The Hashemite University, Zarqa, Jordan

Faculty of Prince Al-Hussein Bin Abdallah II for Information Technology

Computer Science and Applications Department

" *Career Path Hub* "

A project submitted

in partial fulfillment of the requirements for the

B.Sc. Degree in Computer Science and Application

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Jun -2024

CERTIFICATE

It is hereby certified that the project titled Career Path Hub submitted by undersigned, in partial fulfilment of the award of the degree of "Bachelor's" in Computer Science embodies original work done by them under my supervision. All the analysis, design and system development have been accomplished by the undersigned. Moreover, this project has not been submitted to any other college or university.

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ABSTRACT

In Jordan, there is a gap between education and employment in the IT sector, despite the growing number of Internet subscribers and the demand for digital skills. This project addresses this issue by providing two key services: a comprehensive assessment for high school graduates interested in Information Technology (IT) and a specialized job and training search platform for IT graduates. The assessment helps students identify their technical strengths and guides them toward appropriate IT specializations. The job and training search platform streamlines the process for IT graduates to find and apply for relevant job and training opportunities.

We conducted this project by developing a user-friendly website that integrates these services, leveraging digital tools to enhance career guidance and job placement processes. The results indicate that users benefit from improved clarity in their career paths and more efficient job searches. The conclusions reached demonstrate that our platform significantly aids in bridging the gap between education and employment in the IT sector.

The potential impact of our project is substantial, as it not only supports individual career development but also contributes to a more skilled and job-ready IT workforce in Jordan, aligning with the nation's broader goals for technological advancement and economic growth.

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ABBREVIATIONS

• **UML**: The Unified Modelling Language is a general-purpose, developmental, modelling language in the field of software engineering that is intended to provide a standard way to visualize the design of a system.

• **Class diagram:** in the (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

• **Use case diagram:** is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and diverse types of users the system has and will often be accompanied by other types of diagrams as well.

• **Database (DB):** is an organized collection of data, stored and accessed electronically from a computer system. Where databases are more complex, they are often developed using formal design and modelling techniques.

• **Stakeholder:** is a party that has an interest in a company and can either affect or be affected by the business.

• **Non-functional Requirements (NFRs):** define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

• **Info:** Information.

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

This chapter outlines the project's ideas, objectives, motivations, and the challenges we aim to address. We also highlight the project's scope and limitations, setting the stage for our subsequent discussions on implementation and outcomes.

1.1 Overview

This project offers two interconnected services. The first service is tailored for high school graduates interested in Information Technology (IT). Through a comprehensive test, we assist them in understanding their technical inclinations, guiding them to choose an IT specialization that aligns with their abilities and preferences. The second service provides a job\ training search platform exclusively for graduates in IT fields, facilitating their search for suitable employment opportunities and apply to it as well as finding training opportunities.

1.2 Project motivations

1. **Addressing Career Guidance Gap**: Many high school graduates lack access to comprehensive career guidance, especially in specialized fields like Information Technology. By offering tailored assessments and guidance, this project fills this gap and empowers graduates to make informed decisions about their future.

2. **Streamlining Job Search**: The job market can be overwhelming, especially for entry-level candidates. This platform simplifies the job search process by centralizing relevant opportunities and providing tools for application, thereby saving time and reducing frustration for graduates.

3. **Facilitating Training Opportunities**: Training programs are vital for skill development and career advancement. By connecting graduates with relevant training opportunities, this project enhances their employability and prepares them for the demands of the IT industry.

1.3 Problem Statement

This project addresses the following problems:

1. **Lack of Career Guidance**: Many high school graduates lack access to comprehensive career guidance tailored to the IT sector, making it difficult for them to understand their technical inclinations and choose suitable specializations.
2. **Difficulty in Job Search**: Entry-level candidates often struggle to navigate the complex job market in the IT industry. They may face challenges in finding relevant job opportunities and applying to them effectively.
3. **Limited Access to Training Programs**: Training programs are essential for skill development and career advancement in IT. However, some graduates may have limited access to relevant training opportunities, hindering their ability to acquire the necessary skills for employment.

1.4 Project Aim and Objectives:

This project aims to empower high school/ university graduates to make informed decisions about their academic and career paths in Information Technology (IT). It provides them with the necessary tools to explore IT majors and find suitable job/training opportunities after graduation.

Here is how the project will achieve its goal:

1. **IT Aptitude Assessment Test:** We developed a specialized IT aptitude test or questionnaire that helps students identify their interests, skills, and values related to IT. Based on their responses, we will suggest specific IT majors that align with their strengths and preferences., [3].
2. **Job Search Assistance:** we developed a platform that aggregates job opportunities in the IT sector, facilitating graduates' job search process by providing easy access to relevant openings and application tools.

3. **Training Program Access:** we Provide access to a database of relevant training programs and resources aimed at enhancing graduates' skills and readiness for employment in the IT industry.

1.5 Project Limitations:

1. Scope:
- The project focuses solely on providing an online assessment system to help high school graduates determine their specialization in Information Technology (IT).
- The project will not include developing assessment systems for other educational levels or fields of study.

2. Focus on IT College Graduates:
- The training and employment opportunities provided will be specific to IT College graduates in Information Technology.
- This project will only include opportunities for graduates from other disciplines if they are within the field of information technology.

3. Geographic Limitations:
- The project will initially target a specific geographic region or set of areas for implementation.
- Expanding to other areas may be considered in the future, but it is outside the scope of this current project.

1.6 Expected Output of the Project:

1. Accurate Evaluation System:
- Analyzes student responses precisely using proven statistical methods.
- Provides reliable results to help students choose the right specialization.
- Offers personalized recommendations for each student based on their strengths and interests.

2. **Job Portal:**
   - Presents information about available job opportunities in various IT specializations.
   - Assists students in connecting them with potential employers.
3. **Training Portal:**
   - Presents information about available training opportunities in various IT specializations.

1.7 Project schedule

Subject	Date
Decided the idea of the project.	**19/3/2024**
Finished The Project Structure and Planning Tree.	**28/3/2024**
Prototype Design	**7/4/2024**
Database Design	**25/4/2024**
Build frontend code	**16/5/2024**
Write documentation	**18/5/2024**
Build backend code	**19/5/2024**
Testing	**20/5/2024**

Table (1): project schedule

1.8 Report Organization:

The remainder of the report is organized as follows:

Chapter 2: Introduction

This chapter provides an overview of the project, including its background, objectives, and scope.

Chapter 3: Requirements: Chapter 3 focuses on detailing the project requirements in depth. This includes identifying user needs, functional requirements, and non-functional requirements for both the online examination system and the training and jobs opportunities portal.

 Chapter 4: Design

In this chapter, the design aspects of the project are elaborated upon. It covers the conceptual and technical design of the online examination system, including user interface design, database design, and system architecture.

