PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

Project Name:	Skill/Job Recommender Application

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1. INTRODUCTION

The necessity for online job searching has increased due to rising Internet usage. The main issue is that the majority of job-search websites just provide visitors with recruiting material. In order to identify the jobs they wish to apply for, students must search through all the material. The entire process is time-consuming and ineffective. Additionally, the collaborative filtering algorithm used by many e-commerce websites—the most widespread use of recommendation algorithms—does not take into account the user's résumé or the attributes of the item—in this example, the student's CV and the specifics of the hiring process. Therefore, we suggested a better method built on item-based collaborative filtering. The purpose of the current study is to provide a useful technique for online job searching. We intend to provide students with a tailored solution that will make it simple and quick for them to discover the appropriate jobs. In this work, we provide an overview of the current recommendation methodologies that have been used to the development of tailored recommendation systems for both recruiters and job searchers. As compared to recommendation systems in other domains, we have also identified the difficulties in developing a system for hiring employees. Even so, the lack of information in user profiles can be a hindrance. Our following study will review additional research on how to incorporate implicit user behaviour into the preference matrix.

1.1 PROJECT OVERVIEW

Work recommender systems have gained popularity in recent years because they efficiently alleviate information overload by producing personalised job suggestions. Although there are several ways and tactics for using job recommender systems in the literature, the majority of them fall short of recommending positions that are correctly matched to the profiles of job searchers. The three contributions of this work are as follows: i) we made new datasets publicly available made up of a set of job seeker profiles and a set of job openings gathered from various job search engine sites; ii) we proposed a framework for job recommendation based on professional skills of job seekers; and iii) used the proposed framework to carry out an evaluation to empirically quantify the recommendation capacities of two cutting-edge methods while taking various configurations into consideration.

Keywords : "Job matching", "job searching", "job recommender systems", "person-job fit"

As a result, we provide a broad overview of the job suggestion assignment that aims to help with real-world application design and research for this crucial issue. Online

recruitment platforms have grown to be a major avenue for hiring people in most businesses over the past 20 years. These portals reduce the cost of advertising, but they struggle with information overload. Most classic information retrieval methods used by job websites, such as Boolean search strategies, use straightforward word matching algorithms. The primary problem with these portals is that they are unable to comprehend how difficult it is to connect candidates' preferences with organisational needs. As a result, a sizable number of worthy individuals lose out on the chance to land a suitable position.

1.2 PURPOSE

Many individuals wish to apply to and work for the growing number of financially sound, dependable, and promising technological companies/startups that are listed online and that are currently in high demand. Because there are so many systems already in place that advertise millions of jobs that are typically completely irrelevant to consumers, they frequently miss out on these ads. There are several options but little simplification. Job searchers frequently discover that they are unable to obtain the right position for themselves based on their real talents or interests. Therefore, this system addresses the concept from the perspective of the data, placing more emphasis on the quality of the data than the number.

2. LITERATURE SURVEY

Dynamic User Profile-Based Job Recommender System
The basic features are extracted from the job seeker's profile.The profile might get out-dated when the user does not update it in a timely manner. Based on the behaviors of the job applicant and the previous jobs which he/she applied for, the dynamic features are extracted which is an updated version of basic features. So, the system makes a statistic at regular intervals, to generate the dynamic basic features. With the increasing number of applied jobs, the number of extracted features becomes greater. Information gain is calculated for each feature. More the information gain for a feature, the more important the feature is. The dynamic recommendation system works as follows: Initiallyfor solving the cold-start problem, the user based collaborative filtering algorithm is applied to generate the initial recommendation jobs. After having the initial recommendations, the system provides the recommendations to the job seeker and records his behavior. The interested and uninterested jobs set is generated by analyzing the job applicant's behavior. Thus, the interested job set helps in extending and updating the user profile. Thus, the new basic features are used to calculate the similarity between the job applicantand job vacancies. So, new recommendations will be made available for the job applicant.

