SKILL/JOB RECOMMENDATION APPLICATION

PROJECT REPORT

UNDER THE GUIDANCE OF

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1. INTRODUCTION

1.1 Project Overview

This app is a skill recommender solution through which the fresher or the skilled person can log in and find the jobs by using the search option or they can directly interact with the chatbot and get their dream job.

1.2 Purpose

To develop an end-to-end web application capable of displaying the current job openings based on the user skillset. The user and their information are stored in the Database. An alert is sent when there is an opening based on the user skillset. Users will interact with the chatbot and can get the recommendations based on their skills. We can use a job search API to get the current job openings in the market which will fetch the data directly from the webpage.

2. LITERATURE SURVEY

2.1 Existing problem and References

Here, we will take a look at all previous solutions, attempts and implementations to the “SKILL JOB RECOMMENDER” or anything that is vaguely related to it.

S.NO	PAPER TITLE	AUTHOR(S)	MONTH/ YEAR	METHOD/ IMPLEMENTATION TECHNIQUES	RESOURCE LINK
1	**MACHINE LEARNED JOB RECOMMENDATION**	-LOANNIS PAPARRIZOS -B. BARLA CAMBAZOGLU -ARISTIDES GIONIS	2011	1.COLLABRATIVE FILTERING 2.CONTEXT AWARE 3.MATRIX FACTORIZATION 4.GROUP RECOMMENDATION 5.PRODUCT RECOMMENDATION 6.USER CENTRIC RATING 7.PREDICTION	https://dl.acm.org/doi/10.1145/2043932.2043994
2	**COMBINING CONTENT BASED AND COLLABRATIVE FILTERING FOR JOB RECOMMENDATION**	-SHUO YANG -MOHAMME D KORAYEM -KHALIFEH ALJADDA -TREY GRAINGER -SRIRAM NATRAJAN	17TH AUGUST 2017	1.KNOWLEDGE BASED 2.FEATURE SELECTION 3.NEURAL NETWORK 4.GROUP DECISION 5.SUPPORT VECTOR	https://www.sciencedirect.com/science/article/abs/pii/S095070511730374X?via%3Dihub

3	**PERSONALIZED JOB RECOMMENDATION SYSTEM AT LINKEDIN**	-KRISHNARAM KENTHAPADI -BENJAMIN LE -GANESH VENKATARAMAN	2017	1.RECOMMENDER SYSTEM 2.COLLABRATIVE FILTERING 3.LEARNING TO RANK 4.NEUERAL NETWORK 5.USER PREFERENCES 6.DEEP LEARNING 7.ONLINE LEARNING	https://dl.acm.org/doi/10.1145/3109859.3109921
4	**A NOTE ON EXPLICIT VERSUS IMPLICIT INFORMATION FOR JOB RECOMMENDATION**	-MICHAEL REUSENS -WILFRIED LEMAHIEU -BART BAESENS -LUC SELS	2017	1.SUPPORT SYSTEM 2.DECISION MAKING 3.DECISION SUPPORT SYSTEM 4.INFORMATION SYSTEM 5.SUPPLY CHAIN	https://www.sciencedirect.com/science/article/abs/pii/S0167923617300611?via%3Dihub

2.3 Problem Statement Definition

Job, finding a job based on our skills is an very difficult thing we have to go through a lot process, to overcome this and to save time we are introducing this “SKILL JOB RECOMMENDER" which helps us to know job opportunities of the companies through our profile were we will create an account and enter our skillsets in the profile. It automatically searches the job and suggest us jobs based on our skills.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

https://github.com/IBM-EPBL/IBM-Project-33416-1660219960/blob/main/Project%20Design%20%26%20Planning/Ideation%20Phase/Empathy_map.pdf

3.2 Ideation & Brainstorming

https://github.com/IBM-EPBL/IBM-Project-33416-1660219960/blob/main/Project%20Design%20%26%20Planning/Ideation%20Phase/brain%20storm%20and%20ideation.pdf

3.3 Proposed Solution

PROBLEM IN JOB RECOMMENDATION

In Society many individuals face problems in job searching, many job seekers are unable to find their dream job. Many good technical persons are unable to land their dream job and lose their hope. So, we have come up with a solution**.**

SOLUTION FOR THE PROBLEM

Our teammates, have designed a application which helps job seekers to land in their dream job according to their skills

NOVELTY

This software has designed to get recommended specific to the user's skills.

