Gradbond - Alumni Finder Webapp

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Submitted in partial fulfilment of the requirements of the degree of
Bachelor of Science in **Computer Science and Engineering**

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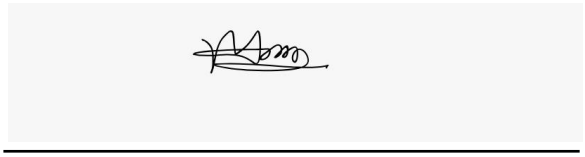
Declaration

We do hereby declare that the research works presented in this project entitled “Gradbond - Alumni Finder Webapp” are the results of our work. We further declare that the report has been compiled and written by us, and no part of this report has been submitted elsewhere for the requirements of any degree, award, diploma, or any other purpose except for publications. The materials that are obtained from other sources are duly acknowledged in this project.



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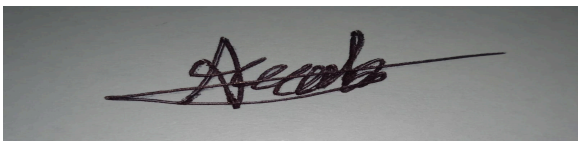

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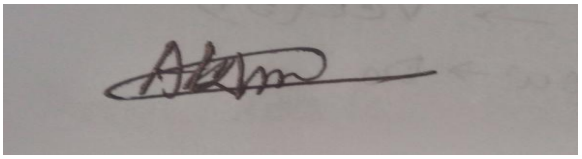

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Approval

I do hereby declare that the research works presented in this thesis entitled, “Gradbond - Alumni Finder Webapp”, are the outcome of the original works carried out by **Mahfuz Mia**, **Azmain Hasan Daiyan**, **Rafiul Islam**, **Naimur Rahman Arnab**, **Akhlakul Islam** under my supervision. I further declare that no part of this thesis/report has been submitted elsewhere for the requirements of any degree, award, diploma, or other purposes except for publications. I further certify that the dissertation meets the requirements and standards for the degree of Bachelor of Science in Computer Science and Engineering.

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Dedication

We would like to dedicate this project to our beloved parents, whose unwavering support, encouragement, and sacrifices have been the foundation of our academic journey. Their constant guidance and unconditional love have inspired us to pursue excellence and persevere through every challenge. This achievement is a reflection of their faith in us.

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Abstract

The transition from academic life to professional careers often presents challenges for students, particularly in finding guidance, mentorship, and networking opportunities. Gradbond – Alumni Finder WebApp is a digital platform designed to bridge this gap by connecting current students with alumni from their respective universities and departments. The system enables students to search for alumni based on specific criteria such as university, department, skills, and job titles, fostering a structured mentorship and networking ecosystem. Alumni can also benefit from this system by identifying potential candidates for recruitment and engaging with the next generation of professionals. With integrated features such as profile management, job postings, event creation, the platform ensures a seamless and interactive user experience. The project leverages cost-effective and open-source technologies to ensure scalability and technical feasibility. This web application aims to create a sustainable and value-driven communication channel between students and alumni, ultimately enhancing career development, industry exposure, and academic-industry collaboration.

List of Figures

List of Abbreviations and Acronyms

HTML5	Hyper Text Markup Language 5
CSS3	Cascading Style Sheets Level 3
Bootstrap	Front-End Framework for Responsive Web Design
Django	High-Level Python Web Framework
PostgreSQL	Postgres Structured Query Language
Git	Version Control System
GitHub	Web-Based Git Repository Hosting Service
Postman	API Testing and Development Tool

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References

Chapter 1

1. Introduction

Chapter 1 presents the Grabond project. The project describes the statement of the issue, background, goals and motivations behind its development. It also discusses the significance of the project, its contributions, and the complex engineering analysis required. Additionally, this bankruptcy offers the general shape of the report.

1.1 Problem Statement

A better connection between alumni and students can lead to more successful outcomes for both groups. Existing platforms like LinkedIn, which are widely used, aren't tailored towards students. These platforms are open to users from any background and are primarily dedicated to professional networking and recruitment rather than academic guidance or mentorship. Therefore, students lack a specialized platform to connect with alumni for career guidance, networking, and mentorship.

Additionally, there is no specific space where alumni can voluntarily engage with students, whether it be to share experiences, provide mentorship, or advertise events and job opportunities. Furthermore, current systems lack specialized search features intended to locate graduates based on criteria such as department, career path, or graduation year.

To address these limitations, we propose GradBond, a platform inspired by successful models in Western institutions. With GradBond, we aim to bridge the gap between students and alumni across the country by offering a dedicated, interactive environment for meaningful academic and professional connections.

1.2 Problem Background

A strong network between alumni and students can significantly enhance career development, mentorship opportunities, and lifelong professional connections for both groups. Alumni can support students through mentorship programs, career guidance events, and even job opportunities, helping them build a more focused and informed career path. Universities also benefit from this relationship, as engaged alumni can provide industry insights and recruitment links that enhance the institution's reputation and graduate outcomes. While platforms like LinkedIn, Behance, AngelList, and GitHub exist, they are not specifically tailored to the needs of university students who require structured guidance and future opportunities. Moreover, in our country, there is currently no dedicated platform that focuses on facilitating such student-alumni connections. Students often rely on outdated methods, such as word-of-mouth referrals, followed by informal communication through general-purpose social media platforms like Facebook. However, these platforms are not designed for academic or career mentoring, therefore, alumni might not be inclined into participate meaningfully. The lack of a centralized and trusted platform makes the process of finding alumni inefficient and time-consuming. There are also concerns about the originality of connections when relying on informal methods. Similarly, alumni do not have a dedicated platform to engage with promising students or offer mentorship and opportunities. Research indicates that students who participate in alumni mentorship programs are more likely to secure employment after graduation and divulge higher levels of gratification with their university experience. Recognizing this, several Western institutions have implemented successful alumni-student networking systems to bridge this gap and strengthen their

academic communities. Our proposal, GradBond, takes inspiration from these international models and seeks to address the specific gap in student-alumni networking within our context.