Temporal Learningand Sequence Modelingfor a Job Recommender System
The approachcombines temporal learningwith sequence modelingto capture complex user-itemactivity patterns to improve job recommendations. It is a time-based ranking model applied to historical observations and a hybrid matrix factorization over time reweighted interactions. Second,it exploitssequence properties in user-items activities and develops a RNN-based recommendation model.

Collaborative Job Prediction based on Naive Bayes Classifier using PythonPlatform
The proposed method includes implementing a recommendation system based on the collaborative filtering technique for job portals. The system is designed to suggest the jobs to the user depending upon his profileand by calculating a similarity index using Euclidean distance of two skill sets and then ranking them accordingto their naïve Bayes algorithm.

Combining content-based and collaborative filtering for job recommendation system:
A cost-sensitive Statistical Relational Learning approach Developed a hybrid content-

based filtering and collaborative filtering approach. The approach adapted a successful Statistical Relational Learning algorithm for learning features and weights and is capable of handling different costs for falsepositives and false negatives. The hybrid recommendation system is constructed by learning the Relational Dependency Network using a state-of-the-art learning approach−Relational Functional Gradient Boosting.

A Combined Representation Learning Approachfor Better Job and Skill Recommendation

The proposedsolution is representation learning based that leverages information of three graphs in order to representeach job and skill into a shared low- dimensional vector space for solving the job recommendation task from the historical job data.

2.1 EXISTING SYSTEM

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.

2.2 REFERENCES

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2.3 PROBLEM STATEMENT DEFINITION

In the last years, job recommender systems have become popular since they successfully reduce information overload by generating personalized job suggestions. Although in the literature exists a variety of techniques and strategies used as part of job recommender systems, most of them fail to recommend job vacancies that fit properly to the jobseekers profiles. Thus, the contributions of this work are threefold, made publicly available a new dataset formed by a set of job seekers profiles and a set of job vacancies collected from different job search engine sites, put forward the proposal of a framework for job recommendation based on professional skills of job seekers, and carried out an evaluation to quantify empirically the recommendation abilities of two state-of-the-art methods, considering different configurations, within the proposed framework. Thus present a general panorama of job recommendation task aiming to facilitate research and real-world application design regarding this important issue. Job matching, job seeking, job search, job recommender systems. Proposed a framework for job recommendation task. This framework facilitates the understanding of job recommendation process as well as it allows the use of a variety of text processing and recommendation methods according to the preferences of the job recommender system designer. Moreover, we also contribute making publicly available a new dataset containing job seekers profiles and job vacancies. 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.
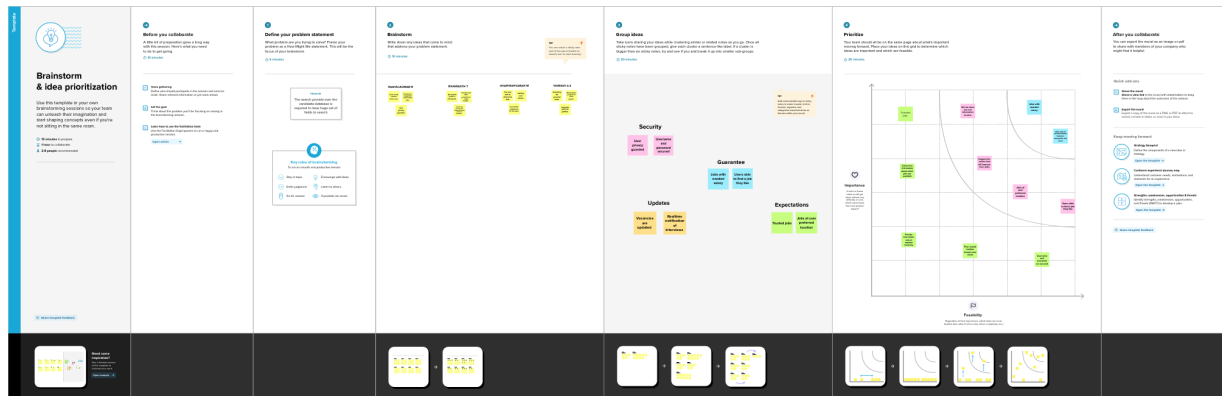
3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

