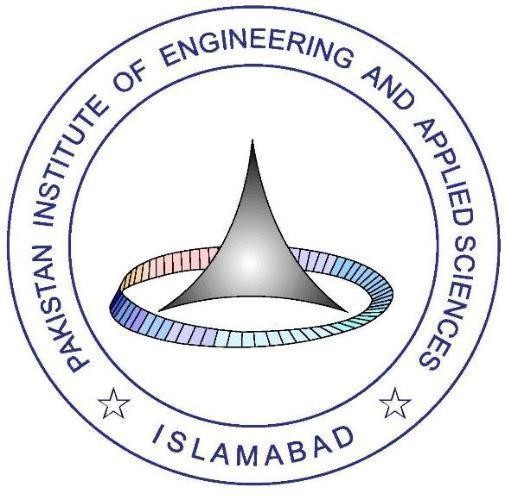
**Development of**

**Job Recruitment Portal**



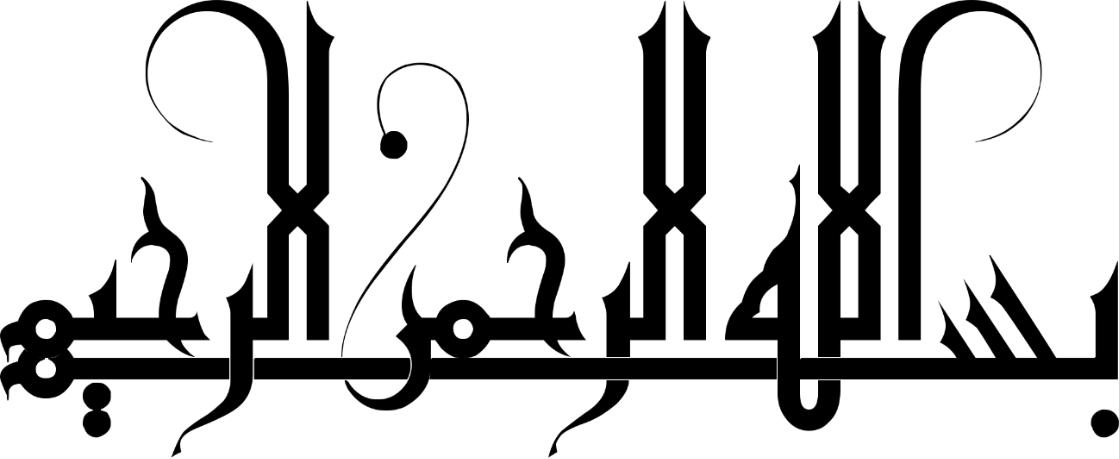
**Mohammad Ahsan Junaid**

**Abdul Rehman**

**Thesis submitted in partial fulfillment of requirements for the Degree of Bachelor of Sciences in Computer and Information Sciences**

**Department of Computer and Information Sciences, Pakistan Institute of Engineering & Applied Sciences, Nilore, Islamabad, Pakistan.**

**May, 2023**



***In the name of Allah, the Entirely Merciful, the Especially Merciful***

**Department of Computer and Information Sciences,**

**Pakistan Institute of Engineering and Applied Sciences, Nilore, Islamabad 45650, Pakistan**

**Declaration of Originality**

I hereby declare that the work contained in this thesis and the intellectual content of this thesis are the product of my own work. This thesis has not been previously published in any form nor does it contain any verbatim of the published resources which could be treated as an infringement of the international copyright law.

I also declare that I do understand the terms ‘copyright’ and ‘plagiarism,’ and that in case of any copyright violation or plagiarism found in this work, I will be held fully responsible for the consequences of any such violation.

**Certificate of Approval**

***This is to certify that the work contained in this thesis entitled***

**“Development of a Web Application, Job Recruitment**

**Portal”**

***was carried out by***

**Mohammad Ahsan Junaid**

**Abdul Rehman**

***Under our supervision and that in our opinion, it is fully adequate, in scope and quality, for the degree of BS Computer and Information Sciences from Pakistan Institute of Engineering and Applied Sciences (PIEAS).***

***Approved by:***

**Signature: Supervisor: *Dr. Anila Usman***

**Signature: Co-Supervisor: *Sir Irfan Hameed***

***Verified by:***

**Signature: Head, DCIS: Dr. Javaid Khurshid**

**Stamp:**

**This project is dedicated to our beloved family, teachers and friends, who offered us unconditional love and support throughout the course of this project.**

**Acknowledgement**

First and foremost, I would like to thank Allah, our sole creator, helper, guider, endower of everything that we have in our lives and forgiver for all the sins that we are guilty of committing. If it wasn’t for His enormous bounty, we would have never achieved anything in our lives and be lost.

I express my sheer appreciation to my supervisor Dr. Anila Usman. She has always been keen on helping and has provided me the guidance on every aspect concerning my project. Even with her grueling schedule she has always taken out time to clear away our doubts or solved any problem which impeded my work.

