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Hustle Base: Bridging Academics and Industry, an internship access and placement portal for students

Amy Zawadi Mugeni

167181

Cyprian Njuguna Kamau

155226

ICS 3 Group A

Supervisor Name: James Gikera

An Informatics Project Proposal Submitted to the School of Computing and Engineering Sciences (SCES) in partial fulfilment of the requirements for the award of a Degree in Informatics and Computer Sciences

School of Computing and Engineering Science

Strathmore University

Nairobi, Kenya

19 May 2025

Declaration and Approval

We declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of our knowledge and belief, the research proposal contains no material previously published or written by another person except where due reference is made in the research proposal itself.

Student Name: Amy Zawadi Mugeni

Admission Number: 167181

Student Signature: _____ Date:_____

Student Name: Cyprian Njuguna Kamau

Admission Number: 155226

Student Signature: _____ Date:_____

Supervisor Name: James Gikera

Supervisor Signature: _____ Date:_____

Abstract

34 Securing internships is an important step in bridging the gap between academic knowledge and professional experience for students. However, the current placement methods are fragmented and inconsistent. They are failing students. They lead to unequal access, miscommunication, and lost opportunities.

Existing solutions, such as BrighterMonday and Internships.co.ke, offer job listings but do not provide academic integration, real-time progress tracking, or verified institutional workflows. These systems lack alignment with academic calendars and do not support structured feedback or reporting mechanisms—gaps that this project intends to address.

49 39 1 This project aims to ease the internship process by building a centralized internship and job placement platform. Students will be able to browse and apply for internship listings through the platform. The proposed system will be developed using the Adaptive methodology based on OOAD, as it makes it easier to incorporate new requirements when they arise.

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List of Abbreviations

CUE: Commission for University Education

CV: Curriculum Vitae

DOM: Document Object Model

ERD: Entity Relationship Diagram

FAQ: Frequently Asked Questions

GPA: Grade Point Average

IDE: Integrated Development Environment

NACE: National Association of Colleges and Employers

NSCI: National Survey of College Internships

OOAD: Object-Oriented Analysis and Design

UAT: User Acceptance Testing

UI: User Interface

UML: Unified Modelling Language

VS Code: Visual Studio Code

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Chapter 1: Introduction

1.1 Background Information

For students, having a meaningful work experience is a vital component in ensuring adequate industrial exposure, financial support, skills and professional development. Internships are one of the most common ways for students to attain work experience, as they provide an opportunity to network with great people and sharpen their skills before entering the workforce. Stepping into the professional world enables students to have various opportunities to apply their academic knowledge, gain practical skills, and explore potential career paths. As described by (Milam, 2024) Finding an internship in a desired field is the best way to gain experience while stepping into the professional world.

This need is not only exclusive to graduates but also for students seeking internships, industrial attachments, and part-time work during their studies. However, the current methods of circulation of opportunities within university environments often fall short, creating major challenges to access among students. Our project addresses the issue of inefficient circulation of a wide spectrum of work-related opportunities to university students, making it difficult to identify and pursue relevant options at various stages in their academic journey. This lack of a centralized system hinders the students' ability to actively plan for their career development.

This issue of ineffective methods of dispersion of job and internship leads creates a barrier to access for students seeking a work experience. This challenge manifests itself as students missing out on relevant opportunities buried within a high volume of general emails and a lack of a well-centralised platform to find internships, leading to decreased application rates, accompanied by a sense of frustration and disengagement among students. Historical data from the National Association of Colleges and Employers (NACE) states that at least 60% of students from the classes of 2013 to 2017 had an internship. (Kaplan, 2023)

However, new data from the National Survey of College Internships (NSCI) suggests that the number has dropped since the pandemic, reporting that just close to a fifth of students (21.5%) had internships in 2021. (Stallings, 2017) One of the major causes is the over-reliance on outdated mass communication methods, which lack the necessary targeting and filtering capabilities to match the students' specific needs and academic stages. Studies also show that more students *want* an internship than those who complete one. According to the NSCI, nearly two-thirds of non-interns shared they wanted to take an internship but couldn't for various

reasons, including that they didn't know how to find internships, they had too heavy a course load, or pay was insufficient.

The career services departments are also affected at large by the reduced effectiveness in connecting students with employers. This can lead to the weakening of the university-industry relationships and a perception that the department is not adequately supporting the students in their career development. Organizations and businesses seeking to recruit students for internships and entry-level positions are also negatively impacted as they experience lower application numbers from qualified candidates due to poor visibility of their opportunities among the student population.

1.2 Problem Statement

Finding internships is a big challenge for university students. The way opportunities are currently shared, through scattered emails, outdated job boards, or hard-to-use career portals, is deemed to be inefficient. However, this problem is not unique to students but to organizations at large. Companies looking to hire interns are also faced with this challenge as they lack a proper centralized platform to advertise and inform students who are actively job seeking of available job listings. This disorganized system significantly drops internship participation, as from a decade ago, the participation dropped to 21.5% in 2021 from 60%, largely because students can't find relevant opportunities (Kaplan, 2023)

This causes a major problem as most times, students waste hours digging through social media pages, irrelevant listings on random websites with limited search filters, and inherently rely on word of mouth. The lack of transparency in terms of tracking application progress often leads to a lot of frustration felt by the students. Consequently, this results in missed deadlines and applying to unsuitable/ undesired job roles. On the employer's side, it is difficult to handle all the countless emails, which makes it harder to choose the best candidate. This lack of centralization makes career services struggle to connect students with employers, and companies miss out on talented applicants. (Milam, 2024)

The current job search process is inefficient and overwhelming for students. When students leave university without meaningful exposure to real work environments, they end up stuck in

a tough market with little experience. This weakens their confidence and limits their ability to get employed in a competitive job market. As a result, many graduates are left unemployed or underemployed. According to the (African Development Bank & African Development Bank Group., 2022) Reports that over 10 million youth enter the African labour force each year, but most are ill-prepared due to limited practical exposure during their studies, widening the gap between education and employment outcomes.

1.3 Aim/ Specific Objectives

To create a platform to ease accessibility to internship opportunities for students and employers

1.3.1 Specific Objectives

i. To investigate the challenges and processes in how internship opportunities are shared with university students
ii. To analyze existing internship platforms to identify their strengths and gaps in meeting student needs
iii. To design a user-friendly platform that allows students to create profiles, upload relevant documents, and apply for internships
iv. To develop the designed platform using React, Node.js, and MongoDB with secure user authentication.
v. To test the platform's functionality and usability to ensure it meets the needs of the stakeholders.

1.3.2 Research Questions

i. How are internship opportunities currently shared with university students, and what are the challenges?
ii. What features do existing internship platforms offer, and where do they fall short for students?
iii. How can a centralized platform improve the efficiency of the internship application process for students?
iv. What technologies are most effective for developing a secure and user-friendly internship platform?
v. How effective is the platform in reducing application delays and improving communication between students and organizations?

1.4 Justification

Literature strongly supports the need for improved university-industry linkages through studies that confirm that students with previous industrial exposure have a higher employability rate compared to students who do not have that experience. The importance of work-related learning and the challenges of information overload (Panel, 2024) all underscore the necessity of more effective and targeted communication channels for career opportunities.

This engagement offers benefits to each of its stakeholders. To students It provides a centralized, user-friendly platform where they can create professional profiles, actively search for relevant opportunities, and efficiently manage their applications. The platform will also offer personal recommendations based on their profile and academic level to reduce information overload. This, in turn, empowers them to take control of their career exploration and increase their awareness of available opportunities.

To Universities and Career services – It offers a more effective channel to disseminate opportunities to the right student cohorts and build stronger relationships with partner businesses and organizations through a streamlined posting and application review process. To Organizations and Businesses – It provides targeted access to a group of qualified students actively seeking relevant work experiences, streamlining their recruitment and application process, reducing advertising costs, and potentially leading to higher quality hires. This inherently improves the efficiency of the acquisition and manipulation of early talent, allowing them to connect and recruit promising students more easily.

This research aims to create a significant difference by:

i) Streamlining the application process for both students and organizations.
ii) Reducing information overload for students by providing a curated and relevant selection of opportunities.
iii) Improving visibility of diverse work opportunities, beyond just graduate roles, and for students at all academic levels.
iv) To shift from a passive broadcast model of opportunity dissemination to an active, personalized matching system

v) Improving the visibility of diverse work opportunities for students at all academic levels.
vi) Providing universities with a more effective tool to support student career development and engage with industry partners

1.5 Scope and Limitations

1.5.1 Scope

The proposed system will focus on designing and developing a web-based platform to connect university students and graduates with internships by verified organisations. It includes requirements engineering through stakeholder interviews, system design, implementation using React, Node.js, and MongoDB, and evaluation through testing. The platform will support core features like user authentication, role-based access, internship listings, and application tracking. The study will engage students, university career offices, and organizations offering opportunities. However, the project does not cover mobile application development and offline capability. Integrations with government systems will also not be pursued in this phase, although the design will consider future extensions.

1.5.2 Limitations

We anticipate the following challenges while engaging with the project:

b) Data privacy and security – Handling student and organizational data, including personal and application information, will necessitate strong security measures. Ensuring data integrity and confidentiality and preventing breaches will be a critical challenge.
c) User adoption – Convincing both students and organizations to actively use a new platform when they might have been accustomed to the existing system will pose a challenge, as it will require an intense demonstration of the clear benefits of the new system and potentially motivating initial adoption.
d) Matching accuracy – developing an effective recommendation system that accurately matches students with their relevant opportunities will be technically complex. Balancing various factors like skills, academic levels, interests, and

opportunity requirements will require detailed and careful algorithm design and potentially some machine learning techniques.

e) Resource constraints - Working within a low budget environment might limit access to certain tools and technologies like APIs or expertise requiring creative problem-solving skills.

f) Maintaining Engagement – Keeping students and organizations actively engaged with the platform over time will require ongoing maintenance, updates, and potentially the introduction of new features. ‘

1.5.3 Delimitations

The delimitations of this project define its scope and boundaries, clarifying what will need to be intentionally included and excluded. The project is delimited as described below:

a) Target users – the primary focus is undergraduate and postgraduate students actively enrolled at a specific university or organization seeking to offer the students employment, internship, and attachment opportunities.

b) Opportunity types - The platform will primarily cater to opportunities typically sought by university students, which include full-time entry-level positions, paid and unpaid industrial attachments, and internships. It is important to note that the platform will not focus on scholarships, positions unrelated to career development, or opportunities requiring advanced professional certifications.

c) Geographical scope – The initial deployment will be limited to opportunities and students within a specific university and its immediate geographic vicinity.

d) Platform features – the core functionalities will include student profile creation, Opportunity posting and browsing, an application submission system, and a recommendation feature based on profile matching.

e) Technology stack – The project will utilize a standard web development structure by using a common programming language, frameworks, and database systems.

