

Design and Implementation of Job Recommendation Application ‘Jobs-360⁰’ for Job Seekers and Employers using Flutter

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Abstract— Top companies are recruiting people online and during and after covid, they work from home. Most of the recruiting companies select people by conducting online test and interviews. Likewise, job seekers also choose jobs online through online portals. Job recruitments nowadays become a very important and fundamental process for industries like Information Technology, Government, and private sectors. The web-based applications caused a substantial impact on the recruitment process. The implementation of online recruiting platforms has become a primary recruitment channel in most companies. While companies established job positions on these portals, job-seeker uses them to publish their profiles. Online recruitment platforms accomplished clear advantages for both employers and job-seekers by reducing the recruitment time and advertisement cost. There are certain recommendation systems available on the internet to support the users in searching for their requirements that match their preferences. A wide range of smart phone applications is popular to deal with all sorts of user's requirements. To improve the e-recruiting functionality, many job recommendation systems have been proposed. This paper analyzes and develop a job application process and related issues for building personalized recommendation systems for job-seekers by an application called ‘JOBS-360⁰’.

Keywords— Job recommendation, Cross-platform Library, ADB, AVD, ML, Flutter

I. INTRODUCTION

Every graduate will experience a situation where they have to decide their job requirements like salary estimate, company, etc. based on their skills in a particular field. This is one of the tough tasks which include a lot of transportation and communications to collect information about jobs and its requirements which should also be suitable and match their need. For an average, it will take a few months just to sort out the required jobs. And the further process of resume preparation which should display their skills and the job application process will push them into

mental stress. But all this is fulfilled by this recommendation system just with one tap.

The job recommendation app will help in many ways to choose the job offered by various employers. For job seekers, it will help to highlight their skills and qualification easily and get their suitable jobs with just spending a very little time. This reduces their head-ache of collecting information about job offers and recruiters need which will waste their time. For job employers, their main part of recruiting is made simple as they get clear data of all their job candidate's unique skills. This will help their

industry to get suitable employees and further reduce their investment in advertisements and job posters.

This app mainly helps them in the reduction of time spend on the above difficult processes. For job recruiters and employers, they need to get a clear vision of their candidate's unique skills and qualifications. Generally, they need to invest a lot just to aware of all job seekers. Even though this seems effective it cannot assure that it will get to people of all areas. Before this, they have to recruit a perfect employee for a given job which decides the industry's productivity and marketing. Although there are many applications in job recommendation, most of them lack filters and other factors like design, requirements, etc.

The proposed solution is a cross-platform (Android and iOS) mobile application, "Jobs 360" which overcomes the above-mentioned limitations by helping job seekers in recommending them a suitable job based on their input skills, requirements, and qualifications. Also, for job employers by creating an efficient e-recruitment process which is very important for every industry. The first and foremost thing is to ensure smooth app flow in all mobile OS. This is thoroughly verified as a whole application is designed using the Flutter Software development kit [1] developed by google which specifies itself as cross-platform, both android and iOS app development tools. Secondly, most job seekers need to show the recruiter's experience level and skills. For that this app has a filter which contains almost all employer's need which mainly reduces their time sorting out suitable jobs. Like the same recruiters also get enough details on their candidates' skill sets and others. User can also search for a particular job or company irrespective of filters they have sorted helping to get through their wish. Overall, this app ensures creating a perfect cycle for job seekers and employers to meet their needs and requirements fulfilled without involving any waste of time and money.

II. RELATED WORK

Nowadays there are many mobile and web-based applications that search and recommend jobs for its users. An app 'Monster jobs' [2] is similar to this app but lacks in variety of filters for job applicants and also an app 'Glass door', but it didn't concentrate on entry-level and intern jobs.

These apps mainly get down while providing smooth flow and equal features to all mobile users of different OS. But due to 'Jobs 360' flutter dependency

ensures its equality over the different OS and hence solving this major issue.

Two of the topmost apps i.e. 'LinkedIn' [3] and 'Naukri' [4] have overcome many common issues. But they lack in providing full-efficiency to all its user. This is because of its premium feature which is quite unaffordable to some people but 'Jobs 360' provides all the features as free to all its users. Also, some of these existing apps create minor difficulty for its user by quite complicated UI design that is there are not user-friendly. So, for this case, 'Jobs 360' is simpler and clearer compared to others making it a user-friendly UI design.

