**A FINAL PROJECT REPORT**
(PGD-210)

*on*

# EMPLOYEE MANAGEMENT SYSTEM

*under the supervision of*

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*Submitted by*

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*in partial fulfillment for the award of the degree*

*of*

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*in*

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# DECLARATION

I hereby declare that a project work being presented in this report entitled "EMPLOYEE MANAGEMENT SYSTEM" submitted in the institute of Information Technology, University of Dhaka is the authentic work carried out by me under the supervision of Dr. B M Mainul Hossain assistant professor of the Institute of Information Technology, University of Dhaka.

I also declare that I have typeset this document only for project related tasks.

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# CERTIFICATE

Certified that this project report "EMPLOYEE MANAGEMENT SYSTEM" is the bonafide work of "MIMMA AKTER" during this project submission as a partial fulfillment of the requirement for the System Design Project of Post Graduate Diploma to Institute of Information Technology is an authentic and original work carried out by Mimma Akter with roll number 2005 under my supervision.

12-08-2021

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# ACKNOWLEDGEMENT

I would like to express my special thanks to my project supervisor Dr. B M Mainul Hossain, Associate Professor, IIT who advised and gave me the opportunity to do this wonderful project on the topic “EMPLOYEE MANAGEMENT SYSTEM”, which also helped me in doing a lot of research and I came to know about so many new things.

I am also grateful to numerous people who have posted various valuable resources on the internet. I am really thankful to them.

Secondly I would also like to thank my parents who helped me a lot in finalizing this project within the limited time frame.

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# ABSTRACT

Employee Management System is a distributed application, developed to maintain the details of employees working in any organization. It maintains the information about the personal details of their employees, which enables them to generate the employee's curriculum vita. The application is actually a suite of applications developed using C#.

It is simple to understand and can be used by anyone who is not even familiar with the simple employee system. It is user friendly and just asks the user to follow step by step operations by giving him few options. It is fast and can perform many operations of a company.

This software package has been developed using the powerful coding tools of C# at Front End and Oracle at Back End. The software is very user friendly. The package contains different modules like Employee details. This version of the software has a multi-user approach. For further enhancement or development of the package, user's feedback will be considered.

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# LIST OF SYMBOLS AND ABBREVIATIONS

| Symbol | Explanation |
|---|---|
| C# | C Sharp |
| EMS | Employee Management System |
| HOD | Head of Department |
| HRMS | Human Resource Management System |
| ERP | Enterprise Resource Planning |
| MVC | Model-View-Controller |
| WBS | Work Breakdown Structure |
| ECMA | European Computer Manufacturers Association |
| ISO | International Standards Organization |
| CLI | Common Language Infrastructure |
| IDE | Integrated Development Environment |
| SQL | Structured Query Language |
| PL/SQL | Procedural Language extensions to the Structured Query Language |
| RDBMS | Relational Database Management Systems |
| ERD | Entity Relationship Diagrams |
| OOP | Object-oriented Programming |
| IIS | Internet Information Services |
| DFD | Data-flow Diagram |
| ERD | Entity Relationship Diagram |

# 1. INTRODUCTION

Employee Management system is an application that enables users to create and store Employee Records. This is a web-based application. The application also provides facilities to generate Employee's curriculum vita too. This application is helpful to the department of the organization which maintains data of employees related to an organization.

In this world of growing technologies everything has been computerized. With a large number of work opportunities the Human workforce has increased. Thus there is a need for a system which can handle the data of such a large number of Employees in an organization. This project simplifies the task of maintaining records because of its user friendly nature.

The aim of the system is to develop “EMPLOYEE MANAGEMENT SYSTEM” software, which should automate the process to create and store employee details . The system is supposed to be used as a subsystem in a large office system, which could be a manual system or a computerized one. Therefore, the proposed system must be able to function under both circumstances.

The proposed system is not freeware and due to the usage of swings, becomes user interactive.

- The project demand a page of employee details that include:
- Employees’ personal details.
- Employees’ report.

## 1.1 BACKGROUND

Most of the contemporary Information systems are based on the Database technology as a collection of logically related data, and DBMS as a software system allowing the users to define, create, maintain and control access to the database.

The process of constructing such kinds of systems is not so simple. It involves a mutual development of application program and database. The application program is actually the bridge between the users and the database, where the data is stored. Thus, the well-developed application program and database are very important for the reliability, flexibility and functionality of the system.

The so defined systems differentiate to each other and their development comprises a great variety of tasks to be resolved and implemented.