Chapter 2: Literature Review

2.1 Introduction

This chapter aims to establish the critical need for a student and organization-centred platform to connect university students with diverse work opportunities, ranging from internships and attachments to entry-level positions, highlighting the inefficiencies of current information dissemination methods within universities. By analysing existing online job platforms like Brighter Monday, Internships Co.ke, and myJobsinKenya, this chapter aims to identify the key limitations such as a lack of opportunities tailored for students with limited experience, non-student-friendly user interfaces, fragmented application processes, outdated information, and the absence of crucial details like application deadlines and work period durations. These shortcomings fuel the significant gap in the current landscape and provide a strong need for the development of a dedicated platform designed to address the specific needs and challenges faced by university students in their pursuit of valuable work experience.

2.2 Current Processes / Pipelines / Existing Technologies

Internship opportunities play a major role in bridging the gap between theory and practice. The current way internship opportunities reach students is a mix of old-school and digital methods, but this is often a mess. Platforms like career fairs, emails, social media, word of mouth, and online job boards. However, these processes are scattered and hard to navigate, leading to many missed opportunities. According to (Mercy Waithaka, 2018), many Kenyan university students lack structured access to internship information and often depend on WhatsApp groups, posters, and referrals, resulting in unequal opportunities and inefficiencies in application processes.

The focus is on how students can access and apply for internships. The process begins when the opportunities are sourced from employers, who may or may not share the opportunities with universities. In the event they do, the staff manually post notices on noticeboards, forward emails, and mention them in classes or during career talks. Students are then expected to independently draft application letters, acquire recommendation letters, and follow up with the organisations. Some institutions have career offices to help students, but the information provided by these offices is mostly outdated or inaccessible to most students. As reported by (Otieno, 2019) less than 30% of students in public universities reported receiving internship

announcements through formal university channels, highlighting a serious disconnect between institutional intent and student experience.

The process of securing internships should align with both university policies and regulatory standards. Universities are expected to support students in finding industrial attachments, following guidelines set by their internal rules as well as the Commission for University Education (CUE). These guidelines emphasize the need for structured placements, effective supervision, and timely evaluations (Mugenda, 2019) However, many of these ideals fall short in practice. Students often submit incomplete or late reports, and supervisors sometimes neglect to fail to fill out forms. This shows a clear gap between expectation and reality. As noted by (Mydyti, 2020) the absence of a centralized digital system undermines fairness, reliability, and real-time tracking elements that are essential for achieving both student and institutional objectives.

2.3 Challenges Facing Processes / Pipelines / Existing Technologies

2.3.1 Inaccessible or outdated information

The Inaccessibility of internship opportunities is a major problem. Subsequently, it also leads to outdated information. Universities stick notices on physical boards or send emails that get lost in inboxes, or are opened past the due dates, and online platforms sometimes list internship opportunities past their deadlines. This happens because career offices don't have digital tools to update listings in real time, and online platforms skip regular checks. Students waste time chasing expired opportunities, and employers get flooded with irrelevant applications. If this is not fixed, students end up graduating without hands-on experience. (Otieno, 2019) found that only about 30% of Kenyan students get internship info through formal university channels. Some schools have tried online portals, but they are barely updated, leaving a gap our platform intends to fill.

2.3.2 Fragmented Information Channels

Internship listing information is scattered across too many channels, like noticeboards, email, WhatsApp groups, and online job boards. This leads to confusion and missed opportunities, especially for students with limited access to some of these platforms. This lack of a central platform limits the ability to find and apply for internships. A study by (Mwangi, 2015)

highlights that the absence of integrated digital platforms in Kenyan universities significantly limits students' access to internship opportunities. Relying on scattered communication methods is inefficient and a major challenge for students with limited connectivity and rural students without institutional networks.

2.3.3 Lack of Real-Time Application Tracking

Once students apply for internships, there is no easy way to track their application status or get updates. This leaves them stressed and in the dark. This stems from manual processes and platforms lacking tracking systems. Without a structured system, feedback is slow. (Mwangi, 2015) argue that the absence of real-time tracking capabilities significantly lowers the quality of student engagement with industry opportunities and makes follow-up difficult for both parties.

2.3.4 No Centralized System for Matching Students and Opportunities

The lack of smart digital systems at both the national and institutional levels to match students with internships, based on their academic backgrounds, skills, and interests, results in students wasting time going through irrelevant listings. This also drowns the employers with irrelevant applications, disrupting the hiring process. It also leads to a mismatch of skills with the needs of the industry. It may also result in the absorption of sub-standard interns into the workforce. (Karimi, 2022) highlight that without intelligent matching systems, students must sift through hundreds of irrelevant listings, and employers are overwhelmed with non-targeted applications.

2.3.5 Poor Communication and Feedback Between Stakeholders

Communication between students, universities, and employers is a major concern. Current systems lack dedicated communication channels. This causes missed deadlines, updates, and unclear expectations. The old-school manual process is not optimal for collaboration between the stakeholders of the system. (Kiptoo, 2020) found that poor communication between university internship coordinators and host organizations frequently results in unclear learning outcomes and dissatisfaction among students. This shows the need for real-time systems that will address these issues to ensure there is smooth collaboration during the whole process.

2.4 Related works

2.4.1 MyJobsinKenya

MyJobsinKenya operates as a two-sided platform catering to both individuals seeking employment and organizations looking to hire. For job seekers, the platform offers a straightforward process to discover available opportunities. It features a prominent search section where users can input keywords related to the type of job they are interested in. When the user initiates a search, the platform displays a list of job listings that match the search criteria. This allows users to quickly scan through relevant openings based on their desired roles.

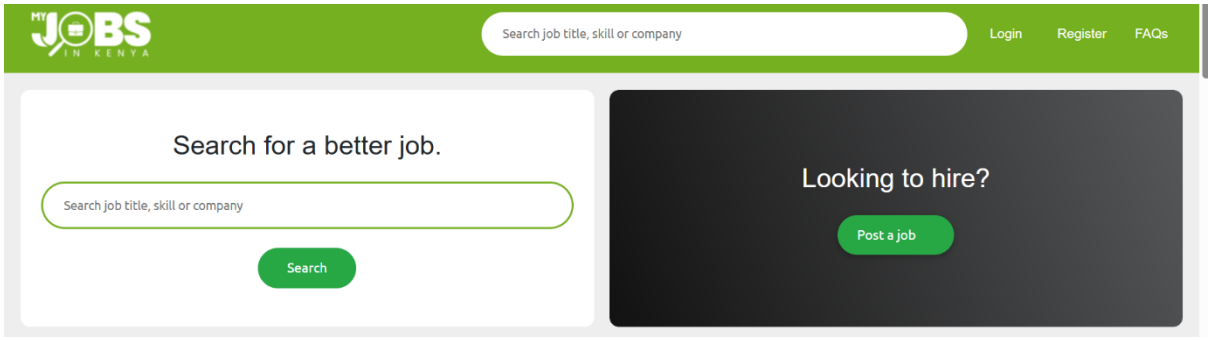

Figure 2.1: MyJobsInKenya landing page ((My Jobs in Kenya, n.d.))

To engage more deeply with the platform, specifically to apply for listed jobs or for organizations to post new vacancies, user registration is a prerequisite. This registration process involves providing personal or organizational details to create an account on myJobsinKenya. Once registered and logged in, job seekers gain the ability to initiate the application process for jobs they find suitable. Similarly, registered organizations can access features to create and manage their job postings, outlining the necessary details and requirements for potential candidates.

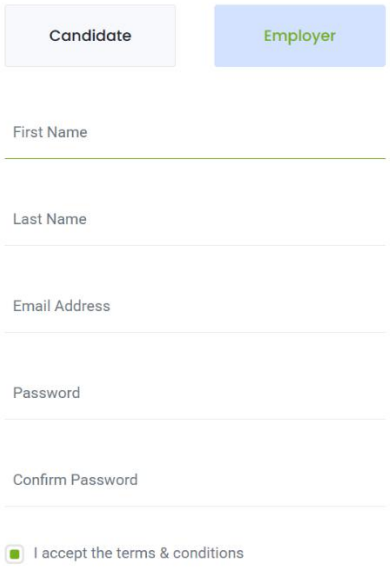

Figure 2.2: My Jobs in Kenya Filtering ((My Jobs in Kenya, n.d.))

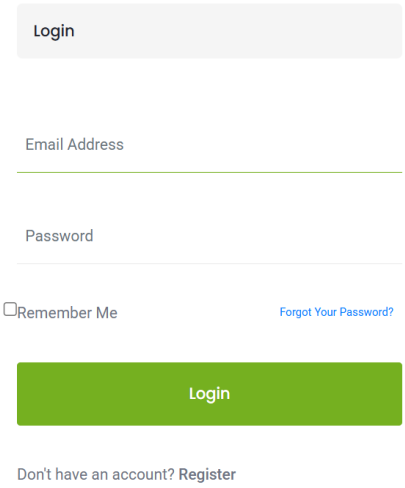

Figure 2.3: My Jobs in Kenya login ((My Jobs in Kenya, n.d.))

Furthermore, myJobsinKenya provides a functionality for job seekers to upload their Curriculum Vitae (CV) or resume. This feature allows users to store their professional profile directly on the platform, to centralize the application process for various job listings. However, similar to the application and job posting functionalities, the ability to upload a CV is also dependent on the user registration process.