FEASIBILITY

The project is feasible and can be implemented using flask framework, and the job API can be brought from third party service, and the software can be accessed from all over the world to meet job at all ends.

BUSINESS MODEL

Apart from job recommendation, a revenue is important for a organization, so the required revenue can be brought up by third party ads like google ads.

SOCIAL IMPACT

This software solves the social impacts like making all job seekers or individuals to meet the job that meets their criteria, so this can solve social issue on job finding.

SCALABILITY

This software is based on SDLC, so the scalability of the software can be changed according to the needs of customers in future.

3.4 Problem Solution fit

HOW CUSTOMERS MEET JOB?

The software uses two types of account, one is vendor type another is customer type, so the job posted by vendors can be easily accessed by customers.

HOW CUSTOMERS GET SUGGESTIONS?

As the profile created for customers, all the experience and skill sets are gathered, so a special type of algorithm will provide suggestion about job that will match their profile.

HOW CUSTOMERS CLARIFY THEIR PROBLEMS?

The software uses customer support facility and chatter bot, so any questions are clarified both vendor and customer side.

WHY JOB RECOMMENDATION APPLICATION?

Many individuals in society are without job due to many reasons so, we come up with online application it is easy to use, and all individuals can apply for the job that fit for their skill.

TIME AND MONEY?

As it is an online platform, the time and money can be saved, comparing to offline platform

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-I	**User Registration**	Registration through Form Registration through Gmail
	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	**Chat Bot**	A Chat Bot will be there in website to solve user queries and problems related to applying a job, search for a job and much more.
	User Login	Login through Form Login through Gmail
FR-5	**User Search**	Exploration of Jobs based on job filters and skill recommendations.
	User Profile	Updating user profile through the login credentials

FR-7	**User Acceptance**	Confirmation of the Job.

4.2 Non-Functional requirements

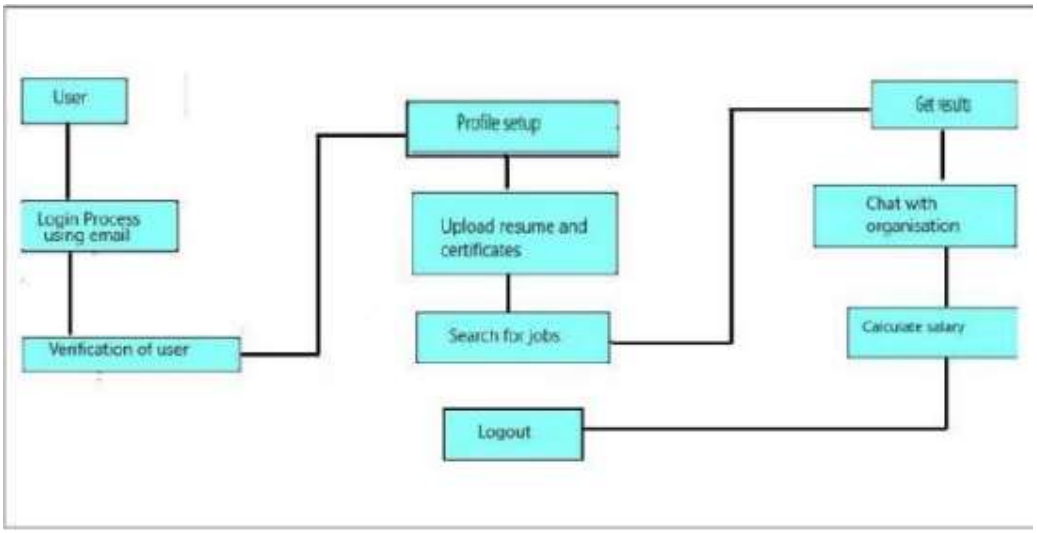
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-I	**Usability**	This application can be used by the job seekers to login and search for the job based on her Skills set.
NFR-2	**Security**	This application is secure with separate login for Job Seekers as well as Job Recruiters.
NFR-3	**Reliability**	This application is open-source and feel free to use, without need to pay anything. The enormous job openings will be provided to all the job seekers without any limitation.
NFR-4	**Performance**	The performance of this application is quicker response and takes lesser time to do any process.
NFR-5	**Availability**	This application provides job offers and recommends Skills for a Particular Job openings.
NFR-6	**Scalability**	The Response time of the application is quite faster compared to any other application.