I also express my sheer appreciation to my co-supervisor, Sir Irfan Hameed. He has always been there for me whenever I needed him, and he has provided me with the necessary guidance on how to proceed with my project. He has helped me immensely in understanding the fundamentals of web development.

Lastly but most importantly I would express my eternal gratitude towards my parents who have always been our backbone throughout the years and have never let me down no matter what.

**Mohammad Ahsan Junaid**

**Abdul Rehman**

**PIEAS, Nilore, Islamabad**

**Table of Contents**

Contents

[Abstract 1](#_Toc135837438)

[Chapter 1: Introduction 2](#_Toc135837439)

[1.1. Problem Definition 2](#_Toc135837440)

[1.2. Proposed System 3](#_Toc135837441)

[1.3 System Functions 4](#_Toc135837442)

[Chapter 2: Literature and Tech Review 5](#_Toc135837443)

[2.1. Management Portal 5](#_Toc135837444)

[2.2. Programming Languages and Frameworks 5](#_Toc135837445)

[2.2.1. HTML 5](#_Toc135837446)

[2.2.2. CSS 6](#_Toc135837447)

[2.2.3. JavaScript 7](#_Toc135837448)

[2.2.4. Bootstrap 8](#_Toc135837449)

[2.2.5. PHP 8](#_Toc135837450)

[2.2.6. MySQL 8](#_Toc135837451)

[2.3. Softwares and Technologies Used 8](#_Toc135837452)

[2.3.1. XAMPP 9](#_Toc135837453)

[2.3.2. Visual Studio 9](#_Toc135837454)

[2.3.3. Apache 9](#_Toc135837455)

[2.3.4. Github 9](#_Toc135837456)

[2.3.5. phpMyAdmin 9](#_Toc135837457)

[2.3.6. 000WebHost 10](#_Toc135837458)

[Chapter 3: Software Design & Architecture 11](#_Toc135837459)

[3.1. System Overview 11](#_Toc135837460)

[3.2 Functional Requirements 11](#_Toc135837461)

[3.3 Non Functional Requirements 11](#_Toc135837462)

[3.4 System Architecture 12](#_Toc135837463)

[3.5. Database Design 13](#_Toc135837464)

[3.6. UI Design 14](#_Toc135837465)

[3.6.1 User Needs 14](#_Toc135837466)

[3.6.2. Assumptions: 14](#_Toc135837467)

[3.7. Scope 14](#_Toc135837468)

[3.7.1. User Management 14](#_Toc135837469)

[3.7.2. Departments in the System 14](#_Toc135837470)

[Chapter 4: Implementation 15](#_Toc135837471)

[4.1. Technology & Tools Used 15](#_Toc135837472)

[4.2. Front End Development 15](#_Toc135837473)

[4.2.1. Entities 15](#_Toc135837474)

[4.3. Backend Development 16](#_Toc135837475)

[4.3.1. How to Calculate Workload? 16](#_Toc135837476)

[4.3.2. How to Handle Workload Weights? 16](#_Toc135837477)

[4.4. Database Structure 17](#_Toc135837478)

[4.4.1. Home Page 17](#_Toc135837479)

[4.5. Web Hosting 17](#_Toc135837480)

[4.4.2. Home Page 17](#_Toc135837481)

[Chapter 5: Structure 18](#_Toc135837482)

[5.1. Front End Structural Diagram 18](#_Toc135837483)

[5.2. Backend and Database Diagrams 18](#_Toc135837484)

[5.2.1. ER Diagram 18](#_Toc135837485)

[5.1.1. Use Case Diagram 18](#_Toc135837486)

[5.1.1. Sequence Diagram 18](#_Toc135837487)

[5.1.1. Relational Schema 18](#_Toc135837488)

[Chapter 6: User Roles 19](#_Toc135837489)

[6.1 . Administrator 19](#_Toc135837490)

[6.2 . Employer 19](#_Toc135837491)

[6.2.1 ER Diagram 19](#_Toc135837492)

[5.1.2. Use Case Diagram 19](#_Toc135837493)

[5.1.2. Sequence Diagram 19](#_Toc135837494)

[6.3 . Applicant / Candidate 19](#_Toc135837495)

[Chapter 7: Conclusion and Future Works 20](#_Toc135837496)

[7.1. Conclusion 20](#_Toc135837497)

[7.2. Future Works 20](#_Toc135837498)

[References 21](#_Toc135837499)

[Appendix B – React JS Installation and Setup 24](#_Toc135837500)

[Appendix C – Libraries Used in Project 26](#_Toc135837501)

[● Bootstrap 26](#_Toc135837502)

**Table of Figures**

[Figure 2.1. HTML Page 5](#_bookmark11)

[Figure 2.2. CSS Code 6](#_bookmark13)

[Figure 2.3. Salient Features of React JS 8](#_bookmark18)