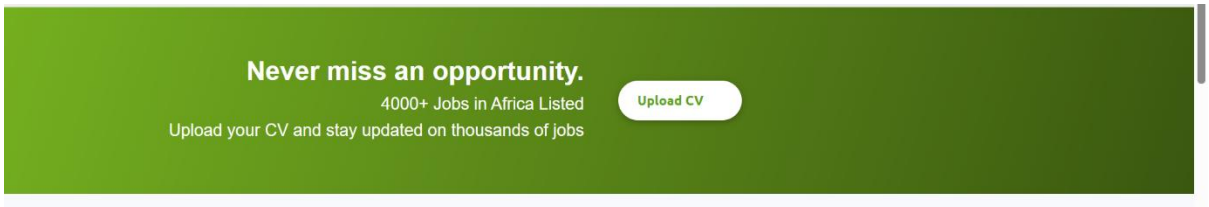

Figure 2.4: My Jobs in Kenya ((My Jobs in Kenya, n.d.)) ((CampusBiz Kenya, n.d.))

2.4.2 Campusbiz

Campusbiz functions as a comprehensive online recruitment platform designed to connect job seekers particularly university students with employers. The platform offers distinct pathways for both parties: those looking for employment and those seeking to hire. A major distinct feature is its search functionality, allowing users to input job titles, keywords, or locations to discover relevant job listings. To further refine search results, Campusbiz equips users with active filters. These filters enable job seekers to narrow down opportunities based on specific criteria such as industry, job type, salary range, experience level, and location, facilitating a more targeted search process.

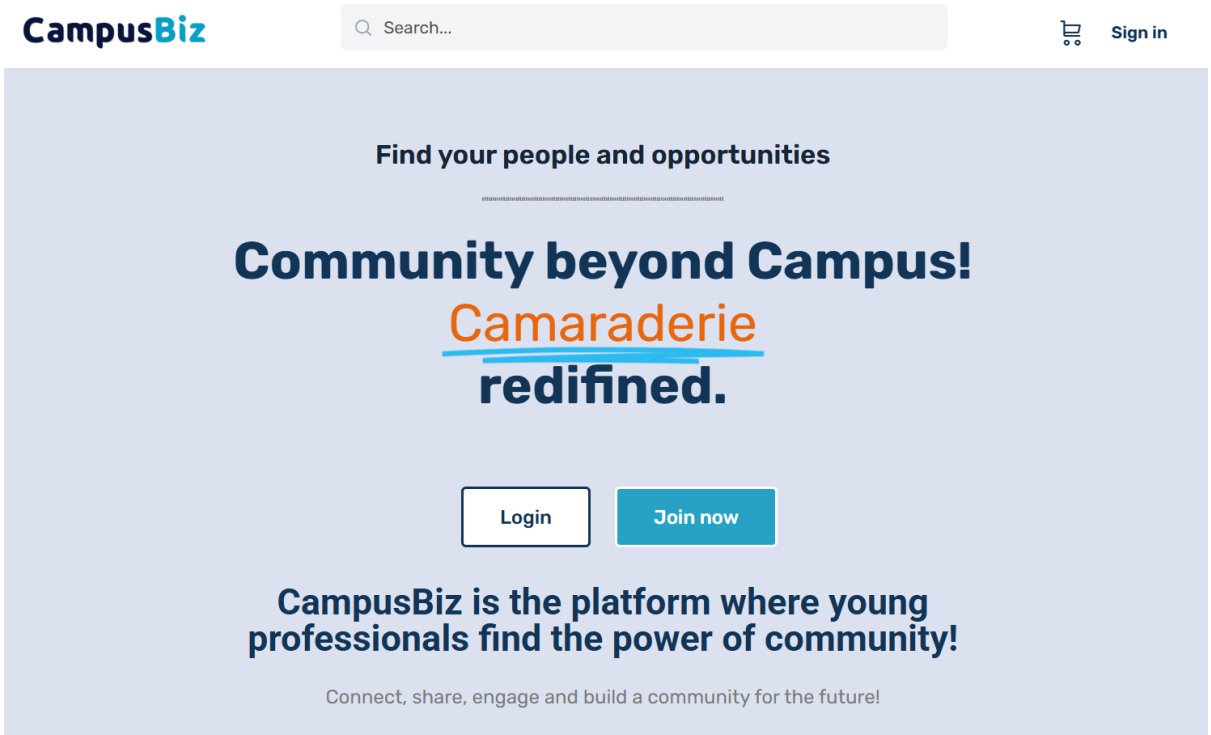

Figure 2.5: CampusBiz ((CampusBiz Kenya, n.d.))

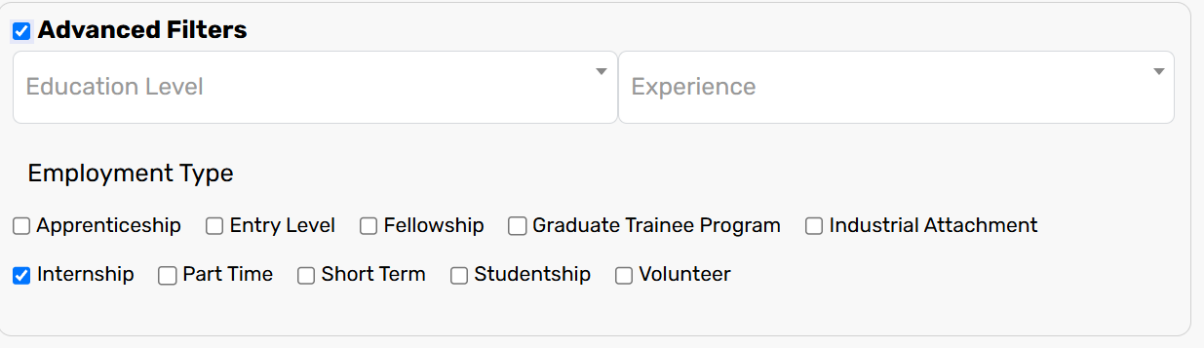

Figure 2.6: CampusBiz Careers ((CampusBiz Kenya, n.d.))

The website also offers a comprehensive menu bar that makes navigating the website fairly simple and user friendly with as much detail as possible. It also contains an employee dashboard that allows employees to post job vacancies in as much detail as possible to meet the students' job vacancy needs. In an effort to maximize security, the platform offers a section where employees are able to validate their job vacancy by undertaking a screening section.

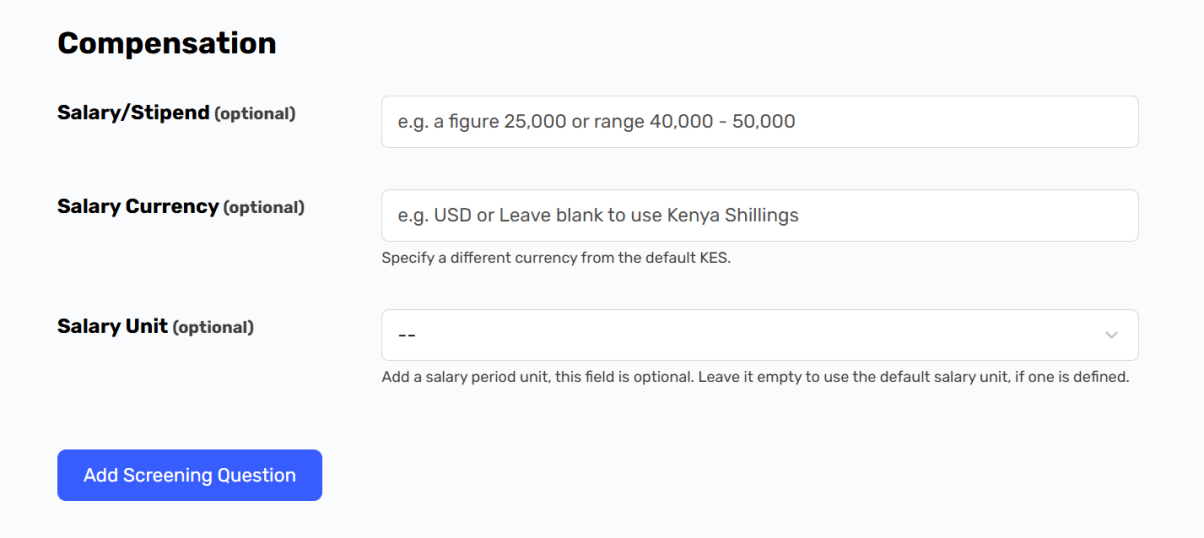

Figure 2.7: Publish a vacancy | CampusBiz Careers. ((CampusBiz Kenya, n.d.))

Additionally, the platform offers a scholarship application platform, which users can utilize to skyrocket their skills and knowledge in different areas. This feature complements its job search tools, providing additional support for students' educational and career advancement. By including scholarships, Campusbiz positions itself as a broader resource for students.

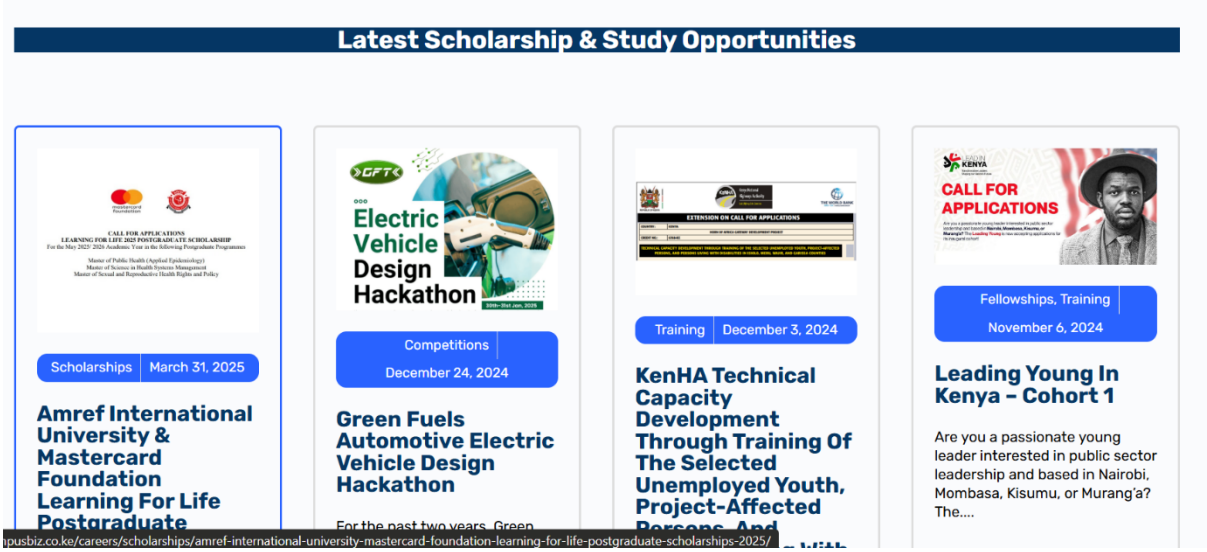

Figure 2.8:CampusBiz Careers. ((CampusBiz Kenya, n.d.))

