

SKILL / JOB RECOMMENDER APPLICATION

PROJECT REPORT

Submitted by

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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 preprocessing. 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”.

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- 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](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?".

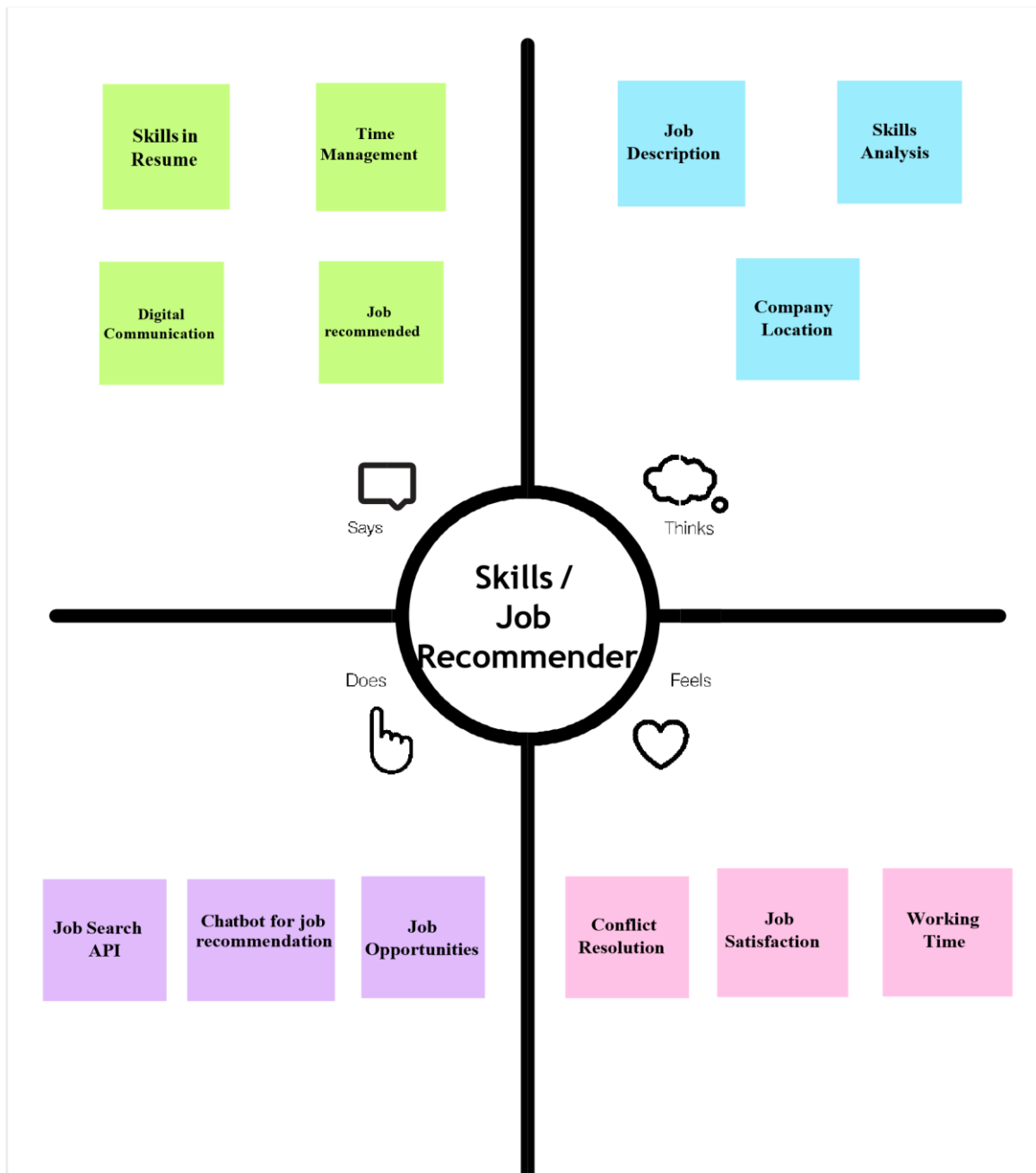
In current situation recruitments done manually for lakhs of students in which many talented students may lose their opportunities due to different reasons since it is done manually, and company also need the highly talented people from the mass group for their growth. So we have built a cloud application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

Template



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

A

Team gathering.

