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ABSTRACT

The Information Technology (IT) area has shown great growth in recent years, even with the economic recession that Brazil has been through and the impact of the coronavirus pandemic. It is estimated that by 2024 the area will have a deficit of more than 290 thousand professionals. However, companies still face other difficulties in hiring, especially people who are looking for their first job in the Information Technology area. Most part of these difficulties are lack of qualified manpower and high prerequisites to fill internship or junior positions. As a result, the objective of this project is: to develop a platform that connects people who seek guidance, improvement or professional relocation in the Information Technology area with professionals that already have the experience they are seeking. The first step was a research and analysis of similar platforms in the market, whose proposal involves mentoring or professional connections, and it concluded that there are no services that fully meet the project's proposal. In the second step, a research was done about mobile development, highlighting Flutter and Firebase platform. The third step defined the application's features, such as suggestion of users and mentors, search for users, become a mentor, private chat, video calls, Portuguese and English languages, light and dark themes and profile customization. The suggestion of users and mentors is done by a match with the registered users, relating their areas of work (where the user has experience) and the areas of interest of each one. For the coding of the project, Flutter and Firebase technologies were used. To design the app, it followed Material Design specifications. For testing and distribution, the app was published on Play Store, Google's Android application platform. The tests were performed by both the researcher and a selected group of users to verify if the functionalities were in accordance to what was defined in the beginning of the project. Perceiving the correct functioning of the application, the project achieved the proposed objective. In addition, it expanded its reach area, because it is possible to find users and mentors from any other area of the market.

1. INTRODUCTION

The idea of this project came up in 2019 in a meeting with the professor and coordinator of the internet computing technician course, Marcio Momberger, from Fundação Liberato. In this meeting, it was discussed about several topics, one of them was professional guidance for new professionals in the Information Technology area.

In times of low economic growth, it is always observed that the unemployment rate tends to increase. Lucci, Branco, Mendonça (2010, p. 169, own translation) says “from the mid-1990s, unemployment rate increased significantly, due to low GDP growth - the main factor that limits the opening of new jobs”¹.

In recent years, Brazil has experienced a strong economic recession and has been recovering slowly since then. About this recession, CASTRO (2018) says that it lasted from April 2014 to December 2016, and it was only in October 2017 that the Codace (Economic Cycle Dating Committee) was able to identify the end of the recession and the current phase of slow recovery.

Still according to CASTRO (2018), he says that in moments of economic recession, the companies invest less, unemployment increases, household consumption decreases, it is a process of cause and effect.

CASTRO (2017, own translation) states “the problems of unemployment in Brazil started in 2015. [...] In just over two years, the unemployment rate went from 6.5% to 13.7, more than double”².

In more recent numbers, Brazil reached a new record in unemployment rate, reaching 14.4% in the quarter ended in August. In addition, the country reached the lowest historic number of employed workers.

In times of unemployment, many people, whether they want to or not, end up having to change careers or areas of expertise. According to Andrade (2019, own translation), “[...] when the unemployment situation lasts for a long time, the professional needs to look for alternatives to adapt to the period of crises and recession that the country faces”³.

¹ “a partir dos meados de 1990, as taxas de desemprego aumentaram significativamente, em decorrência do baixo crescimento do PIB - principal fator que limita a abertura de novos postos de trabalho”

² “os problemas do desemprego no Brasil começaram em 2015. [...] Em pouco mais de dois anos, os desocupados passaram de 6,5% para 13,7%, mais que o dobro”

³ “[...] quando a situação [de desemprego] se perdura por muito tempo, o profissional precisa ir em busca de alternativas para se adequar ao período de crise e recessão que o país enfrenta”

In addition, this career change can occur in several ways: opening an own business, working in the informal sector or in conventional jobs. Among the several possibilities, one of them is in the Information Technology (IT) area.

The website Computer World (2019) says that the IT market could have a deficit of more than 290 thousand professionals by 2024. In other words, IT market shows a great demand for new professionals and it is one of the areas that less suffered with the recent economic recession.

1.1. Theme

Education, *networking*, mentorship and professional guidance.

1.2. Reason

Although Information Technology area has not been affected by economic recession as other economic sectors and it presents a high demand for new professionals, it still faces difficulties in hiring, mainly people who seek for their first job in Information Technology area. Regarding these difficulties, they do not have a specific cause, instead, they are a result of a set of factors.

One of these causes, according to Cilo (2019), is the lack of qualified manpower to fill these thousands of positions. In other words, when the professional leaves college, he has deficiencies in his knowledge or lack of interest in seeking for knowledge.