2.4.3 Brighter Monday

Brighter Monday functions as a comprehensive online recruitment platform designed to connect job seekers with employers. The platform offers distinct pathways for both parties: those looking for employment and those seeking to hire. A major distinct feature is its search functionality, allowing users to input job titles, keywords, or locations to discover relevant job listings. To further refine search results, Brighter Monday equips users with active filters. These filters enable job seekers to narrow down opportunities based on specific criteria such as industry, job type, salary range, experience level, and location, facilitating a more targeted search process.

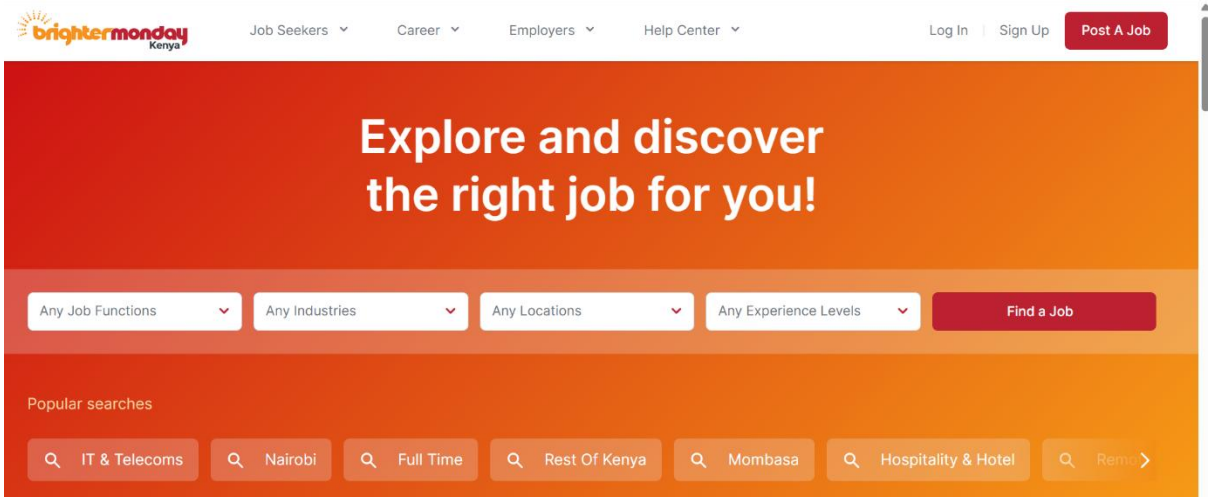

Figure 2.9: BrighterMonday (BrighterMonday)

Additionally, the platform offers a skills assessment tool, which users can utilize to evaluate their proficiencies in different areas, potentially aiding them in identifying suitable career paths and highlighting their strengths to potential employers. For user support, Brighter Monday includes a comprehensive help center section that contains frequently asked questions (FAQs) to address common queries and provides clarity on platform functionalities. Additionaly, they also offer CV review services, where users can receive feedback on their resumes to enhance their quality and impact.

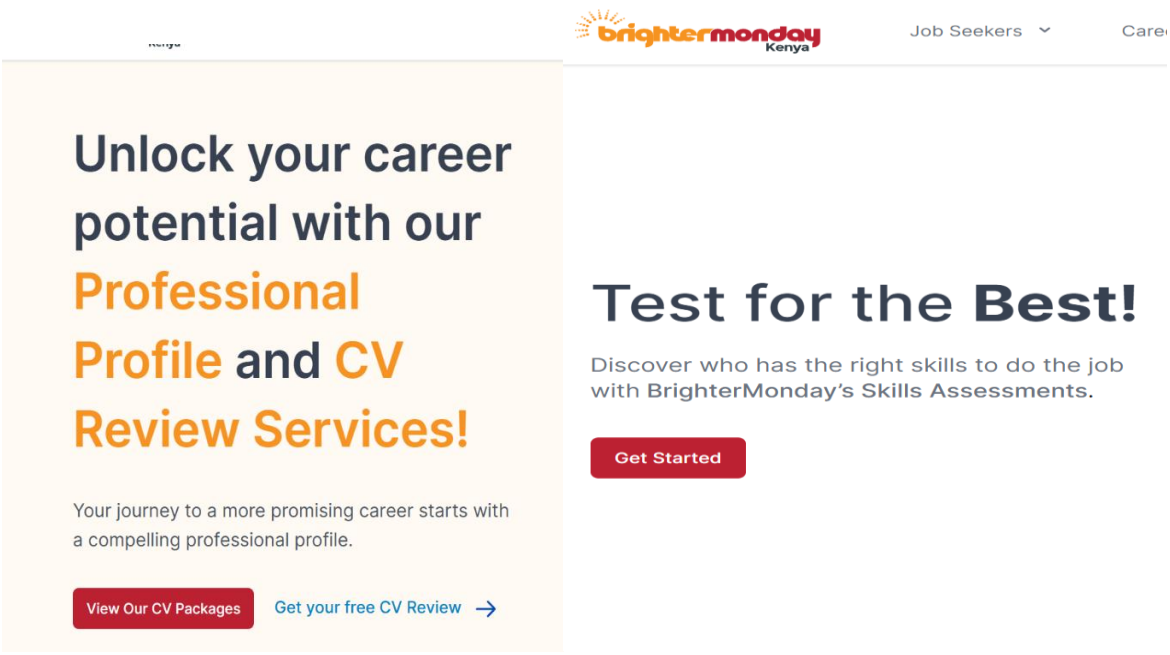

Figure 2.10: BrighterMonday Kenya. (BrighterMonday)

Brighter Monday also aims to support career development through supplementary resources. It features a section dedicated to articles providing insights and advice on various aspects of career progression, covering topics like resume writing, interview skills, and industry trends.

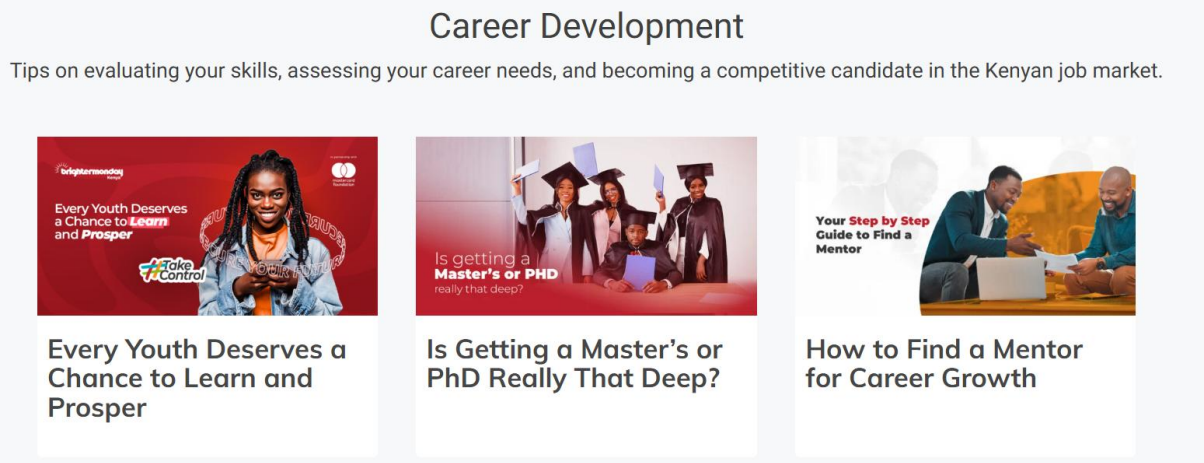

Figure 2.11: BrighterMonday Kenya. (BrighterMonday)

2.4.4 Internships Co.Ke

Internships Co.ke is another platform that has its focus primarily on students seeking internships. It operates with a key feature centred around keeping its users informed of new opportunities through a subscription-based notification system. Individuals interested in receiving regular updates on the latest internship and job alerts can sign up for this subscription service. By providing their contact information and specifying their areas of interest, subscribers can receive timely notifications via email whenever new opportunities matching their preferences are posted on the platform.

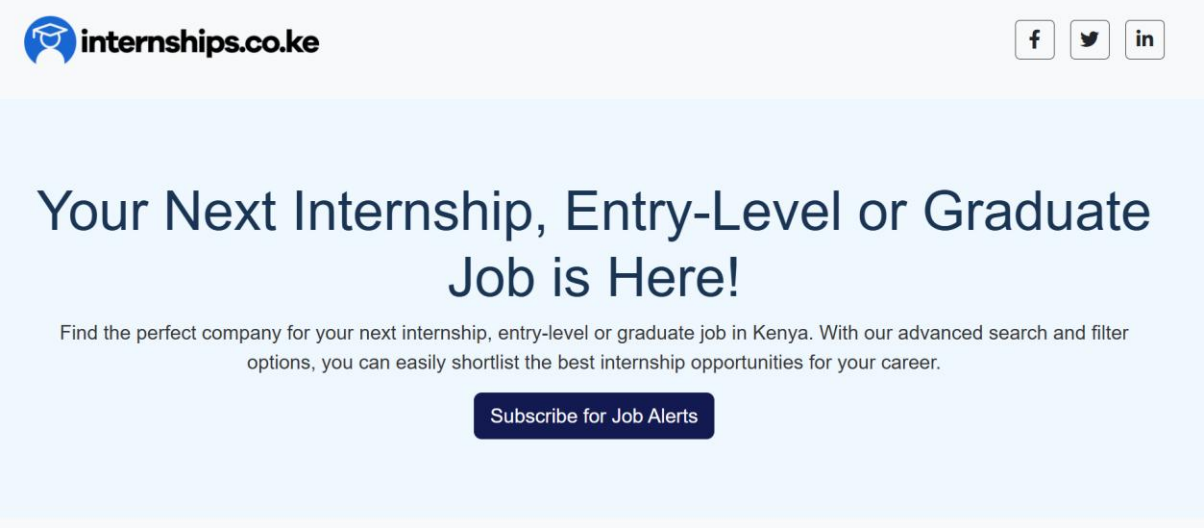

Figure 2.12: internships.co.ke website (internships.co.ke)

Internships Co.ke also provides users with a set of filters to refine their search for relevant opportunities. These filters typically include criteria such as the work region or geographical area of the internship, and the specific job title or role being offered. By utilizing these filters, users can narrow down the displayed job listings to those that align with their preferences and requirements in terms of location and the type of internship they are seeking.