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.

C

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

To develop an end-to-end web application capable of displaying the current job openings based on the user skillset.

5 minutes

PROBLEM

How might we [your problem statement]?

22

Key rules of brainstorming

To run a smooth and productive session

Stay in topic.

Defer judgment.

Go for volume.

Encourage wild ideas.

Listen to others.

If possible, be visual.

Step 2: Brainstorm, Idea Listing and Grouping

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 icon to start drawing!

NANJUNDESHWARI



BUVANAA



MADRUMITHA



SNEKA



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 and break it up into smaller sub-groups.

20 minutes

Job Recommendations



Resume



Notifications



Feedbacks



Other informations



Refinement



Chatbot



TIP

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

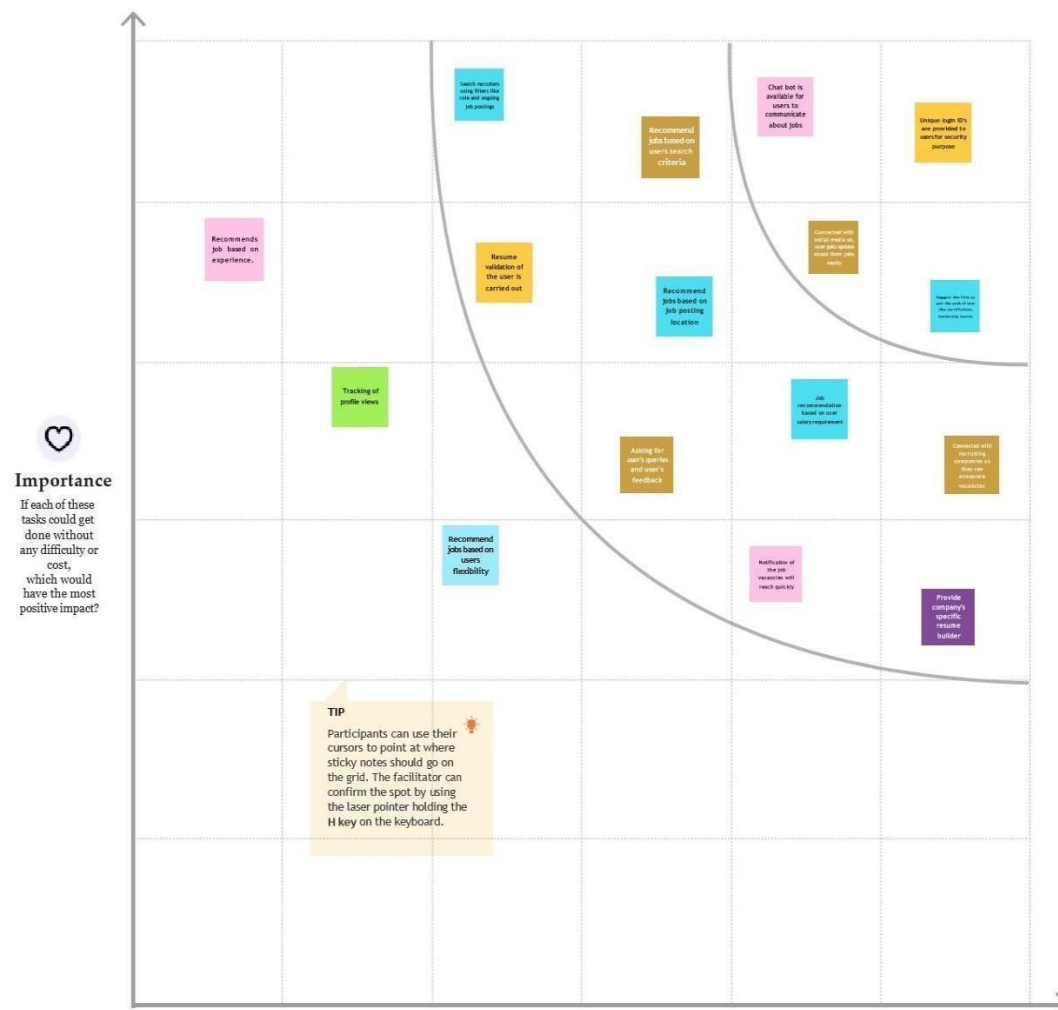
Step 3: Idea Prioritization

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

Define CS, Fit in CC	1. CUSTOMER SEGMENT(S) Who is your customer? CS Customers who are not able to solve their own Problem and in need for a possible solution from their agents/job providers.	6. CUSTOMER CONSTRAINT. What constraint prevents your customer from taking action or limiting their choice of solution? CC The problem of contacting the agent and all the problems and procedure in it.	5. AVAILABLE SOLUTION Which solutions are available to the customer when they face the problem. AS <ul style="list-style-type: none"> They can check FAQ's Session for fast support. If the problem is not listed, they can post the problem in new queries section. Which will be further assisted by the agent team. 	Explore AS, Differentiate
Focus on J&P, Tap into BE, Understand RC	2. JOBS-TO-BE-DONE/PROBLEMS Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; Explore different sides? J&P <ul style="list-style-type: none"> This Application Allows Customers to get recommended job according to their skillset They will be able post their resume and wait for the solution. They will also get solutions to their queries They can also access our FAQ's Section on our website. 	