Regarding unfilled positions, Renato (2014, own translation) says “[...] companies require from the candidate to have several certifications, previous experience and advanced knowledge in the technologies that the company works with”⁴. In other words, the high requirement to fill internships or junior positions makes even more difficult for people to get their first job in the IT area.

In any case, whether due to a lack of qualified manpower or exaggeration in the position requirements, the reality is that new professionals in the IT area need to be proficient in some technologies, in one or more languages (usually English), communication skills and so on. Thus, it is essential to the professional to have knowledge in English, to meet and interact with people from the same area (*networking*) and deepen their knowledge in some technology.

⁴ “[...] as empresas exigem que o candidato tenha várias certificações, experiência na área e conhecimento avançado na tecnologia que a empresa que está recrutando trabalha”

Assuming that some of these characteristics are essential to get a first job position in the IT area, the present project aims to create a platform that connects people, allows them to become mentors and attend to classes to deepen their knowledge.

1.3. Problem

How to develop a platform that connects people who seek guidance, improvement or professional relocation in the Information Technology area with professionals that already have the experience they are seeking?

1.4. Objective

Develop a platform that connects people who seek guidance, improvement or professional relocation in the Information Technology area with professionals that already have the experience they are seeking.

2. THEORETICAL REFERENCE

This topic subsidizes the project with information about technologies and similar platforms in the market.

2.1. Mobile applications development

The development of mobile applications may occur in three different ways: native applications, hybrid applications or web apps. Each one of these forms shows unique characteristics and has advantages and disadvantages. (MADUREIRA, 2017)

2.1.1. Native applications

Native applications are developed using an exclusive language for a specific operation system. In the market, there is a predominance of two systems: Android and iOS with their own languages: Java and Kotlin for Android and Objective-C and Swift for iOS.

Applications that use native language tends to be faster and more efficient than the other ones. According to Gomes (2018, own translation), “a native application tends to be more reliable and runs faster when compared to others”⁵.

2.1.2. Web apps

Web apps are not properly applications, they are websites that were developed almost exclusively for mobile devices. They can be accessed through any device, as long as there is a browser installed. Its programming is made with web languages, such as HTML, CSS and JavaScript (MADUREIRA, 2017).

2.1.3. Hybrid applications

Hybrid applications are a mix between native applications and web apps since they can be developed using web languages or native languages. In addition, their performance tends to be higher than web apps and they are present in app stores (MADUREIRA, 2017).

Among hybrid technologies, there is one called Flutter. Flutter is a framework created and maintained by Google to facilitate the cross-platform development, especially for front-end applications. It can build applications for Android, iOS, Web, Linux, macOS and Windows. Although it is a new technology, launched in 2017, it is already used by giant companies, such as Google, Ebay, BMW, Tencent, Alibaba Group, Nubank and others. (FLUTTER, 2020).

2.2. Realtime databases

One of the real-time databases in the market is the Cloud Firestore, which is a NoSQL database hosted on cloud and synchronize information between all the users in milliseconds. (FIREBASE, 2019).

Regarding Firebase costs, there is a free usage quota. When the free usage quota is over, a charge is made based on how much more was consumed. The limits of Cloud Firestore work according to Table 1.

⁵ “um aplicativo nativo tende a ser mais confiável e com funcionamento mais rápido quando comparado aos demais”.

Table 1 – Cloud Firestore free quota x costs

Feature	Free quota	Cost
Data Storage	1 GiB total	US\$ 0.18/GiB
Writing documents	20 thousand/day	US\$ 0.18/100 thousand
Reading documents	50 thousand/day	US\$ 0.06/100 thousand
Deleting documents	20 thousand/day	US\$ 0.08/100 thousand

Source: Firebase (2020)

In addition, it is available an example estimating the daily active users, comparing between small, medium and large and the estimated cost for each case. The table 2 illustrates this example.

Table 2 – Estimated cost by usage level in Cloud Firestore

Daily active users	Estimated cost
5 thousand daily active users (small)	US\$ 12.14/month
100 thousand daily active users (medium)	US\$ 292.02/month
1 million daily active users (large)	US\$ 2951.52/month

Source: Firebase (2020)

2.3. Similar platforms in market

There are several platforms related to online mentorship, online education, on the other hand, they do not implement all the features in only one platform. The analysis of the platforms described below is in the first step of methodology. These platforms were separated in three categories: networking, mentorship and education.

2.3.1. Networking platform

Networking, according to Hudson (2017, own translation), “[...] it is to build a professional network to exchange experiences and information and enhance opportunities through relationships”⁶. In this way, the platforms have as objective connect people to exchange experiences.

