ACCUJOB - JOB SEARCH AND OPTIMIZATION WEBSITE

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Abstract: Internet is a resource which has become so important that we cannot imagine our lives without it in the today's modern era. Internet has various function. This resource can be effectively used for the job searching process. The conventional methods should be modified and moved online. The concepts of software engineering have been applied to develop a website that can help in the job search process and make it easy and less time consuming as compared to the conventional methods. This website gives the percentage chances of the person getting recruited and tells them if they are qualified, under-qualified or over-qualified for the wide range of jobs that they have selected from the website. All the stages of the software development processes from requirements specification to testing have been documented and summarized in this paper.

Index Terms - internet, recruitment, qualification, job.

I. INTRODUCTION

In today's world, everything has become online and making everything available online is something that everyone is working on. In the times of pandemic when people were not able to go out, it was very difficult for them to find jobs and it is during this time that there have to be some websites or applications which can provide opportunities for job seekers to find the job they are looking for.

Considering this, we have decided to build a website called "Accu Job". This website helps the people who are searching for jobs in showing them the list of the jobs that they are eligible for helping them in finding their jobs quickly and also improving on the skills they have presently so that they can improve on the skills and develop themselves so that they will be industry ready.

While building this process, Software development life cycle was followed properly in order to achieve the goals that are needed in a proper manner. The SDLC model chosen was Waterfall and all the phases of the waterfall model were followed as the project demands. Following the Software development processes made the path leading to the application very understandable and easy. Diving right into the project without having proper knowledge about the requirements and other stuff will only lead to the improper functioning of the application.

II. PROBLEM STATEMENT

AccuJob is a web app which aims at solving the area of uncertainty in the regular job-portal market. By uncertainty we mean, suppose that one candidate applies for a job and then he/she has to wait for a long time till they hear back from the company, or they might not hear back from the company at all. This means a lot of time has been wasted already which could be utilized doing skill development or job searching. AccuJob solves this problem by using two algorithms. A sorting and a scoring algorithm. The scoring algorithm scores the applicant based on the qualifications they have entered in the website and then the sorting algorithm ranks these applicants based on this score whenever they apply for a specific job. This tells the user the chance of them securing a job and if they feel it is less, they can apply for another job.

III. OBJECTIVE

In the current world having a job is really necessary for living a comfortable life. Getting a job is not at all an easy task as there is so much competition in the current world and also specifically due to this pandemic situation. This project tells the people their chances of being recruited in the company they have applied for.

IV. LITERATURE REVIEW

Internet usage has increased from practically zero to 70% of the population in the last ten years. Although research has lagged behind popular opinion, many people believe that the Internet has improved job search efficiency for job seekers. Additionally, it appears that effort has been divided between different job seeking activities as a result of the Internet. However, there is some

indication that the unemployed are getting more choosy about the positions they finally apply to. The unemployed are now more likely to have looked at adverts and to have contacted an employer directly.*[7]*

Proposed System

The system's objective is to enable job seekers to search for positions based on their talents, geography, and desired role. The job seekers are competent in all fundamental tasks, including updating and adding information as well as retrieving information. To ensure that they are shortlisted, job seekers can provide an updated version of their resume based on the capabilities the employer needs. The website also assists job seekers in creating a resume that adheres to standards and meets the level at which employers anticipate it to be."The benefits include data centralization, real-time status reporting, user-friendliness, convenience, and protection, among others. This programme lessens the burden of managing and keeping track of the workings of individual departments in a university.[5]. The job seeker's submitted email address will be used to alert them of any updates pertaining to the job seeker. The employer can update the roles he needs filled as well as view and evaluate all of the candidates who have applied for open positions. The applicant will be notified through email of any updates on their application for the position the company is seeking. The list of candidates who have applied to the organization with all of their information, including the role they have applied for and a resume, will appear on the employers' dashboard.
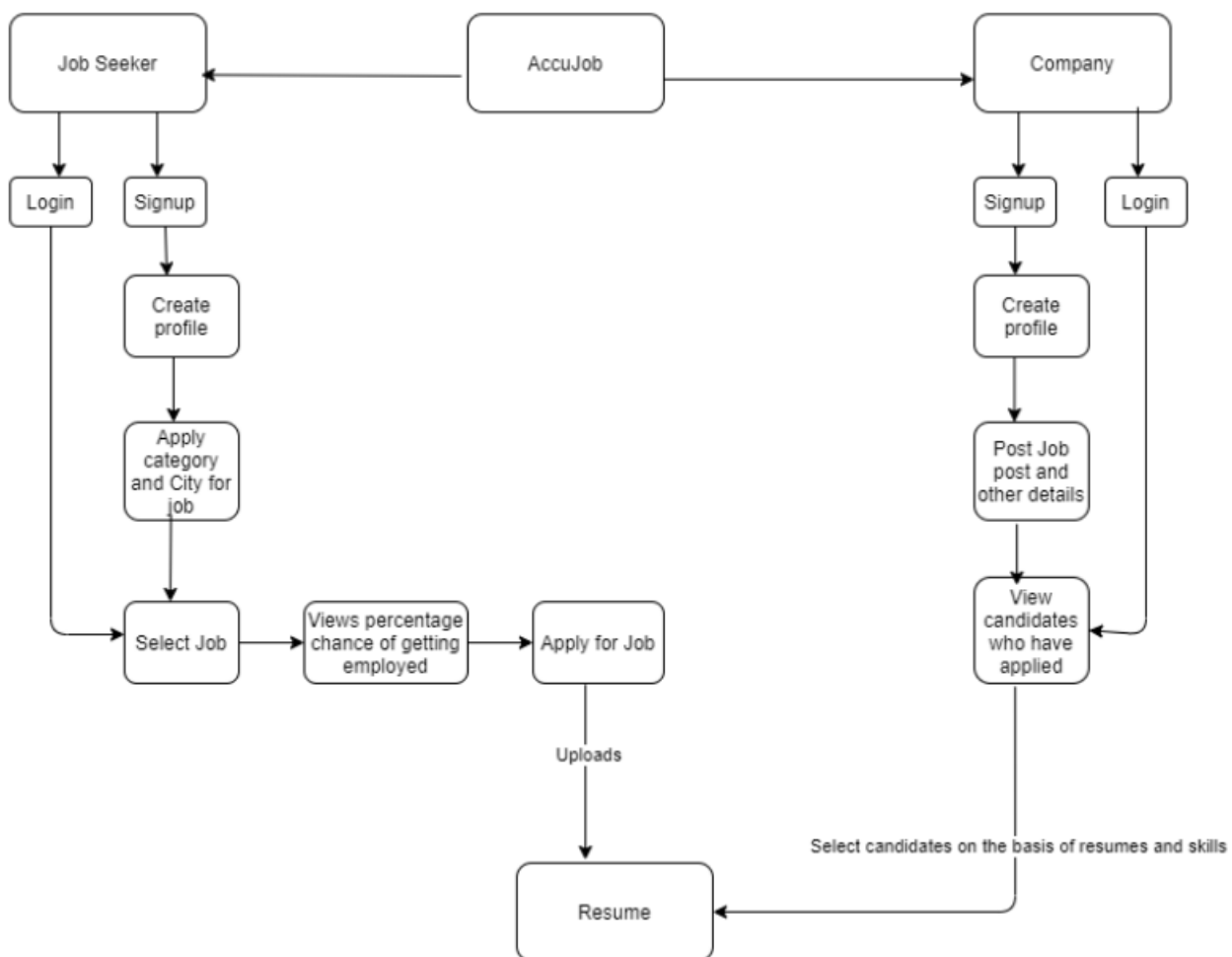

