IBM NALAIYA THIRAN 2022-23 PROJECT REPORT
SKILL AND JOB RECOMMENDER
TEAM ID - PNT2022TMID04440

1. INTRODUCTION

1.1 PROJECT OVERVIEW

The Skill recommender system allows new or experienced employees to log in and look for positions through the search option, or they can directly communicate with the chatbot to locate their dream job. An end-to-end web application is developed that displays the current job vacancies depending on the user's skill set. The database stores the user and their information. When there is a job vacancy that matches the user's skill set, an alert is delivered. Users will communicate with the chatbot, and suggestions will be made depending on their skill. By using a job search API which pulls the data straight from website job seekers can acquire the most recent job vacancy in the market.

1.2 PURPOSE

The recommender system technology attempts to assist users in finding jobs that fit their own interests; it has been successfully used in e-commerce applications to efficiently deal with challenges connected to information overload. Skill and Job Recommender systems helps the job seekers to get personalized recommendations of job vacancies based on their skill set.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

Hiring a qualified candidate for a certain job is a time-consuming and labor-intensive procedure. Both businesses and job seekers are dealing with an increase in data overload and a time-consuming recruitment procedure. Because candidate profiles are so different, it is difficult for recruiters to locate the appropriate competencies. As a result, it is critical to determine the most important characteristics of each job candidate.The online recruitment specialist confronts significant hurdles in identifying relevant profiles among a large number of applications. This approach adds more manpower costs, time, and difficult-to-fill vacancies in the company.

2.2 REFERENCES

Sridevi, G. M., and S. Kamala Suganthi. "AI based suitability measurement and prediction between job description and job seeker profiles." *International Journal of Information Management Data Insights* 2, no. 2 (2022): 100109.

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Giabelli, Anna, Lorenzo Malandri, Fabio Mercorio, Mario Mezzanzanica, and Andrea Seveso. "Skills2Job: A recommender system that encodes job offer embeddings on graph databases." *Applied Soft Computing* 101 (2021): 107049.

Usabiaga, Carlos, Fernando Núñez, Lukasz Arendt, Ewa Gałecka-Burdziak, and Robert Pater. "Skill requirements and labour polarisation: An association analysis based on Polish online job offers." *Economic Modelling* 115 (2022): 105963.

Aljohani, Naif Radi, Ahtisham Aslam, Alaa O. Khadidos, and Saeed-Ul Hassan. "Bridging the skill gap between the acquired university curriculum and the requirements of the job market: A data-driven analysis of scientific literature." *Journal of Innovation & Knowledge* 7, no. 3 (2022): 100190.

Lord, Rhiannon, Ross Lorimer, John Babraj, and Ashley Richardson. "The role of mock job interviews in enhancing sport students' employability skills: An example from the UK." *Journal of Hospitality, Leisure, Sport & Tourism Education* 25 (2019): 100195.

2.3 PROBLEM STATEMENT DEFINITION

Though the person is Graduated they are not able to find the job based on their skillset. Not knowing where to search**.** Freshers are trying to explore in various fields but keep on failing in finding the right job which leads to lack of self confidence. Through email only the job seekers are directed to the concerned department since there is no particular platform for raising their queries for their respective skill based jobs.