Chapter 5: Implementation

Chapter 5 describes the implementation phase of the project, detailing the process of translating the design specifications into actual software components. It discusses programming languages, frameworks, and tools used in the development process. Chapter 6: Conclusion, Results, and Future Work

This chapter presents the concluding remarks of the project, summarizing the key findings and results obtained. It discusses the implications of the project outcomes and potential areas for future work and enhancements.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction
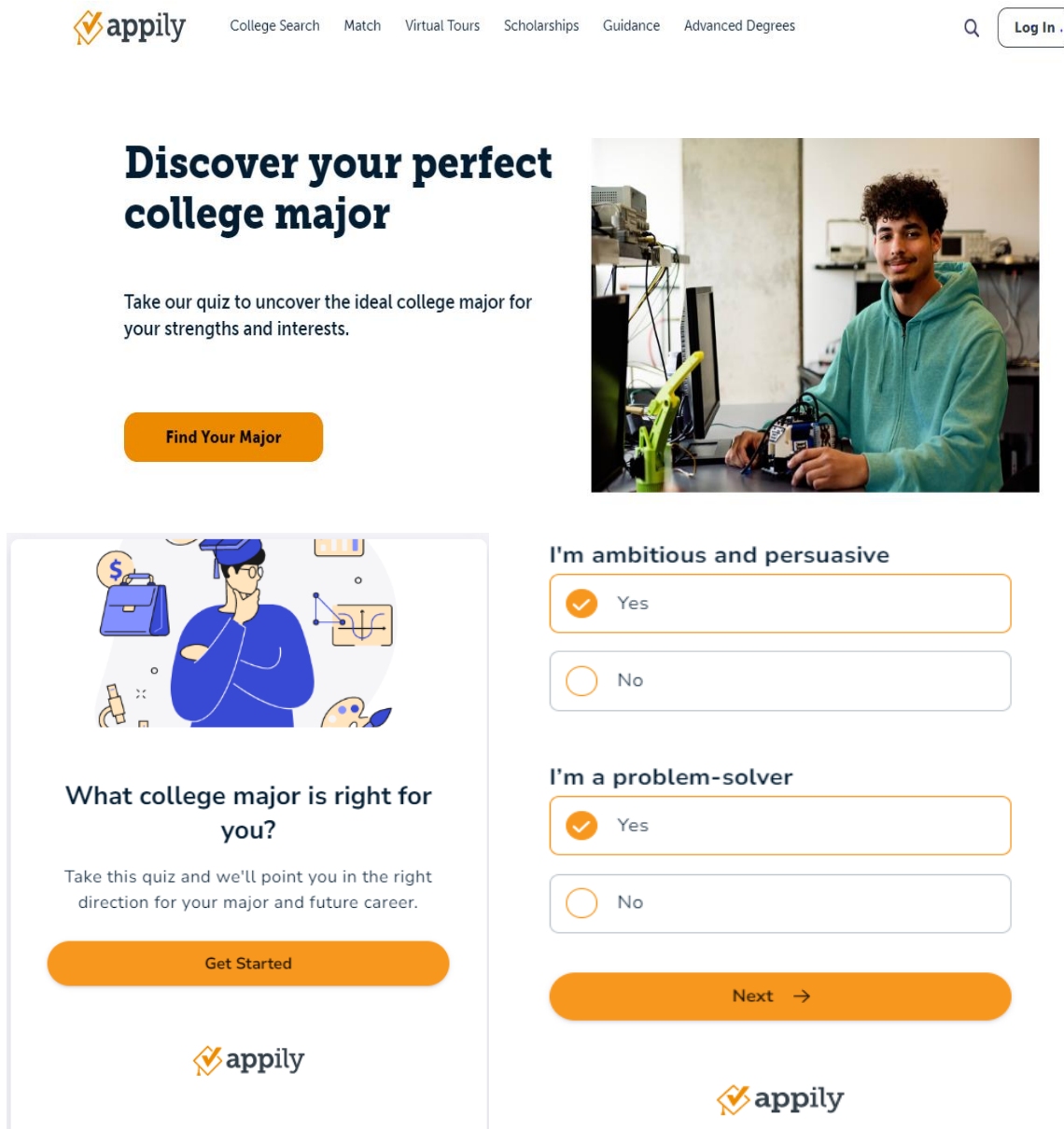
The fields of technology and information technology (IT) are experiencing continuous and rapid evolution, making them attractive destinations for many high school graduates seeking to enter this dynamic industry. However, these graduates face challenges in understanding their technical inclinations and determining the most suitable career path for them. This is where this project comes in, offering two interconnected services aimed at empowering these graduates and assisting them in building a successful career future in the field of information technology.

This first service is grounded in a deep understanding of students' inclinations towards technology, as we provide a comprehensive test that helps them identify their technical inclinations and guides them towards specializations that align with their abilities and interests. Through this test, we aim to provide personalized and specialized guidance to students, helping them make informed decisions about their career paths.

The second service, we aim to facilitate the job\training search process for graduates of IT fields, through a specialized platform that connects students and employers in this field. Providing a virtual environment that facilitates communication and information exchange between the two parties can significantly increase employment opportunities and enhance recruitment among graduates.

2.2 Existing Systems

- **My.appily.com**: This website designed for taking quizzes or assessments to help individuals discover more about themselves, possibly for career or personal development purposes. Users answer questions about their interests, skills, and preferences, and then receive personalized recommendations or insights based on their responses, as shown in figure (1) , [1].

- **Cercoltd.com**: This website for a company named "Cerco Ltd.". It likely includes information about the company's products or services in the technology industry, along with details about their job and training opportunities, and contact information. as shown in figure (2), [2].
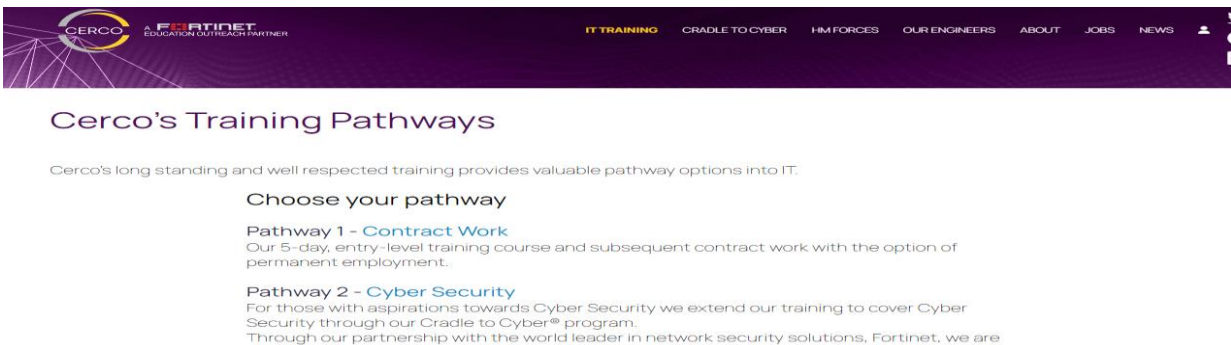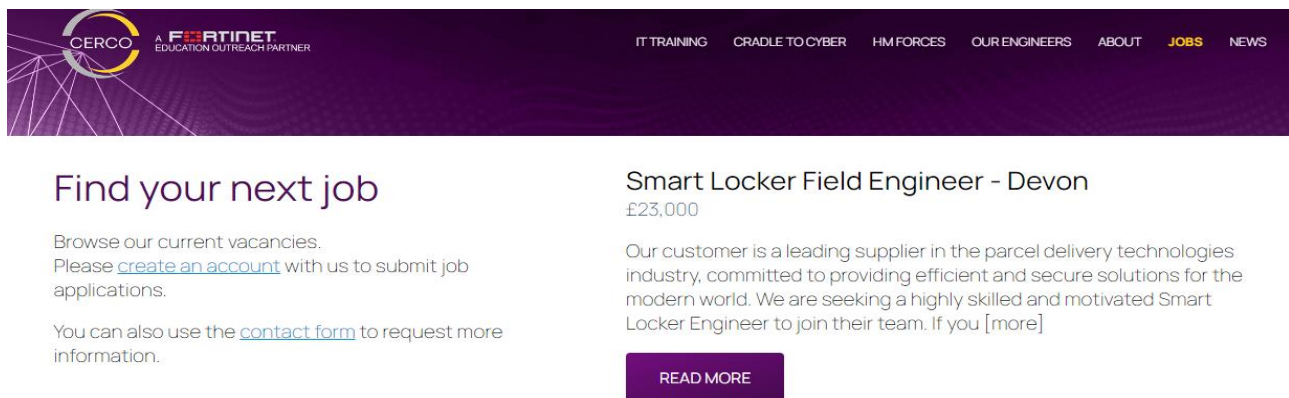
FIGURE (2): CERCOLTD.COM WEBSITE

2.3 Overall Problems of Existing Systems

1. Lack of Personalization: Many existing career guidance and job search systems offer one-size-fits-all solutions that do not adequately account for individual differences in skills, interests, and preferences. This can result in mismatches between students' abilities and chosen career paths.

