

LUMBINI ICT CAMPUS
TRIBHUVAN UNIVERSITY
INSTITUTE OF SCIENCE AND TECHNOLOGY



Project on

“Sajilo Job”

A project report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Information Technology awarded by Tribhuvan University.

Submitted by:

Aparna Sapkota (21755/075)

Lanisha Koirala (21761/057)

Rachana Lamichhane (21768/075)

Submitted to

Lumbini ICT Campus

Department of Computer Science and Information Technology

Gaindakot-2, Nawalpur

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LIST OF ABBREVIATIONS

CV	Curriculum Vitae
RAD	Rapid Application Development

1. INTRODUCTION

1.1 Background

Information in the twenty-first century is increasingly resembling biological beings. In recent years, a key study problem in the field of recommender systems has been how to unearth the massive quantity of data required to satisfy the needs of their seeker. In the age of big data, the demand for "personalized" services has risen dramatically. Collaborative filtering technology appeared to overcome the problem. Due to the need for things based on user data and user ratings of some of the items, collaborative filtering is the most popular and advanced recommendation approach. The “Sajilo Job” system is very needy and less implemented system here in Nepal.

1.2 Problem Statement

In today's age everyone is keen to achieve better results in each field, everyone wants to explore their inner interests. Everyone wants to work on the field, they are interested. Everything in today's world needs to be online and our online Sajilo Job is one that is expected to provide such facilities to our users. Using a better algorithm for the purpose of recommending Candidates based on the CV provided by the users to the one that are looking for candidates to hire of the web application we can get better recommendations.

In the past, people used different manual ways to find appropriate jobs for them. The job seekers' personal information and enterprises' recruiting information may get overloaded which leads to low utilization rate. Many recruiters waste their time by making sure that they are qualified or not. Finding the right candidates can be tedious.

1.3 Scope and Limitation

1.3.1 Scope

The scope of this project are mentioned below:

- Sajilo Job is an online web platform which can be accessed by any people who has access to internet thus has a global reach.
- It helps companies to connect to candidates just with click and with the drop of their CV.
- It saves user time for searching and finding the appropriate candidate & jobs, then any other manual method and also provide suitable job for each candidate.

1.3.2 Limitation

Our job recommendation system will have all the functionalities to connect appropriate candidate to the companies but one major limitation of our system is that it is not a HR management system as we don't include all the process to hire a candidate we just connect them to the companies.

1.4 Objectives

The objectives of our projects are:

- To create a system that suggest appropriate candidate for job recruiters according to their skills.
- To assist recruitment process within an organization.

1.5 Project Question

- How to better manage recruitment process within an organization?
- What are the requirements need for Sajilo Job?
- How the new technology will have an impact on old System?
- Why this system is beneficial?

1.6 Application

Our recommendation system keeps track of user's skillsets & company's industry along with search keywords and recommends an appropriate candidate based on those skillsets.

1.7 Feasibility Analysis

A Feasibility study is a preliminary study which investigates the information of prospective user and determine resource requirement, cost benefit and feasibility of the propose system. in this phase estimated are compared with available resource and a cost benefit analysis of the system is made. The feasibility analysis activity involves the analysis of the problem and collection of all relevant information related to the project. The main objective of the feasibility analysis is to determine whether the project would be feasible in term of economic feasibility, technical feasibility, operational feasibility and schedule feasibility or not. It is also to make sure that input data which are require for project are available. We analyze the feasibility of our project on the base of following topic.

1.7.1 Technical feasibility

Evaluating the technical feasibility is the trickiest part of a feasibility study. This is because, at the point in time there is no any detailed designed of the system, making it difficult to access issues like performance, costs (on account of the kind of technology to be deployed) etc. A number of issues have to be considered while doing a technical analysis; understand the different technologies involved in the proposed system. Before commencing the project, we have to be very clear about what are the technologies that are to be required for the development of this system. Is the required technology available? Our system “Sajilo Job System” is technically feasible since the required tools are easily available. Python can be easily handled. Although all tools seem to be easily available there are challenges too.

1.7.2 Operational feasibility

Proposed project is beneficial only if it can be turned into information systems that will meet the operating requirements. The job data analysis will be helpful to detect the skills of any individual

1.7.3 Schedule feasibility

Schedule feasibility is defined as the likelihood of a project being completed within its scheduled time frame. A project will fail if it takes too long to be completed before it is useful. Typically, this means estimating how long the system will take to develop, and if it can be completed in a given period of time using some methods like playback period. Schedule feasibility is a measure how reasonable the project time table is. Given our technical expertise, are the project deadlines reasonable? Some project is initiated with specific deadlines. It is necessary to determine whether the deadlines are mandatory or desirable.

A minor deviation can be encountered the original schedule decided at the beginning of the project. The coding and research have not been feasible in terms of schedule

2. LITERATURE REVIEW

Before starting development of the new system, different requirements are taken into account. As our project solely based on the job recruitment system with the recommendation that uses data science, the requirements analysis is done on various aspects of hiring process as well as recommendation systems that are prevalent in the country and worldwide.

2.1 Study of the Existing System

With growing number of internet user in the world, now everything is being online. One of the most common way today's, job-seekers uncover employment opportunities by using online sources. There are hundreds of job portals, social media channels, networking groups, and staffing company websites to choose from. MERO JOB, JOBS NEPAL, RAMROJOB, KUMARI JOBS, CMS JOB, KANTIPUR JOB and so on are the best ranked online job portal in Nepal with highest Alexa ranking. Mero Job is the best ranked and popular in Nepal for online job. Most of the job portal sites perform job recruitment on the basis of profile ranking and previous work performed on the portal.

Our project different in the way that is uses

- Python and its libraries such as NumPy Scikit learn and pandas.
- Implement the algorithm and analyzed the result.
- Used best outcome in the web application using Django related works

3.METHODOLOGY

There are endless algorithms to help a seeker find the right job, some are the traditional algorithms while some are newly found and there are a large number of hybrid algorithms which are a combination of many algorithms. All these algorithms have only goal to seek a righteous job for the candidate [1] [2]. CF is a popular recommendation algorithm that bases its predictions and recommendations on the ratings or behavior of other users of the system. It also uses a profound technique called as Information Retrieval (IR). Information Retrieval is a new and advanced technique used for achieving the most accurate and desired result without compromising on the efficiency of the result.