Teams can utilise an empathy map as a collaborative tool to learn more about their clients. An empathy map can depict a group of users, such as a consumer segment, in a manner similar to user personas. The empathy map was invented by Dave Gray in the beginning and has become very well-liked in the agile community.
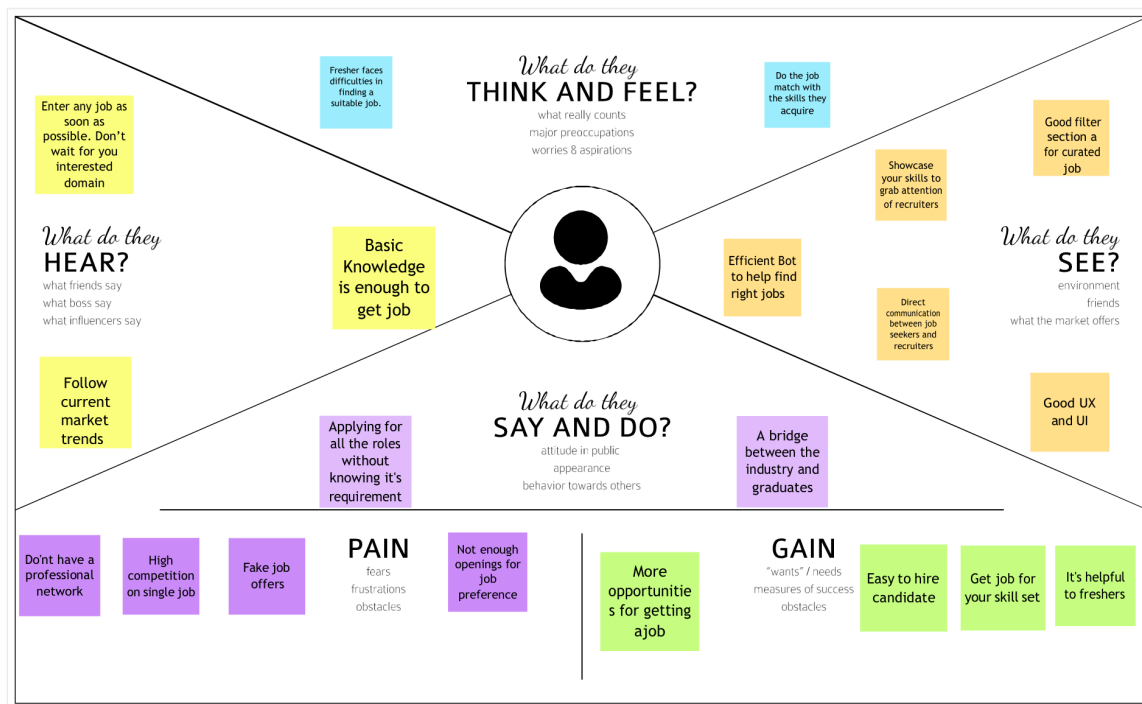
3.2 Ideation & Brainstorming

Ideation is the term used to describe the entire creative process of developing and sharing new ideas. It can take many various forms, such as developing a completely original idea or fusing many previously existing ideas to develop a new organisational structure. Ideation is comparable to the process of brainstorming. You should approach brainstorming with a determined strategy since it serves as the foundation for the other stages of the ideation process. In a normal brainstorming session, one or more participants focus their thoughts on a specific subject or problem.