LinkedIn: it is the largest professional network in the world. It is used to find and announce job positions, connect people, work as a *Curriculum Vitae* etc.

2.3.2. Mentorship platform

Mentorship is understood by Gomes (2016) as a tool that helps people to achieve their goals, in other words, the mentee receives advices to achieve a higher level of his career or life.

CodeMentor: it is a platform whose audience target is people from Information Technology area, where it is possible to find mentors from several types of technology.

2.3.3. Education platform

Education platforms offer online courses, free or paid, for users or private lessons to them.

Profes: it is a Brazilian platform that offers private lessons with teachers from several areas of knowledge.

⁶ “[...] é construir uma rede de contatos profissional para trocar experiências e informações e potencializar oportunidades através de relacionamentos”

3. METHODOLOGY

This topic clarifies all the steps that were made to execute the project.

3.1. Product's Criteria

The project was developed by following these pre-established criteria:

- Identification of each user
- Private chat between users
- Allow videocalls
- Meet a person from a specific area
- Profile for each user

3.2. Research steps

This topic explains all the steps that were accomplished throughout the project.

3.2.1. Analysis of similar platforms in the Market

Based on the research indicated in the theoretical references about similar platforms in the market, it was performed a comparative analysis between the project and the platforms. The followings criteria were used to evaluate the platforms: has an app? Has support for Portuguese language? Has mentorship features? Has the possibility to create professional connections?

The table 3 illustrates the result of this comparison.

Table 3 – Comparison between platforms in the market and the project

Criteria/Platform	Has app?	Has Portuguese support?	Has mentorship resources?	Has professional connections?
LinkedIn	Yes	Yes	No	Yes
Code Mentor	No	No	Yes	No
Profes	No	Yes	Yes	No
Mentor Hunt	Yes	Yes	Yes	Yes

Source: Author (2020)

According to Table 3, it is possible to conclude that there is no platform in the market to mobile devices, with Portuguese language support, that allows a search for mentors from a specific area.

3.2.2. Platform operation

Concluded the step 3.2.1, it was defined how the application will work.

Initially the user is directed to the home page, where he can choose between logging in or registering a new account. When registering a new account, he receives a confirmation email and will only be able to proceed with the registration when the email is confirmed.

After the login or registration is done, the user is redirected to the Homepage, where it is possible to access all the functionalities. These functionalities are in four places: side navigation, community page, mentors page and chat page.

On the side navigation, the user has access to these following features: to be online or invisible (in this way, the user does not appear as a suggestion to other users), to edit the profile, to become a mentor, to access application settings and to logout.

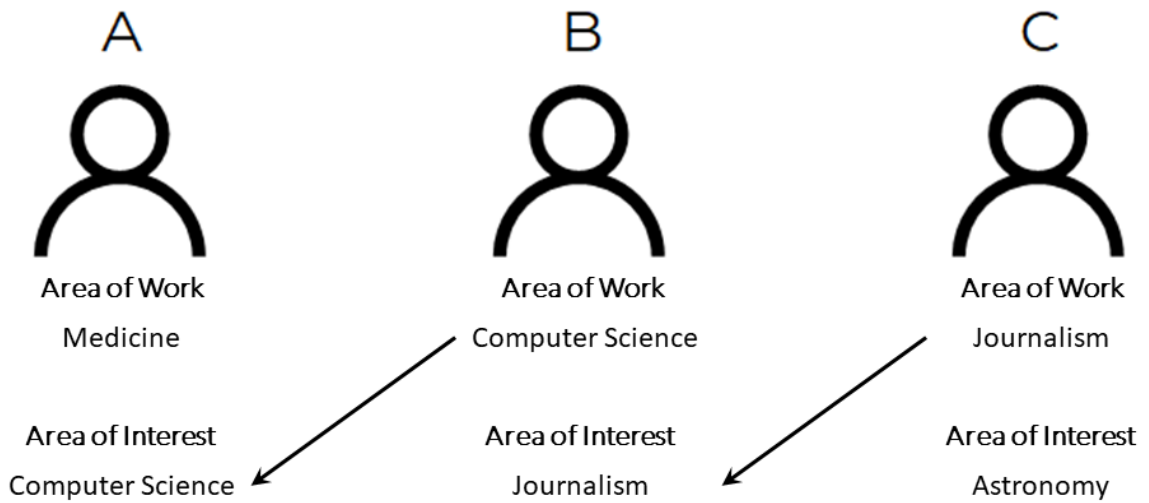
On the community page, it shows other users that have in their areas of work the same areas in areas of interest from the current user. When selecting a user, it opens the profile page with its information and then, it is possible to start a private chat.

