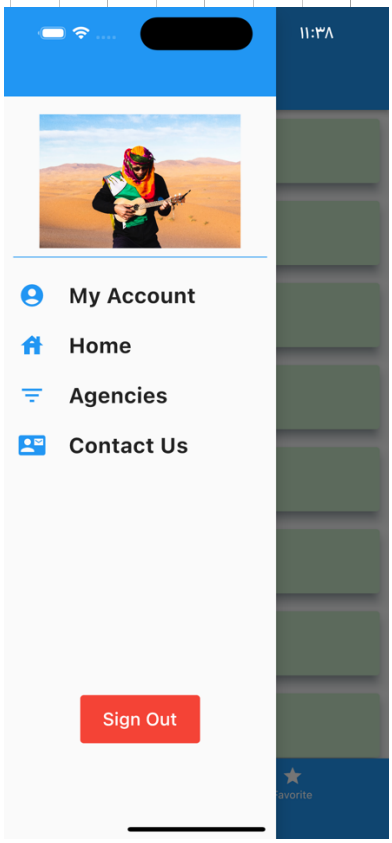


Figure 19 : App Drawer

❖ My Account Screen:

in this screen the user will find all his information and some application settings .

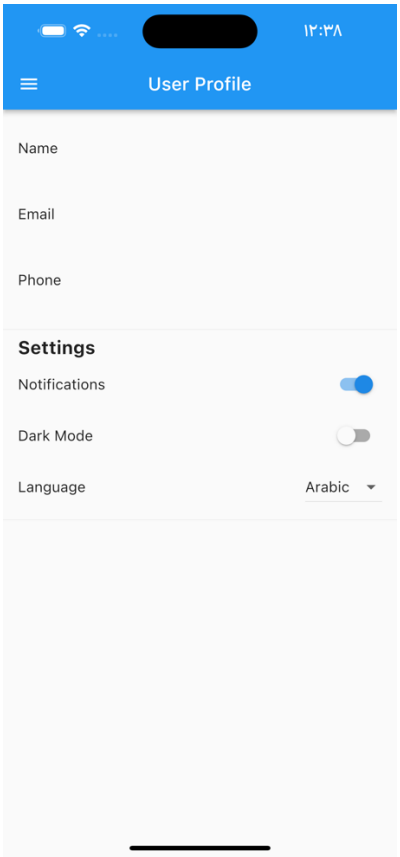


Figure 20 : My Account Screen

❖ Agencies Screen:

Here, within this platform, the user will discover a comprehensive directory of national agencies, each accompanied by their respective contact details. Should the user desire to establish direct communication with any of these agencies, they will have the means to do so effortlessly. By initiating contact with the chosen agency, the user can effectively entrust them with the entirety of their vacation arrangements, ensuring a seamless and hassle-free experience from start to finish

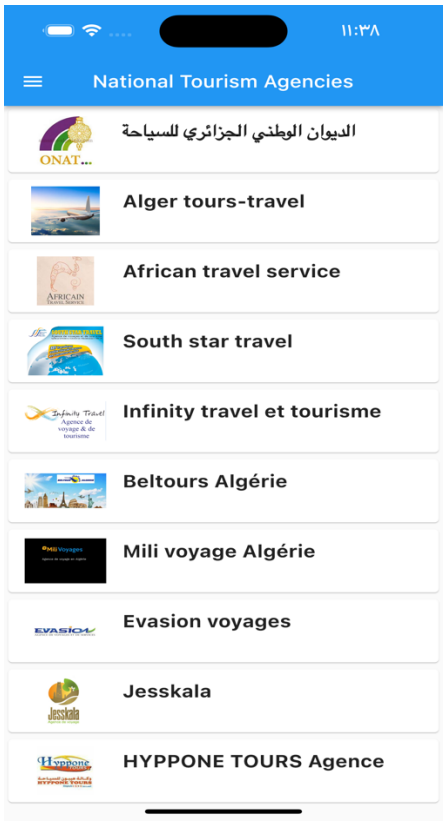


Figure 21 : National agencies screen

Figure 22: Agencies details screen

❖ Contact Us Screen:

In this screen, the user is provided with a convenient means to directly contact the company in case they encounter any issues, have inquiries, or simply wish to ask a question. The platform offers a seamless and efficient communication channel for users to reach out to the company and receive prompt assistance, ensuring that their concerns are addressed and their queries are answered effectively.

