SKILL / JOB RECOMMENDER APPLICATION

PROJECT REPORT

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in partial fulfillment of the requirements for the award of the degree

of

BACHELOR OF ENGINEERING

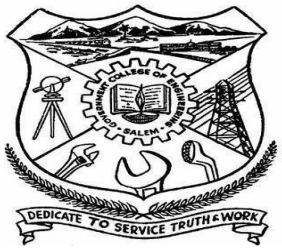
in

ELECTRONICS AND COMMUNICATION ENGINEERING

GOVERNMENT COLLEGE OF ENGINEERING

SALEM

(An Autonomous Institution)



ANNA UNIVERSITY, CHENNAI

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Skill /Job Recommender Application

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1. INTRODUCTION

Having lots of skills but wondering which job will best suit you? Don't need to worry! We have come up with 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.

1.1 Project Overview

There has been a sudden boom in the technical industry and an increase in the number of good start-ups. Keeping track of various appropriate job openings in top industry names has become increasingly troublesome. This leads to deadlines and hence important opportunities being missed. Through this research paper, the aim is to automate this process to eliminate this problem. To achieve this, IBM cloud services like db2, Watson assistant, cluster, Kubernetes have been used. A hybrid system of Content-Based Filtering and Collaborative Filtering is implemented to recommend these jobs. The intention is to aggregate and recommend appropriate jobs to job seekers, especially in the engineering domain. The entire process of accessing numerous company websites hoping to find a relevant job opening listed on their career portals is

simplified. The proposed recommendation system is tested on an array of test cases with a fully functioning user interface in the form of a web application. It has shown satisfactory results, outperforming the existing systems. It thus testifies to the agenda of quality over quantity.

1.2 Purpose

With an increasing number of cash-rich, stable, and promising technical companies/startups on the web which are in much demand right now, many candidates want to apply and work for these companies. They tend to miss out on these postings because there is an ocean of existing systems that list millions of jobs which are generally not relevant at all to the users. There is an abundance of choices and not much streamlining. On the basis of the actual skills or interests of an individual, job seekers often find themselves unable to find the appropriate employment for themselves. This system, therefore, approaches the idea from a data point of view, emphasizing more on the quality of the data than the quantity.

2. LITERATURE SURVEY

2.1 Existing Problem

Existing system is not very efficient, it does not benefit the user in maximum way, so the proposed system uses ibm cloud services like db2, Watson virtual assistant, cluster, kubernetes and docker for containerization of the application.

[1] In this section, we describe our framework for job recommendation. We narrow down the scope and focus on recommendation of job vacancies for Information Technology (IT) professionals acting in the Brazilian market. The proposed framework is composed by three stages: data collection, data preparation and recommendation.

[2] we select a group of the nearest job offers based on the distance to that profile (job matching). In the case of TF-IDF representation, we use the cosine distance while for word embeddings, we use the relatively new Word Mover's Distance (WMD) [Kus15]. Once retrieved the top "k" job offers for the profile, we sort them in descending order based on the inverse of this distance (ranking)

[3] To perform job offers scraping, we created a list of keywords from the IT industry and used them as search terms. For each keyword, we search all the

related job offers using Catho's search engine and save the retrieved results in our database; thus, the content's quality is highly related to the quality of the Catho's search engine.

[4] we retrieved data from job search sites using only IT keywords, there were still some job offers that do not correspond to this field, then, the first step in this phase is filtering out job offers that do not belong to the IT field. To achieve this, we use a dictionary of weighted IT terms to match each job offer in its document-like format.

[5] Once job offers and profiles are filtered, the second step is text pre-processing. In this task, we perform stop words removal, tokenization and lemmatization for the Portuguese language.

[6] The third step, feature representation, aims to represent these documents (job offers and profiles) as vector space models. For this purpose, we adopted two approaches: word embeddings and TF-IDF. The latter technique does not require so much effort to be implemented unlike the former.

2.2 References

Shaha T Al-Otaibi and Mourad Ykhlef. "A survey of job recommender systems".

In: International Journal of the Physical Sciences 7.29 (2012), pp. 5127–5142. issn: 19921950. doi: 10.5897/IJPS12. 482

- N Deniz, A Noyan, and O G Ertosun. "Linking Person-job Fit to Job Stress: The Mediating Effect of Perceived Person-organization Fit". In: Procedia - Social and Behavioral Sciences 207 (2015), pp. 369– 376.
- M Diaby, E Viennet, and T Launay. "Toward the next generation of recruitment tools: An online social network-based job recommender system". In: Proc. of the 2013 IEEE/ACM Int. Conf. on Advances in Social Networks Analysis and Mining, ASONAM 2013 (2013), pp. 821–828. doi: 10. 1145/2492517.2500266.
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● M Kusner et al. “From word embeddings to document distances”. In: Proc. of the 32nd Int. Conf. on Machine Learning, ICML’15. 2015, pp. 957–966.

● T Mikolov et al. “Distributed Representations of Words and Phrases and Their Compositionality”. In: Proc. of the 26th Int. Conf. on Neural Information Processing Systems - Volume 2. NIPS’13. Lake Tahoe, Nevada, 2013, pp. 3111– 3119. url: http://dl.acm.org/citation.cfm?id=2999792. 2999959.

● T Mikolov et al. “Efficient estimation of word representations in vector space”. In: arXiv preprint arXiv:1301.3781 (2013).

● G Salton and C Buckley. “Term-weighting approaches in automatic text retrieval”. In: Information Processing and Management 24.5 (1988), pp. 513–523. issn: 0306-4573. doi: https://doi.org/10. 1016/0306- 4573(88)90021- 0. url: http://www.sciencedirect.com/science/article/pii/ 030645738890021 PROBLEM

2.3 Problem Statement Definition

"Can an efficient recommender system be modeled for the Job seekers which recommend Jobs with the user’s skill set and job domain and also addresses the issue of cold start?".

In current situation recruitments done manually for lakhs of students in which many talented students may lose their opportunities due to different reasons since it is done manually, and company also need the highly talented people from the mass group for their growth. So we have built a cloud application to do this process in a efficient manner.