9. PROBLEM ROOT CAUSE. What is the real reason that the problem exists? RC The only real reason that this problem exists is the lack of awareness and ratio of proven results which could create trust issues with their agent.	7. BEHAVIOR What does your customer do to address the problem and get the job done. BE <ul style="list-style-type: none"> They must first Post their resume and then wait for 2 hours. They can also use our chatbot to easily contact our Team. They can also refer the FAQ's session. 	Focus on J&P, Tap into BE, Understand RC
Identify string TR & ME	3. TRIGGERS What triggers customers to act. ER <ul style="list-style-type: none"> Customers get to know the absolute recommendation to their need. Fast Response. 	10. YOUR SOLUTION Our solution involves autonomous system which does the following: RC <ul style="list-style-type: none"> A personal Help desk which can be accessed through all the devices which are compatible with browser. Customers can post their queries in the new thread section. They can also access the FAQ's Section to see if the problem is already listed They can also view their results progress through their mails. They will get support from the team until the problem gets resolved. 	8. CHANNELS of BEHAVIOR ONLINE CH <ul style="list-style-type: none"> For a new query they need an online connectivity to post and receive recommendation from our team. They can also use our chatbot 24/7 While they are in online. OFFLINE <ul style="list-style-type: none"> They can Read the messages once it is received through the cloud app. They can access FAQ's while they are offline. 	Identify string TR & ME
	4. EMOTIONS: BEFORE/AFTER How do customers feel when they face a problem or a job and afterwards. TM <ul style="list-style-type: none"> Enables Customers to Trust to their agent about posting their personal informations. Feeling comfortable with the solution and the company's service. 			

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.

