

**INTEGRATED ALUMNI NETWORKING AND STUDENT ASSOCIATION
MANAGEMENT SYSTEM FOR TERTIARY INSTITUTIONS**

BY

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE,
FACULTY OF PHYSICAL SCIENCE, UNIVERSITY OF BENIN, BENIN CITY. IN
PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF A
BACHELOR OF SCIENCE (B. Sc) DEGREE IN COMPUTER SCIENCE.**

NOVEMBER 2025.

CERTIFICATION

This is to certify that this project work was carried out by **OSAZE JOHN FAVOUR (Mr.)** with Matriculation Number **PSC2105395** under my supervision, and it is adequate in scope and content, for the award of Bachelor of Science (**B.Sc.**) Degree in Computer Science from the University of Benin.

DR. (MR.) A.O. IDEHEN
SUPERVISOR

DATE

APPROVAL

This project work is hereby approved in partial fulfillment of the requirements for the award of Bachelor of Science (B.Sc.) Degree in Computer Science from the University of Benin

DR. (MRS.) R.A. USIOBAIFO
HEAD OF DEPARTMENT

DATE

DEDICATION

I dedicate this project to God for granting me the strength and guidance to complete it, as well as for His protection during my time at the University of Benin. This work is also dedicated to my parents for making this journey smoother, for their encouragement and support, and to my siblings for their unwavering presence when I needed them. Finally, I dedicate this project to my supervisor, as this work would not have been possible without your valuable direction and guidance.

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ABSTRACT

In many tertiary institutions, alumni networks and departmental associations are either underutilized or nonexistent, despite their potential to facilitate mentorship, career growth, and school development. The University of Benin (UNIBEN), like many Nigerian universities, lacks a unified digital platform that connects alumni with current students through their departmental associations in an organized and lasting manner. This lack of connection limits chances for mentorship, knowledge sharing, and professional networking, while also reducing the effectiveness of associations in academic and social development.

This project proposes the creation and implementation of an Integrated Alumni Networking and Departmental Associations Management System. The platform will allow alumni to connect with students for mentorship and career advice. It will also serve as a hub for departmental associations to share news, plan events, and collaborate on projects, while providing students with access to job and internship opportunities. The system will include user role management (students, alumni, administrators), profile creation, association hubs, event and job postings, and a basic messaging system.

The project will employ a modular software engineering approach, integrating backend development, database management, and a user-friendly interface. By using modern web technologies, the system will be scalable, accessible, and easy to maintain. The expected outcome is a functioning platform that enhances alumni-student relationships, facilitates departmental associations, and fosters career development at the university. Beyond its immediate use, the project may also serve as a model for alumni engagement and student support systems in other universities.

CHAPTER ONE

INTRODUCTION

1.1. BACKGROUND OF THE STUDY

The connection between a university and its graduates lasts a lifetime and extends well beyond graduation day. Alumni are now viewed as more than just former students; they are vital members of the university community and an important indicator of its success (Sander, 2013). They embody the enduring legacy of a university, serving as ambassadors, mentors, and supporters through donations (Weerts, Cabrera, & Sanford, 2010). In today's digital age, maintaining this relationship is essential for growth. Consequently, universities around the world are investing in digital strategies to engage their alumni networks (Shafi, 2017) effectively.

In the past, alumni engagement focused on newsletters, reunions, and central alumni offices, usually located on campus. However, with the rise of social media, this emphasis has shifted to digital engagement (Towner & Lego Muñoz, 2011). Platforms like LinkedIn and Facebook have become standard tools for professional and social networking. However, they often offer a generic solution that misses the specific context and cultural identity that shape an institution's unique community (Boyd & Ellison, 2007).

A key, often overlooked aspect of this community is the departmental or faculty-level association. Research on student retention and success has consistently emphasized the significance of academic and social integration within a student's chosen field of study (Tinto, 1993). This sense of belonging often persists after graduation, as alumni form a stronger bond with their respective department. It is within these focused groups where the most significant and professionally relevant connections are often formed (Milošević-Đorđević & Žeželj, 2014).

This project acknowledges the dual nature of alumni identity, which encompasses loyalty to the leading institution and a strong connection to a specific academic department. It explores the need

for a technology solution that honors both aspects. The background of this study highlights the gap between broad, university-wide alumni platforms and the informal communication methods employed by departmental associations. An integrated system that combines the broad perspective of a central alumni network with the intimate nature of departmental associations is crucial for creating a truly engaging alumni experience (McAlexander, Schouten, & Koenig, 2002).

Alumni and departmental associations play a significant role in institutional growth by offering benefits such as mentorship, professional networking, fundraising, and community building (Balogun, 2022). For instance, alumni contributions in Ogun State have included constructing infrastructure, funding scholarships, and supplying educational materials to enhance educational quality.

Moreover, universities globally are recognizing the importance of digital platforms. The National Open University of Nigeria (NOUN) is currently developing a digital portal to bolster alumni engagement, improve communication, and increase efficiency (Obierika, 2025). These platforms help connect alumni with students, promote ongoing engagement, and improve institutional outreach.

However, many Nigerian universities, including the University of Benin (UNIBEN), continue to rely on outdated methods, such as physical notice boards or informal messaging groups. These approaches are ineffective and lack continuity. This gap reveals the need for a unified digital system that links alumni outreach to departmental association activities, mentoring, and career development.

1.2. MOTIVATION

The motivation behind this project arises from the growing need to modernize alumni engagement and student support systems at UNIBEN, as well as in other tertiary institutions. While alumni are eager to give back through mentoring, job referrals, or fundraising, there is no centralized platform to facilitate this contribution efficiently (Ogunade & Elizabeth, 2024). Coupled with this, departmental associations often lack robust communication tools, limiting their capacity to engage

members, coordinate events, and sustain activities. Addressing these challenges via a digital platform could enhance mentorship opportunities, strengthen alumni ties, and empower student associations.

1.3. PROBLEM STATEMENT

Despite the evident importance of alumni engagement, many tertiary institutions struggle to manage their alumni relations in an integrated and effective manner. The current approach is often fragmented and fails to leverage the full potential of the alumni network. The core problems that this project seeks to address are:

- 1. Fragmented Communication and Data Silos:** Alumni relations are typically siloed. A central university alumni body may operate its own platform, while individual departmental associations use various unofficial channels, such as WhatsApp or Facebook groups. This creates information silos, making coordinated communication and data management nearly impossible, a common challenge in large organizations (Al-Hakeem & Al-Khateeb, 2018).
- 2. Lack of Relevant and Targeted Engagement:** The success of online communities hinges on providing value and relevance to their members (Wenger, McDermott, & Snyder, 2002). Generic, university-wide platforms often fail to deliver content that is relevant to alumni from specific disciplines, leading to “communication clutter” and low engagement rates (Mayfield, 2008).
- 3. Inefficient Management for Departmental Associations:** Departmental administrators lack dedicated tools to manage their members, organize events, or disseminate important information. They rely on manual methods or generic social media tools not designed for formal association management, leading to administrative overhead and poor record-keeping.

- 4. Missed Mentorship and Career Opportunities:** Mentorship from individuals with shared academic backgrounds is highly effective for student success and career readiness (Crisp & Cruz, 2009). The current fragmentation makes it incredibly difficult for students to identify and connect with graduates from their own department for targeted career guidance, representing a massive missed opportunity for career development.

Therefore, the absence of a unified platform that caters to both central and departmental alumni needs results in diluted engagement, administrative inefficiencies, and a significant loss of potential value for both the association and its members.

1.4. AIM AND OBJECTIVES

Aim:

The primary aim of this project is to design an Integrated Alumni Networking and Departmental Association Management System that is solely for tertiary institutions.

Objectives:

To achieve the stated aim, the following specific objectives will be pursued:

1. Investigate the current methods adopted by tertiary institutions for alumni-student connections and departmental associations.
2. Identify the loopholes and successful features of the existing systems.
3. Analyze data obtained and proffer solutions to fill the gaps in the current system and improve working features.
4. Implement a digital web-based platform that embodies all solutions effectively and efficiently.

1.5. SCOPE AND LIMITATIONS OF RESEARCH

Scope:

The scope of this project is to develop a functional web application. The platform will be built using modern web technologies and will be accessible via a web browser. The core functionalities will include role-based user registration, comprehensive user profiles, a university-wide news feed, private departmental groups, event management, a searchable alumni directory, and a job board.

Limitations:

This project, due to time and resource constraints, will have the following limitations:

- The system will be a web application and will not include dedicated native mobile applications for iOS or Android.
- Advanced features such as real-time video chat, payment gateway integration, and AI-powered recommendation engines are outside the scope of this implementation.
- The initial deployment will be on a test server, and the study will not cover large-scale, commercial deployment challenges.

1.6. RESEARCH METHODOLOGY

An iterative software development model will guide this work, facilitating phased design, implementation, and testing.

Steps include:

1. **Requirements Gathering:** Conduct interviews and surveys with university stakeholders, including students, alumni, and association leaders.
2. **Comparative Analysis:** Study existing systems like NOUN's portal or global alumni platforms to identify successful features (Obierika, 2025)
3. **Design:** Create use case diagrams, system architecture, and database schema.
4. **Implementation:** Build with modern web frameworks like the MERN stack; use a relational database service like Supabase.

5. **Testing:** Perform unit, integration, and user acceptance tests to validate functionality and user experience.
6. **Documentation:** Record methodologies, design decisions, and evaluate performance versus project objectives.

1.7. RESEARCH SIGNIFICANCE

The successful implementation of this integrated platform will provide significant benefits to all stakeholders, primarily by building and leveraging social capital within the university community (Adler & Kwon, 2002).

1. **To Tertiary Institutions:** Research has shown a strong correlation between positive alumni relationships and philanthropic contributions (Gaier, 2005). A more engaged alumni base, facilitated by technology, can also enhance an institution's reputation and recruitment efforts (Sander, 2013).
2. **To Departmental Associations:** Departments will be empowered with a formal platform to efficiently manage their association affairs and foster a stronger sense of community, which is a key factor in long-term alumni loyalty and identity (Milošević-Đorđević & Žeželj, 2014).
3. **To Students:** The platform will facilitate access to a network of professionals from their specific field of study. Access to such networks and mentorship is a critical component of career development, as they can significantly impact a student's transition from education to employment (Crisp & Cruz, 2009).
4. **To Alumni:** Graduates will benefit from a more streamlined networking experience focused on their specific field, leading to more meaningful interactions and stronger professional ties within a trusted community (McAlexander, Schouten, & Koenig, 2002).
5. **To Future Researchers:** This project will serve as a practical case study and a foundational model for other institutions. The documentation and architecture can guide future research in the field of educational technology and online community management.

CHAPTER TWO

LITERATURE REVIEW

This chapter provides a detailed examination of the current literature, technologies, and systems related to designing and implementing an integrated alumni and departmental networking platform. The goal is to establish a robust theoretical and technical foundation, place the problem in context, and clearly identify the gap this project aims to address.

The review is split into three main sections. First, it examines the conceptual framework, focusing on established theories of community building, social capital, and user engagement that support the project's rationale. Second, it examines the current software technologies and design patterns employed in developing modern, scalable web applications. Finally, it provides a critical analysis of existing systems, ranging from global social networks to specialized alumni platforms, to identify their features, limitations, and the specific gap in the market that this project aims to address.