1.3 Project Objectives

Gradbond aims to establish several constitutional objectives by developing a platform that bridges the gap between alumni and students through a dedicated, secure and easy to access platform. The following goals have been set up for Gradbond:

1. Developing a working web app that let's users, specifically students and alumni of different universities, create and manage their profiles, connect with each other through an easy to manage and secure system.
2. Make it easy for students to find and connect with their desired alumni through a smart searching system that can find an alumni based on his/her respective department, graduation year, name, job title and many more criterias.
3. Letting the alumni give back to his institution by arranging and promoting events through our web app, fostering solidarity and communication between alumni and current students. Not only that but also arranging useful workshops and skill building sessions to help students achieve/bolster specific skills.
4. Helping students land purposeful jobs through the alumni network and boosting the kickstart of their career using a job board feature in our system which will help students as well as alumni find or recruit expected jobs/candidates.

1.4 Motivations

The interpersonal networking between alumni and students remains very weak or completely absent in most of the universities. Even though there are global platforms like Linkedin and Facebook for communication and networking, their relevance to institutions drops due to these platforms being used for all kinds of purposes and not being solely focused and tailored for academic and professional needs of institutions. While manually communicating or using facebook groups seem effective at first glance but they essentially lack the ability to keep the focus solely on the purpose and tend to lead astray in terms of proper data delivery. As a result of this, students miss valuable information and job opportunities, while alumni have no clear way to give back to their respective institution.

This was how the idea of Gradbond was conceived. A platform that empowers both students and alumni to grow together. We noticed that many students, especially from the rural background, feel disconnected in their journey from campus to job and also in making professional networking. Our aim is to fill this gap by implementing our webapp and help promote a culture of networking and professional support. Having a user friendly and easy to use system can significantly help these students.

As a long time project of ours, we strongly felt that this will be something that benefits a lot of institutions and will be a warm welcome considering the impact it will bring. It will also continue to benefit future batches of our institution if implemented by the authority.

Developing GradBond not only allowed us to apply our technical skills but also address a pressing need that can uplift student communities across the country.

1.5 Significance of the Project

The project concisely solves many precise real-life problems such as networking opportunities with alumni and vice versa, getting connected with alumni of various reputable institutions, staying up to date with the industry's job portal through alumni reach, reputable companies' lucrative job offers, and various events throughout the campus aligning with the best interests of academic prospects and extracurricular activities. The project also has a great contribution towards the students, which is that they can reach out to the alumni for academic counseling for their projects and such, which also includes the alumni's guidance for study abroad and professional guidance in all manners. Also, there are various students who face challenges that can be categorized as financial, ethical, moral, and such, where the best guidance they can get is from the alumni. Too many students every year face such struggles throughout their academic journey, where our proposed system can solve these problems in an efficient manner. No other systems like this have been formally developed yet in Bangladesh; thus, a great opportunity for a commercial approach also arises, which marks the feasibility in a positive aspect. Considering the factor columns where the project is standing, a great significant value lies within this, where commercial, moral, ethical, and problem-solving approaches have been maintained.

1.6 Project Contribution

With the solvency of precise problems for the students such as networking, getting connected with various campus events, getting up to date with reputable companies' job portals and having knowledge about their offerings, professional guidance in counseling on various matters, etc., the project marks its contribution in many sectors. It’s been mentioned that there is no official development of such systems in Bangladesh; this puts the project in a great position of feasibility analysis on commercial, technical, and moral grounds. This also opens an opportunity for the students to get clear guidance on any precise path (such as study abroad, research on specific topics, etc.) from the professional counseling of an alumnus, which puts a contribution point at a huge boost. Both the student and the alumni will be beneficial because when the alumni and the student connection gets a proper channel and establishes a great relationship, students will be the most effective because of the expert guidance and counseling, whereas alumni will get the best output from the students for their company, which puts a great positive image for the alumni in their workspace. Thus, the campus will be recognized as an efficient icon to others.

1.7 Complex Engineering Analysis

1.7.1 Complex Engineering Problems

The GradBond initiative tackles a variety of engineering challenges that surpass conventional software development, requiring advanced problem-solving skills, system-level thinking, and interdisciplinary integration. Conflicting System Requirements: A significant engineering challenge is balancing the conflicting requirements of user privacy and open networking. Users should be able to manage the visibility of their profile information, yet the platform also needs to support easy discovery and meaningful interaction. Striking this balance demands a carefully designed system that allows users to personalize their privacy preferences while still

maintaining full platform functionality and a smooth user experience. Compliance with Data Protection Regulations: GradBond operates under a regulatory framework that enforces strict data protection laws, such as the General Data Protection Regulation (GDPR) and the Family Educational Rights and Privacy Act (FERPA). Meeting these regulations requires handling several complex tasks, such as obtaining user consent, encrypting confidential information, safeguarding data storage, and providing users with control over their personal data. Complying with these legal requirements adds both technical and ethical obligations to the platform's design. Stakeholder Diversity and System Integration: The platform must cater to a diverse range of stakeholders—including students, alumni, universities, and employers. Each team has different goals and expectations from the system. Designing a unified solution that satisfies all parties requires a robust architectural strategy, modular system design, and constant feedback loops to maintain alignment. Highly Interdependent Components: GradBond unites several interconnected features, such as mentorship support, real-time chat, event management tools, and tailored recommendation systems. For the platform to operate smoothly and manage data effectively, these components must function seamlessly together. Reaching this level of integration requires careful planning and a solid grounding in systems engineering.

1.7.2 Complex Engineering Activities

Creating GradBond requires strong technical skills, creative problem-solving, and effective collaboration among specialists from various fields.

1. **Integration of Advanced Technologies:**
   The project leverages cutting-edge technologies such as AI-driven recommendation systems, cloud infrastructure, real-time communication protocols, and advanced analytics. Integrating these systems requires knowledge across multiple engineering domains and seamless orchestration of back-end and front-end development
2. **Creative System Design and Innovation:**
   GradBond includes unique features like smart mentor matching, activity tracking, and customized career support. These functionalities demonstrate how modern technology is combined with a user-centric design strategy.
3. **Managing Ethical and Regulatory Risks:**
   Core responsibilities include securing data exchange, creating algorithms that ensure fairness and neutrality, and embedding legal compliance within the system’s design. Tackling these challenges successfully requires careful ethical judgment and rigorous engineering methods..
4. **High Impact on Society and Education:**
   The system supports students in advancing their careers, strengthens the institution’s reputation, and fosters meaningful alumni connections, showcasing its wide-reaching impact across education, the economy, and society.
5. **Multi-Stakeholder Coordination and Collaboration:**
   Engineering projects require active collaboration between universities, software developers, former students, and current learners. Effectively managing these partnerships requires fostering transparent communication, keeping comprehensive records, ensuring stakeholder participation, and implementing flexible, iterative development approaches such as agile.

