

# **NALAIYA THIRAN REPORT**

**(IBM)**

ON

## **SKILL / JOB RECOMMENDER APPLICATION**

Submitted by

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### **BACHELOR OF ENGINEERING**

in

### **COMPUTER SCIENCE AND ENGINEERING**

### **GOVERNMENT COLLEGE OF ENGINEERING - BARGUR**

(An Autonomous Institution affiliated to Anna University - Chennai)



**NOV - 2022**

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# CHAPTER 1

## INTRODUCTION

### 1.1 Project Overview

Finding jobs have always been hard - from not having proper knowledge on the organization's objective, their work culture and current job openings to finding the right candidate with desired qualifications to fill their current job openings. Online Job Search Portals have since then been introduced making job seeking convenient on both sides. Job Portal is the solution where recruiters as well as the job seeker meet aiming at fulfilling their individual requirement. They are the cheapest as well as the fastest source of communication reaching a wide range of audience on just a single click irrespective of their geographical distance.

### 1.2 Purpose

Even though online job portals have existed for a while, they only brought in more challenges, like:

- The education system does not always fulfil and focus on individual person skill development.
- Spending hours to find useful info from enormous number of posts online.
- People who lack industry knowledge are unclear about what exactly they need to learn in order to get a suitable job for them.

# CHAPTER 2

## LITERATURE SURVEY

### 2.1 Existing Problems

- Job portals pretty much work using resume information to match people instead on customizing on a job seeker's skill set.
- Recruiters see very similar resumes of hundreds of applicants making it impossible to figure out which candidate seems to be relevant or better for the job at hand.

### 2.2 References

- <https://ieeexplore.ieee.org/document/7944917>
- [https://www.researchgate.net/publication/325697854Job\\_Recommendation\\_based\\_on\\_Job\\_Seeker\\_Skills\\_An\\_Empirical\\_Study](https://www.researchgate.net/publication/325697854Job_Recommendation_based_on_Job_Seeker_Skills_An_Empirical_Study)
- <https://www.quora.com/LinkedIn>
- <https://ieeexplore.ieee.org/document/8960231>
- <https://ieeexplore.ieee.org/document/9752295>

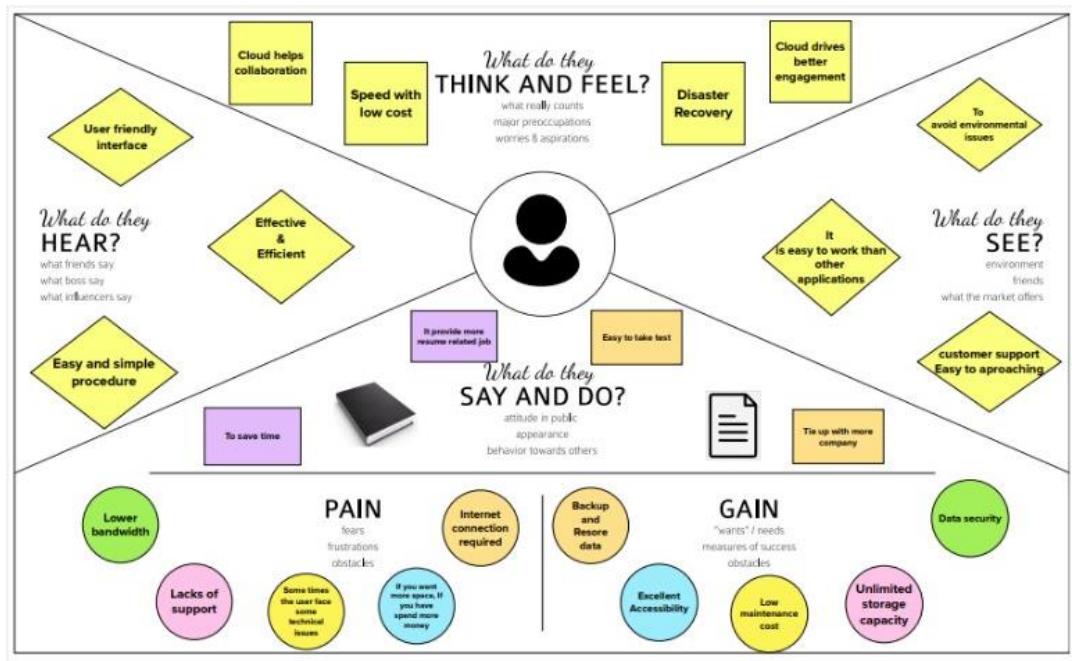
### 2.3 Problem Statement Definition

The current problem recruitment is done manually, most available jobs in Nigeria can only be applied at the agency can be done for which job seekers have to go to the agency check the available jobs at the agency.


## CHAPTER 3

### IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas



#### 3.2 Ideation & Brainstorming



### Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

⌚ 10 minutes to prepare  
🕒 1 hour to collaborate  
👥 2-8 people recommended

**Before you collaborate**

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

⌚ 10 minutes

- Team gathering**  
Define who should participate in the session and send an invite. Share location, duration or pre-work ahead.
- Set the goal**  
Think about the problem you'll be focusing on solving in the brainstorming session.
- Learn how to use the facilitation tools**  
Use the facilitation Superpowers to run a happy and productive session.

[Open article](#) →

**1 Define your problem statement**

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⌚ 5 minutes

### PROBLEM

How might we help job seekers search for job vacancies?

How might we make the hiring procedure easier to select the best candidates for the job?

How might we make the job search customized?

How might we manage a large number of users simultaneously and effectively?

How might we provide a proper platform for recruiters to display job openings?

2

## Brainstorm

Write down any ideas that come to mind that address your problem statement.

🕒 10 minutes

### TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

## Dhinesh Kumar S

Should provide information about the ongoing or upcoming job openings in various sectors. Also regular updates should be provided to the job seekers via email.

Job seekers should be able to search jobs by desired role, salary, location and should be facilitated with such personalized options that meet their needs.

Resume extraction or resume parsing helps in analyzing, storing extracted useful information from the uploaded CV automatically which helps in identifying the best applicants.

Job Seeker should be able to bookmark any number of jobs that he is looking for and apply for it later on.

Job seekers should be provided with a list of technical courses and certifications to choose from. These courses help job seekers to become skilled and industry ready.

All applications should be stored in one place in folders. It can be tagged, bookmarked for quicker access.

Job seekers should be provided with knowledgeable insights to crack interviews.

## Aasai Thambi E

Job Seekers are recommended job roles based on the skills and experience listed in their resumes.

Job Seekers are recommended skills to gain and ways to strengthen their resumes based on their preferred job roles.

Job Seekers should be notified about the job application deadlines.

Job Seekers should be able to navigate easily through the application (intuitive UI)

## Harish Kumar G

Developing a chatbot to give personalized job recommendations for candidates

Backup and recovery options for user account and job search history

Efficient connectivity between job seeker and recruiter

Fake job offers detection and removal

## Satheesh M

Efficient job recommendation to the job seeker by parsing his resume.

Filtering of candidates based on their skills

Timely reminders to the candidates regarding the deadlines of application process.

Displaying of a match score for the candidate to know how much his skills match the job profile



3

**Group ideas**

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

**TIP**

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

**SUPPLEMENTARY FEATURES**

Fake job offers detection and removal

Displaying of a match score for the candidate to know how much his skills match the job profile

Should provide information about the ongoing or upcoming job openings in various sectors. Also regular updates should be provided to the job seekers via email.

Job Seekers should be notified about the job application deadlines.

Timely reminders to the candidates regarding the deadlines of application process.

**PERSONALIZED JOB RECOMMENDATIONS**

Job Seekers are recommended job roles based on the skills and experience listed in their resumes.

Job Seekers are recommended skills to gain and ways to strengthen their resumes based on their preferred job roles.

**RESUME PARSING**

Resume extraction or resume parsing helps in analyzing, storing extracted useful information from the uploaded CV automatically which helps in identifying the best applicants.

Efficient job recommendation to the job seeker by parsing his resume.

**JOB SEARCH**

Filtering of candidates based on their skills

Job seekers should be able to search jobs by desired role, salary, location and should be facilitated with such personalized options that meet their needs.

**SKILLS ENHANCEMENT**

Job seekers should be provided with a list of technical courses and certifications to choose from. These courses help job seekers to become skilled and industry ready.

Job seekers should be provided with knowledgeable insights to crack interviews.

**SOFTWARE SYSTEM DESIGN**

Job Seeker should be able to bookmark any number of jobs that he is looking for and apply for it later on.

Developing a chatbot to give personalized job recommendations for candidates

All applications should be stored in one place in folders. It can be tagged, bookmarked for quicker access.