3.1 Research Methodology

RAD stand for “Rapid Application Development” model. It is a type of incremental model. In RAD model the components or functions are developed in parallel as if they were mini projects. The developments are time boxed, delivered and then assembled into a working prototype. This can quickly give the customer something to see and use and to provide feedback regarding the delivery and their requirements. ^[5]

Rapid-Application Development (RAD) is both a general term used to refer to alternatives to the conventional waterfall model of software development as well as the name for James Martin's approach to rapid development. In general, RAD approaches to software development put less emphasis on planning and more emphasis on process. In contrast to the waterfall model, which calls for rigorously defined specification to be established prior to entering the development phase, RAD approaches emphasize adaptability and the necessity of adjusting requirements in response to knowledge gained as the project progresses. Prototypes are often used in addition to or sometimes even in place of design specifications.

On receiving system design models, we break down system into sub components as modules. And each module is implemented using programming language or web application. While coding we will be using Django, Django REST Framework, MySQL, JWT authentication, incorporate with other various languages like HTML, CSS, Bootstrap etc. The main motivation for using RAD is rapidly changing requirements as the requirements are the gathered at the beginning of the project

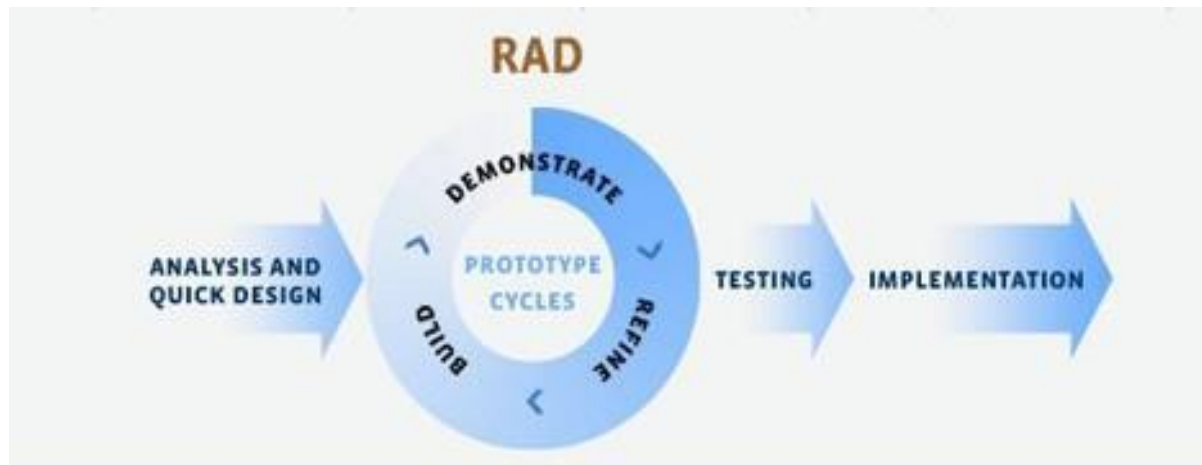


Figure 3.1: RAD life cycle

There are many reasons for which RAD has been employed:

- Short Development Period
- Constant Maintenance
- Encourage Users' Feedback

Under RAD there are four major phases:

- Requirement Planning Phase
- User Design Phase
- Construction Phase
- Cutover Phase