[Figure 2.4. Collections in MongoDB 9](#_bookmark20)

[Figure 3.1. Intended Use of the System 10](#_bookmark25)

[Figure 4.1. Employee Entity 19](#_bookmark60)

[Figure 4.2. Course Entity 20](#_bookmark61)

[Figure 4.3. Workload Entity 20](#_bookmark62)

[Figure 4.4. Payment Entity 21](#_bookmark63)

[Figure 4.5. ER Diagram of the System 22](#_bookmark65)

[Figure 4.6. User Interface Structure 23](#_bookmark67)

[Figure 4.7. Home Page 25](#_bookmark75)

[Figure 4.8. Employee Page 26](#_bookmark77)

[Figure 4.9. Add Employee Page 26](#_bookmark79)

[Figure 4.10. Edit Employee Page 27](#_bookmark81)

[Figure 4.11. Course Page 28](#_bookmark84)

[Figure 4.12. Add Course Page 28](#_bookmark85)

[Figure 4.13. Edit Course Page 29](#_bookmark88)

[Figure 4.14(a) Workload Page 30](#_bookmark89)

[Figure 4.14(b) Workload Page 31](#_bookmark90)

[Figure 4.15. Add Workload Page 32](#_bookmark92)

[Figure 4.16. Edit Workload Page 33](#_bookmark95)

[Figure 4.17. Payment Page 34](#_bookmark97)

[Figure 4.18(a) Report Page 35](#_bookmark98)

[Figure 4. 18(b) Report Page 35](#_bookmark99)

[Figure 4.18(c) Report Page 36](#_bookmark100)

[Figure 4.18(d) Report Page 36](#_bookmark101)

[Figure 4.19(a) Configuration Page 37](#_bookmark103)

[Figure 4.19(b) Configuration Page 38](#_bookmark104)

[Figure 4.19(c) Configuration Page 39](#_bookmark105)

# Abstract

The Job Recruitment Portal is a comprehensive web-based platform designed to help employers and applicants streamline the job recruitment process. The portal aims to connect job seekers and employers through an efficient and user-friendly interface, facilitating seamless job search, application, and selection procedures. The administration, employers, and applicants are the three main actors in the system. As the super user, the admin has the authority to manage the database, monitor system statistics, and perform other administrative tasks. Employers can post job openings, review applicant profiles, select or reject applicants, and download resumes as well as contact applicants through the in-built mailbox. Applicants, on the other hand, can search available job listings, apply for relevant positions, and showcase their qualifications through resume submissions. The Job Recruitment Portal aims to improve the efficiency and effectiveness of the job recruitment process for both employers and applicants by providing a centralized platform for job posting and application management. To ensure a robust and password protected secure system, the project employs a number of technologies and frameworks. We investigate the design, development, and evaluation of the Job Recruitment Portal, as well as its performance and potential future enhancements, in this thesis. The outcomes demonstrate the system's effectiveness in facilitating seamless job recruitment procedures and improving the overall experience for both employers and applicants.

# Chapter 1: Introduction

The Job Recruitment Portal aims to revolutionize the job recruitment process by providing employers and applicants with a user-friendly and efficient platform. Traditional methods of recruitment frequently result in delays, inefficiencies, and missed opportunities. This project addresses these issues by providing a centralized system with three primary actors: administrator, employers, and applicants. The database and system statistics are managed by the administrator, while employers can post jobs, review applicants, and download resumes. Applicants can look for jobs and apply for them. The portal makes use of technologies and frameworks to ensure a stable system. The focus of evaluation is on performance, usability, and user satisfaction. The findings contribute to the field of job recruitment and provide guidance for future improvements. The goal is to improve the overall experience for employers and applicants by streamlining the recruitment process, saving time and effort.

## Problem Definition

Traditional recruitment methods frequently face a number of challenges that impede the process's efficiency and effectiveness.

* Handling a large volume of job applications manually is time-consuming and labor-intensive, resulting in delays and potential oversight of qualified candidates.
* Job seekers struggle to find relevant opportunities among numerous sources, resulting in potential positions being missed.
* The lack of standardized formats for resumes and job postings makes objective candidate evaluation and decision-making difficult.
* Without a centralized system, employers struggle to effectively track and manage applications.
* Limited Reach and Narrow Candidate Pool: Conventional techniques, such as newspaper ads or physical job postings, may only reach a narrow pool of individuals. Due to this, there may be a lack of diversity and skilled applicants who are not actively looking for work through conventional routes may go unnoticed.
* High costs: Conventional hiring practices can be pricey, including participating in job fairs and newspaper advertising. Advertising, travel, and other associated costs may require organizations to set aside large sums. This can be difficult, especially for startups and small businesses with scarce resources.
* The management of applications, paperwork, and communication can be inefficient and prone to mistakes when done manually. Traditional techniques frequently lack automated components.