5. PROJECT DESIGN

5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual of the information flows a system A neat and dear DFD can depict the amount of the system graphically. It shows how data enters and leaves the system, what and where data is stored



5.2 Solution & Technical Architecture

REQUIREMENTS

This project is done using the Flask framework for backend development, and other required packages like flask-login, flask SQL alchemy, flask-form, security packages etc.

For frontend development CSS, HTML, JavaScript is used along with CSS framework like bootstrap.

For API testing postman application is used, and

For deployment IBM cloud service is used.

DESIGN

All the requirements are used to design the software. The design and architecture of the software is done in a unique manner so the software can be reused and developed in future.

The routers are programmed in routers.py file, The forms used in the software are developed in forms.py file. The database model is created in model.py file, the testing is done in separate tests.py file.

Finally, HTML files are stored in templates folder and static file is stored in static folder

IMPLEMENTATION

The designing process is done, and implementation is done by developing the logic by coding. All the required packages are imported and for each router specific logic is developed according to the use.

UNIT TESTING

Each part of the software is developed by individual team members, and it is tested individually by the python unit testing package.

INTEGRATION AND TESTING

After unit testing all parts of the software are integrated and tested finally, so the flask application can be run in any platform. The testing process includes Alpha testing and Beta testing.

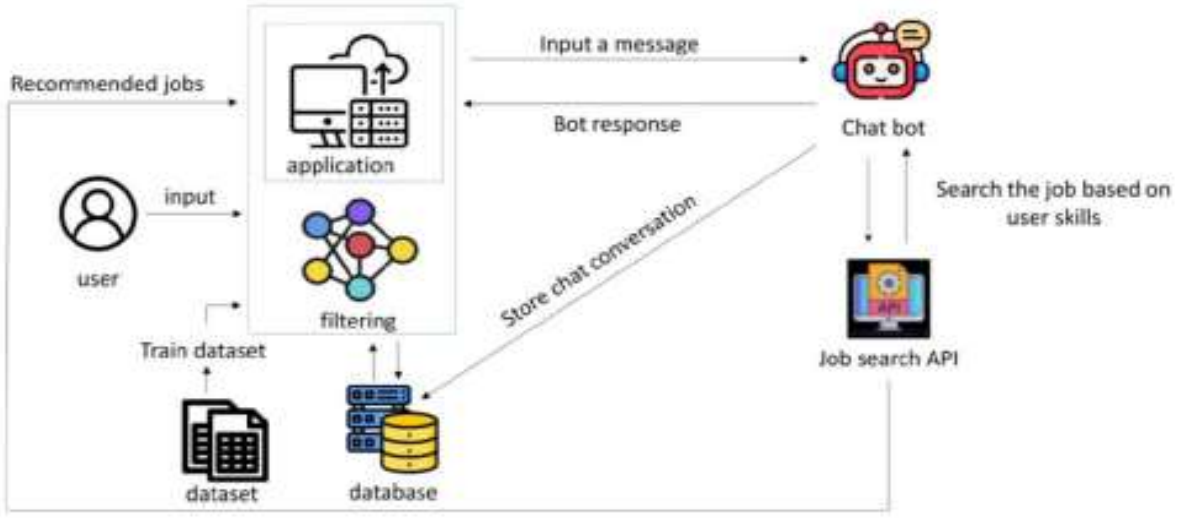
DEPLOYMENT

The flask application is finally deployed in IAAS platform like IBM cloud service, so it can be run in HTTPS protocol along with SSL.

In the deployment process a real time database is connected along with real time file storage.

MAINTENANCE

After successful deployment, if there is a package update, it is implemented in the software.