Fig. 1. System Overview

V. SOFTWARE REQUIREMENTS SPECIFICATION (SRS)

5.1 Product Perspective

This is a new, self-contained product. Waterfall model has been chosen for the project. The reason for choosing Waterfall Model are Waterfall model is also known as the linear sequential life cycle model. In this model the whole operation is divided into phases and one phase is started only when the previous phase has been fully completed. Waterfall model is implemented when the following conditions occur-When the system requirements are known, clear and fixed. Product definition is stable in nature. Technology is understood. No ambiguous requirements. Project is short. Ample resources with expertise available freely. Waterfall model was chosen because- We are aware of our system requirements, which amounts to only a PC and a webhosting service. The product definition is a job portal that uses a simple arithmetic algorithm to rank job preferences for suitable candidates.

The technology needed here is a PC, a web hosting service and a working and functional knowledge of the following languages: Java-script, PHP, HTML. As of yet, there are no ambiguous requirements in the project. However there arises any, will be intimidated in the further versions of the SRS. The project is a small web application, and thus short.

5.2 Product Functions

Some of the major functions of the product are:

- The under-qualified candidates will get a message that they are not qualified enough for the job and they need to apply for some other positions and will be given some suggestions according to their skills.
- The over qualified people also will also receive a message that they are over qualified for the job and will be given suggestions.
- While the qualified people will be given ranks according to their skills that will in turn give them their chances of being recruited and similarly reduce the time consumed for the recruiter by giving them the best possible options.
- The percentage chances of the person getting recruited is another major attraction of the website.

5.3 User Classes and Characteristics

Majority of the users using our website are assumed to be of age group 21-25, these are the students who have freshly graduated from their colleges and now are in search of the jobs. This is the group that is well aware of the technical advancements as compared to other age groups. This can be used by student from any background either B Tech, BSc, BA or any other field. The people in other age groups looking for job are lesser so these are people who'll use the website the least. The user here is expecting to find a job that suits him and also for which he's equally qualified (not under-qualified or over qualified) such that he can live a peaceful life ahead.

5.4 Operating Environment

This is a web-based system and hence will require operating environment for a client and server GUI. This will be operating in the following:

i)   Distributed Database → Use of distributed database helps in
 a) Management of data with different levels of transparency.
 b) The performance of the website gets improved
 c) It is easy to expand i.e., increasing database size, adding more data.
 d) The reliability on the website is increased because of the distributed database

ii)   Client / Server System → We are client server system because
     a) All the data is concentrated in a single place i.e., the server so there will data protection and security.
     b) It will be easy to upgrade, replace or relocate the nodes in the client server.

iii) Operating System: Windows → We are using Windows because majority of the people use Windows laptops only so it will be easy, but any other operating system is totally fine as it works in all kinds of Operating Systems.

iv)   Database: MongoDB → We are using MongoDBL because:
 a) Data Security is more
 b) The performance is good

v)   Platform: NodeJS and JavaScript → Java and is used for Back-End Development and HTML5, JavaScript and CSS for Front-End.

5.5 Design and Implementation Constraints

i) The speed of the website can be an issue. The page might generally take more than 5 to 7 seconds to load if we put more graphics (i.e., images or videos of bigger sizes) into the page or that will be fine.
 ii) One more important design constraint may be the viewing mode of the website. The website is actually built for a normal screen size but if it is viewed from a mobile phone, it might be a problem in some cases only.
iii) The UI/UX part maybe an issue.
 iv) As this is a basic web page, data security can be an issue. Data can be leaked.
 v) The user needs to know English as this website is written in English language only.
 vi) Sometimes there may be a delay in the delivery of OTP or any message or any mail to the user because of some issues.
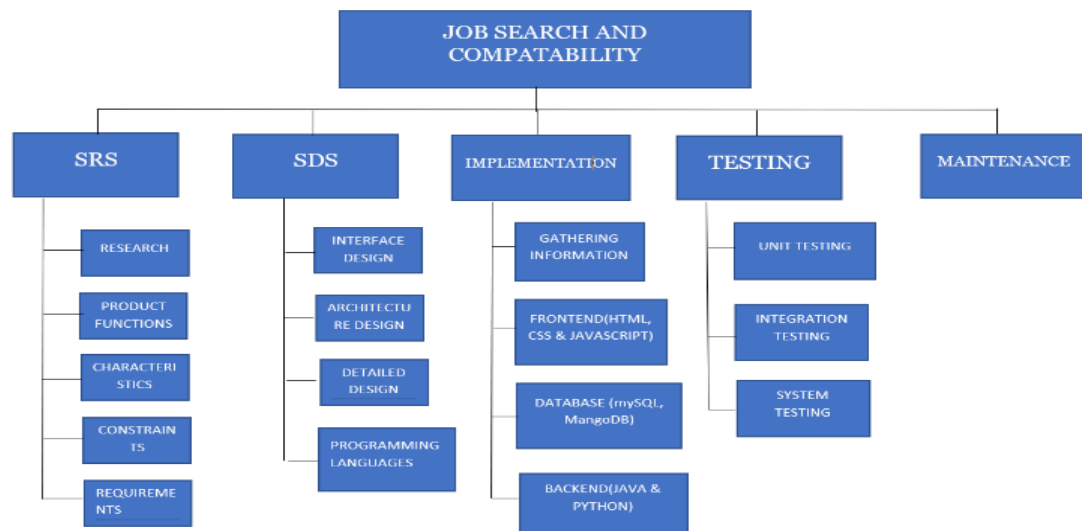 vii) The responsibility of maintaining the website will fall completely on the maintenance team.

