Tribhuvan University

Institute of Science and Technology

A Project Report on

MOMentum: Next-Gen Career Hub for Moms

Submitted to

Department of Computer Science and Information Technology

Nepathya College

Manigram, Tilottama-5, Nepal

In partial fulfillment of the requirements for the Bachelor's Degree in Computer Science and Information Technology (BSc. CSIT)

Abstract

"MOMentum" is an innovative platform designed to empower new mothers and mothers with young children by providing them with flexible and remote job opportunities. The project aims to support moms who are unable to commit to full-time work due to childcare responsibilities by connecting them with employers offering suitable work arrangements. By leveraging web technologies, MOMentum creates a supportive community and a user-friendly job search experience for mothers.

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Chapter 1: Introduction

1.1. Introduction

In recent decades, the importance of women's employment in the world of work has been increasingly recognized and valued, thanks in part to a growing number of studies showing that women's work has positive consequences for a Country's development and growth, not only in employment, but also in the economic, financial, and social spheres [1] [2] [3]. This has led, at least in high-income Countries, to an increasing adoption of policies that support women's work and better work-life balance, understood as the possibility of being meaningfully involved in both one's work life and one's personal life, being able to balance the demands coming from both of these spheres and satisfactorily living one's role within the work context, the couple, the family, and society more generally [4].

Despite these advancements, challenges persist, particularly for mothers who strive to balance work and family responsibilities. A study in Harvard Business Review [5] demonstrated that employers are generally biased against stay-at-home-moms, viewing them as less capable, less reliable, less deserving of a job, less committed to work. The study also found that stay-at-home-moms were only half as likely to get a call back for a job or land an interview as parents who had been laid off for the same amount of time. And if they actually land the job? Across sectors, women lose a staggering 37% of their earning power when they spend three or more years out of the workforce. However, challenges persist, particularly for mothers who strive to balance work and family responsibilities.

"MOMentum" is an innovative platform designed to empower new mothers and mothers with young children by providing them with flexible and remote job opportunities. The project aims to support moms who are unable to commit to full-time work due to childcare responsibilities by connecting them with employers offering suitable work arrangements. By leveraging web technologies, MOMentum creates a supportive community and a user-friendly job search experience for mothers.

1.2. Problem Statement

Career Isolation: Many new mothers face significant challenges in re-entering the workforce after childbirth. They often have to isolate their careers for up to 3-4 years until their child grows older, making it difficult to maintain professional skills and networks. After such a gap, adjusting to the professional environment becomes challenging, leading to stress and reduced job satisfaction.

Workplace Marginalization: Survey results by Talent Corp (2013) states that women are marginalized at work because of a prevailing belief that they prioritize family over work. This stereotype can lead to fewer opportunities and support for women in their careers. The survey by HRAsia [6] found that the key reason why women quit their jobs encompasses lack of flexibility (75%), concerns about child-care (60%) and unsupportive bosses and work environment (55%) and motherhood triggers 64% of gender bias in the workplace.

1.3. Objective

The system's objective is to create a user-friendly job portal specifically for mothers who are returning to work. Momentum aims to achieve the following goals:

- To provide flexible job listings that align with mothers' schedules and responsibilities, enabling them to re-enter the workforce without compromising their family commitments.
- To provide tools like a Resume Builder and Resume Scorer that help mothers bridge career gaps and effectively match their skills to job opportunities.
- To empower mothers by offering resources, articles, and motivational content that build their confidence, while also working towards creating a bias-free hiring process that ensures fair opportunities for all.

1.4. Scope

i. Resume Builder:
   Users can easily input their work experience, education, skills, and other relevant details. The Resume Builder will allow users to preview, edit, and download their resumes.

ii. Resume Scorer:
   Incorporate Resume Scorer that evaluates resumes based on the related job description and provides feedback for improvements.

iii. User Profiles:
   Create separate Profile for Job seekers & employers

iv. Job Application Management:
   Users can apply for jobs and track applications. Employers can post the job and hire the candidate.

v. Job Listings:

The Job Listings feature of MOMentum allows employers to post job opportunities that are specifically flexible, catering to the needs of mothers or those seeking non-traditional work arrangements. These job listings are categorized.

vi. Flexible Work Options:

Listing of freelance,part-time, contract or project based jobs.

1.5. Limitations:

The limitations of MOMentum include the initial implementation being limited to a specific geographic region or country, which may restrict access for some users. The accuracy of the Resume Scorer may vary depending on the quality and quantity of user-provided data, algorithm used potentially affecting its effectiveness. Additionally, based on user feedback and technological advancements, continuous updates and improvements will be required to ensure the platform remains relevant and effective.

1.6. Development Methodology

The project will be developed with continuous feedback, ongoing research, and the flexibility to adapt to changing requirements. To achieve this, we will follow the agile methodology. This approach allows for iterative development, where the platform is built and improved in small, manageable increments.

1.7. Report Organization

The report is divided into 6 chapters. Each chapter is divided into different headings and sub-headings. The preliminary section contains the overall information about the project. This section includes abstract, table of contents, list of figures and abbreviations. The main report is divided into 6 chapters, which includes:

Chapter 1: Introduction

It includes Introduction about the system. The problem statement, objectives, scopes and limitations, and the development methodology of this system has been discussed

Chapter 2: Background study and Literature Review

It includes the study of the current environment the system will be deployed into. It contains a literature review section where the research works done in the field of the system are discussed in brief.

Chapter 3: System Analysis

It includes the study of functional requirements and non-functional requirements of the system. It will also include the Gantt chart, ER diagram and DFD of the system which specifies the workflow, entities, attributes, and their relationships.

Chapter 4: System Design

It includes the design of the database, forms, and interface of the system. It also discusses algorithms that are used in the system.

Chapter 5: Implementation and Testing

It includes the details of the different design and development tools used for the development of the system. It includes details of front-end tools, back-end tools, database technologies which are used for the development of the system. It also includes the testing of the system with different test cases as per the requirements.