2.1. ALUMNI ENGAGEMENT AND NETWORKING

Alumni associations have long been recognized as an integral part of higher education institutions worldwide. They serve as a bridge between the past and present, creating opportunities for graduates to maintain ties with their alma mater while supporting current students through mentorship, sponsorship, and career guidance. Alumni engagement is not limited to fundraising alone; it also involves networking, institutional branding, research collaborations, and creating opportunities that enrich both the alumni and the institution (Balogun, 2022).

2.1.1 Global Perspectives on Alumni Engagement

In advanced economies, alumni associations are highly structured and strategically leveraged. For instance, Harvard University runs one of the most robust alumni networks globally, with chapters on nearly every continent. Through these chapters, alumni provide career mentorship, internship

opportunities, and funding for academic projects (Draper, 2020). Similarly, the University of Oxford operates a digital alumni platform that enables graduates to maintain professional connections while providing students with access to mentorship and global job opportunities (Johnson, 2019).

Digital platforms play a central role in these successes. For example, MIT's alumni portal integrates career development resources with networking tools, ensuring that graduates remain invested in the institution long after graduation (Chen, 2021). These systems demonstrate how structured alumni engagement enhances institutional reputation, strengthens research opportunities, and provides students with access to global professional communities.

2.1.2 Alumni Engagement in the Nigerian Context

Unlike their counterparts in the West, alumni associations in Nigeria face many challenges. They have made some notable contributions, like building infrastructure, providing scholarships, and donating teaching equipment. However, these associations still rely heavily on informal communication tools such as WhatsApp and Facebook (Nwachukwu, 2018). This reliance results in poor record-keeping, inconsistent engagement, and inadequate documentation of alumni contributions.

Research indicates that alumni in Nigeria are more likely to be involved in building projects, such as lecture theaters, laboratories, and hostels, rather than in areas like career mentorship or networking (Ogunade & Elizabeth, 2024). The focus on physical contributions rather than professional engagement highlights a significant gap in how universities use their alumni network for student development. For example, the University of Lagos Alumni Association has led major infrastructure projects, but there is little evidence of ongoing mentorship programs connecting alumni with current students (Adebayo, 2020). Similarly, at the University of Ibadan, alumni efforts primarily support scholarship funds and institutional endowments, while digital platforms for alumni-student interaction remain underdeveloped.

2.1.3 Challenges of Alumni Networking in Nigeria

Some of the key challenges include:

- **Poor digital infrastructure:** Most Nigerian universities lack centralized platforms that keep alumni data updated.
- **Fragmented communication:** Alumni activities are often managed through separate social media groups, reducing inclusivity and long-term continuity.
- **Weak institutional support:** Universities often view alumni as external donors rather than stakeholders in academic and career development.
- **Limited mentorship structures:** Unlike global practices, mentorship in Nigerian institutions is largely informal, unstructured, and dependent on personal relationships.

2.1.4 The Need for Digital Alumni Networking Platforms

Digital platforms can address these challenges by:

- Centralizing alumni records for effective communication and data management.
- Creating mentorship spaces where alumni guide students on academic choices, career paths, and entrepreneurship.
- Facilitating professional networking, connecting graduates within industries and across borders.
- Promoting institutional branding as alumni success stories become visible globally.

Thus, alumni engagement in Nigeria requires a paradigm shift from brick-and-mortar contributions to digital mentorship and career development platforms, aligning with global best practices.

2.2. ROLE OF DEPARTMENTAL ASSOCIATIONS IN STUDENT DEVELOPMENT

Departmental associations play a vital role in the lives of students in Nigerian universities. They function as the closest level of student organization, offering a platform for academic, professional, and social development. According to Eze & Onah (2018), departmental associations provide students with a microcosm of leadership opportunities, encouraging them to develop skills in communication, problem-solving, and teamwork.

2.2.1 Academic Development through Departmental Associations

One of the most important functions of departmental associations is to support students academically. They organize:

- Tutorials and revision classes for challenging courses.
- Workshops, conferences, and symposiums that expose students to emerging issues in their disciplines.
- Competitions and academic exhibitions, which encourage creativity and innovation.

These activities supplement classroom learning and help students build competencies outside the formal curriculum (Okafor & Ifeanyi, 2022).

2.2.2 Leadership and Soft-Skill Development

Departmental associations also serve as a training ground for developing leadership skills. Through elections, executive positions, and committee work, students acquire practical experience in leadership and governance. For example, serving as a departmental president, secretary, or financial officer helps students develop:

- Organizational skills (planning events, managing dues, maintaining records).
- Communication skills (public speaking, negotiations with lecturers, liaising with alumni).
- Conflict resolution skills (handling disagreements among members).

These competencies are directly transferable to the workplace and significantly enhance graduate employability (Eze & Onah, 2018).

2.2.3 Social and Cultural Development

Beyond academics, departmental associations promote social cohesion and cultural identity. They organize social events, such as dinners, cultural days, and sports competitions, which foster unity and a sense of belonging among students. These activities contribute to mental well-being and create an environment where students feel part of a larger academic community (Okonkwo, 2021).

2.2.4 Challenges of Departmental Associations in Nigeria

Despite their importance, departmental associations in Nigeria face numerous challenges:

- **Manual record-keeping:** Membership lists, financial records, and event plans are often poorly maintained.

- **Inefficient communication:** Information is mainly disseminated through physical notice boards or word-of-mouth, which can exclude many students.
- **Financial mismanagement:** Without transparent, digital systems, dues collection and expenditure are prone to abuse.
- **Limited alumni integration:** Departmental associations rarely connect effectively with alumni, thereby missing opportunities for mentorship and funding.

2.2.5 Digital Transformation of Departmental Associations

With the rapid adoption of digital technologies by Nigerian youths, departmental associations have the potential to become more effective by embracing digitization. Digital platforms can:

- Streamline communication using real-time notifications.
- Improve financial transparency by enabling online dues collection.
- Enhance alumni-student interaction, linking departmental alumni with undergraduates.
- Archive records for continuity, even when leadership changes annually.

Okafor & Ifeanyi (2022) demonstrated that digitized student associations show higher levels of participation, accountability, and innovation compared to traditional paper-based structures. Therefore, integrating departmental associations into a centralized digital platform with alumni engagement functions would transform them from isolated, semi-formal bodies into strategic hubs for academic and career growth.

2.3. DIGITAL PLATFORMS FOR CAREER DEVELOPMENT AND MENTORSHIP

The shift to digital technologies has transformed career development and mentorship globally. Platforms like LinkedIn and Handshake connect students with employers and mentors, thereby expanding access to opportunities. LinkedIn, with over 900 million users, enables networking, job searches, and professional growth. Handshake, designed for university students, links graduates to employers and alumni in a structured way. In Nigeria, however, career services remain underdeveloped and poorly digitized. Most students rely on informal networks for mentorship and

guidance. An institution-specific alumni and departmental platform could bridge this gap by integrating mentorship and career services tailored precisely to the school's needs and preferences.

2.4. REVIEW OF INITIAL SYSTEMS

To justify the development of a new platform, it is essential to analyze existing solutions. This review covers three categories of platforms that alumni and departments currently use.

Legacy Methods

Before the widespread adoption of dedicated digital platforms, and still prevalent in many under-resourced institutions, alumni management has relied on a combination of manual and semi-computerized systems. A thorough understanding of these initial methods and their inherent inefficiencies is crucial to appreciating the transformative potential of a modern, integrated solution.

The Conventional Process

The initial system study reveals a process heavily reliant on physical records. As described in existing research, the conventional method involves storing alumni and current student details in paper ledgers, often maintained independently by each department (Subashini & Sowndarya, 2017). This decentralized, paper-based approach requires the central administration to collate details manually, a process that is both time-consuming and prone to significant error. Communication is similarly conventional, relying on postal mail to inform members about renewals, meetings, and events. This method is slow, expensive, and suffers from a notoriously slow response rate, making timely engagement nearly impossible (NPOInfo, 2021).

Semi-Computerized Methods

An incremental improvement over paper ledgers is the use of basic computerized tools, such as Microsoft Excel spreadsheets. While this method digitizes the data, it essentially replicates the flaws of the manual process. The data remains decentralized, with each department or association maintaining its own separate files. There is no centralized database, making it challenging to maintain data integrity, search for specific records efficiently, or get a holistic view of the alumni

network (Sasikumar et al., 2020). Updating alumni details can become a tedious and often neglected task, resulting in outdated and unreliable information.

2.4.1 Drawbacks of Initial Systems

The limitations of these legacy methods directly inform the requirements for the proposed system. Key drawbacks identified in the literature include:

1. **Inefficiency and Time Consumption:** The manual and semi-manual processes of data collection, updating, and communication are exceptionally tedious and time-consuming (Subashini & Sowndarya, 2017).
2. **Lack of a Centralized and Accurate Database:** Decentralized records in ledgers or separate Excel files make it impossible to maintain a single, accurate "source of truth" for alumni data (Adir et al., 2015).
3. **Geographical and Accessibility Constraints:** Requiring members to submit forms by hand or communicating via mail creates significant barriers for alumni who are not geographically close to the institution, limiting the growth of a truly global network.
4. **Poor Data Security and Privacy:** Paper records and unencrypted spreadsheets offer minimal protection for sensitive personal information, posing a significant privacy risk.
5. **One-Way Communication:** Static websites or newsletters provide information but offer no room for interaction, feedback, or community building, a model that has been proven ineffective for sustained engagement (Barnard & Zenia, 2008).

2.4.2 Digital Systems

The evident inadequacies of legacy methods have led to an inevitable migration towards existing digital platforms. This section critically evaluates these platforms, ranging from global giants to local examples, to determine their suitability and identify their shortcomings in relation to the project's specific, nuanced goals.

The tabular comparison below highlights the strengths and critical drawbacks of the current digital systems, thereby underscoring the need for a specific, cost-effective solution that integrates alumni networking, departmental associations, and student career development.

System	Strengths	Limitations
LinkedIn	Global visibility, professional networking	Not university-specific; lacks departmental/community context
Graduway	Tailored alumni-student mentorship	Proprietary, costly, and not accessible to Nigerian universities
Handshake	Career and internship placement support	Employer-driven, with less focus on alumni-student relationships
Facebook/WhatsApp Groups	Free, easy to use, already popular	Informal, lacks structure, and has poor mentorship features
NOUN Alumni Portal (Nigeria)	Institution-focused, structured engagement	Still developing, limited reach, and adoption

Table 2.1: Comparison of the strengths and limitations of existing digital platforms.

2.4.3 Analysis of Existing Nigerian University Alumni Portals (Case Studies)

To understand the local context, this review analyzes the alumni portals of two prominent Nigerian universities, using them as benchmarks to evaluate standard features and persistent gaps.