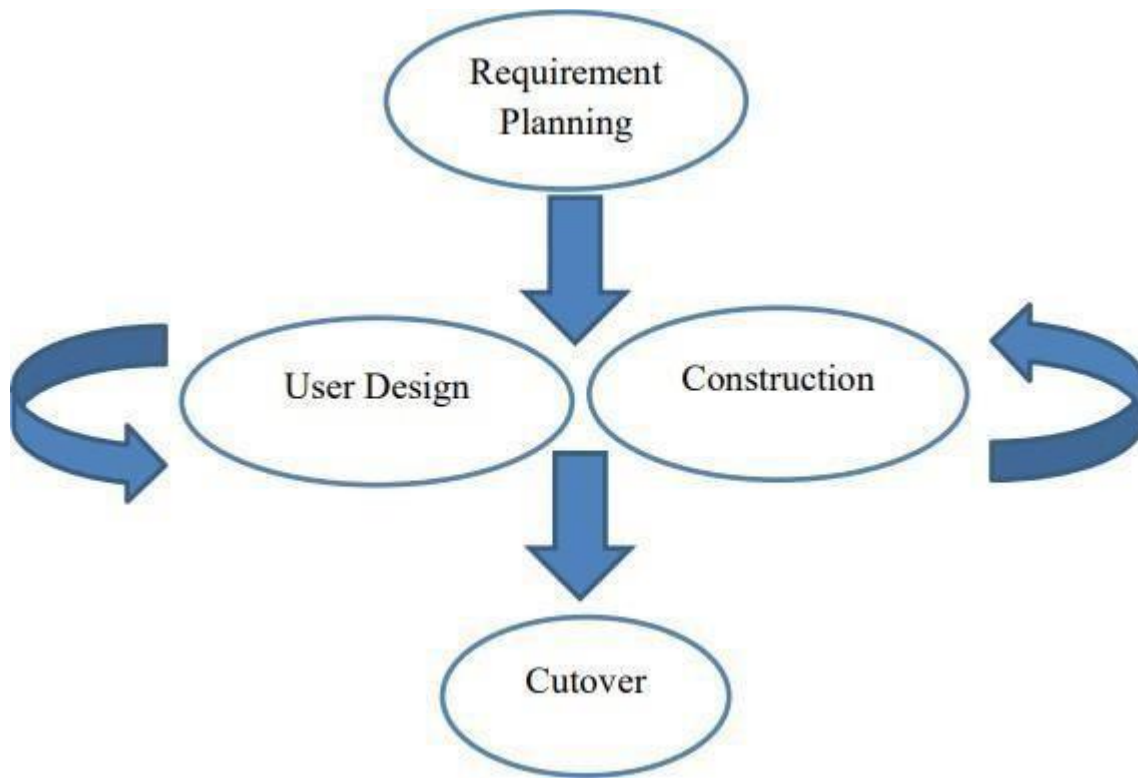


Fig 3.2 Four main phases of RAD

3.1.1 Requirement Planning Phase

Both system planning and system analysis will be carried out in this phase. In the beginning of this phase, preliminary research work will be carried out. Information such as what kind of sources and the whereabouts of sources would be identified. For this project, a mixture of primary and secondary sources will be used. An example of primary source is the research study on the current job system; an example of secondary source is the commentary and the analysis of different techniques. Both of these sources can be retrieved from the internet. After getting the information, analysis study will be taken place to identify the project needs, project scope, problems statement and system requirement, which all these have been discussed in the earlier sections.

3.1.2 User Design Phase

In this phase, the draft idea of the whole system will be identified. System architecture and several important things such as the initial interface, functionalities, etc. will be drafted out. Throughout

this phase, the author will have to design the whole system before proceeding into the next phase to construct the prototype

3.1.3 Construction Phase

This is a phase whereby a prototype will be developed. After the developer has drafted out the whole system, which include the initial interface, functionalities, etc., a prototype will be built based on that information. However, the prototype is not finalized yet. During this phase, the developer will also act as the user to try out the prototype in order to make sure that the prototype is working perfectly and also ensure that it is user-friendly. Whenever there's a problem occurs, the developer will then move back to phase II to redesign and continue to reconstruct the new prototype in phase III until all the requirements are satisfied (as shown in Figure 3.1 above).

3.1.4 Cutover Phase

This phase is also known as the implementation phase. In this phase, all the changes made to the prototype are finalized and the prototype now is ready to deploy as the system. A final testing will be carried out in this phase to ensure that the prototype is truly ready to be used.

3.2 System Design

3.2.1 System Model

The system design for our system is explained by following models that is required for the recommender system.

- **ER Diagram of the System**

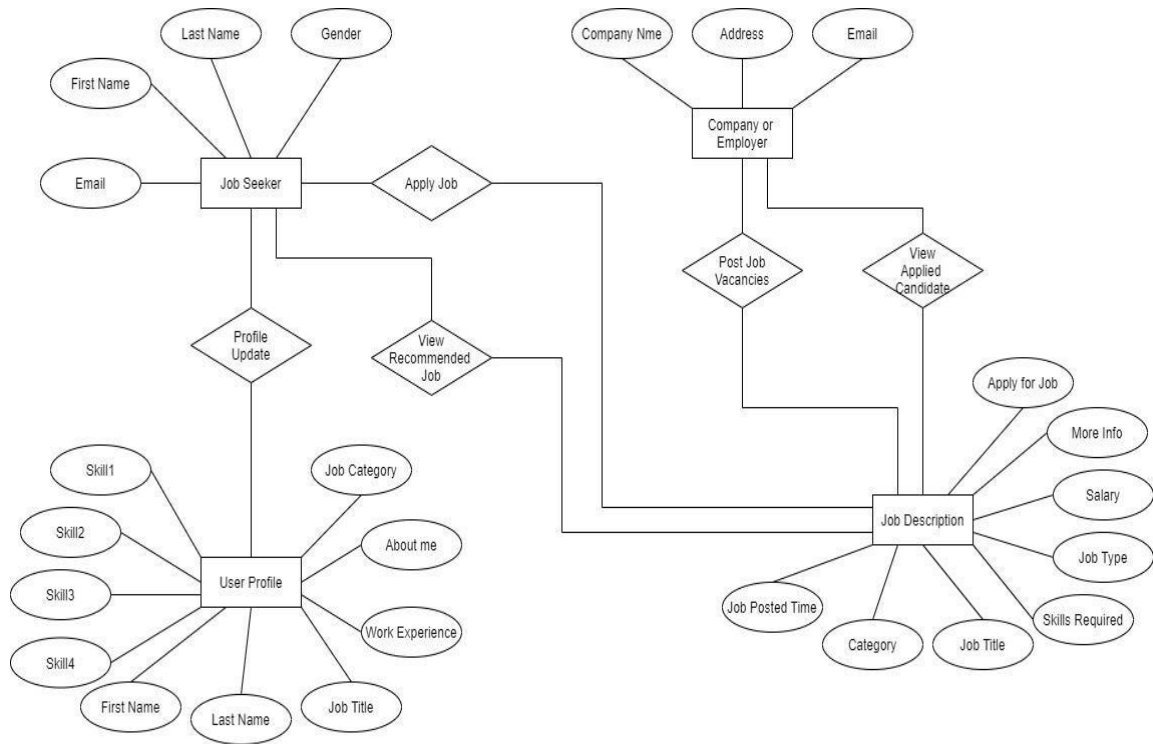
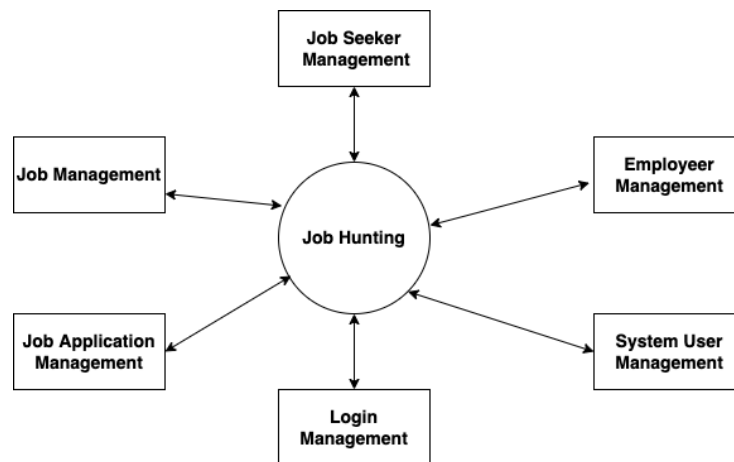