Fig. 2. WBS Chart

5.6 Interfaces
5.6.1 User Interface
As soon as the site opens on the top there is the logo of the website. Right next to it are many options like jobs, recruiters, companies, tools and login options available. In the jobs option you can see all the jobs that are available in the country from all fields. In the recruiter option you can see all the companies that are recruiting currently. Then in the tools section you can make changes in your profile sign out or see the notifications. The last option is the sign in option through which you can sign into your account. There is also a option of the preferred city of the user and also the area of his job search like Engineering, Teaching, Research etc. If any image is not displayed and if "Image" is displayed, the user needs to assume that there was an image over there but due to some reasons the image is not opening in the particular user's system. There will be an error message popping up if you don't enter a proper valid email ID. The email ID must work.

5.6.2 Hardware interfaces
There are no major hardware requirements. Just the basic ones like a computer or laptop or mobile with internet connectivity will work.

5.6.3 Software interfaces
   i)   The system that the customer is using must have a HTML editor to view all the code that we have for developing the website. There are many available like Brackets, Visual Studio Code etc.
   ii)   Some tools are needed to upload files to the website like uploading Resume, CV.
   iii)   The communication between the database and the web portal consists of operation concerning both reading and modifying the data.

5.6.4 Communication interfaces
The communication between the systems is an important part as every page is dependent on another but in way the communication is achieved is not important as it handled by the underlying operating systems for the web portal.
There are only two communication requirements:
Email:
   The person will be notified via email on every step of the job search process.
Mobile Number:
   The person will be notified via message on every step of the job search process.

5.7 System Features

5.7.1 Finding Jobs according to your wishes
5.7.1.1 Description and Priority
The stakeholders of this project are the End Users i.e. Employee, Employer, Database Administrator, Front End Developer, Back End Developer, Government. This website allows the users to find the jobs according to their wishes and tell them their percentage chances of getting employed according the required qualifications mentioned by the recruiter.
5.7.1.2 Stimulus/Response Sequences.
According to the qualifications entered by the user and the qualifications mentioned by the recruiter, both of them are compared and points are given on the basis of similarities of the qualifications and then the percentage is given, which determines whether the person is under-qualified, over-qualified or enough qualified.

5.7.2 Functional Requirements User Sign Up or Login:

5.7.2.1 Description and Priority:

This is for the user. If the user is first time user then he must create a new account for himself. If he has an account, he can directly login into the account. The priority of this particular requirement is high.

5.7.2.2 Stimulus/Response Sequences:

This can be stimulated by going to the top right of the page i.e. the right side of the navigation bar and click on either Sign Up or Login. On clicking it takes to a new page where the details are to be entered.

5.7.3 Functional Requirements:

The user has to do it to go the next page for uploading his documents. The user must have a valid email account.

5.7.3.1 Description and Priority:

After logging in, there will be options to enter your details like the name, DOB, Skills, interests, hobbies and also an option to upload the certificates which area must and the priority is high

5.7.3.2 Stimulus/Response Sequences:

The options to enter the details will be visible properly on any screen and the user can understand easily on seeing it and there will be option after the details where you can upload the certificates and after writing everything, there will be a submit button which on clicking displays uploaded successfully.

5.7.4 Functional Requirements:Retrieve Password

These particular details can be used to find the percentage chances of him getting placed in a company.

5.7.4.1 Description and Priority:

If the user has forgotten his/her password and if he wants to login again and reset the password, he can use the forgot password button in the Login page. The priority of this step is medium as it is completely based on the user

5.7.4.2 Stimulus/Response Sequences:

The Forgot Password option will be available in the Login Page and on clicking the button, he/she will be redirected to another page where he has to enter either his email or phone number to which an OTP will be sent and on entering the correct OTP, he/she will able to reset the password.

Fig. 3. Use Case Diagram

VI. SOFTWARE DESIGN SPECIFICATION(SDS)

6.1 Design Methodology

Some principles to be followed while making the website are:

- The design must be consistent across web pages. For example, each page of the site will have a navigation bar with all the links.
- The website must be responsive or mobile compatible.
- For easy navigation we will have a navbar which can be used to navigate to all the pages of the website.
- To establish effortless communication with the visitors, information will be organized by making good use of headlines and sub-headlines, cutting the waffle, and using bullet points.

6.2 Pseudocodes for core components

SCORING ALGORITHM TO DETERMINE QUALIFICATION

SCORE FOR EMPLOYEE Step 1 - START

Step 2 - Import numpy, mysql. connector

Step 3 - Declare cursor function // This function helpsus iterate through the rows //

Step 4 - Import reference database

Step 5 - Import database containing qualificationsStep 6 - Start a WHILE loop

Step 6.1 - In the FOR function, iterate througheach row of the employee table containing qualifications.

Step 6.2 - For each iteration, search for matchingqualification in the reference database.

Step 6.3 - Allocate the allotted point of thequalification in the reference database to the similar database in the employee table.

Step 6.4 - Keep adding the scores till iteration stops.Step 6.5 - Assign variable a = (sum of scores)

Step 6.6 - End the WHILE loop

Step 7 - Repeat the same process for all the employees Step 8 - Create a table which contains all the EmployeeIDs (primary key) and their respective total scores.

Step 9 – STOP

SORTING ALGORITHM TO SORT THE EMPLOYEE BASED ON THEIR SCORE

Step 1 - START

Step 2 - Import numpy, mysql. connector

Step 3 - Declare a cursor function // This function helpsus iterate through the rows //

Step 4 - Import the database created by the scoringalgorithm

Step 5 - Read the data of each rows containing theemployee ID and their respective score.

Step 6 - Apply QUICKSORT to this data. Step 7 - Create a new table with the sorted list.

Step 8 - This list determines the applicant's scopeof securing a job.

Step 9 - STOP

6.3 Architecture

The AccuJob system architecture is designed to maintain a database server which stores the information of all our clients and all the processes, a login/logout type interface, a server to run our sortingand scoring algorithms which determines job probability and a visual interface to display the end result of our processes. All this is carried out in synchronicity using transfer protocols, such as TCP/IP, FTP, HTTP etc.

6.4 Subsystem and Components

The user sees the homepage of the website, on it there are many options like jobs which will show all the available job titles or posts available on the website. Next option is recruiters which shows all thecompanies which have posted jobs on the site. Under the services section there are two options one is Sample Resume and another is Interview Questions. The former gives the job seekers some sample resumes from which the users can design their own resumes and the other options gives the list of interview questions which the user can see in order toprepare for his/her interview. Then there is a LOGIN and a signup option. Clicking on either gives two options for employee or for company.

For Job Seeker:

On clicking the Signup option for employee, the user is directed to the signup page, where the user needs tofill up some basic information like Name (first and last), email ID, phone number, password, address (line 1 and line 2), city, state, ZIP code and country. After filling up the details, user is taken to profile page.

