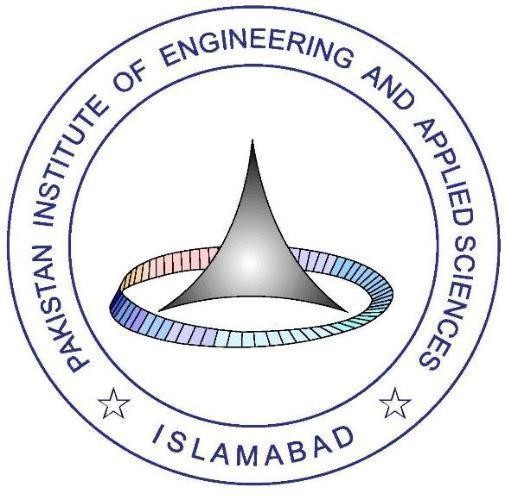
**Development of**

**Job Recruitment Portal**



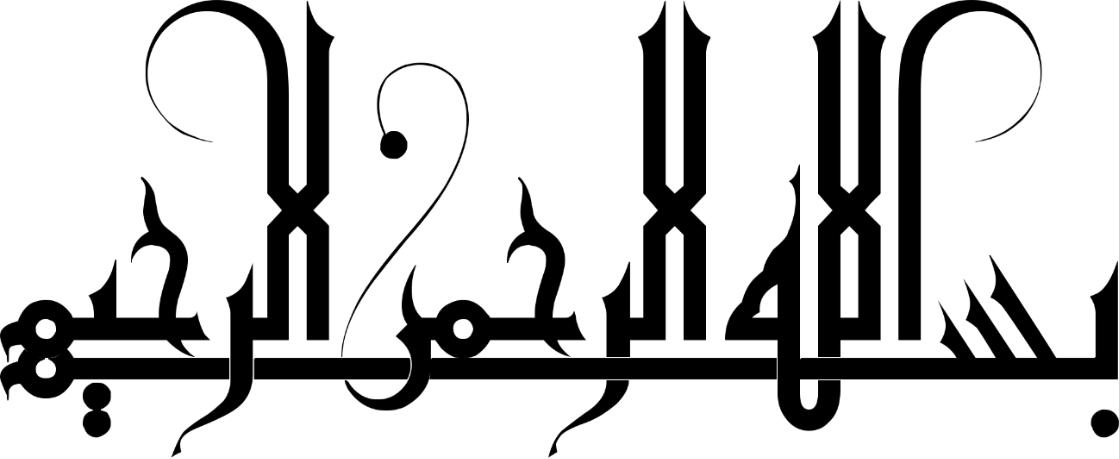
**Mohammad Ahsan Junaid**

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**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,**

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**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).***

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**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.**

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**Mohammad Ahsan Junaid**

**Abdul Rehman Asif**

**PIEAS, Nilore, Islamabad**

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# 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