- FUTA Alumni Association Worldwide:** The Federal University of Technology, Akure (FUTA) alumni portal is a significant step towards creating a central digital hub. Its feature set, including user registration, event management, and a centralized database, provides foundational functionalities. However, a deeper analysis reveals a critical architectural limitation: the platform operates as a single, monolithic community. It fails to offer distinct, private, or administratively autonomous spaces for individual departmental associations. An announcement about a reunion for the 1995 Civil Engineering class, for instance, gets lost in a sea of general university news, reducing its visibility and relevance. This top-down structure does not adequately reflect the reality that an alumnus's primary affinity is often with their department or program.

- **University of Nigeria (UNN) Alumni Affairs:** The UNN portal similarly provides a centralized system for alumni to connect and access information. It includes valuable features, such as an information board for events and career openings. However, a comparative analysis highlights notable functional gaps. The reported absence of a gallery misses a vital opportunity to build a shared sense of history and nostalgia through visual storytelling. The lack of a structured feedback mechanism positions the platform as a top-down broadcast tool rather than a bottom-up, community-driven platform. Most importantly, like the FUTA portal, its architecture appears to be centralized, lacking the deep integration of departmental sub-communities that is central to the thesis of this project.



Figure 2.1: Home Page of the University of Nigeria Alumni Affairs

2.5. CONCEPTUAL FRAMEWORK

The development of an effective online platform is not merely a technical challenge; it is also a socio-technical one. The success of the "Integrated Alumni Networking and Departmental Associations Platform" hinges on its ability to cultivate a vibrant and engaged community. This section reviews key theories that inform the design and purpose of such a community.

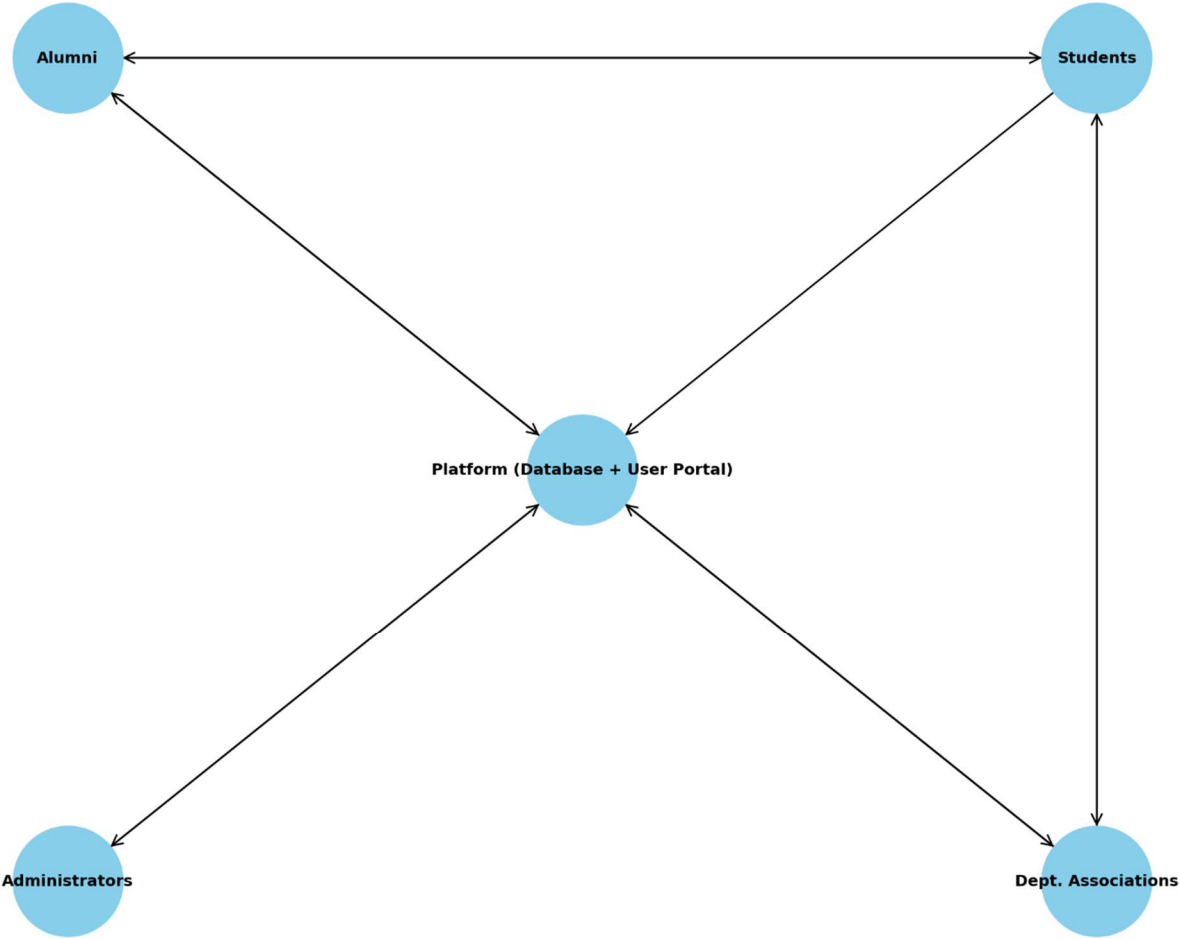


Figure 2.2: Contextual Diagram of the Proposed System for the UConnect Platform

The conceptual framework of this study illustrates how alumni, students, departmental associations, and administrators interact through a centralized platform. Alumni provide mentorship and career opportunities; students access academic and professional resources; departmental associations manage events and communication; and administrators oversee the platform. The central database ensures integration, efficiency, and sustainability.

2.6. REVIEW OF RELATED LITERATURE

As an institution grows, it needs to evolve to effectively manage the increased amount of information required to run effectively. Today, this means making the leap from analog to digital. Alumni and student associations are among the most important components of any institution, as they represent the college on a global scale and promote inclusivity within the university. This system is a web-based management platform that bridges the gap between the institute and its alumni network, while also reaching out to current students on a broader scale, thereby creating and expanding opportunities for both.

According to Nayyar et al. (2021), the need for communication between graduates and their colleges and universities has increased in recent years to gain a deeper understanding of their needs and the labor market requirements. This research continues to contribute to building a solid foundation among graduates and university students, enabling them to gain a deeper understanding of the labor market's needs. This will strengthen the labor market in the information technology field and introduce new efficiencies.

Hayman and Partridge (2013) concluded that alumni networks can be used to help young people navigate the transition from education into employment and to support schools in financing extracurricular activities and infrastructure projects. Alumni involvement is a crucial aspect of an educational institution or foundation. A portion of the esteem of a university rests on its Alma Mater. After the students complete their education, they begin their voyage in the corporate world. This system serves not only to bridge communication between alumni and their friends, but also between alumni and the college. It also serves as an effective way to mentor current students and improve their university journey by sharing experiences with them (Sasikumar et al., 2020).

2.7. SUMMARY TABLE OF REVIEWED STUDIES

The following table provides a condensed summary of the key academic literature and industry studies reviewed in this chapter. Each entry highlights the central focus of the study, its principal findings, and, most importantly, its direct relevance to the design, justification, and core features

of the proposed integrated platform. This synthesis bridges the gap between established theory and the practical implementation of this project.

Author(s) & Year	Focus of Study	Key Findings	Relevance to Current Study
Balogun, M. A. (2022)	Utilization of Alumni Associations for improving education quality in Ogun State.	Alumni make significant contributions to infrastructure, scholarships, and educational materials.	Limited emphasis on digital mentorship and networking highlights the need for structured alumni platforms.
Ogunade & Elizabeth. (2024)	Roles of Alumni Associations in the Development of Nigerian Tertiary Institutions.	Alumni support is crucial, but it is often focused on physical projects rather than mentorship or student development.	Shows lack of integrated alumni-student systems; need for platforms beyond infrastructure.
Draper, S. (2020).	Alumni engagement in the digital age (case studies: Harvard & Oxford).	Digital alumni portals enhanced mentorship, global networking, and institutional fundraising.	Context differs from Nigeria; platforms are resource-intensive. Demonstrates the benefits of structured systems.
Smith, J. (2021).	Handshake platform and student career services in U.S. universities.	Handshake increased student employability through alumni-employer linkages.	Employer-driven system, not tailored for Nigerian contexts. Highlights mentorship potential.
Okafor & Ifeanyi. (2022)	Digital Transformation of Student Associations in Nigerian Universities.	Digitized associations improved participation, accountability, and communication.	Adoption is still limited due to a lack of integration with alumni networks. Supports inclusion of departmental

			associations in the platform.
Nwachukwu, O. (2018).	Managing student associations in Nigerian universities.	Identified inefficiencies in manual communication and record-keeping in associations.	Confirms the problem of weak departmental structures; justifies the digitization of associations.
Obierika, M. (2025)	Launch of the NOUN Alumni Portal and Digital Alumni Engagement in Nigeria.	NOUNAA portal centralizes alumni data, communication, and verification services.	Still in early stages; it does not integrate departmental associations. Demonstrates the feasibility of Nigerian alumni portals.

Table 2.2: Summary table of reviewed literature and studies.

2.8. SUMMARY AND IDENTIFICATION OF THE RESEARCH GAP

This literature review has established a strong foundation for the project. The conceptual framework emphasizes that thriving online communities are founded on principles of social capital, shared practices, and brand identity. The technology review confirms that mature and robust tools are readily available to build a sophisticated web application.

2.8.1 Research Gaps Identified

- Nigerian alumni platforms exist but lack structured mentorship and departmental integration.
- Departmental associations remain underdeveloped in terms of digital capabilities, relying on informal tools.
- Existing global platforms are too broad or too expensive for Nigerian universities.

- Few integrated solutions exist that combine mentorship, networking, and departmental association management within a single system.

The critical analysis of existing systems reveals a clear and significant gap. Current solutions force a choice between generic, unprofessional, or prohibitively expensive platforms. There is a distinct lack of an integrated, cost-effective solution specifically designed to serve both the macro-level needs of a university's central alumni office and the micro-level community needs of its individual departmental associations. Global networks lack focus and trust, general social media lacks professionalism and formal tools, and commercial platforms are often too expensive and rigid. This project directly addresses this gap by proposing a unified platform that empowers departmental associations as first-class citizens within the broader university network, thereby creating a more relevant, engaging, and valuable experience for all stakeholders.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

This chapter lays out the basic plan for the "Integrated Alumni Networking and Departmental Associations Platform." It marks a significant shift from the ideas and concepts discussed in earlier chapters to the actual technical design of the proposed system. As the main engineering chapter, it carefully explains the approach taken for system development. This includes a detailed look at both functional and non-functional requirements, as well as high-level architectural and detailed designs that will guide the implementation stage.

The primary objective of this chapter is to present a clear and logical design that directly addresses the problems and objectives outlined in Chapter 1. Each design choice, from the development method to the database structure, is made with a specific model in mind. This ensures that the final product is strong, flexible, secure, and fully meets the needs of its intended users: the university, its departmental associations, alumni, and students.

3.1. ANALYSIS OF EXISTING SYSTEMS

In most Nigerian tertiary institutions, alumni engagement and departmental association management are mostly informal, fragmented, and decentralized. Existing systems, if they exist, typically consist of simple communication tools, such as WhatsApp groups, Facebook pages, and Google Forms. While these platforms allow casual conversations, they lack structure, data organization, and oversight from the institution. As a result, important tasks like alumni tracking, mentorship programs, event management, and dues payment are poorly coordinated. For example, departmental associations often depend on manual record-keeping and social media announcements. This approach can lead to data loss during leadership changes and inconsistent participation from members. These challenges make it hard to build lasting student-alumni relationships or gather insights that can guide the institution's development.