## Proposed System

The solution for this is a modern “Job Recruitment Portal”, As the world moves on to a digital era, searching for Jobs or finding the right Employee for one, like all other aspects of daily life, are being shifted to be online, saving time, human resources, accessible and providing ease of use. We intended to create a platform that will automate the process where organizations can put up job vacancies, where applicants can go through them and apply in the right job.

Where employers would have the ease of checking through CV’s and selecting the suitable candidates etc. And applicants will find a platform that will allow them to apply in multiple jobs according to their qualifications easily as well as get side-by-side updates.

It is web-based platform, with a good UI/UX having a Landing page, Job Vacancies Page from where one can apply into preferred job after registering with the system as an applicant where email validation shall be done, then provide data and upload their CV and apply for jobs they want, they can also search by the search bar and apply search filters for their needs like locations, experience requirements etc. Employers would have access to a job posting page where they set the requirements and the details of the job like title, salary, details etc. This system has a database for all records of jobs i.e. Job Titles (with details), Applications (CV attached, Data provided) as well as details of users such as employers, and most importantly the applicants like their Names, CNIC, Addresses, Qualifications, and so on.

To secure all this data and avoid mishaps, security measures will be taken starting off with proper Authorization being implemented like access-controls over user types, where an applicant can only view, update his/her own data rather than having access of others, the employer only accessing data of applicants who have applied to his posted job, Admin having access of everything including the database etc.

Applicants/Candidates can apply in one or more jobs with easy without entering same data (name, CNIC, Addresses etc.) again for each job they apply. On the employers end they can check all the applications to a certain job, contact applicants regarding concerns through in-built communication channel and download CV’s and data of applicants for further processing if needed.

## 1.3 System Functions

The following are key system functions:

* **User Registration and Login Authentication:**

Employers and Applicants can register and create accounts on the portal, that are password protected and encrypted in database, hence even admin cannot see them.

User login authentication ensures secure system access and protects user data.

* **Job Posting and Management:**

Employers can create and post job openings, describing the job's details and requirements.

As needed, job listings can be edited, updated, or removed.

* **Filtering and Job Search:**

Applicants can use specific criteria to search for available jobs. Filtering options allow applicants to refine their search results and find relevant job opportunities.

* **Management of Applicant Profiles:**

Employers can review applicant profiles, including resumes, can establish contact if they have applied to any job posting by that employer.

* **Candidate Selection:**

Based on their suitability for the job, employers can mark applicants as selected / rejected.

Selected candidates can be contacted for interviews, assessments, or other stages of the selection process through the in-built mailbox.

* **Download Resume/CV:**

Employers can download applicants' resumes or CVs for offline review or further evaluation.

* **Management and the Admin Dashboard:**

The system administrator has access to a comprehensive dashboard for system management.

Admin functions include approval of employer account, managing users, databases, and generating system statistics. Admin reserves rights to delete any posted job, or employer account as well from here.

* **In Built Mailbox:**

The in-built mailbox offers applicants and employers to communicate any misunderstandings or important notices and details.

* **Change Password / Deactivate Accounts:**

Employers and applicants can both use this option to modify their passwords inside the portal. To ensure account security, users can reset their passwords and access their account settings. Users are also able to deactivate their accounts within the portal.

# Chapter 2: Literature and Tech Review

Chapter 2 contains many basic concepts, technologies and frameworks that are significant in the conduct and development of the project titled “*Information System for Managing Visiting Faculty / Teaching Assistants”.*

## Management Portal

Information systems are large, linked collections of information, data and processes. They are employed in virtually every element of human life, business, and industry.

The phrase "information system" in technology refers to any tool or information system that facilitates the gathering and utilization of data. Information systems can be utilized to give aid inside a company or for personal benefit.

A good information system enables the user to quickly access, comprehend, and react to information. Users get access to the most up-to-date information whenever they need it to complete a task.

## Programming Languages and Frameworks

In this section, different technologies and tools that can be used to develop this information system are discussed.

### HTML

A common markup language for building and organizing web pages is HTML (Hypertext Markup Language). It offers a collection of tags that specify the organization and display of content on the internet. Text, images, links, forms, and other elements can all be included in HTML and displayed in a web browser. It offers a logical, hierarchical structure that enables web designers to efficiently organize and format the content. Developers can use HTML to build semantically sound web pages that are compatible with assistive technology and search engines. Along with JavaScript and CSS (Cascading Style Sheets), HTML is a core language used in modern web development. All of the main web browsers support it, ensuring cross-platform compatibility.

### CSS

CSS is a style sheet language that is used to describe the presentation and formatting of HTML and XML documents. It provides a set of rules and properties that control how web pages look visually. CSS allows web designers to separate a webpage's content from its presentation, providing greater flexibility and consistency across multiple pages. Designers can define various aspects such as colours, fonts, layout, and animations by applying CSS to HTML elements. CSS encourages efficient web development by allowing the reuse of styles across different pages, making it easier to maintain and update a website's overall design. It works with HTML to create visually appealing and responsive web pages. Web designers have precise control over the aesthetics of their websites with CSS, which improves the user experience and overall presentation of content.