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To enable job seekers to find jobs relevant to their skill set
2.	Idea / 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
3.	Novelty / Uniqueness	• 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
4.	Social Impact / Customer Satisfaction	• Ease of job application procedure • Help users stay up to date with latest skills through the resources provided
5.	Business Model (Revenue Model)	• Provide additional features for premium users to enhance their job search experience

3.4 Problem Solution fit

	1. CUSTOMER SEGMENT(S) **CS**	6. CUSTOMER CONSTRAINTS **CC**	5. AVAILABLE SOLUTIONS **AS**	
Define CS, fit into CC	Who is your customer? i.e. working parents of 0-5 y.o. kids	What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.	Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking	**Explore AS, differentiate**
	1.Graduate students 2.working professionals 3.job seekers with various qualifications	1.Confidence 2.Premium section 3.Spam job alerts	Pros 1.Cultivate commercial relationship 2.Having filters ⸱ Cons 1.Having high competition 2.fraudulent acitivity	

	2. JOBS-TO-BE-DONE / PROBLEMS **J&P**	9. PROBLEM ROOT CAUSE **RC**	7. BEHAVIOUR **BE**	
Focus on J&P, tap into BE, understand RC	Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.	What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.	What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)	**Focus on J&P, tap into BE, understand RC**
	1.Searching is to be made simple 2.Spam is to be reduced 3.The data wants to be stored securely	There are various spam and fake job posting in the existing things the filters help the customers to easily navigate	Customer get their job done by accessing various platform and consulting firms.	

	3. TRIGGERS **TR**	10. YOUR SOLUTION **SL**	8. CHANNELS of BEHAVIOUR **CH**	
Identify strong TR & EM	What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.	If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.	**8.1 ONLINE** What kind of actions do customers take online? Extract online channels from #7	**Identify strong TR & EM**
	1.Advertisement 2.More getting jobs 3.Easy access	To give a end to end solution from applying a job to getting a job and give the API and lot of filters to get desired result and remove the spam jobs.	**8.2 OFFLINE** What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.	
	4. EMOTIONS: BEFORE / AFTER **EM** How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design.		Online 1.Search for job 2.Update the resume 3.apply for job ⸱ Offline 1.Visit the company 2.Go for interview	
	Before 1.No awareness about jobs 2.Applying for all jobs they get ⸱ After 1.Aware about the jobs 2.getting alerts about the jobs 3.more confident about getting a job			

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution.

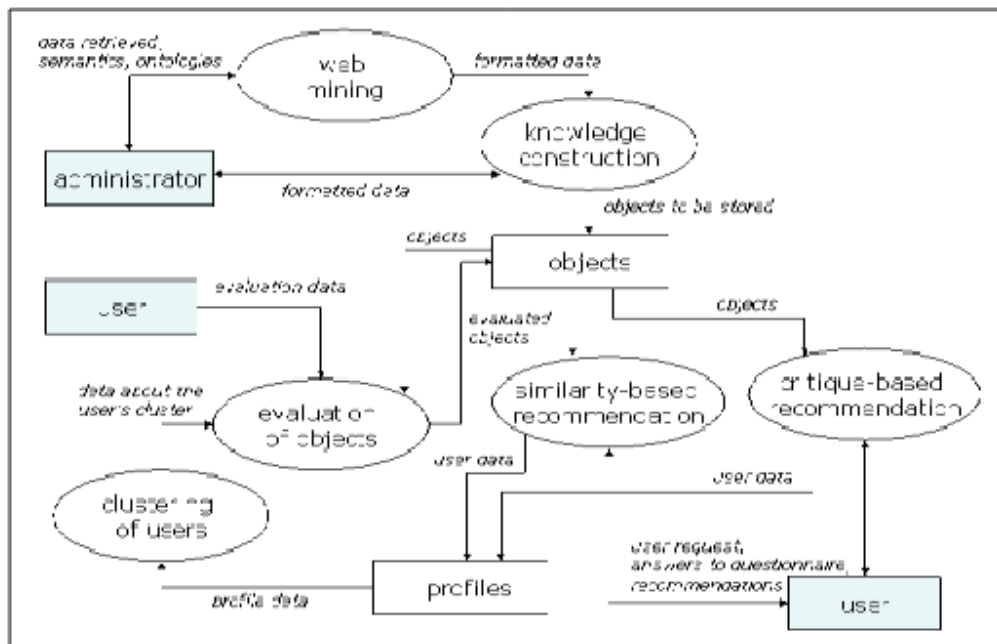| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration via Form And via Gmail
FR-2	User Confirmation	Confirmation through Email That is through OTP
FR-3	Chat Bot	A Chat Bot will be there in website to solve user queries and problems related to applying a job, search for a job and much more.
FR-4	User Login	Login through Form Login through Gmail
FR-5	User Search	Exploration of Jobs based on job filters and skill recommendations.
FR-6	User Profile	Updation of the 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.