Some universities in Nigeria have attempted to establish alumni portals, with the National Open University of Nigeria (NOUN) Alumni Portal being a notable example. The NOUN Alumni Association (NOUNAA) portal serves as a central place for alumni registration, event updates, and membership payments. However, it primarily focuses on graduate registration and communication, offering limited support in terms of mentorship, student interaction, or departmental involvement. Similarly, a few private universities maintain basic alumni databases for verification and fundraising purposes, but they often lack features such as real-time communication, job boards, and professional networking. Without these capabilities, their effectiveness in enhancing student employability and alumni engagement is limited.

Around the world, platforms like LinkedIn, Handshake, and university-managed portals, used by institutions such as Harvard and Oxford, demonstrate the benefits of organized digital alumni systems. These platforms support mentorship, career development, and fundraising through data analysis, automated communication, and tailored content delivery. However, such systems often require significant resources and ongoing management. Many Nigerian institutions currently lack the capacity to tackle these issues. Consequently, most universities continue to use basic digital tools that do not scale well or promote meaningful connections between students and alumni.

3.2. PROBLEMS WITH THE EXISTING SYSTEMS

As stated in Chapter 2, the following are the problems of these existing systems that directly inform the functional and non-functional requirements for the proposed system. A detailed examination reveals the following critical drawbacks:

1. **Pervasive Inefficiency and High Opportunity Cost:** The manual and semi-manual processes are exceptionally tedious. The staff time dedicated to menial tasks, such as data entry, mail merging, and manual record searching, represents a significant opportunity cost, detracting from strategic activities like relationship building, event planning, and fundraising (Adir et al., 2015).

2. **Absence of a Centralized Single Source of Truth:** The decentralization of records makes it impossible to maintain a single, accurate, and authoritative "source of truth" for alumni data. This lack of a unified database results in conflicting information, undermines data-driven decision-making, and renders comprehensive reporting nearly impossible.
3. **Insurmountable Geographical and Accessibility Barriers:** Requiring members to submit physical forms or relying on postal mail creates significant barriers for alumni who are not geographically proximate to the institution. In an era of globalization, this approach effectively disenfranchises the increasingly important diaspora of international alumni, severely limiting the network's growth and diversity.
4. **Significant Data Security and Privacy Vulnerabilities:** Paper records stored in filing cabinets and unencrypted spreadsheet files on local computers offer minimal protection for sensitive Personally Identifiable Information (PII). This poses a significant privacy risk and, in many jurisdictions, may constitute a failure to comply with modern data protection regulations, such as Nigeria's NDPR or the European Union's GDPR.
5. **Static, One-Way Communication Model:** Legacy methods are inherently non-interactive. Static websites or newsletters function as a broadcast medium, providing information but offering no channels for feedback, peer-to-peer interaction, or genuine community building. This model has been proven ineffective for fostering the sustained, two-way engagement that modern communities thrive on (Barnard & Zenia, 2008).

3.3. THE PROPOSED SYSTEM

Having identified the significant limitations of existing systems, this project proposes the design and implementation of an innovative solution, a platform called "UConnect." This system is not merely an incremental improvement on existing alumni portals; it represents a fundamental architectural and philosophical shift in how university communities are managed digitally. The proposed system is conceptualized as a "Hub-and-Spoke" model, a design that directly addresses the dual nature of alumni identity.

- **The Hub:** Represents the central tertiary institution (e.g., Auchu Polytechnic). It provides a unified platform for all members, handling university-wide announcements, hosting a central alumni directory, and promoting a shared institutional identity. It is the macro-level community that connects every member, regardless of their specific academic background.
- **The Spokes:** Represent the individual departmental associations (e.g., Department of Computer Science, Department of Mass Communication). Each spoke is a semi-autonomous, feature-rich micro-community within the larger hub. These spaces are empowered with their own administrative tools, private content feeds, and targeted functionalities, allowing them to foster the deep, relevant connections that generic platforms cannot achieve.

This integrated architecture is the main innovation of the proposed system. It rejects the false choice of selecting between a single, large university platform and a disorganized mix of different social media groups. Instead, it builds a helpful ecosystem where the strength of the departmental communities, or the spokes, supports the overall energy of the university network, the hub, and vice versa.

This approach aims to improve relevance, which significantly boosts user engagement. User engagement is a key factor in the success of an online community (Preece, 2001). The system is built from scratch as a web-based application. It ensures compatibility across platforms and can be accessed from any device with a web browser, overcoming the geographical barriers found in older systems (Barnard & Zenia, 2008).

3.3.1 Features of the Proposed System

A suite of core features defines the proposed system, each designed to serve the integrated model.

1. **Unified Authentication with Role-Based Access Control (RBAC):** A single, secure login portal for all users. Upon registration, users are assigned a role (Student or Alumnus) and must affiliate with their respective department. The system's RBAC architecture

ensures that users only see and interact with the features and data appropriate to their role and permissions.

2. **The Dual-Feed System:** A cornerstone of the user experience.
 - **University Hub Feed:** A central feed visible to all logged-in users, displaying major university-wide news, convocation announcements, and events open to the entire alumni community.
 - **Departmental Spoke Feed:** A private, curated feed visible only to members of a specific department. This is where targeted content such as department-specific job alerts, research news, and notices for departmental reunions will be posted, ensuring maximum relevance.
3. **Integrated Departmental Management Portals:** This is the system's most unique feature. Each department ("spoke") is given its own administrative dashboard, accessible by the Departmental Administrator. This portal allows them to:
 - **Verify Members:** Approve or deny registration requests from users claiming to be from their department, ensuring the sanctity of the community.
 - **Manage Content:** Post news, create photo galleries, and manage discussion forums exclusively for their members.
 - **Organize Events:** Create and manage events (e.g., "Annual Dinner for the Department of Accounting") with targeted invitations and RSVP tracking.
4. **Advanced, Searchable Alumni Directory:** A comprehensive database of all registered students and alumni. Its power lies in its advanced filtering capabilities, allowing a user to perform complex queries.
5. **Targeted Job and Opportunity Board:** Unlike a generic job board, this feature allows posters to target their listings. An alumnus working at a law firm can post a job opening and choose to make it visible only to graduates from the Faculty of Law, ensuring they receive applications from the most relevant candidates.

6. **Structured Mentorship Program:** The system will facilitate a formal mentorship program. Alumni can indicate their willingness to mentor in their profile, specifying the areas of expertise for which they are available to mentors. Students can then search the directory for potential mentors, filtering by department, and submit a formal "Mentorship Request" through the platform. This structured approach will prove highly beneficial for student career development (Crisp & Cruz, 2009).

3.3.2 Why a Web-Based Platform?

Web-based applications have four core benefits. They are as follows:

1. **Compatibility:** Web-based applications are far more compatible across platforms than traditional installed software, like web browsers.
2. **Efficiency:** Everyone hates dealing with piles of paper unless they have no other alternatives. The benefit of a web-based solution is that services and information are available from any web-enabled Personal Computer (PC).
3. **Security of live data:** Usually, in more complex systems, data is moved about separate systems and data sources. In web-based systems, these systems and processes can often be merged by reducing the need for data transfer. Web-based applications also provide additional security by eliminating the need for users to have direct access to the data and backend servers.
4. **Cost-Effective:** Web-based applications can significantly reduce costs due to lower support and maintenance requirements, reduced demands on the end-user system, and simplified plans.

The research by Barnard & Zenia (2008) examines how well an online web community can meet the informational needs of alumni, explicitly focusing on the alumni of the University of Johannesburg. Creating an online community web portal for alumni will provide a customized

approach to content, sharing, context, and commerce of information. This online platform will provide alumni with opportunities to reconnect with old classmates and foster relationships through regular social interactions. The platform would encourage valuable discussions for all stakeholders, as these communities can overcome geographical and time barriers.

It is easy to access individual records or small groups of records from the encrypted database by accurately identifying them. However, running queries that match a large number of records is impractical. The database is configured so that all queries, except those explicitly permitted by the privacy policy, become computationally intractable. In other words, solutions are independent of any access-control software or hardware. Effective management of data resources is typically regarded as essential. Still, Adir (2015) notes that while improving data quality is important, it is also necessary to seek economic benefits. This suggests that high data quality may not always be the most economically viable choice.

Hayman and Partridge (2013) found that online alumni networks can help young people transition from education to work and assist schools in funding extracurricular activities and infrastructure development. Mijic and Jankovic (2012) suggest that a practical way to track information about graduate students and alumni, as well as their potential contributions to improving and innovating academic programs, is through an information (web) system. Kathleen et al. (2004) documented the creation of a method to locate alumni and gather feedback from their workplaces. The goal of this approach is to improve the program and the engagement on the platform through alumni involvement.

3.4 SYSTEM ACTORS AND THEIR ROLES

Before detailing the requirements, it is essential to define the actors who will use the system. An actor is a user or an external system that interacts with the platform.

Actor	Description	Primary Goals & Key Permissions
Guest	An unregistered, anonymous visitor to the platform.	To learn about the alumni association. Can only view public pages. Cannot interact with community features.
Student	A verified, currently enrolled student of the institution.	To connect with alumni, find mentors and internships, and join their departmental group. Cannot post jobs.
Alumnus	A verified graduate of the institution.	To network with peers, mentor students, post jobs, and participate in discussions in both the central hub and their departmental spoke.
Departmental Admin	A user with administrative rights over a single department.	To verify new members for their department, manage department-specific content (news, events, gallery), and moderate their departmental forum.
Super Admin	The highest-level administrator with system-wide authority.	To manage all users, create new departmental associations, manage central university content, and oversee the entire platform's health and security.

Table 3.1: System actors, their primary goals and key roles

3.5. REQUIREMENT ANALYSIS

This section defines the specific requirements that the system must fulfill. These are broken down into two categories: functional requirements, which describe what the system does, and non-functional requirements, which describe how well the system does it.

3.5.1 Functional Requirement of the Proposed System

Functional requirements are associated with specific functions, tasks, or behaviors that the system must fully support. A functional requirement directly relates to a process that the system must perform or the information it needs to contain. The following are the functional Requirements identified by the analysis.

User Registration and Authentication

The system must provide a secure and reliable means for users to register and log in. During registration, students will verify their identity using their matriculation numbers, while alumni will confirm their graduation details and year of graduation. The university will assign administrators exceptional credentials. This process will ensure that only authorized users gain access to the system. Passwords will be stored in an encrypted format, and email verification links will be used to confirm user identities. This requirement is essential for maintaining security, preventing impersonation, and ensuring that the platform's user base consists solely of legitimate students, alumni, and staff.

Profile Management

Each registered user should be able to create and manage a detailed personal profile. For alumni, this profile will include information such as graduation year, degree, department, employment details, skills, and availability for mentorship. Students will be able to provide academic information, interests, and career aspirations. The system will allow users to update their information at any time. This feature enhances networking, allows for accurate user categorization, and helps the platform recommend mentors, associations, or opportunities that match users' academic and professional interests.