### JavaScript

JS (JavaScript) is an interpreted high-level programming language that is primarily used to add interactivity and dynamic behavior to web pages. All modern web browsers support it, allowing developers to create interactive elements, perform calculations, manipulate web page content, and respond to user actions in real-time. JavaScript can be embedded directly within HTML documents or included as separate files, improving website functionality and user experience. It includes event handling, DOM manipulation, AJAX for asynchronous communication, and the ability to create interactive web applications. It is a versatile language that can be used in server-side environments, mobile app development, and other software projects in addition to web development.

### Bootstrap

Bootstrap is a popular front-end framework for developing responsive and mobile-first websites. Bootstrap, created by Twitter, is a collection of pre-designed templates, CSS styles, and JavaScript components that make it easier to create modern and visually appealing web pages. It uses a grid-based layout system, which allows developers to easily arrange and align page elements. Bootstrap also includes a plethora of reusable user interface components, such as navigation bars, buttons, forms, modals, and carousels, that can be easily customized and integrated into web projects. Because it is built with HTML, CSS, and JavaScript, it is compatible with all modern web browsers. Bootstrap provides developers with a time-saving and efficient solution for creating responsive and professional-looking websites, thanks to its extensive documentation and active community support. It encourages consistency, responsiveness, and cross-browser compatibility, making it an ideal choice for both novice and experienced web developers.

### PHP

PHP (Hypertext Preprocessor) is a popular server-side scripting language that is used in web development. It is primarily used for the development of dynamic and interactive web pages and web applications. PHP code is embedded directly into HTML, allowing developers to seamlessly mix logic and presentation. PHP is a versatile programming language that can interact with databases, handle form data, generate dynamic content, and perform a variety of server-side tasks. It is supported by the majority of web servers and runs on a variety of operating systems, making it extremely accessible. PHP includes a large number of built-in functions and libraries that help to simplify common web development tasks. Its open-source nature fosters a large and active community, resulting in a wealth of resources, frameworks, and plugins that aid in development. PHP allows developers to create robust and scalable web applications that power some of the internet's most popular websites.

### MySQL

MySQL is a relational database management system (RDBMS) that is free and open source that allows for the efficient storage, management, and retrieval of structured data. It is widely used in web applications and is an essential component of many websites' and systems' backend infrastructure. MySQL employs a client-server architecture, in which the server manages and stores data, while clients (such as applications or websites) interact with the server to perform various database operations. MySQL provides a robust and scalable solution for data-driven applications by supporting SQL (Structured Query Language) for querying and manipulating data. It includes data security, transaction support, and support for a variety of data types and indexing mechanisms. MySQL is well-known for its speed, dependability, and simplicity of use, making it a popular choice for both small-scale projects and enterprise-level applications. It is compatible with a variety of operating systems and works well with a variety of programming languages and frameworks, making it a versatile and powerful database management tool.

## Softwares and Technologies Used

In this section, different technologies and tools that can be used to develop this portal are discussed.

### XAMPP

XAMPP is a free and open-source software package that includes everything needed to set up a local web server environment. "XAMPP" is an abbreviation for cross-platform (X), Apache (A), MariaDB (M), PHP (P), and Perl (P). It contains all of the components required to run dynamic web applications on a local machine, making it an excellent choice for developers and web designers. XAMPP is a pre-configured package that includes the Apache web server, the MariaDB (formerly MySQL) database management system, the PHP scripting language, and the Perl programming language. It also includes tools for database administration, such as phpMyAdmin, and a file transfer server, FileZilla. XAMPP works with a variety of operating systems, including Windows, macOS, and Linux. It makes it easier to set up a local development environment, allowing users to test and debug web projects before deploying them to a live server. Because of its ease of installation, comprehensive feature set, and community support, XAMPP is widely used by both developers and beginners.

### Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) that offers a comprehensive set of tools and features for software development. It supports a wide range of programming languages and frameworks, including C#, C++, Visual Basic, and.NET. Visual Studio is an easy-to-use and highly productive environment for developing, debugging, and deploying applications across multiple platforms and devices. It has code editors, project management tools, integrated debugging capabilities, and a large collection of libraries and extensions. Visual Studio also integrates seamlessly with source control systems, allowing developers to effectively collaborate on projects. Visual Studio has become a go-to choice for professional developers and students alike, thanks to its powerful features, extensive documentation, and supportive community. Visual Studio provides the tools and resources needed to streamline the development process and deliver high-quality software, whether you're creating desktop applications, web applications, mobile apps, or cloud-based solutions.