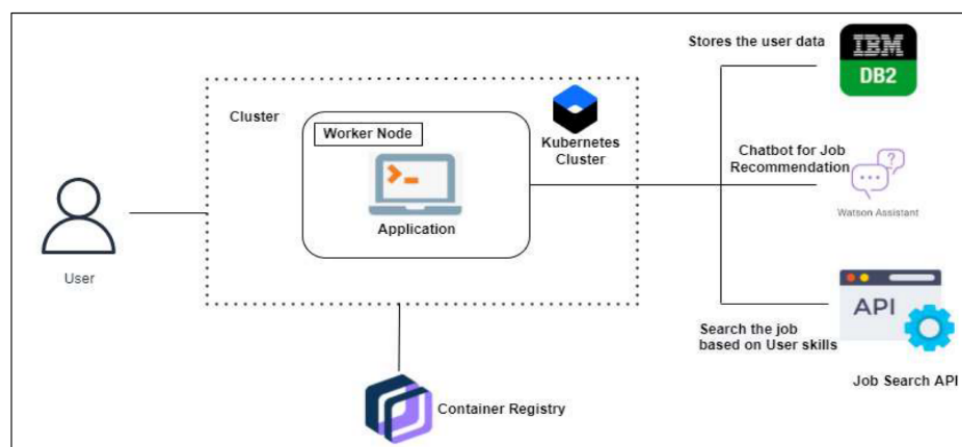| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	This application can be used by the job seekers to login and search for the job based on her Skills set.
NFR-2	Security	This application is secure with separate login for Job Seekers as well as Job Recruiters.
NFR-3	Reliability	This application 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 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 & Technical Architecture

S.No.	Parameter	Description
1.	Is the System Robust ?	Yes, the system is robust that it can't be crashed intermittently and it has been tested for several times before placing it to the high availability environment .
2.	Is it build-able ?	Yes it is partially buildable platform as the budget required will be more as cloud is a pay per use model and time taken will be quite comparatively less .
3.	Is it Scalable ?	Yes the system proposed is highly scalable as it can handle the growing workload where good performance is also needed to work efficiently. Deployment of the platform has been done using various os virtualization platform it will handle the workload statistically.
4.	Is it highly modifiable ?	Yes, the system is modifiable and it can admit to the changes by detecting errors that needs to be fixed and new functionalities. It is highly responsive to the changes .

5.3 User Stories

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 Linkedin	I can register & access the dashboard with Linkedin Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register and access the dashboard through Gmail also	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can log on to the application through email id and password	High	Sprint-1
	Dashboard	USN-6	As a user , I can login and chat with the chatbot	Once I logged on the application I can chat with the chatbot	High	Sprint-3
Customer (Web user)	Registration	USN-7	As a user , I can log on and register the application for the services being provided	I can access my account / dashboard	High	Sprint-1
		USN-8	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
	Login	USN-9	As a user, I can log into the application by entering email & password	I can log on to the application through email id and password	High	Sprint-1
Customer care executive	Should Regularize the Send grid service	USN-10	As a executive and service operator of the service they should make sure that service provided are properly send and received by the user.		High	Sprint-2
	Should monitor the chatbot regularly whether working or not	USN-11	As a executive to provide a quality based service chatbot is important for assisting if any assistance is needed for the user		High	Sprint-2