Figure 2.13: Find your dream Kenyan Internship, (internships.co.ke)

However, a significant aspect of the application process on Internships Co.ke is the redirection to external links. When a user selects a job listing that interests them and clicks the "apply" button, instead of initiating an application process directly on the Internships Co.ke website, they are taken to a new, external web address. This external link likely belongs to the organization offering the internship and hosts their specific application form or process.

Figure 2.14: Find your dream Kenyan Internship, (internships.co.ke) (Myjobmag)

2.4.5 MyJobMag

MyJobMag functions as an online platform facilitating connections between job seekers and employers. Individuals looking for employment can utilize the platform's search functionality to find relevant job postings based on keywords, job titles, or locations. To stay informed about new opportunities, users have the option to subscribe to receive notifications, ensuring they are alerted when jobs matching their criteria are listed on the site.

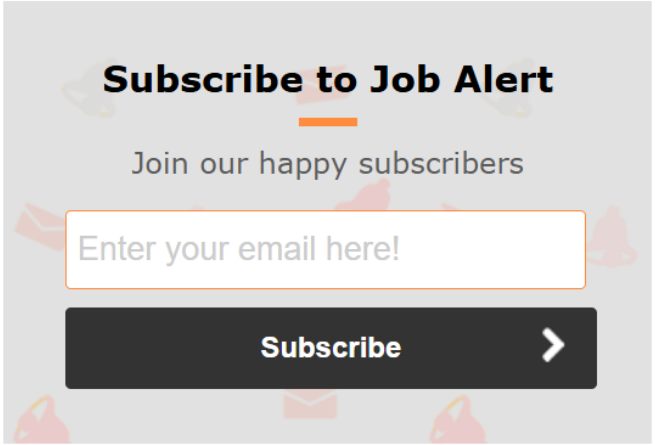

Figure 2.15: Myjobmag. ((Myjobmag)

41 The platform also provides a range of tools and resources aimed at supporting job seekers in their career development. It features a CV builder, allowing users to create and format their resumes directly on the platform. Additionally, MyJobMag offers a section dedicated to career

advice, including articles, tips, and guidance on various aspects of the job search process, such as interview techniques and career planning.

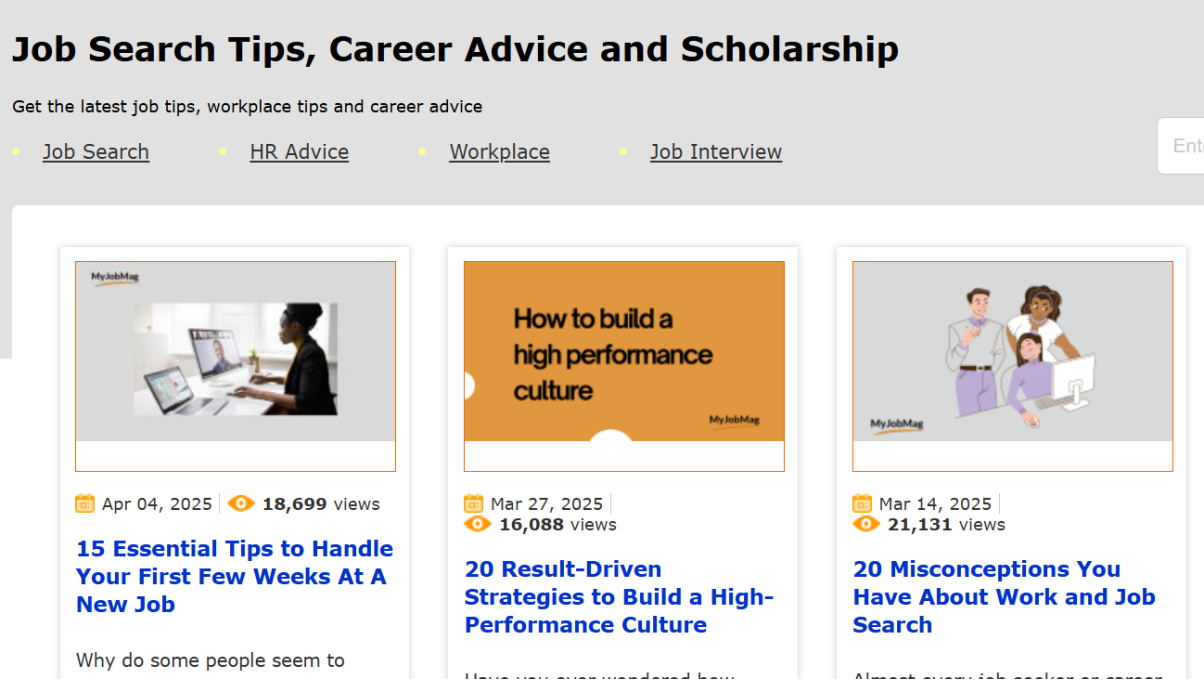

Figure 2.16: Myjobmag. (Myjobmag)

To access the full suite of features, including the ability to apply for jobs and for employers to post vacancies, users are required to log in after completing the registration process. This controlled access ensures that interactions on the platform are tied to user accounts, likely for managing applications, job postings, and personalized notifications.

2.5 Gaps in related works.

2.5.1 My Jobs in Kenya

MyJobsinKenya presents significant shortcomings, particularly when considered as a resource for university students seeking internships, attachments, and entry-level employment:

- **Limited Number of Job Postings:** The extremely low volume of job postings on MyobsinKenya renders it practically unusable for students actively seeking opportunities. With such a small number of listings, students lack the solid chance of finding a relevant role.

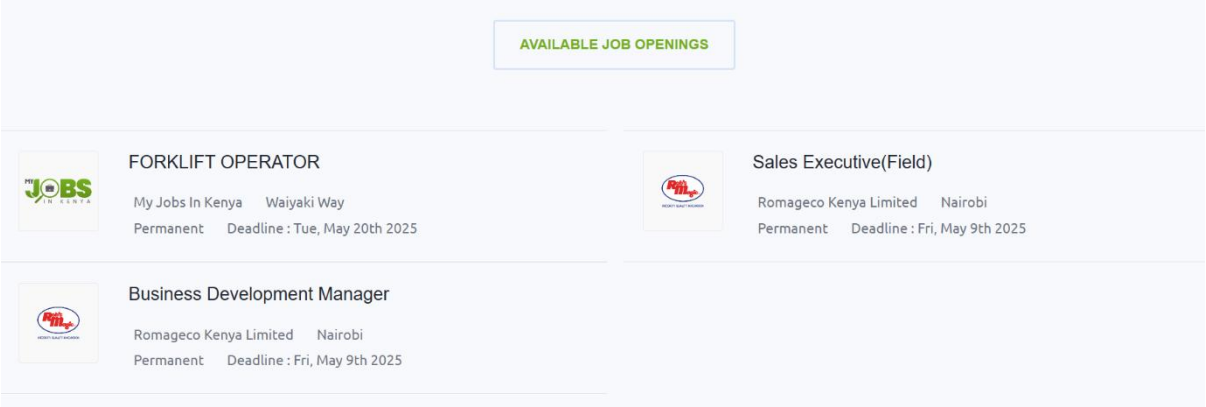

Figure 2.17: My Jobs in Kenya. ((My Jobs in Kenya, n.d.))

User Experience Not Relevant to Students: The user experience of MyJobsinKenya is not tailored to the needs and expectations of university students. The platform might be designed for experienced professionals or lack features crucial for students, such as filtering by academic discipline, internship duration, or entry-level focus. Students accustomed to user-friendly and intuitive online interfaces will likely find a non-relevant UI (User Interface) frustrating and inefficient.

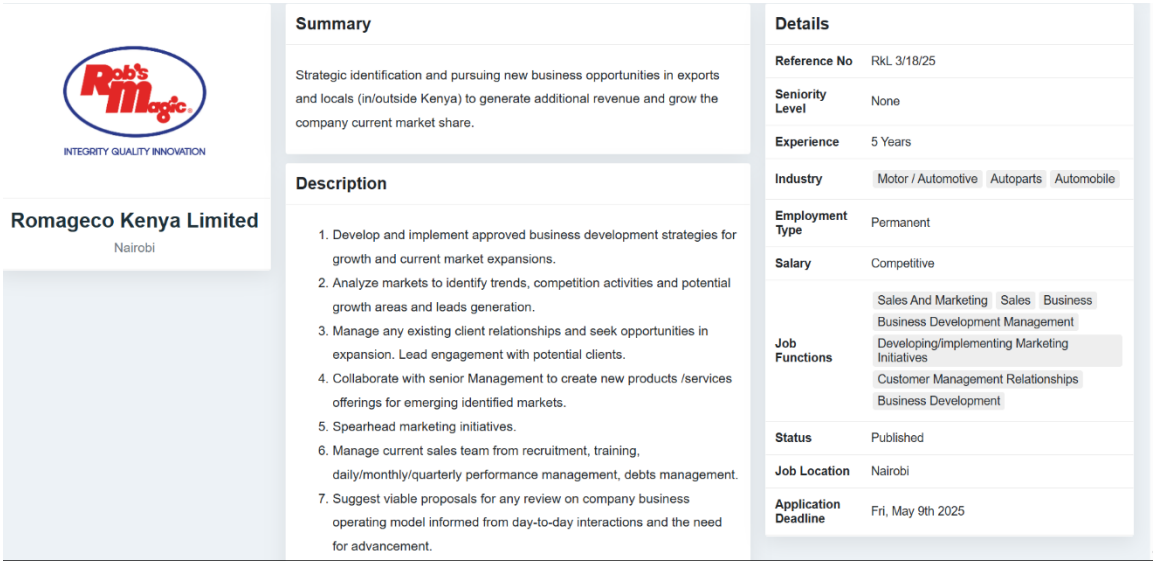

Figure 2.18: My Jobs | Kenya. ((My Jobs in Kenya, n.d.))