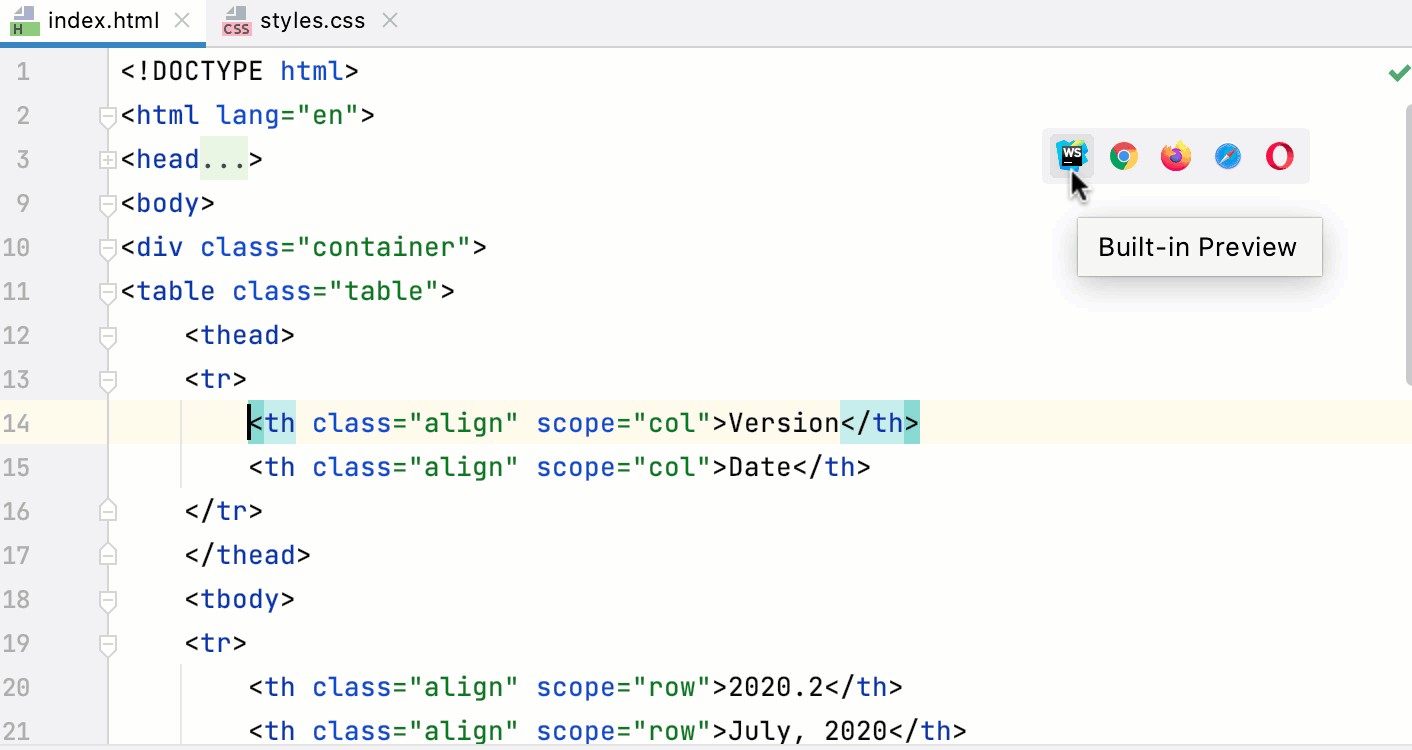
In this section, different technologies and tools that can be used to develop this information system are discussed.

### HTML

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

The foundation of HTML pages are HTML elements. Images and other objects, like interactive forms, may be embedded within the rendered pages. By indicating structural semantics for text elements like headings, paragraphs, lists, links, quotations, and other objects, HTML offers a way to generate structured texts. Tags, which are written in angle brackets, are used to distinguish HTML elements. Input and image tags, for example, add content directly to the page. Other tags, like <p> describe the text of the document. They may also contain other tags as sub-elements. Browsers use the HTML tags to interpret the page's content rather than displaying them.

The figure 2.1 shows an example of HTML page;



### CSS

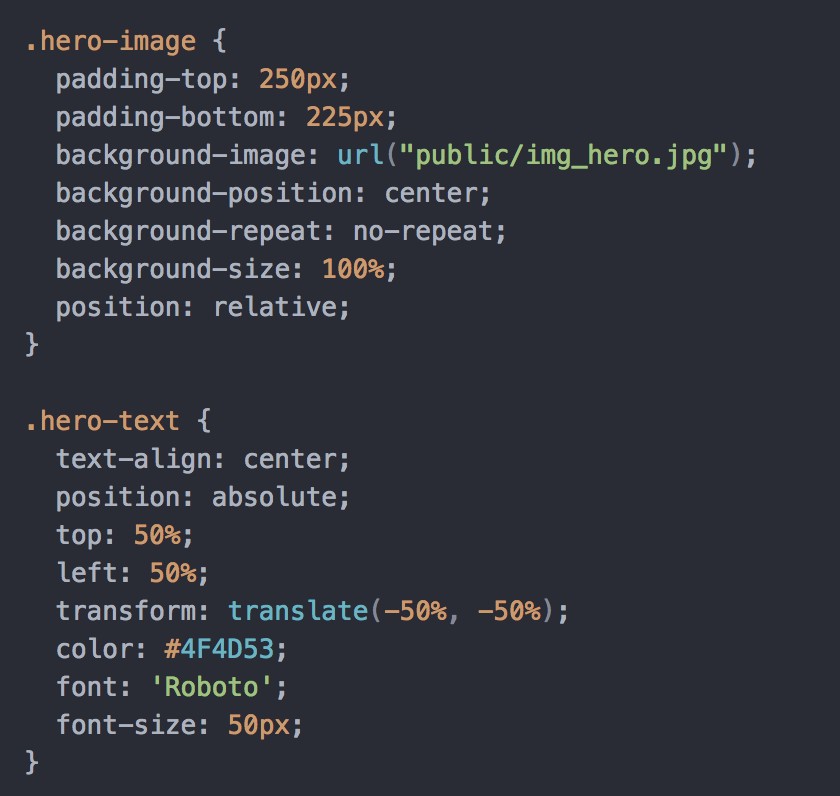
*Figure 2.1. HTML Page [1]*

A stylesheet language called Cascading Style Sheets (CSS) is used to describe how a document written in HTML is presented. CSS specifies how items should be shown in various media, including speech, paper, screens, and other media.