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP AND CANVAS

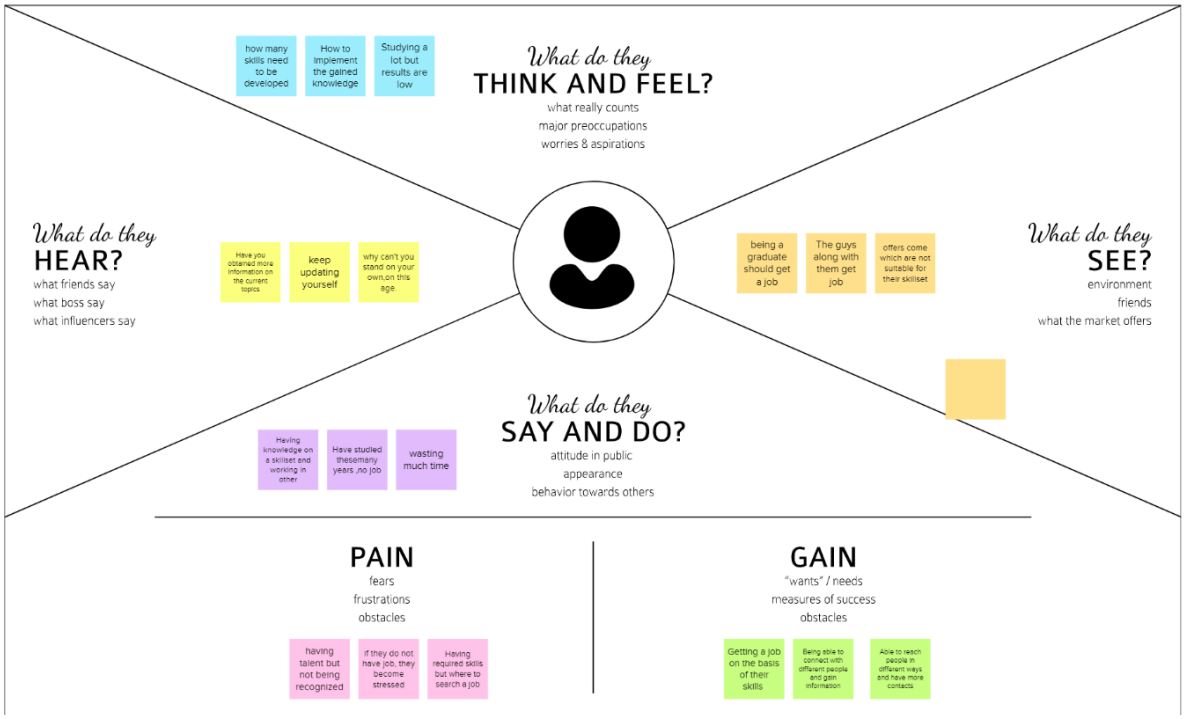
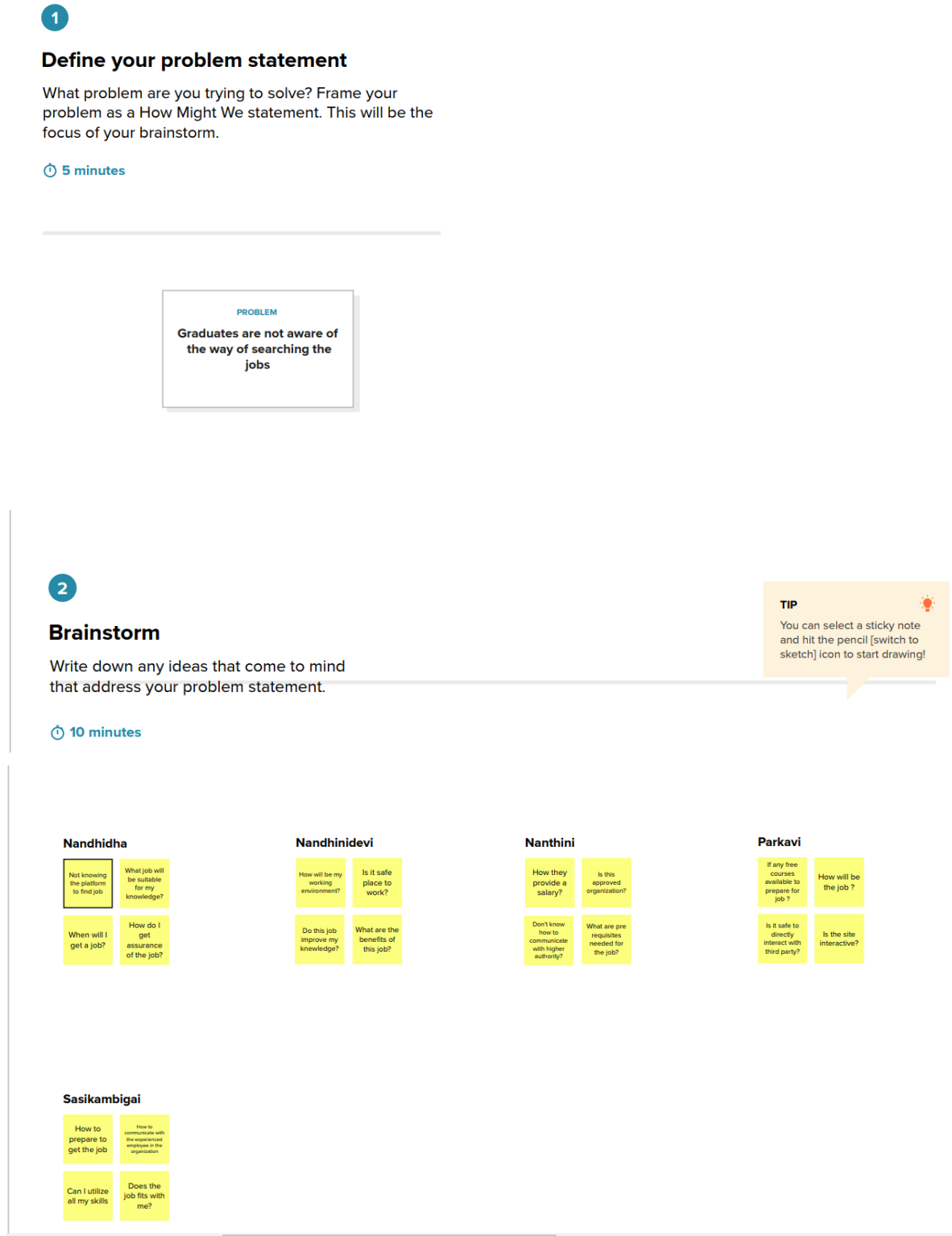