1.8 Project Organization

In chapter 1 presents the Grabond project. The project describes the statement of the issue, background, goals and motivations behind its development. It also discusses the significance of the project, its contributions, and the complex engineering analysis required. Additionally, this bankruptcy offers the general shape of the report.

In chapter 2, a review of relevant literature and an analysis of the current problems in alumni-student networking platforms are presented. This chapter highlights limitations and explores existing solutions that lay the foundation for understanding the needs of Grabond.

In chapter 3 describes the methodology used in the project, covering the system architecture, feasibility study, requirement analysis, and system design. It details the technical and functional aspects that define the platform’s development.

In chapter 4 focuses on the implementation of Grabond, including system equipment, modules, and prototype design. IIt also covers the requirements for end-user systems and the testing and quality assurance processes to ensure platform reliability.

In chapter 5 discusses sustainability standards, the impact of the project on society, ethical considerations, challenges, constraints, and provides a timeline and milestones using a Gantt chart.

In chapter 6 summarizes the project's outcomes, addresses limitations, and suggests areas for future work.

Chapter 2

2. Background Study

2.2 Agile Methodology for GradBond Development

GradBond follows the Agile software development methodology. Agile emphasizes adaptability, and frequent stakeholder feedback. The development process is broken down into small, manageable cycles called sprints, enabling continuous progress and rapid response to changing requirements. These time-boxed iterations help ensure that work is reviewed regularly, feedback is incorporated early, and improvements are made consistently throughout the development lifecycle.

2.2.1 Why Agile is Suitable for GradBond

Agile is particularly well-suited for the GradBond platform due to several reasons:

- Flexibility in Evolving Requirements: Since the project may face evolving expectations during development—especially as stakeholders interact with early versions—Agile allows for smooth adaptation without rigid, long-term planning.

- Continuous Feedback: At the conclusion of each sprint, feedback is gathered and reviewed. This guarantees that the development process maintains consistent with user expectations and institutional goals, while also allowing developers to swiftly recognize and resolve issues.

- Team Collaboration: Agile encourages regular communication and collaboration within the development team. This collaborative environment fosters ownership, transparency, and productivity.

In short, Agile provides the necessary structure for responsive development while giving the team the freedom to adapt and improve incrementally.

2.2.2 Agile Lifecycle in GradBond

The development of GradBond will follow an Agile lifecycle in the following way:

1. Planning & Requirement Gathering: The project begins with identifying key features, user needs, and goals. A product backlog—a prioritized list of features and functions—is created to guide development.

2. Initial Design & Prototyping: Based on early requirements, basic system designs (like wireframes, database schemas, and user flow diagrams) are prepared. Prototypes are shared for early feedback and refinement of scope.

3. Sprint Development: In this phase, a few high-priority tasks or features are selected, developed, and tested. Progress is reviewed at the end of each cycle through team meetings and feature demonstrations.

4. Integrated Testing & Improvement: During each sprint, functional and user-level testing will be conducted. Based on findings, features will be revised or extended in future sprints.

5. Final Testing & Deployment: Once all essential features are complete, a final round of integration and user acceptance testing will be conducted. The platform will be deployed for institutional use after validation, starting with an initial version and adding features or making changes based on feedback.

GradBond will be developed in a structured manner by following the agile method. The team can respond quickly to feedback, improve quality with each cycle, and deliver a platform that is practical, scalable, and genuinely useful to Bangladeshi universities and their academic communities

2.3 Literature Review

GradBond - Alumni Finder Webapp is a platform where students can interact with alumni from different reputable institutions with specific terms in mind. The system creates a tunnel for students to build a network with alumni with a proper gesture, while maintaining the security of the data of both students and alumni. The system serves the students with great benefit, which is to get connected to a bigger part of their academic phase, including the post-graduation period, to hop into corporate life. The features that make the system scalable are: finding alumni with proper attributes, where alumni are filtered based on the defined criteria; making a connection with other reputable institutions' alumni, which puts a positive mark for students to create a base for their social networking aspects; finding jobs according to the precise terms in demand in reputable companies through alumni; and finding events and activities in various universities through the system.

With the best interest of academic purposes, the system also serves an ethical performance for students, which is that students can get counseling from alumni in terms of financial, academic, moral, or career-dependent decisions, which also makes the system very scalable. In the corporate phase of a postgraduate student, getting into a reputable company can be critical or complex in terms of the scenario, because every company wants people/participants/manpower where they can generate proficient output. Alumni here can play a crucial role through the system by updating a job post and getting students into the company through evaluating precise factors. By executing this, a network will be built between students and alumni in the corporate phase rather than within the academic boundary, which brings out the utmost efficiency of the system.

The terms which the system serves will have a wide range of acceptance in terms of stakeholders because networking in any era of time or phase of a process is very crucial for learning, implementing, and applying. It will limit the distance between students and alumni, which also instills a general sense of communication skills with one another as a soft skill. Top universities such as Harvard University, Oxford University, MIT, etc., have their internal system of communication between students and alumni, which creates opportunities for students to perform and practice their talent in front of the world — which signifies why they have the most success ratio in creative and technical fields of job placements.

Keeping such statistical evolution in mind, GradBond's development also holds the potential to become a giant platform in the upcoming phase of evaluation. The system will face various limitations such as data security for publications and marketing, huge traffic loads when the system becomes a daily-use tool for every student and alumnus, static data to store for user profiles to present rather than real-time data input, and advancements of infrastructural modules in machine learning and AI implications. With the development in progress, GradBond will initiate those factors one step at a time with each update to make the system an all-time usable tool for each stakeholder.

2.4 Problem Analysis

It has been observed that there is no dedicated networking platform between alumni and students in our country. Although similar systems exist worldwide, outdated methods are still commonly used for networking between students and alumni in our country. Due to the lack of a dedicated platform for communication between the two groups, issues such as inefficiency and authenticity concerns arise. Moreover, it is observed that alumni are less likely to provide guidance to students through traditional methods of networking using social media. Therefore, this is a systemic issue as it affects an entire group who would benefit more from a system designed to provide the required support. As industrialization and modernization is becoming rapid, it has become a major issue for inexperienced students to secure employment. Therefore, receiving proper guidance from experienced alumni is an effective way to address this issue.