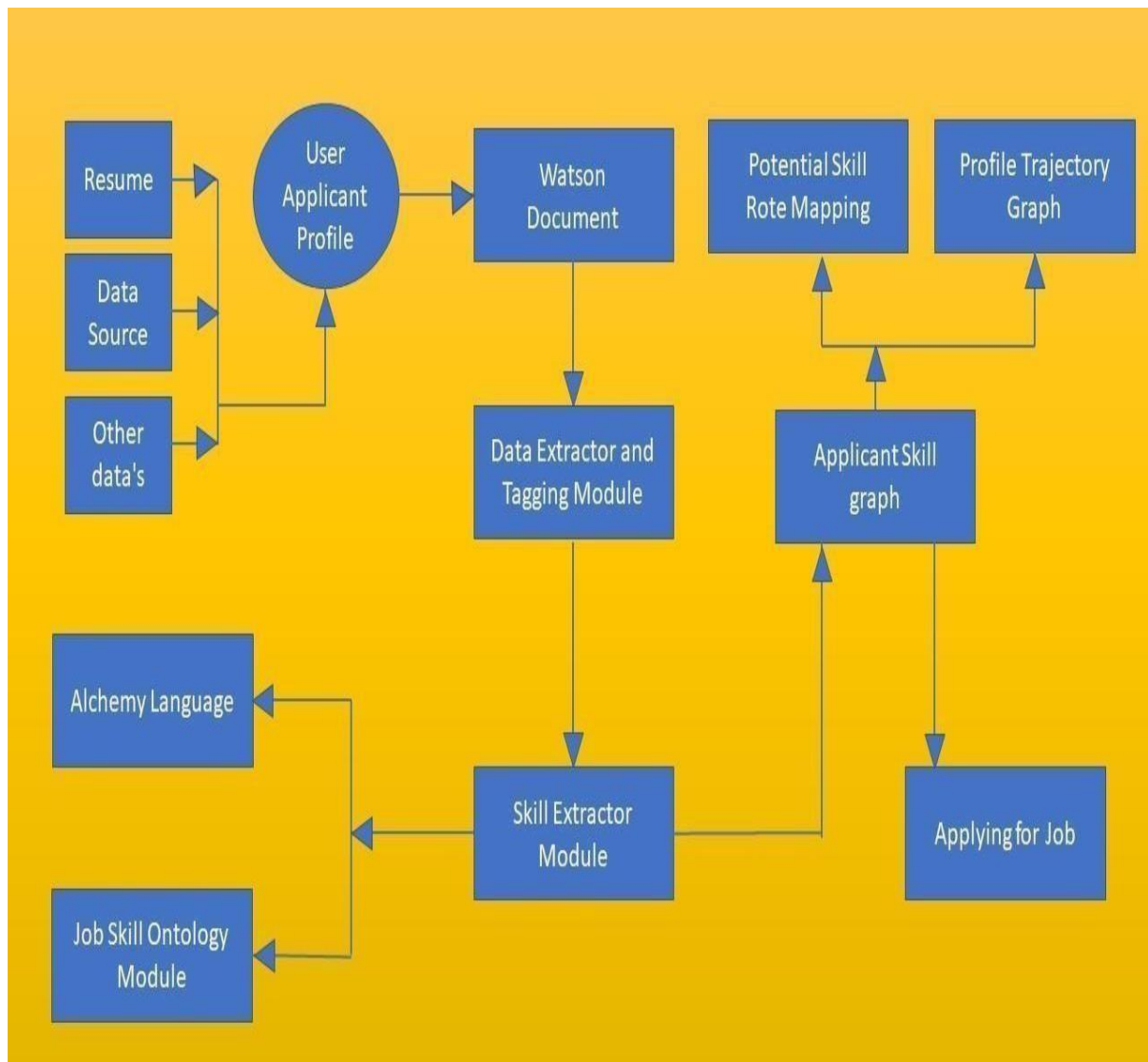
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	✓ User-Friendly Application.
NFR-2	Security	✓ End-to-End Encryption.
NFR-3	Reliability	✓ Based on personalised skill sets.
NFR-4	Performance	✓Analysing the skill sets of the user to ensure our recommendations reach them better.