2. Limited Accessibility: Some systems may not be easily accessible to all students, particularly those from underprivileged backgrounds or with disabilities. This lack of accessibility can hinder equal opportunities for all students to access career guidance and job search support.

3. Bias and Discrimination: Some systems may inadvertently perpetuate bias and discrimination, either through their algorithms or the content they provide. This can disadvantage certain groups of students, such as those from minority backgrounds or underrepresented communities, in their career development journey.

2.4 Overall Solution Approach

1. Personalized Guidance and Support: Develop a system that offers personalized career guidance and support to students based on their individual skills, interests, and preferences.

Utilize advanced assessment tools and algorithms to accurately identify students' strengths and match them with suitable career paths.

2. Enhanced Accessibility: Ensure that the system is accessible to all students, regardless of their background or abilities. Implement user-friendly interfaces and provide support for students with disabilities to ensure equal access to career guidance and job search resources.

3. Mitigating Bias and Discrimination: We employ well-established statistical methods to minimize the likelihood of bias in the analysis process. This approach effectively reduces the potential for unfairness or discrimination in the interpretation of student responses.

CHAPTER 3: REQUIREMENT ANALYSIS

This chapter includes the analysis of the functionalities and data used in the project. It summarizes the designer tasks carried out to the project team.

3.1 Stakeholders:

This figure (3) represents the methodology used in our system analysis to define, clarify, and organize system requirements. The main actors in our system are **Admin, Receptionist (System User), Student, Company.**[4].
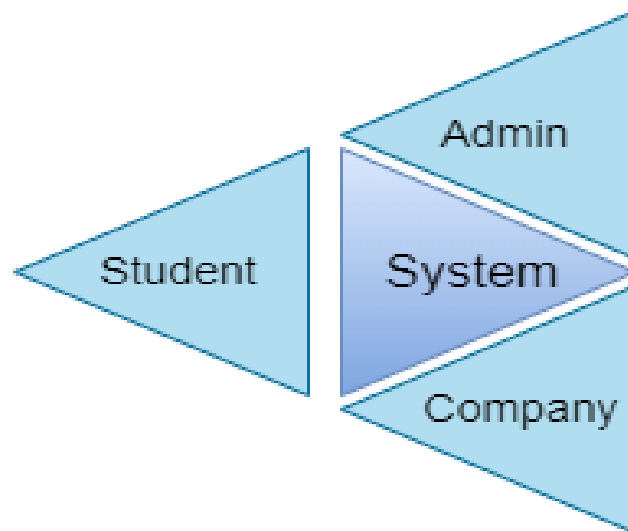
FIGURE (3): STAKEHOLDERS DIAGRAM.

2.1.1 (Admin)

1. can browse the website.
2. can log in to this website to use it.
3. can add/update/delete Jobs and Training
4. can Review the Jobs and Training
5. can log out from the website.

2.1.2 (Student)

1. can browse the website.
2. can register in this website to use it.
3. can log in to this website to use it.
4. can apply to Take a Test
5. can log out from the website.

2.1.3 (Company)

1. can register in this website to use it.
2. can log in to this website to use it.
3. can review the Job Applicants.
4. can log out from the website.
5. can add jobs and training and the admin can approve it or not.

3.1.1 Use Case Section

3.1.1.1 Admin Use Case Diagram shown in figure (4),[4].
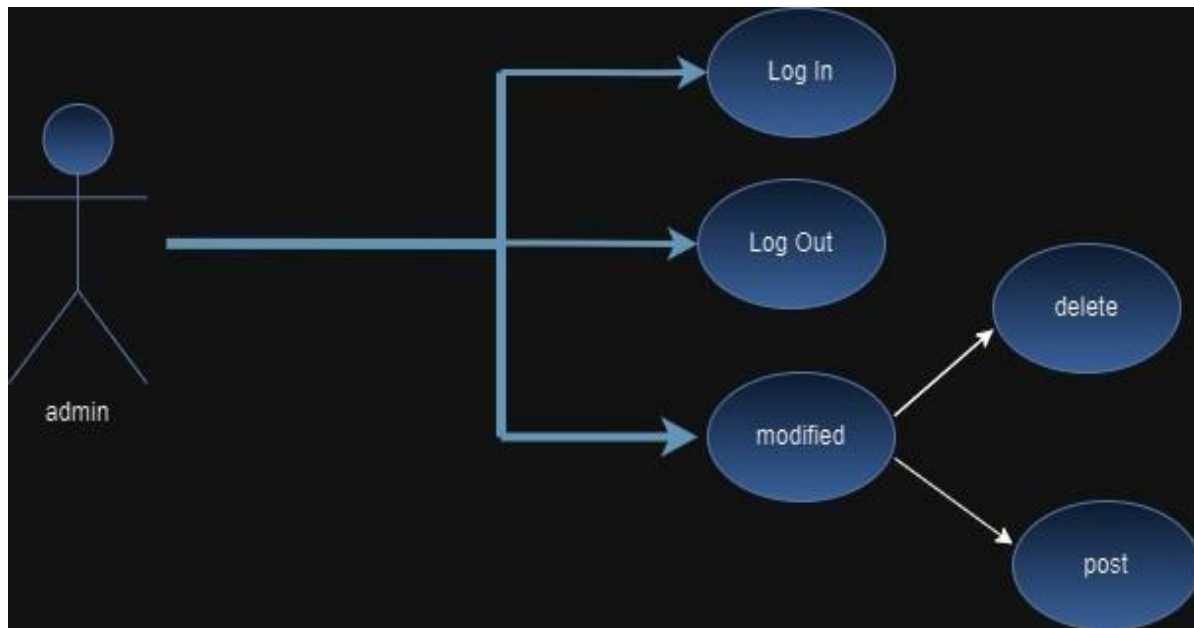
FIGURE (4): ADMIN USE CASE DIAGRAM

The admin works as the heart of the system, as his job is the mediator between the company

and the student.