The basic idea can be depicted on Figure 1.1 below:

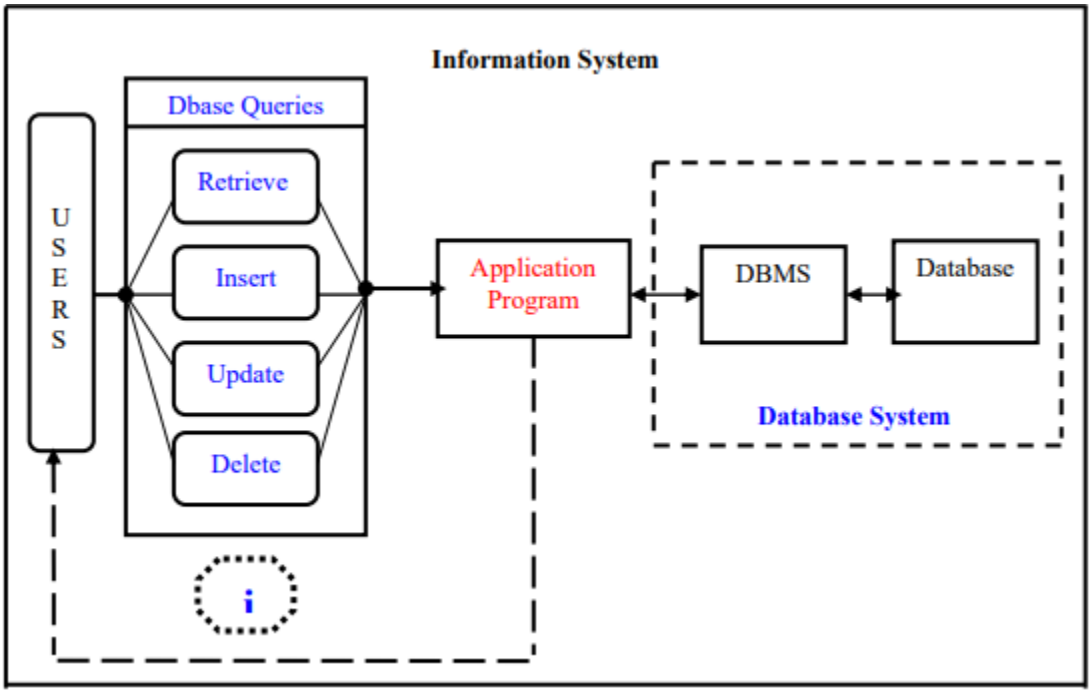



**Figure 1.1 Database information systems - principle scheme**

Information systems suggests a computer technology to be used in order to provide information to users in an organization (for instance), as for the purposes of data transformation into useful information; computer hardware and software are designed and used.

A particular case is the Human Resources Information System development. These kinds of systems are responsible for storing data of the staff within an organization and generating reports upon request.

Such a system could be integrated with other Information systems or modules: Accounting Information System (AIS) – designed to transform financial data into information, or Management Information System (MIS) that provides decision-oriented information to managers, and so on…

"Organizations depend on Information Systems in order to stay competitive. Productivity, which is crucial to staying competitive, can be increased through better Information Systems."

## 1.2 BACKGROUND STUDY ON TOPICS RELATED TO THE PROJECT

A HRMS refers to the systems and processes at the intersection between human resource management (HRM) and information technology. It merges HRM as a discipline and in particular it's basic HR activities and processes with the information technology field whereas the programming of data processing systems evolved into standardized routines and packages of enterprise resource planning (ERP) software.

An organization or company with a very large number of employees manages a greater volume of data. This activity can be daunting without a more sophisticated tool to store and retrieve data. The various levels of sophistication can be examined by looking at the evolutionary aspects of HR technology. These aspects can be characterized into four stages of development: Paper-based systems, early personal computer (PC) technology, electronic databases, and Web-based technology.

The benefits of automation are becoming widely known to HR and other areas of the business. The focus has shifted to automating as many transactions as possible to achieve effectiveness and efficiency.

The technology of the future will be about speedy access to accurate current information, and reliability to access this information via multiple systems will give organizations a strategic edge. HR is expected to relinquish its role as sole owner of HR information, so that managers and employees can use this information to solve their own problems using Web-based systems. This new system will not necessarily mean reduction in HR staff. The new system will enable HR professionals to focus on transforming information into knowledge that can be used by the organization for decision making; it will be about HR and IT working together to leverage this technology. A recent study by the Hackett Group, a business process advisory firm found that high-performing organizations spend 25 percent less than their peers on HR because they use technology effectively.

The two most popular Web-based HR applications used today are self-service for employees and self-service for managers. These applications have enabled companies to shift responsibility for viewing and updating records onto individual employees and have fundamentally changed the manner in which employees acquire information and relate to their HR departments.

## 1.3 SOFTWARE LIFE CYCLE MODEL

Software development life cycle process specifies a method of developing the software. Each software development project starts with some needs and ends with some software that satisfies those needs. A software development life cycle specifies the set of activities that should be performed to go from user needs to final products. There are different models of SDLC process and each model specifies the activities and the order in which they should be performed. Depending on the nature of the project, a suitable model is chosen and the entire process of software requirement analysis, design, coding, testing and maintenance is performed accordingly.