Figure : ER Diagram for System

• Data Flow Diagram

Level 0



Level 1

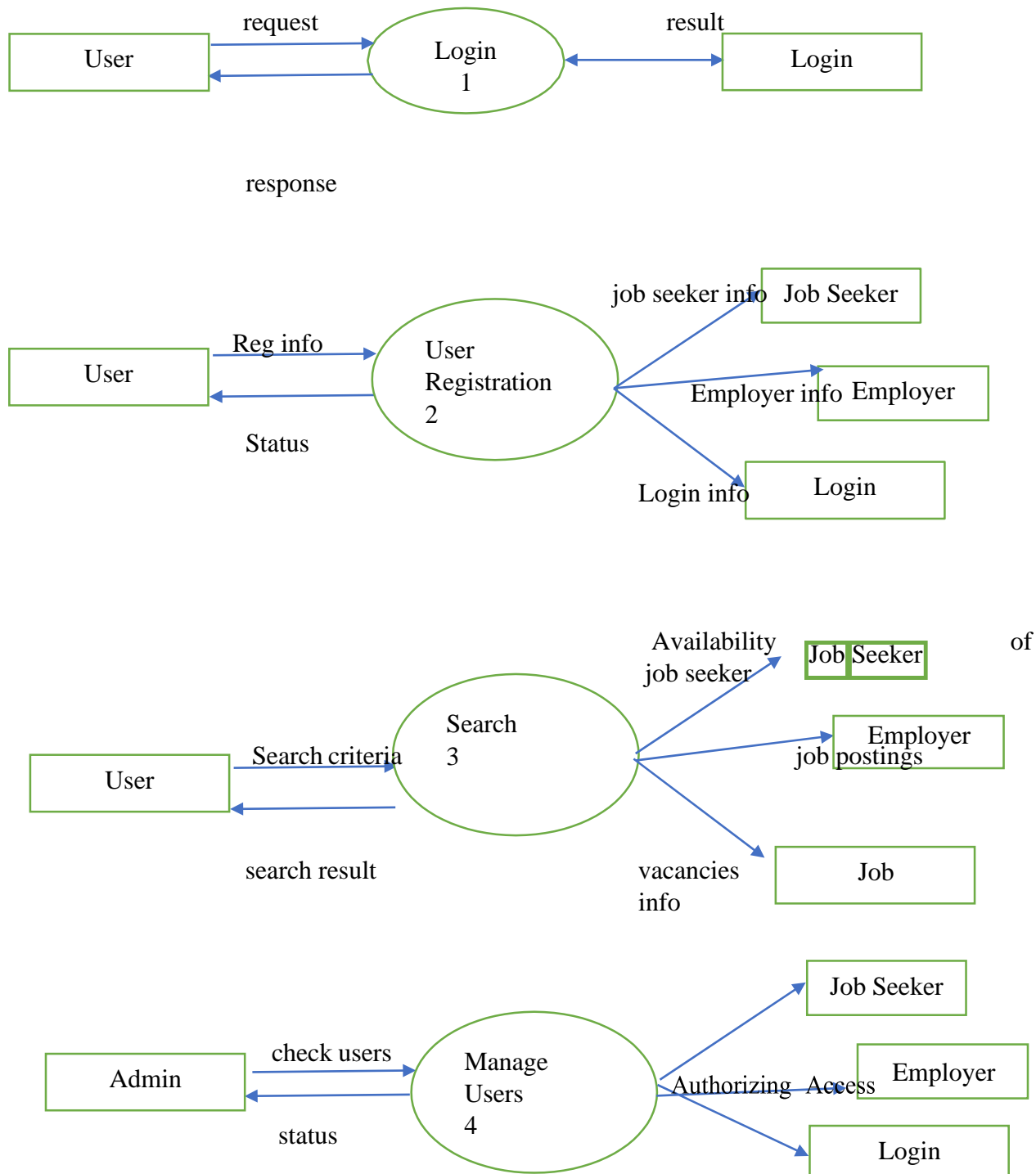


Figure : Dataflow Diagram

- **Flowchart of the system**

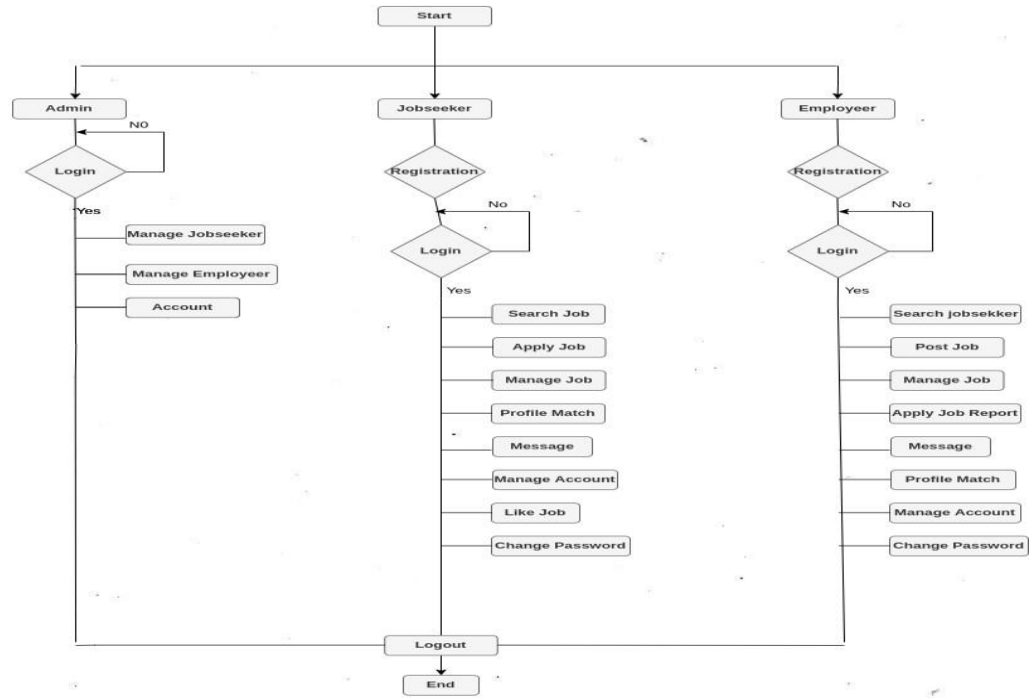


Figure : Flowchart of the system

- **Use Case Diagram**

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipse. In fig. there are three actors: Admin, Employer and Job-seeker. Firstly, both actors (employer and jobseeker) need to register and then login to access our system. Job-seekers need to fill up the form with basic information, skills set etc. and the form is generated into CV. Employer posts job vacancies and view shortlisted candidates for the corresponding vacancy. Admin has more access than other two actors. Admin can access and manage all data of both employer as well as jobseeker.