3.1.1.2 Student Use Case Diagram shown in figure (5), [4].
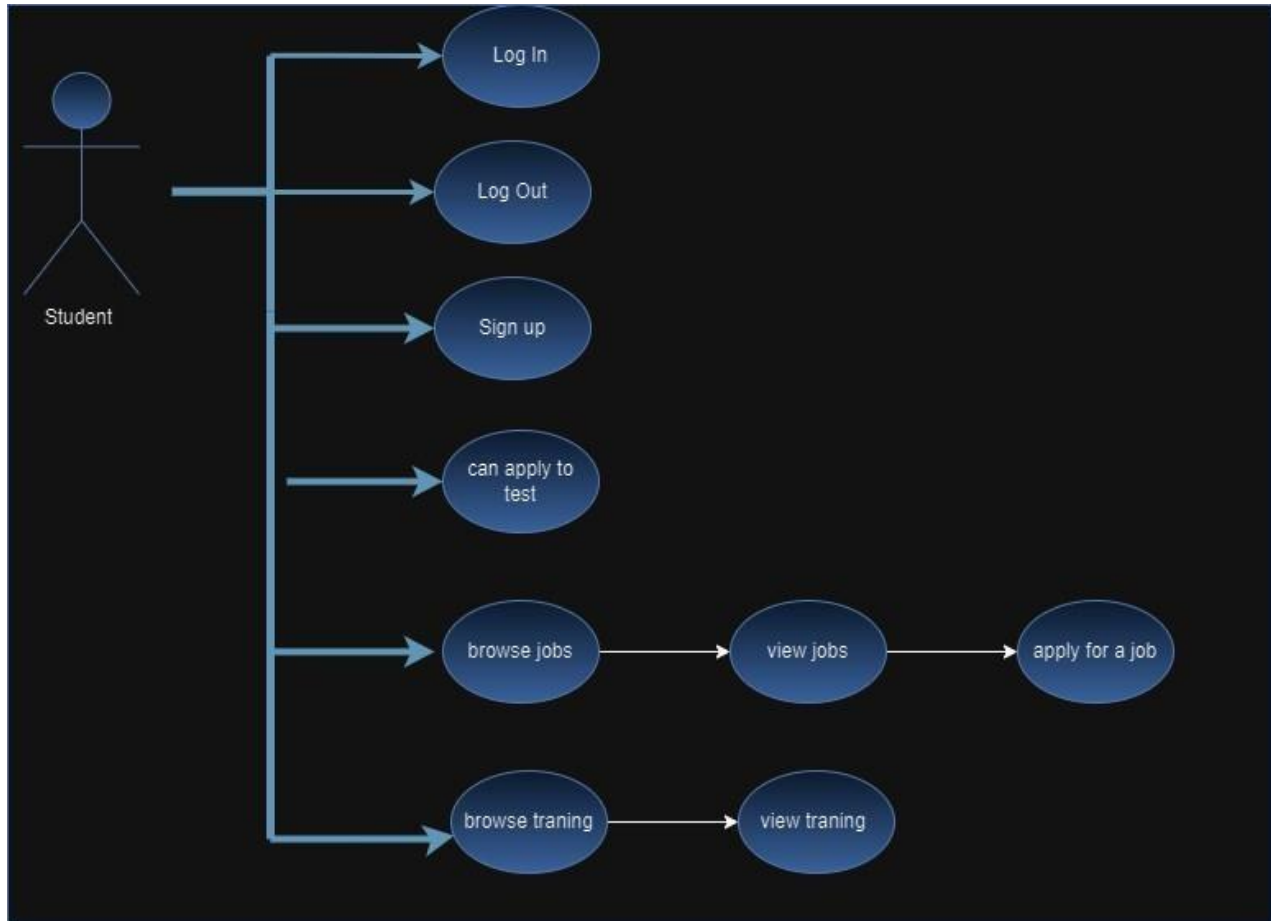
FIGURE (5): STUDENT USE CASE DIAGRAM

The student is the user who has the largest share of the system's functions and services, and the services provided to him are always subject to increase and development.

3.1.1.2 Company Use Case Diagram shown in figure (6), [4].
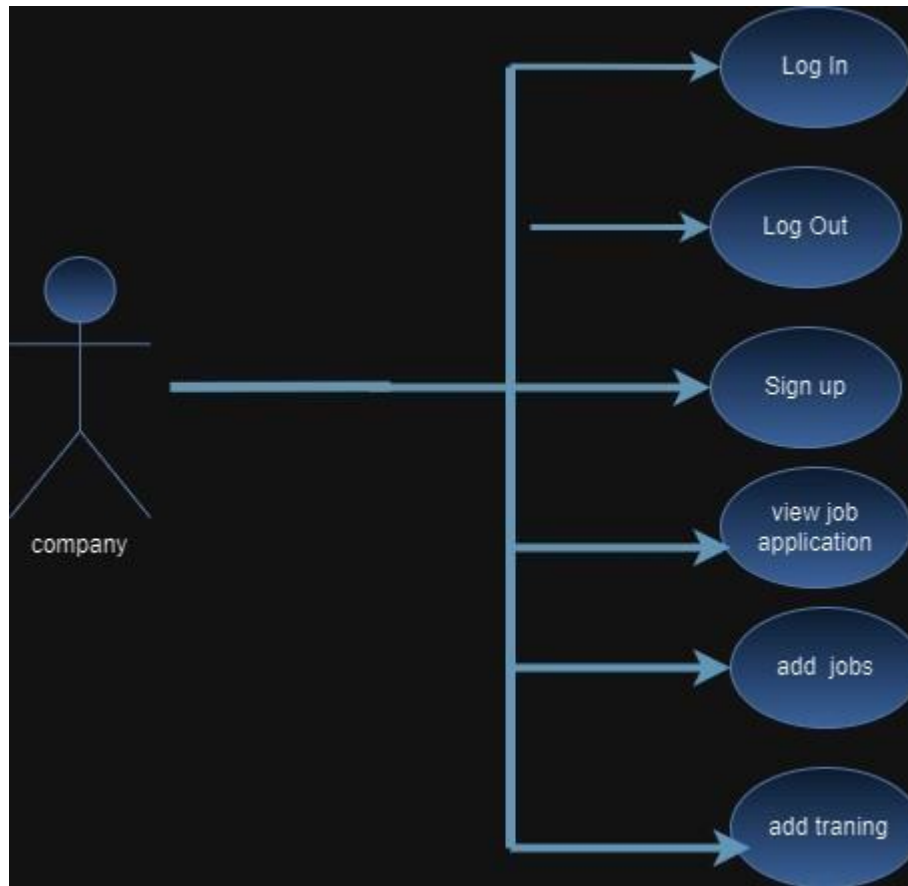
FIGURE (6): COMPANY USE CASE DIAGRAM

The company representative logs in to the platform and posts a job / training listing specifying job / training title, description, required qualifications, and other relevant details The company representative accesses the platform to review applications submitted by students for the posted job listing.

3.3 Non-Functional User Requirement

1. **Performance:** The system should run smoothly, even when many users are using it at the same time. It should be fast and responsive, especially when taking the IT aptitude test or searching for jobs**.**

2. **Security:** We need to keep all user information safe and private. This means encrypting data like test results and job applications so that only authorized people can access it. We also need strong login systems to prevent unauthorized access.

3. **Reliability:** Users should be able to rely on the system being available when they need it. We'll make sure the system doesn't go down often and that we have backups in case something goes wrong.

4. **Usability:** The system should be easy and intuitive to use. The IT aptitude test should be straightforward, with clear instructions, and the job search platform should be simple to navigate, making it easy to find relevant jobs.

5. **Scalability:** As more people use the system, it should be able to handle the increased load without slowing down or crashing. We'll design it to grow with the number of users and to handle peak times without any issues.

6. **Compatibility:** Users should be able to access the system from different devices and web browsers without any problems. We'll make sure it works well on computers, tablets, and smartphones, and that it's accessible to everyone, including those who use assistive technologies.

Chapter 4: Architecture and Design

4.1 overview

This chapter systematically breaks down the project, beginning with an explanation of how all the data is organized and detailing the main components of the system.

The goal is to provide a comprehensive understanding of how each part integrates into the whole, rather than focusing solely on individual functionalities. Subsequently, we will delve into the interactions between these components to illustrate the overall operation of the system.

 This chapter offers an overarching view of the program's architecture. Later sections will provide an in-depth exploration of specific elements, allowing for a detailed comprehension of the intricacies involved. We hope this structured approach facilitates a thorough understanding of our program's design.