Efficient connectivity between job seeker and recruiter

Job Seekers should be able to navigate easily through the application (intuitive UI)

Backup and recovery options for user account and job search history



4

## Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes

### TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.



### 3.3 Proposed Solution

The system customizes and only shows recommended jobs based on the user's skill set and preferences (Using graphql api). Similarly, the same recommendation system helps provide job applicant recommendations to the job recruiters to find the most eligible candidates for their firm. All-important data - job seeker's and host's personal information needs to be also stored safely and securely. Using a sql database is the easiest, safest and convenient way possible. Data needs to also be private in some cases like when information is shared with the host while applying for a job.

### 3.4 Problem Solution Fit

Define CS, fit into CL	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> <div>Job seekers</div>	<b>6. CUSTOMER LIMITATIONS</b> <small>EG. BUDGET, DEVICES</small> <span>CL</span> <div>1)High adoption costs , security concerns. 2)Not aware of the implementation of cloud applications</div>	<b>5. AVAILABLE SOLUTIONS</b> <small>PLUSES &amp; MINUSES</small> <span>AS</span> <div>can use computer and mobile applications that provide a lot of work</div>	Explore AS, differentiate
	<b>2. PROBLEMS / PAINS</b> <small>+ ITS FREQUENCY</small> <span>PR</span> <div><ul style="list-style-type: none"><li>It's difficult to find more jobs</li><li>Isn't known if the application doesn't work properly.</li></ul></div>	<b>9. PROBLEM ROOT / CAUSE</b> <span>RC</span> <div>1) As unemployment has increased, competition for jobs has increased  2) Companies are looking for highly skilled workers</div>	<b>7. BEHAVIOR</b> <small>+ ITS INTENSITY</small> <span>BE</span> <div><b>Direct related:</b> Tries to find a solution to prevent this problem  <b>Indirect related:</b> Located in rural where internet connectivity might not be strong enough to facilitate fast transmission speeds.</div>	Focus on PR, tap into BE, understand RC
Focus on PR, tap into BE, understand RC	<b>3. TRIGGERS TO ACT</b> <span>TR</span> <div>Create more job opportunities to lift people out of poverty in developing nations.</div>	<b>10. YOUR SOLUTION</b> <span>SL</span> <div><i>"cloud application development based job/ skill recommender for job seekers" !!</i>  It suggests suitable jobs as soon as possible according to the skills of the job seeker</div>	<b>8. CHANNELS of BEHAVIOR</b> <span>CH</span> <div><b>ONLINE:</b> Job seekers must understand the company's requirement well and search accordingly  <b>OFFLINE:</b> Search through classifieds for jobs that match your skills</div>	Focus on PR, tap into BE, understand RC
	<b>4. EMOTIONS</b> <small>BEFORE / AFTER</small> <span>EM</span> <div><b>BEFORE:</b> Finance, jobless and conflict in relationship.  <b>AFTER:</b> If you get work to fix the problem</div>			
Identify strong TR & EM	Extract online & offline CH of BE			

## CHAPTER 4

### REQUIREMENT ANALYSIS

#### 4.1 Functional Requirements

Following are the functional requirements of the proposed solution.

S. No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
1	User Registration	Registration through Form Registration through Google Account Registration through LinkedIn Account
2	User Login	Login using login credentials Sign in with Google/ LinkedIn Account
3	Search jobs	Job seekers search for jobs by desired role, salary and location.
4	Get Appropriate Job Recommendations	Resume extraction/resume parsing is done to extract useful information from the CV uploaded by the job seekers. The extracted features are the basic features, and the job seeker's activity is recorded, which gives the dynamic features.
5	Get Job Alerts	Timely reminders are provided regarding the deadlines of the application process and new job openings.
6	Get Accurate Skill Recommendations	Job seekers are recommended technical certification courses based on their resumes to become skilled and industry ready.
7	Display Job-Skill Match Score	Job seekers are provided with a match score which indicates how much their skills match the job profile.
8	Fake Job Detection and Removal	The portal has a fake job offer detection engine embedded in it.
9	Post job vacancies	Job recruiters post details of job vacancies in their company. The details include the job description, required qualifications, job responsibilities, working conditions, etc.
10	Bookmark Job Posts	The job seeker can bookmark or tag any number of jobs that they apply for, for quick access.

## 4.2 Non-Functional Requirements

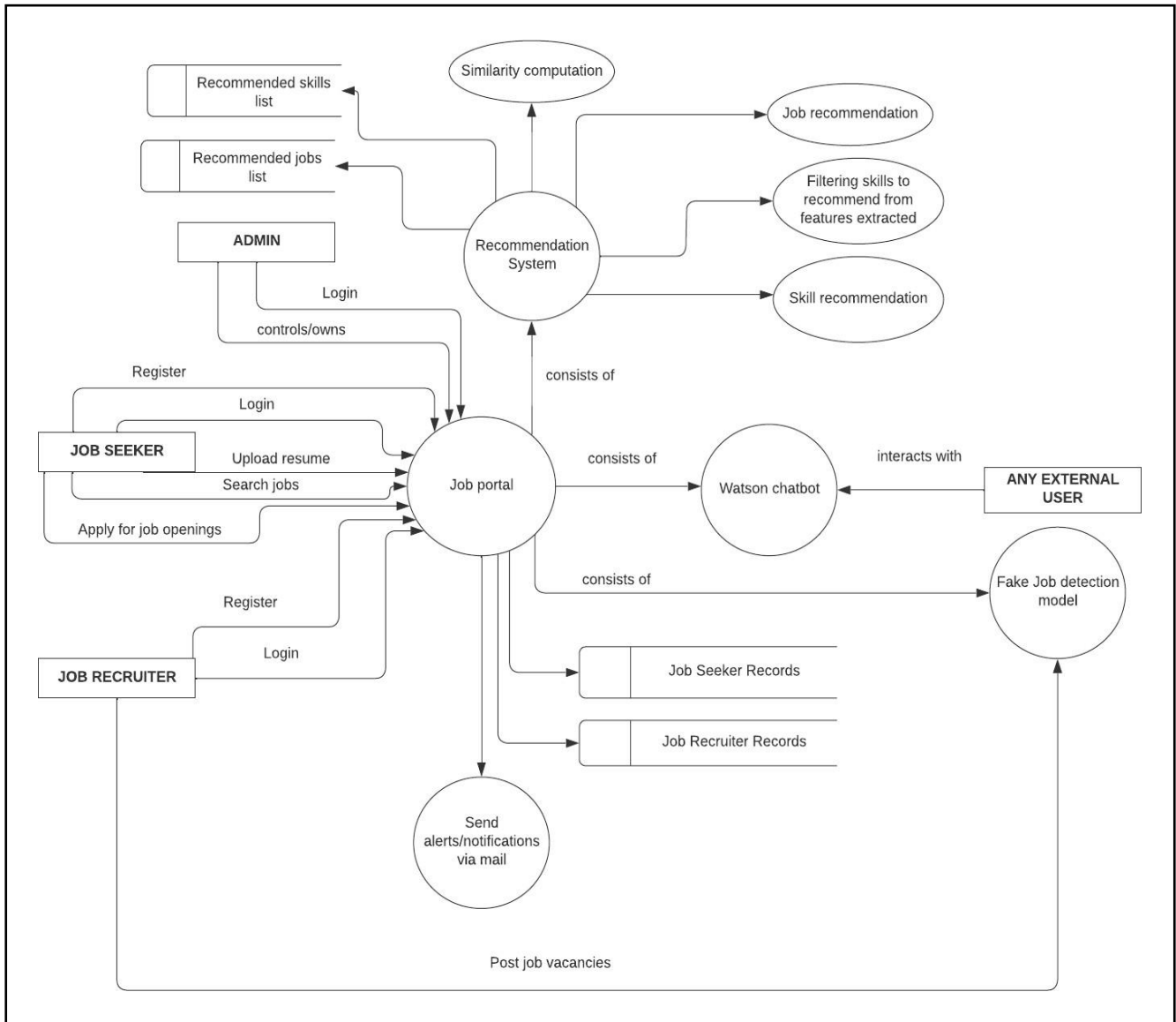
Following are the non-functional requirements of the proposed solution.

S. No.	Non-Functional Requirement	Description
1	Usability	Intuitive UI is provided to the users, ensuring they can easily navigate through the application.
2	Security	<b>Authentication</b> - The user must be logged in to view the job posts and apply. <b>Withholding of sensitive information</b> - Passwords are not stored within the system or revealed to the users. <b>Privacy</b> - The users can choose who can view their profile/posts.
3	Reliability	The system performs without failure in 95% of the use cases. The total downtime for the system over a year shall not exceed 50 hours.
4	Performance	<b>Processing time</b> - The processing time takes less than three seconds. <b>Response time</b> - The server responds to the client's requests in less than one second. <b>Querying time</b> - Querying the database takes less than one second.
5	Availability	The system is always available.
6	Scalability	To meet the changing demand and workload, cloud services are utilized.
7	Recovery	The system frequently backs up the user data to avoid any data loss. In the event of any disaster, the latest backup is immediately restored.