On clicking the sign in option, the sign in page openswhere the user needs to enter a email ID and password. If the password and email ID is correct then dashboard opens which displays the jobs.

On the profile page the user needs to fill his/her name, qualifications, skills, area of interest (Field inwhich user wants to pursue his/her career), preferredlocation for the job(city). After this is done, dashboard opens.

On the dashboard all the available jobs are available on the basis of area of interest and preferred location given by the user. Here the name of the company, job title, pay per month and last date to apply all these details are available. If the users like the mentionedthings he/she can click on view details button.

On clicking view details, the details given by the company are available including salary, company logo, company name, last date to apply, job title, about the company, skills required for the jobs and most importantly it shows the percentage chances of user getting recruited for the job. If the user likes everything, he can click on Apply now option.

On clicking apply now a page opens up where theuser needs to upload his/her resume and submit. For Company

On clicking the Signup option for company, the user is directed to the signup page, where the user needs tofill up some basic information like Company Name, company's email ID, phone number, password, address (line 1 and line 2), city, state, ZIP code and country. After filling up the details, user is taken to profile page.

On clicking the sign in option, the sign in page openswhere the user needs to enter the email ID and password. If the password and email ID is correct then dashboard opens which displays all the candidates.

On the profile page the user needs to fill the name of the company, Job title, available posts, salary, skills required, Job description, logo of the company and the last date to apply. After this is done, dashboard opens.

On the dashboard the Employers can see the list of people who have applied for the job along with their skills and qualifications. If the company is interested, they can click on View details. This page will show name of the candidate, the post he/she has applied for, about the candidate section includes Skills and qualifications of the candidate. It also shows the percentage chances of the candidate getting selected to the company. If the company likes it there is an option download resume from which the company can download the person's resume. After reading theresume, if the employer likes the candidate, they can call him/her for the interview.

6.5 Database Schema

MongoDB database has been used for this project. New tableshave been made for storing data. They are:

- Employee – Employee table is related to all the data of theparticular employee.
- Employer – Profile table is related to all the data of theparticular employee.
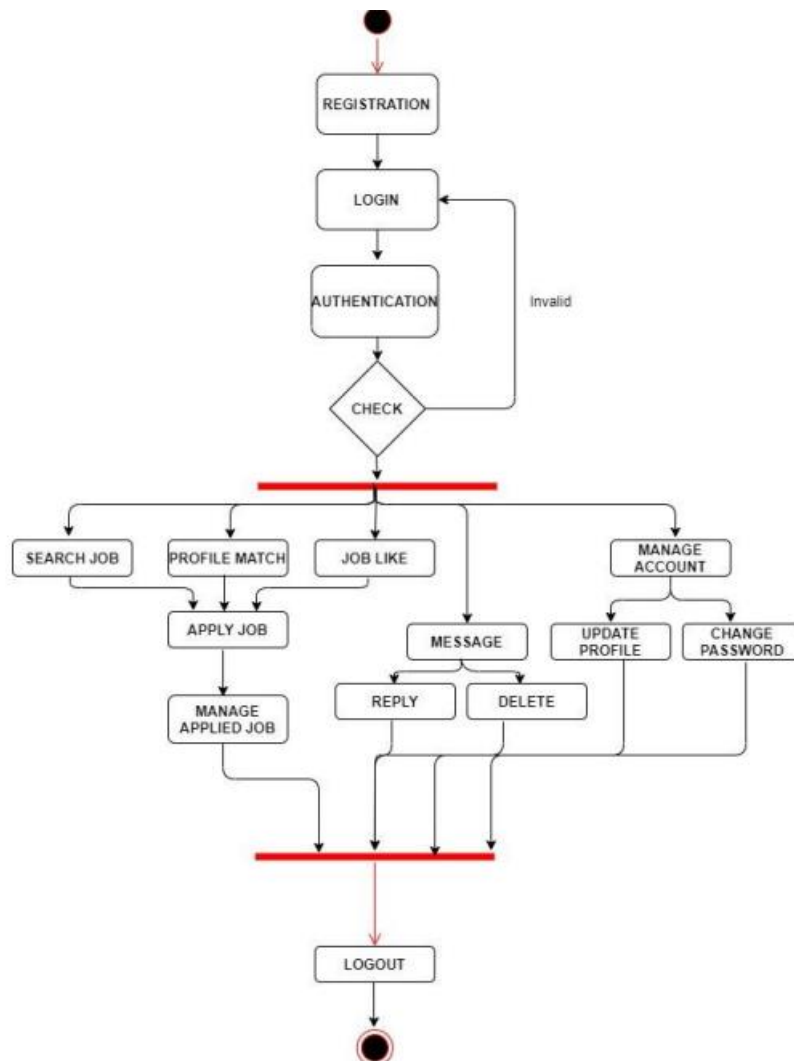
VII. ANALYSIS MODLES
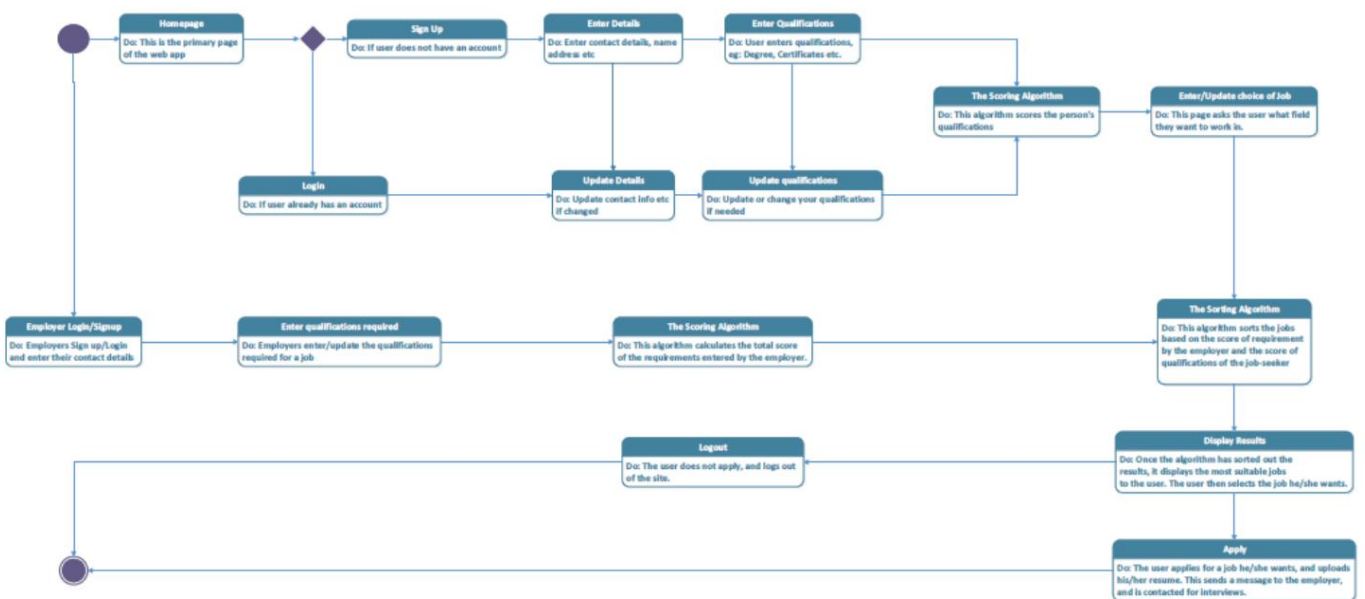

