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.

PAPER TITLE	METHOD	MERITS	DEMERITS	PAPER LINK
Skill Scanner: Connecting and Supporting Employers, Job Seekers and Educational Institutions with an AI-based Recommendation System	Combines NLP techniques to extract, vectorize, cluster and compare skills in a pipeline and outputs statistics and recommendations for all three players in form of reports	• Help employers, job seekers and educational institutions adapt to the job market's needs	• Requires educational institute data like syllabus, lesson plans, etc • Returns reports which might be tedious to read	https://bit.ly/3L7mdrX
Recommendation of Job Offers Using Random Forests and Support Vector Machines	Random Forest and Support Vector Machines	• Automatically recommend job offers • Efficiently works at web scale, in large databases or with large instances.	• SVMs work with models hard to interpret by humans • Does not use textual description from job offers	https://www.jorgemar.com/papers/Recommendation-Job-Offers.pdf
A Machine Learning approach for automation of Resume Recommendation system	Using Content-based Recommendation, using cosine similarity and by using k-NN to identify the CVs that are nearest to the provided job description	• Effectively captures the resume insights and their semantics.	• Accuracy is only 78%	https://www.sciencedirect.com/science/article/pii/S187705092030750X
Enhanced DSSM (deep semantic structure modeling) technique for job recommendation	Deep Semantic Structure Algorithm	• Word embeddings are used which don’t require expensive annotations.	• Words with multiple meanings are conflated into a single representation	https://www.sciencedirect.com/science/article/pii/S1319157821001853

Technical Job Recommendation System Using APIs and Web Crawling	Puppeteer and Representational State Transfer (REST) APIs for web crawling have been used. A hybrid system of Content-Based Filtering and Collaborative Filtering is implemented to recommend jobs.	• Allows users to study job popularity, skill demand, etc	• This paper uses collaborative filtering which faces well-known problems of privacy breaches and cold start. • Crawling process is not automated.	https://www.hindawi.com/journals/cin/2022/7797548/

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-25416-1659962945/blob/main/Project%20Design%20and%20Planning/Ideation%20Phase/Empathy%20Map%20Canvas.pdf

3.2 Ideation & Brainstorming

https://github.com/IBM-EPBL/IBM-Project-25416-1659962945/blob/main/Project%20Design%20and%20Planning/Ideation%20Phase/Brainstorming%20-%20Idea%20Generation.pdf

3.3 Proposed Solution

PROBLEM STATEMENT
To enable job seekers to find jobs relevant to their skill set

SOLUTION DESCRIPTION
Create a web application for recommending relevant job openings, with the following features

- Chatbot for job recommendations
- Use a job search API to get the current openings in the market
- Alert users when relevant openings come up
- Filter job openings according to user's profile

NOVELTY
- Provide third-party resources for most sought after skills in the industry
- Customize alert notification settings
- Alert users about deadlines for jobs that align with their skills

SOCIAL IMPACT
- Ease of job application procedure
- Help users stay up to date with latest skills through the resources provided

BUSINESS MODEL

● Provide additional features for premium users to enhance their job search experience
● Display ads with openings available from different companies

SCALABILITY
The application can be scaled up and down easily since Kubernetes is used for orchestrating the application

3.4 Problem Solution fit

https://github.com/IBM-EPBL/IBM-Project-25416-1659962945/blob/main/Project%20Design%20and%20Planning/Project%20Design%20Phase%20I/Problem%20Solution%20Fit.pdf

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-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Chatbot	To solve user's queries regarding searching/applying for a job etc..
FR-4	User Logic	Login through forms Login through Gmail account
FR-5	User Profile	Update user's details/resume
FR-6	Search For Jobs	Based on Job filters and skill recommendations
FR-7	Alert Users	Notify users when relevant openings and deadlines come up.

4.2 Non-Functional requirements

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Useful for job seekers to login and search for jobs based on his/her skill set
NFR-2	**Security**	Secured login for users by password or gmail account.
NFR-3	**Reliability**	To make sure that the system performs without failure in above 90% of use cases within a month.
NFR-4	**Performance**	To decrease the server response time by how, the application performs faster.
NFR-5	**Availability**	The application shall be monitored so that the server down time is minimized and is available.
NFR-6	**Scalability**	The application can be scaled up and down easily since Kubernetes is used to orchestrate the application

5. PROJECT DESIGN

5.1 Data Flow Diagrams

https://github.com/IBM-EPBL/IBM-Project-25416-1659962945/blob/main/Project%20Design%20and%20Planning/Project%20Design%20Phase%20II/Data%20Flow%20Document.pdf