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

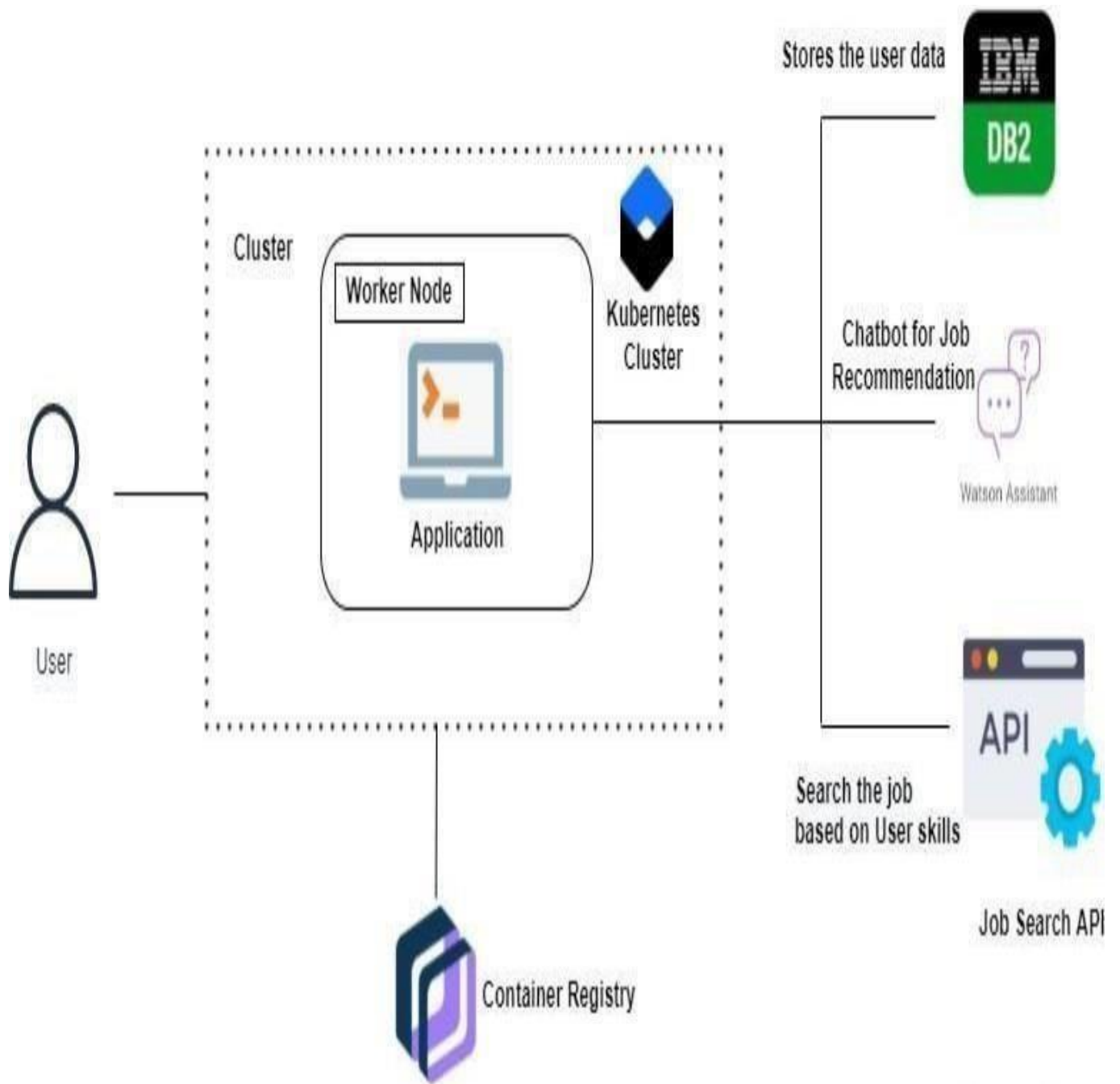
5.1 Data flow diagrams:

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 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 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
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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	US N-1	As a user, I can register for the application by entering my password, and confirming my password.	my account / dashboard	High	Sprint1
		US N-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
		US N-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		US N-4	As a user, I can register for the application through Gmail	I can receive confirmation email & click confirm	Medium	Sprint 1
	Login	US N-5	As a user, I can log into the application by password	I can access my account / dashboard	High	Sprint 1

	Dashb oard	US N- 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	Sprint1
Customer (Web user)	Identity- Aware	US N-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	Sprint1-

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	Sprint1
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	Manjunaathaa S S Agashi A Manobalan P Mariselvam M
SPRINT 2	Connect application to ibm db2	Manjunaathaa S S Agashi A Manobalan P Mariselvam M
SPRINT 3	Integrate ibm Watson assisstant	Manjunaathaa S S Agashi A Manobalan P Mariselvam M
SPRINT 4	Containerize the app and deploy the application in ibm cloud	Manjunaathaa S S Agashi A Mano balan Mariselvam

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: #e0e0e0;  
  
    color: white;  
  