Fig. 4. Activity Diagram
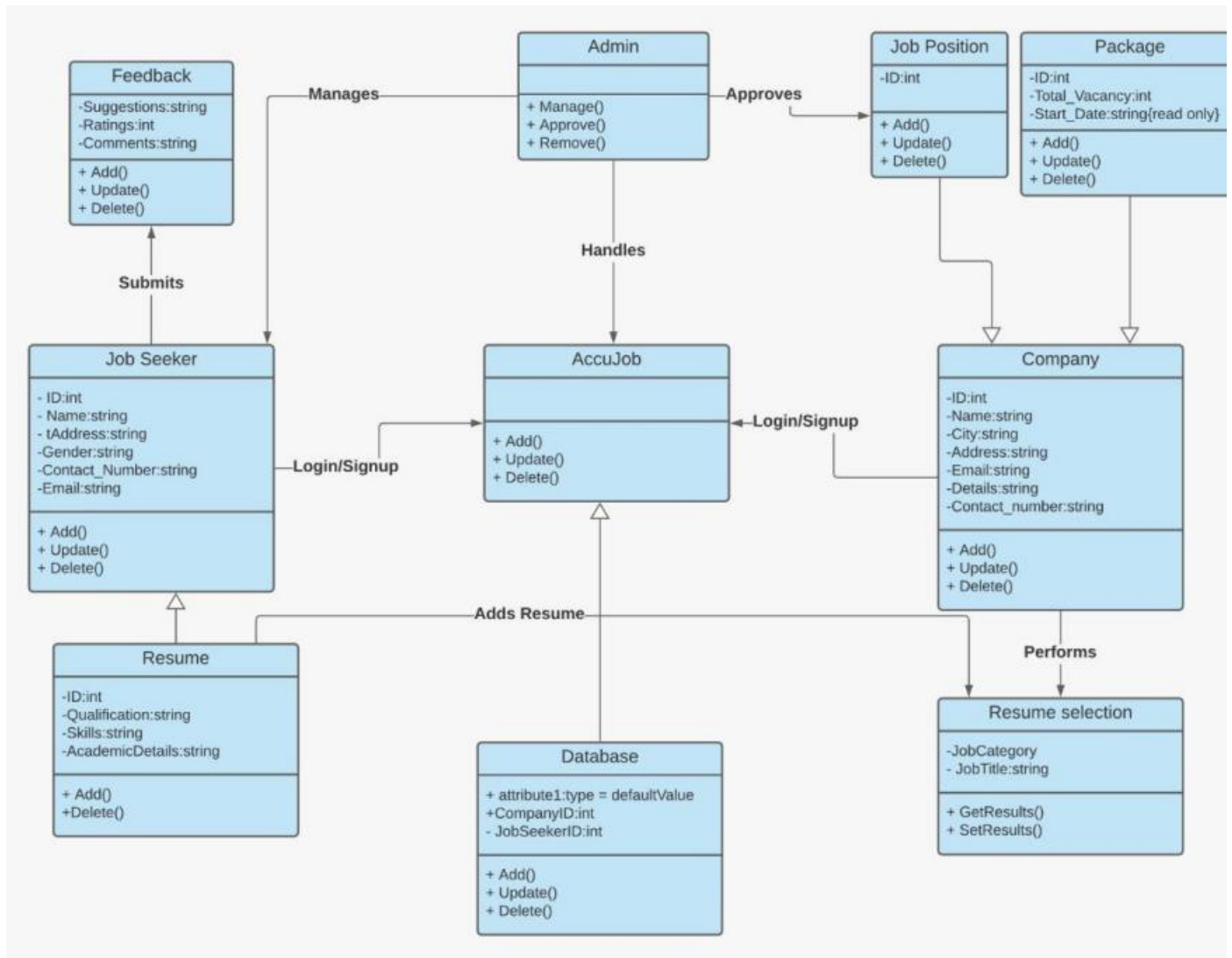

Fig. 5. State Transition Diagram

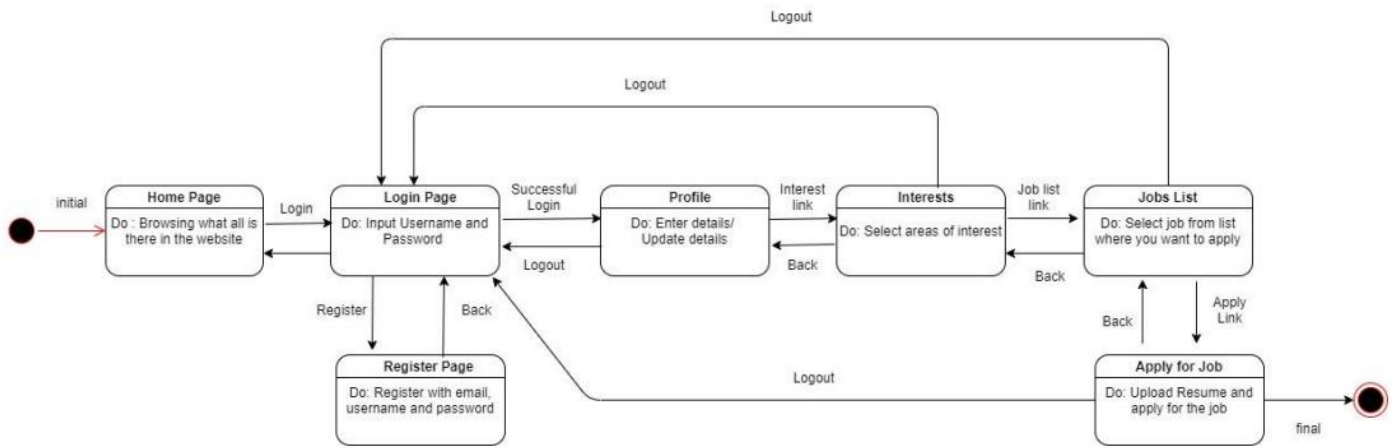Fig. 6. Class Diagram

Fig. 7. Entity Relationship Diagram

Fig. 8. Start Chart Diagram

VIII. IMPLEMENTATION AND TESTING

In this part of the paper, we shall be able to see the testing methods, testing processes, and the test results that we obtained when performing these tests on AccuJob. To facilitate testing, Cyclomatic Complexity, and automated testing tool Selenium has been used.