Alumni-Student Mentorship Module

The system must support a mentorship feature that allows students to connect directly with alumni mentors. Students will be able to browse profiles of available alumni mentors and send mentorship requests. Alumni can accept, decline, or recommend alternative mentors. Once a mentorship relationship is established, both parties can communicate through the platform's secure messaging system. This functionality enables students to receive career guidance and professional support,

while also providing alumni with the opportunity to contribute to the university community's development.

Departmental Association Management

This requirement focuses on providing departmental associations with digital tools to manage their members, records, and activities. Each association will have an online portal through which leaders can post announcements, share updates, and maintain an archive of records, including meeting minutes and past projects. The system will also support the digital collection of membership dues, enabling transparent financial management. By automating these processes, the system will help departmental associations maintain continuity, prevent data loss during leadership changes, and promote better coordination among members.

Event Management

The system must include a module for creating, managing, and publicizing events. Departmental associations, alumni groups, or administrators can organize both physical and virtual events through the platform. Users will be able to view event details, RSVP to attend, and receive automated notifications and reminders. The system will also track attendance and generate event reports. This feature streamlines event coordination, improves participation, and ensures that information about university activities reaches the right audience efficiently.

Job and Internship Posting

The platform must serve as a bridge between alumni and students by hosting a digital job and internship board. Alumni and verified organizations can post available job openings, internship opportunities, or professional training programs. Students will be able to browse listings, filter them by department or interest, and submit applications directly through the portal. This feature enhances employability, fosters professional growth, and strengthens the relationship between alumni and the university.

Messaging and Notification System

The system should include an internal communication mechanism that enables direct messaging between users. Students and alumni can exchange messages related to mentorship or job

applications, while administrators can send system-wide notifications. Important events, reminders, and announcements will also trigger automated notifications via email or SMS. This functionality improves collaboration and ensures that all users are kept informed about updates and opportunities within the community.

Administrative Control Panel

The system will include a dedicated administrative dashboard that grants authorized university personnel oversight of all activities on the platform. Administrators can manage users, approve departmental associations, monitor mentorship engagements, and generate analytical reports on platform usage. This module ensures proper supervision, helps maintain data integrity, and supports decision-making through access to real-time reports and statistics on alumni and student participation.

3.5.2 Non-Functional Requirement of the Proposed System

Non-functional requirements are the constraints the system must work within. These are the quality attributes that ensure the system is effective and reliable.

Security

As the system will handle confidential and personal information, security is a non-negotiable priority. All data transmission between the client and server will be encrypted using SSL/TLS (HTTPS). User passwords will be securely hashed using a modern algorithm, such as *bcrypt*. The system will be designed to be resilient against common web vulnerabilities, including SQL Injection and Cross-Site Scripting (XSS).

Performance

The system shall be responsive and provide a smooth user experience. Key performance indicators will include page load times of less than 3 seconds for major pages under normal load conditions. Database queries shall be optimized to ensure fast retrieval of information, even as the user base grows.

Usability and Accessibility

The user interface (UI) must be clean, intuitive, and easy to navigate for all users, regardless of their technical proficiency. The system will employ a responsive design, ensuring it is fully functional and readable on devices of all sizes, from desktops to mobile phones. Adherence to Web Content Accessibility Guidelines (WCAG) will be considered to ensure the platform is usable by people with disabilities (Nielsen, 2012).

Scalability:

The architecture must be designed to accommodate future growth. The system should be able to handle a significant increase in the number of users, departments, and posts without a noticeable degradation in performance. This will be achieved through a well-designed database schema and a stateless backend architecture.

Reliability

The system should be highly available, with a target uptime of 99.5%. This ensures that the community can depend on the platform being accessible whenever they need it. The system should also include robust error handling to prevent crashes and provide the user with helpful feedback when an error occurs.

3.6. SYSTEM ARCHITECTURE AND INTERFACE

This section presents a comprehensive technical blueprint of the platform, detailing the architecture, visual design philosophy, and use case models.

3.6.1 Architectural Design and Justification

The platform will be architected as a modern Three-Tier Web Application. This architectural pattern was deliberately chosen over alternatives like a monolithic or microservices architecture for the following reasons:

- **Separation of Concerns:** It cleanly separates the user interface (Presentation Tier), the business logic (Logic Tier), and the data storage (Data Tier). This separation makes the system easier to develop, debug, and maintain.
- **Scalability:** Each tier can be scaled independently. If the application logic becomes a bottleneck, we can scale the backend servers without touching the database or frontend.
- **Flexibility:** It allows for different development teams (e.g., frontend and backend) to work on their respective tiers simultaneously. It also means the backend API can be used to serve other clients in the future, such as a native mobile app, without any changes to the business logic.

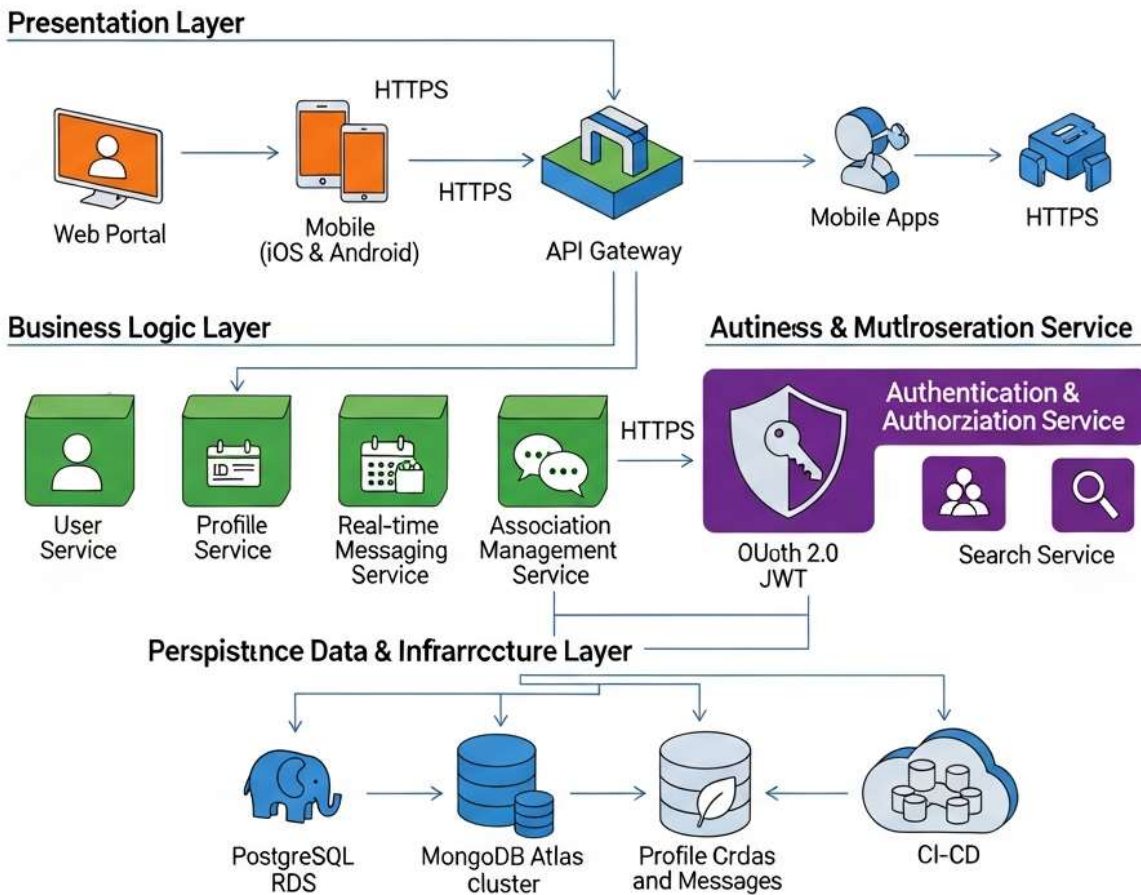


Figure 3.1: The system architecture showing the different layers that make up the system

3.6.2 User Interface (UI) Design Philosophy

The user interface was designed with simplicity, accessibility, and consistency in mind. It employs a responsive design approach to ensure compatibility across all devices and platforms. Each user type (student, alumni, and administrator) has a distinct dashboard tailored to their specific needs and activities. The interface features clearly labeled menus for navigation, including Dashboard, Mentorship, Events, Associations, Jobs, and Settings. The color scheme and typography were selected to align with modern institutional branding while maintaining readability.

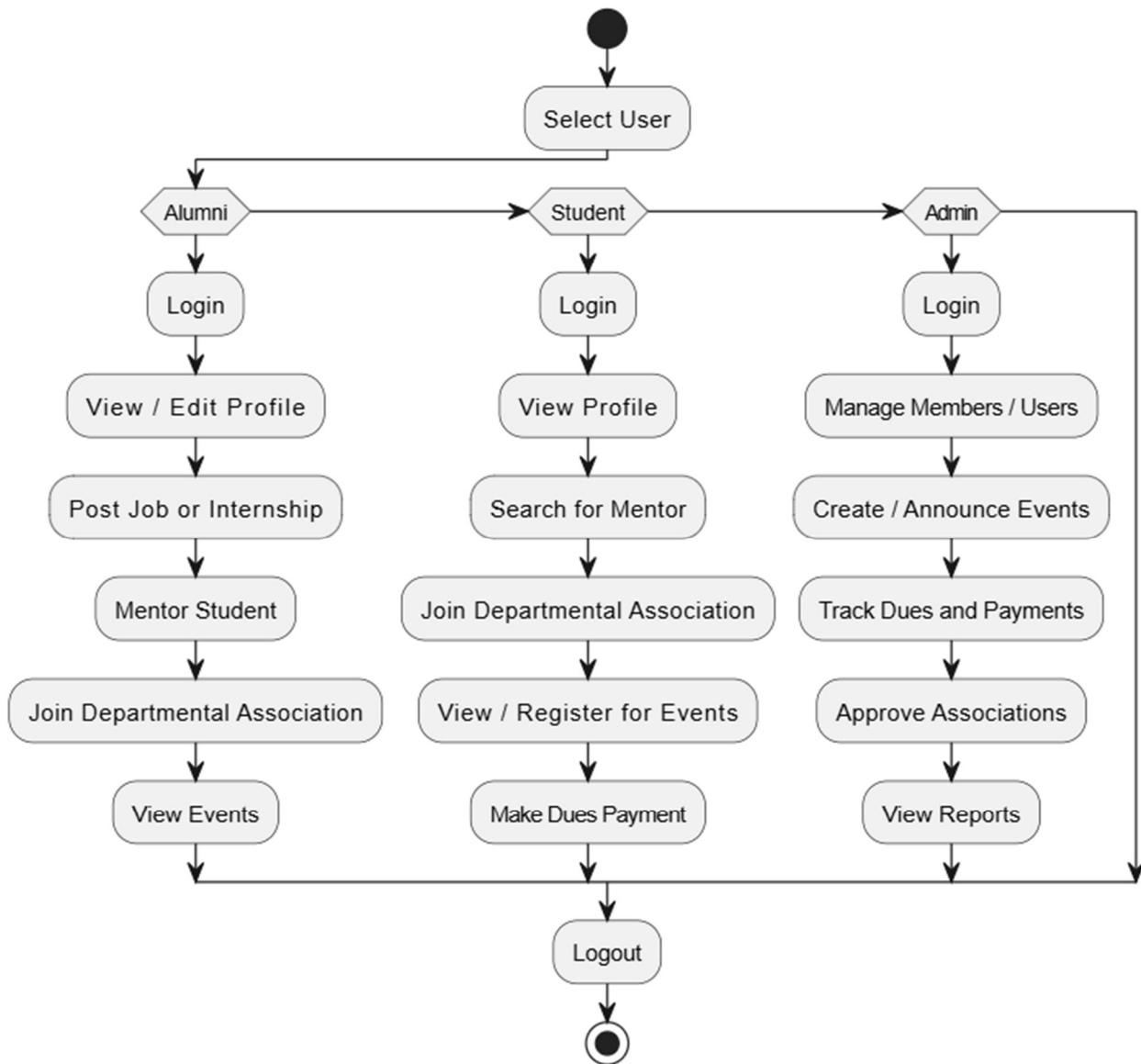


Figure 3.2: Flow chart of the system interface showing how the different components interact

3.7. COMPARATIVE ANALYSIS

This section presents a comparison between the existing digital systems currently used for alumni and departmental association management and the proposed system (UConnect). The comparative analysis highlights the strengths and weaknesses of the previous platforms used currently by universities and compares them to the advanced features and capabilities of the proposed digital platform. By comparing both systems in terms of specific features and functionality, this section demonstrates how the proposed solution offers a more effective approach to alumni and departmental collaboration within tertiary institutions.