5.3 User Stories

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application.	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook.	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail.		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password.		High	Sprint-1
	Dashboard	USN-5	As a user, I can access my dashboard after signing in.	I can access my account / dashboard	High	Sprint-1
Customer (Web user)	Access	USN-6	As a user, I can setup a profile, and basic details by signing in.			
		USN-7	As a user, I will upload my resume, certificates, and other requirements.	I can perform several task in the application	Medium	Sprint-1
Customer Care Executive	Chatbot	USN-8	As a user, I can seek guidance from the customer care executive.		High	Sprint-1
Administrator	DBMS	USN-9	As a administrator, I can keep the applications of your organization relies on running.	I can perform various modifications in the applications.	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Acceptance criteria
Sprint-1	UI Design	USN-1	As a user, I can see and experience an awesome user interface on the website	Medium	Better Impression about a website
Sprint-1	Registration	USN-2	As a user, I can register for the application by entering my email, password, and confirming my password.	High	I can access my account / dashboard
Sprint-1		USN-3	As a user, I can register for the application through Gmail	Medium	I can receive confirmation email & click confirm
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	High	I can access my account / dashboard
Sprint-!	Flask	USN-5	As a user, I can access the website in a second	High	I can access my account / dashboard
Sprint-1	Dashboard	USN-6	As a user, If I Logged in correctly, I can view my dashboard and I can navigate to any pages which are already listed there.	High	I can access all the pages/ dashboard
Sprint-2	User Profile	USN-7	As a user, I can view and update my details	Medium	I can modify my details/data
Sprint-2	Database	USN-8	As a user, I can store my details and data in the website w	Medium	I can store my data

Sprint-2	Cloud Storage	USN-9	As a user, I can upload my photo, resume and much more in the website.	Medium	I can Upload my documents and details
Sprint-2	Chatbot	USN-10	As a user, I can ask the Chatbot about latest job openings, which will help me and show the recent job openings based on my profile	High	I can know the recent job openings
Sprint-2	Identity-Aware	USN-11	As a User, I can access my account by entering by correct login credentials. My user credentials is only displayed to me.	High	I can have my account safely

Sprint-1	Dashboard	USN-6	As a user, If I Logged in correctly, I can view my dashboard and I can navigate to any pages which are already listed there.	High	I can access all the pages/ dashboard
Sprint-2	User Profile	USN-7	As a user, I can view and update my details	Medium	I can modify my details/data
Sprint-2	Database	USN-8	As a user, I can store my details and data in the website w	Medium	I can store my data
Sprint-2	Cloud Storage	USN-9	As a user, I can upload my photo, resume and much more in the website.	Medium	I can Upload my documents and details
Sprint-2	Chatbot	USN-10	As a user, I can ask the Chatbot about latest job openings, which will help me and show the recent job openings based on my profile	High	I can know the recent job openings

Sprint-2	Identity-Aware	USN-11	As a User, I can access my account by entering by correct login credentials. My user credentials is only displayed to me.	High	I can have my account safely
Sprint-3	Learning Resource	USN-12	As a user, I can learn the course and I will attain the skills which will be useful for developing my technical skills.	High	I can gain the knowledge and skills
Sprint-3	Docker	USN-13	As a user, I can access the website in any device	High	I can access my account in any device
Sprint-3	Kubernetes	USN-14	As a user, I can access the website in any device	High	I can access my account in any device
Sprint-3	Deployment in cloud	USN-15	As a user, I can access the website in any device	High	I can access my account in any device
Sprint-3	Technical support	USN-16	As a user, I can get a customer care support from the website which will solve my queries.	Medium	I can tackle my problem & queries.
Sprint-4	Unit Testing	USN-17	As a user, I can access the website without any interruption	High	I can access the website
Sprint-4	Integration testing	USN-18	As a user, I can access the website without any interruption	High	I can access the website
Sprint-4	System testing	USN-19	As a user, I can access the website without any interruption	High	I can access the website
Sprint-4	Correction	USN-20	As a user, I can access the website without any interruption	High	I can access the website
Sprint-4	Acceptance testing	USN-21	As a user, I can access the website without any interruption	High	I can access the website