8.1 Routes or Modules

There were various algorithms that facilitated the execution of Cyclomatic Complexity. The pseudocode for these algorithms are numerous, and we have provided the codes which facilitate the Cyclomatic Complexity.

Cyclomatic complexity = E – N + 2*P Where,
E = number of edges in the flow graph,

N = number of nodes in the flow graph,
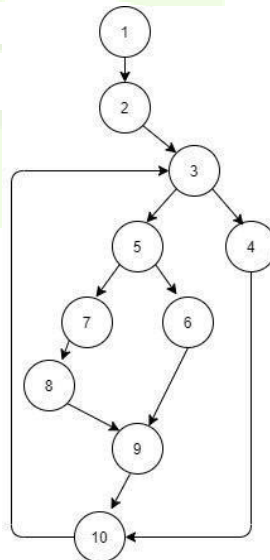P = number of nodes that have exit points So cyclomatic complexity = 12 – 10 + 2 = 4

Fig. 9. Program Flow Diagram for Skills verification for Employers.
Similarly, program flow diagrams for other routes and subroutes have been made.

8.2 Testing

Testing is a stage in software development that is as important as implementation. Testing helps us uncover error, flaws and defects in our code and implementation of the project. Based on the Cyclomatic Complexity calculated, test cases were generated. Manual testing was carried out on these components first and the results were noted down. The results of manual testing are summarized in the following table.

Test Case ID	Test Objective	Test Data	Expected Results	Actual Results	Test Pass/Fail
TEST CASE 1	LOGIN (Employee)	username: rohit password: rohit@123	Employee Dashboard	Display Employee Dashboard	Pass
TEST CASE 2	LOGIN (Employer)	username: apple password: apple@123	Employer Dashboard	Display Employer Dashboard	Pass
TEST CASE 3	SIGN UP (Employee)	FirstName: Rohit LastName: Barar username: rohit PhoneNumber: 9876543211 Skills: C,C++,Python.....	Employee Login	Display Employee Login	Pass
TEST CASE 4	SIGN UP (Employer)	companyName: Apple username: apple PhoneNumber: 9517531258 Skills Required: C,C++,Python.....	Employer Login	Display Employer Login	Pass
TEST CASE 5	Employee Dashboard	View Details of the Company button	Apply Page (Employee)	Display Apply Page (Employee)	Pass
TEST CASE 6	Apply Page (Employee)	Apply Now button	Resume Upload Page (Employee)	Display Resume Upload Page (Employee) (before uploading)	Pass
TEST CASE 7	Resume Upload Page (Employee) (before uploading)	Upload file option	Resume upload Page (Employee) (after uploading)	Display Resume upload page (Employee) (after uploading)	Pass
TEST CASE 8	Resume Upload Page (Employee) (after uploading)	Submit button	Employee Dashboard (without the details of the company applied)	Display Employee Dashboard (without the details of the company applied)	Pass
TEST CASE 9	Employer Dashboard	View details button	Call for interview Page displaying the details	Display Call for interview Page displaying the details	Pass

Fig. 10 Test Case Table part 1

			of the particular employer (before downloading the resume)	of the particular employer (before downloading the resume)	
TEST CASE 10	Call for interview page displaying the details of the particular employee (before downloading the resume)	Download resume button	Call for interview Page displaying the details of the particular employer (after downloading the resume)	Display Call for interview Page displaying the details of the particular employer (after downloading the resume)	Pass
TEST CASE 11	Call for interview Page displaying the details of the particular employer (after downloading the resume)	Submit button	Employer Dashboard	Display Employer Dashboard	Pass
TEST CASE 12	LOGOUT (Employer and Employee)	Logout button	Index page	Display Index Page	Pass
TEST CASE 13	LOGO Click	Logo Click	Index Page	Display Index Page	Pass
TEST CASE 14	Jobs button	Clicking Jobs button	Jobs Page displaying all the jobs in the DB	Jobs Page displaying all the jobs in the DB	Pass
TEST CASE 15	Services button	Clicking Services button	Dropdown showing sample resume and sample interview questions buttons	Dropdown showing sample resume and sample interview questions buttons	Pass
TEST CASE 16	Sample Resume button	Clicking Sample Resume Button	New tab opening with a sample resume	New tab opening with a sample resume	Pass
TEST CASE 17	Sample Interview	Clicking Sample Interview Questions button	New tab showing the list of	New tab showing the list of	Pass

Fig. 11 Test Case Table part 2

There are total 17 test cases. They have been displayed in the above tables. We will look at the program flow diagram for the create new profile route to understand how the test cases were derived from it.

Once the user (employee/employer) finishes registration and uploaded the relevant skills that are required for the creation, maintenance, and functioning of the account then we can use the inserted information as a part of the testing processes.

Fig. 12 Program Flow Diagram for main process flow.

The testing tool used for the testing of AccuJob was the automated testing software, Selenium. It tested various aspects of the website, such the time duration of each request, errors, failed tests, passed tests, DNS and SSL behavior, etc.

Here are a few screenshots of the testing results obtained.