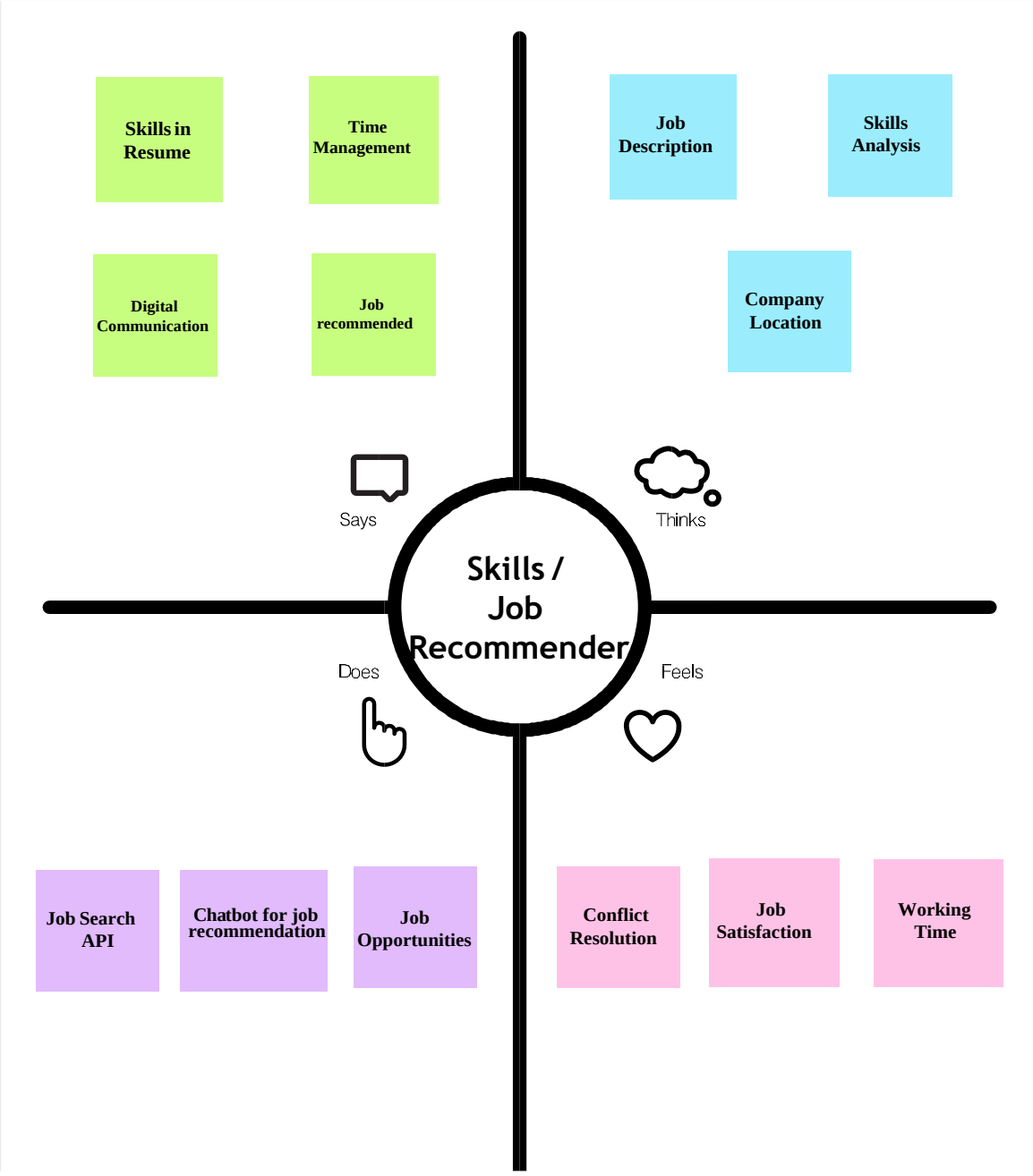
3. IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users in order to