Chapter 6: Conclusion and Future Recommendations

It includes the summary of the system and the project. It also includes the possibilities which the system can implement in the future.

The final part of the report consists of References and Appendices. The references are listed according to the IEEE format and the Appendices includes the snapshots of the system.

Chapter 2: Background Study and Literature Review

2.1 Background of the Study

The project MOMentum, leverages advanced technologies to streamline job searching and recruitment processes. Key technologies involved include React, NodeJs, database management systems, and the implementation of the Term Frequency-Inverse Document Frequency (TF-IDF) method combined with a keyword-matching algorithm using the JavaScript natural library for Resume Scorer.

TF-IDF is particularly effective for text analysis tasks such as resume scoring because it quantifies the importance of each term within a document relative to a corpus. By evaluating term significance, TF-IDF helps to identify key skills and qualifications in resumes that match the requirements of job descriptions, enhancing the relevance of the scoring process [7]. Similarly, the use of TF-IDF in resume scoring enables the system to prioritize unique and relevant terms that are crucial for matching job descriptions. This approach ensures that resumes containing highly relevant skills and experiences receive appropriate scores, which is essential for accurate candidate evaluation [8]. Moreover, Keyword Matching complements TF-IDF by ensuring that specific job-related terms and qualifications are identified and scored accurately. This technique allows the Resume Scorer to detect exact matches between job descriptions and resumes, ensuring that critical qualifications are not overlooked [9].

2.2 Literature Review

Research indicates that job seekers increasingly rely on online resources for employment opportunities. According to a study by Pew Research Center [10], 88% of college graduates utilized online job resources in their most recent job search. Another study by World Bank [11], highlighted the potential of using online job portal data to inform labor market policies, emphasizing the importance of digital platforms in employment. Despite the prevalence of job portals, there is a gap in services targeting mothers re-entering the workforce after a career break.

In the article "Here’s How to Make a Career Gap ‘Work’ for you," [12] states that Many mothers scale back on paid work to provide care, leading to gaps in their employment

history. When these mothers seek to return to the workforce, they face the challenge of addressing these gaps on their resume. The professional world of hiring and recruiting often demands a justification for such career breaks.
Consequently, there is a need for effective strategies to explain these gaps, highlighting transferable skills and presenting the break in a positive light. This is essential for reassuring potential employers and enhancing employability despite the career interruptions.

The article by Elisha Shrestha [13] illustrates the significant challenges that mothers in Nepal face regarding maternity leave despite existing legal provisions. According to Shrestha, the Labor Act mandates 98 days of maternity leave, including 60 days fully paid, yet many private employers fail to comply, leaving women with difficult choices such as quitting their jobs. This scenario underscores the broader issue of inadequate support for working mothers, which directly aligns with the goals of the MOMentum project.

Momentum can mitigate such challenges by offering solutions that address the needs of mothers who struggle to balance career and caregiving responsibilities.

Chapter 3: System Analysis

3.1. System Analysis

The detailed methodologies used to develop the application are described in the following subsections.

3.1.1 Requirement Analysis

The Requirements Specification is a crucial document in software engineering that outlines the detailed description of what the software system should accomplish. It serves as a foundation for the entire development process, guiding developers, testers, and stakeholders throughout the project.

i. Functional Requirements:

Functional requirements define the behavior of the system in terms of its interactions with users, other systems, and the environment. The Functional requirement of the system are listed below:

- **Resume Builder:** The Resume Builder will also allow users to preview, edit, and download the resumes.
- **Resume Scorer:** The Resume Scorer is a crucial feature that evaluates user resumes against job descriptions to ensure relevance and quality. This functionality involves analyzing resumes to match key qualifications, skills with the requirements specified in job listings. The system will provide score so that user knows they have to enhance the resume.
- **User Profiles:** The platform will offer separate profiles for job seekers and employers to facilitate tailored interactions.
- **Job Application Management:** This feature allows users to apply for jobs and track the status of their applications. Job seekers can submit applications, view application history, and receive notifications about updates or changes. Employers can monitor received applications, review candidate profiles, and manage the hiring process.
- **Job Listings:** Employers will have the capability to post job on the platform, specifying details such as job descriptions, required skills, and application deadlines.

ii. Non-Functional Requirements:

These specify the criteria that the system must meet concerning its quality attributes such as performance, reliability, security, usability, and maintainability. The non-functional requirements of the system are listed below:

- **Performance:** The system should provide quick responses for job searches, resume evaluations, and application submissions. The platform must deliver a response time of less than 3 seconds for job searches, resume evaluations, and application submissions.
- **Usability**: The platform should be designed with user-friendliness in mind, ensuring that all features are easy to navigate and understand. The platform should achieve a usability score of at least 85% in user satisfaction surveys.
- **Security**: The system must implement robust security measures to protect user data from unauthorized access or breaches. User data, including resumes, should be automatically deleted after 90 days of inactivity to ensure data privacy.
- **Scalability**: The platform should be designed to scale as the number of users and job listings increases. This involves designing a flexible architecture that can accommodate additional users, job postings, and features over time.
- **Reliability**: The platform should have a high uptime, with minimal downtime or technical issues. This includes implementing regular backups, robust error handling, and a comprehensive disaster recovery plan. Error handling should ensure that 95% of errors are resolved within 24 hours.