Software (System) Architecture

4.2.1 Logical View

The system is based on working with three types of users, **Admin ,student(high school graduate , graduated student), company** each of whom has different permissions, so there are different functions for each user, shown in figure (7), [4].
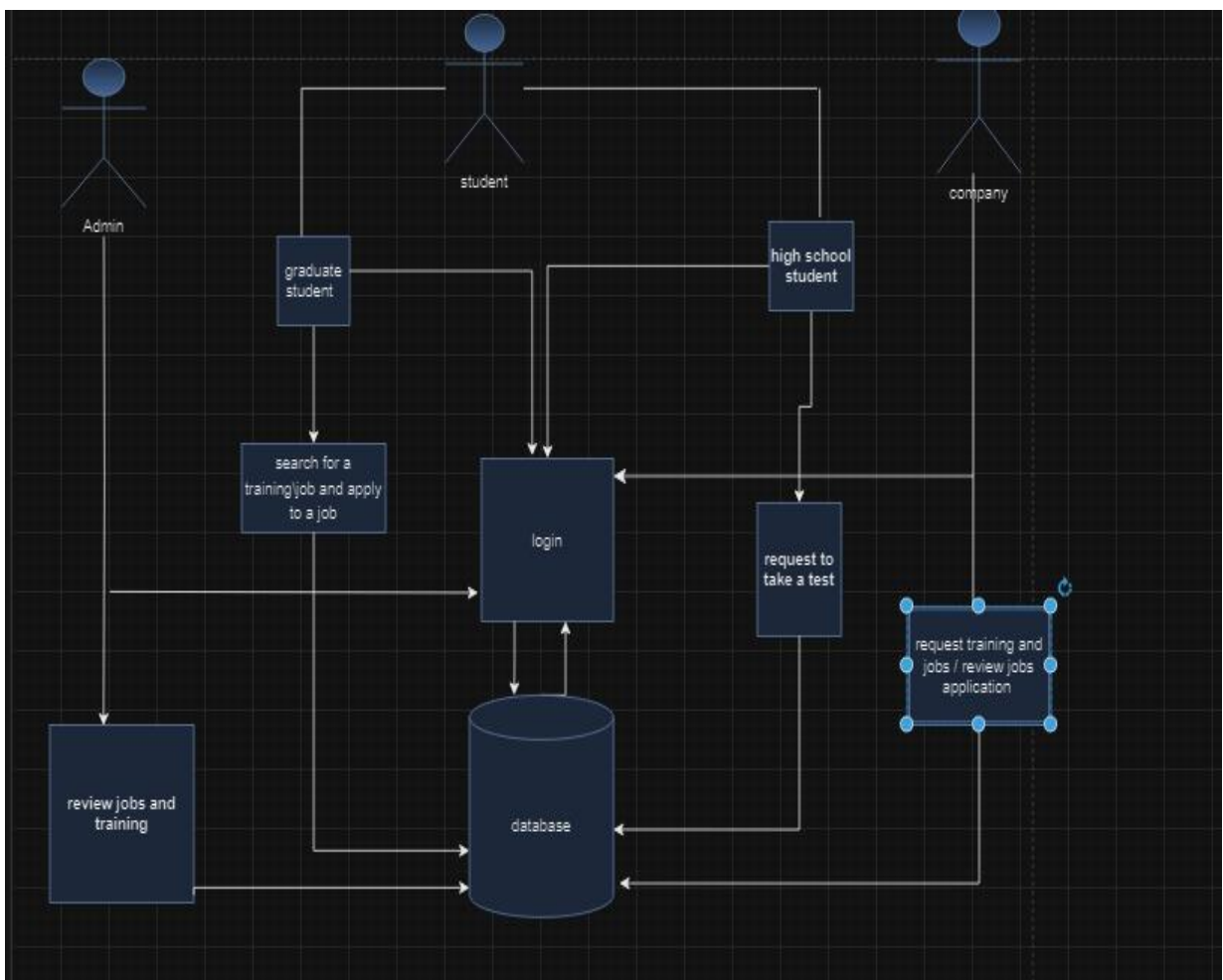
Figure (7): logical view

4.3 Software (System) Design

4.3.1 UML sequence/communication diagram

4.3.1.1 admin Sequence Diagram as shown in figure (8), [4].
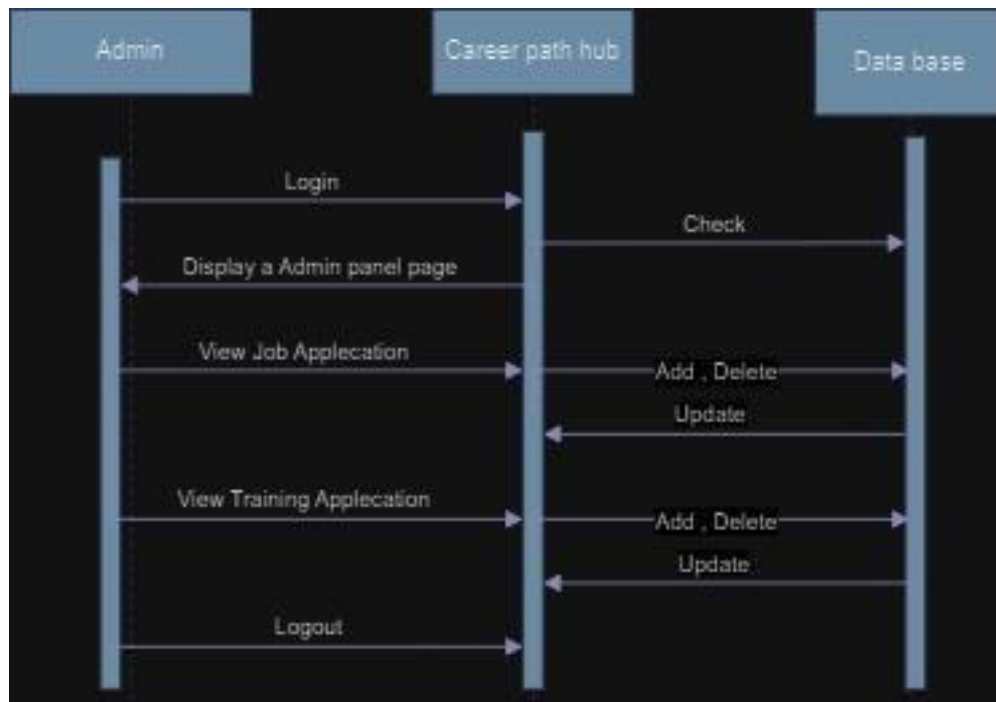
Figure (8): admin Sequence Diagram

The admin interaction with the system is summed up by operations of deletion and addition. it can considered to be the gateway to the beginning of everything, and the gateway to the end as well.

Student Sequence Diagram as shown in figure (9), [4].

Figure (9): Student Sequence Diagram

The student interaction with the system is represented in this figure such as signup, login and logout from the website and can track their progress, whether it's completing the test, applying for a job ,and view training list.

4.3.1.3 Company Sequence Diagram as shown in figure (10), [4].
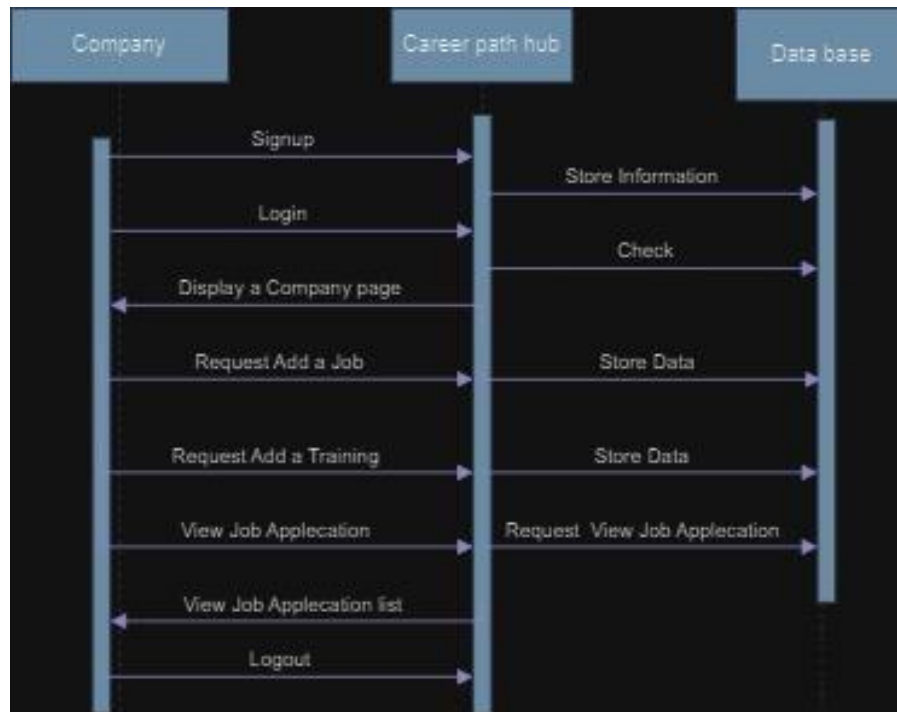
Figure (10): Company Sequence Diagram

The Company interaction with the system is explained in this figure by sign up, login and logout from the website. company can effectively utilize the platform to request to add job and training opportunities, review job applications.