1) Create a shared understanding of user needs, and

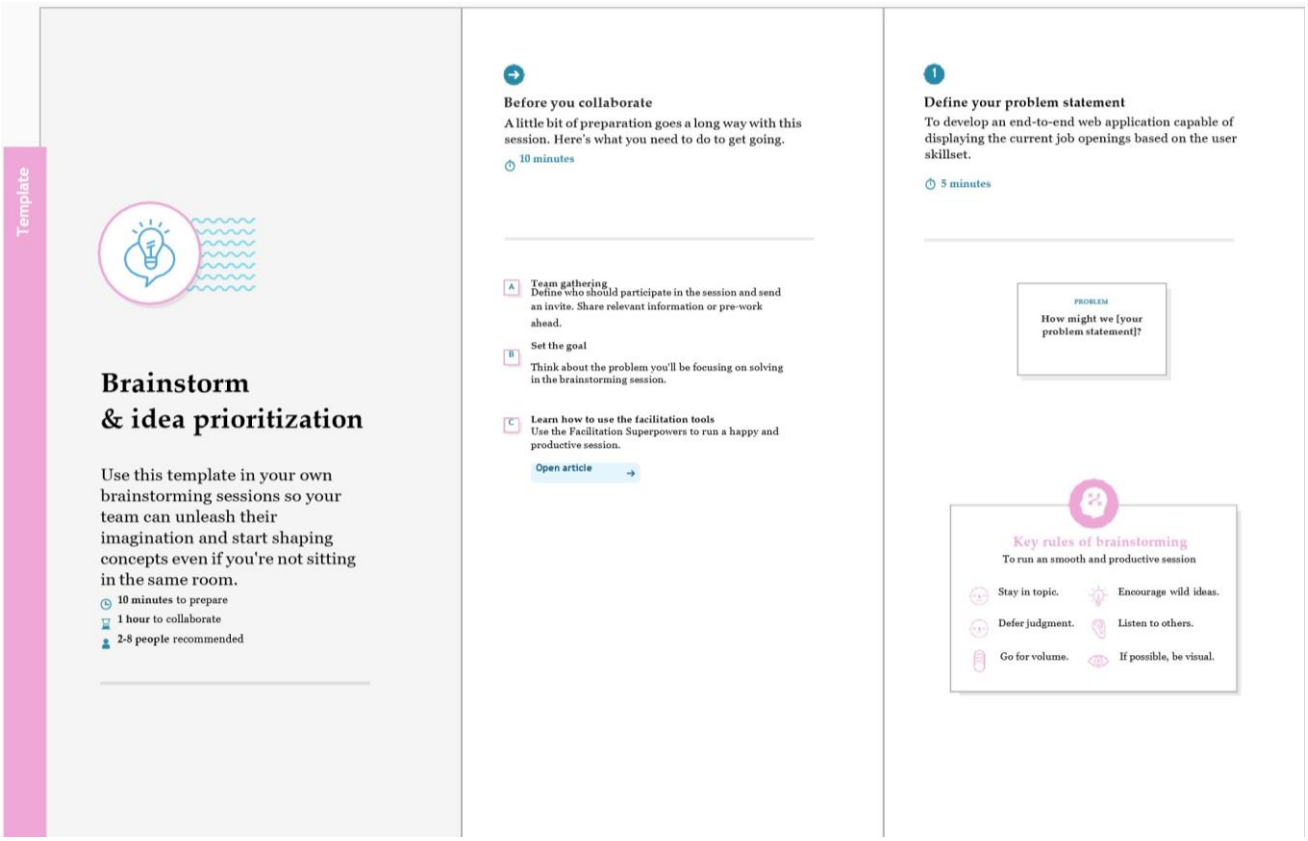
2) Aid in decision making



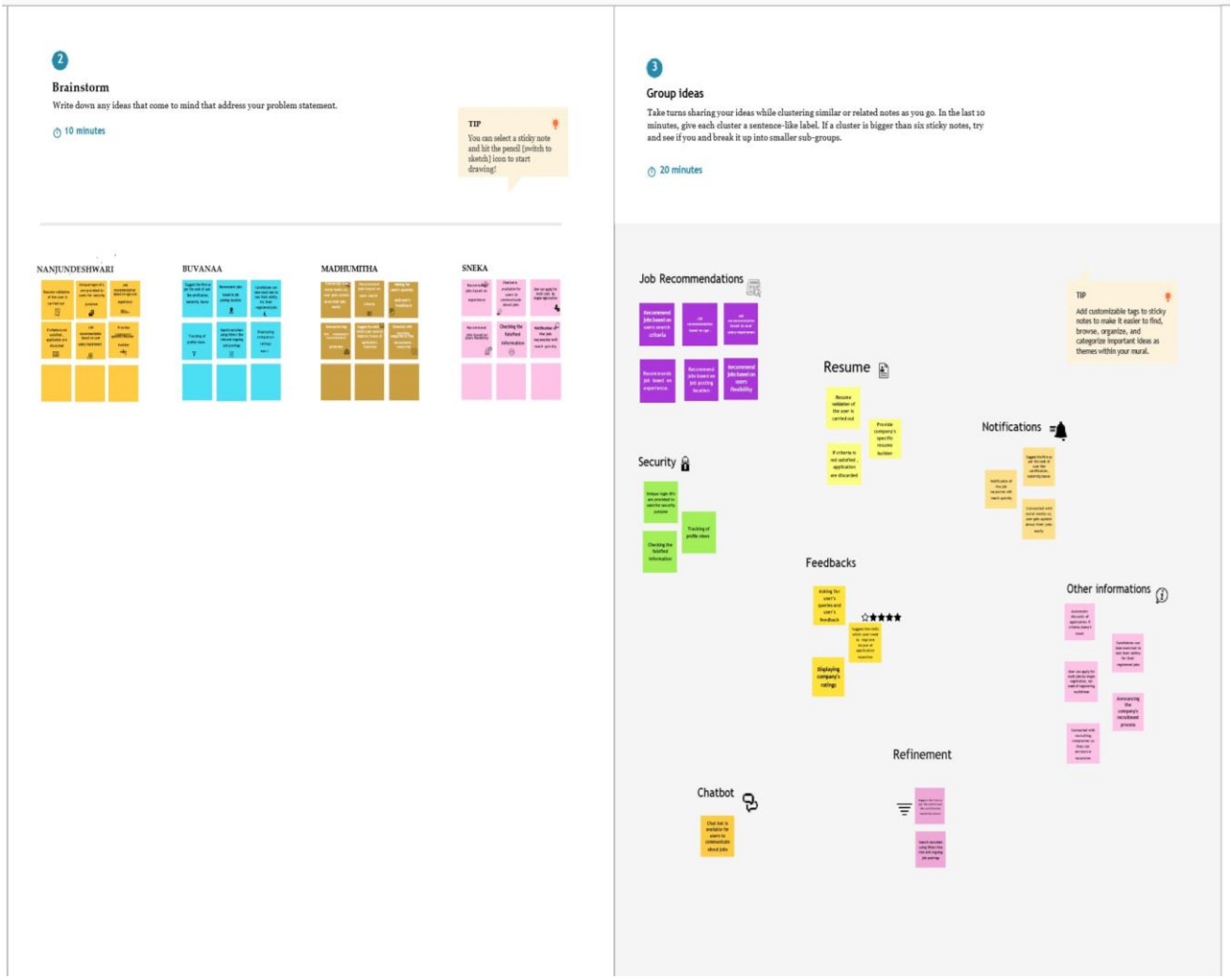
3.2 Ideation & Brainstorming

Brainstorm & Idea Prioritization Template: Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions. 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.