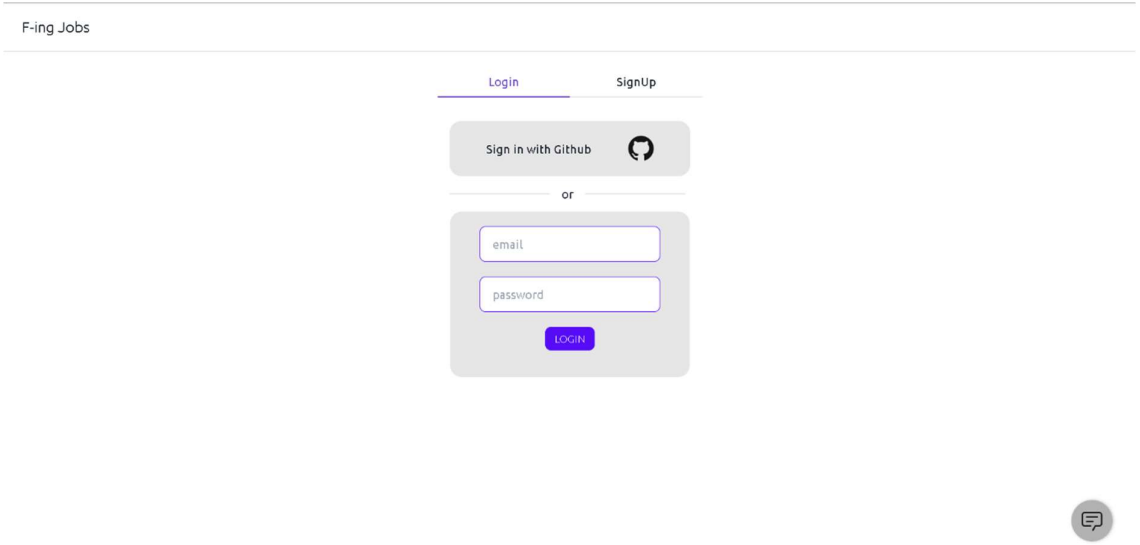
6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date	Story Points	Sprint Release Date
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	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