Features	FUTA	UNN	UConnect
Registration	Yes	Yes	Yes
Gallery	Yes	No	Yes
Event management	Yes	Yes	Yes
Feedback Mechanism	Yes	No	Yes
Fundraising	No	Yes	Yes
Database	Yes	Yes	Yes
Departmental Integration	No	No	Yes

Table 3.2: Comparative analysis of the proposed system (UConnect) and existing digital systems

The table above clearly shows that while current portals offer some features, they usually lack important support for departmental sub-communities.

3.8. RISK ANALYSIS & MITIGATION

This section identifies potential risks that could affect the successful development, deployment, or operation of the platform and outlines measures to mitigate them. Risk analysis ensures that challenges such as technical failures, data breaches, user resistance, or funding limitations are anticipated early and addressed proactively. By evaluating each risk in terms of its likelihood and potential impact, appropriate strategies can be implemented to reduce or eliminate threats, thereby improving the overall success of the system.

Risk	Impact	Mitigation
Low adoption by alumni/students	High	Intensive onboarding campaigns, collaboration with Alumni Office, incentives (events, visible alumni benefits)
Payment failures/disputes	Medium	Use trusted local payment providers, offer manual payment fallback, and provide transaction receipts & reconciliation.
Data breach	Critical	Strong encryption, access controls, audits, and an incident response plan
Funding for hosting & maintenance	Medium	Utilize university servers for initial deployment, adopt low-cost cloud tiers, and propose phased paid features.
Scope creep	Medium	Strict MVP definition, change control, iterative releases
Legal / privacy non-compliance	High	Draft privacy policy; seek legal guidance on NDPR; obtain consent flows

Figure 3.3: Potential risks involved in building the platform, impact and mitigation techniques

CHAPTER FOUR

SYSTEM IMPLEMENTATION

This chapter presents the design, implementation, and testing processes of the proposed Integrated Alumni and Departmental Associations Networking Platform (UConnect). It provides details on how the system's conceptual framework and requirements (as discussed in Chapter 3) were transformed into a working digital solution. The chapter covers the system's overall architecture, design specifications, implementation details, and testing procedures used to ensure that the final product meets functional and non-functional requirements. Emphasis is placed on system modules, user interface design, and the programming tools and technologies utilized during development.

4.1. CHOICE OF DEVELOPMENT ENVIRONMENT AND TOOLS

Selecting an appropriate development environment is a crucial prerequisite for implementation. The tools were chosen based on their industry relevance, robustness, and suitability for building modern, scalable web applications.

4.1.1 Software Requirements (The Development Stack)

The following software tools formed the core of the development and deployment environment:

1. **Code Editor: Visual Studio Code (VS Code)**

- VS Code is a powerful, free, and highly extensible code editor. Its integrated terminal, extensive library of extensions for JavaScript, React, and Node.js development (e.g., ESLint, Prettier), and robust debugging capabilities make it an ideal choice for streamlining the development workflow.

2. **Frontend Framework: React.js**

- React was chosen for the presentation tier due to its component-based architecture, which allows for the creation of reusable and maintainable UI elements. Its vast ecosystem and strong community support ensure that any technical challenges can

be swiftly addressed. We will be using either Create-React-App or Vite as the toolchain to bootstrap the project.

3. Backend Runtime Environment: Node.js

- Node.js allows for the use of JavaScript on the server-side, enabling a "full-stack JavaScript" development experience. This consistency simplifies the development process. Its asynchronous, non-blocking I/O model makes it exceptionally performant for building fast and scalable APIs.

4. Backend Framework: Express.js

- Express.js is a minimal and flexible Node.js web application framework. It provides a robust set of features for building RESTful APIs without imposing rigid structural constraints, making it perfect for this custom project.

5. Database Management System: PostgreSQL

- PostgreSQL is a powerful, open-source object-relational database system known for its reliability, data integrity, and advanced features. Its strong adherence to SQL standards and its ability to handle complex relational data make it the ideal choice for managing the interconnected data of users, departments, events, and jobs.

6. Version Control System: Git & GitHub

- Git is the industry-standard version control system, essential for tracking changes, managing code branches, and collaborating. GitHub will be used as the remote repository for code backup and project management.

4.2. SYSTEM MODULES AND COMPONENTS

This section provides a detailed account of the implementation of the system's core modules. The development followed the Agile-Prototyping methodology, with each module representing a key functional area of the platform. The system was developed as a collection of interdependent modules, each designed to perform a specific function. The major modules include:

a) User Management Module

Handles user registration, login, authentication, and role assignment. It ensures that only authorized individuals, such as students, alumni, association leaders, and administrators, can access specific functionalities.

UCONNECT

Seamlessly connect with your alumni and association

Log in to join your alma mater online.

Copyright © 2025 UConnect Inc. Privacy Policy

Create Account

Create a new account to get started with Frello.

Full Name
John Doe

Email
user@company.com

Password
Enter password

Confirm Password
Confirm password

Create Account

OR SIGN UP WITH

Google Apple

Already Have An Account? Sign In.

Figure 4.1: Sign Up page

UCONNECT

Seamlessly connect with your alumni and association

Log in to join your alma mater online.

Copyright © 2025 UConnect Inc. Privacy Policy

Welcome Back

Enter your email and password to access your account.

Email
user@company.com

Password
Enter password

Remember Me [Forgot Your Password?](#)

Log In

OR LOGIN WITH

Google Apple

Don't Have An Account? Register Now.

Figure 4.2: Log In page

b) Profile Management Module

Enables users to create, edit, and view their personal and professional information. Alumni can include job titles, career experience, and skills, while students can highlight academic achievements and interests.

The screenshot shows the UCONNECT Profile Management interface. At the top, the UCONNECT logo is on the left, "Profile Management" is in the center, and a user profile for Alex Johnson (Student) is on the right. Below the header, the main content area is titled "Profile Management" and includes a "Never saved" indicator and a "Save Changes" button. The interface is divided into two main sections: "Basic Info" and "Profile Preview".

Basic Info Section:

- Profile Photo:** A circular profile picture of Alex Johnson with "Change Photo" and "Remove" buttons. Below it, text reads "JPG, PNG or GIF. Max size 5MB".
- Basic Information Form:**
 - Full Name *:** Alex Johnson
 - Email Address *:** alex.johnson@university.edu (with a link to "Contact support to change your email")
 - Department *:** Computer Science
 - Year of Study *:** Junior (3rd Year)
 - Current Role/Focus:** Computer Science Student
 - Location:** Select your location
 - Bio:** Passionate computer science student with a focus on full-stack development and machine learning. Looking to connect with ind (164/500 characters)

Profile Preview Section:

- Profile Preview:** Shows how the profile appears to other users (100% completion).
- Profile Card:** Displays Alex Johnson's name, title "Computer Science Student", and location "san".
- Bio:** "Passionate computer science student with a focus on full-stack development and machine learning. Looking to connect with industry professionals and gain mentorship."
- Skills:** JavaScript, React, Python, Machine Learning
- Interests:** Data Development, Full-Stack Development, Open-Source (+1 more)
- Buttons:** "Request Mentorship", "D", and "A" icons.

Footer: Navigation icons for Home, Discover, Communities, Mentors, and Profile.

Figure 4.3: Profile Settings page

c) Mentorship Module

Facilitates structured mentorship relationships between alumni and students. Students can request mentorship, and approved mentors can interact with their mentees through in-platform messaging.