Step 1: Team Gathering, Collaboration and Select the Problem Statement



Step 2: Brainstorm, Idea Listing and Grouping



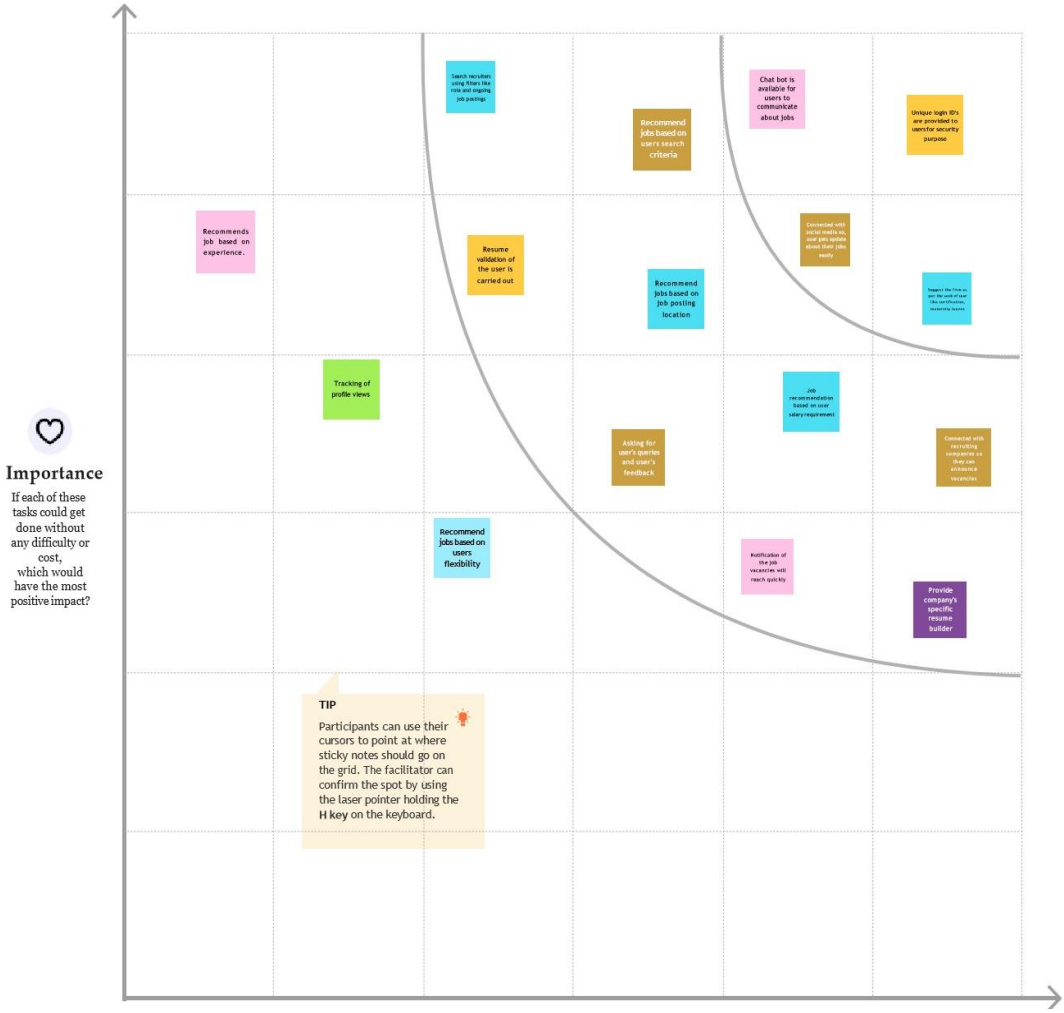
Step 3: Idea Prioritization

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

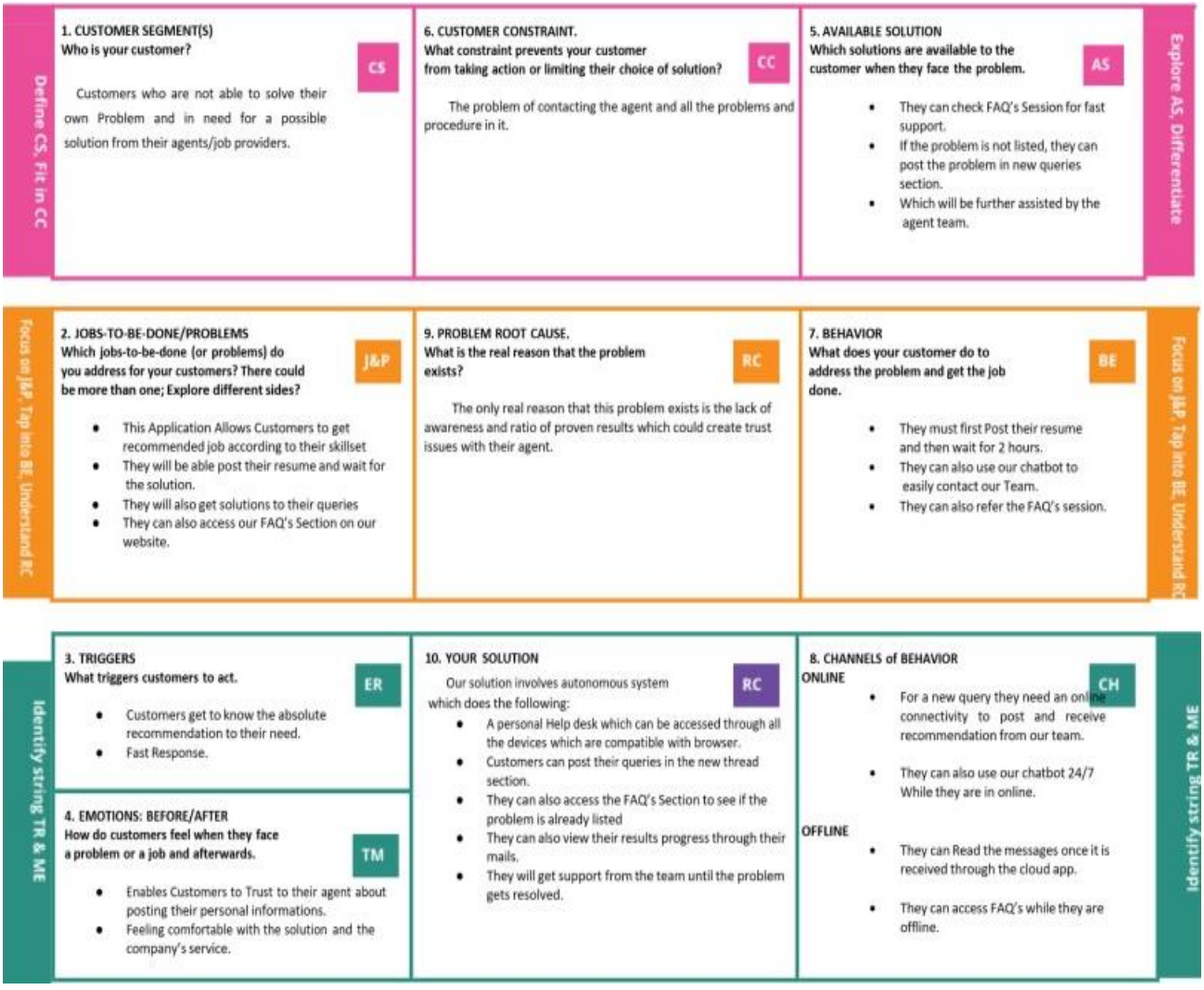


3.3 Proposed Solution

Having lots of skills but wondering which job will best suit you? Don't need to worry! We have come up with 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.

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

3.4 Problem Solution Fit



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 Form. Registration through Gmail. Registration through Application.
FR-2	User Confirmation	Confirmation via Email. Confirmation viaOTP.
FR-3	User Login	Login using credentials.
FR-4	User Application	Search for desired company.
FR-5	User Profile	Complete user profile by providing personal details.
FR-6	User Application	User applies for the desired company.

4.2 Non-functional requirements:

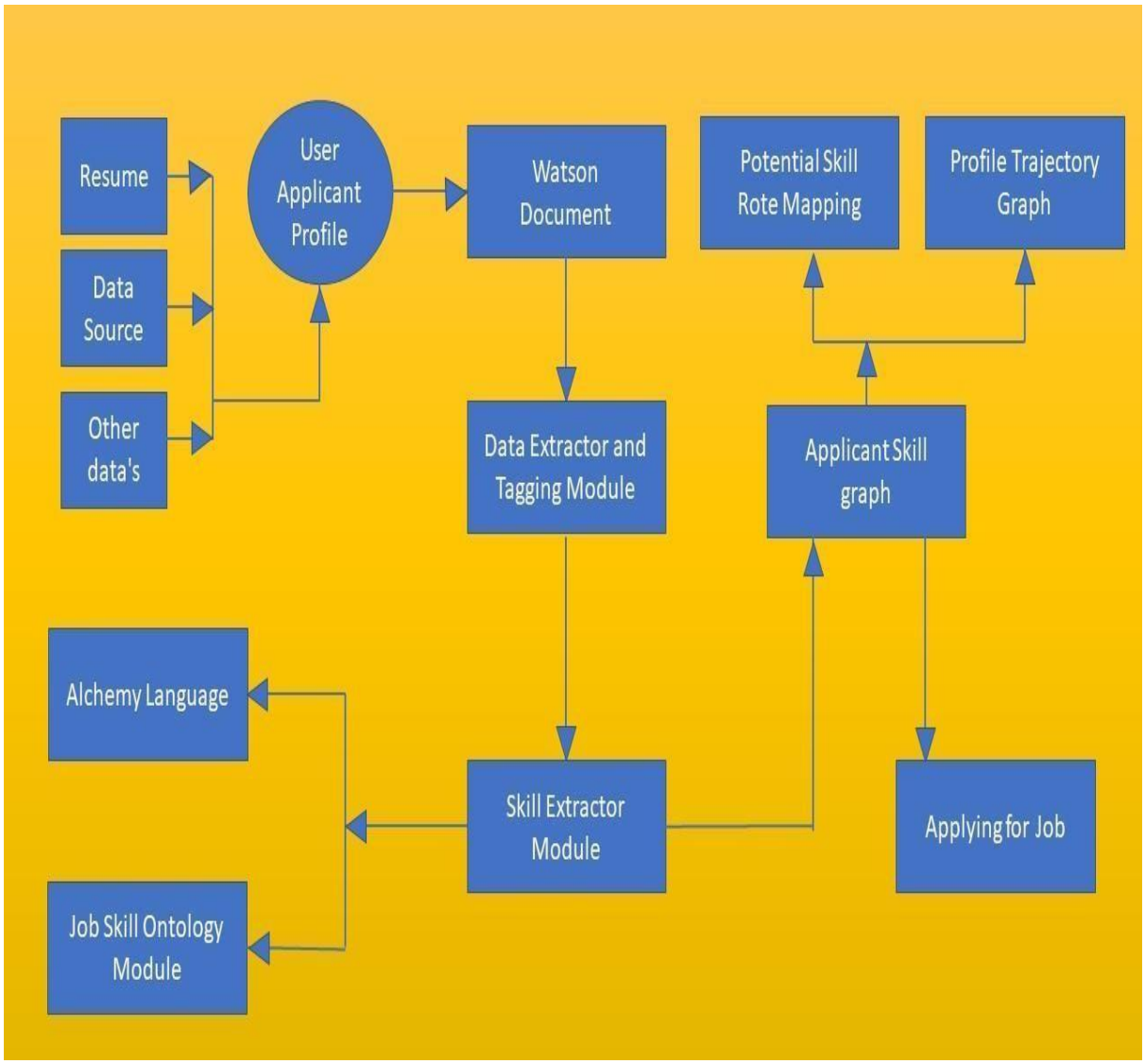
Following are the non-functional requirements of the proposed solution.

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	Usability	✓ User-Friendly Application.
NFR-2	Security	✓ End-to-End Encryption.
NFR-3	Reliability	✓ Based on personalised skill sets.
NFR-4	Performance	✓Analysing the skill sets of the user to ensure our recommendations reach them better.
NFR-5	Availability	✓ 24/7 chatbot support✓ 24/7 chatbot support.
NFR-6	Scalability	✓ Reaching the on-scale requirement of the user.