It is evident that there is no platform dedicated specifically for students as most of the networking platforms are industry-focused, like LinkedIn, Behance, AngelList, GitHub etc. Furthermore, as there is no verified system that will identify someone as an alumnus, students may become vulnerable to scams or deception, which is harmful to them. Plus, the absence of a structured system for alumni to educate potential students is also a recurring issue, because this makes students lack career-related guidance or opportunities that might be provided to them.

Existing systems like LinkedIn, Behance, AngelList, etc. are focused on experienced users who can work in any dedicated field. But they don’t have any system where students from various universities can receive proper guidance before entering the job market. Especially since in our country, the people are still used to old traditional methods of networking with alumni, the academic culture is built like that. Relying on such outdated methods in the modern era leads to slow and inefficient outcomes. Therefore, we have proposed this system as no tools currently exist in our country to solve this issue. So after doing our literature review, we have seen how similar systems in other countries have contributed to the whole student sector, making them more ready to go into the job market.

The following are the pain points we have targeted:

1. **For students:**
    - There is no verified contact list of alumni.
    - No formal way to seek guidance from alumni.
    - Confusion on where to seek mentorship.
2. **For alumni:**
    - No easy channel to give back, mentor, or scout potential future candidates.
    - Lack of motivation to stay engaged with university after graduation.
3. **For institutions:**
    - Difficult to track the impact of alumni and the outcome of their engagement.
    - Missed opportunities to heighten the reputation of the universities.

After COVID, digital engagement has heightened tenfold, making it more common for people to seek guidance online. Not only that, during the July revolution in Bangladesh, it has been observed that due to the communication between alumni and students the mass uprising coordination was possible. The alumni helped students in various ways. However, without a proper networking system, the efforts lacked organization. So, after these events, we have noticed the lack of such a system in our country. Creating such a system will provide our country with not only a better future for the still learning students but also strengthen the bonds between individuals. It will also support the nation's industrial growth by reducing unemployment among recent graduates. Having said that, our proposed solution fills all these criteria as it creates a medium for both students and alumni to communicate and further support one another.

Chapter 3

3. Methodology

Chapter 3 describes the methodology used in the project, covering the system architecture, feasibility study, requirement analysis, and system design. It details the technical and functional aspects that define the platform's development.

3.1 System Architecture

The system architecture is represented using a flowchart diagram. This diagram fully showcases the core functionalities of our project and the logical flow that a user will follow. It mainly focuses on how the system differentiates between user roles, such as separating functionalities for students and alumni from the beginning of the flow. Initially, the user can either register or log in if they already have an account. During login, users must enter valid credentials; otherwise, they are prompted to try again. Only through proper authentication by the backend will the users be able to log in. During registration, users can choose to sign up as either a student or an alumnus. Based on the user's roles after registration, they will have different levels of functionality and authorization in the system. After the registration and login process, the users will be divided based on their roles. Students will only have the authority to search alumni, view profiles, view events, send/receive messages, view notifications, join events, and view/apply for jobs. Alumni, on the other hand, can access all student features in addition to posting jobs and creating events. This key feature differentiates GradBond from generic social platforms and reflects the core reasoning behind our design decision. Our system maintains a role-based access control model that efficiently assigns appropriate functionalities to each user type. Furthermore, the simplicity of our system makes it quite user-friendly, especially considering that the core features are accessible to both types of users. This role-based system model ensures that both types of users get relevant content while using the web application.