III. DESIGN OF 'JOBS-360'

The application needs some software which makes it work properly without any errors. There are many types of requirements [5-10]. These are briefly listed below.

3.1 Requirement Specifications

- Data Requirements

For this implementation, some data requirements will ensure a smooth flow of the application. So, the main data required is login credentials which are used to create an account for the user. Without the login process, the application will not work properly

- Functional Requirements

Any user of this application needs a base to run this application. Their device should get all the features of the application without any malfunction. For this either they need the apk of the application to install it or need to download it directly from play store. Further to use the application, they need to input some basic requirements which in term creates an account and makes the user get the application and all its features.

- Non-Functional Requirements

An important requirement for the application to run what exactly the developer designed is the performance of the app irrespective of the platform to be used. Here performance means a few skills of the device which is used to run the application. These are listed as scalability, responsiveness, use-ability, reliability, network coverage, etc. Scalability means that the app should able to adapt itself to increased usage or able to handle more data as time progress. For example, when the user data (caches, stored data, etc) increases app should be able to handle them without delay by optimizing the way storage is done and accessed. Finally, the most important is the network requirement i.e. the app should get a good

internet connection because the whole running of the application needs net/wi-fi connection like connecting to the database for user login and fetching other details. So, these are some basic Non-Functional Requirements to get a smooth user-experience of this application.

- System Requirements

The application needs a device where the Operating System (OS) is either Android or iOS. The minimum requirement is that the version of OS used. So, the app runs on every device with android Jelly Bean version v16, 4.1.x or newer, and iOS 8 or newer. And also, in iOS devices (iPhone 4S or newer) and x86 ARM Android devices. It also runs in Android emulators and the iOS simulator. These are some basic minimum requirements that will help in running the app without any error during the working/running of the application.

3.2 Design Approach

This work is developed by designing each page and analyzing its requirements which makes the implementation and execution simple and clear [11]. For making this basic project design every main functionality is classified and separated as modules that are effective in displaying the whole project design as an easy one. So, this modular design is good in explaining every aspect of the project. These modules are executed together resulting in flawless application flow. As mentioned above, every module of the project is explained in detail below:

3.2.1 User Registration

The main and primary function of the app is creating a user account. This is done by getting some validated and verified user inputs such as username, email, password and securely inserting it into the database system. This is used every time to fetch the given details and verify the user. This lies as the foundation of the application.

3.2.2 User Login

Every user of the application must have to log in to use the application. This needs some input which should exactly match with the credentials that they have entered while registering. If it fails, they cannot authenticate. For this function the code is written as such it will be secure from some main exploitations and flaws.

3.2.3 Listing and Navigation

The main screen and its routes come under this module. This module executes the main purpose of this application. So, this has many parts. First, it displays the job lists in form of cards with the required job details. When we come to routes, we have almost all the navigation from this page/ screen. From this, it takes the

user to filters, the search bar in the form of navigation bar buttons, and the about page in the form of an app bar icon button. The main code of the application is used to design and develop this functional module. Apart from this, there are many sub-modules but all these will shelter under this main app module

3.3 Application Design

While putting all the modular design into a single frame refers to application design. To represent anything in a single frame, the flow diagram is the best of all due to its simplicity. Below is the main workflow diagram of the application.

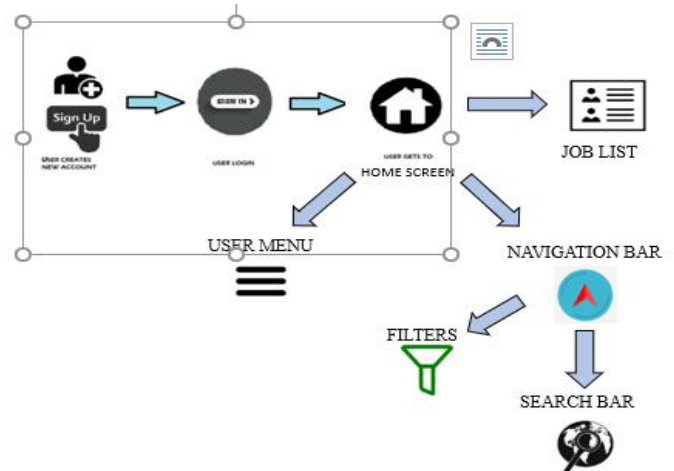


Fig.1: Workflow diagram of the application

Figure 1 is the general workflow which will be common for every user. Certain tasks can be performed by users. These can be neatly explained in the form of a diagram. Figure 2 lists out the user’s tasks list.