# CHAPTER 5

## PROJECT DESIGN

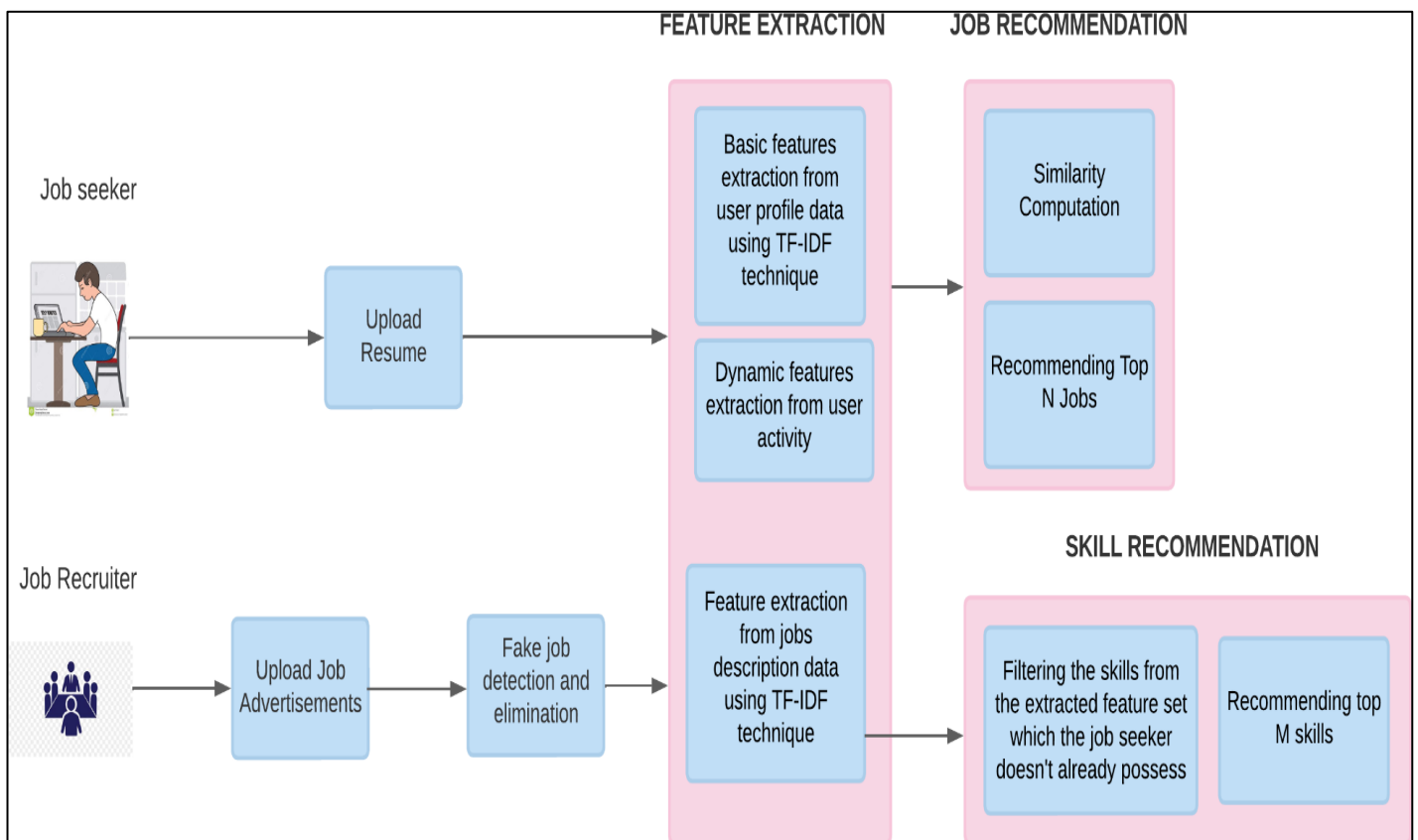
### 5.1 Data Flow Diagrams



## 5.2 Solution & Technical Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.



### 5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
Job Seeker/ Recruiter	Registration	USN-1	As a job seeker/ recruiter, I can register for the application by entering my details.	I can access my account/dash board.	High	Sprint 1
		USN-2	As a job seeker/ recruiter, I can register for the application through Google Account.	I can access my account/dash board.	Low	Sprint 1
		USN-3	As a job seeker/ recruiter, I can register for the application through LinkedIn.	I can access my account/dash board.	Low	Sprint 1
Job Seeker/ Recruiter/ Admin	Login	USN-4	As a job seeker/ recruiter, I can log into the applicationby entering login credentials.	I can access my account/dash board.	High	Sprint 1
Job Seeker	Job Search	USN-5	As a job seeker, I can search for job postings based on preferred job roles, location, and salary.	I can find job postings related to mysearch.	High	Sprint 1
	Apply for Jobs	USN-6	As a job seeker, I can apply for the jobs listed in the portal.	I can applyfor job openings.	High	Sprint 1
	Get Job Recommendations	USN-7	As a job seeker, I upload my resume.	I can get skill and job recommendations by resume parsing.	High	Sprint 2



User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance Criteria	Priority	Release
		USN-8	As a job seeker, I can get job recommendations based on my profile via the chatbot.	I can get job recommendations	High	Sprint 2
	Get Skill Recommendations	USN-9	As a job seeker, I can get job recommendations based on my desired job role and prior experience via the chatbot.	I can get accurate skill recommendations which help me gain the required skills.	High	Sprint 2
	Get Job-Skill MatchScore	USN-10	As a job seeker, I can get the job-skill match score for my desired job to my present skills.	I can get a Job-Skill match score which helps to improve my current stance.	Medium	Sprint 3
	Get Job Alerts	USN-11	As a job seeker, I get alerts regarding application deadlines and new job postings.	I can comply with the deadlines for job applications and be updated on various current job requirements.	High	Sprint 3
	Bookmark Job Posts	USN-12	As a job seeker, I can bookmark job postings.	I can access job posts more accessible and faster.	Medium	Sprint 3
Recruiter	Post Job Vacancies	USN-13	As a recruiter, I can post job vacancies.	I can access job vacancies posted on the application.	High	Sprint 1
Application	Remove fraudulent job posts	USN-14	The application analyses the job postings by the recruiter and removes fake job posts.	The fraudulent job postings are removed.	Medium	Sprint 3

## CHAPTER 6

### PROJECT PLANNING & SCHEDULING

#### 6.1 Sprint Planning & Estimation

##### Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	High	Dhinesh Kumar Satheesh
Sprint-1		USN-2	As a user, I will receive confirmation email once. I have registered for the application	High	Aasai Thambi Harish Kumar
Sprint-2		USN-3	As a user, I can register for the application through Facebook	Low	Dhinesh Kumar Aasai Thambi
Sprint-3		USN-4	As a user, I can register for the application through Gmail	Medium	Satheesh Harish Kumar
Sprint-2	Login	USN-5	As a user, I can log into the application by entering email & Password	High	Dhinesh Kumar Harish Kumar
Sprint-2	Dashboard	USN-6	Create a model set that contains those models, then assign it to a role.	High	Harish Kumar Satheesh
Sprint-4	Identity-Aware	USN-7	Open, public access, User-authenticated access, Employee-restricted access.	High	Aasai Thambi Dhinesh Kumar
Sprint-1	Communication	USN-8	A customer care executive is a professional responsible for communicating the how's and why's regarding service expectations within a company.	Medium	Harish Kumar Satheesh
Sprint-3	Device management	USN-9	You can Delete/Disable/Enable devices in Azure Active Directory but you cannot Add/Remove Users in the directory.	Medium	Dhinesh Kumar Satheesh

## Project Tracker, Velocity & Burndown Chart

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date(Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	18	06 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	19	19 Nov 2022