5.PROJECT DESIGN

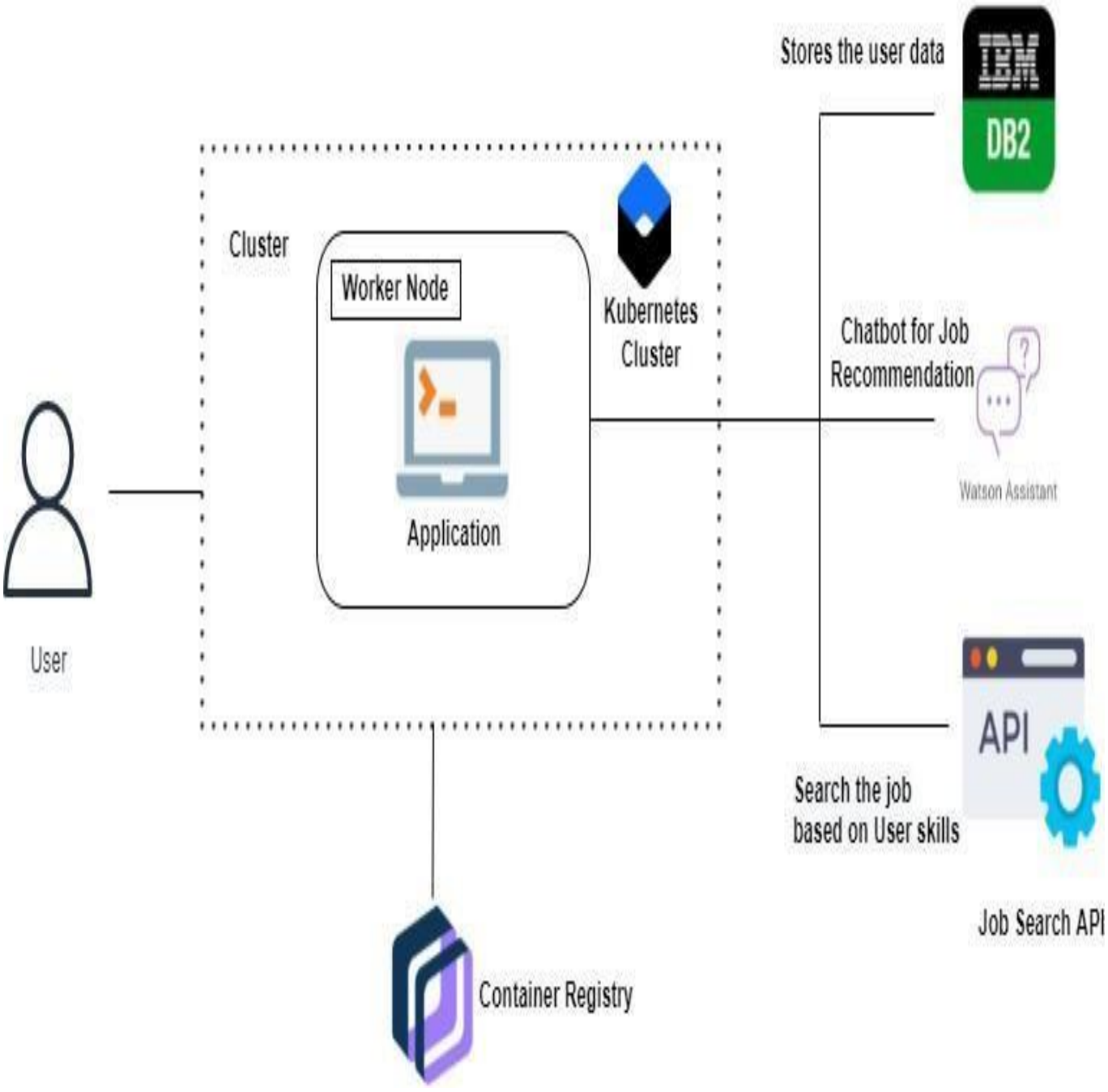
5.1 Data flow diagrams:

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 rightamount 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 Technology Architecture:

The deliverable shall include the architectural diagram as below



S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js /ReactJ setc.
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	IBMDB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
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.

5.3 User Stories

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

User Type	Functional Requirement	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	I can receive confirmation email & click confirm	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account / dashboard	High	Sprint-1
	Dashboard	USN-6	Create a model set that contains those models, then assign it to a role.	Assign that group to the appropriate roles on the Roles page.	High	Sprint-1
Customer (Web user)	Identity-Aware	USN-7	Open, public access, User-authenticated access, Employee-restricted access.	Company public website. App running on the company intranet. App with access to customer private information.	High	Sprint-1

Customer Care Executive	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.	For how to tackle customer queries.	Medium	Sprint-1
Administrator	Device management	USN-9	You can Delete/Disable/Enable devices in Azure Active Directory but you cannot Add/Remove Users in the directory.	Ease of use.	Medium	Sprint-1

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning and Exatimation

Title	Description
Literature Survey and Information Gathering	Gathering Information by referring the technical papers, research publications etc
Prepare Empathy Map	To capture user pain and gains Prepare List of Problem Statement
Ideation	Prioritise a top 3 ideas based on feasibility and Importance
Proposed Solution	Solution include novelty, feasibility, business model, social impact and scalability of solution
Problem Solution Fit	Solution fit document
Solution Architecture	Solution Architecture
Customer Journey	To Understand User

	Interactions and experiences with application
Functional Requirement	Prepare functional Requirement
Data flow Diagrams	Data flow diagram
Technology Architecture	Technology Architecture diagram
Milestone & sprint delivery plan	Activity what we done & further plans
Project Development Delivery of sprint 1,2,3 & 4	Develop and submit the developed code by testing it

6.2 Sprint delivery schedule

SPRINT	TASK	MEMBERS
SPRINT 1	Create Registration page , login page , Job search portal , job apply portal in flask	Nanjundeshwari M Madhumitha M Buvanaa B Sneka S
SPRINT 2	Connect application to ibm db2	Nanjundeshwari M Madhumitha M Buvanaa B Sneka S
SPRINT 3	Integrate ibm Watson assisstant	Nanjundeshwari M Madhumitha M Buvanaa B Sneka S
SPRINT 4	Containerize the app and deploy the application in ibm cloud	Nanjundeshwari M Madhumitha M Buvanaa B Sneka S

6.3 Reports from JIRA:

Average Age Report.
Created vs Resolved Issues Report.
Pie Chart Report.
Recently Created Issues Report.
Resolution Time Report.
Single Level Group by Report.
Time Since Issues Report.
Time Tracking Report.

7.CODING & SOLUTIONING

Feature 1:

App Market

This is one of the feature of our application which provides companies job details for end users

```
<!Doctype html>

<html>

  <head>

    <title>MSBN JOB PORTAL</title>

  </head>

  <style>

    body{

      background-image: url("https://gowmi12.s3.jp-tok.cloud-object-storage.appdomain.cloud/search%20(2).jpeg");

    }

    h1{
```

```
        color: antiquewhite;
        font-size: 4pc;

    }
    h2{
        font-size: 2pc;
        color: #04AA6D;    }
  a {
    text-decoration: none;
    display: inline-block;
    padding: 8px 16px;
    }

   a:hover {
   background-color: #ddd;
   color: black;
    }

.previous {
  background-color: #f1f1f1;
 color: black;
}
```

```
.next {
 background-color: #e01010;
color: white;
}
</style>
<body>
<h1>Welcome  </h1>
<h2>        We are glad to</h2>
<h2> Introduce our MSBN </h2>
<h2>         Portal!</h2>

<pre> <a href="https://gowmi12.s3.jp-tok.cloud-object-storage.appdomain.cloud/login%20and%20%20signup%20pg%20.html" class="next">Start &raquo;</a></pre>

</body>
</html>
```

Feature 2:

ChatBot (using IBM Watson)

This chat bot feature provides help tooltip for end users if any help needed forusers

```
<script>
    window.watsonAssistantChatOptions = {
```

```
        integrationID: "9be41b76-06b0-426f-8469-962f2963cdb6", // The ID
        of this integration.region: "au-syd", // The region your integration is
        hosted in.
        serviceInstanceID: "76838ca2-a227-4f56-b180-94f01901cdbf", // 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>
```

8. TESTING

Test Cases:

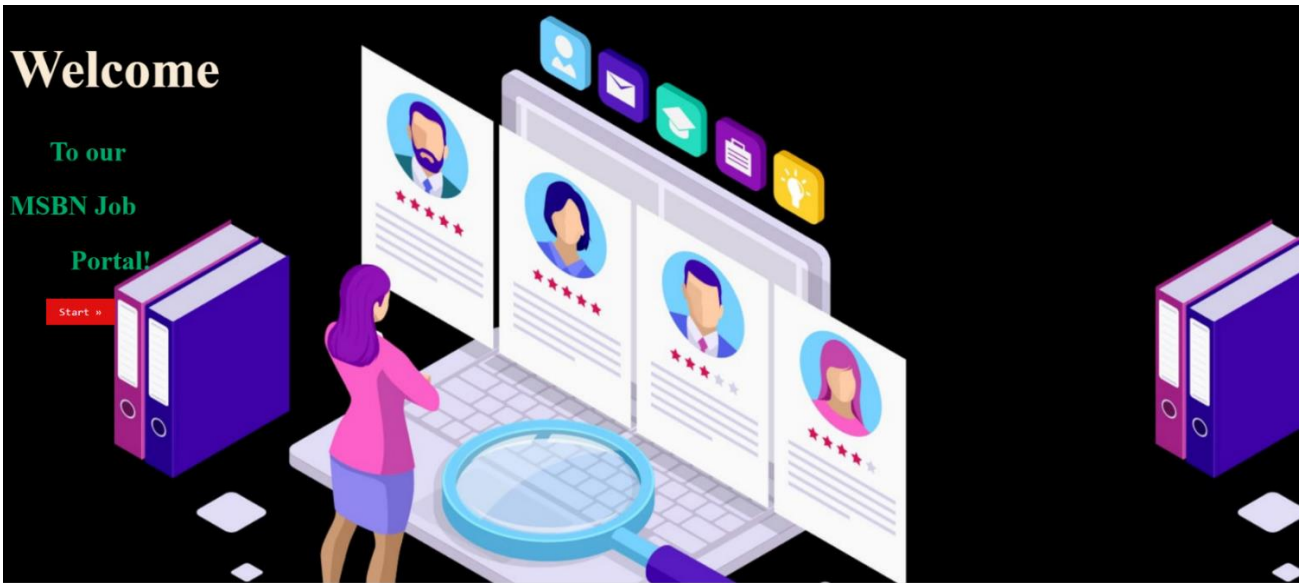
We tested for various validations. Tested all the features with using all the functionalities. Tested the data base storage and retrieval feature too.

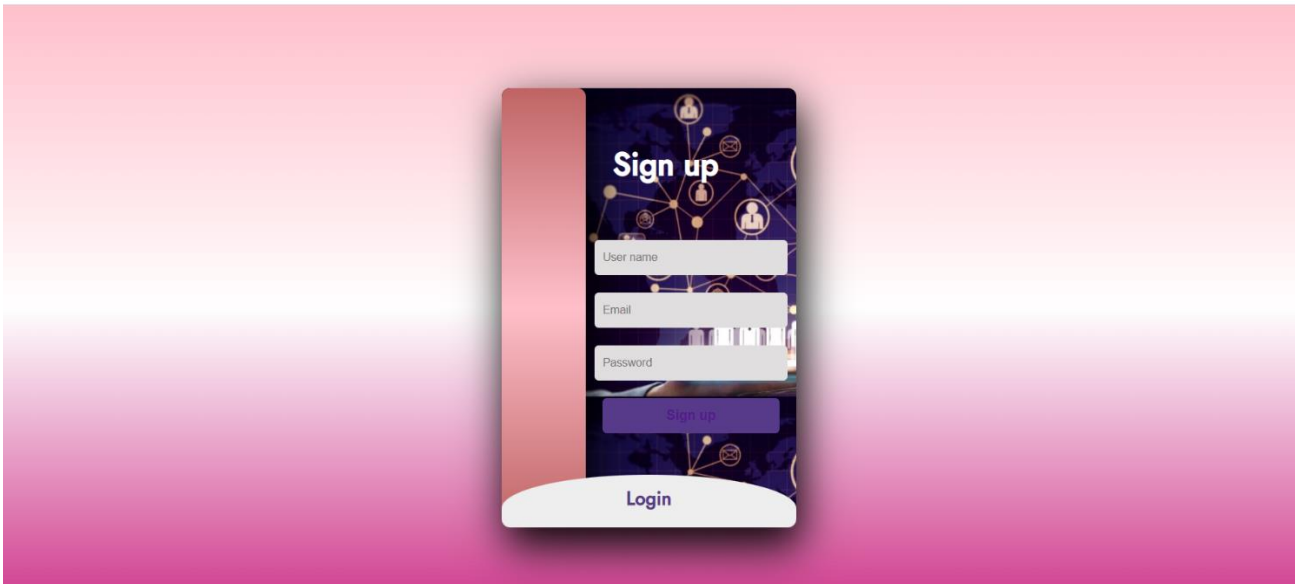
Testing was done in phase 1 and phase 2, where issues found in phase1 werefixed and then tested again in phase2.

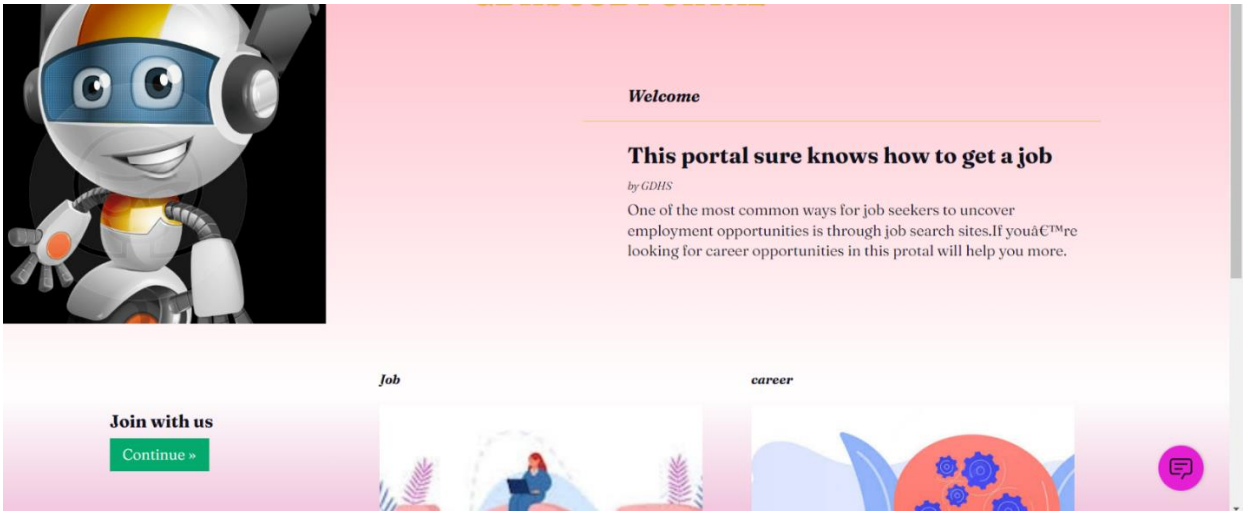
User Acceptance Testing:

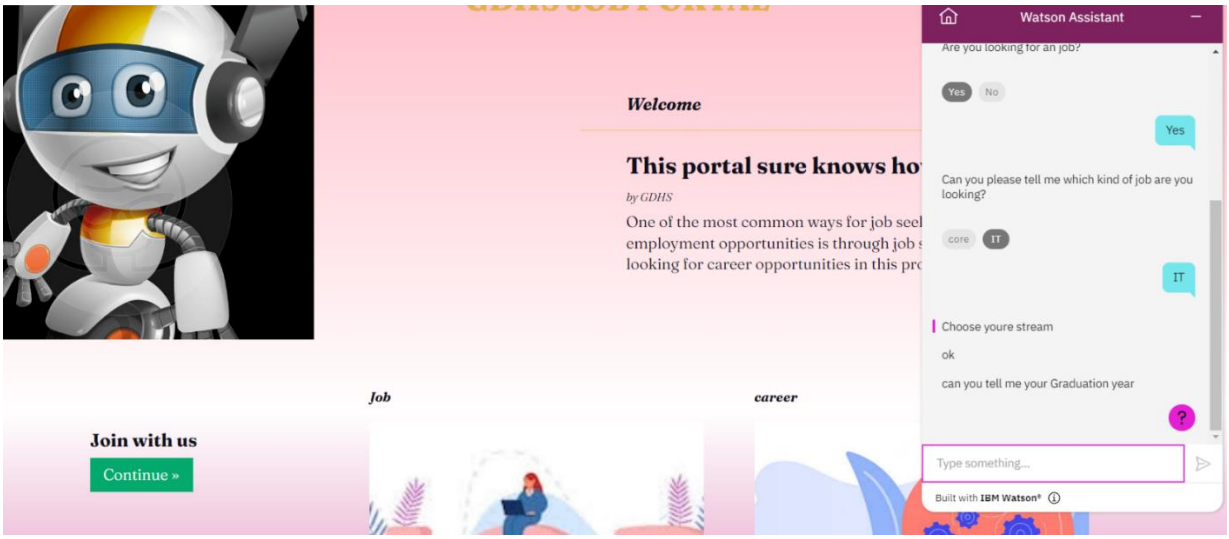
Real world testing was also done, by giving to remote users and asking them touse the application. Their difficulties were fixed and tested again until all the issues were fixed.

9. RESULTS


Welcome
To our
MSBN Job
Portal!
Start »


Sign up
User name
Email
Password
Sign up
Login


Welcome
This portal sure knows how to get a job
by GDHS
One of the most common ways for job seekers to uncover employment opportunities is through job search sites.If youâ€™re looking for career opportunities in this protal will help you more.
Job
career
Join with us
Continue »


Welcome
This portal sure knows ho
by GDHS
One of the most common ways for job seek
employment opportunities is through job s
looking for career opportunities in this pro
Job
career
Join with us
Continue »
Watson Assistant
Are you looking for an job?
Yes
No
Yes
Can you please tell me which kind of job are you looking?
core
IT
IT
Choose youre stream
ok
can you tell me your Graduation year
Type something...
Built with IBM Watson®

INTERVIEW TIPS

click images!

Resume

Good resume is important

Add youre skills

Make an simple

Communication

Communication is important

It also statisfies one's needs

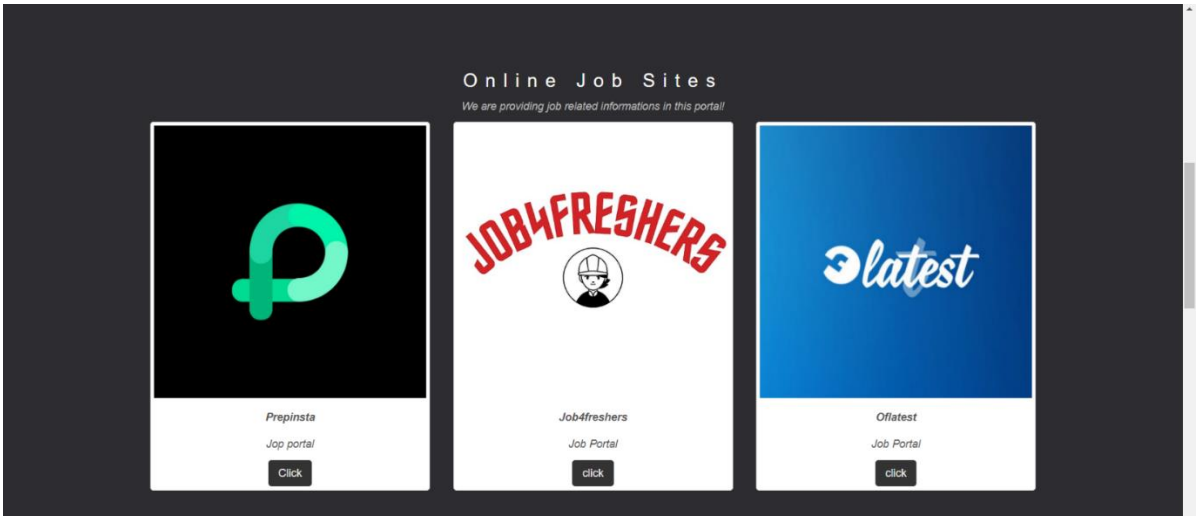
Think before you speek

Analyse

Analyse which job is better

Check the job is good fit or not

Imporve your knowledge



Medical Field Jobs

Medical Field Jobs and Vacancies

Jop portal

Click

Best Health Care Jobs of 2022

Job Portal

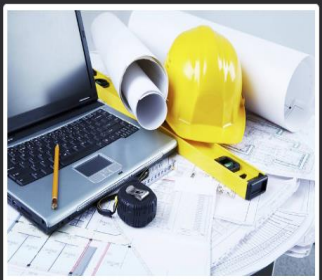
click

Medical Feild Jobs

Job Portal

click

Cvil Field Jobs



Cvil Site Engineer

Jop portal

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Job Portal

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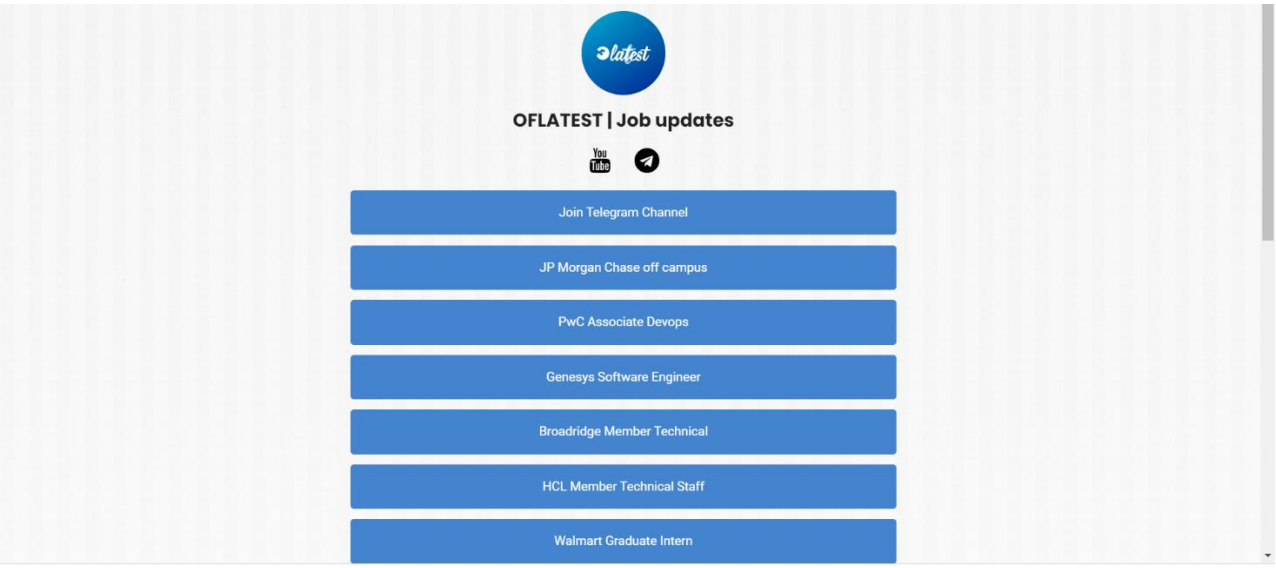
Cvil Feild Engineer Jobs and Vacancies