3.1.2 Feasibility Study

A feasibility study is a comprehensive analysis conducted to determine whether a proposed project or solution is viable and worth pursuing. It evaluates various aspects of the project to assess its practicality, potential for success, and overall value.

i. Technical Feasibility

The project will use React.js for the frontend and Node.js for the backend, both of which are well-suited for building scalable and responsive web applications. MongoDB will be used as the database management system.TF-IDF (Term Frequency-Inverse Document Frequency) and keyword matching algorithms will be implemented for the resume scorer

feature. These algorithms are effective for basic text analysis and can provide relevant scoring based on job descriptions.

ii. Operational Feasibility

To ensure smooth adoption, MOMentum will include comprehensive guides and tutorials tailored for both users job seekers and employers. These resources will cover the portal's features, job search functionality, and resume scoring process.

iii. Economic Feasibility

The development will be done using open-source tools and resources available within the college infrastructure. The absence of financial costs makes the project economically feasible. The project can be developed and tested within the existing college environment, utilizing available resources without incurring additional expenses.

Project Schedule and Gantt chart

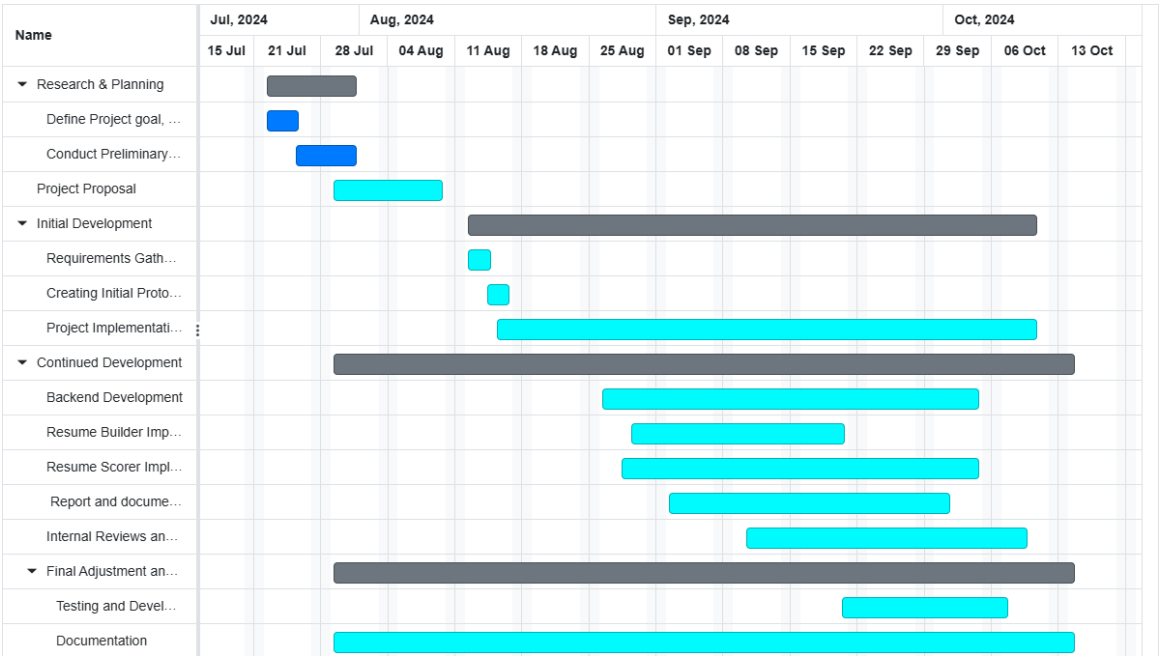


Fig 1 : Project Schedule Using Gantt Chart

3.1.3. High Level Design of System

Level-0 DFD:

A Level 0 Data Flow Diagram (DFD) provides an overview of the system, depicting its major processes and the flow of data between them at a high level. It represents the system as a single process box, showcasing the interaction between external entities and the system itself.