Fig. 13. Test Report for Employee Login

In Fig. 14 we can see the various tests that the automated software has performed and the test targets that the test was supposed to perform.
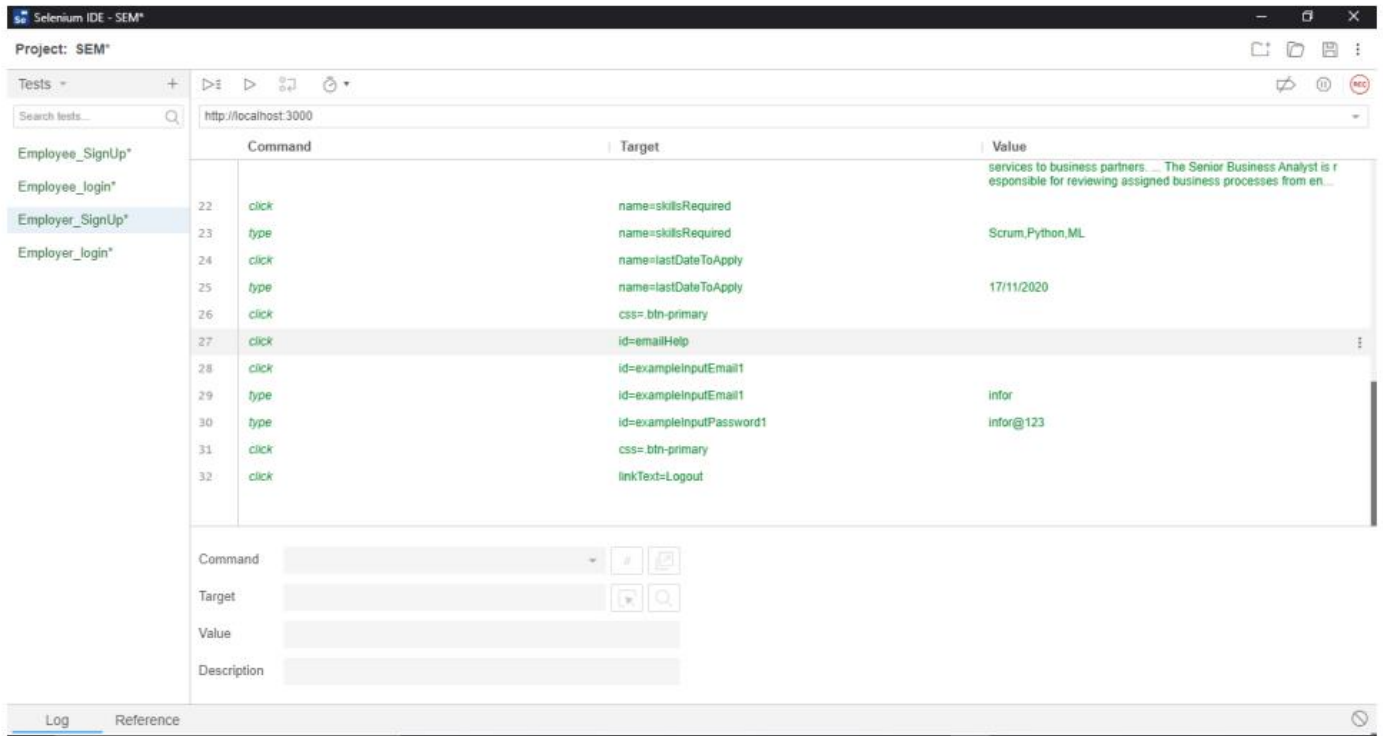
Fig. 14. Automated Testing Results for Employee Home page

The testing results hence help us understand that the website is reliable and can maintain its efficiency under high pressure conditions. It is also fairly accurate and errorless.
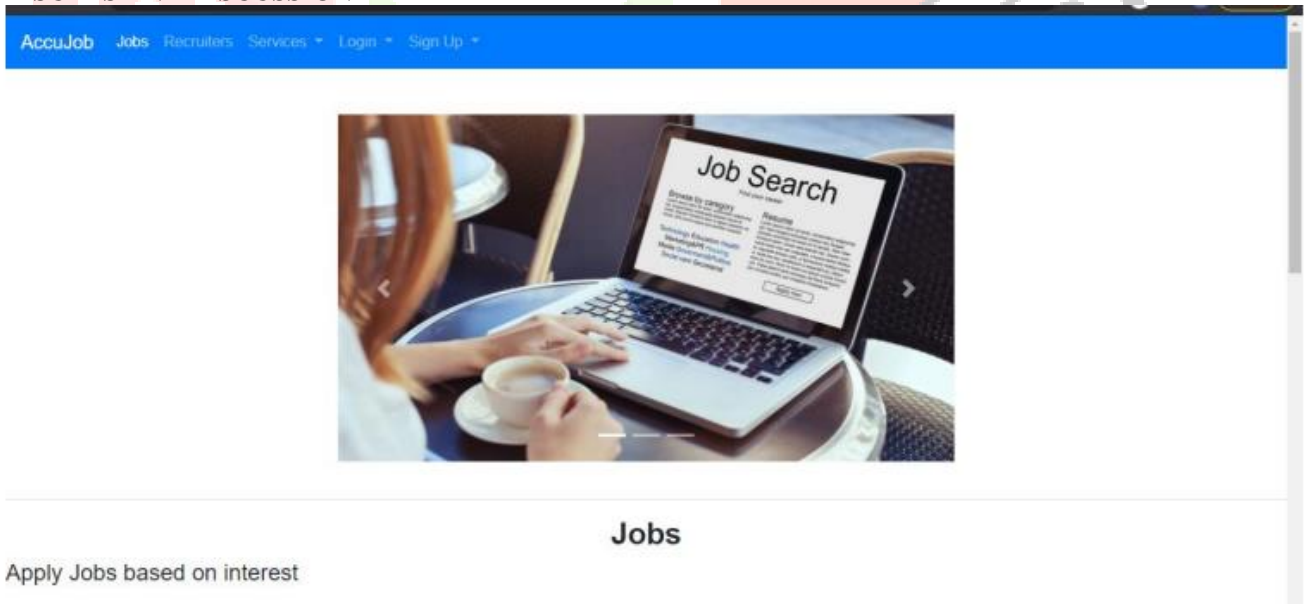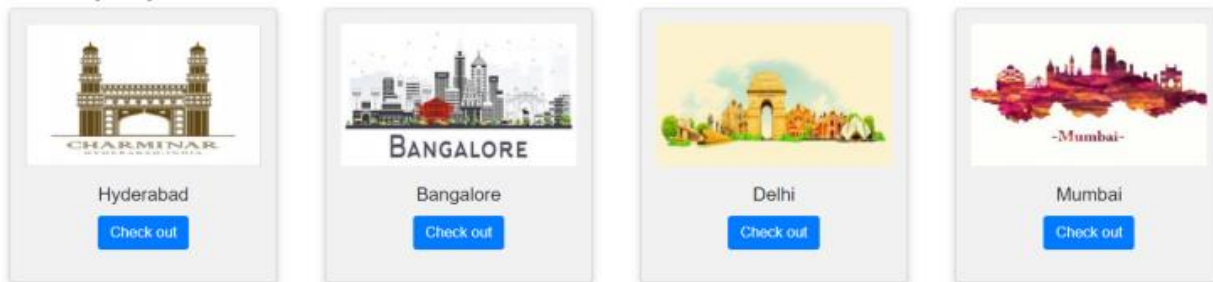
IX. RESULTS AND DISCUSSION
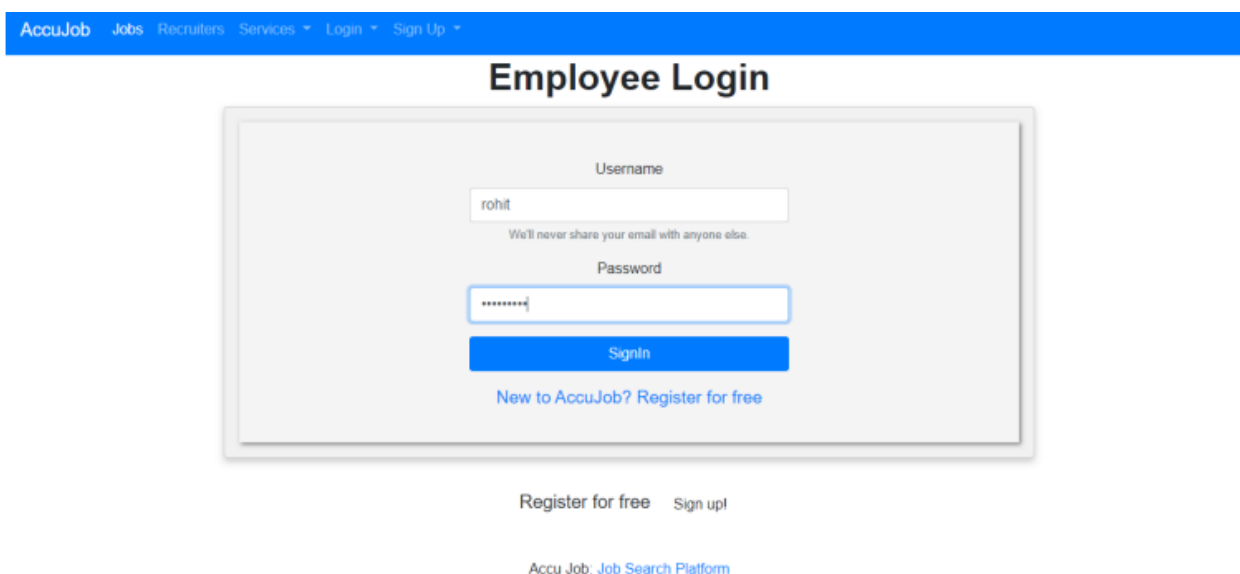