System Flowchart

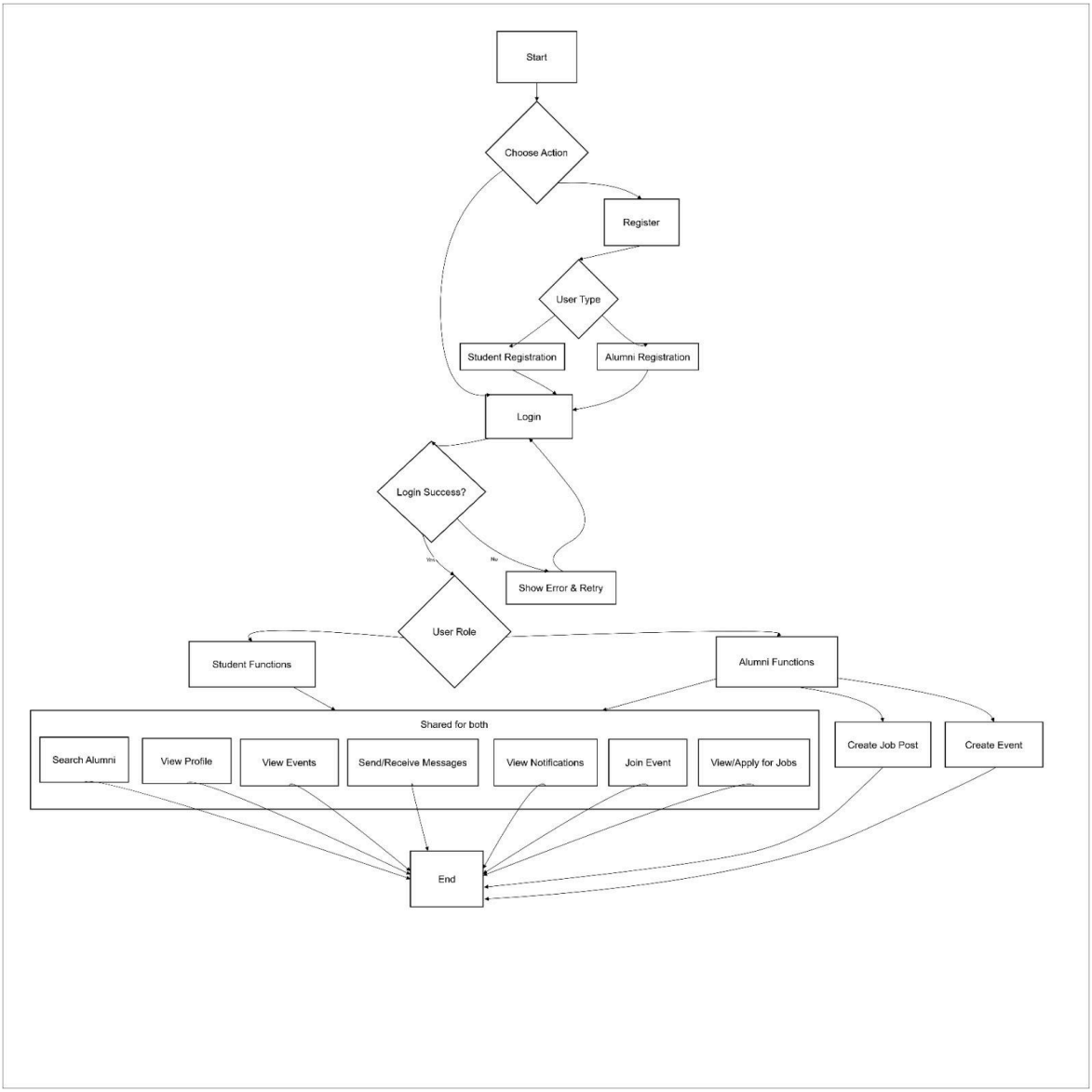

Fig 1.1 : System Flowchart

The flowchart in the figure illustrates the logical sequence of the interactions in the GradBond platform. It showcases the entire user journey from authentication to role-based access and functionality. At first, it begins when the user starts and gets the option to choose between login or register. If they click register, they will be taken to picking a role—student or alumni—and if they pick login, they will have to input the credentials they provided during the registration process. If the login is successful, they will be led to the home page; otherwise, an error will show.Our GradBond system is role-based, so if a student logs in, they will have a set of roles or actions they can take, whereas if an alumni logs in, they will have different roles and access. Students can search for alumni, view alumni profiles, view/join events, send and receive messages, view notifications, and view and apply for jobs, whereas alumni can do everything the student can but also create or post events and job opportunities.This structured flow ensures both usability and security. By guiding users in a role-based path, the system remains organized and user-friendly with maximum efficiency.

3.2 Feasibility Study

Gradbond - Alumni Finder Webapp is a system keeping the term in prior for students to find, network, and seek counsel from alumni in the most proficient manner to keep the output maximized as much as possible. For developing such a system, the analysis for checking feasibility shows viability and represents great possibility for further elevation.

3.2.1 Economic Feasibility

In the development phase of the system, to gather the data of alumni, the information will be sought from online sources, or the alumni will be asked to sign up with their data, or the information records will be requested from reputable universities' databases that are almost free of cost. This is the only labor part of the project; thus, it marks the system as economically feasible. For the revenue model from the system, the Freemium Tiers (free for students, premium features for job circulars and recruiters) will be the most viable option for further elevation of the project when it gets the most traffic and becomes a daily-use material for the students. After finding a large amount of student interaction in the system, investors' attention will take a great lean toward investing in the future, finding the opportunity to imply ROI from the system. While the students maintain great communication with the alumni and industry experts keep monitoring for extracting the best for their company, this will create many more opportunities to find investment for the elevation of the project.

3.2.2 Technical Feasibility

For the development of the system, the technical tools and other elements which will be used are HTML5, CSS3, Bootstrap, Django, PostgreSQL, Git, Postman, VSCode, etc., which are almost free of cost to bring the system online. Almost every technical stack here used for development purposes is zero cost, which proportionally aligns with the positive technical feasibility term. For maintaining the system online, we need a low-bandwidth internet connection with a minimal amount of data for the user to log in or register, which is easy to get anywhere in the regional prospect.

3.2.3 Operational Feasibility

Almost every student/university focuses on the target to achieve, which is to get the students a job or make them successful entrepreneurs to conduct business successfully. To roll this in motion, expert opinion and guidance matter the most. The system lets students interact with alumni according to their specific needs, which creates a strong network system. Alumni can also be greatly benefitted by finding the best recruits for their industry. This workflow will be seamless as long as communication or connection has been made with the users or interactors, which requires almost zero cost. As students roll up every year, the system's long-term sustainability to remain online with a great success ratio becomes risk-free in that prospect.

3.3 Requirement Analysis

3.3.1 Functional Requirements

The GradBond system is expected to provide the following core features:

- **User Authentication and Authorization:** The system must allow users to register and login safely. Role-based access requires a distinction between privileges between graduates and students.

- **User Role and Profile Management:** The system will organize users into two primary groups—students and alumni.
- **Alumni Search by Students:** Students shall be able to search for alumni based on multiple criteria, such as university, department, or profession. Search results must be efficiently filtered and paginated.
- **Event Management by Alumni:** Alumni will have the ability to create, modify, and remove event listings.
- **Job Posting Feature:** Alumni shall be able to publish job opportunities. Each job listing includes the position title, company information, a summary of responsibilities, qualification criteria, and application guidelines.
- **Real-Time Messaging:** The platform will facilitate real-time interactions between students and alumni by leveraging web sockets or equivalent technologies, ensuring smooth and immediate communication.
- **Notification System:** Users shall receive real-time and system-triggered notifications for new messages, event updates, and job postings relevant to them.

3.3.2 Non-Functional Requirements

GradBond is structured to fulfill a series of non-functional requirements aimed at improving the system's stability, efficiency, and user satisfaction.

- **Performance:** The system must respond to user actions within an average of one second under normal usage conditions.
- **Security:** All communications must be encrypted (via HTTPS). Authentication tokens (JWT) shall be used to manage sessions securely.
- **Maintainability:** The codebase must follow modular design principles and Django best practices to facilitate future development and debugging.
- **Usability:** The user interface must be responsive, intuitive, and accessible across a variety of devices including desktops, tablets, and smartphones.
- **Data Integrity:** The system must enforce strict access control to ensure that only authorized users can modify or delete data. Transactions must maintain atomicity.

3.3.3 Tools & Technology

The engagement system will be developed using the following tools and technologies.

- **Front-End Development**
    - **HTML5/CSS3:** For structuring and styling the web pages, ensuring a modern and user-friendly design.
    - **Bootstrap:** A front-end framework for developing responsive and mobile-first web applications, facilitating a seamless user experience.
- **Back-End Development**
    - **Django:** Django offers a user-friendly way to write the backend with an inbuilt Admin management interface.
- **Database Management**
    - **PostgreSQL:** PostgreSQL is an advanced object-relational database used for storing diverse data, including user profiles, job postings, events, and other key information.
- **Version Control and Collaboration**

    - **Git:** Git is a tool for version control that records code modifications and enables team collaboration during development.
    - **GitHub:** GitHub hosts Git repositories and provides tools for project management, and code reviews.
- **Testing and Deployment**
    - **Postman:** A tool for testing APIs and ensuring that the back-end services function correctly.