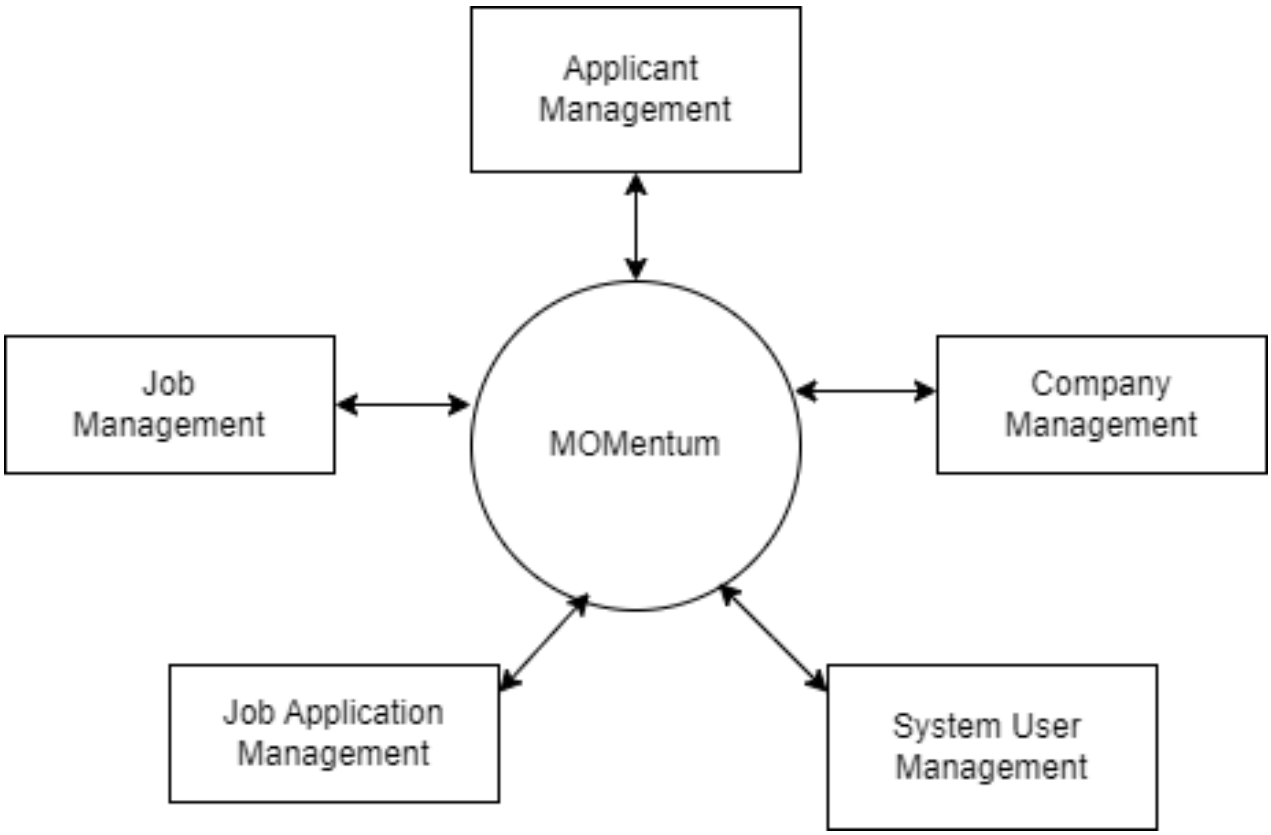


Fig 2: DFD Level 0

Level 1 DFD

Level 1 DFD delves deeper into the system's functionalities, breaking down the processes identified in the Level 0 diagram into more detailed sub processes. It illustrates how data flows within each process and between them, offering a more granular view of the system's operations.

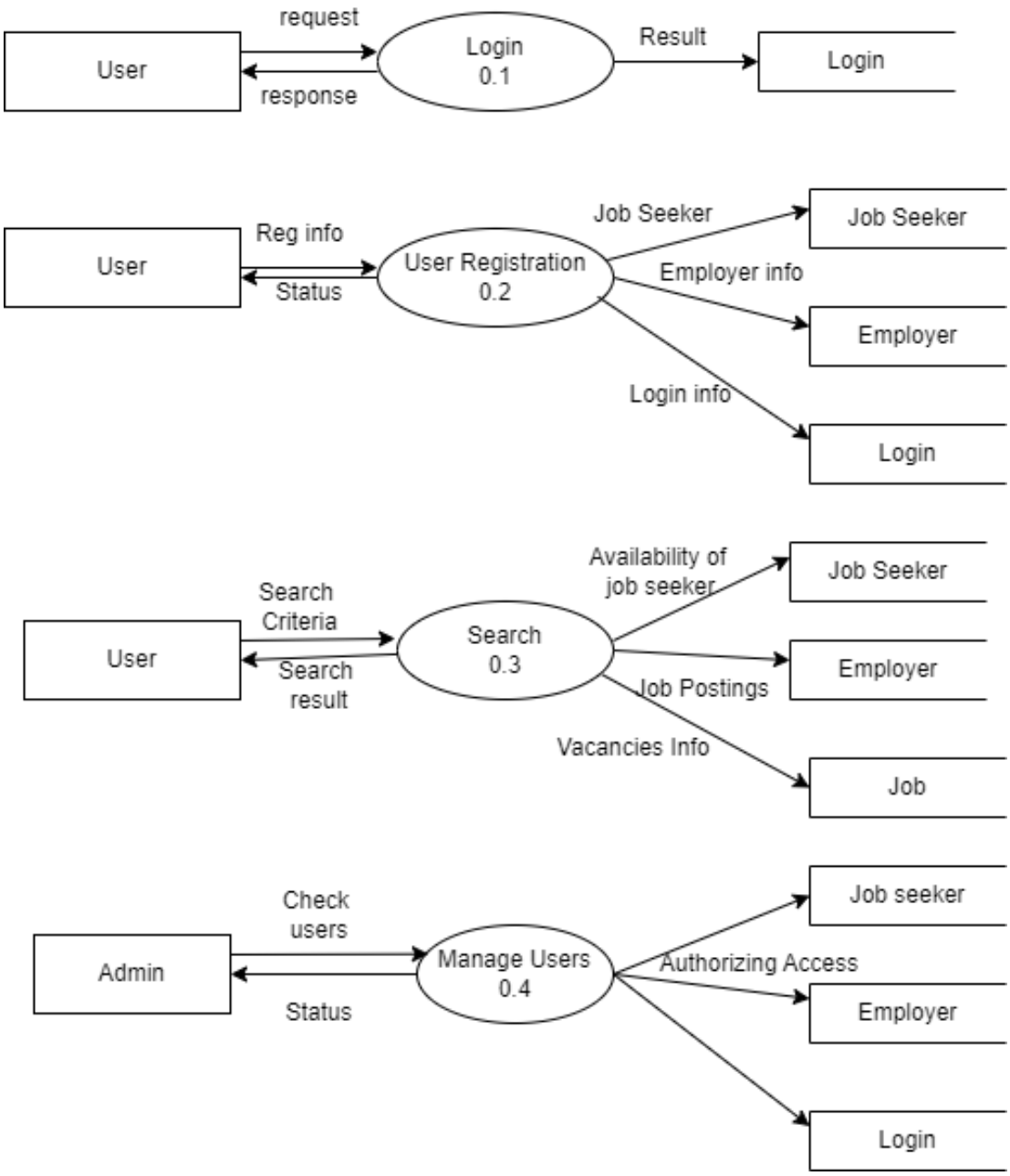


Fig 3: DFD Level 1

Level 2 DFD

Level 2 DFD delves deeper into the system's functionalities, breaking down the processes identified in the Level 1 diagram into more detailed sub processes. It illustrates how data flows within each process and between them, offering a more granular view of the system's operations.