5.2 Solution & Technical Architecture

https://github.com/IBM-EPBL/IBM-Project-25416-1659962945/blob/main/Project%20Design%20and%20Planning/Project%20Design%20Phase%20II/Technology%20Stack%20.docx.pdf

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 I 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 I dashboard
Sprint-!	Flask	USN-5	As a user, I can access the website in a second	High	I can access my account I 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

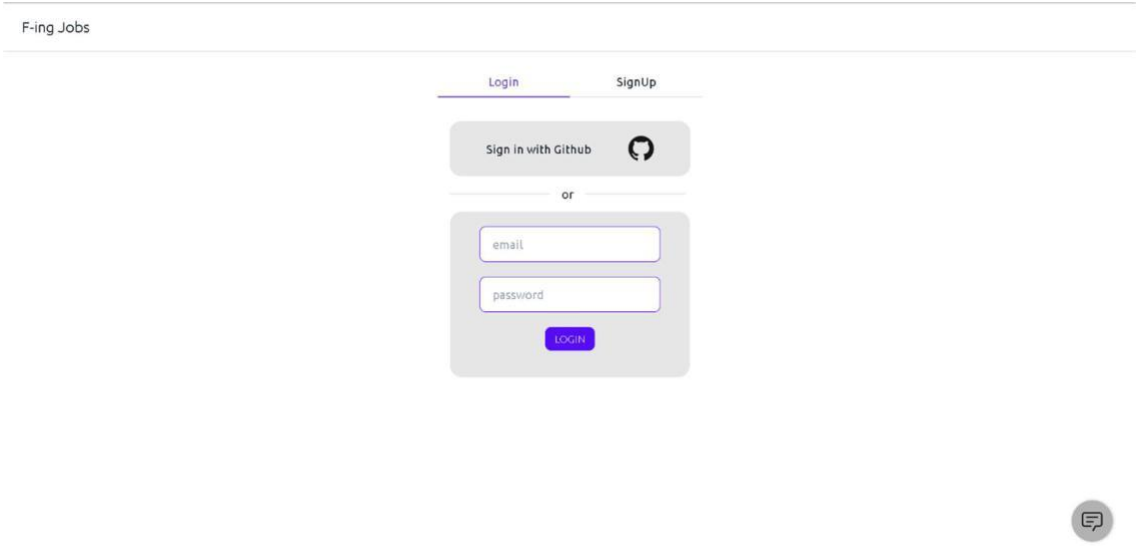
6.2 Sprint Delivery Schedule

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

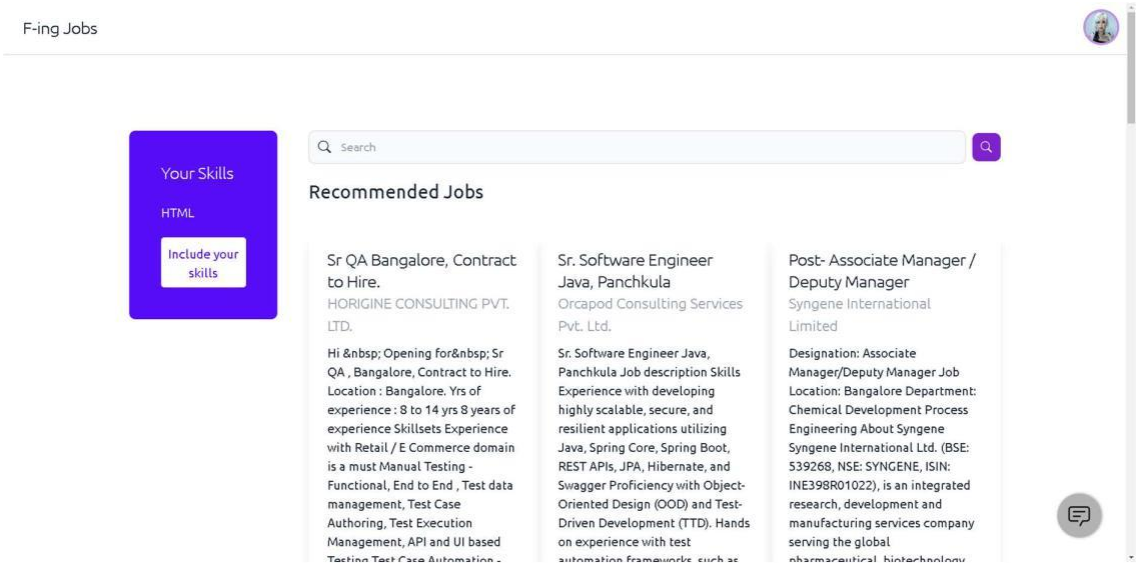