3.4 System Design

3.4.1 Development Model

Fig 1.2 : Agile Model

The development of Gradbond - Alumni Finder WebApp was done using the Agile Development model. As agile is a flexible model it allows for the system to be broken down into manageable sprints,each focusing on core features like user authentication, alumni search etc. This approach improved the product quality and ensured that the product could be delivered on time with minimal bugs and problems. The continuous improvement also helped align the project with the actual need of the stakeholders

3.4.2 Use Case Diagram

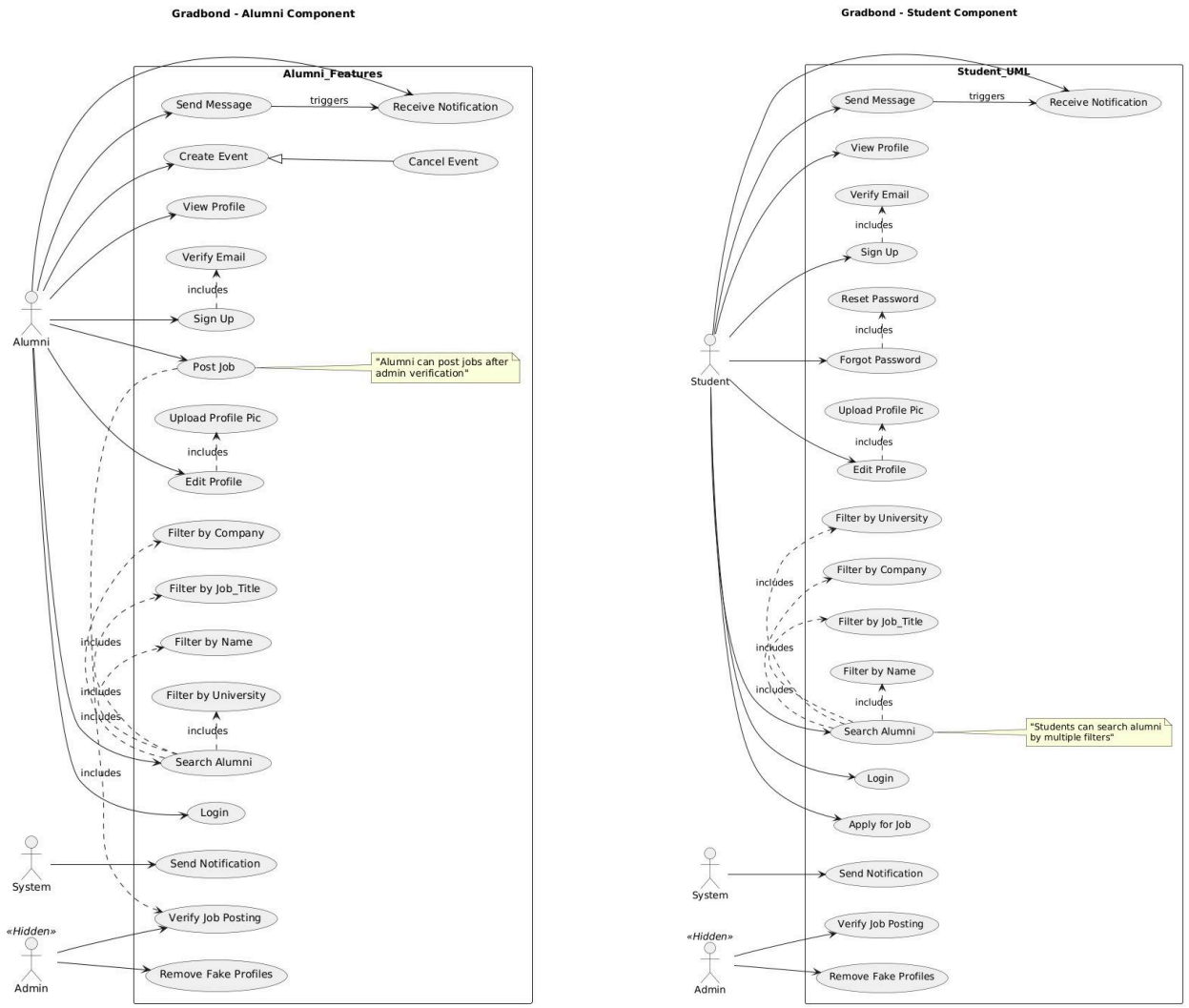

Fig 1.3 : Use Case Diagram

The use case diagrams provide an overview of the core interactions between users and the GradBond system, focusing on student and alumni roles. Student Component The Student Use Case Diagram shows the actions a student can perform after registering on the platform. These include managing their profile, retrieving a forgotten password, and searching for alumni using several filters such as name, job title, company, and university. Students can also communicate with alumni through messages and apply for job opportunities. They also get notified based on their interactions on the platform. Alumni Component This diagram shows what interactions are available for an alumni user after he/she signs up to the system. Alumni can manage their profile, share job openings on the job board, and organize or cancel events. They can also explore the alumni network using multiple search filters and interact with others via messaging. Administrators have backend roles such as verifying job posts and handling inappropriate or false profiles to maintain platform integrity.

3.4.3 Context Diagram

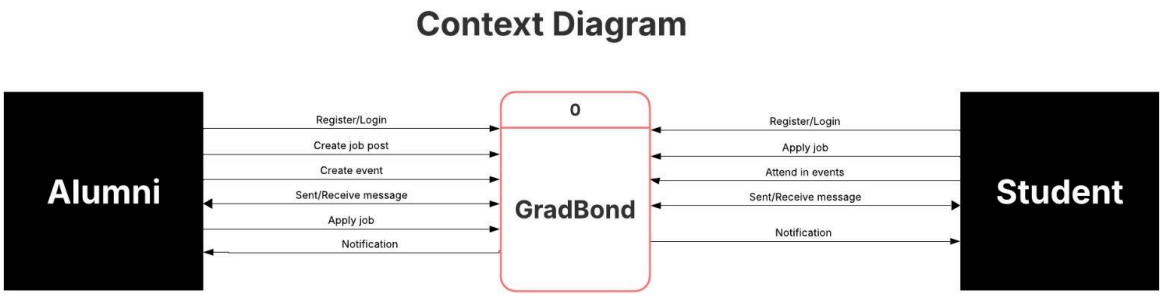

Fig 1.4 : Context Diagram

The diagram illustrates how the GradBond platform interacts with two key user types: Alumni and Students. Both users are able to sign up or log in, exchange messages, and receive updates from the system. Alumni can create job listings and set up events, whereas students have the option to apply for these jobs and join the events. GradBond acts as a bridge, enabling seamless communication and engagement between these two groups through a range of shared features.