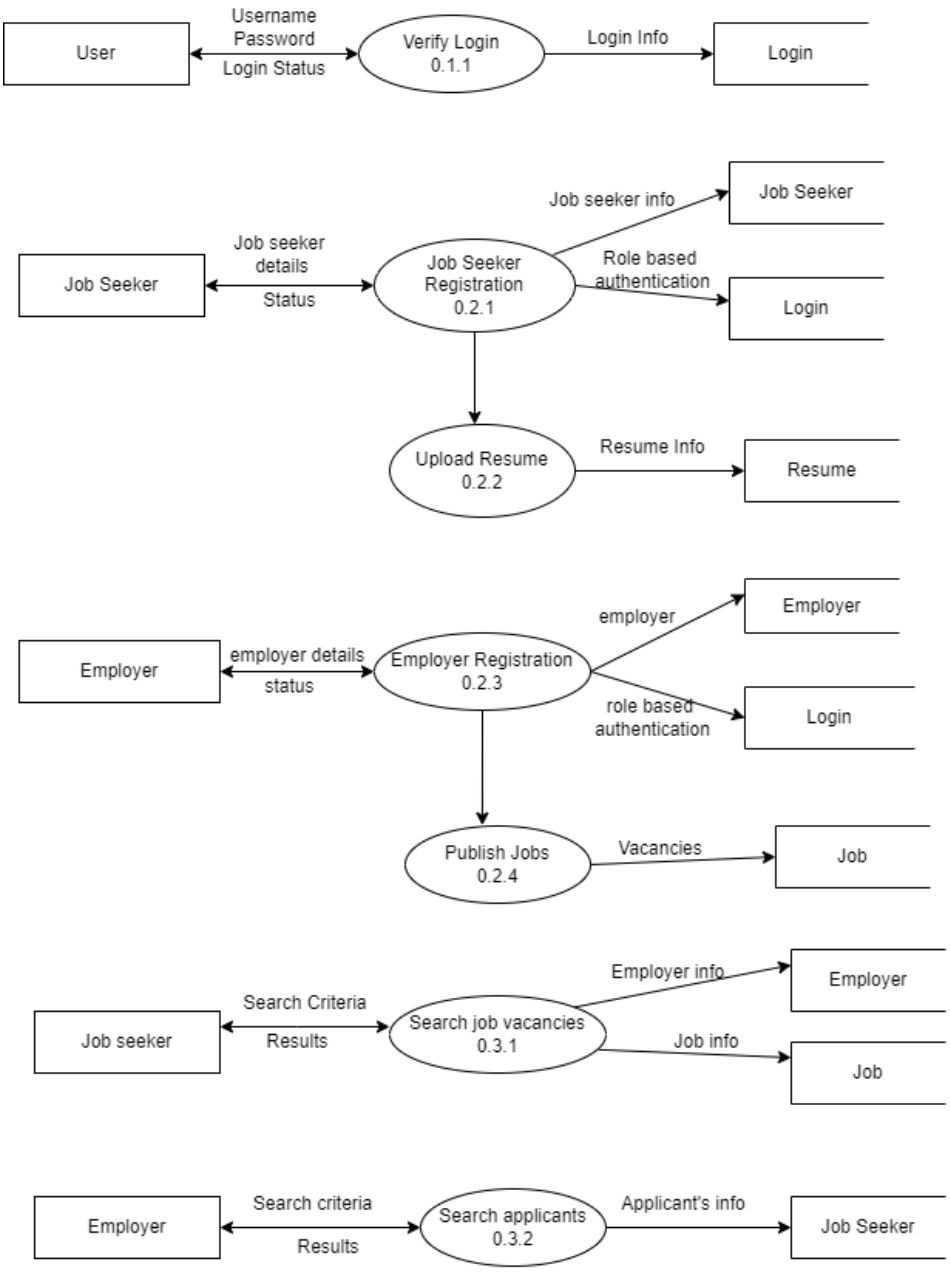
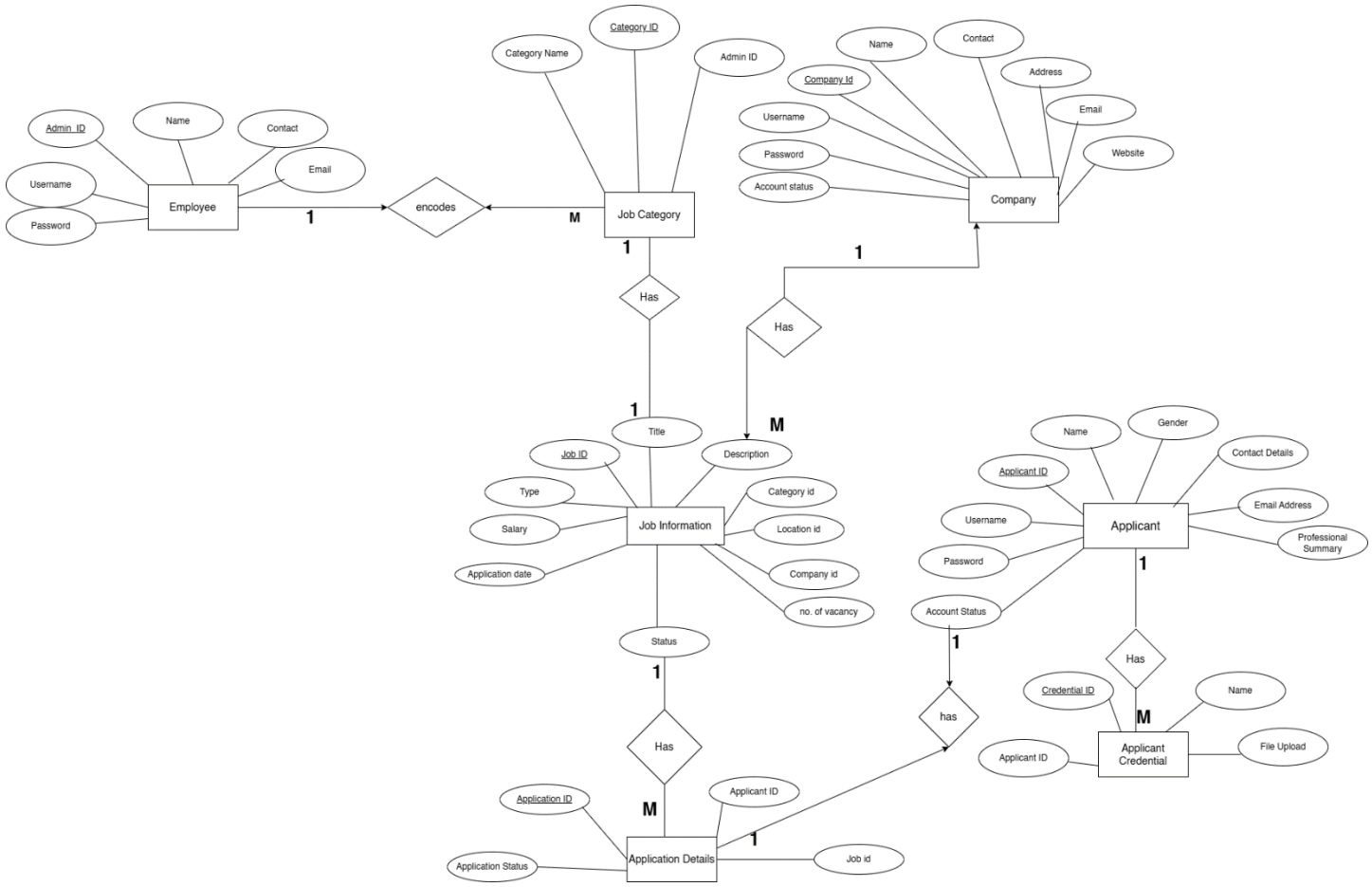