2.5.2 Campusbiz

Campusbiz is a general job and career platform that serves a broad spectrum of job seekers and employers. While it is a popular platform in the region, its limitations become apparent when considering the specific needs of university students seeking internships, attachments, and entry-level positions:

Non-Student-Friendly User Experience: The user interface and overall experience of CampusBiz are designed for a general job-seeking audience, which may not align with the specific needs and expectations of university students. Students often require features that cater to their academic timelines (e.g., filtering by internship duration, academic major relevance), a more visually intuitive interface familiar to their online experiences, and guidance on creating student-specific application materials.

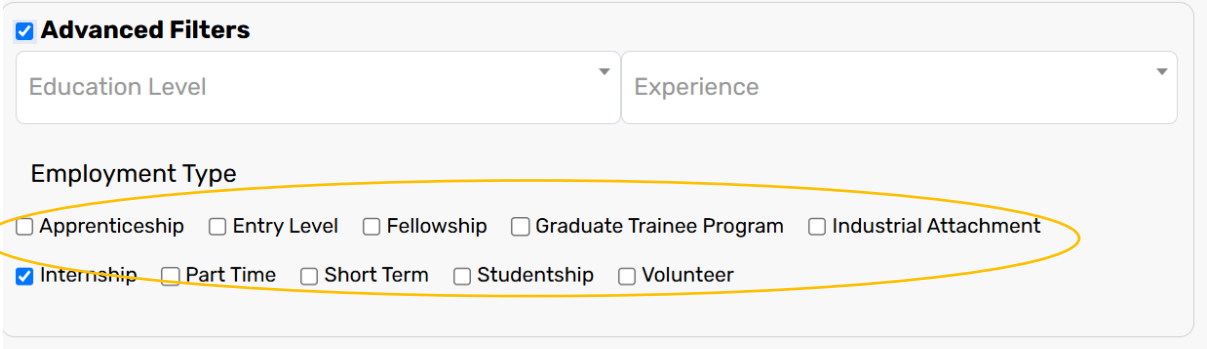

Figure 2.19 CampusBiz Careers. ((CampusBiz Kenya, n.d.))

2.5.3 Brighter Monday

Brighter Monday is a general job and career platform that serves a broad spectrum of job seekers and employers. While it is a popular platform in the region, its limitations become apparent when considering the specific needs of university students seeking internships, attachments, and entry-level positions:

Non-Student-Friendly User Experience: The user interface and overall experience of Brighter Monday are designed for a general job-seeking audience, which may not align with the specific needs and expectations of university students. Students often require features that cater to their academic timelines (e.g., filtering by internship duration, academic major relevance), a more visually intuitive interface familiar to their online experiences, andguidance on creating student-specific application materials.

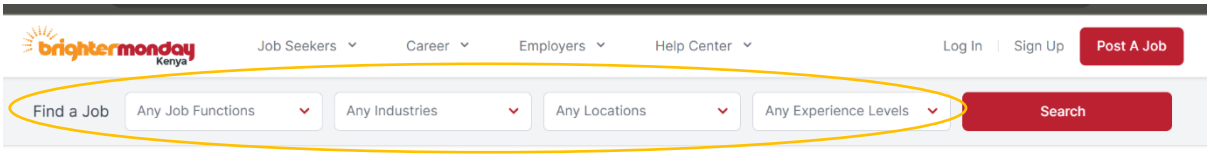

Figure 2.20: BrighterMonday Kenya. (BrighterMonday)

2.5.4 Internships Co.ke

Internships Co.ke, while focusing specifically on internships in Kenya, it suffers from several limitations that our project aims to overcome:

- **Plain and Boring UI:** An unengaging user interface can significantly hinder user adoption, especially amongst our target audience, which includes university students who are accustomed to visually appealing and intuitive online experiences. A dull and difficult-to-navigate interface can lead to frustration and students being less likely to spend time exploring opportunities on the platform.

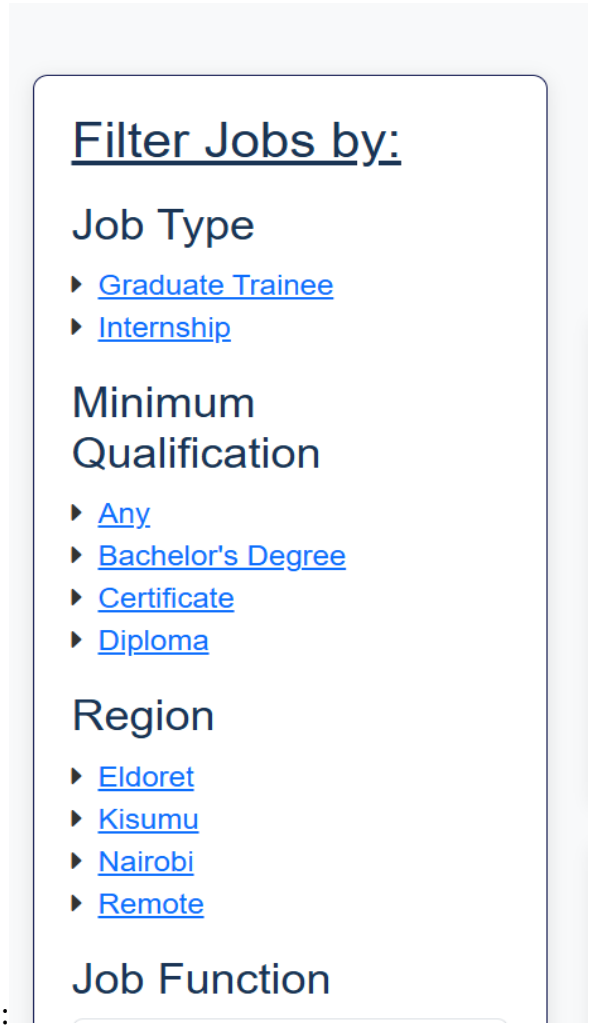

Figure 2.21: Find your dream Kenyan Internship, (internships.co.ke)

On-Site Application Not Available: The inability to complete applications directly on Internships Co.ke adds a significant barrier for students and organizations as well. Having to navigate external sites, create new accounts, and learn different application procedures for each

opportunity increases the effort required and can lead to students abandoning applications due to frustrations and organizations losing track of the applications received.

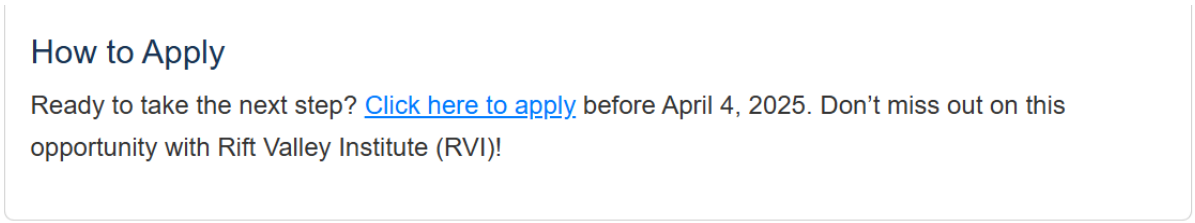

Figure 2.22: Find your dream Kenyan Internship, (internships.co.ke)

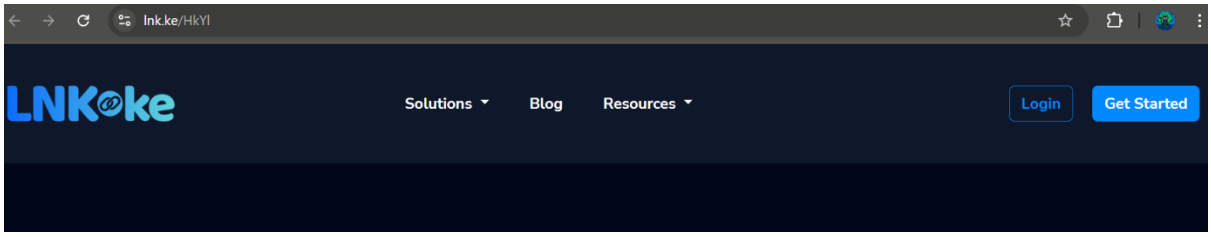

Figure 2.23: Find your dream Kenyan Internship, (internships.co.ke)

Outdated job listing information: Another limitation of Internships Co.ke is the prevalence of outdated information/ static data, particularly job listings where the application deadlines have already passed. This severely diminishes the platform's utility for university students actively seeking timely internship opportunities**.** The business organizations are also severely impacted by this, as they fall victim to receiving tons of outdated and irrelevant applications from students.

Figure 2.24: Find your dream Kenyan Internship, (internships.co.ke)

2.5.5 MyJobMag

While MyJobMag aims to adequately serve its purpose as a bridge between job seekers and employers due to its centralized platform, it falls short in a few aspects that center around the overall student experience while interacting with the platform. Some of its drawbacks are described as follows:

Non-student-friendly user Interface

This lack of an appealing user experience could discourage students from actively exploring the available opportunities, leading to lower engagement with the platform compared to a more modern and student-friendly interface.

Lack of essential information within the job listings. Specifically, the absence of clearly stated application deadlines and the duration of the work period create considerable uncertainty for students. Without knowing when an application period closes, students risk missing out on timely submissions. Similarly, the absence of a work period duration makes it difficult for students to determine if an internship or entry-level role aligns with their academic schedules and availability for different types of work engagements.

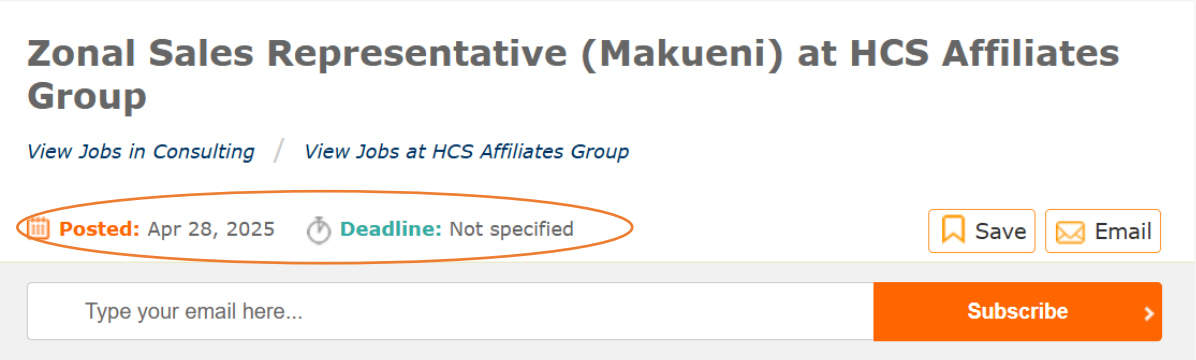

Figure 2.25: Myjobmag. (Myjobmag)

2.6 Technologies to be used

This project will use a range of modern web and communication technologies to support the core functions of the system. It will heavily rely on Internet technology to deliver real-time interactions between users, since it is web-based. This addresses accessibility issues, as most

students have internet-enabled devices (Kinyanjui, 2022). Sommerville (2016) notes web platforms' effectiveness for user-centric systems.