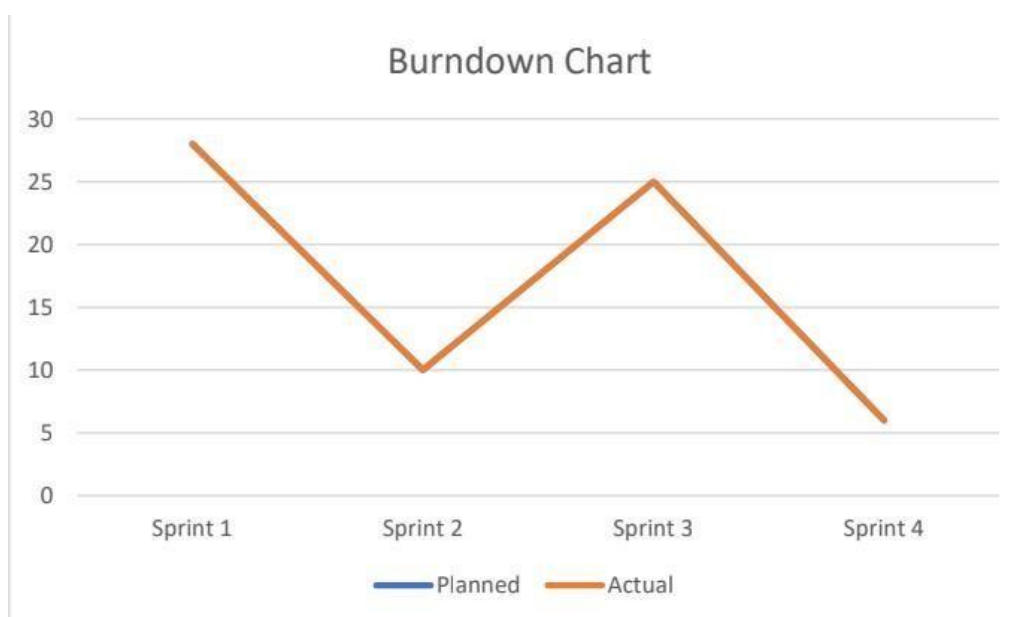
### Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

### Burndown Chart

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



## 6.2 Sprint Delivery Schedule

<b>Title</b>	<b>Description</b>	<b>Date</b>
<b>Literature Survey and Information Gathering</b>	Gathering Information by referring the technical papers, research publications etc.	2 September 2022
<b>Prepare Empathy Map</b>	To capture user pain and gains Prepare List of Problem Statement	10 September 2022
<b>Ideation</b>	Prioritize a top 3 ideas based on feasibility and Importance	17 September 2022
<b>Proposed Solution</b>	Solution include novelty, feasibility, business model, social impact and scalability of solution	24 September 2022
<b>Problem Solution Fit</b>	Solution fit document	29 September 2022
<b>Solution Architecture</b>	Solution Architecture	1 October 2022
<b>Customer Journey</b>	To Understand User Interactions and experiences with application	8 October 2022
<b>Functional Requirement</b>	Prepare functional Requirement	14 October 2022
<b>Data flow Diagrams</b>	Data flow diagram	15 October 2022
<b>Technology Architecture</b>	Technology Architecture diagram	16 October 2022
<b>Milestone &amp; sprint delivery plan</b>	Activity what we done & further plans	21 October 2022
<b>Project Development- Delivery of sprint 1,2,3 &amp;4</b>	Develop and submit the developed code by testing it	24 October 2022 – 19 November 2022

# CHAPTER 7

## CODING & SOLUTIONING

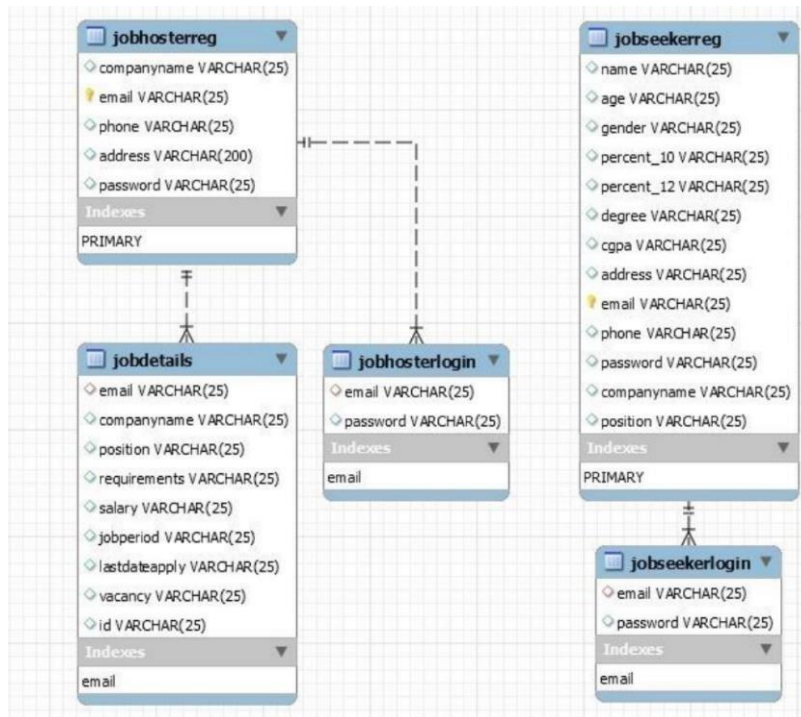
### 7.1 Feature 1

Skill based job recommendation – Jobs are recommended based on job seeker's individual skill set. This also brings in custom list of jobs that's different for different job seekers.

### 7.2 Feature 2

Hosting jobs– Job hoster can easily host jobs that can be accessed by a varied range of applicants. Additional feature – filtering through jobs based on skill, location, salary/stipend, mode of job (for both applying and hosting jobs).

### 7.3 Database Schema



# CHAPTER 8

## TESTING

### 8.1 Test Cases

#### Test Cases for Registration Page

Test Cases	Feature	Description	Steps to Execute	Expected Results
TC-001	User Interface	Check all textboxes, checkboxes and buttons	1. Click textboxes, checkboxes and buttons	UI should work properly
TC-002	Required fields	Check the required fields by not filling any data	1. Do not enter any value in the field. 2. Click on the Register button.	A required field message should be displayed
TC-003	Required fields	Check if the user is registered by filling all the required fields	1. Enter valid values in the required fields. 2. Click the Register button.	1. Users should be registered successfully 2. Mail should be sent to the user
TC-004	Required fields	Check if password and confirm password are same	1. Enter different passwords for Password and Confirm Password fields	It should display a message saying that the passwords don't match
TC-004	Email validation	Check if the email is valid	1. Enter Invalid Emails 2. Click on the Register Button.	It should show an invalid email message
TC-005	Email validation	Check all the valid emails	1. Enter Valid Email 2. Click on the Register Button	It should not show any message
TC-006	Email validation	Check if Email already exists in the database	1. Enter an already registered email. 2. Click Register button	It should say that email already exists

### Test Cases for Login Page

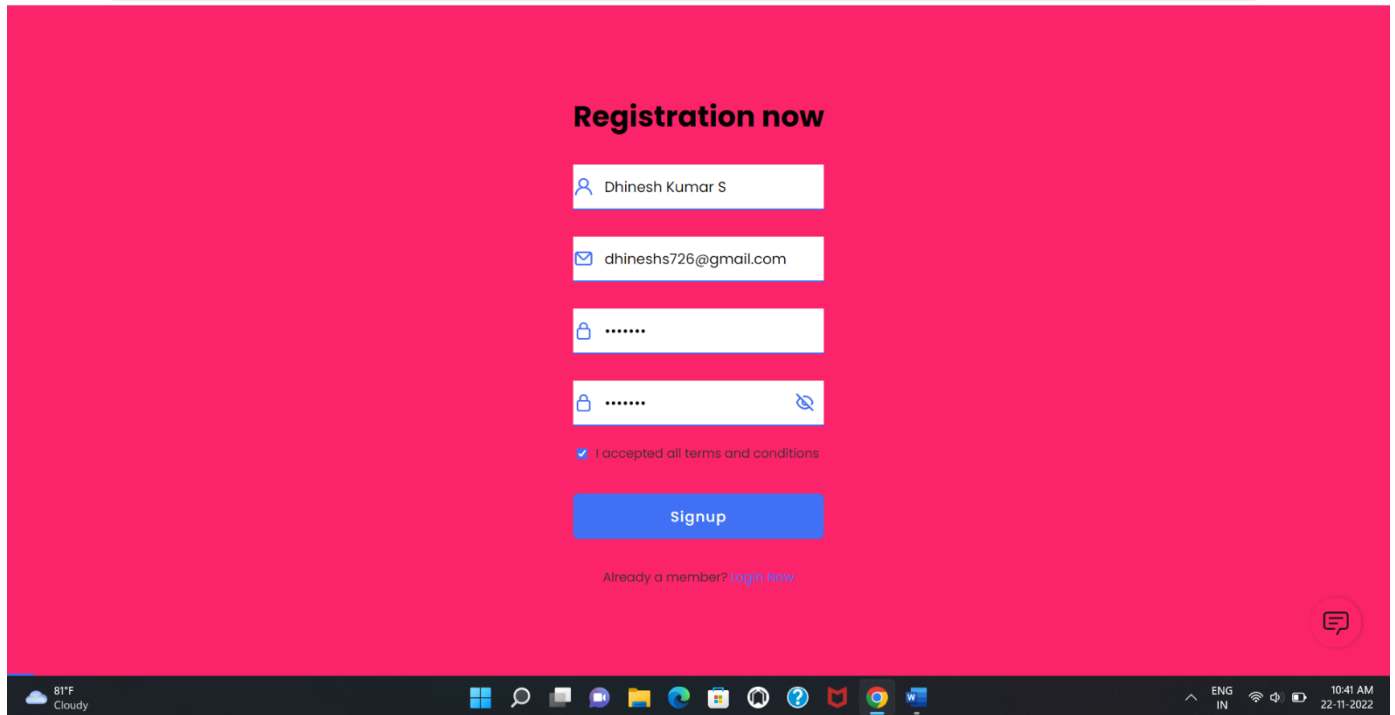
Test Cases	Feature	Description	Steps to Execute	Expected Results
TC-001	User Interface	Check all textboxes, checkboxes and buttons	1.Click textboxes, checkboxes and buttons	UI should workproperly
TC-002	Required fields	Check the required fields by not filling any data	1. Do not enter any value in the field. 2. Click on the Loginbutton.	A required field message should be displayed
TC-003	Required fields	Check user should by filling all the required fields	1. Enter valid values in the required fields. 2. Click the Login button.	1. Users should be logged in successfully 2. User should be redirected to home page
TC-004	Email validation	Check if the email is valid	1. Enter Invalid Emails 2. Click on the LoginButton.	It should show an invalid email message
TC-005	Required fields	Check if Password is valid	1.Enter Invalid password 2.Click on the Loginbutton	It should show invalid password message