### Apache

If Apache, also known as Apache HTTP Server, is a popular open-source web server. It is one of the most widely used and long-lasting web server solutions available. Because of its flexibility, stability, and performance, Apache is a popular choice for hosting websites and serving web content. It works with a variety of programming languages and frameworks and supports multiple operating systems, including Windows, Linux, and macOS. URL rewriting, SSL/TLS encryption, virtual hosting, and load balancing are just a few of the features and modules available to enhance Apache's functionality. It has strong security measures and customizable configuration options, allowing administrators to tailor the server to their specific requirements. Because of the extensive community support and documentation provided by Apache, it is accessible to both novice and experienced users. Overall, Apache is a dependable and feature-rich web server software that has remained a mainstay of the web hosting industry.

### Github

GitHub is a web-based platform that provides hosting for version control repositories. It enables developers to effectively collaborate on projects, track changes, and manage source code. Developers can use GitHub to create repositories to store their code and easily share and collaborate with others by inviting contributors to join their projects. The platform includes features like branching and merging that allow developers to work on different versions of the code at the same time and seamlessly merge their changes. GitHub also has an issue tracking system, which allows developers to report and track bugs or feature requests within a project. It also includes a robust code review system that allows peers to review and provide feedback on each other's code changes. GitHub hosts millions of public repositories as an open-source community, making it a valuable resource for discovering and contributing to a wide range of projects. It has evolved into a necessary tool in modern software development, encouraging collaboration, code sharing, and community-driven innovation.

### phpMyAdmin

phpMyAdmin is a graphical user interface (GUI) tool for managing and administering MySQL databases that is accessible via the web. It has an easy-to-use interface that allows users to perform database operations like creating and managing databases, tables, and indexes, running SQL queries, importing and exporting data, and managing user privileges. phpMyAdmin makes it easier to manage MySQL databases, especially for users who are unfamiliar with the command-line interface. Users can easily interact with their databases thanks to its user-friendly interface, making it a valuable tool for web developers, database administrators, and system administrators. phpMyAdmin is written in PHP and supports multiple languages, allowing users all over the world to have a localized experience. It is a widely used tool because of its ease of use, robust features, and active community support. phpMyAdmin is a convenient and powerful solution for managing MySQL databases, whether used for small-scale projects or large-scale enterprise applications.

### 000WebHost

000webhost is a free web hosting platform that allows users to host their websites at no cost. It has an easy-to-use interface and a variety of features that make website building and management easier. Users can enjoy free web hosting services with 000webhost without the requirement to invest in a dedicated hosting solution. Users may create dynamic and interactive websites because to the platform's support for PHP and MySQL. It includes a website builder and is compatible with popular content management systems (CMS) such as WordPress. While 000webhost is free, it does have some restrictions, like restricted storage space, bandwidth, and server resources. phpMyAdmin is an easy and powerful tool for administering MySQL databases, whether used for small-scale projects or large-scale enterprise applications.

# Chapter 3: Software Design & Architecture

## 3.1. System Overview

The purpose of the project is to develop an online information system that provides all the necessary information or details of the activities that an employee is currently involved in and manages and define workload for regular faculty, visiting faculty and teaching assistants / lab engineers based on designation, labs, thesis supervision, managerial responsibilities, other contributions etc. and helps in managing and automating payments of visiting faculty and TA/lab engineers.

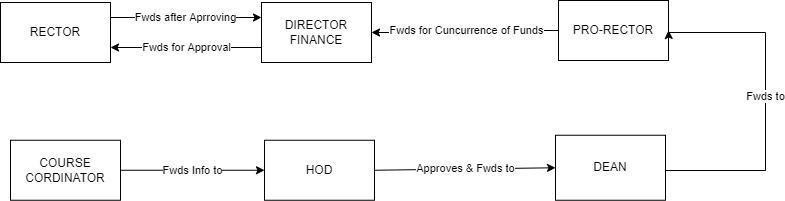
## Functional Requirements

The intended audience of the system is following:

* + 1. Course Coordinator (CC)
    2. Head of Department (HoD)
    3. Dean
    4. Pro-Rector
    5. Director Finance
    6. Rector

## Non Functional Requirements

The figure 3.1 elaborates how these users will be using the information that the system will generate.



*Figure 3.1. Intended Use of the System*

## System Architecture

In terms of the information management system, this project has a very broad scope. Overall, it will entail learning and experimenting with

* + 1. Web design, setup and development.
    2. Database creation and maintenance.
    3. Design and setup of the server.

Internally, there are two modules to this project's development.