Similar to community page, the mentors page shows mentors that have in their areas of mentorship the same areas in areas of interest from the current user. When selecting a mentor, it opens the profile page with its information and then, it is possible to start a private chat and schedule a private lesson.

On the chat page, it shows all the chats the user (or mentor) has.

For suggesting users and mentors, the platform has the following behavior: when the user is registering the account, it must be informed the areas of work (experience) and areas of interest. The platform matches users and mentors with both information. The Figure 1 illustrates how it works.

Figure 1 – How user and mentor suggestion works



Source: the author (2020)

3.2.3. System's Design

The system's interface was created using the specification on *Material Design*, a design language developed and maintained by Google. Cabin and Montserrat were the selected typography to the text elements in the platform, both distributed for free on Google Fonts.

In addition, it was created a logo to the system, showed in Figure 2

Figure 2 – Mentor Hunt Logo



Source: the author (2020)

This symbol shows a target, a goal, remembering a “hunting”. This idea is transferred to a square in a modern and concise way.

3.2.4. Coding

After concluding the step 3.2.3, it was time to decide about the technologies to create the platform and create it. For this purpose, Flutter was selected to create the app, once it is a modern and hybrid technology, which means it is possible to build apps for Android and iOS from the same source code. For data storage and user management, it was selected Firebase.

The implementation of Material Design took place in a simple way, since Flutter has several widgets that implement the design specifications, all of them defined and explained in the official documentation, which can be accessed through the website: flutter.dev/docs/development/ui/widgets/material.

Some system’s features were implemented using libraries available on Dart Packages (pub.dev). The Table 4 shows the packages, version and purpose.

Table 4 – Packages, version and purpose

PACKAGE	VERSION	PURPOSE
Cached Network Image	2.2.0+1	Keep images from internet available in cache.
Device Info	0.4.2+8	Read the device information
Image Picker	0.6.7+2	Allows to pick up images from gallery or camera
Permission Handler	5.0.1+1	Request user permission for device resources (storage, camera etc)
Shimmer	1.1.1	Add widgets to create the Shimmer effect in a simpler way
Shared Preferences	0.5.6+3	Read and write simple data in format key-value
Url Launcher	5.5.0	Allows to open links from the app on browser

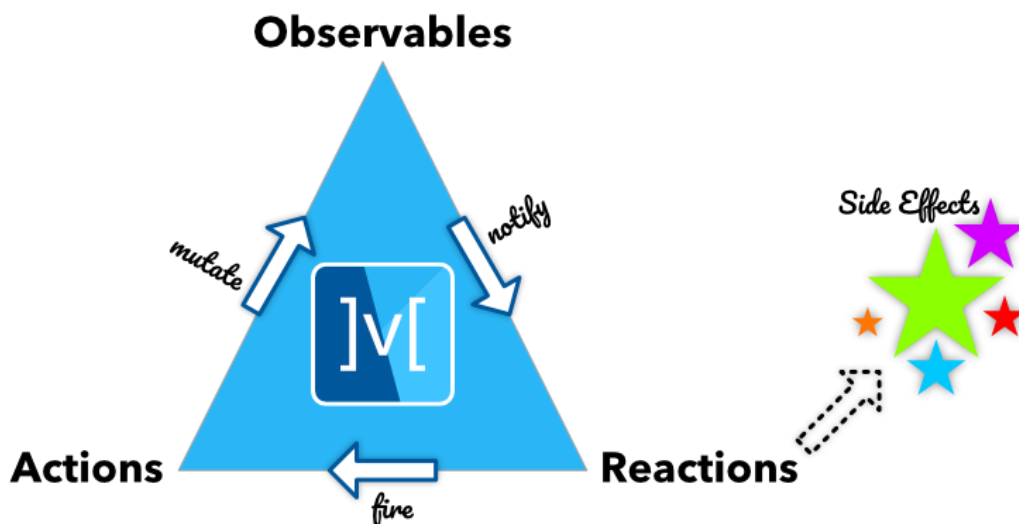
Source: the author (2020)

An important point that required a definition was about the application state management, in other words, how to manage user's actions and reflect them on system behavior. There are some state managers for Flutter, such as: BLoC pattern, Redux, Scoped Mode, MobX, GetX, and others.

Among these state managers, MobX was selected as the main state manager for the project once it has a low learning curve and it is simple to understand and implement.

In general way, the MobX implements the Observer software design pattern, in other words, when an object changes its state, all its dependents are notified and updated automatically. The Figure 3 exemplifies the concept.