## 8.2 User Acceptance Testing

### Real-time usage output

#### Registration Page



The screenshot shows a registration form titled "Registration now" on a pink background. The form includes input fields for a name (Dhinesh Kumar S), email (dhineshs726@gmail.com), and two password fields (one masked with dots, the other with a toggle icon). A checkbox for "I accepted all terms and conditions" is checked. A blue "Signup" button is at the bottom of the form. Below the button is a link "Already a member? [login Now](#)". A chat bubble icon is in the bottom right corner. The Windows taskbar at the bottom shows the date and time as 10:41 AM on 22-11-2022.

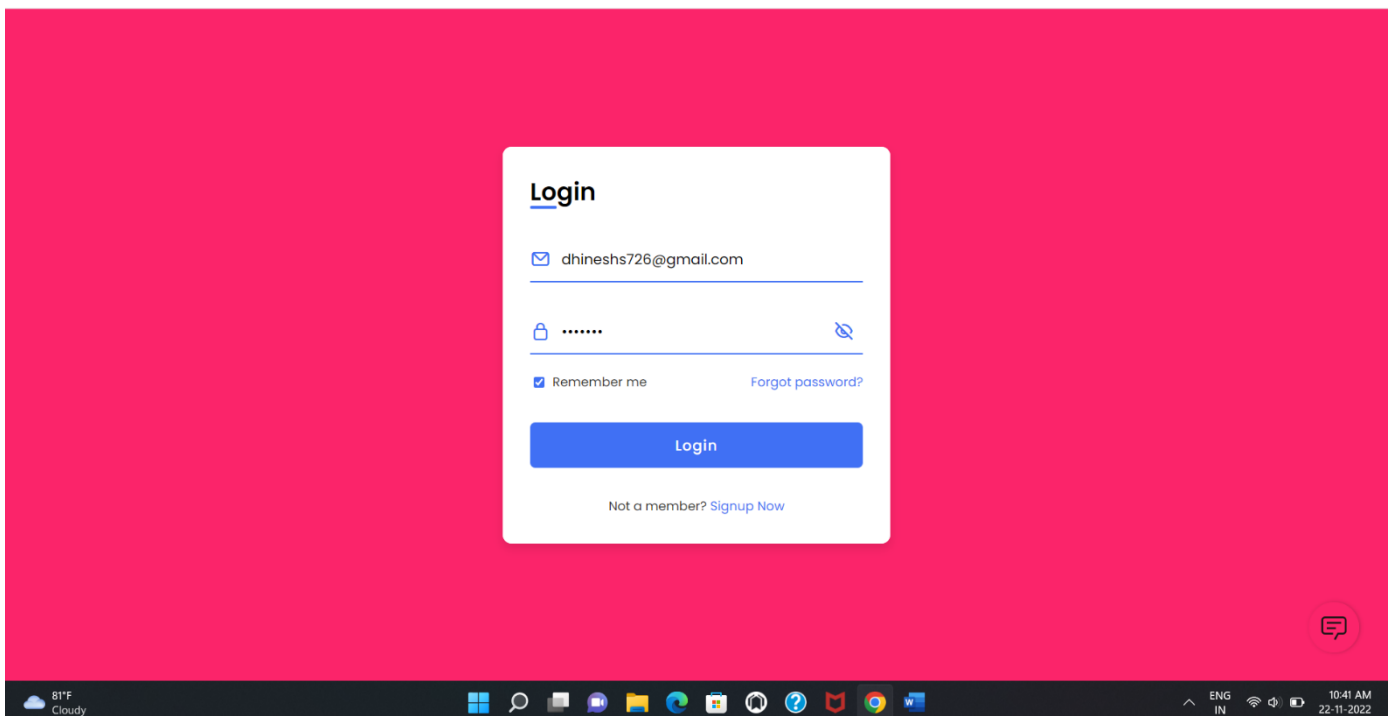
**Registration now**

☒ I accepted all terms and conditions

**Signup**

Already a member? [login Now](#)

#### Login Page



The screenshot shows a login form titled "Login" on a pink background. The form includes input fields for email (dhineshs726@gmail.com) and password (masked with dots and a toggle icon). A checkbox for "Remember me" is checked. A link "Forgot password?" is next to the password field. A blue "Login" button is at the bottom of the form. Below the button is a link "Not a member? [Signup Now](#)". A chat bubble icon is in the bottom right corner. The Windows taskbar at the bottom shows the date and time as 10:41 AM on 22-11-2022.

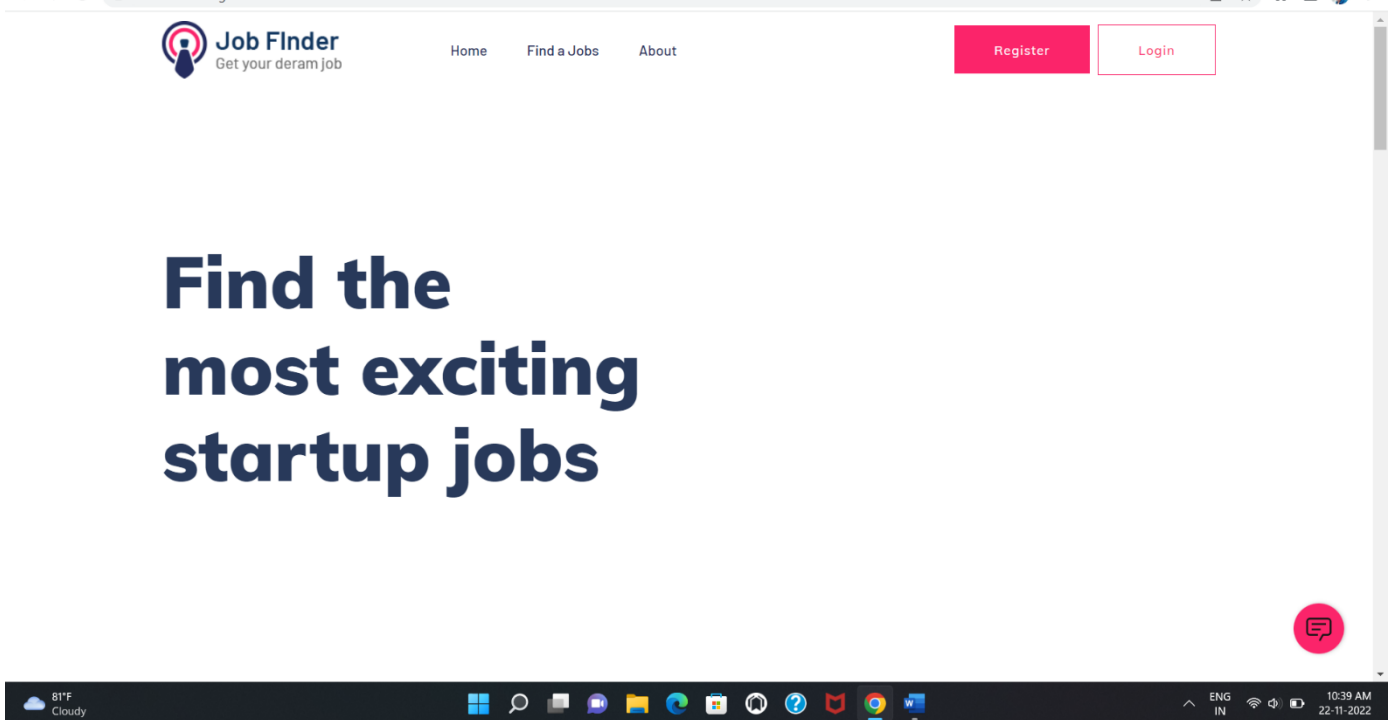
**Login**

☒ Remember me [Forgot password?](#)