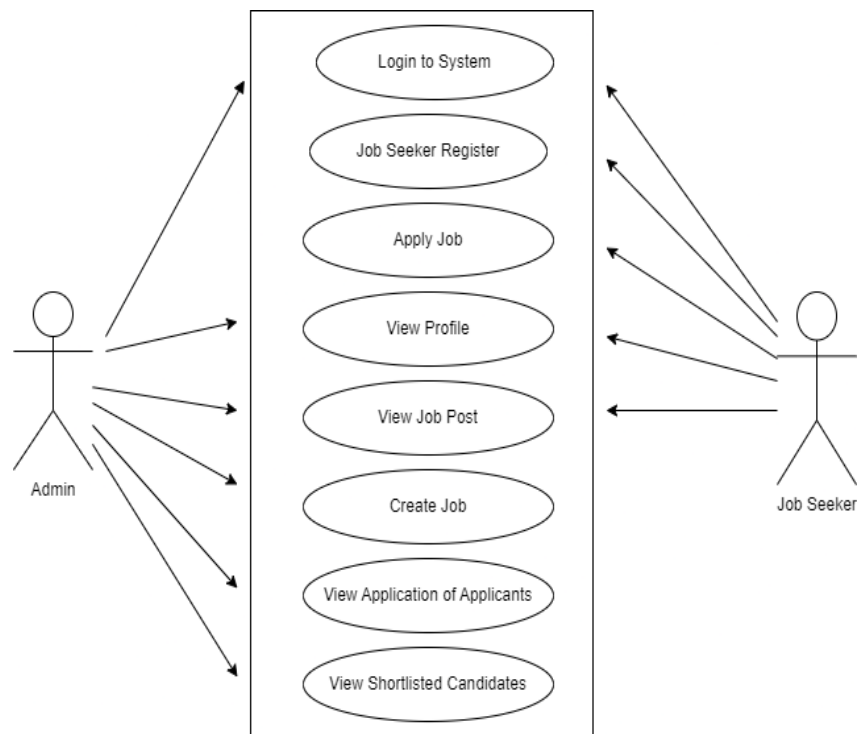


Figure: Use Case Diagram

- **Class Diagram**

In software engineering, a class diagram is a type of static structure diagram that describes the structure of a system by showing the systems classes, their attributes, operations (or methods), and the relationships among objects. The classes in a class diagram represent both the main elements, interactions in the application, and the classes to be programmed. In fig. after the job-seeker registers, he/she can login with their email address (id of sajilo job can be made with email) and password. The job-seeker can fill the form which later generates into CV. In same way the company or employer can login with their email address and password after they have registered. The company or employer can post job vacancies as well as view shortlisted candidates obtained after the application filled by the applicant for the corresponding vacancy.

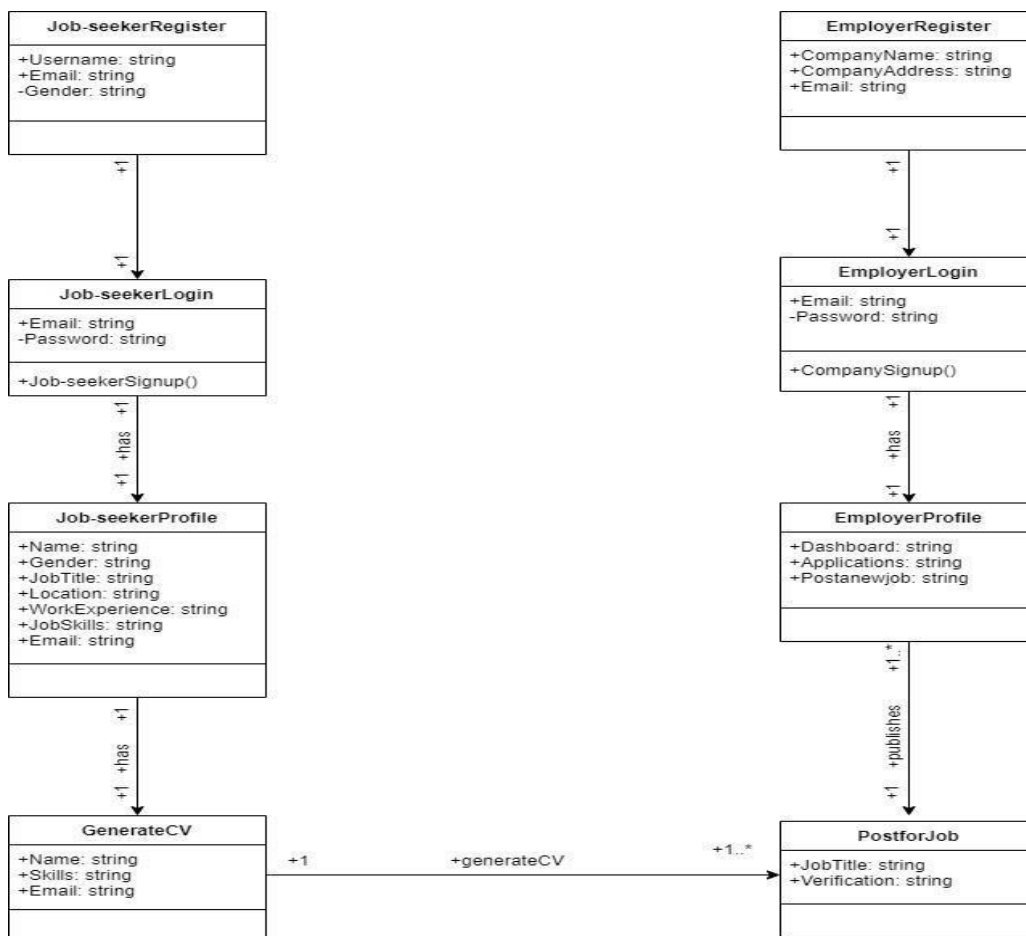


Figure: Class Diagram

3.3 Requirement Identification

There are various methods are used in the requirement identification phase recursively.