3.4 User-Interface (UI) Design

A user-friendly UI design is the most preferred for any of its users. This application has a clear and simple [12]. The application has many screens like sign-up, login, home screens, etc. Each of these screens is said to be user-friendly because each of its functions like input seeking fields and navigation details of the buttons is respectively with the hint and label text which prevents users from accidentally misleading to any different pages other than their need. For example, the home screen of the application specifies all its routes and button functions clearly to the user. Figure 2, 3 are the images of the home screen.



Fig.2, 3: Components of home screen

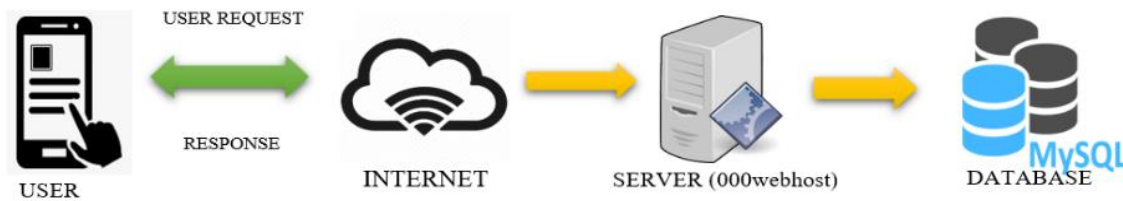


Fig.4: Flow diagram for login process

3.6 Methodology

The application development is closely linked with the software development life-cycle (SDLC). There are some basic stages of SDLC. This application is developed using the 'waterfall' model. The background of the model is planning and sequence. The whole project is mapped out in the planning and analysis stages. This application also has a plan and is executed in sequence. The entire application is built, and then it is all tested to make sure that it is working properly. In this model, the requirements are clear and both developers and users have a unified and clear vision about the result. The project requirement is to recommend a suitable job for the user based on the inputs provided and this is all needed for both user and developer. This model is used in a wide range because it is very meticulous and it's also a good application method to use for big projects that need to have one unified. vision. The

This article can be downloaded from here: www.ijaems.com

3.5 Database Design

The database of the application is designed in such a way that it can be easily processed. Simple the structural design fast is the running of the application. So, it is made clear that the manipulations can be performed easily. This implementation does a specific set of operations like creation, selection, etc. with the database. MySQL [5] is the database used which is a free and open-source relation database management system (RDBMS). The database is hosted remotely using a web service. This project uses 000webhost [6] powered by Hostinger which is free and also able to perform all web-based hosting. This acts as receiver and sender of the data which interacts with application and database. This service communicates via HTTP protocol [13]. From the application side, the project uses a special in-built package of flutter framework known as 'http'. As all the parsing of data is done through JSON format, the application uses one of the best server-side programming language Hypertext Pre-processor (PHP) for connecting with the database and also executing structured queries to manipulate the database. First, the written PHP code is hosted using the web service and it is used in the flutter framework through 'http' package [14-15].

advantages of this model are it forces structured organizations, allows for an early design change.

IV. IMPLEMENTATION OF THE APP USING FLUTTER

4.1 Flutter Software Development Kit (SDK)

Flutter is an open-source UI SDK created by Google. It uses Dart for its single codebase feature. It is used in the project for its advantages like hot reload, hot restart, widget-based coding, the composition of classes and functions. One of the cool features of flutter is the hot reload which attracts all the developers. Hot reload means that the changes made by the developers can be seen instantaneously with Hot Reload. This feature is designed mainly for developers as it makes the changes visible within the app itself. As the changes made are visible

within seconds, developers can fix the bugs in no time. So, for every simple change in the code, we can see the differences in the output within some milliseconds. This helps in faster development of required output without errors and warnings.

4.2 Android Debug Bridge (ADB)

Flutter uses ADB as a tool to connect with physical android or iOS devices and also with emulators which can be used to run our application. This helps to check the flow of the application and detect errors. Later we can debug and rectify them depending on our needs. As flutter supports the hot reload feature, for every change in the code and application we can view the results.