}
```

```
</style>
```

```
<body>
```

```
    <h1>Welcome </h1>
```

```
    <h2> &nbsp; &nbsp; &nbsp; &nbsp; We are glad to</h2>
```

```
    <h2> Introduce our MSBN </h2>
```

```
    <h2>&nbsp; &nbsp; &nbsp; &nbsp; &nbsp; &nbsp; Portal!</h2>
```

```
        <pre>                <a                href="https://gowmi12.s3.jp-tok.cloud-  
objectstorage.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 for users

```
<script>
  window.watsonAssistantChatOptions = {
    integrationID: "9be41b76-06b0-
    426f8469-962f2963cdb6", // 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.

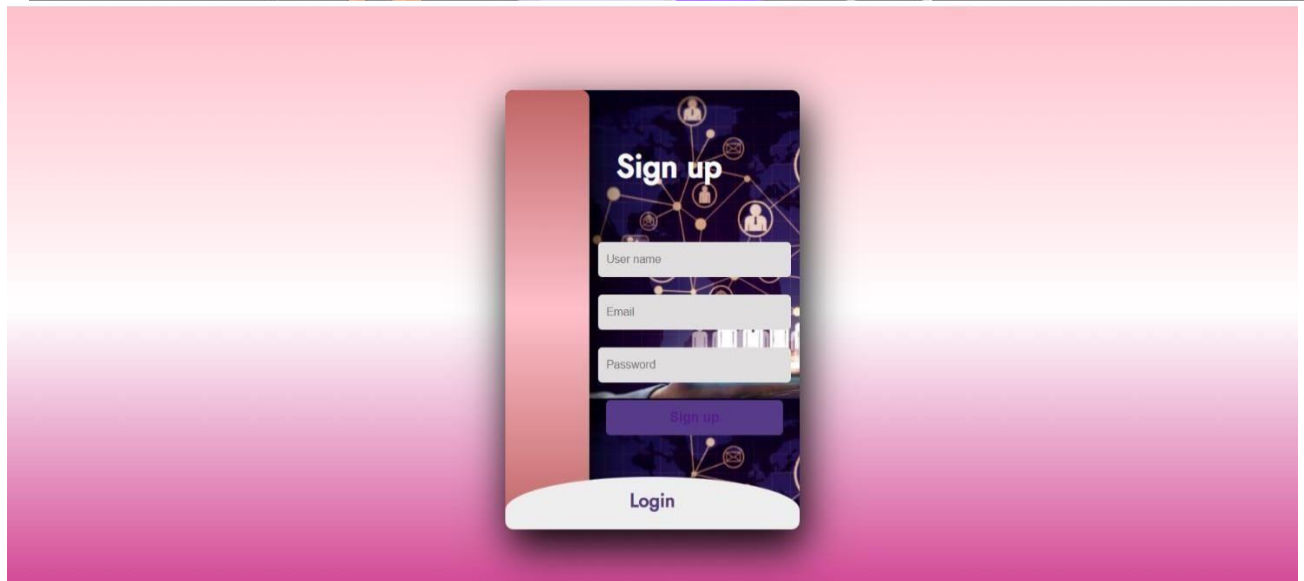
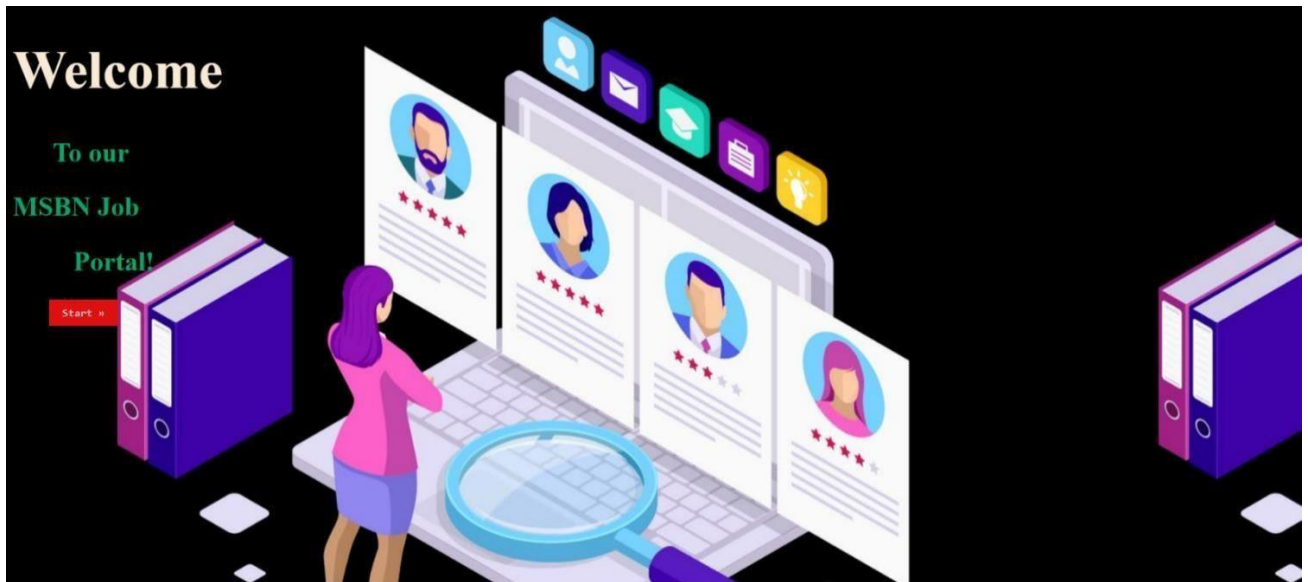
Testing was done in phase 1 and phase 2, where issues found in phase1 were fixed and then tested again in phase2.

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

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 you're looking for career opportunities in this portal will help you more.

Join with us

Continue »

Job

career



Welcome

This portal sure knows how

by GDHS