Figure 1 : Empathy map for Skill and Job Recommender

3.2 IDEATION AND BRAINSTORMING

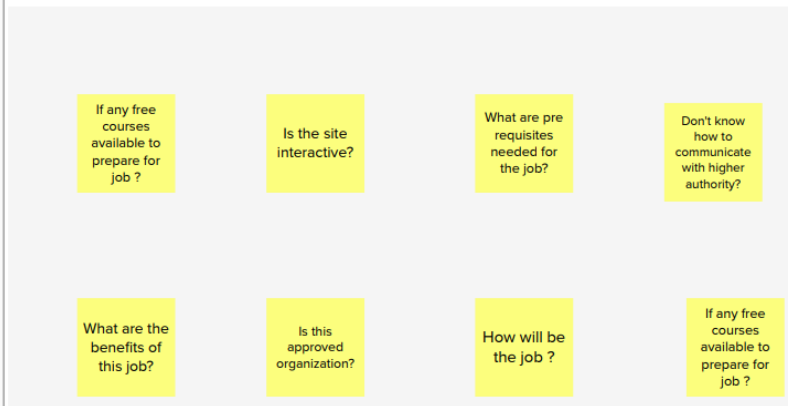


3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes



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

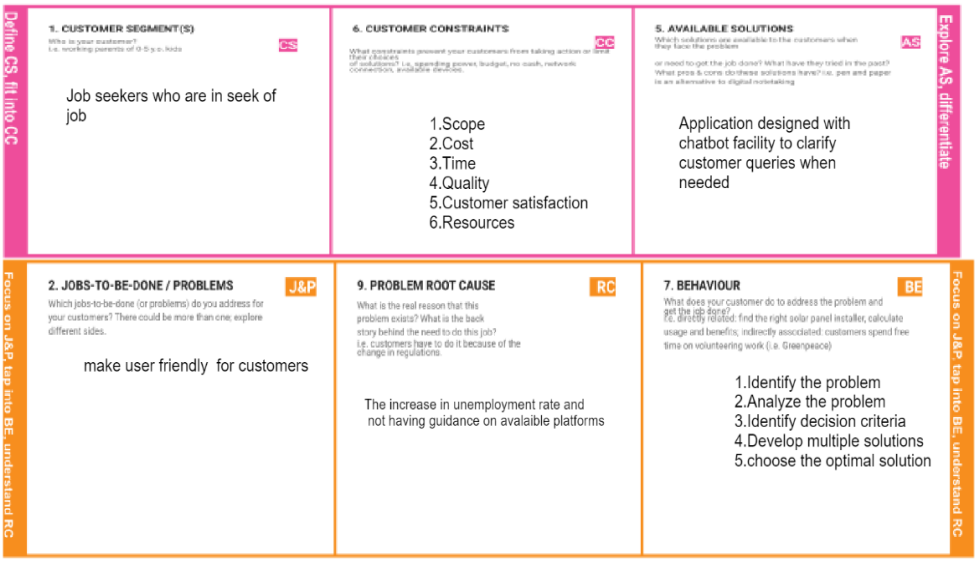
3.3 PROPOSED SOLUTION

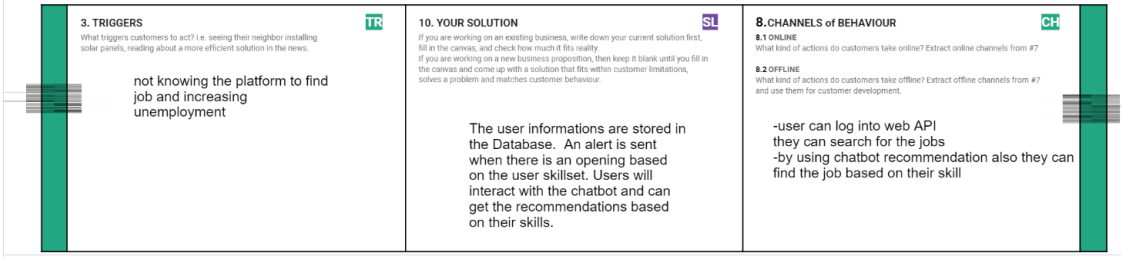
Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Difficulties for finding the platform for job availability
2.	Idea / Solution description	Making a easier platform in finding jobs suitable to individual skills
3.	Novelty / Uniqueness	According to the skills updated the job availability will be displayed
4.	Social Impact / Customer Satisfaction	Searching the Job availability will be easier
5.	Business Model (Revenue Model)	
6.	Scalability of the Solution	highly scalable

3.4 PROBLEM SOLUTION FIT

Project Title: Job/Skill Recommender | **Project Design Phase-I - Solution Fit Template** | **Team ID:** PNT2022TMID04440





4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

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 emails or phone number Registration through emails or phone number Email IDs.
FR-2	**User Confirmation**	Configuration via email. Configuration via OTP to phone number
FR-3	**User requirement:**	Chat bots gets information properly. It process quickly and easily. It response depends on user's information. It gives multiple languages to get information.