1. Workload
2. Payment

## Database Design

Following are the acronyms and their definitions that are used in this final report of the project.

|  |  |  |
| --- | --- | --- |
| **#** | **Acronym** | **Definition** |
| 1 | CC | A course coordinator's major responsibility is to maintain quality and  consistency of instruction in multiple-department courses. |
| 2 | HoD | A faculty member who has been granted the responsibility of leading  a particular academic department. |
| 3 | Dean | Deans have academic, managerial, and fiscal responsibilities for a  university and also verify the correctness of instruction. |
| 4 | Pro-Rector | The deputy Rector in a university. |
| 5 | Director  Finance | A director of finance administers the financial operations and  financial planning of a company. |
| 6 | Rector | The Rector has a supervisory role and also represents the university. |
| 7. | Workload | It is a numerical value that is calculated from different factors  including courses, managerial position etc. |
| 8. | Contact  Hours | Total hours to which an employee is engaged to a particular course. |
| 9. | Financial  Impact | Total expected payment of an employee at the start of the semester. |
| 10. | Payment Due | Total actual payment to be issued to an employee at the end of the  semester. |
| 11. | Course  Contribution | It describes whether an employee is fully or partially engaged in a  course. |

## UI Design

### User Needs

* + - 1. Central repository of payments history and reports.
      2. Overview of workload burden of all employees; to simplify the assignment of courses.
      3. Automatic calculation of department expenses.

### Assumptions:

Following are the assumptions of the developed project;

* + - 1. System is only be used by elevated users.
      2. Course Coordinator has knowledge about course schedules, teacher’s miscellaneous details such as research projects, total students taught, etc.
      3. Prior knowledge about how the system works.
      4. Two or more courses cannot have the same course code.
      5. Course Coordinator is aware of missed no. of classes for each teacher for finalizing payments.

## Scope

### User Management

Central User Management will be incorporated with appropriate access/privileges of the system.

### Departments in the System

Both employee and course will require a department's field that must be associated with it. This will play an important role when generating department-wise financial reports.

# Chapter 4: Implementation

## Technology & Tools Used

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap
    2. ReactJS
    3. MongoDB

## Front End Development

### Entities

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

Following are the entities of the system;

## Backend Development

### How to Calculate Workload?

Workload calculation was one of the challenging tasks as there was no previous system in the institute that calculates workloads of its employees. Moreover, there are several factors that can contribute in workload so how to tackle them and bring into an automated system was also a big challenge for me. For this, a formula was derived to calculate workload’s final score.

Final Score = [Factor 1\*wFactor 1] + [Factor 2\*wFactor 2] + [Factor 3\*wFactor 3] & so on... where

* + - 1. Factor is the value that user types in the workload form.
      2. wFactor is the weight of a particular factor.

### How to Handle Workload Weights?

Each factor of the workload contains its weight. So, if the weights of factors are set static, it becomes a hectic task to change the weight of a factor repeatedly because there may come a need in future to alter any of the weights.

In order to tackle this situation, a configuration page is developed where all the weightage parameters can be updated.

## Database Structure

The features of the information system are following:

### Home Page

Home page is the first page that will be shown to the user. The interface of the login page is shown in figure 4.7.

## Web Hosting

The features of the information system are following:

### Home Page

Home page is the first page that will be shown to the user. The interface of the login page is shown in figure 4.7.

# Chapter 5: Structure

## Front End Structural Diagram

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap
    2. ReactJS
    3. MongoDB

## Backend and Database Diagrams

### ER Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

### Use Case Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

### Sequence Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

### Relational Schema

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

# Chapter 6: User Roles

## . Administrator

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap
    2. ReactJS
    3. MongoDB

## . Employer

### ER Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

### Use Case Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

### Sequence Diagram

A concept or thing within a system, such as a person/role, object, concept, or event, is referred to as an entity.

## . Applicant / Candidate

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap
    2. ReactJS

# Chapter 7: Conclusion and Future Works

## 7.1. Conclusion

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap
    2. ReactJS

## 7.2. Future Works

The technologies and frameworks that are used to develop system are;

* + 1. Bootstrap

# References

1. “HTML | PyCharm,” *PyCharm Help*. [https://www.jetbrains.com/help/pycharm/editing-](https://www.jetbrains.com/help/pycharm/editing-%20%20%20%20%20html-files.html) [html-files.html](https://www.jetbrains.com/help/pycharm/editing-%20%20%20%20%20html-files.html) (accessed Aug. 15, 2022).
2. “Returning To Plain HTML + CSS. Over the past week, I tried my hand at… | by Danny Krug | Medium.” [https://medium.com/@dannykrug/returning-to-plain-html-css-](https://medium.com/%40dannykrug/returning-to-plain-html-css-4386b61f3da) [4386b61f3da](https://medium.com/%40dannykrug/returning-to-plain-html-css-4386b61f3da) (accessed Aug. 18, 2022).
3. “React – A JavaScript library for building user interfaces.” <https://reactjs.org/> (accessed Aug. 28, 2022).

[4].“Databases and Collections — MongoDB Manual.” <https://www.mongodb.com/docs/manual/core/databases-and-collections/> (accessed Aug. 29, 2022).