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Title	Description	Date
Literature Survey and Information Gathering	Gathering Information by referring the technical papers, research publications etc	2 SEPTEMBER 2022
Prepare Empathy Map	To capture user pain and gains Prepare List of Problem Statement	10 SEPTEMBER 2022
Ideation	Prioritise a top 3 ideas based on feasibility and Importance	17 SEPTEMBER 2022
Proposed Solution	Solution include novelty, feasibility, business model, social impact and scalability of solution	24 SEPTEMBER 2022
Problem Solution Fit	Solution fit document	29 SEPTEMBER 2022
Solution Architecture	Solution Architecture	1 October 2022
Customer Journey	To Understand User Interactions and experiences with application	8 October 2022
Functional Requirement	Prepare functional Requirement	14 October 2022
Data flow Diagrams	Data flow diagram	15 October 2022
Technology Architecture	Technology Architecture diagram	16 October 2022
Milestone & sprint delivery plan	Activity what we done &further plans	21 October 2022
Project Development Delivery of sprint 1,2,3 & 4	Develop and submit the developed code by testing it	24 October 2022 – 19 November 2022

6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Acceptance criteria	Team Members
Sprint-1	UI Design	USN-1	As a user, I can see and experience an awesome user interface in the website	Medium	Better Impression about a website	Rishwanth T Raghulkumar R
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	Sharveshvaran M Vignesh AS
Sprint-1		USN-3	As a user, I will receive confirmation email once I have registered for the application	High	I can receive confirmation email & click confirm	Rishwanth T Vignesh AS
Sprint-1		USN-4	As a user, I can register for the application through Facebook	Low	I can register & access the dashboard with Facebook Login	Raghulkumar R Sharveshvaran M
Sprint-1		USN-5	As a user, I can register for the application through Gmail	Medium	I can receive confirmation email & click confirm	Raghulkumar R Vignesh AS
Sprint-1	Login	USN-6	As a user, I can log into the application by entering email & password	High	I can access my account / dashboard	Rishwanth T
Sprint-!	Flask	USN-7	As a user, I can access the website in a second	High	I can access my account / dashboard	Sharveshvaran M Rishwanth T

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Acceptance criteria	Team Members
Sprint-1	Dashboard	USN-8	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	Vignesh AS Raghulkumar R Rishwanth T
			Submission Of Sprint-1			
Sprint-2	User Profile	USN-9	As a user, I can view and update my details	Medium	I can modify my details/data	Rishwanth T Sharveshvaran M
Sprint-2	Database	USN-10	As a user, I can store my details and data in the website w	Medium	I can store my data	Vignesh AS Sharveshvaran M Raghulkumar R
Sprint-2	Cloud Storage	USN-11	As a user, I can upload my photo, resume and much more in the website.	Medium	I can Upload my documents and details	Vignesh AS Sharveshvaran M
Sprint-2	Chatbot	USN-12	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	Rishwanth T Raghulkumar R
Sprint-2	Identity-Aware	USN-13	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	Sharveshvaran M Raghulkumar R
			Submission of Sprint-2			