Fig 4: DFD Level 2

ER Diagram

The Entity Relationship Model is a model for identifying entities (like jobseeker o company) to be represented in the database and representation of how those entities are related. The ER data model specifies enterprise schema that represents the overall logical structure of a database graphically.



Chapter 4: System Design

4.1. Design

System design refers to the process of defining the architecture, components, modules, interface, and data for a software system. It involves creating a blueprint or plan for the system that specifies how it will be built, how it will function, and how it will meet the requirements of the clients.

Database Design

i. User Table

TABLE 1: USER TABLE

S. N	Attribute	Datatype	Constraint
1	_id	ObjectId	Primary Key
2	userFullName	String	Not null
3	userEmail	String	Not null
4	userPassword	String	Not null
5	userPhoneNumber	Number	Not null
6	Role	String	
7	createdAt	Date and Time	
8	savedResume	Array	
9	profilePicture	Object	

ii. Jobs Table

TABLE *2*:JOB TABLE

S. N	Attribute	Datatype	Constraint
1	_id	ObjectId	Primary Key
2	title	String	Not null
3	Company name	String	Not null
4	Company description	String	Not null
5	category	String	Not null
6	country	String	Not null
7	city	String	Not null
8	location	String	Not null
9	Salary	Number	Not null
10	expired	Boolean	Not null
11	postedon	Date and Time	Not null
12	postedby	Object	Not null

iii. Application Table

TABLE *3*:APPLICANT TABLE

S. N	Attribute	Datatype	Constraint
1	_id	ObjectId	Primary Key
2	Full name	String	Not null
3	Email	String	Not null
4	Phone	Number	Not null
5	Address	String	Not null
6	Resume	Object	Not null
7	Cover letter	String	Not null
8	Applicant id	ObjectID	enum
9	Employer ID	ObjectID	enum

4.2. Algorithm Details

TF-IDF

TF-IDF stands for Term Frequency-Inverse Document Frequency. It's a statistical measure used to evaluate how important a word is to a document in a collection of documents. A word that appears frequently in many documents has a low IDF, while a rare word across documents has a higher IDF. The TfIdf object from the Natural library (a Natural Language Processing (NLP) library for Node.js) is used to calculate TF-IDF scores. It will hold and calculate term frequencies (TF) and inverse document frequencies (IDF). The resume text and the job description are treated as two documents in the TfIdf object. The TfIdf library will compute the term frequency for each word in both the resume and the job description. It will also compute the inverse document frequency, which reflects how common or rare each term is across the documents. For each term in the job description, its TF-IDF score is accumulated to give a final score. The idea is:

- **TF (Term Frequency)**: Measures how frequently a term appears in a document. A higher frequency implies that the word is important in that specific document.
- **IDF (Inverse Document Frequency)**: measures how important a word is across documents. Words that appear in many documents are considered less important. The formula is:

$$IDF(t) = log\ \frac{total\ number\ of\ documents}{number\ of\ documents\ containing\ the\ term}$$

Keyword Matching:

A simple algorithm that looks for overlaps between the words in the job description and the resume text. It measures how many words in the job requirements also appear in the resume. This would look for specific keywords from the job description in the resume, identifying whether the candidate's resume includes the necessary skills, qualifications, or experience.

Chapter 5: Implementation and Testing

5.1. Implementation

5.1.1. Tools Used

Frontend

React: ReactJS, is an open-source JavaScript library developed and maintained by Facebook. It is widely used for building user interfaces (UIs) or web applications with a focus on creating interactive and dynamic user experiences.

Backend Tools used

Express.js: Node.js is used as a backend framework for handling the server-side logic of the project. Express, is a backend web application framework for building RESTful APIs with Node.js.

Database Used:

MongoDB: MongoDB is used as a database system in this project. MongoDB is a popular open-source, NoSQL database system that uses a document-oriented data model instead of the traditional table-based relational data model.

5.1.2. Implementation Details of Modules

Modules are the partitions of any project done to ease the task of development. Different modules are designed so that debugging and other development phases get the easiest implementation.
The different modules of the system are:

- Landing page
- Login page
- Signup page
- Profile Section
- Post and View Job
- Apply Job
- Resume Builder
- Resume Scorer

5.2. Testing

5.2.1. Cases for Unit Testing

Unit testing is a type of software testing where individual units or components of a software are tested. The purpose is to validate that each unit of the software code performs as expected. The following test scenarios were used to test the system after the build was completed.