4.3.2 Database Diagram Model as shown in figure (11), [4].
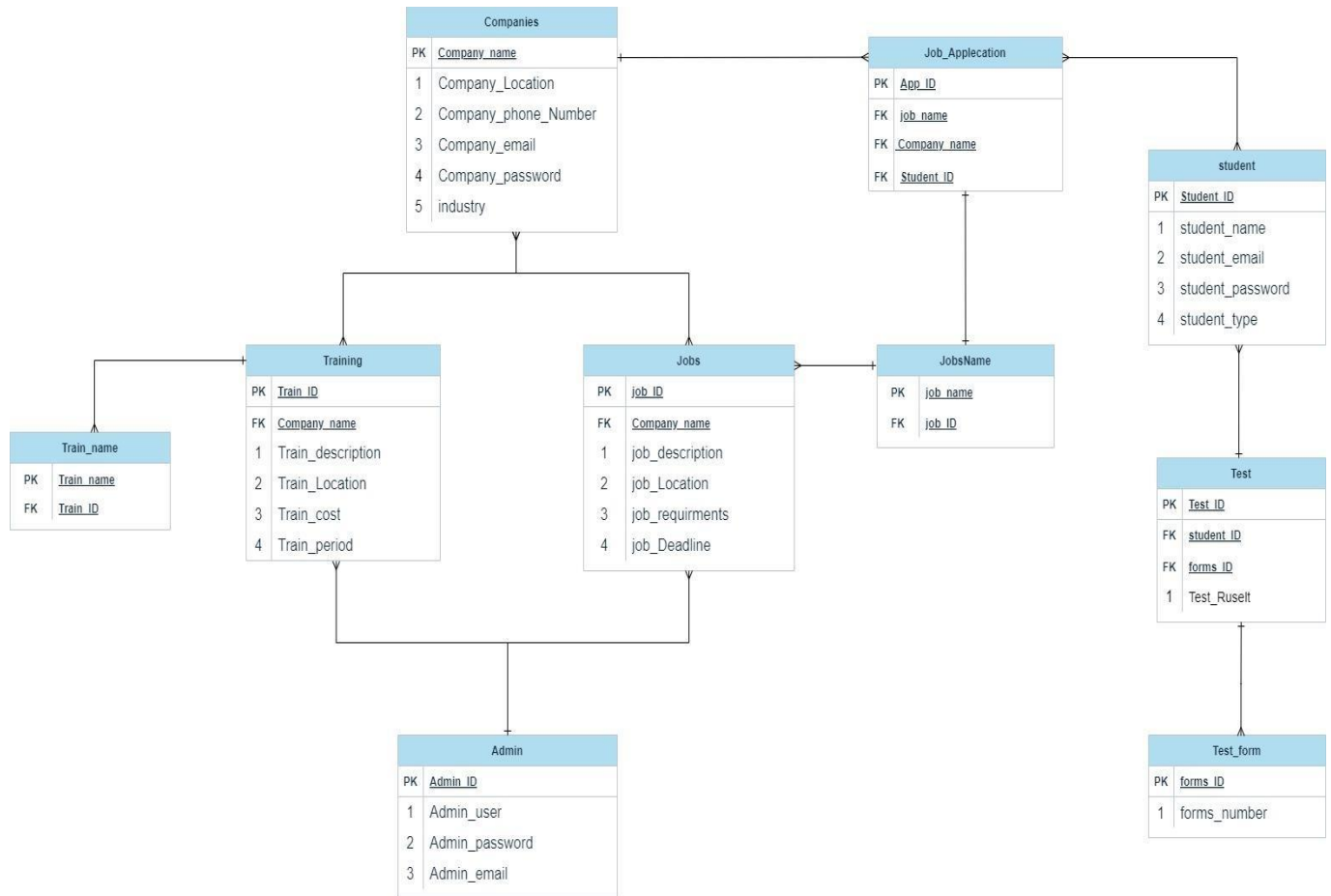
Figure (11): Database Diagram Model

The initial form, the system consists of 10 tables that can be increased based on future developments.