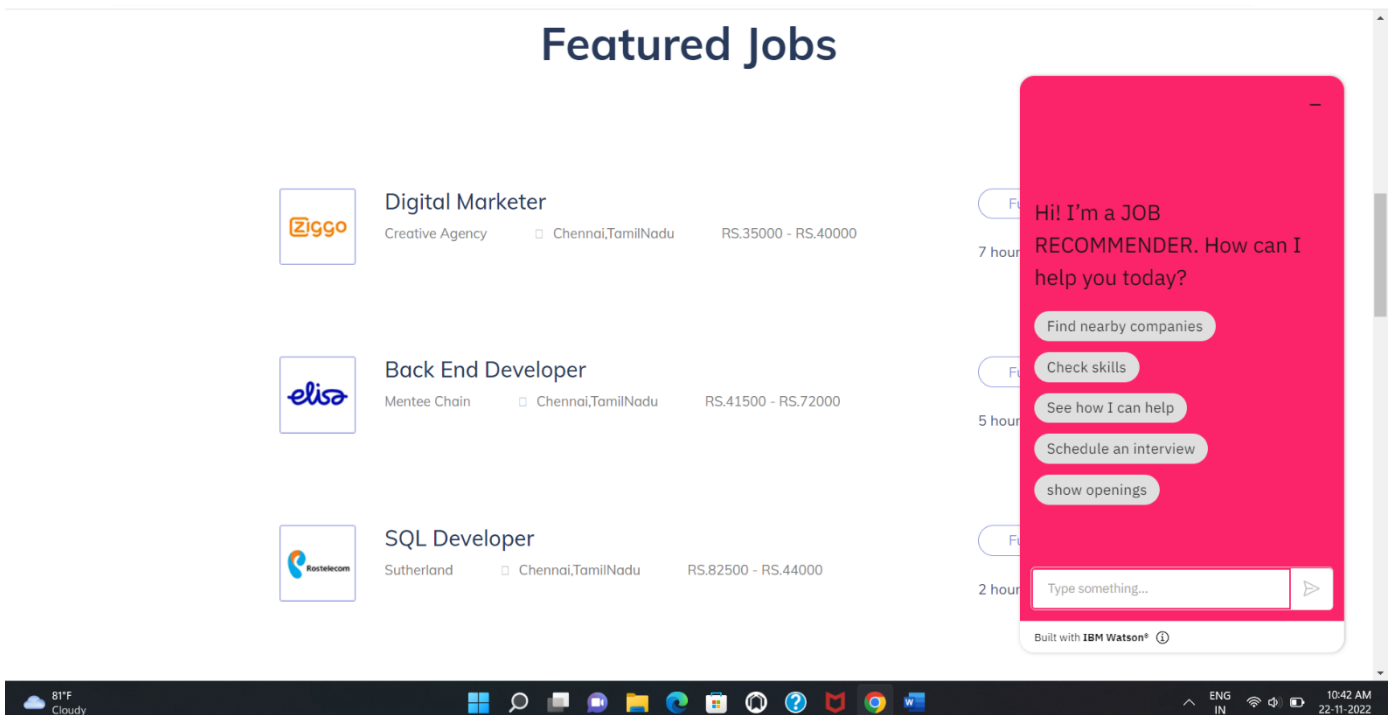
**Login**

Not a member? [Signup Now](#)

## Home Page



## Chatbot Page



## Job Categories

### Browse Top Categories

  
Design & Creative  
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## Application Page



### TIBCO Developer

Infosys Chennai,TamilNadu RS.53500 - RS.40000

#### Job Description

Analysis and software development for standalone Tibco BW components which provide the middle and back office solutions for Collateral Management Design, develop and unit-test his deliverable - as per exit criteria Responsible for seeing the delivery through to various environments + productions as per the project requirements Bug fixing and application support Review the development work for Quality and efficiency Documentation of the tasks performed Communication with regional stakeholders Documenting legacy code and optimizing where necessary

#### Required Knowledge, Skills, and Abilities

- TIBCO Toolkit, in particular Business Works
- Communication Skills.
- Database
- XML/XSLT SVN, GIT Labs, GIT Hub,Bit bucket

#### Education + Experience

#### Job Overview

Posted date : 20 October 2022  
Location : Chennai  
Vacancy : 17  
Job nature : Full time  
Salary : RS.50000 yearly  
Application date : 18 November 2022

Apply Now

#### Company Information

##### Infosys

Infosys is a global leader in next-generation digital services and consulting.

Name: Infosys

Web : infosys.com



## **CHAPTER 9**

### **RESULTS**

#### **9.1 Performance Metrics**

Based on the person-job fit premise, we propose a framework for job recommendation based on professional skills of job seekers. We automatically extracted the skills from the job seeker profiles using a variety of text processing techniques. Therefore, we perform the job recommendation using TF-IDF and four different configurations of Word2vec over a dataset of job seeker profiles and job vacancies collected by us. Our experimental results show the performances of the evaluated methods and configurations and can be used as a guide to choose the most suitable method and configuration for job recommendation.

## CHAPTER 10

### ADVANTAGES & DISADVANTAGES

- Sourcing candidates requires a lot of effort, which means it can cost a company both time and money. It was found in one study that referred candidates are 55% faster to hire, compared with employees sourced through career sites. An advantage of employee referrals is that your current team member makes the connection and saves the recruiter that initial time of sourcing the candidate. Further, the candidate could be a better match compared to other candidates who apply externally. This will also help expedite the process and cut back on the need to find alternative options.
- Employees will want to work with someone who will improve their own output and day-to-day workload. So, in most cases, you can have more confidence in the candidate's ability to perform the necessary tasks. Further, according to research done by Zao, nearly three in ten employers have caught a fake reference on an application. So, a personal recommendation that is already within the company can instill confidence that the reference is in fact valid and reputable.
- After two years, retention of referred employees is 45% compared to 20% from job boards. Employee referrals tend to stay around longer, perhaps because they are personally connected to their peers. That's not to mention that the referrer themselves may feel more respected and valued too after their company takes their recommendation. And when an employee feels respected and valued, they can become more dedicated in turn. You may also want to give an employee referrer a bonus to show your appreciation.
- While in most cases an employee's motives should be "pure," there may be circumstances where a person wants to just work with their friend or receive the referral bonus. This can result in the candidate not being as qualified as either the referrer or referee said they were. The referrer may think that they can make up for the candidate's shortcomings or give them a crash course to level-set their skills. This can impact their own production in a negative way. And now your company may have two underperforming employees—and you may have to look to fill both of these positions in the not-so-far-off future.

## **CHAPTER 11**

### **CONCLUSION**

We proposed a framework for job recommendation task. This framework facilitates the understanding of job recommendation process as well as it allows the use of a variety of text processing and recommendation methods according to the preferences of the job recommender system designer. Moreover, we also contribute making publicly available a new dataset containing job seekers profiles and job vacancies. Future directions of our work will focus on performing a more exhaustive evaluation considering a greater amount of methods and data as well as a comprehensive evaluation of the impact of each professional skill of a job seeker on the received job recommendation.

## **CHAPTER 12**

### **FUTURE SCOPE**

For this system to be hybrid, content-based filtering is required, which can only recommend jobs based on the user's current profile. It cannot deliver anything surprising based on the user's past searches. This paper also uses collaborative filtering which faces well-known problems of privacy breaches and cold start. The system has a broad scope that can be used to make it more robust and foolproof. Firstly, automating the crawling process is required, when a new company is added to the database. In other words, removing the one-time configuration step/process to fetch jobs of a particular new company can be done. These models can implement techniques such as KNN in collaborative filtering. Implementing NLP in content-based filtering for better and more accurate search matching can be done.

Along with this, testing and collecting more user data for better performance of the collaborative filtering module is required. Lastly, improving the cleansing process of the job description and using natural language processing are required. While using collaborative filtering, this work can be improved by giving different weights to different users based on their LinkedIn skills.