Fig. 15. Index Page

Select by City

| Hyderabad | Bangalore | Delhi | Mumbai |
| Check out | Check out | Check out | Check out |

Select by Company

Fig. 16. Home Page

Employee Login

AccuJob   Jobs   Recruiters   Services ▾   Login ▾   Sign Up ▾

Username

rohit

We'll never share your email with anyone else.

Password

●●●●●●●●

SignIn

New to AccuJob? Register for free

Register for free   Sign up!

Accu Job: Job Search Platform

Fig. 17. Employee login page

AccuJob   Jobs   Recruiters   Services ▾   Logout

Jobs Matching your Preference

Apple

Job Title: Data Scientist

Pay/Month: 1500000

Job Description: Collecting data through means such as analyzing business results or by setting up and managing new studies. Transferring data into a new format to make it more appropriate for analysis. Creating new, experimental frameworks to collect data

Last Date to apply is 30/10/2020

Percentage Chances of getting recruited: 50 %

View Details

Fig. 18. Employee Dashboard

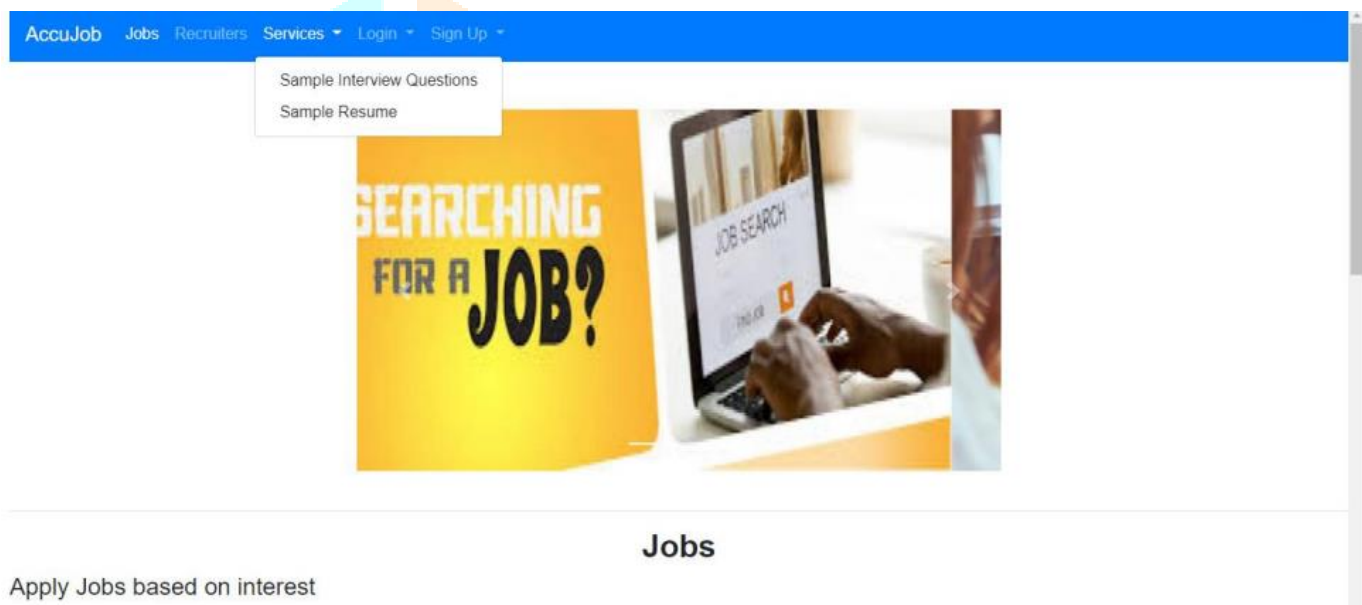Fig. 19. Employee Resume upload

Fig. 20. Sample Interview Questions

The AccuJob team treats this project as a journey, because at the starting of the project, this was just an idea and then each member realized the skills required, learnt it and also successfully implemented it. The team has gotten exposed to a in depth level as to how to make a web app and how to make it user friendly and intuitive.

By implementing the things learnt in the subject, the path became easier, as we knew how to proceed and what model to follow (Waterfall model) and how to conduct testing, how to manage documentation, etc.

Another important technical aspect the team learnt in this time was designing and implementing a user friendly and intuitive GUI (Graphic User Interface) which makes the web application attractive as well as functionally fluid.

As taught in the subject, testing and planning were not treated as two separate entities nor were there any specific phases to execute these operations. They were maintained and executed all along the development of the application, at times when the modules were independently created and also when they were joined to function as a whole.

At the end, it is necessary to say how the team has experienced Software Engineering. The whole team feels that it is an essential subject, as everybody can learn how to code, however, without knowing how to document things properly, or what model to follow so as to get the best results in the shortest time, things can become a mess. Software Engineering Methodologies helps us prevent that and increase efficiency to the optimum level.

X. ACKNOWLEDGMENT

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