7.1 Feature 1

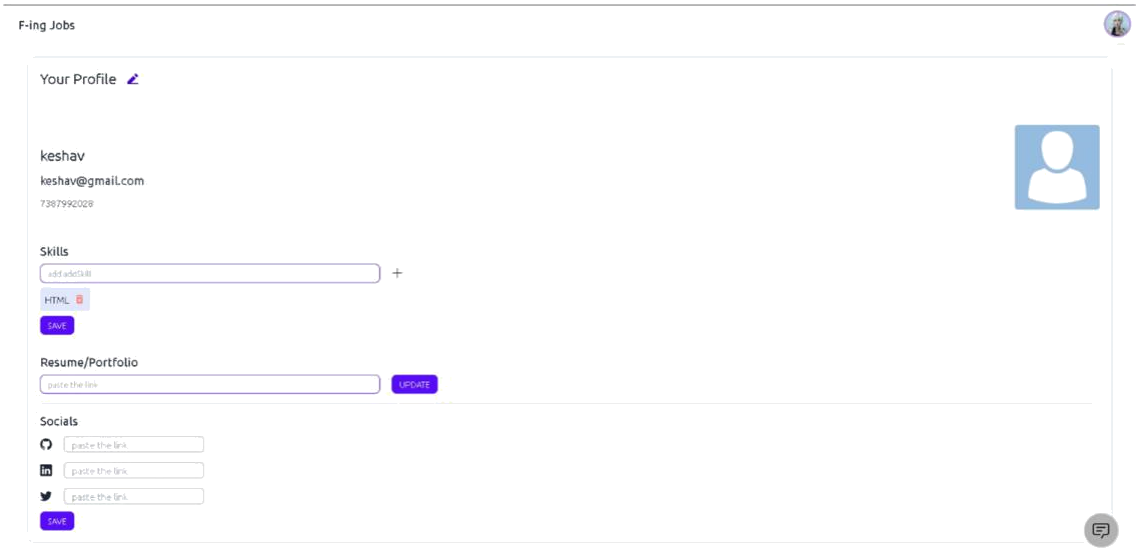
Login and Register screen for users



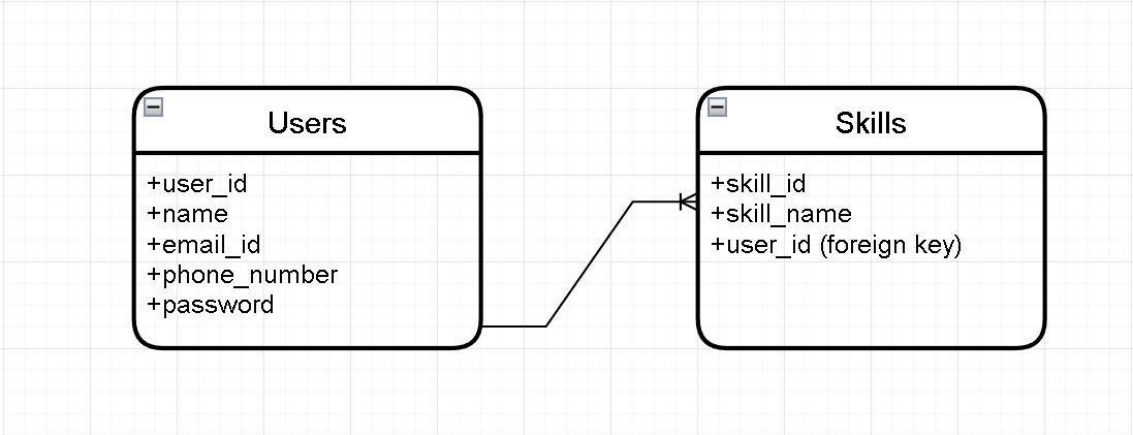
7.2 Feature 2

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 recover password
4. 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

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.

Source Code

https://github.com/IBM-EPBL/IBM-Project-25416-1659962945/blob/main/Final%20Deliverables/Project%20Code/README.md

GitHub & Project Demo Link

GitHub: https://github.com/IBM-EPBL/IBM-Project-25416-1659962945

Demo Link:
https://drive.google.com/file/d/1HAHHJq2WggL2vmchQ4Zuw9T0oEO9IgK7/view?usp=share_link