4.4 User Interface Design (prototype)
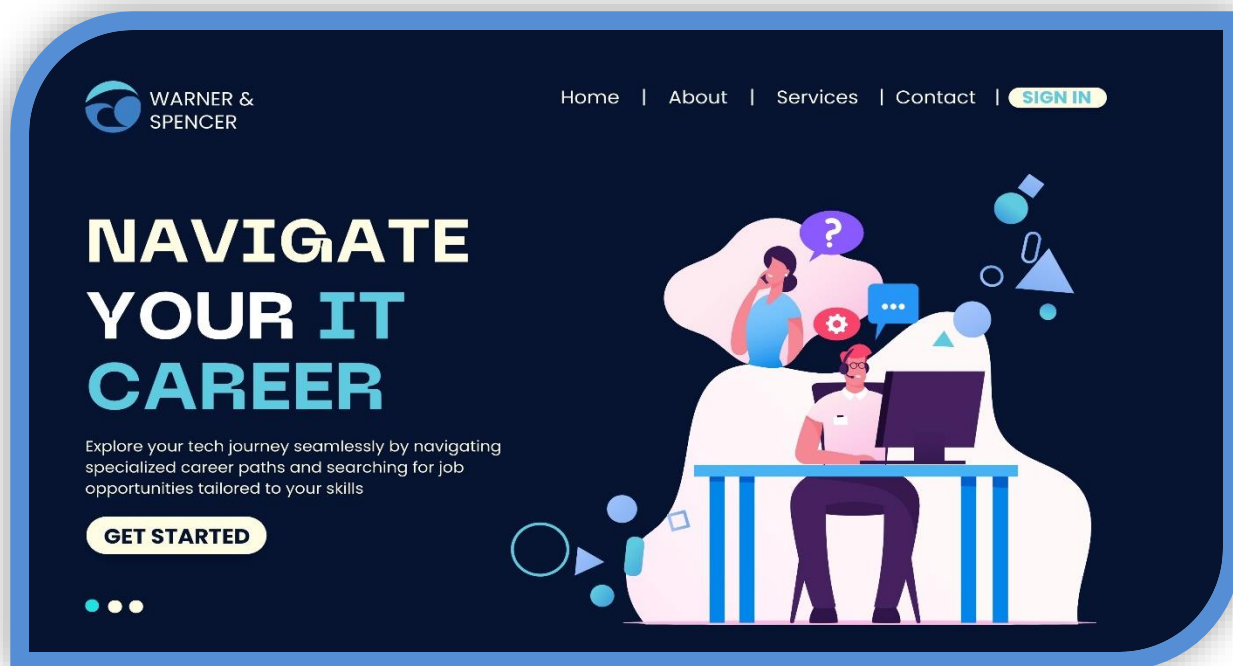
Figure (12) : homepage interface

Figure (13) : Jobs Section
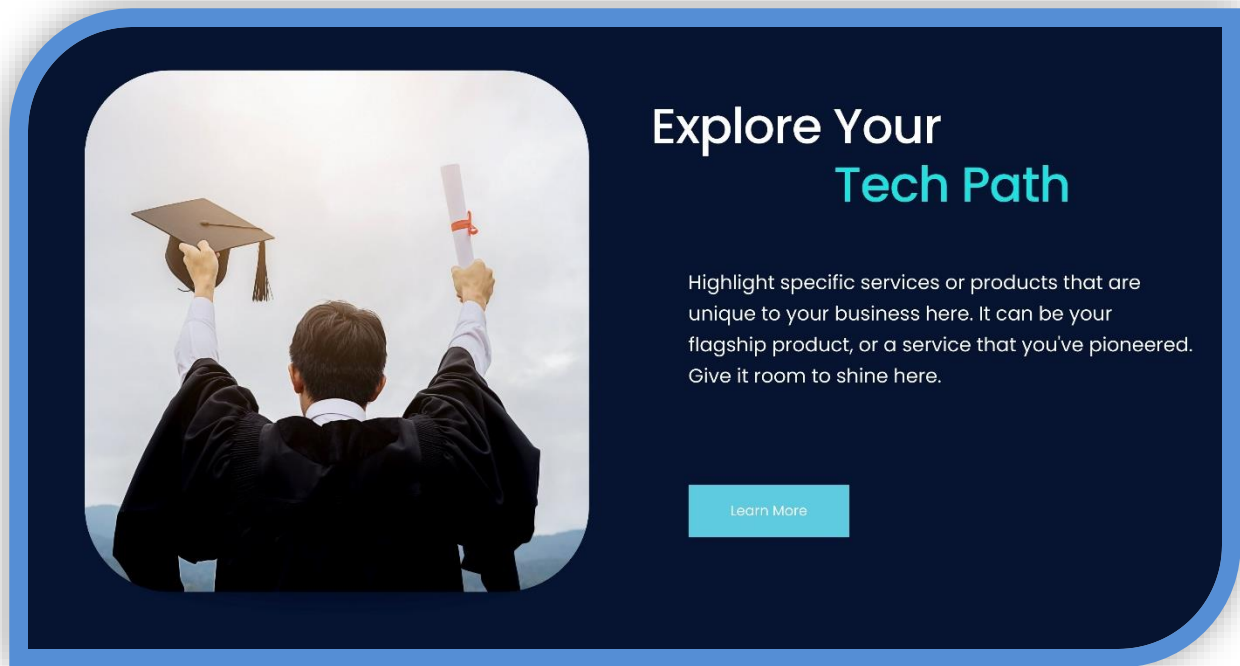
Figure (14) : Test Section
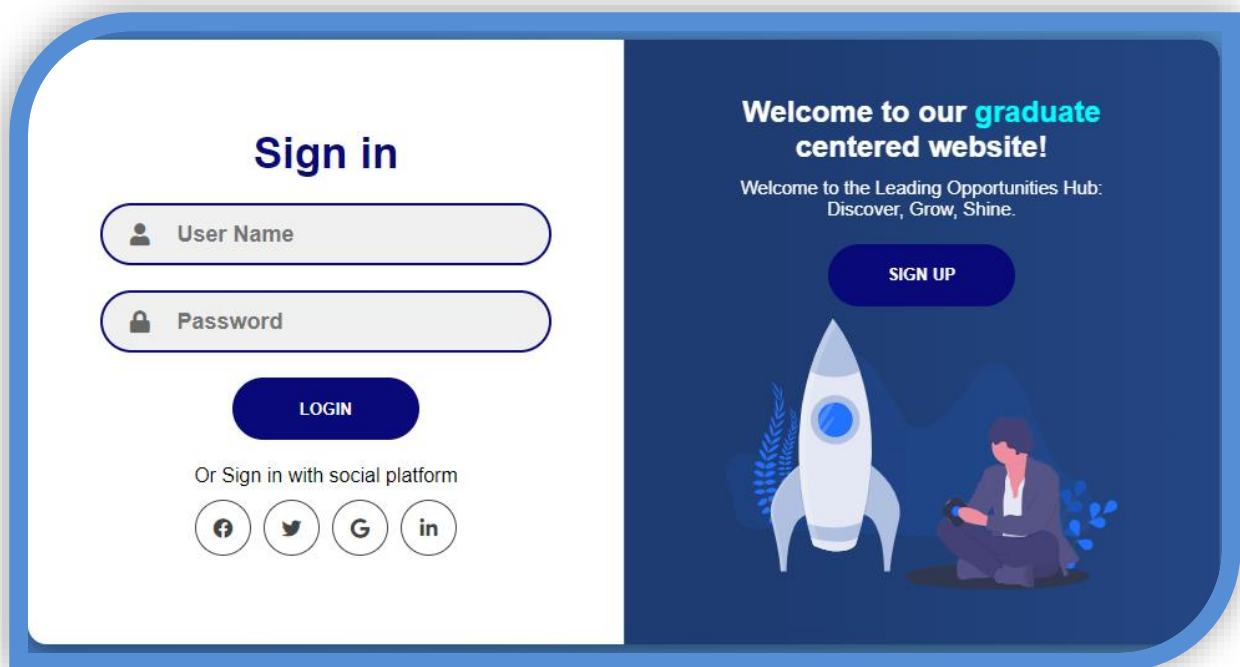
Figure (15) : Sign in for Student

Figure (16) : Sign up for Student
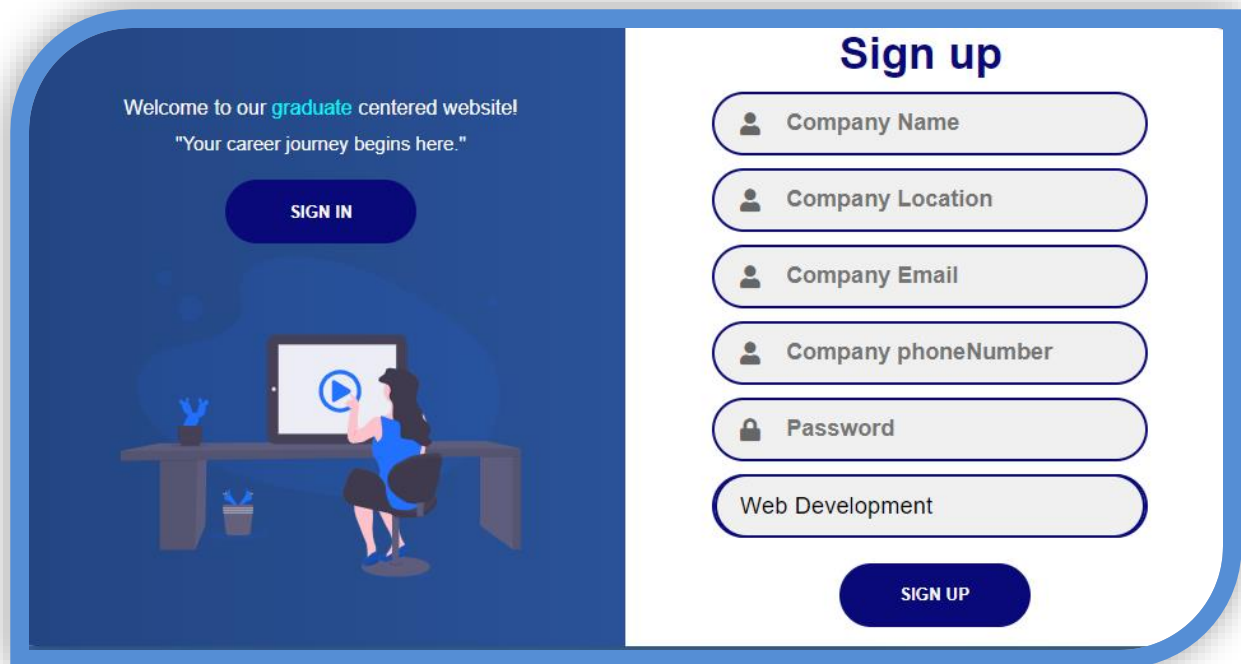
Figure (17) : Sign in for Company

Figure (18) : Sign up for Company

Figure (19) : Start the Test

Figure (20) : Test questions

We've analyzed your test responses and found that the best IT specialization for your career path is: **Computer Science.**

Based on your test analysis, we found that you enjoy solving mathematical problems like algebra and calculus and engaging in activities that require critical thinking, such as programming or robotics competitions. Thus, a **Computer Science major** is suitable for you, focusing on developing your programming and technology skills.