A cloud-based database system will be used to ensure real-time updates, overcoming delays in existing systems. This also supports scalability and flexibility, especially as different universities and companies adopt the system. Application Programming Interfaces (APIs) connect the platform's components, enabling seamless interactions. (Stallings, 2017)highlights APIs' role in integrating distributed systems.

Cloud infrastructure will be used to host the platform, to provide scalability and constant availability for users. The system will also integrate email notifications for updates offering a familiar communication method for users. By using internet, web communication, and cloud database technologies, the platform ensures secure, scalable, and reliable internship management for its users.

2.7 Conceptual Framework

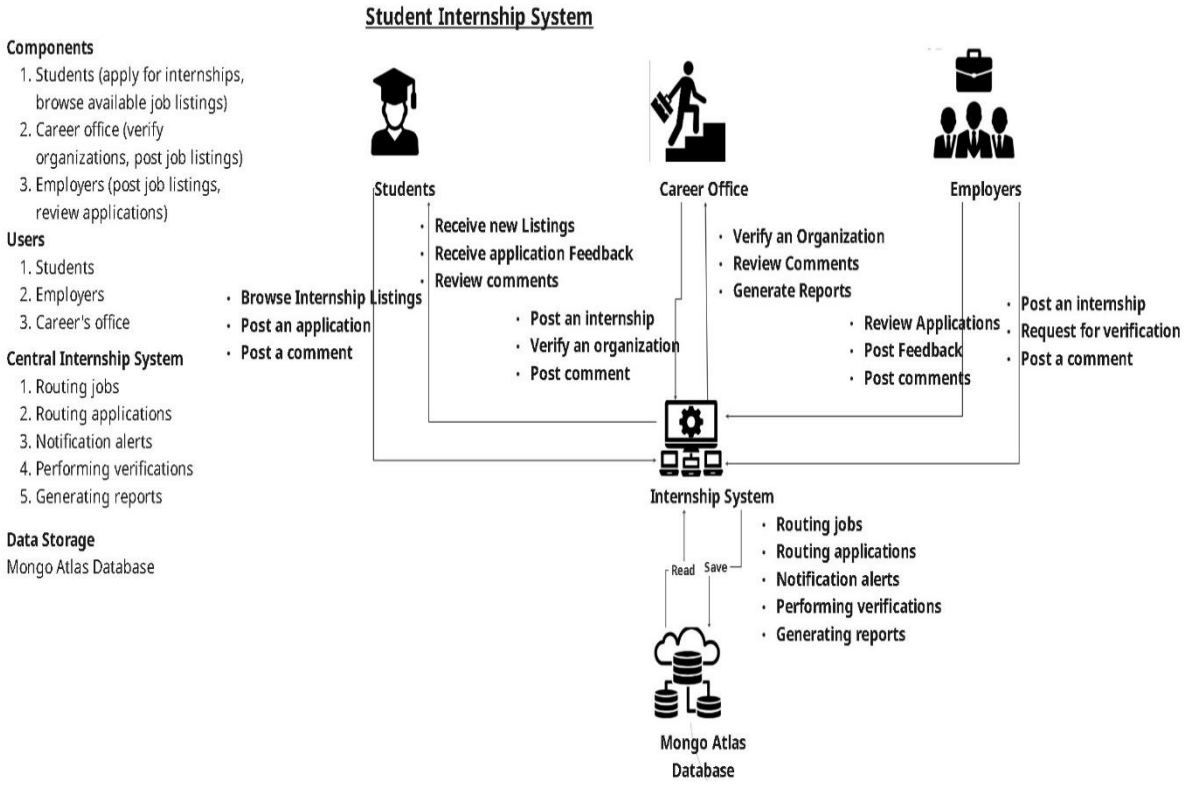

Figure 2.26: Conceptual framework

Chapter 3: Methodology

3.1 Introduction

This chapter describes the Software Development Methodology that will be applied to the proposed project. It will also discuss the applied development approach and the system analysis, design, and ITS deliverables.

3.1.1 Object-Oriented Analysis and Design

Object-Oriented Analysis and Design (OOAD) is a technical approach used in the analysis and design of a system. It describes information systems by identifying objects, which can represent entities such as people, events, or places. Objects encapsulate both data and the processes that operate on that data. Unified Modelling Language (UML) is used to develop object models that visualize and document the system's structure and behaviour (Shelly, 2012).

This methodology is suitable for the proposed system because it provides principles of encapsulation and abstraction. Encapsulation bundles data and methods within objects, while abstraction focuses on essential features while hiding unnecessary details. This approach allows for segmentation, which reduces problem complexity by breaking down the system into manageable, reusable components. For example, students, organizations, and job postings can be modelled as objects, each with its own data (attributes) and functions (methods). This approach would simplify the development process, promote code reuse, and enhance the system's maintainability and scalability. UML diagrams will be used to represent the relationships between these objects and the flow of interactions within the system.

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3.2 Applied Development Approach

This project adopts the Object-Oriented Analysis and Design (OOAD) method because it aligns with our platform’s user-centric design. This will accommodate the need for interaction between the different users. (Sommerville, 2016) says OOAD shines in user-centric systems with changing requirements. Furthermore, the system is expected to grow based on user feedback. (Booch, 2007) says OOAD is best suited for platforms with dynamic workflows, user-driven interactions, and the need for high cohesion between business logic and user actions.

The system will use Agile Prototyping, an adaptive method that helps us create and test the system modules. (Pressman, 2005) highlights Agile Prototyping's strength in validating user-centric designs early. It involves iterative cycles where we build quick prototypes, test them with users, and make changes based on feedback. Each cycle (1–2 weeks) focuses on a key feature, while consulting stakeholders where possible.

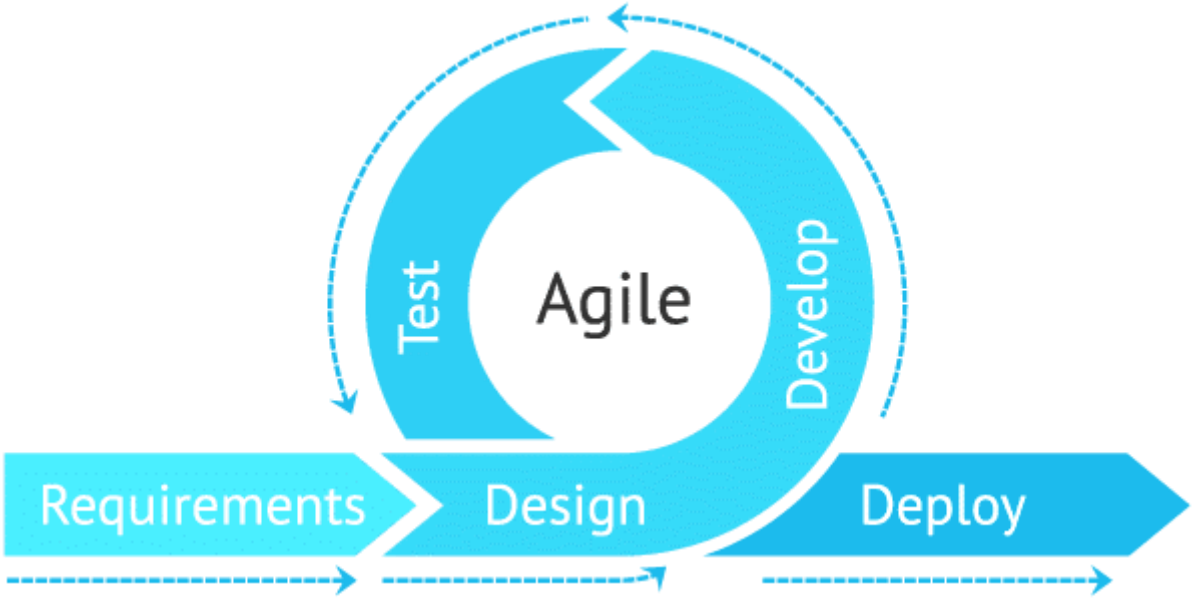

Figure 3.1: Adaptive Agile Project Management (Herko, 2024)

3.2.1 Requirements Gathering and Analysis (Sprint 1)

This phase involves collecting and understanding user needs. This will be through interviews and online surveys, reviewing existing systems, and creating user stories like "*As a student, I want to apply for internships online and track my application status in real-time*." This will help identify the functional requirements and initial system specifications. (Pressman, 2005) emphasizes gathering requirements iteratively to align with user expectations.

3.2.2 Design and Prototyping (Sprint 2)

This phase focuses on building a design based on user requirements. The activities here will include designing a base prototype using wireframes and mapping the workflows for each of the stakeholders. These will then be reviewed and modified based on the feedback.

3.2.3 System Development (Sprints 3-5)

Development is done using an iterative, component-based approach. At the end of each sprint, a usable feature is produced. The key activities will include setting up the architecture, implementing role-based access, and developing stakeholder modules (student, employer, module).

3.2.4 Testing and Feedback (Sprint 6)

Here, the system is tested for usability, functionality, and performance. The activities involved will include conducting User Acceptance Testing (UAT) with students, running unit tests for logic, logging bugs, and collecting feedback. This helps correct critical issues before final deployment.

3.2.5 Finalization and Deployment (Sprint 7)

The final sprint focuses on preparing the system for submission and delivery. The activities include completing the project documentation and finalizing and deploying the platform on a cloud server.

3.3 System Analysis

This section shows the analysis of the proposed system using Object-Oriented Analysis and Design (OOAD) techniques. System analysis aims to understand the expected behaviours of the system by modelling how the different users will interact with the system. The diagrams provide insight into system functionality, data relationships, and the flow of operations between users and internal system components.