# CHAPTER 13

## APPENDIX

### Source code:

#### app.py

```
import bcrypt
import ibm_db
from sendmail import *
from flask import Flask, redirect, render_template, request, session, url_for
conn = ibm_db.connect("DATABASE=bludb;HOSTNAME=9938aec0-8105-433e-8bf9-0fbb7e483086.c1ogj3sd0tgtu0lqde00.databases.appdomain.cloud;PORT=32459;SECURITY=SSL;SSLServerCertificate=DigiCertGlobalRootCA.crt;UID=bnz27724;PWD=QQCWGUbP4lZASUTd",",")
app = Flask(__name__)
app.secret_key = b'_5#y2L"F4Q8z\n\xec]/'
@app.route("/",methods=['GET'])
def home():
    if 'email' not in session:
        return redirect(url_for('index'))
    return render_template('index.html',name='Home')
@app.route("/index")
def index():
    return render_template('index.html')
@app.route("/index1")
def index1():
    return render_template('index1.html')

@app.route("/job_details")
def job_details():
    return render_template('job_details.html')

@app.route("/job_details1")
def job_details1():
    return render_template('job_details1.html')

@app.route("/job_details2")
def job_details2():
    return render_template('job_details2.html')

@app.route("/job_details3")
def job_details3():
    return render_template('job_details3.html')

@app.route("/job_details4")
def job_details4():
```



```

return render_template('job_details4.html')

@app.route("/job_details5")
def job_details5():
    return render_template('job_details5.html')

@app.route("/job_details6")
def job_details6():
    return render_template('job_details6.html')

@app.route("/job_listing")
def job_listing():
    return render_template('job_listing.html')

@app.route("/about")
def about():
    return render_template('about.html')

@app.route("/registration",methods=['GET','POST'])
def register():
    if request.method == 'POST':
        name = request.form['name']
        phn = request.form['phn']
        email = request.form['email']
        psw = request.form['psw']

        if not name or not email or not phn or not psw:
            return render_template('registration.html',error='Please fill all fields')
        hash=bcrypt.hashpw(psw.encode('utf-8'),bcrypt.gensalt())
        query = "SELECT * FROM user_detail WHERE email=? OR phn=?"
        stmt = ibm_db.prepare(conn, query)
        ibm_db.bind_param(stmt,1,email)
        ibm_db.bind_param(stmt,2,phn)
        ibm_db.execute(stmt)
        print(stmt)
        isUser = ibm_db.fetch_assoc(stmt)
        if not isUser:
            insert_sql = "INSERT INTO user_detail(name, email, phn, psw) VALUES (?,?,?,?)"
            prep_stmt = ibm_db.prepare(conn, insert_sql)
            ibm_db.bind_param(prepare_stmt, 1, name)
            ibm_db.bind_param(prepare_stmt, 2, email)
            ibm_db.bind_param(prepare_stmt, 3, phn)
            ibm_db.bind_param(prepare_stmt, 4, hash)
            ibm_db.execute(prepare_stmt)
            sendMailUsingSendGrid(API,from_email,to_emails,subject,html_content)
            return render_template('registration.html',success="You can login")
        else:
            return render_template('registration.html',error='Invalid Credentials')

    return render_template('registration.html',name='Home')

```

```

@app.route("/login",methods=['GET','POST'])
def login():
    if request.method == 'POST':
        email = request.form['email']
        psw = request.form['psw']

        if not email or not psw:
            return render_template('login.html',error='Please fill all fields')
        query = "SELECT * FROM user_detail WHERE email=?"
        stmt = ibm_db.prepare(conn, query)
        ibm_db.bind_param(stmt,1,email)
        ibm_db.execute(stmt)
        isUser = ibm_db.fetch_assoc(stmt)
        print(isUser,psw)

        if not isUser:
            return render_template('login.html',error='Invalid Credentials')

        isPasswordMatch = bcrypt.checkpw(psw.encode('utf-8'),isUser['PSW'].encode('utf-8'))

        if not isPasswordMatch:
            return render_template('login.html',error='Invalid Credentials')

        session['email'] = isUser['EMAIL']
        return redirect(url_for('home'))

    return render_template('login.html',name='Home')

@app.route("/apply",methods=['GET','POST'])
def apply():
    if request.method == 'POST':
        name = request.form['name']
        email = request.form['email']
        psw = request.form['password']
        age = request.form['age']
        job = request.form['job']
        interest = request.form['interest']

        if not name or not email or not psw:
            return render_template('apply.html',error='Please fill all fields')
        hash=bcrypt.hashpw(psw.encode('utf-8'),bcrypt.gensalt())
        query = "SELECT * FROM applyform WHERE email=? OR psw=?"
        stmt = ibm_db.prepare(conn, query)

```

```

ibm_db.bind_param(stmt,1,email)
ibm_db.bind_param(stmt,2,psw)
ibm_db.execute(stmt)
isUser = ibm_db.fetch_assoc(stmt)
if not isUser:
    insert_sql = "INSERT INTO admin_detail(name, email, psw,age,job,interest) VALUES
(?,?,?,?,?,?)"

    prep_stmt = ibm_db.prepare(conn, insert_sql)
    ibm_db.bind_param(prepare_stmt, 1, name)
    ibm_db.bind_param(prepare_stmt, 2, email)
    ibm_db.bind_param(prepare_stmt, 3, psw)
    ibm_db.bind_param(prepare_stmt, 4, age)
    ibm_db.bind_param(prepare_stmt, 5, job)
    ibm_db.bind_param(prepare_stmt, 6, interest)
    ibm_db.execute(prepare_stmt)
    return render_template('apply.html',success="You can login")
else:
    return render_template('apply.html',error='Invalid Credentials')

return render_template('apply.html',name='Home')

if __name__ == "__main__":
    app.run(debug=True)

```

## LOGIN.HTML

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">

  <!-- ===== Iconscout CSS ===== -->
  <link rel="stylesheet" href="https://unicons.iconscout.com/release/v4.0.0/css/line.css">

  <!-- ===== CSS ===== -->
  <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/style2.css">
</head>
<body>

  <div class="container">
    <div class="forms">
      <div class="form login">
        <span class="title">Login</span>
        <form method="post">
          <div class="input-field">
            <input type="text" placeholder="Enter your email" name="email" required>
            <i class="uil uil-envelope icon"></i>
          </div>
          <div class="input-field">
            <input type="password" class="password" placeholder="Enter your password"
name="psw"required>
            <i class="uil uil-lock icon"></i>
            <i class="uil uil-eye-slash showHidePw"></i>
          </div>

          <div class="checkbox-text">
            <div class="checkbox-content">
              <input type="checkbox" id="logCheck">
              <label for="logCheck" class="text">Remember me</label>
            </div>

            <a href="#" class="text">Forgot password?</a>
          </div>
          <a href="index1.html">
            <div class="input-field button">
              <input type="button" value="Login">
            </div>
          </a>
        </form>
      </div>
    </div>
  </div>
```

```

    <div class="login-signup">
      <span class="text">Not a member?
        <a href="/registration.html" class="text signup-link">Signup Now</a>
      </span>
    </div>
  </div>

  <script src="script.js"></script>
  <script>
    window.watsonAssistantChatOptions = {
      integrationID: "65c01ed6-9fc1-4883-979a-3676279ebe44", // The ID of this
integration.
      region: "us-south", // The region your integration is hosted in.
      serviceInstanceID: "8fcd017f-a192-420a-aafe-18cb0330efca", // The ID of your service
instance.
      onLoad: function(instance) { instance.render(); }
    };
    setTimeout(function(){
      const t=document.createElement('script');
      t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
      document.head.appendChild(t);
    });
  </script>

</body>
</html>

```

## REGISTRATION.HTML

```

<!DOCTYPE html>
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">

  <link rel="stylesheet" href="/assests/css/line.css">
  <link rel="stylesheet" href="/style2.css">
<body>

  <div class="form signup">
    <div class="container">

      <span class="title"><h3>
        Register now!!1</h3></span>

```

```

<form method="post">
  <div class="input-field">
    <input type="text" placeholder="Enter your name" name="name" required>
    <i class="uil uil-user"></i>
  </div>
  <div class="input-field">
    <input type="text" placeholder="Enter your email" name="email" required>
    <i class="uil uil-envelope icon"></i>
  </div>
  <div class="input-field">
    <input type="password" class="password" placeholder="Create a password"
name="psw" required>
    <i class="uil uil-lock icon"></i>
  </div>
  <div class="input-field">
    <input type="text" placeholder="enter your phone number" name="phn"
required>
    <i class="uil uil-lock icon"></i>
    <i class="uil uil-eye-slash showHidePw"></i>
  </div>

  <div class="checkbox-text">
    <div class="checkbox-content">
      <input type="checkbox" id="termCon">
      <label for="termCon" class="text">I accepted all terms and conditions</label>
    </div>
  </div>

  <div class="input-field button">
    <a href="/index1.html" > <input type="button" value="Signup"></a>
  </div>