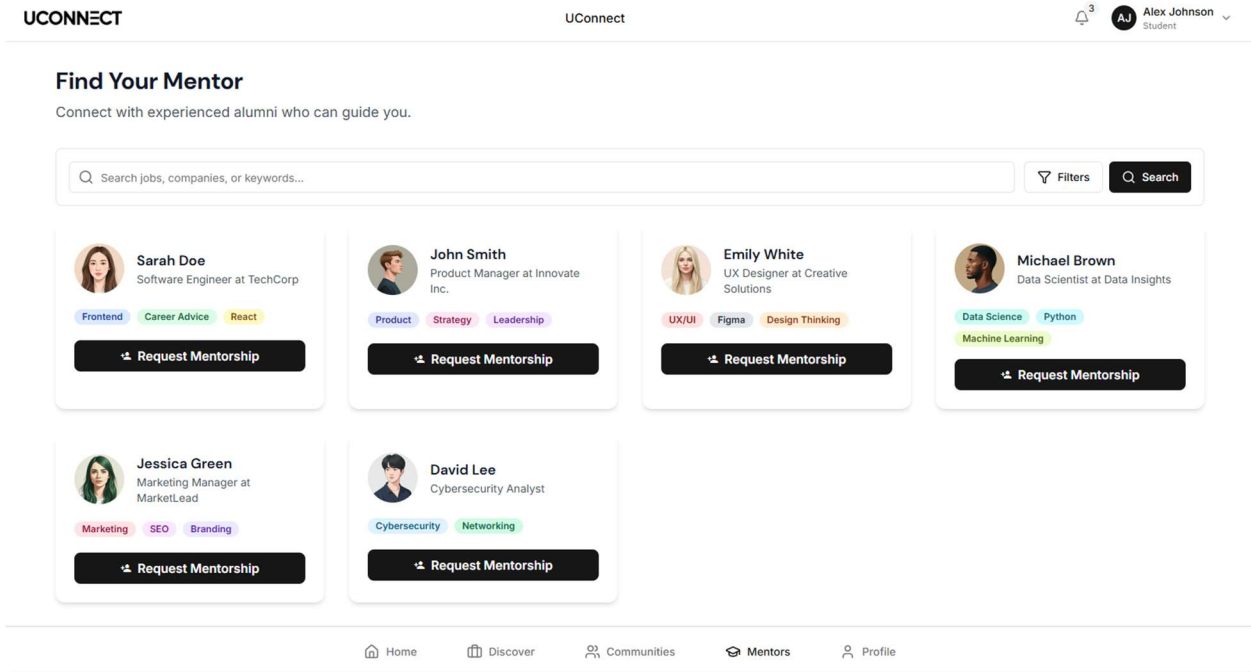


Figure 4.4: Mentorship page

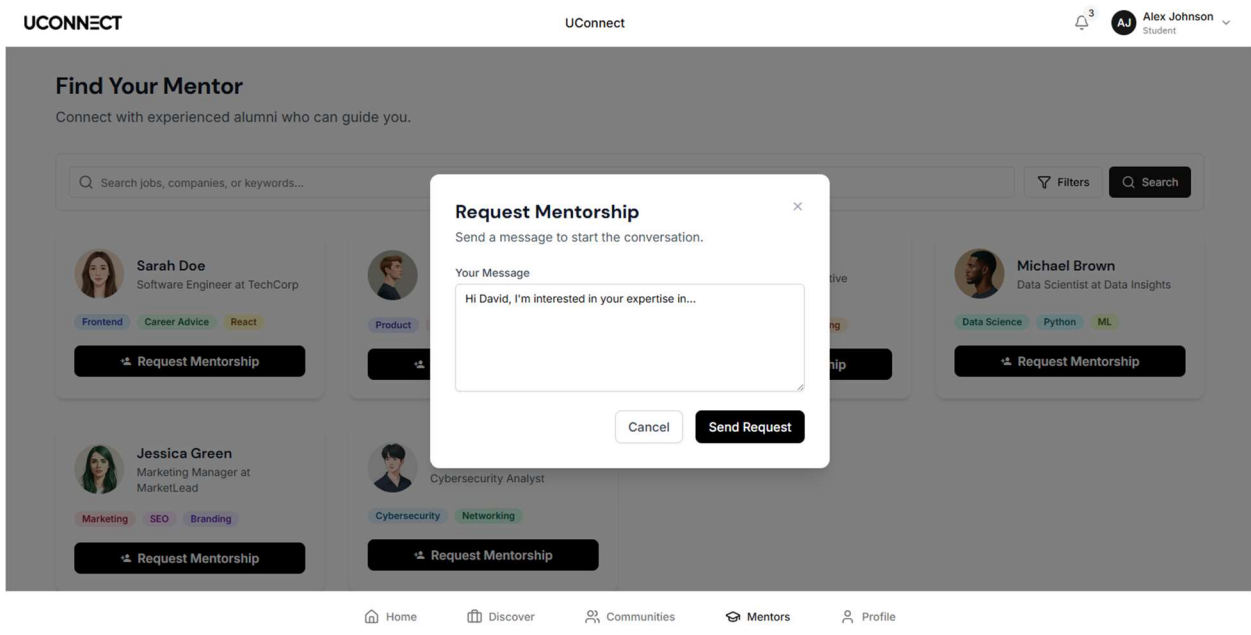


Figure 4.5: Mentorship page (mentorship request modal)

d) Departmental Association Module

Supports the creation and management of departmental associations. Leaders can post updates, organize meetings, manage members, and collect dues digitally.

UCONNECT Departmental Associations 3 AT Alex Thompson Student

Departmental Associations

Connect with your academic community and build professional networks

Search associations, departments, or activities...

Department: All Departments | Activity Level: All Activity Levels | Membership: All Associations | Sort By: Name (A-Z)

Showing all 8 associations

Your Associations

Computer Science Association ✓ Joined
Computer Science
Connect with fellow CS students and alumni. Participate in coding competitions, tech talks, and networking events...
1.2k members **high activity** 35% alumni
Recent Activity: New internship opportunities posted by Microsoft alumni
View Details

Business Administration Club ✓ Joined
Business Administration
Develop your business acumen through case competitions, guest speaker series, and networking with...
654 members **medium activity** 28% alumni
Recent Activity: Alumni panel discussion on startup funding strategies
View Details

Law Society ✓ Joined
Law
Connecting law students with practicing attorneys and judges. Participate in moot court competitions, legal...
312 members **medium activity** 48% alumni
Recent Activity: Supreme Court visit organized for constitutional law students
View Details

My Associations

8 Notifications | 6 Events

Computer Science Association 5
Computer Science
New internship opportunities posted by Microsoft alumni
1h ago
1247

Business Administration Club 2
Business Administration
Alumni panel discussion on startup funding strategies
4h ago
654

Law Society 1
Law
Supreme Court visit organized for constitutional law students
8h ago
312

View All Associations →

Discover More Associations

Arts & Humanities Society
Arts & Humanities
Celebrating creativity and critical thinking across literature, philosophy, history, and fine arts. Join our...
287 members **low activity** 22% alumni
Recent Activity: Student art exhibition opening next Friday
+ Join Association

Education Future Leaders
Education
Preparing tomorrow's educators through teaching workshops, classroom observation programs, and...
198 members **low activity** 45% alumni
Recent Activity: Teaching certification workshop registration open
+ Join Association

Engineering Student Society
Engineering
The premier organization for engineering students across all disciplines. Join us for professional development...
892 members **high activity** 42% alumni
Recent Activity: Career fair registration now open - 50+ companies attending
+ Join Association

Medical Student Association
Medicine
Supporting future healthcare professionals through mentorship programs, research opportunities, and clinica...
423 members **high activity** 55% alumni
Recent Activity: Residency application workshop scheduled for next week
+ Join Association

Figure 4.6: Department Associations page

e) Event Management Module

Allows users to create and view events. Attendees can RSVP, and the system automatically generates reminders and attendance lists.

The screenshot displays the 'University Events' page on the UCONNECT platform. At the top, the user is logged in as Alex Johnson, a Student. The page features a search bar and navigation tabs for 'List View' and 'Calendar View'. A filter sidebar on the left allows users to refine events by date range, department, location, event type (Career, Networking, Workshops, Seminars, Social, Conferences), and capacity. The main content area shows six featured events:

- Tech Career Fair 2024**: Sun, Sep 15, 9:00 AM - 5:00 PM, Main Campus - Student Center. Organized by Career Services. 245 attending / 500 capacity.
- Alumni Networking Mixer**: Fri, Sep 20, 6:00 PM - 9:00 PM, Downtown Alumni Center. Organized by Alumni Association. 89 attending / 150 capacity.
- Computer Science Research Symposium**: Wed, Sep 25, 10:00 AM - 4:00 PM, Engineering Building - Auditorium A. Organized by CS Department. 156 attending / 200 capacity.
- Homecoming Weekend Celebration**: Sat, Oct 5, 8:00 AM - 11:00 PM, Campus Wide. Organized by Student Activities. 1250 attending / 2000 capacity.
- Entrepreneurship Workshop Series**: Sat, Oct 12, 2:00 PM - 6:00 PM, Business School - Room 301. Organized by Entrepreneurship Center. 78 attending / 100 capacity.
- Medical Alumni Reunion**: Fri, Oct 18, 5:00 PM - 10:00 PM, Medical Center - Conference Hall. Organized by Medical Alumni Association. 134 attending / 180 capacity.

Figure 4.7: Events page

f) Job and Internship Board Module

Acts as a career hub where alumni and employers can post job openings or internship opportunities accessible to students.

The screenshot displays the UCONNECT Job Board interface. At the top, the UCONNECT logo is on the left, "Job Board" is in the center, and a user profile for "Alex Johnson Student" is on the right. Below the header, the "Job Board" title is followed by the subtitle "Discover career opportunities posted by alumni and partner companies".

The main content area features a search bar with the placeholder "Search jobs, companies, or keywords...", a "Filters" button, and a "Search" button. Below the search bar, the interface shows "Showing 8 jobs" and a "Sort by: Newest First" dropdown menu.

On the left side, there is a "Filters" sidebar with a "Clear All" button. The filters include:

- Job Type: All Types
- Work Location: All Locations
- Department: All Departments
- Experience Level: All Levels
- Application Deadline: Any Deadline
- Show salary range (Only show jobs with disclosed salary)
- Alumni posted jobs (Jobs posted by university alumni)

At the bottom of the filters sidebar are "Cancel" and "Apply Filters" buttons.

The main job listings are as follows:

- Marketing Coordinator** (Microsoft): Seattle, WA, Full-Time, Mid Level, \$75,000 - \$95,000/year, Posted 8/25/2025. Skills: Digital Marketing, Content Strategy, Analytics. Posted by Sarah Johnson (Alumni).
- Product Manager** (Spotify): New York, NY, Full-Time, Mid Level, \$130,000 - \$170,000/year, Posted 8/24/2025. Skills: Product Strategy, Agile, User Research.
- Content Writer** (HubSpot): Boston, MA, Part-Time, Entry Level, \$25 - \$35/hour, Posted 8/23/2025. Skills: Content Writing, SEO, Marketing.
- Data Analyst** (Netflix): Los Gatos, CA, Full-Time, Entry Level, \$85,000 - \$110,000/year, Posted 8/22/2025. Skills: SQL, Python, Tableau.
- Financial Analyst** (Goldman Sachs): New York, NY, Full-Time, Entry Level, \$95,000 - \$120,000/year, Posted 8/21/2025. Skills: Financial Modeling, Excel, Bloomberg.

Each job listing includes a "View Details" button and a "Quick Apply" button. A "Saved Jobs (3)" sidebar on the right lists three saved jobs: Software Engineer Intern (Google), UX Designer (Apple), and Financial Analyst (Goldman Sachs), each with an "Expired" status.

Figure 4.8: Job and Internship page

g) Messaging and Notification Module

Enables internal communication through private messages and system-generated notifications via email or SMS.

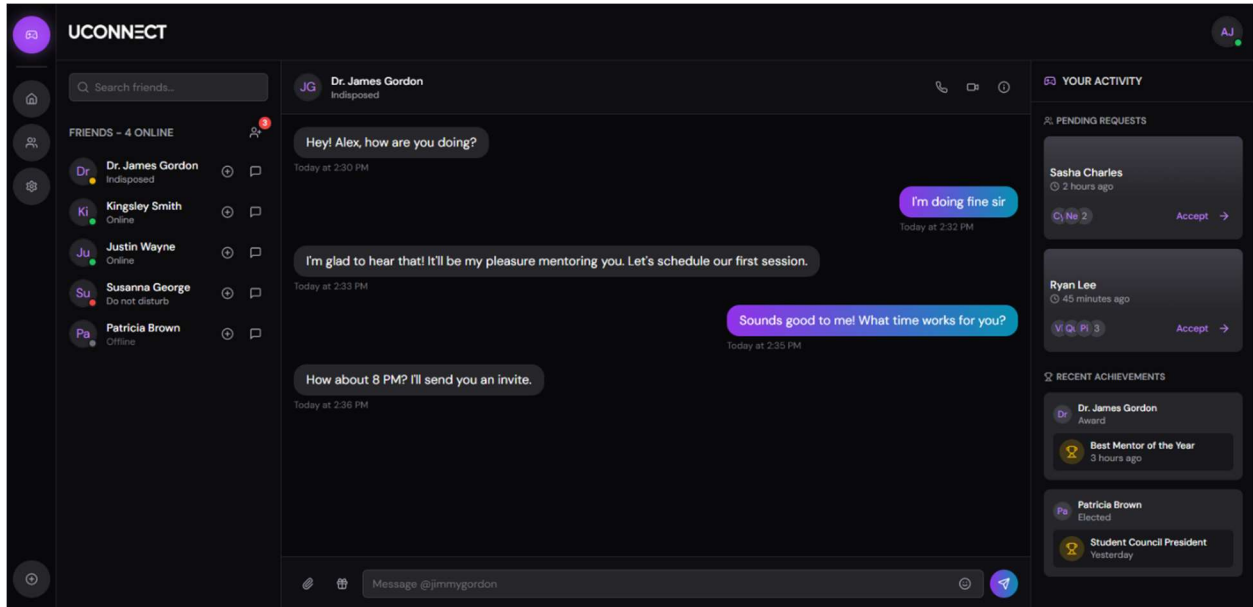


Figure 4.9: Messaging page

4.3. SYSTEM TESTING

System testing is a crucial phase that ensures the application functions properly, is reliable, and meets the specified requirements. We used a multi-layered testing approach. Testing verified that the system fulfilled all functional and non-functional requirements. The process included unit testing, integration testing, and user acceptance testing (UAT).