The style and feel of a web page are handled by CSS. The color of the text, the font style, the spacing between paragraphs, the size and arrangement of columns, the background pictures or colors used, layout designs, differences in display for various devices and screen sizes, and a variety of other effects can all be controlled using CSS.

Although CSS is simple to grasp and learn, it offers strong control over how an HTML document is presented. CSS is most frequently used in conjunction with HTML as markup languages.

The figure 2.2 shows a CSS code used to style an HTML page;



### JavaScript

*Figure 2.2. CSS Code [2]*

The quickest and simplest method to create webpages is with Tailwind CSS. Tailwind CSS is a utility-first CSS framework for quickly creating unique user experiences. It is a low-level CSS framework that is extremely adaptable and provides all the building blocks required to create custom designs without requiring you to struggle to overcome obnoxious opinionated styles.

The best part about tailwind is that it doesn't enforce design guidelines or dictate how your website should look; instead, you just combine little parts to create a one-of-a-kind user interface. Simply put, Tailwind takes a "raw" CSS file, processes it through a configuration file, and outputs the results.

### Bootstrap

Bootstrap is a powerful front-end framework for building contemporary web pages and online apps. It's open-source and free to use, but it includes plenty of HTML and CSS templates for UI interface components like buttons and forms. JavaScript extensions are supported by Bootstrap as well.

The frontend of our information system is built using bootstrap 5 which is the latest version. The grid system of bootstrap really helped in creating responsive web pages that respond to the size of the screen.

### PHP

To develop a user interface in our React applications, we can simply import and use several components from the Material-UI package. As a result, the developers can save a lot of time by not having to write everything from start.

Google's guidelines for creating user interfaces served as a major source of inspiration for Material-UI widgets. Therefore, creating aesthetically appealing applications is simple for developers.

### MySQL

JavaScript is a dynamic language that supports object-oriented, declarative (like functional programming), and imperative programming paradigms.

The ECMAScript Language Specification and the ECMAScript Internationalization API specification are the standards for JavaScript.

The wide library of frameworks available in JavaScript enables programmers to create mobile and online applications quickly. Developers use frameworks, which are collections of pre- written JavaScript code, for common functionalities.

The most widely used frameworks for JavaScript applications are

* + - 1. React is a group of JavaScript tools designed for creating web application user interfaces.
      2. React Native is a collection that enables JavaScript developers to create mobile apps.
      3. Node.js is a set of tools that permits two-way data exchange with servers.

Some of the most potent social networking systems in use today are powered on Facebook's React and React Native frameworks, which were created by the company. Uber, Pinterest, Netflix, Instagram, Amazon, Twitter, Udemy, and many other websites use React.

## Softwares and Technologies Used

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

### XAMPP

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

The foundation of HTML pages are HTML elements. Images and other objects, like interactive forms, may be embedded within the rendered pages. By indicating structural semantics for text elements like headings, paragraphs, lists, links, quotations, and other objects, HTML offers a way to generate structured texts. Tags, which are written in angle brackets, are used to distinguish HTML elements. Input and image tags, for example, add content directly to the page. Other tags, like <p> describe the text of the document. They may also contain other t

### Visual Studio

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

### Apache

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

### Github

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

### phpMyAdmin

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

### 000WebHost

If you decide to create a web-fronted app for mobile devices, HTML is the best option. Given that it is not a programming language, java script commonly uses it. It enables you to logically arrange all of the content on your pages. It works with any browser and makes your pages look their best across all platforms.

# 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.

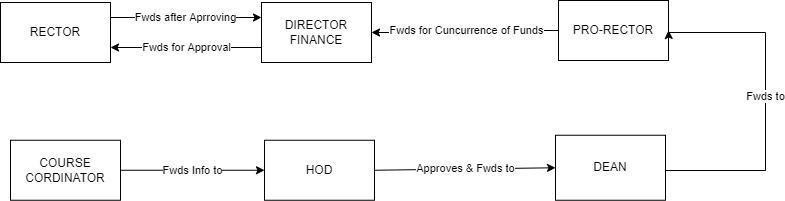
## Functional Requirements

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

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**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.