3.3.1 Interview

One of the primary way of collecting requirements are using the interview from the real user. So we are also adopting this technique such that we could gather requirements for our system. For this propose we will use semi structured method. The purpose of using semi structure method is that user can suggest best among the option and if they don't find the options are good enough they can also suggest us with the option.

3.3.2 Expert's Help

We can also use our expert's help to gather the requirements for our project. The major advantage of using expert's help is that it will make us all well understood about the all the aspects of the system we have to keep eyes on. For this project our expert will be the supervisor of the project.

3.3.3 Feedback

We have used RAD so that we can gather feedback at the end of a cycle and draw new and improved version of requirements from the feedback. For the feedback we have used our own classmates and one member of project acted as a QA for the project.

3.4 Requirement Specification

3.4.1 System Requirements

Both hardware and software requirements lie under the system requirements section. They are categorized into further 3 categories hardware and software for development environment, hardware and software for production for server side and same for client side.

Hardware and Software for development:

- A computer with internet connection
- A web browser
- Python 3.0+, Django 3.0+, Django Rest Framework, Sql database,
- Development Web Server Gateway Interface

Hardware and Software Requirements for Production Server side:

- A python based server
- WSGI interface
- Pg admin
- Static server

Hardware and Software Requirements for Production Client side:

- A web browser

3.4.2 User Requirements

There are two types of users i.e., a candidate and a company. Both of the users should be able to post their data onto the server and the company should be able to access the data from the candidate. The company gets many data but only the contact of those candidate whose CVs are paid by the company. The paid CVs remain there for only 15 days.

3.4.3 Functional Requirements

For the candidates (jobseeker) the functional requirements are as follows:

- Login/Register:
- Complete their CV by filling up the form
- Change/Reset Password
- Filtering the Preferred Jobs

For the companies (employer) the functional requirements are as follows:

- Login/Register
- Complete their profile by filling up the form
- Get Notifications of different kinds.
- Access list of shortlisted candidates
- Search Candidates

For the admin the functional requirements

- Full access to the information of jobseeker.
- Manage other modules.
- Create Jobs
- Delete/Remove jobs
- Categorize job suitable and unsuitable jobs.
- Categorize Expired jobs and active jobs.

3.4.4 Non Functional Requirements

Non-functional requirement deals with additional quality of the system such as performance, cost benefits, documentation, new information preserving and security matter.

The following are the non-functional requirements associated with the new system:

- **Availability:** The system, is available all the time if internet connection is reliable.
- **Security:** The project allows only authorized user to login into the system and Sensitive data is accessed and changed by authorized body. (i.e. we use password encryption method).
- **Usability:** The system will be easy to be used by all People who can read and write English language.
- **Performance:** The system performs its task efficiently and effectively because the team project will use advanced programing language and optimized query to develop the system.
- **Modifiability:** The authorized body can modify the system easily since the system is developed with user-friendly programming language, which is Python.

4. TESTING

Testing is conducted in every stage of the SDLC. It helps to determine whether the given input to our system provides correct output or not. It mainly ensures that the system performs as planned. Following are some of the test carried out in this project.

4.1 Unit Testing

Unit testing concentrates on ensuring that the individual unit of the application is working properly. Each of the units are tested independently for their proper functionality. The unit test are done as following units:

Table 4.1: Test Case for Working Experience Validation

Test Case	Description	Expected Result	Actual Result	Status
Registration Field validation	Entered invalid email.	Email Validation Error	Email Validation Error	successful
Less Secure Password	Less secured password	Password Validation error	Password Validation error	Successful

Login Form Validation	Entered invalid email and password	Wrong user credential error	Wrong User Credential Error	successful
Form complete and submit for verification	Filled all the fields in the profile and submit for verification	Profile should be verified successfully	Profile verified successfully	Successful

4.2 Acceptance Testing

- It includes overall system with real data.
- Alpha testing is acceptance testing with single user.
- Beta testing involves distributing system to certain users to use and provide feedback. With the help of feedback, we would know errors and any changes that has to be made.