TABLE 4: A TEST CASE FOR JOBSEEKER LOGIN

TestId	Test Case	Input	Expected Outcome	Observed Output	Remark
1	Successful User Login	Email: kritimakhanal@gmail.com Password: root	Login successful should redirect to the profile.	User Successfully Logged in and can	PASS
2	User Login Fail	Email: kritima.khanal@gmail.com Password: testpass	The login fails and shows the error message to enter the right credentials	The user was unable to log in to the system.	PASS

TABLE5: A TEST CASE FOR EMPLOYER LOGIN

TestId	Test Case	Input	Expected Outcome	Observed Output	Remark
1	Successful Admin Login	Email: employeer@gmail.com Password: admin	Login successful should redirect to the user profile.	Company Successfully Logged in and can add jobs.	PASS
2	Admin Login Fail	Email: employeer@gmail.com Password: testpass	The login fails and shows the error message to enter the right credentials	The admin was unable to log in to the system	PASS

Chapter 6: Conclusion and Future Recommendations

6.1. Conclusion

MOMentum provides organizations with a unique opportunity to enrich their workforce by tapping into the talents of individuals returning from career breaks. These returnees bring not only their existing skills but also fresh perspectives and a renewed sense of commitment, which can lead to increased innovation and resilience within the company. By integrating these individuals, companies are likely to experience higher retention rates, as the supportive environment fostered by MOMentum enhances job satisfaction and employee loyalty. This commitment to supporting career returnees also resonates positively within the broader community, showcasing the company's dedication to social responsibility and community good.

For Moms, MOMentum offers a crucial lifeline, providing a structured and supportive pathway back into the workforce. It equips them with the confidence, tools, and opportunities to overcome the challenges of a career break, helping them bridge gaps in their resumes and reconnect with their professional aspirations. Through MOMentum, moms are not only able to regain their footing in the job market but also to advance their careers in a meaningful and impactful way.

6.2. Future Recommendations

To ensure continued success and growth, the following recommendations are proposed for the future development of the project:

Incorporate AI and Automation: AI can revolutionize job matching process. Develop an AI model trained on job descriptions, resumes, and industry trends to identify the most suitable candidates for a given role. Include a resume scoring feature that evaluates the strength of the resume based on industry benchmarks and provides actionable improvement tips.

Data Analytics: Use Data to gather insights on user engagement, project impact, and operational efficiency for data-driven decisions.

Recommendation System: Customize job recommendations based on individual profiles, factoring in career aspirations, location preferences, and industry demands.

Develop Sustainable Funding Models: To ensure the long-term viability of Project and position it as a self-sustaining initiative, implementing funding strategies is critical.

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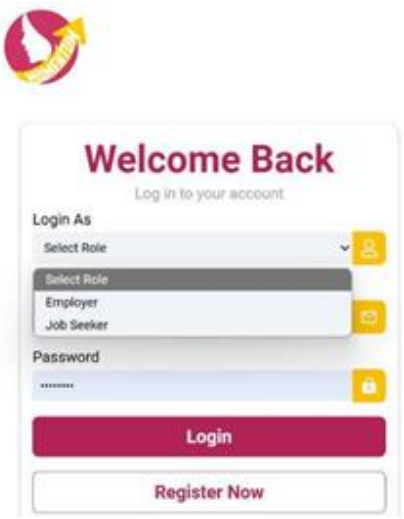
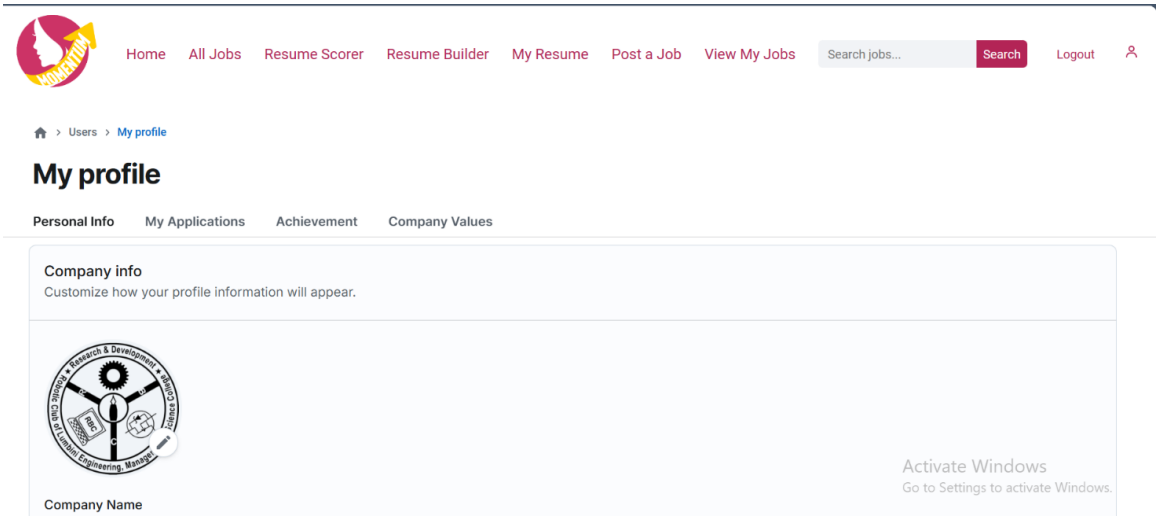
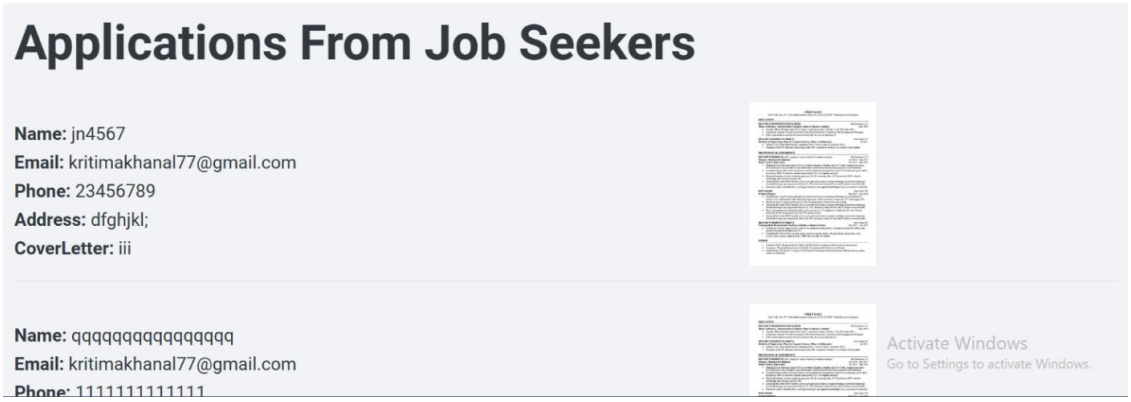
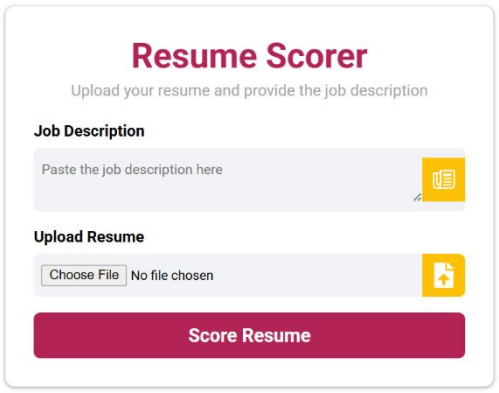
Appendices