7. CODING & SOLUTIONING

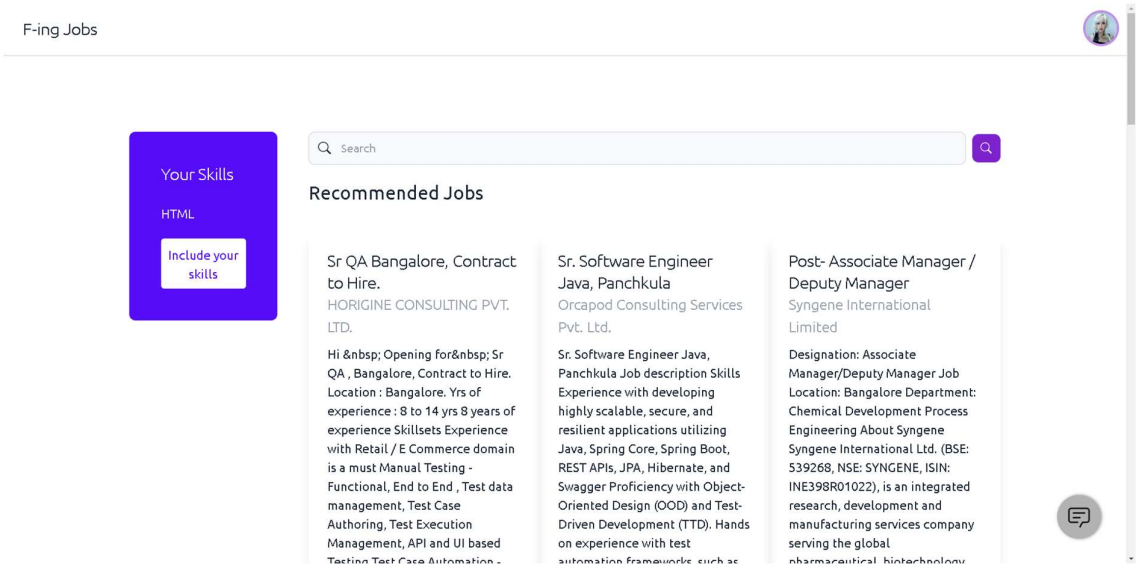
7.1 Feature 1

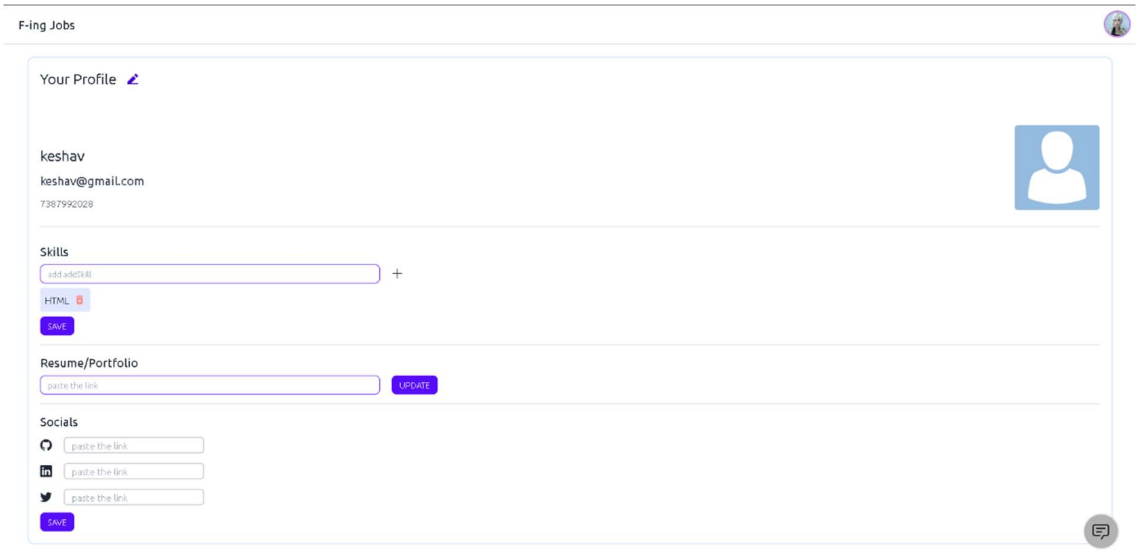
Login and Register screen for users



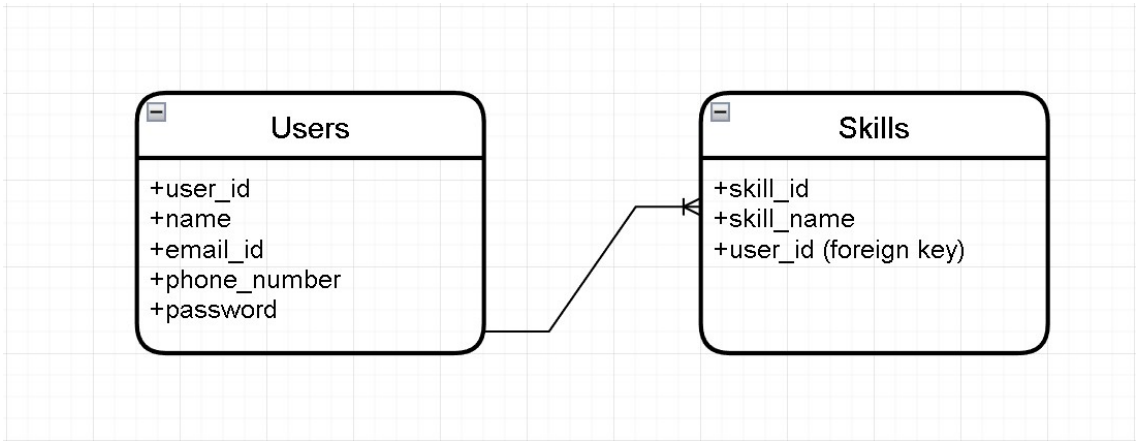
7.2 Feature 2

Dashboard and profile section





7.3 Database Schema (if Applicable)



8. TESTING

8.1 Test Cases

Test Scenarios

1. Verify user can see login page
2. Verify user can login to application
3. Verify user can navigate to create your account page
4. Verify user can recovery password
5. Verify login page elements