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Acceptance criteria	Team Members
Sprint-3	Sendgrid service	USN-14	As a user, I can get a notification or mail about a job opening with the help of sendgrid service.	Medium	I can get a notification in a second.	Rishwanth T Raghulkumar R
Sprint-3	Learning Resource	USN-15	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	Vignesh AS Sharveshvaran M Raghulkumar R
Sprint-3	Docker	USN-16	As a user, I can access the website in any device	High	I can access my account in any device	Vignesh AS Rishwanth T
Sprint-3	Kubernates	USN-17	As a user, I can access the website in any device	High	I can access my account in any device	Raghulkumar R
Sprint-3	Deployment in cloud	USN-18	As a user, I can access the website in any device	High	I can access my account in any device	Rishwanth T
Sprint-3	Technical support	USN-19	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.	Vignesh AS Sharveshvaran M
			Submission of Sprint-3			
Sprint-4	Unit Testing	USN-15	As a user, I can access the website without any interruption	High	I can access the website without any interruption	Rishwanth T Raghulkumar R
Sprint-4	Integration testing	USN-16	As a user, I can access the website without any interruption	High	I can access the website without any interruption	Sharveshvaran M Rishwanth T

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Priority	Acceptance criteria	Team Members
Sprint-4	System testing	USN-17	As a user, I can access the website without any interruption	High	I can access the website without any interruption	Raghulkumar R Vignesh AS
Sprint-4	Correction	USN-18	As a user, I can access the website without any interruption	High	I can access the website without any interruption	Sharveshvaran M Raghulkumar R
Sprint-4	Acceptance testing	USN-19	As a user, I can access the website without any interruption	High	I can access the website without any interruption	Rishwanth T Vignesh AS
			Submission of Sprint-4			

7. ADVANTAGE AND DISADVANTAGE

Advantages:

1. Employement opportunities:
The foremost advantage of having a profile in our application is that it is your doorway into employment oppportunities world wide. Before the advent of online job application, students, would get jobs through connections. However, now your job opportunities have increased maganimously. Students who have attained education abroad can put in their area of specialization and find an appropriate job. Apart from this, if there is a particular company that you're interested in, you can make applications for the same.

2. Easy Job Application
The traditional recruiting process has taken a back seat and online job application has become paramount. Gone are the days, where you would have to run around with copies of your resume. With the ease of uploading the necessary information on your profile, not only will the recruiters persue through your profile but you can update your skills regularly. The initial stress of a job application is reduced because the recruiters is already aware of your skills and wants to explore them further. This gives you on an excellent opportunities to capitalize on the same and use the app to its fullest.

3. Initiate Connections
Apart from receiving a job offer, the connections you establish on your profile help you in the long run. For instance, you may start by connecting with your school and college friends and eventually shift to your collegues. An alumunus from your university is good connections to have. Having an illustrios list of connections speaks to your strong profile Having a connections who is working at your dream comapny cam be your pathway to the same. Initiating connections will alow you to analyse industry trends and be at the top of the game.

4. Endorsement and Connections
Collecting endorsements and connections is an excellent way of adding social backing to your profile. As mentioned earlier, having illustrious connections will add value to your profile. Upon receiving endorsement for your skills, employers receive extra confidence in your profile. The trick now is to not only have relevant skills but also make your profile stand out.

Disadvantages:

1. Risk of identity theft
There are loads of personal information that you have to display on your profile for prospective employers to see. Hence, in a case whereby LinkedIn servers develop an issue, you stand a risk of losing important information to the public, resulting in identity theft.

2. Incomplete profile challenge
LinkedIn like other social network websites required you to put up an attractive profile. That is a profile that is appealing to employers and prospective recruiters. People however find it hard to fill out profile details completely due to one reason or other.

3. Tons of Spam message
There's a saying that among 12 disciples there will always be Judas. Think of how many Judas will be available on a website with over 1200 million people. LinkedIn is filled with spam messages from recruiters, employers, and even job seekers. All just to seek attention, mislead, and extrot money, etc.

4. Premium package can be expensive
Good thing they say doesn't come cheap. Although, LinkedIn allows you to join the platform without paying. But the LinkedIn premium packages are charged for. For example, the "medium-sized career" price is just about $29.99/month. There are so many added benefits that this offer brings but can still be very costly for a starter or medium-sized business.

8. CONCLUSION

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

9. APPENDIX

*Please find our -> **Github** <- project Link.*