3.4.4 Data Flow Diagram

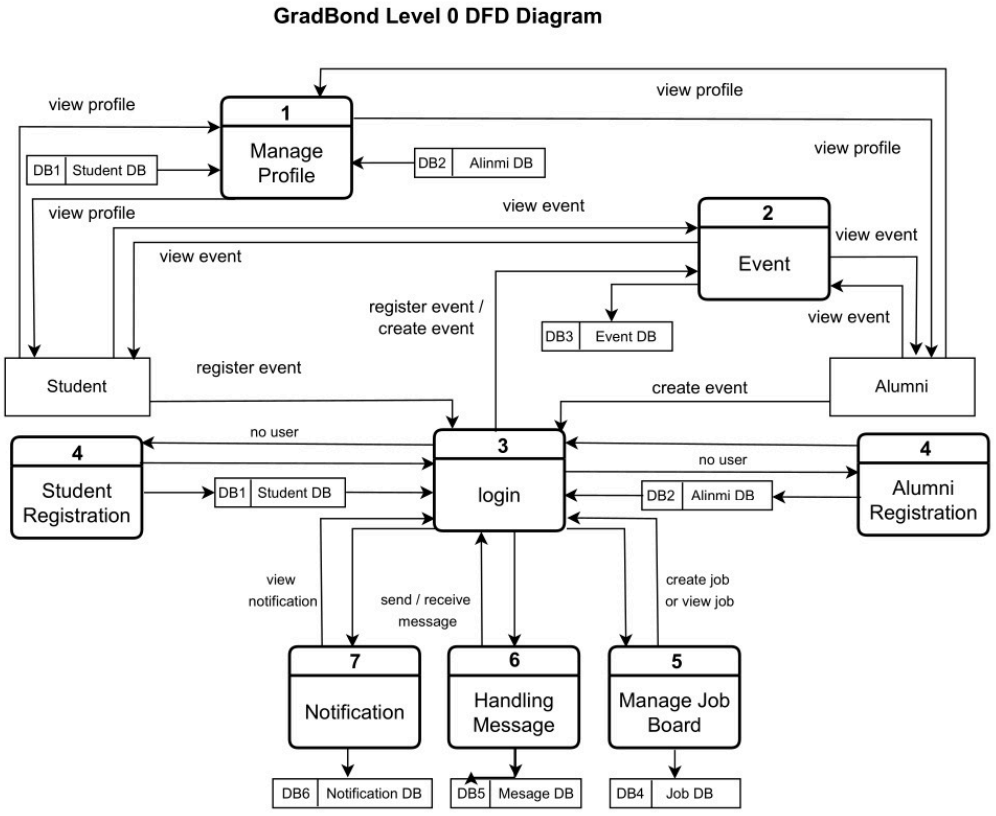

Fig 1.5 : Data Flow Diagram

The Level-0 DFD of GradBond illustrates the major processes, data flows, external entities, and databases involved in the system. It represents how students and alumni interact with the platform through key modules such as profile management, event participation, job boards, messaging, and notifications. System Components and Descriptions Manage Profile (Process 1) Function: Allows users (both students and alumni) to view and update their profiles. Databases: DB1: Student Database DB2: Alumni Database Flow: Fetches and stores profile information based on user type. Event Management (Process 2) Function: Handles the viewing, registration, and creation of events. Databases: DB3: Event BD Users: Students: Can view and register for events. Alumni: Can view, register for, or create events. Login System (Process 3) Function: Authenticates users based on credentials. Databases: DB1: Student DB DB2: Alumni DB Flow: Transfers users to system access or to the corresponding registration process. Registration (Process 4) Function: Handles new user registration. Modules: Student Registration Alumni Registration Data is stored in the corresponding database (DB1 or DB2). Manage Job Board (Process 5) Function: Allows alumni, jobs and students to open/apply. Database: DB4: Job Database Handling Messages (Process 6) Function: Supports communication between students and alumni via messaging. Database: DB5: Message Database Notification System (Process 7) Function: Manages alerts and notifications for events, jobs, and messages. Database: DB6: Notification Database External Entities Student: Interacts with modules such as login, registration, profile, events, messages, notifications, and job board. Alumni: Interacts similarly but with added privileges, such as posting jobs and creating events.