5. RESULT AND OUTPUT

5.1 Result

Homepage

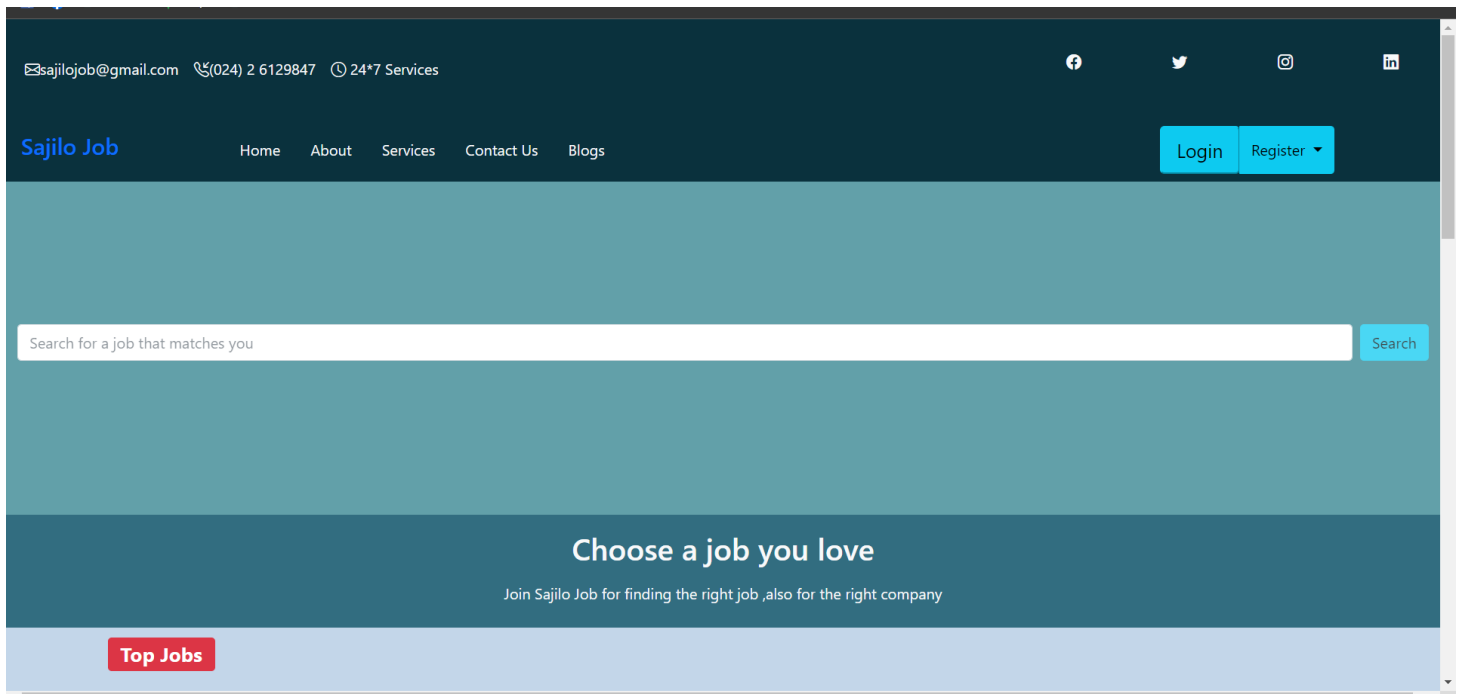


Fig 5.0.1 Homepage of the system

Search Page

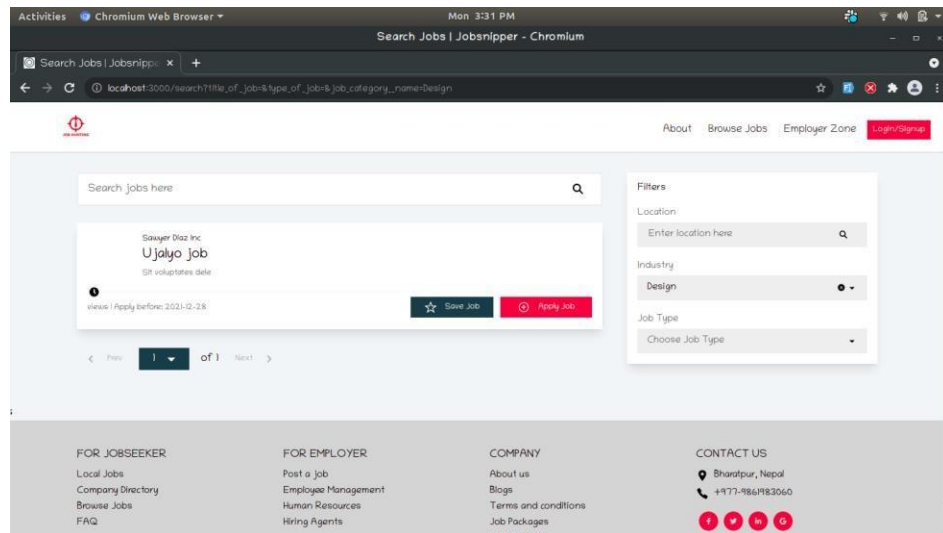


Fig 5.0.2 Search Page

Login page

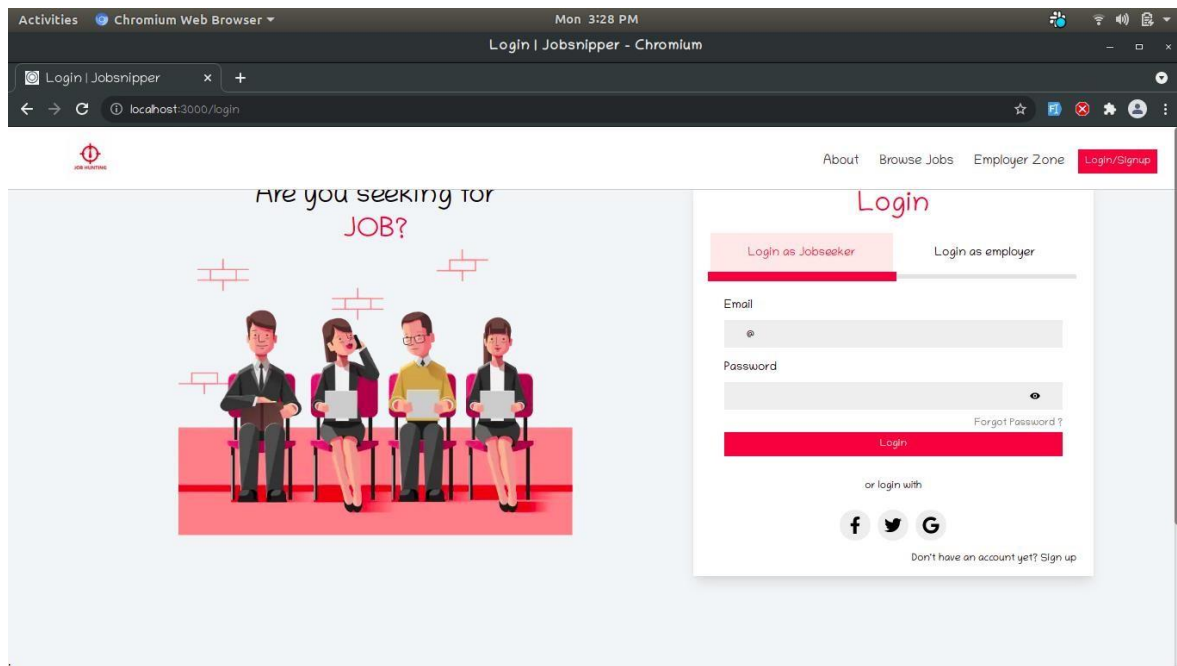
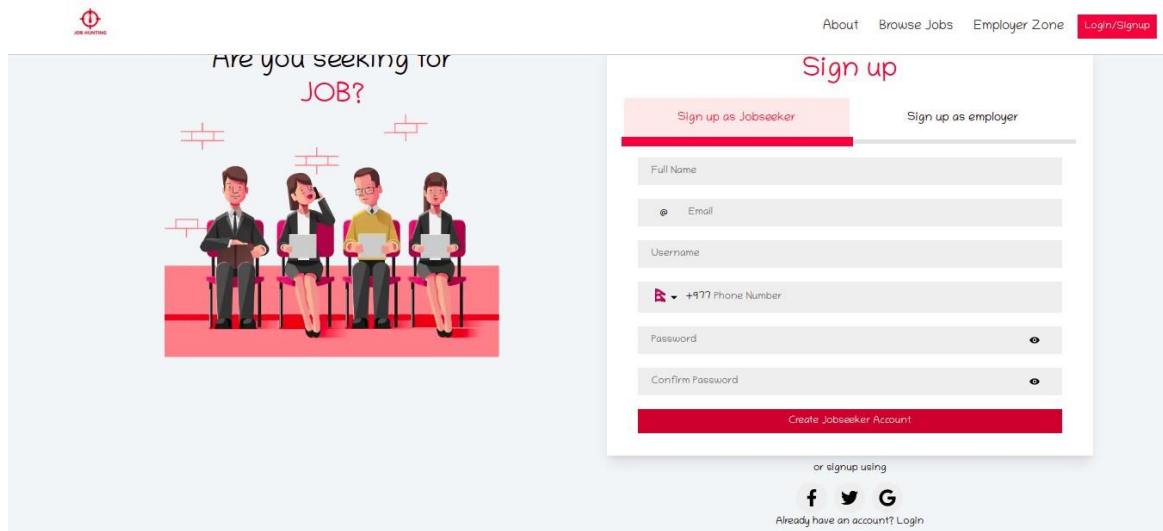


Fig 5.0.3 Login page

Sign Up



The screenshot shows a web page for job seekers. On the left, there is an illustration of four people sitting in a row of red chairs, holding laptops. Above them, the text "Are you seeking for JOB?" is displayed. On the right, there is a "Sign up" form. The form has two tabs: "Sign up as Jobseeker" (selected) and "Sign up as employer". The "Sign up as Jobseeker" tab contains the following fields: "Full Name", "Email", "Username", "+977 Phone Number", "Password", and "Confirm Password". Below these fields is a red button labeled "Create Jobseeker Account". At the bottom of the form, there is a link "or signup using" followed by social media icons for Facebook, Twitter, and Google+. Below the social media icons is a link "Already have an account? Login".

Are you seeking for
JOB?

Sign up

Sign up as Jobseeker Sign up as employer

Full Name

Email

Username

+977 Phone Number

Password

Confirm Password

Create Jobseeker Account

or signup using

f t G

Already have an account? Login

Figure 5.0.4 sign up of candidate

6. RISK AND MITIGATING

During leading our project towards completion, we may go through various risk factor which we are describing below as well as we make some strategy to avoid these risks.

- **[Risk1]**

The content we included may not be sufficient to describe the existing feature of the current system which may not enhance the promotion of our system.

[Strategy1]

Special focus and concentration should be given by phase of the requirement identification and analysis and content of system.

- **[Risk2]**

The users may not get the actual information they want and might not give the high degree while deciding the information to be included from users point of view.

[Strategy2]

Proper questioning among the user should be conducted to get the actual requirement and point of interest by the user.

- **[Risk3]**

To many people may be involve in decision making process so that there is inability to make the decision.

[Strategy3]

Leader or project coordinator should discuss with the team and should make his/her