V. RESULTS AND DISCUSSION

5.1 User Interface Representation

The application contains many new and cool features making it a user-friendly one. These new features make the application more interactive and quicker responsive one. As flutter supports many good widgets most of them have been used well in this application. There are many features in this application and these need some approach like what are the requirements, usage, etc. So, every screen and its features are explained in brief below:

5.2 Splash Screen

This application has a splash screen as an introduction to this app. This splash screen uses some animation like a shimmer effect along with the app title which will provide the user with a good experience. This will provide a hint to the user about the application's standard and the basic user interface design. The image of the splash screen is given below in figure 6.

5.2.1 User Registration

As mentioned in the above topics the user needs to create an account. This is the starting function of the application. This page starts the first interaction with the user. Here there are 2 options for the user either they have to create their account if they don't have one or they can simply skip this step and proceed to login with the already created account. For user registration, certain details are needed as input from the user. This screen gets the email id, username, password from the user in the form text input field, and after that, there is a button that submits the inputs which are in turn taken to the database for the user with the help of PHP through the internet. One important thing is that this process needs network connectivity or internet access either through mobile data or Wi-Fi with a stable and good connection.



Fig.5: Image of Card Dismission



Fig.6: Image of Splash Screen



Fig.7: Image of Sign-up Screen



Fig.8: Validation of User Sign-up

The user needs to get the confirmation that the account has been created and registered with the given inputs as a username and password. In some cases, the username or email id may already exist so this detail needs to be conveyed to the user. This is displayed in the dialogue box and further action buttons. This validation process for instance if it registered successfully it displays in the dialogue box which is given in below image

5.2.2 User Login

In all cases after the registration page, the login page appears for every user. This page prompts the user for two inputs that is username and password in the respective text input field. Both of these fields have text editors that are comfortable for the user to edit input values. Same as in the case of user registration this page also has a validation part. This validation is important as strangers can get into other accounts with incorrect credentials. So, this page also displays about login status in a dialogue box after pressing the login button. The dialogue box also states which data is entered incorrectly making it easy for the user to understand the problem.

5.2.3 Home Screen

After the user login process the main page that is the home screen of the application appears. This home page consists of different parts. Each part performs various tasks based on user requests. These parts are explained in detail below.

5.2.3.1 Job Recommendation Cards

After all the login steps, the home page appears. The main content of the page is job recommendations and other sub-tasks and functions. For every user, there are certain job recommendations. But these can be customized depending on their inputs like salary estimate, job type, and experience level through filters. But before changing filters there are default job recommendations that fill this home screen.

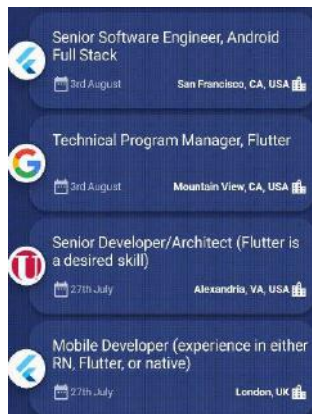


Fig.9: Image of Job Recommendations

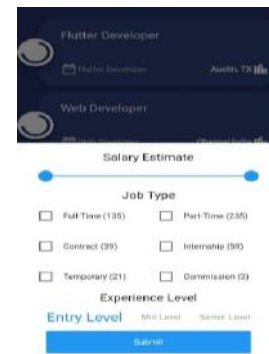


Fig.10: Image of Job Filters

These job recommendations are listed in the form of dismissible cards which contains enough details for users to choose. These cards give a quick overview of listed jobs like job title, date created, location, etc. If user interested in any particular job, if they click the card, it automatically gives either a brief description job and its features or simply redirect to the website of job offering company where they can directly apply for that job through their official website. This depends on the type of job and the company offering it. If there are some unwanted jobs displayed the user can simply swipe to remove it from the page. In case if the user needs more different jobs, they can refresh by pulling from top to bottom which updates the job and its respective details. So, for every refresh, the job cards keep on updating proving a vast variety of jobs to the user of the application.

5.2.3.2 Navigation Bar

In this application, user can get the best job based on their requirements like salary, type, etc. and they look for jobs that fulfil their qualification. So, the application needs to get some input from which the suitable jobs are recommended. The user may need to change their requirements frequently. For this, the application has the feature filter in the navigation bar which is at the bottom of the application on every page so that they can access it easily from any part of the screen or page of the application. This filter contains many inputs like job type where it is in the form of checkboxes. The user needs to simply tick their type and salary input is in the form of a range value slider where the user can set their job salary value with a minimum and maximum value. For experience level, they need to choose from listed options. These properties of image filters are shown in Figure 11. Apart from filters, the user needs some manual customization, for example, some users may need a job from a particular job offering company or salary or location of the job. To make this comfortable for the user the application is also provided with a search option where users can search for different available companies, salary

range, location, etc. This is enabled when they press the search button in the navigation bar. The search bar input is also in text editing type so that they can edit based on their need.