3.4.5 Entity-Relationship Diagram

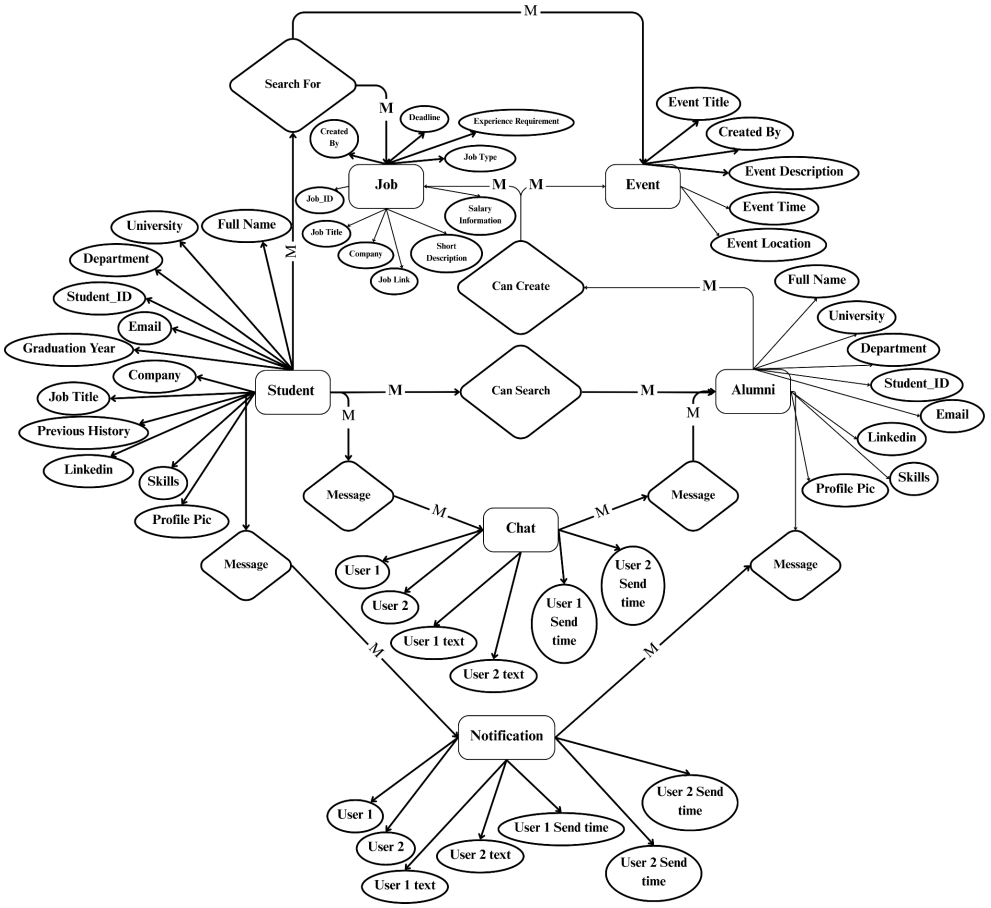

Fig 1.6 : ER Diagram

The ER-diagram represents the Gradbond - Alumni Finder Webapp database structure, where entities are Student, Alumni, Job, Event, Chat, and Notification. The diagram contains relationships between students and alumni where they will search, message, or interact within the system. The key attributes, which are university, skills, job title, and profile details, are associated as per precise user type. The diagram represents a many-to-many (M:N) relational structure among the users.

3.4.6 Database Schema Diagram

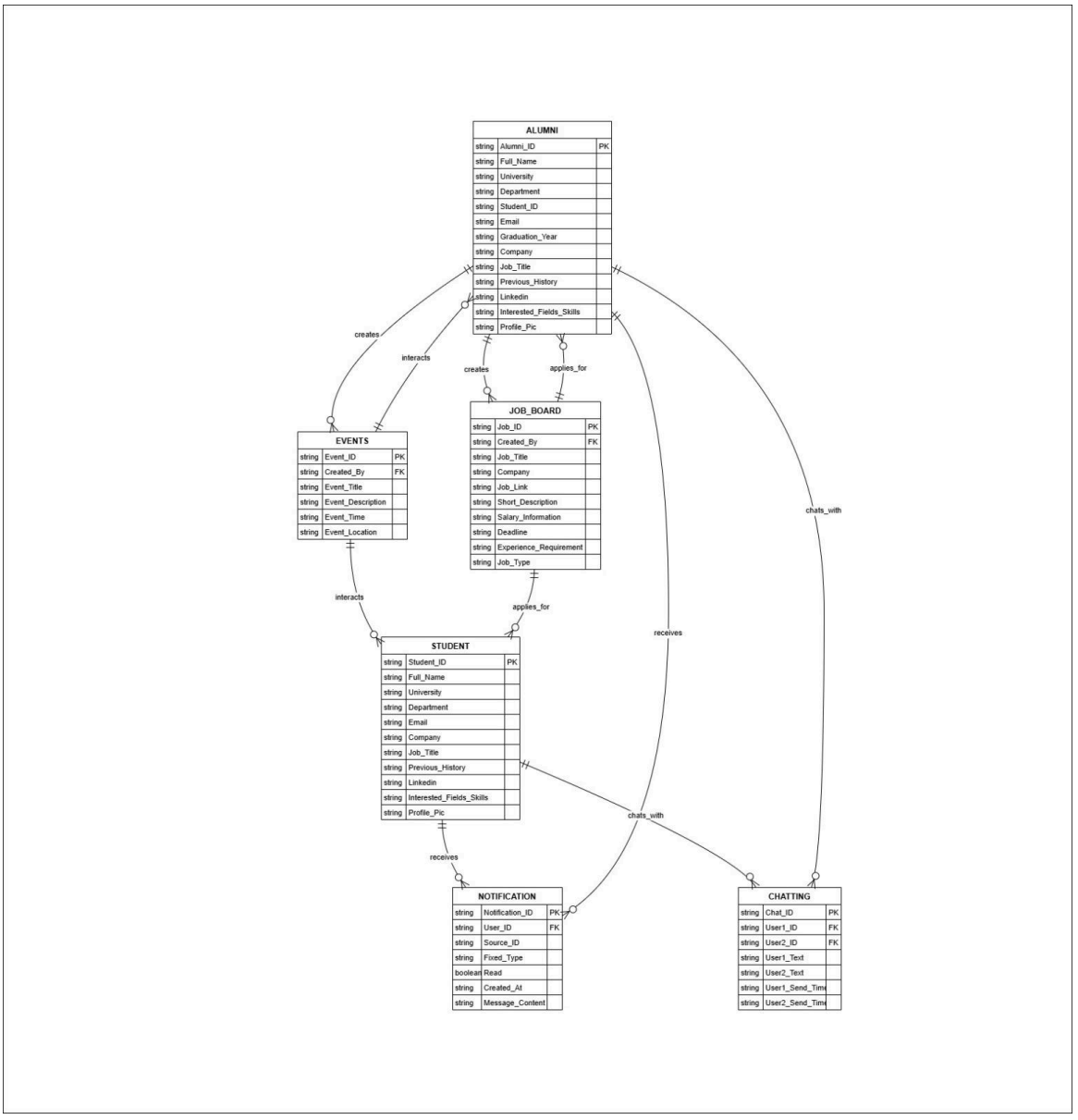

Fig 1.7 : Schema Diagram

The schema diagram in the figure showcases the structure of the GradBond website and illustrates the relationships between its core tables. The system has two main types of users, represented by the Alumni and Student tables, which store account information for each user type. While both students

and alumni can apply for events and jobs, only alumni have permission to create or post them. The Events and Jobs tables allow alumni to list opportunities, while both user types can interact with them, meaning alumni can even join events or apply for jobs. The Chatting table facilitates communication between users, where any combination of students and alumni can message each other, identified as User1 and User2. Finally, the Notification table sends various alerts to both user types. Overall, this schema supports GradBond's core functionalities by enabling organized, role-based data access and ensuring smooth user interactions.

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