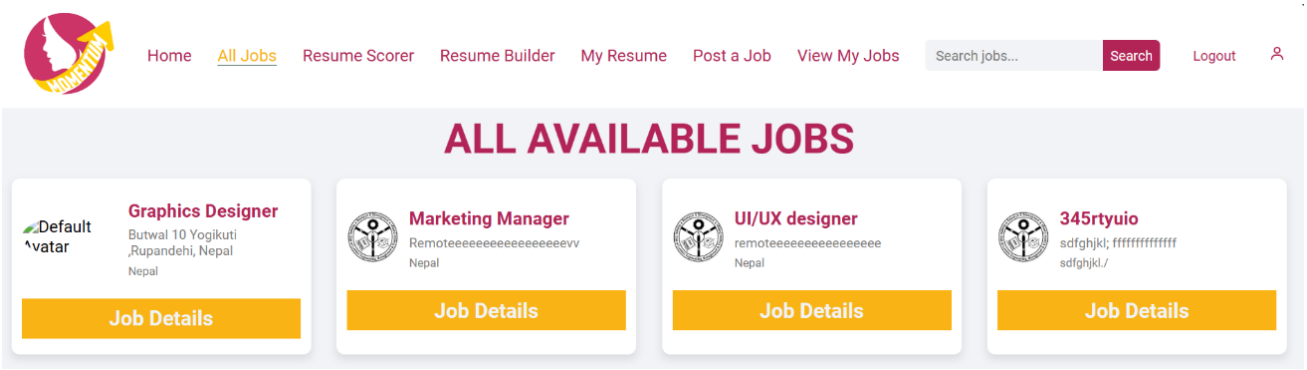
Snapshot

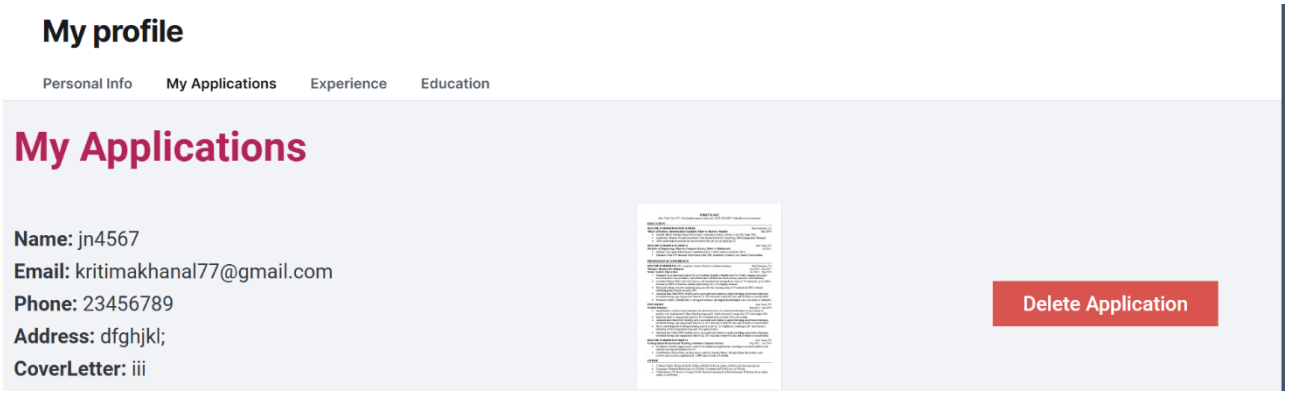












Kritima Khanal

kritimakhanal77@gmail.com | Butwal 10, Rupandehi, Nepal | +977 9847029329 | www.linkedin.com

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Career Objective

With proficiency in HTML, CSS, and JavaScript, a basic understanding of React, and strong graphic design skills using Adobe Illustrator and Canva, I have an extensive grasp of design principles. I'm seeking a front-end web development internship where I can utilize my skill set and further enhance my proficiency in React.

Education

Kathmandu Institute of Science and Technology

+2 in Science

GPA: 3.46

Achieved Scholarship Award 2075

2075 - 2077

Nepathya College, Tribhuvan University

Bachelor in Computer Science and Information Technology