One of the most common ways for job seekers to uncover employment opportunities is through job search sites. If you're looking for career opportunities in this portal will help you more.

Join with us

Continue »

Job

career

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 your 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 your skills
Make it simple

Communication



Communication is important
It also satisfies one's needs
Think before you speak



Analyse



Analyse which job is better
Check the job is good fit or not
Improve your knowledge

Online Job Sites

We are providing job related informations in this portal!



Prepinsta

Job portal

[Click](#)



Job4freshers

Job Portal

[click](#)



Olatest

Job Portal

[click](#)

Medical Field Jobs



Medical Field Jobs and Vacancies

Job portal

Click



Best Health Care Jobs of 2022

Job Portal

click



Medical Field Jobs

Job Portal

click

Civil Field Jobs



Civil Site Engineer

Job portal

Click



Civil

Job Portal

click



Civil Field Engineer Jobs and Vacancies

Job Portal

click



OFLATEST | Job updates



Join Telegram Channel

JP Morgan Chase off campus

PwC Associate Devops

Genesys Software Engineer

Broadridge Member Technical

HCL Member Technical Staff

Walmart Graduate Intern



@job4freshers



@job4freshers

Daily Job update for Freshers and Experience <https://job4freshers.co.in/>



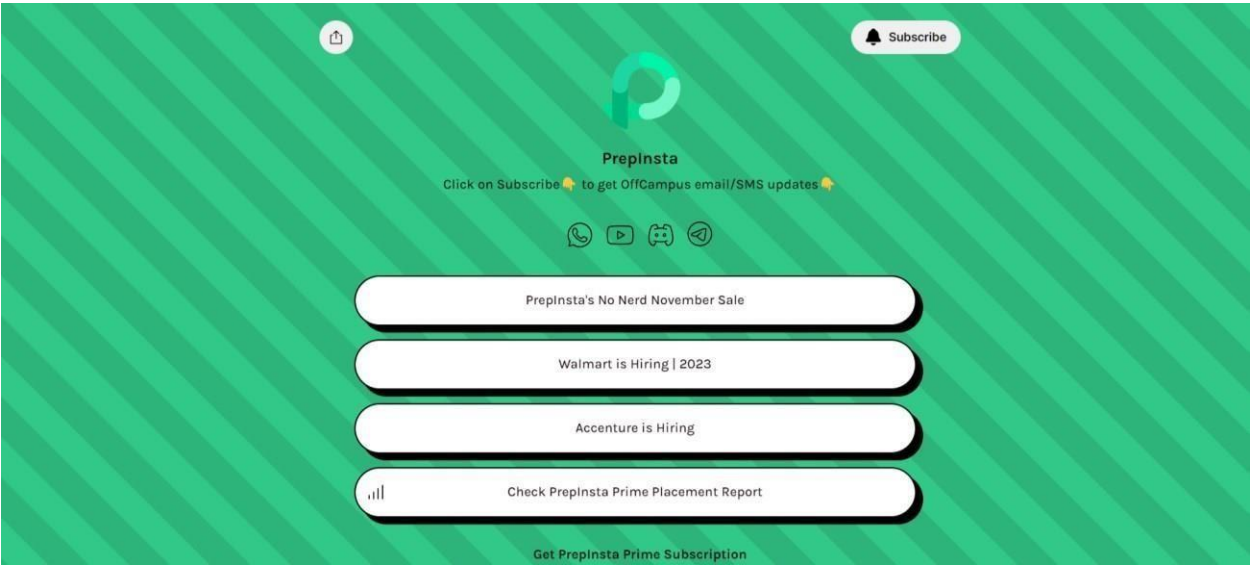
Subscribe to our YouTube channel for Work From Home & Government Job Updates

Join our TELEGRAM group for more job updates & Direct links

Join Our WhatsApp Group for direct links

Nokia Off Campus For Software Developer | Bangalore | Apply Now - Job4freshers

Cognizant Recruitment 2022 | Process Executive | Latest Job Update | Apply Now



Job Application Form

« 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.

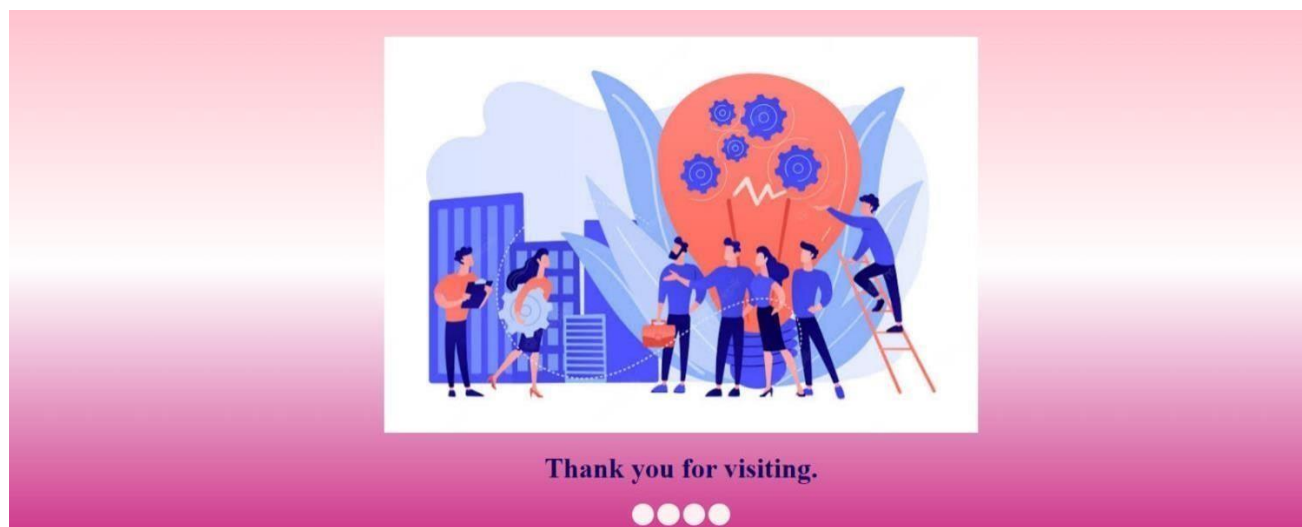
📍Chicago, US
📞Phone: +00 1515151515
✉Email: mail@mail.com



Name Email

Comment

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



10. **ADVANTAGES AND DISADVANTAGES**

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 techniqueto 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>
```

Welcome

We are glad to

[illegible]

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

</body>