- **[Risk4]**

This might lack the active participation of the team members which leads the project towards failure. Since, we will be unable to meet the milestone.

[Strategy4]

Should enhance the active participation of all the team members to reach the milestone in actual time limit.

7. CONCLUSION AND FUTURE WORK

7.1 Conclusion

Implementing our system makes customer easy and reliable because they don't have to visit different sites. Sajilo Job can be a valuable tool for connecting real people with real jobs, in real time, especially for college graduates, who are more likely to search for jobs on the internet. The increasing job opportunities and changing scenario of the business environment today has made more people to search for better career and employers to search for better potential. Recommender systems have great value in recommending relevant resources to users. It can be quite useful in finding novel and serendipitous recommendations. The main aim of the system is to improve sparsity problem successfully.

Limitation

- Our software doesn't have full hiring process.
- Our software doesn't include text parsing from CV files to fill up the profiles

7.2 Future work

Currently, we have limited the amount of data in our system, the data that are present in our system is only the partial data. So, in future the amount of data will also be increased. Some of the future plans are listed as following:

- Incremental Improvements
- Fully Exploiting Feedback of the Users
- Social Implications
- Aiding full hiring process within us.
- Using inbuilt contracts for contract based hiring

8. TIME PLAN

On the basis of week our project has following time estimation:

Table 8.1 Time frame

Week/Milestones	1	2	3	4	5	6	7	8	9	10	11	12
Title selection/ proposal												
Project Proposal												
Proposal defense												
Problem identification												
Initial Requirements												
Sprint I: User Authentication												
Sprint II: User Profile												
Sprint III: Static Pages												
Mid-term defense												
Sprint IV: Cart Functionality												
Sprint V: Notification Functionality												
Sprint VI: Checkout Functionality												
Sprint VII: Payment Integrations												
Final Report												
Final Defense												

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