Figure 3 – MobX's main concepts



Fonte: Mobx.dart (2020)

Observables represent the application reactive state, in other words, the variables control the system. Actions are all the actions that change observables. Reactions are notified all the time when an observable is changed, which allows other behaviors inside the platform.

It was necessary some libraries to use MobX on Flutter. The table 5 informs what packages and its respective version that were necessary.

Table 5 – Packaged used to implement MobX

PACKAGE	VERSION
Mobx	1.2.1
Flutter Mobx	1.1.0
Mobx Codegen	1.1.0
Build Runner	1.10.0

Source: the author (2020)

There are some widgets provided by these packages to implement the pattern. One of them is the widget *Observer*, which monitors all the *observables* (variables) declared inside it and every time when an observable is changed, the *Observer* is updated automatically.

As it was said before, the Firebase platform was selected to storage data, manage users, storage files and push notifications. The Table 6 informs the relations between Firebase resources and packages available on Dart Packages for its implementation.

Table 6 – Firebase resource and its respective Flutter package

Firestore resource	Flutter package	Version	Purpose
Authentication	Firestore Auth	0.16.1	Manage registration/login with email and password
Authentication	Google Sign In	4.4.0	Registration/login using preexistent Google's account
Cloud Firestore	Cloud Firestore	0.13.6	Data storage
Storage	Firestore Storage	3.1.6	File storage
Cloud Messaging	Firestore Messaging	6.0.16	Push notifications
-	Firestore Core*	0.4.4+3	Enable Firestore connection

*It is not a Firestore resource by itself, but it was necessary use this library to implement other resources.

Source: the author (2020)

One of the product's criteria, videocalls, was implemented using a third-party platform called Agora, which provides resources for video and voice calls in real time. It is provided through a Flutter package, available on Dart Packages, called *agora_rtc_engine*. It was used the version 3.1.2.

While Flutter can build apps for Android and iOS platforms, it was tested and developed only for Android, since it was required a more robust infrastructure to develop for iOS. For example, to build the iOS version of the app it is required a Macbook and an iPhone to run it (or in a iOS simulator, but it can be executed only in a Macbook).

3.2.5. Project costs

Throughout the development of the project, it was necessary to pay to use some platforms. However, most part of the resources are free once Flutter and Visual Studio Code are distributed for free. Firebase and Agora platform are free up to a certain amount of consumption.

The sum of expenses was US\$ 25.00 USD plus taxes. In Reais, the cost was R\$ 145.29 BRL (1 dollar equals to 5.46 reais in the transaction moment) to buy an Android developer license, which enables to publish the app on Play Store. This was the only cost for the project.

3.2.6. Publishing the app

The app was distributed on a internal test channel from Play Store and shared with a selected group of testers.

3.3. Data collection and analysis

This topic clarifies how the data was collected and analyzed by the author.

3.3.1. Data collection

The data was provided by two ways: from tests made by the author and from a selected group of testers.

The author's tests were made during the step 3.2.4. The objective of these tests was to find issues during the development process and fix them.

The testers were selected according to two characteristics: experience in software development area and facility to execute test cases. The group was composed by 10 people, where all of them are currently working in software development area and have the experience of executing test cases.

The tests executed by the group had the objective to find more complex issues on the system, simulating more complex situations. Their evaluation was responsible to verify some features, such as private chat, video calls and suggestion of users and mentors.

3.3.2. Data analysis

The data analysis was based on the data collected in step 3.3.1. It was observed issues related to behavior, performance and design. The analysis was made according to the evolution of the application, monitoring the pre-defined criteria. Once a feature achieved the correct behavior, it was assumed that the feature is completed and allows to go to the next feature.

4. CONCLUSION

This project achieved the objective proposed: it developed a platform that connects people who seek guidance, improvement or professional relocation in the Information Technology area with professionals that already have the experience they are seeking. In addition, the project went beyond what was proposed: it is not limited by Information Technology area, it is possible to find mentors or users from, basically, any other area.

The problem was answered: a platform based on this project definitions can be build using Flutter and Firebase platform and it shows a low cost once most part of the technologies used are for free.

In addition, the technologies used on this project were easy to learn and to implement, they have a low learning curve and the integration between them is consistent, in other words, it does not present any serious or constant errors. Even achieving the objective, the project proves to be quite versatile once it has the possibly to improve and add several new features.

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In this project, the authors develop a platform that connects people who seek guidance, improvement or professional relocation in the Information Technology area with professionals that already have the experience they are seeking. The project is complete. The authors may consider to focus more on the matching algorithm, and run more experiments to evaluate the performance of the proposed platform. Furthermore, it is not a new topic. There are many existing technologies. More comparison between these existing technologies are suggested.