</form>

<div class="login-signup">
  <span class="text">Already a member?
  <a href="/login.html" class="text login-link">Login Now</a>
</span>
</div>
</div>
</body>
<script>
  window.watsonAssistantChatOptions = {
    integrationID: "65c01ed6-9fc1-4883-979a-3676279ebe44", // The ID of this
integration.
    region: "us-south", // The region your integration is hosted in.
    serviceInstanceID: "8fcd017f-a192-420a-aafc-18cb0330efca", // The ID of your
service instance.
    onLoad: function(instance) { instance.render(); }
  };

```

```

        setTimeout(function(){
            const t=document.createElement('script');
            t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
            document.head.appendChild(t);
        });
    </script>
</body>
</head>

```

## ABOUT.HTML

```

<!doctype html>
<html class="no-js" lang="zxx">
    <head>
        <meta charset="utf-8">
        <meta http-equiv="x-ua-compatible" content="ie=edge">
        <title>Job Finder</title>
        <meta name="description" content="">
        <meta name="viewport" content="width=device-width, initial-scale=1">
        <link rel="manifest" href="site.webmanifest">
        <link rel="shortcut icon" type="image/x-icon" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/img/favicon.ico">

        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/bootstrap.min.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/owl.carousel.min.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/flaticon.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/price_rangs.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/slicknav.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/animate.min.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/magnific-popup.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/fontawesome-all.min.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/themify-icons.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/slick.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/nice-select.css">
        <link rel="stylesheet" href="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/css/style.css">
    </head>

```



```

<body>

<!-- Preloader Start -->
<header>
  <!-- Header Start -->
  <div class="header-area header-transparent">
    <div class="header-top header-sticky">
      <div class="container">
        <div class="row align-items-center">
          <div class="col-lg-3 col-md-2">
            <!-- Logo -->
            <div class="logo">
              <a href="index.html"></a>
            </div>
          </div>
          <div class="col-lg-9 col-md-9">
            <div class="menu-wrapper">
              <!-- Main-menu -->
              <div class="main-menu">
                <nav class="d-none d-lg-block">
                  <ul id="navigation">
                    <li><a href="/index.html">Home</a></li>
                    <li><a href="/job_listing.html">Find a Jobs </a></li>
                    <li><a href="/about.html">About</a></li>

                  </ul>
                </nav>
              </div>
              <!-- Header-btn -->
              <div class="header-btn d-none f-right d-lg-block">
                <a href="/registration.html" class="btn head-btn1">Register</a>
                <a href="/login.html" class="btn head-btn2">Login</a>
              </div>
            </div>
          </div>
          <!-- Mobile Menu -->
          <div class="col-12">
            <div class="mobile_menu d-block d-lg-none"></div>
          </div>
        </div>
      </div>
    </div>
  </div>
  <!-- Header End -->
</header>
<main>

```

```

<!-- Hero Area Start-->
<div class="slider-area ">
  <div class="single-slider section-overly slider-height2 d-flex align-items-center" data-
background="http://s3.jp-tok.cloud-object-
storage.appdomain.cloud/jobportalwebsite/assets/img/hero/about.jpg">
    <div class="container">
      <div class="row">
        <div class="col-xl-12">
          <div class="hero-cap text-center">
            <h2>About us</h2>
          </div>
        </div>
      </div>
    </div>
  </div>
</div>
<!-- Hero Area End -->
<!-- Support Company Start-->
<div class="support-company-area fix section-padding2">
  <div class="container">
    <div class="row align-items-center">
      <div class="col-xl-6 col-lg-6">
        <div class="right-caption">
          <!-- Section Tittle -->
          <div class="section-tittle section-tittle2">
            <span>What we are doing</span>
            <h2>Talented people are getting Jobs</h2>
          </div>
          <div class="support-caption">
            <p class="pera-top">
              The company was incorporated on May 1, 1995 under the Companies
              Act, 1956 as job hunter(India) Private Limited and became a public limited company on April
              27, 2006. Starting with a classified recruitment online business, jobfinder.com, Job hunter has
              grown and diversified rapidly, setting benchmarks as a pioneer for others to follow. Driven by
              innovation, creativity, an experienced and talented leadership team and a strong culture of
              entrepreneurship, today, it is India's premier online classifieds company in recruitment,
              matrimony, real estate, education and related services.
            </p>
          </div>
        </div>
      </div>
      <div class="col-xl-6 col-lg-6">
        <div class="support-location-img">
          
          <div class="support-img-cap text-center">
            </div>
          </div>
        </div>
      </div>
    </div>
  </div>
</div>

```

```

<!-- Support Company End-->
<!-- How Apply Process Start-->
<div class="apply-process-area apply-bg pt-150 pb-150" data-background="http://s3.jp-
tok.cloud-object-storage.appdomain.cloud/jobportalwebsite/assets/img/gallery/how-
applybg.png">
  <div class="container">
    <!-- Section Tittle -->
    <div class="row">
      <div class="col-lg-12">
        <div class="section-tittle white-text text-center">
          <span>Apply process</span>
          <h2>How it works</h2>
        </div>
      </div>
    </div>
    <!-- Apply Process Caption -->
    <div class="row">
      <div class="col-lg-4 col-md-6">
        <div class="single-process text-center mb-30">
          <div class="process-ion">
            <span class="flaticon-search"></span>
          </div>
          <div class="process-cap">
            <h5>1. Search a job</h5>
            <p></p>
          </div>
        </div>
      </div>
      <div class="col-lg-4 col-md-6">
        <div class="single-process text-center mb-30">
          <div class="process-ion">
            <span class="flaticon-curriculum-vitae"></span>
          </div>
          <div class="process-cap">
            <h5>2. Apply for job</h5>
            <p></p>
          </div>
        </div>
      </div>
      <div class="col-lg-4 col-md-6">
        <div class="single-process text-center mb-30">
          <div class="process-ion">
            <span class="flaticon-tour"></span>
          </div>
          <div class="process-cap">
            <h5>3. Get your job</h5>
            <p></p>
          </div>
        </div>
      </div>
    </div>
  </div>
</div>

```

```

<!-- How Apply Process End-->

</main>
<footer>
<!-- Footer Start-->
<div class="footer-area footer-bg footer-padding">
  <div class="container">
    <div class="row d-flex justify-content-between">
      <div class="col-xl-3 col-lg-3 col-md-4 col-sm-6">
        <div class="single-footer-caption mb-50">
          <div class="single-footer-caption mb-30">
            <div class="footer-tittle">
              <h4>About Us</h4>
              <div class="footer-pera">
                <p> Connect the world's professionals to make them more productive
and successful.</p>
              </div>
            </div>
          </div>
        </div>
      </div>
      <div class="col-xl-3 col-lg-3 col-md-4 col-sm-5">
        <div class="single-footer-caption mb-50">
          <div class="footer-tittle">
            <h4>Contact Info</h4>
            <ul>
              <li>
                <p>Address :<br>
                2, jobfinds ltd,<br>
                Anna Nagar,<br>
                madurai</p>
              </li>
              <li><a href="#">Phone : 99999 99999</a></li>
              <li><a href="#">Email : info@jobfinder.com</a></li>
            </ul>
          </div>
        </div>
      </div>
    </div>
  </div>
<div class="footer-bottom-area footer-bg">
  <div class="container">
    <div class="footer-border">
      <div class="row d-flex justify-content-between align-items-center">
        <div class="col-xl-10 col-lg-10 ">
          <div class="footer-copy-right"> <p>
            Copyright &copy;<script>document.write(new
Date().getFullYear());</script> All rights reserved
          </p>

```

```

        </div>
    </div>

    </div>
</div>
</div>
<!-- Footer End-->
</footer>

<script>
    window.watsonAssistantChatOptions = {
        integrationID: "65c01ed6-9fc1-4883-979a-3676279ebe44", // The ID of this
integration.
        region: "us-south", // The region your integration is hosted in.
        serviceInstanceID: "8fcd017f-a192-420a-aafe-18cb0330efca", // The ID of your
service instance.
        onLoad: function(instance) { instance.render(); }
    };
    setTimeout(function(){
        const t=document.createElement('script');
        t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
        document.head.appendChild(t);
    });
</script>
</body>
</html>

```

## **GITHUB LINK**

<https://github.com/IBM-EPBL/IBM-Project-34236-1660233256>

## **DEMO VIDEO LINK**

- Google drive:

[https://drive.google.com/file/d/1QK3fA14et7L\\_lvG2rVPIG199\\_7et8KKv/view?usp=drivesdk](https://drive.google.com/file/d/1QK3fA14et7L_lvG2rVPIG199_7et8KKv/view?usp=drivesdk)

- YouTube:

<https://www.youtube.com/watch?v=FDsUH6sqs3w>