5.2.3.3 User Menu

The application has some important features which should be available to the user whenever required. This includes changing user details, option for job employers, and logging out. So, these are given in the form of a drawer that comes in when the user swipes from left to right or click the menu icon button. This menu displays the username and email id with the account picture and some sections for easy navigation. The following are the different sections in the menu

- **Home:**
This is the default screen when the user opens the application. It is used in the menu because the user can directly jump from any other screen to the home screen which contains the job details. They can use the menu to navigate to the home page quickly.
- **Account:**
Sometimes the user needs to view or change their account details which are the main feature for the user. This is made easy by just using the account section on the menu so that it will be easy for users to access the account section from any page of the application.
- **Notifications:**
The application pushes some notification like job alerts and other new things. This may affect some user experience like they don't want push notifications from the application at a particular time. So, they can use this section to handle the notification timing and other settings like turning on or off the notification.
- **Log Out:**
After using the application, the user needs to safely log out from the application to prevent the usage by other people. So, this log out system is placed in the user menu section for easy logging out the process for the user of this application. After pressing this section, the application erases the current user details and restore to null that is it simply gets out from the main home screen and returns to the login screen. After this users again have to log in for entering a particular account. This process just restarts the application to starting state of the login page.

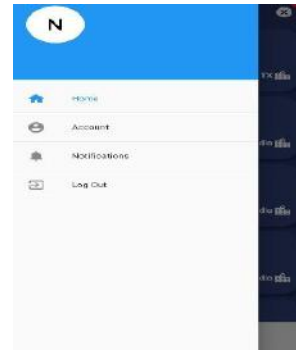


Fig.12: Image of User Menu



Fig.13: Image of Application Info

5.2.3.4 Application Information

The user of the application needs to get sufficient information about the developer and also be provided with a way to easily communicate with the developer. For example, if someone wants to get details about the developer or to give suggestions and feedback to the application or to report some issues and bugs regarding the application, they should get enough contact information about the developer. The user also needs an overview of the application and its features. For this, the app bar at the top of the home screen has the icon button which displays the necessary application information and contacts.

VI. CONCLUSION AND FUTURE WORKS

The job portal named 'Jobs 360' is successfully designed and implemented in flutter. It is a safe and secure job portal that contains many amicable features that help both job seekers and employers. Users can use the updated app at any time for their usage. The app 'Job 360' is a good option for job seekers to get a suitable job. As mentioned above there are many new features that make the user feel comfortable and the application makes the process of job employment an easy one and hence saving some considerable amount of time for its users. Although there

are many applications used for this purpose, they have certain limitations, disadvantages and they lack some advanced features.

This application solved many problems and overcame major disadvantages which in turn providing a better option for users. The advantages are like the filters for a different type of job and the application is a cross-platform one that enables the user to access the app from both Android and iOS. As the application has a simple UI design, it makes it a user-friendly mobile application. The complexity of the application is also less that it doesn't need any prerequisite knowledge to use this application. Finally, this application will be useful to job seekers and at the same time for job employers or offerors making a complex process a simple one which is available to every people and hence saving time.

There are some more functions and features that could be added with this are listed below:

- Making the user account more secure. Currently, the account is secure from some cyber-attacks like SQL injection. To make it more secure, some powerful encryption function can be implemented to make user account even safer by preventing many other illegal attacks.
- Posting of job and its details with the certification. This is because there will be some fake job details posted by some users which will make a bitter experience for the user. The application users may get cheated on some fake jobs posted in this application. To prevent this problem every job will be posted only after confirmation from the job offeror about job details and certification from the application such that this job is available for the given salary, location, time, etc.
- Extending job recommendations from different locations. This application just recommends jobs from a few locations and countries. By increasing the recommendation location, it can be useful to many other people who prefer some particular location. This increases user from all other parts of the country.
- Using Machine Learning (ML) concepts to predict a suitable job by getting skills from job seekers. This will make the recommendations more accurate and hence enhancing the user experience.

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