Search

1. Verify user can search by entering keywords in search box
2. Verify user can see suggestions based on keyword entered in search box
3. Verify user can see related auto suggestions displaying based on keyword entered in search box
4. Verify user can see no matches found message when no results are matching with entered keyword
5. Verify user can see search detailed page when nothing entered in textbox

Sample test results

Test Scenario	Expected Result	Actual Result	Status
Verify that after registration users are navigated to login page	Users should be navigated to registration page	Working as expected	**Pass**
Verify the UI elements in Login/Signup popup	Users should be notified of login process	Not working	**pass**
Verify user can log into application with Valid credentials	User should be logged into website properly	Working as expected	**Pass**
Verify that categories of skills and jobs are shown in homepage	Categories of skills and jobs should be shown in homepage	Working as expected	**Pass**
Verify that jobs are displayed in homepage	jobs should be displayed in homepage	Working as expected	**Pass**

Verify that when clicked on jobs it is redirected to correct page	When clicked on job link it should be redirected to correct page	Working as expected	**Pass**

8.2 User Acceptance Testing

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity1	Severity2	Severity3	Severity4	Subtotal
ByDesign	5	0	0	0	5
Duplicate	1	1	0	1	3
External	2	2	0	1	5
Fixed	8	3	0	2	13
NotReproduced	0	0	1	0	1
Skipped	0	0	0	0	0
Won'tFix	0	0	0	0	0
Totals	8	6	1	2	14

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	TotalCases	NotTested	Fail	Pass
PrintEngine	7	0	1	6
ClientApplication	51	0	0	51
Security	4	0	2	2
OutsourceShipping	15	0	1	14
ExceptionReporting	9	0	0	9
FinalReportOutput	4	0	0	4
VersionControl	2	0	0	2

9. RESULTS

9.1 Performance Metrics

Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Voluem Changes	Risk Score
New	Moderate	No Changes	Moderate	Minimum	>5 to 10%	ORANGE
Existing	High	No Changes	Low	Minimum	No Changes	GREEN
Existing	No Changes	No Changes	No Changes	Moderate	>30 to 50 %	RED
New	Moderate	No Changes	High	Minimum	>10 to 30%	ORANGE

NFT - Detailed Test Plan				
S.No	Project Overview	NFT Test approach	Assumptions/Dependencies/Risks	Approvals/SignOff
1	Skill/Job Recommender	User creates a new account	User does not have account	Yes
2	Skill/Job Recommender	User adds skill	User is in profile page	Yes
3	Skill/Job Recommender	User applies for job	User is in dashboard page	Yes
4	Skill/Job Recommender	User logs out of app	Use clicks logout button	Yes

10. ADVANTAGES & DISADVANTAGES

Advantages

1. Users can filter jobs based on their skills.
2. Easier to find and apply for remote jobs.
3. Exposure to a wide range of opportunities in one single platform

Disadvantages

1. Users cannot search jobs in particular location
2. Users must create an account to access application

11. CONCLUSION

Thus, the application to recommend jobs to users based on their skills was developed and deployed successfully.

12. FUTURE SCOPE

The demand for jobs is rising, and more skilled developers are emerging every day. Hence this application has a lot of room to improve in ways that enable the users to find jobs that suit their needs and align with their skills.

Here are some features that can be added/improved:

1. Integrate with other platforms such as Indeed or LinkedIn
2. Use data from users to train AI model that suggests suitable jobs for wide variety of skills.
3. Make the project open source and get feedback from the community.

13. APPENDIX

Links for the references, source code and demo for the project can be found below.

Application Live Link: http://169.51.207.195:32478

Source Code

https://github.com/IBM-EPBL/IBM-Project-33416-1660219960/tree/main/Final%20Deliverables/Project%20Code

GitHub & Project Demo Link

GitHub: https://github.com/IBM-EPBL/IBM-Project-33416-1660219960

Demo Link: https://youtu.be/17QrARMxdgA