Job Portal

click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Genesys Software Engineer
Broadridge Member Technical
HCL Member Technical Staff
Walmart Graduate Intern

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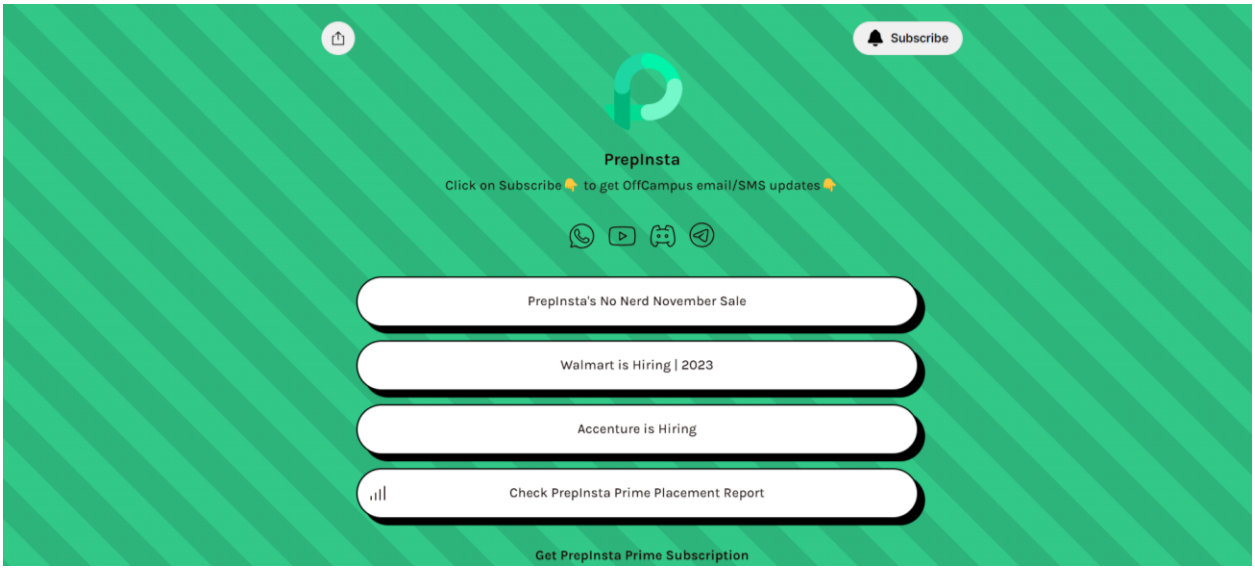
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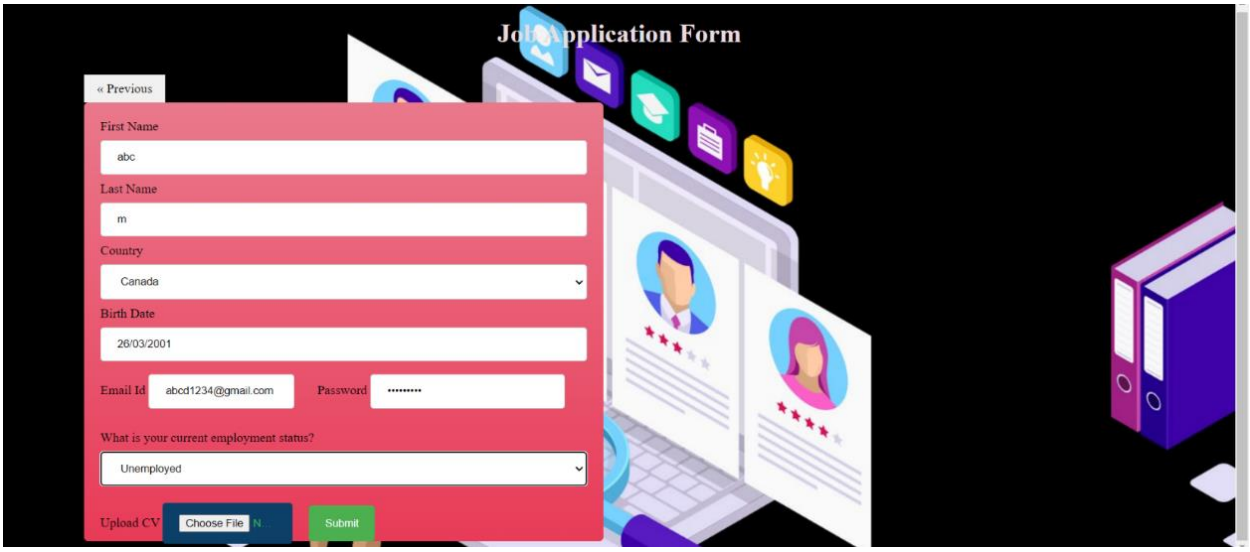
PrepInsta
Click on Subscribe👇 to get OffCampus email/SMS updates👇
PrepInsta's No Nerd November Sale
Walmart is Hiring | 2023
Accenture is Hiring
Check PrepInsta Prime Placement Report
Get PrepInsta Prime Subscription


« Previous
First Name
abc
Last Name
m
Country
Canada
Birth Date
26/03/2001
Email Id
abcd1234@gmail.com
Password
What is your current employment status?
Unemployed
Upload CV
Choose File
Submit

Fan? Drop a note.

Chicago, US

Phone: +00 1515151515

Email: mail@mail.com

Name

Email

Comment

Send

About

If you have any questions or concerns,don't hesitate to let me know and I look forward to hearing from you

Thank you for visiting.

10. ADVANTAGES AND DISAVANTAGES

ADVANTAGE :

- It helps candidates to search the job which perfectly suites them and make them aware of all the job openings.
- It help recruiters of the company to choose the right candidates for their organizations with appropriate skills.
- Since it is cloud application, it does require any installation of software and is portable.

DISADVANTAGE:

- It is costly.
- Uninterrupted internet connection is required for smooth functioning of application

11. CONCLUSION

we have used ibm cloud services like db2, cloud registry, kubernetes , Watson assistant to create this application , which will be very useful for candidates who are searching for job and as well as for the company to select the right candidate for their organization.

12. FUTURE SCOPE

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. We can use machine learning techniquesto recommend data in a efficient way.

13. APPENDIX

SOURCE CODE

```
<!Doctype html>
<html>
   <head>
      <title>MSBN JOB PORTAL</title>
   </head>
   <style>
      body{
         background-image: url("https://gowmi12.s3.jp-tok.cloud-object-storage.appdomain.cloud/search%20(2).jpeg");
      }
      h1{
         color: antiquewhite;
         font-size: 4pc;

      }
      h2{
         font-size: 2pc;
         color: #04AA6D;   }
     a {
      text-decoration: none;
```

```
    display: inline-block;
    padding: 8px 16px;
    }

   a:hover {
   background-color: #ddd;
   color: black;
    }

.previous {
  background-color: #f1f1f1;
 color: black;
}

 .next {
  background-color: #e01010;
 color: white;
}
</style>
<body>
    <h1>Welcome  </h1>
    <h2>        We are glad to</h2>
    <h2> Introduce our MSBN </h2>
```

<h2>   Portal!</h2>

<pre> <a href="https://gowmi12.s3.jp-tok.cloud-object-storage.appdomain.cloud/login%20and%20%20signup%20pg%20.html" class="next">Start »</a></pre>

</body>

</html>