4.2 NON-FUNCTIONAL REQUIREMENTS

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

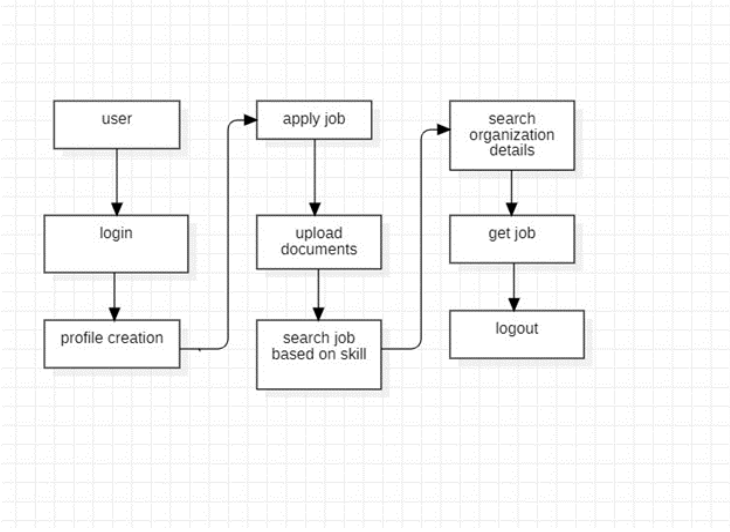
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Developers can put buttons that users get access easily. People with no understanding of French must be able to use the web.
NFR-2	**Security**	Access permissions for the particular system information may only be changed by the system's data administrator.

NFR-3	**Reliability**	The database of the chatbot software must be updated frequently.
NFR-4	**Performance**	The loading must be no more than 2 seconds for users that access the website using an LTE mobile connection.
NFR-5	**Availability**	New module deployment mustn't impact any issues in its performance. And give the restore timings to display. It should not take more than one to restore.
NFR-6	**Scalability**	The website traffic limit must be scalable enough to support more users at a time.

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

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



5.2 SOLUTION AND TECHNICAL ARCHITECTURE

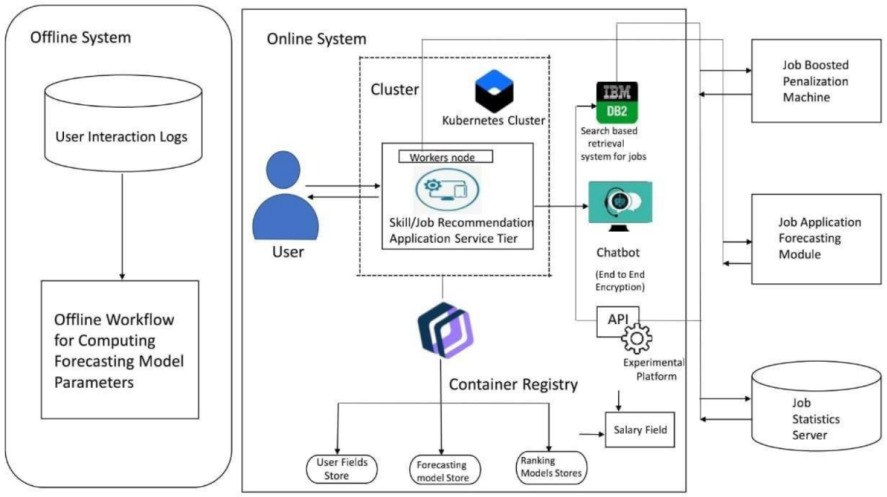


Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How the user interacts with the application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Developing Interface	Developing application for the task	Java / Python
3.	Voice Assistance	Voice commands instead of typing.	IBM Watson STT service
4.	Chatbot Assistance	Conversational Interface	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.

6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
9.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Open source framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro- services)	Artificial Intelligence (AI)
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	RAID(redundant array of independent disks)

S.No	Characteristics	Description	Technology
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	DRAM or flash memory

5.3 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 logging in into the account	I can access my dashboard	High	Sprint-1
Customer (Web user)	Access	USN-6	As a user,I can access, setup my profile and basic details by logging in			

		USN-7	As a user I can upload my required documents and resume	I can use the application to complete a variety of tasks.	Medium	Sprint-1
User Type	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Acceptance criteria**	**Priority**	**Release**
Customer Care Executive	chatbot	USN-9	As a user, I can consult with the customer service representative.		High	Sprint-1
Administrator	Application	USN-10	As a Administrator I can manage the application	I can fix the problem arise from customer and application	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Use the below template to create product backlog and sprint schedule

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**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.	2	High	Nandhidha GC
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Nandhinidevi S
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Nanthini PL

Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Parkavi M
Sprint-2	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Sasikambiga CJ
Sprint-2	Dashboard	USN-6	As a user I can find the Jobs available according to my skills	5	High	Nandhidha GC
Sprint-3		USN-7	As a user I have rights to know about the availability of job vacancies	3	Medium	Parkavi M
Sprint-3	Admin	USN-8	Admin can be updated with job availabilities and collaboration with new companies	4	High	Nanthini PL
Sprint-4	For help	USN-9	Users can contact admin for any help on the bot	5	High	Nandhinidevi S
Sprint-4	Reviews	USN-10	feedback for the website used can be provided by the users	5	Medium	Sasikambiga CJ

6.2 SPRINT DELIVERY SCHEDULE

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	20 Oct 2022	26 Oct 2022	20	30 Oct 2022

Sprint-2	20	6 Days	26 Oct 2022	02 Nov 2022	20	
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022		
Sprint-4	20	3 Days	16 Nov 2022	19 Nov 2022		

7. CODING & SOLUTIONING

FEATURE 1: INTEGRATING CHATBOT TO HTML PAGE

```
<!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">
<title>Document</title>
</head>
<body>
<h1>My Chatbot</h1>
<blockquote>Click the bottom right corner to chat</blockquote>
<script>
window.watsonAssistantChatOptions = {
integrationID: "01ca5fe5-3f42-4a97-8965-332afedd97be", // The ID of this
integration.
region: "au-syd", // The region your integration is hosted in.
serviceInstanceID: "5683f375-e95c-4fa1-8471-5b76177675c2", // 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); });
```

8.TESTING

8.1 TEST CASES

- Verify the user is able to login to the application or not
- Validating the user with username and password
- Verifying the user database

8.2 USER ACCEPTANCE TESTING

The application enables users friendly requirements and satisfies the user requirements completely
By distributing the application to remote users and requesting them to utilise it, real-world testing was also carried out. Up until all of their concerns were resolved, their challenges were corrected and tested once more.

9.RESULTS

9.1 PERFORMANCE METRICS

The Performance metric of the application is measured based on how the job seeker can effectively find the job based on their skill set.

10.ADVANTAGES & DISADVANTAGES

- The advantage of this application includes a chatbot feature for finding the suitable job based on their skills and consumption of time is less for searching for a job on a website.
- The disadvantage may include the application is unable to detect the fake document.Chatbots can be costly to operate: due to the learning curve, it may require a dedicated human to manage and maintain it. The user's profile was left incomplete.

11.CONCLUSION

Artificial intelligence-powered chatbots and personal assistants are fundamentally altering business.Numerous chatbot development platforms are available for a variety of businesses, including e-commerce, retail, banking, leisure, travel, healthcare, and so forth.Chatbots are more effective than humans at reaching out to a large audience via messaging apps. They have the potential to become a capable information-gathering tool in the near future.

12.FUTURE SCOPE

Chatbots' future scope may encompass numerous benefits for organizations, but experts warn they must be carefully steered in the proper path for firms to realize these benefits.
Andy Peart, chief marketing and strategy officer of Artificial Solutions, a global software business, sees training data as a significant barrier to entry for organizations looking to implement chatbots.
This is especially true for increasingly complex chatbots that attempt to grasp intent and answer in natural language emulating human speech.

12.1.VOICE INTERFACE

If the future requires smart chatbots that do more than employ programmed, single-turn dialogues, their interface must also evolve.
A voice interface can help users with impairments or those who are distrustful of technology, but it also necessitates the creation of another layer of NLP.

12.2.FUTUREBOTS

Although voice interface is optional, chatbots have been in use long enough for developers and experts to decide which aspects of chatbots are essential.
NLP(Natural Language Processing) development, human-like conversational flexibility, and 24-hour support are critical to chatbot survival in business contexts.
Chatbots are AI devices, and in the future, they must stay up with AI developments such as automatic machine learning, simple system integration, and rising intelligence.