Whether faced with technical difficulties, seeking further information, or requiring clarification on any matter, the user can utilize this feature to engage with the company directly, fostering a positive and interactive user experience.

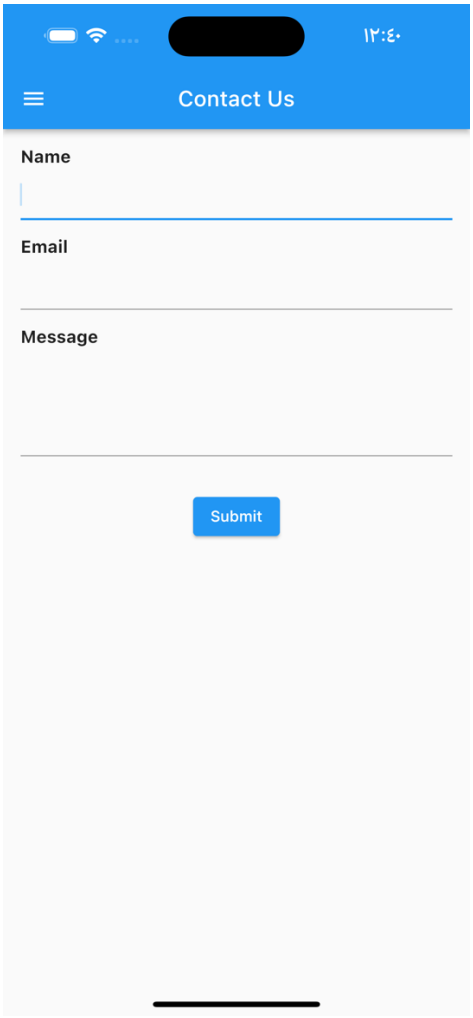


Figure 23 : Contact Us screen

3 CONCLUSION and PERSPECTIVES :

In conclusion, this thesis has explored the development of a tourism phone application for android and IOS that provides comprehensive information on tourist attractions, restaurants, and hotels to enhance the tourist experience.

The application uses location-based services to offer accurate information on the locations of tourist places, hotels, and restaurants, and allows tourists to contact local tourism agencies for further assistance.

The study has focused on the design and development of the application, its usability, and user satisfaction. The insights from this research provide valuable information on the effectiveness of such applications in enhancing the tourist experience, and highlight the potential for further innovation and development in this area. The application can serve as a useful tool for tourists looking for comprehensive information to enhance their travel experience, and for tourism agencies seeking to improve their services and offerings.

In the future the app will provide tourist with these features:

- Personalized app with machine learning and artificial intelligence algorithms for customized recommendations.
- Integration of blockchain in tourism apps provides secure and transparent financial transactions, eliminating intermediaries and reducing costs. Enhances security and reduces fraud risk .
- Chatbox feature offers personalized assistance, quick access to information, saving time and enhancing user experience.

By taking these perspectives into account, it is possible to develop an attractive, functional and relevant mobile tourism application that offers an optimized user experience and meets the needs of today's travelers. The continuous search for innovation and improvement is essential to remain competitive in the ever-changing digital tourism market.

In conclusion, we have created a promising mobile tourism application, offering a user-friendly and personalized platform for travelers. We hope that this solution will contribute to enrich travel experiences, promote tourist destinations and facilitate the discovery of new horizons.
We also keep on continuous attention to market developments and user feedback in order to keep the app up to date, add new features and meet the changing expectations of travelers. With an approach focused on innovation and continuous improvement, the mobile tourism app has the potential to become a must-have tool for travelers around the world.

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