3.3.1 Use Case Diagram

The Use case diagram will be used to represent the primary functions of the system. It will also identify the users and how they interact with it. It will include high-level functions like Register Account, Post Internship, Apply for Internship, Review Applications, Approve Placement, and

Generate Reports. This helps visualize the system boundaries and define the required features from the user's perspective.

3.3.2 Sequence Diagram

This will model the flow (sequence) of interactions between objects in the system for different processes. For example, it will model how a student applies for an internship: from searching for opportunities, applying, and getting employer feedback. It helps developers understand the logic and execution of the system.

3.3.3 Entity Relationship Diagram (ERD)

This will define the data structure of the system, representing the relationships between entities such as Users, Internships, Applications, and Organizations. It will specify attributes (e.g., Student ID, Internship Title, Status) and define how entities relate (e.g., one student can apply to many internships). The ERD is vital for designing the system's database schema and enforcing data integrity.

3.3.4 Class Diagram

This will define the system objects with their attributes (properties) and methods. For example, the *student* class may include attributes such as *studentID, email, and methods like applyForInternship() or uploadCV().* This makes it easier to implement reusable components during development.

3.3.5 Activity Diagram

This will show workflows in the system, like the *Internship Application Flow*, showing how a student searches, selects, and applies for an opportunity, and how approvals and responses are handled. The diagram will guide prototype testing to validate efficient workflows. It also helps identify processes and decision points in workflows.

3.4 System Design

This segment focuses on developing models, such as user interfaces, that meet all the documented requirements for the system and illustrate the basic input-output processes. These models will be illustrated using a database schema, wireframes, and a system architecture diagram.

3.4.1 Database Schema

A database schema is a structure that describes the logical arrangement of the data to be stored within the system. It defines entities, attributes, relationships, and constraints to ensure that data integrity and consistency are maintained (Lucid Software Inc., 2021) For the proposed system, the database schema will describe the logical constraints for data related to:

Students with regard to their personal information, such as name, university, program, year of study, contact details, and uploaded documents.

Organizational details, including organization name, type, contact information, and authorized representatives.

Opportunities shared by organizations to determine data on internships, attachments, and entry-level positions, including titles, descriptions, requirements, locations, deadlines, and stipends (if applicable).

Student filled applications containing records of student applications to specific opportunities, including application status and relevant dates.

3.4.2 Wireframes

Wireframes are skeletal frameworks that provide a visual representation of the layout and functionality of the system's user interface. They serve as a guide for visualizing the structure and interaction flow of the users in the application's screens. In the proposed system, wireframes will be used to map out the various screens and their functionality, including:

A student dashboard that would display relevant opportunities, application status, and profile information.

An organization dashboard to manage posted opportunities and review applications.

An opportunity listings page that would display available internships, attachments, and entry-level jobs with search and filter options.

A student's profile page that would allow students to manage their personal, academic, and professional information.

An opportunity posting form that would enable organizations to create and edit new opportunity listings.

An application form that would streamline the process for students to apply for opportunities.

3.4.3 System Architecture

System architecture is a conceptual diagram that demonstrates the high-level structure of the system, including its components, their interactions, and the overall organization of hardware, software, and processing methods (Rosenblatt & Shelly, 2012). The system architecture for the proposed platform will:

- Conceptualize the system's structure, showing the different layers (e.g., presentation layer, application layer, data layer).
- Capture the details of user interactions, such as how students and organizations interact with the platform.
- Illustrate how the system will process and manage data, from user input to storage and retrieval.
- Describe the flow of information within the system and between different components.

3.5 System Development Tools and Techniques

This section describes the tools and techniques designed for the development of university students for an employment platform. The tools described below were selected based on their suitability and effectiveness in achieving the project objectives, considering factors such as ease of use, teamwork compatibility, scalability, and relevance to the web application development to be created.

3.5.1 React

React is a JavaScript library for building user interfaces. It allows developers to create dynamic and interactive web applications with a component-based structure that makes its components reusable.

We chose React for the front-end development due to its efficiency in rendering with the Virtual Document Object Model (DOM). Its large and active community helps in providing ample resources, libraries, and support for the developers. Due to its component-based structure, it allows the creation of reusable UI components, leading to faster development and an easily maintainable code environment.

3.5.2 Node.js

Node.js is a JavaScript runtime environment that executes JavaScript code outside of a web browser. It is built on a JavaScript engine and is commonly used for building highly reliable, scalable, and high-performance server-side applications and APIs.

Node.js was selected for the back-end development due to its speed in execution and efficiency, as it can use JavaScript on both the front-end and back-end, allowing for code sharing and a more consistent development experience. It is a large environment of packages, such as npm, and its suitability for real-time applications and APIs that will be necessary for features like application status updates.

3.5.3 Mongo Atlas DB

MongoDB Atlas is a fully managed cloud database service that stores data in flexible JSON-like documents. It is most suitable for applications with evolving database schemas.

MongoDB was chosen as the database for this project due to its flexibility in handling diverse data structures like student profiles, organization details, job listings, etc, without requiring a fixed schema. Its scalability will be beneficial to the system as it grows, together with its compatibility with React and Node.js, which will significantly simplify data handling and manipulation.

3.5.4 Git and GitHub

Git is a cloud-based version control system that tracks changes to code over time, allowing for collaboration and easier management of different versions of the software. GitHub is a web-based platform for version control using Git that provides similar features to Git, including code review and project management.

GitHub will serve as our central repository for the codebase, facilitating collaboration and teamwork, error management, and code review to ensure a well-organized, maintainable project.

3.5.5 Integrated Development Environment (IDE) – Visual Studio Code (VS Code)

Visual Studio Code is a code editor that supports a wide range of programming languages, together with providing features like syntax highlighting, debugging tools, an integrated terminal, and Git integration.

VS Code was chosen as the primary IDE due to its ease of use, strong support for JavaScript, and its compatibility with GitHub. It also supports JavaScript-related technologies such as React and Node.js. Its large community and its comprehensive library of extensions aid in enhancing productivity and its cross-platform compatibility.

3.6 System Deliverables

This section serves to outline the key deliverables for the proposed platform designed to connect university students with employment and internship opportunities. These deliverables aim to address the system requirements that have been defined.

3.6.1 System Proposal

This documentation details the proposed platform, articulating the problem the system aims to solve. It also discusses the inefficient and fragmented distribution of work opportunities to university students through existing systems thus highlighting the platform's purpose, to create a centralized, user friendly space for students to discover and apply for relevant internships, attachments and employment opportunities requiring minimal experience and for organizations and businesses to connect with qualified student potential.

3.6.2 Authentication module

This module will manage all user access to the platform. This includes;

Student registration – This section will allow university students to create accounts by providing necessary details such as Student name, University, academic program, year of study, and contact information

Organization registration – The system will allow representatives from companies and university departments to register their organizations, providing details such as organization name, industry, and contact information.

Login – This platform aims to have secure functionalities to allow registered students and organization representatives to access their respective dashboards using their credentials

3.6.3 Student profile module

This module will enable students to create and manage their professional profiles. It will contain features such as:

Basic display of the student's personal details and information.

Academic information highlighting the student's year of study, academic program, GPA, relevant coursework, and skills.

A document upload section to enable students to upload their CVs, cover letters, and other relevant documents.

Active filters to allow students to set preferences for opportunities they are seeking, together with the duration, location, and desired salary

3.6.4 Opportunity posting module

This module will allow registered organizations to create and manage their job, internship, and attachment postings. It will contain features such as:

Opportunity details to specify job title, description, requirements, responsibilities, duration, stipends (if included), location, application deadline, and target student qualifications.

A posting management dashboard to allow both organizations and university career departments to edit, view, and manage their active and past postings.

3.6.5 Application Management Module

This section will facilitate and monitor the application process between students and organizations. Features will include:

A student application section that would allow students to browse and apply for posted employment opportunities.

A section to facilitate the tracking of applications, thus enabling the students to track the status of their applications.

A review section to provide organizations with tools to view, filter, and manage the applications they receive.

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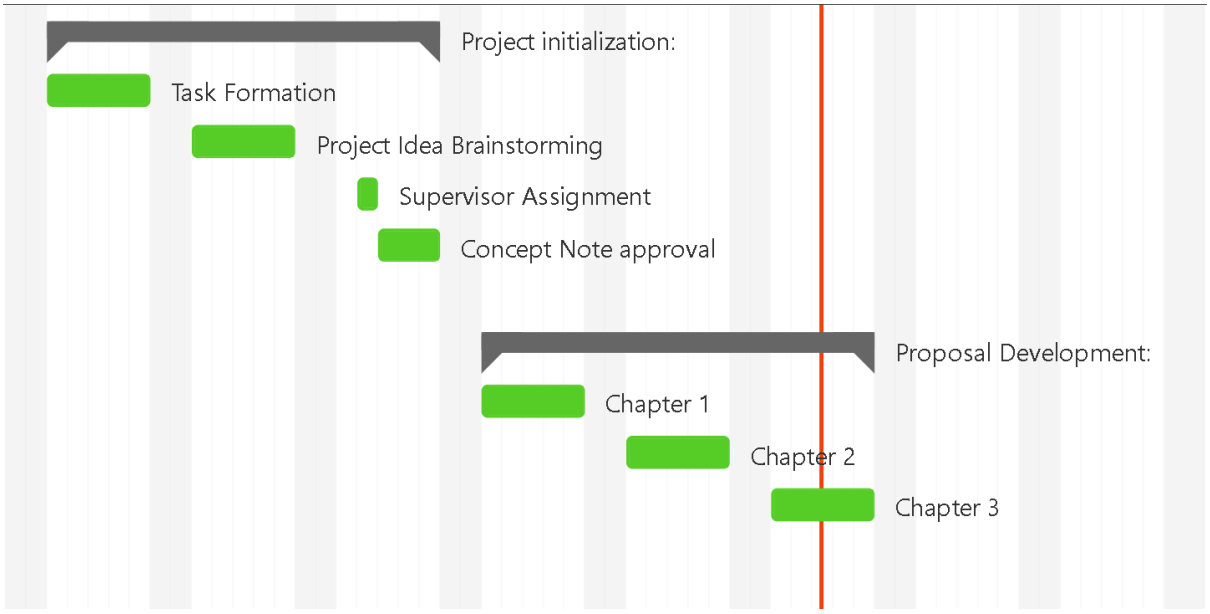
Appendix

Appendix 1: Gantt Chart



Appendix 1: Gantt Chart