Figure (21) : Test results

Figure (22) : Job Search

Figure (23) : Job description

CHAPTER 5: IMPLEMENTATION PLAN

Description of Implementation

The project is a web application using Node.js for the backend and PostgreSQL for the database.
It offers two main services: a comprehensive test, [3]. for high school graduates to identify suitable IT
specializations and a job/training search platform for IT graduates. The frontend, built with HTML, CSS
(Tailwind CSS), and JavaScript, features interactive forms where users answer questions to determine.
their IT specialization. The backend processes these responses, calculates scores, and stores the results
in the PostgreSQL database. Visualizations, created with Chart.js, help users understand their test results.
The application also facilitates job and training searches, allowing users to find and apply for
opportunities. Security measures ensure user data protection, and the application is designed to be
responsive and accessible.

Programming language and technology

Front-End Design:

- HTML
- JavaScript
- CSS (Tailwind CSS)

Back-End Development:

- Node.js
- Express.js

Database:

- PostgreSQL

Charting Tools:

- Chart.js

Integrated Development Environment (IDE):

- Visual Studio Code

Using JavaScript and Node.js for back-end development provides a non-blocking, event-driven architecture that efficiently handles multiple concurrent connections, making it ideal for scalable and responsive web applications. Leveraging the vast ecosystem of libraries available through npm allows for rapid development and integration of various functionalities. Tailwind CSS, combined with HTML and JavaScript, simplifies the creation of interactive and visually appealing front-end designs with utility-first classes, ensuring consistency and maintainability. This combination allows for a highly customizable and responsive user interface that can adapt to various devices and screen sizes. PostgreSQL is chosen for its reliability and support for advanced queries, offering robust data management capabilities and ensuring data integrity and consistency through ACID compliance. Its powerful indexing and full-text search features enhance the performance and scalability of the application. Chart.js enhances the application by providing dynamic and interactive visualizations. of test results, aiding users in understanding their technical inclinations and specialization recommendations, thus improving user engagement and facilitating better decision-making. Visual Studio Code streamlines the development process with features like IntelliSense, debugging capabilities, and integrated Git control, while its extensive range of extensions further enhances productivity and provides a comprehensive toolkit for high-quality software development. The IDE's support for various programming languages and frameworks makes it a versatile tool for managing complex projects, fostering collaboration among development teams through features like live share and remote development support. Together, these technologies create a powerful and efficient environment for developing and maintaining the web application, ensuring a seamless user experience and streamlined development workflow.

Part of implementation if possible, as shown on figure (24), [5].

on figure (25), [6].

```
69   app.post('/loginStu', (req, res) => {
70     var User = req.body.Username;
71     var Userpassword = req.body.password;
72
73     if (User && Userpassword) {
74       pool.query("SELECT * FROM students WHERE student_name = $1 AND student_password = $2", [User, Userpassword], (error, results) => {
75         if (error) {
76           console.error('Error executing query:', error);
77           res.status(500).send('Internal Server Error');
78           return;
79         }
80         // users = [{username:User , password: Userpassword}];
81         console.log('Number of records found:', results.rows.length);
82
83         if (results.rows.length > 0) {
84           username.push(User);
85           Password.push(Userpassword);
86
87            console.log(username);
88            console.log(Password);
89
90           res.sendFile(path.join(intialPath, "homepage.html"));
91           } else {
92             res.sendFile(path.join(intialPath, "login.html"));
93             }
94       });
95     }
96   });
```

Figure (24): Login for Student & Fresh Graduate

```
// Define total score possible per specialization
const totalPointsPossible = totalPointsPossiblePerSpecialization * 6; // Six specializations

// Calculate raw percentages based on scores
const rawPercentages = scores.map(score => (score / totalPointsPossiblePerSpecialization) * 100);

// Normalize the percentages to sum to 100%
const sumRawPercentages = rawPercentages.reduce((acc, num) => acc + num, 0);
const normalizedPercentages = rawPercentages.map(p => (p / sumRawPercentages) * 100);

// Round percentages to two decimal places
const roundedPercentages = normalizedPercentages.map(p => Math.round(p * 100) / 100);

// Ensure the sum is exactly 100% by adjusting the highest value
let sumRoundedPercentages = roundedPercentages.reduce((acc, num) => acc + num, 0);
if (sumRoundedPercentages !== 100) {
    const difference = 100 - sumRoundedPercentages;
    const maxIndex = roundedPercentages.indexOf(Math.max(...roundedPercentages));
    roundedPercentages[maxIndex] += difference;
}
```

Figure (25): The process of Calculating percentage

CHAPTER 6: TESTING PLAN

Describe the scope, approach, resources and schedule of intended test activities. It identifies amongst others test items, the features to be tested, the testing tasks, test coverage, degree of tester independence, the test environment, the test design techniques and entry and exit criteria to be used, and the rationale for their choice.

6.1 Black-box

The black box testing technique is completely based on the software's requirements and specifications. The Functionality is tested without knowing the internal code structure and the implementation details, so it focuses on the software system's inputs and output. Table (3) concludes the tests that we applied to our application's

Components:

Test Case	Input	Expected Output
Prototype testing	Prototype testing	Connected prototype pages
Scenario simulation	Scenario of system usage	Handled the simulated scenario

Table (2): Black Box Testing Components

6.2 Postman

Postman is a versatile collaboration platform for API development, testing, and documentation. Originally known as a powerful API testing tool, it has evolved into a comprehensive ecosystem that supports the entire API development lifecycle. It provides developers, testers, and other stakeholders with a unified platform to design, develop, test, and document APIs.

Postman for Backend Testing:

By leveraging Postman for back testing on our clinic website, we can finally ensure the reliability, security and performance of our APIs. The tool's versatility and features make it an invaluable asset in the development and testing lifecycle, contributing to delivering a high-quality website.

➢ **Some future tests expected to be conducted by the postman:**

API Method	Response
Register New Student And Company	-
Login To System	-
Apply the Test	-
View Test Result	-
Add New Jobs And Training	-
View Jobs Details	-
Apply for the job	-

Table (3): Postman Testing Example

CHAPTER 7: CONCLUSION AND RESULTS

7.1 Summary of project

In today's rapidly evolving digital landscape, there remains a significant need to bridge the gap between education and employment, particularly in the IT sector. As IT students, we recognize the importance of supporting this transition. This project is dedicated to facilitating the career paths of both high school graduates and IT field graduates through two interconnected services.

The first service targets high school graduates with an interest in Information Technology (IT). By offering a comprehensive assessment, this help these students understand their technical aptitudes and guide them towards an IT specialization that best fits their skills and interests.

The second service is a job and training search platform specifically designed for IT graduates. This platform streamlines the search for employment and training opportunities, enabling graduates to find and apply for jobs that match their qualifications and career aspirations. Additionally, it connects them with relevant training programs to further develop their skills.

By promoting digital transformation and supporting career readiness, this project aims to create a more proficient and competitive IT workforce, ultimately contributing to the technological advancement of the society.

7.2 Summary of accomplished project

7.1.1 Determine requirements.
7.1.2 Analyze the system.
7.1.3 Conceptualization
7.1.4 Make a prototype.
7.1.5 Build Database

7.3   Future Work

- Code Frontend Screens by HTML, CSS, JavaScript

- Code Backend by using Node Js and PostgreSQL.

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6) https://javascript.info