In unit testing, we verified the accuracy of individual modules, including user registration and event creation. Integration testing confirmed that these modules worked together smoothly without data inconsistencies. User acceptance testing involved real students, alumni, and departmental representatives using the platform to ensure it met their expectations for usability, accuracy, and reliability.

Test results showed that the system successfully handled registration, authentication, mentorship matching, and event management without errors. Minor bugs identified during testing were corrected before deployment.

4.3.1 Testing Strategy

1. **Unit Testing:** Individual functions and components were tested in isolation to ensure they worked as expected. For instance, the backend function for hashing a password was tested to confirm it always produced a valid hash.
2. **Integration Testing:** This phase focused on testing the interaction between different modules. For example, testing the full registration flow, which involves the frontend form, the backend API endpoint, and the database, to ensure they work together seamlessly.
3. **User Acceptance Testing (UAT):** This involved manually testing the entire application from the perspective of each system actor (Student, Alumnus, Dept. Admin) to ensure all use cases were functional and the user experience was intuitive.

4.3.2 Test Plan and Results

The following table details a sample of the test cases executed during the UAT phase.

Test Case ID	Description	Test Steps	Expected Result	Actual Result	Status
UAT-001	New User Registration	1. Navigate to the registration page. 2. Fill in valid user details. 3. Click "Create Account."	The user should see a "Registration successful" message, and their account status should be "pending verification."	The system displayed a success message, and the user was correctly saved to the database with isVerified set to FALSE.	Pass

UAT-002	Departmental Admin Verification	<ol style="list-style-type: none"> 1. Log in as a Departmental Admin. 2. Navigate to the "Verify Members" dashboard. 3. Click "Approve" on a pending user. 	The user's status should be updated in the list, and the user should now be able to log in with full privileges.	The user was successfully verified, and upon logging in with the new user's account, full access was granted.	Pass
UAT-003	Job Post Targeting	<ol style="list-style-type: none"> 1. Log in as an Alumnus. 2. Navigate to the Job Board and create a new post. 3. Target the post to a specific department (e.g., "Computer Science"). 	The job post should only be visible to members of the "Computer Science" department and not to others.	The test confirmed that only users from the target department could see the job post.	Pass
UAT-004	Invalid Login Attempt	<ol style="list-style-type: none"> 1. Navigate to the login page. 2. Enter a valid email, but an incorrect password. 3. Click "Login." 	The system should display a clear "Invalid credentials" error message and should not grant access.	The system correctly displayed the error message and prevented login.	Pass

Figure 4.1: Conducted user acceptance tests (UAT) and their results

4.4 PROBLEMS ENCOUNTERED AND SOLUTIONS

No development process is without its challenges. The following are some of the key technical problems encountered during implementation, along with the solutions devised.

i. **Problem 1: Complex State Management in the Frontend**

- *Description:* As more features were added, managing the shared state of the application (like the logged-in user's data) across many different React components became complex and led to "prop drilling."
- *Solution:* The React Context API was implemented. A global AuthContext was created to hold the user's authentication state and profile information. This allowed any component in the application to access this data directly, without needing to be passed down through multiple layers of props, thereby simplifying the component structure and improving maintainability.

ii. **Problem 2: Securing API Endpoints**

- *Description:* Initially, all API endpoints were public. A robust mechanism was needed to protect sensitive endpoints and ensure that only authorized users could perform specific actions (e.g., only a Departmental Admin can verify users).
- *Solution:* A custom authentication middleware was created in Express.js. This middleware was applied to protected routes. It inspects the Authorization header of incoming requests, verifies the JWT, and decodes it to extract the user's ID and role. If the token is invalid or the user's role does not meet the requirement for that route, the middleware rejects the request with a 401 Unauthorized or 403 Forbidden error.

iii. **Problem 3: Efficient Database Querying for the Directory Search**

- *Description:* The alumni directory search feature requires building a dynamic SQL query based on multiple optional filter criteria. A naive approach of concatenating strings to build the query would be inefficient and highly vulnerable to SQL Injection attacks.

- *Solution:* The backend was implemented to construct the SQL query programmatically. It starts with a base `SELECT * FROM users` query and then conditionally adds `WHERE` clauses based on the filters the user provided. Critically, all user-supplied values were passed to the database query as parameterized inputs, which is the standard method for preventing SQL Injection and ensuring database security.

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1. SUMMARY

The study aimed to develop a digital platform that connects alumni, current students, departmental groups, and administrators within a single system. The primary objective was to enhance communication and collaboration among these groups by establishing an online platform that facilitates mentorship, event management, and career development.

The project started with a thorough examination of existing alumni and departmental systems. It was found that most Nigerian institutions utilize informal tools, such as WhatsApp or Facebook groups, for communicating with alumni. While these tools are helpful for fundamental interactions, they lack structure, record management, and oversight from the institution. Based on this, the proposed system was designed to offer a more organized, data-driven, and scalable option specifically for the university context.

The system features a three-tier architecture, which includes the frontend (user interface), backend (server logic), and database (data storage and retrieval). Development followed an iterative model, allowing gradual integration and testing of each functional module. These modules included user management, profile creation, mentorship, departmental association management, event scheduling, and job postings. The system utilizes modern technologies, including React.js for the frontend, Node.js for backend logic, and PostgreSQL for database management.

Testing involved unit, integration, and user acceptance tests with students, alumni, and departmental representatives. The system met the key functional and non-functional requirements, including secure authentication, mentorship matching, and a responsive design. The project demonstrated that an integrated digital platform can significantly enhance collaboration, mentorship, and institutional growth at any institution.

5.2. CONCLUSION

In conclusion, this project achieved its goal of designing and developing a platform that combines central alumni networking with specific features for departmental associations. The final system serves as a strong proof of concept, offering a solution to the long-standing issue of weak alumni engagement. By moving beyond the traditional one-size-fits-all model of alumni portals, this project showed the significant benefits of a more focused, community-based approach.

The "Hub-and-Spoke" model is the most important contribution of this project. It recognizes that an alumnus has a dual identity: they are a university graduate and, often more importantly, a member of their specific department. By providing dedicated, feature-rich spaces for these departmental "Communities of Practice," the platform creates a relevant and valuable user experience that basic platforms, such as LinkedIn or standard university portals, cannot match.

The successful implementation confirms that this system is both feasible and strategically important. It offers a clear path for colleges and universities to build stronger, more engaged, and supportive communities. The platform delivers real benefits to everyone involved, from students seeking mentors to departments looking to connect with their graduates. In doing so, it strengthens the lifelong connection between institutions and their alumni.

5.3. RECOMMENDATIONS

Based on the findings and experiences gathered during the project, the following recommendations are made for future improvement and institutional adoption:

- 1. Institutional Integration:** The university should officially adopt and integrate the platform into its administrative structure, linking it with existing portals such as student records and academic databases to ensure data consistency and sustainability.
- 2. Mobile Application Development:** A mobile version of the platform should be developed to enhance accessibility and allow real-time interaction for students and alumni who primarily use smartphones.

3. **Data Validation and Expansion:** The university should collaborate with departmental heads and the alumni office to validate and expand the alumni database, ensuring that contact information and profiles are up to date.
4. **Continuous Improvement and Maintenance:** A dedicated technical team should be established to maintain, upgrade, and monitor the system regularly, ensuring its performance and security.
5. **Enhanced Security Measures:** As the user base grows, additional security features such as two-factor authentication (2FA) and encrypted backups should be implemented to protect sensitive data.
6. **Sponsorship and Awareness Campaigns:** The university should organize sensitization and awareness programs to encourage alumni and students to register and actively participate in the platform's activities.
7. **Future Research:** Further research should explore the integration of artificial intelligence and data analytics to generate insights on alumni engagement, mentorship effectiveness, and institutional development trends.

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APPENDIX

chat.jsx

```
import { UserNav } from "../components/user-nav"
import { FriendsList } from "../components/friend-list"
import { ChatArea } from "../components/chat-area"
import { Sidebar } from "../components/sidebar"
import { GameActivity } from "../components/game-activity"

export default function Chat() {
  return (
    <div className="flex h-screen bg-black text-white overflow-hidden">
      <Sidebar />
      <div className="flex flex-col flex-1">
        <header className="border-b border-zinc-800 p-4 flex items-center justify-between
bg-zinc-900/50 backdrop-blur-sm">
          <h1 className="text-xl font-bold bg-gradient-to-r from-purple-500 to-cyan-500 bg-
clip-text text-transparent">
            NeonConnect
          </h1>
          <UserNav />
        </header>
        <div className="flex flex-1 overflow-hidden">
          <FriendsList />
          <ChatArea />
          <GameActivity />
        </div>
      </div>
    </div>
  )
}
```

register.js

```
const express = require('express');
const bcrypt = require('bcryptjs');
const db = require('../db'); // Database connection module
const router = express.Router();

router.post('/register', async (req, res) => {
  try {
    const { fullName, email, password, departmentId, role } = req.body;

    // 1. Check if user already exists
    const userExists = await db.query('SELECT * FROM users WHERE email = $1', [email]);
    if (userExists.rows.length > 0) {
      return res.status(400).json({ error: 'User with this email already exists.' });
    }

    // 2. Hash the password
    const salt = await bcrypt.genSalt(10);
    const passwordHash = await bcrypt.hash(password, salt);

    // 3. Insert the new user into the database
    const newUser = await db.query(
      'INSERT INTO users (full_name, email, password_hash, department_id, role) VALUES ($1, $2, $3, $4, $5) RETURNING user_id, email',
      [fullName, email, passwordHash, departmentId, role]
    );

    res.status(201).json({ message: 'User registered successfully. Awaiting verification.', user:
    newUser.rows[0] });
  }
});
```

```
    } catch (err) {  
      console.error(err.message);  
      res.status(500).send('Server error');  
    }  
  });
```

```
module.exports = router;
```