1. “The Complete 2022 Web Development Bootcamp,” *Udemy*[.](https://www.udemy.com/course/the-complete-web-development-bootcamp/) <https://www.udemy.com/course/the-complete-web-development-bootcamp/> (accessed Aug. 16, 2022).
2. M. O. contributors Jacob Thornton, and Bootstrap, “Bootstrap.” <https://getbootstrap.com/>(accessed Aug. 24, 2022).
3. “MongoDB Atlas: Cloud Document Database | MongoDB.” [https://www.mongodb.com/cloud/atlas/lp/try2?utm\_content=controlhterms&utm\_source](https://www.mongodb.com/cloud/atlas/lp/try2?utm_content=controlhterms&utm_source=google&utm_campaign=gs_emea_pakistan_search_core_brand_atlas_desktop&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0dXbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw_wcB)

[=google&utm\_campaign=gs\_emea\_pakistan\_search\_core\_brand\_atlas\_desktop&utm\_ter](https://www.mongodb.com/cloud/atlas/lp/try2?utm_content=controlhterms&utm_source=google&utm_campaign=gs_emea_pakistan_search_core_brand_atlas_desktop&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0dXbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw_wcB) [m=mongodb&utm\_medium=cpc\_paid\_search&utm\_ad=e&utm\_ad\_campaign\_id=12212](https://www.mongodb.com/cloud/atlas/lp/try2?utm_content=controlhterms&utm_source=google&utm_campaign=gs_emea_pakistan_search_core_brand_atlas_desktop&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0dXbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw_wcB) [624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0d](https://www.mongodb.com/cloud/atlas/lp/try2?utm_content=controlhterms&utm_source=google&utm_campaign=gs_emea_pakistan_search_core_brand_atlas_desktop&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0dXbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw_wcB) [XbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw\_wcB](https://www.mongodb.com/cloud/atlas/lp/try2?utm_content=controlhterms&utm_source=google&utm_campaign=gs_emea_pakistan_search_core_brand_atlas_desktop&utm_term=mongodb&utm_medium=cpc_paid_search&utm_ad=e&utm_ad_campaign_id=12212624545&adgroup=115749718983&gclid=Cj0KCQjwr4eYBhDrARIsANPywChc7Rl0dXbU5oNRLKUhiUPNuxtg1suhu9H0H8seDK0506n9W24dCKAaAp4CEALw_wcB) (accessed Aug. 24, 2022).

1. “W3Schools Free Online Web Tutorials.” <https://www.w3schools.com/>(accessed Aug. 25, 2022).
2. “MDN Web Docs.” [https://developer.mozilla.org](https://developer.mozilla.org/) (accessed Aug. 25, 2022).
3. “Database Management System”, published by IT Series Publications and the authors fo the book are Imran Saeed, Tasleem Mustafa, Tariq Mahmood and Ahsan Raza Sattar. [https://freebooks.pk/books/database-management-system](https://freebooks.pk/books/database-management-system/)/ (accessed Aug. 26, 2022).
4. “Entity Diagram - diagrams.net.” <https://app.diagrams.net/> (accessed Aug. 29, 2022).

**Appendix A – Instructions to Use System**

Instructions to use Information System:

* To use the system, a user must have an account and must be logged in the system.
* All the configuration related to programs, weights and pay rates will be on the configuration page.
* All the employees and courses should be added and checked before filling the workload page.
* In the course section, while adding courses, if the course has theory credit, lab credit must be filled with zero and vice versa.

# Appendix B – React JS Installation and Setup

1. **Install Nodejs**

Packages for React are managed and shared using NPM, the Node package manager. Along with Nodejs, NPM will also be installed. It is possible to download and set up Node.js from the official Node Js website.

https://nodejs.org

Once the Installation of Node is complete. Open Node Js Command Prompt and we can check the version as well.

1. **Install Create-React-App Tool**

The following action is to use NPM to install a project called create-react-app. Utilizing our technology, this tool makes it simple to construct React applications. This can be set up either permanently at the system level or momentarily at a folder level.

npm install -g create-react-app

1. **Creating a New React Project**

After installing create-react-app, we can start building our first react application. Following is command used to create a new project

create-react-app name-of-project

Don't use an uppercase character while creating the project.

1. **Running the React Application**

Now lets run it locally on our system using npm start command. Launch the browser and visit http://localhost:3000. We can see our first React Application in the browser.

cd name-of-project npm start

Now, we have created a new project using react and executed the project.

1. **Install Visual Studio Code**

Download and install Visual Studio Code from the following URL

<https://code.visualstudio.com/download>

After the VS Code installation, open the project that has been created earlier using the VS Code. The Project has the following 3 folders

* 1. Node\_modules
  2. Public
  3. src

The output we have seen when the project is executed comes from a file called Index.html which resides inside the public folder.

# Appendix C – Libraries Used in Project

Name and purpose of libraries used in this project:

### Bootstrap

This is a CSS framework that is used to create responsive websites.

* **React**

This is a front-end java script library used to build user interfaces.

* **Axios**

This library is used to make http requests from frontend.

* **React-Router-Dom**

This library is used to make routes in frontend.