Various life cycle models are present, but our system is based on WATERFALL MODEL, which is most widely used in procedure oriented development. This model attempts to break up the identifiable activities into a series of actions, each of which must be completed before the next begins. The activities include Problem definition, Requirement Analysis, Design, Coding, Testing and maintenance.

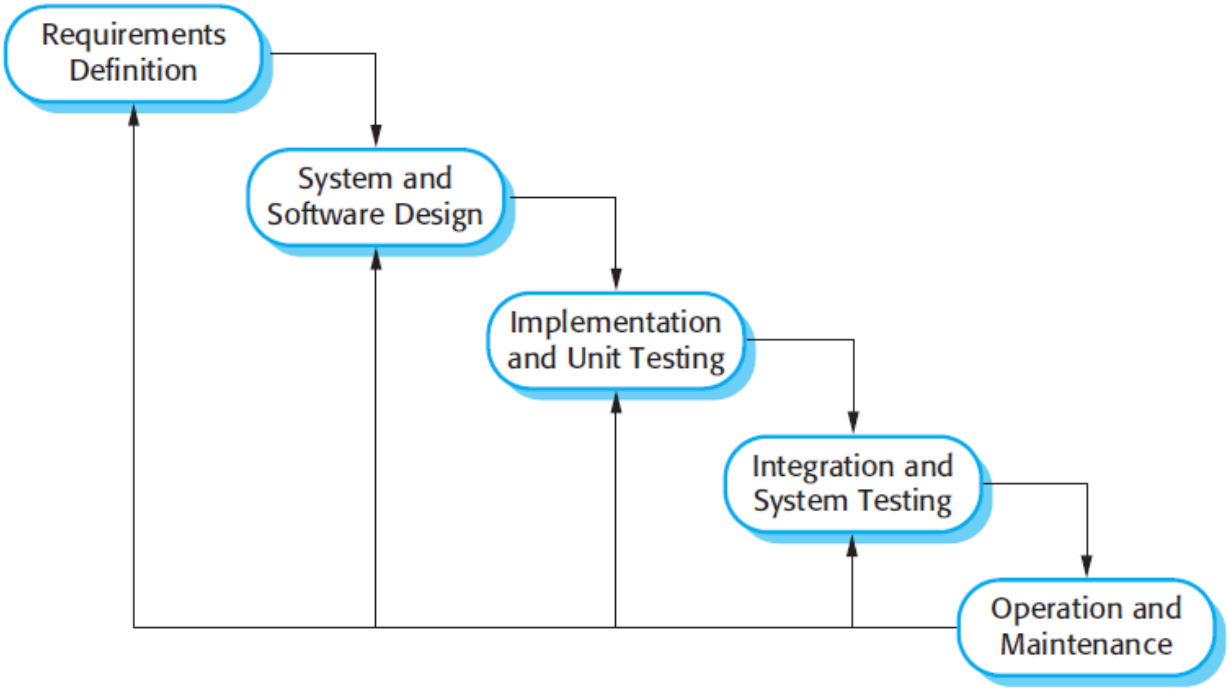



**Figure 1.3 : The Waterfall Model**

An initial investigation culminates in a proposal that determines whether a system is feasible or not. It determines its workability, impact on the organization, ability to meet user needs, and effective user resources. The objective of feasibility study is not to solve the problem but to

acquire a sense of its scope. During the study, the problem definition is crystallized and aspects of the problem to be included in the system are determined. Consequently, cost and benefits are estimated with greater accuracy at this stage. This is a bridge in between the User Requirements and the output that he can avail under a set of given constraints, inputs and outputs. The main steps are :

Statement of constraints Problem Definition Analysis Maintenance Testing Coding Design.

1. Identification of specific system objectives.
2. Description of outputs.

## 1.4 SCOPE

The scope of this project will be limited to the following:

- ***Employee profiles:***
  Employees will have access to their personal profiles and will be able to edit their details.

- ***Report generation:***
  The HR manager will be able to generate timely reports in order to monitor employees and this can be used for performance appraisals. The reports will have all the information of an employee from educational background, training attended, projects done as well as technical skills.

- ***Recruitment Process:***
  The admin will add an employee and a default password and employee id will be generated and sent to the new employees email. The HR manager will then have the ability to add an employee's information to the database.

## 1.5 REPORT OVERVIEW

The next chapter and its subsections will turn the attention to the method for resolving the problem, the programming environments used for developing the system and the implementation of the operations performed upon the database.

# 2. METHODOLOGY

This chapter involves some subsections that concern the basic scheme of resolving the given task and comprise both the methods and tools of its development as well.

## 2.1 METHOD

At the very commencement, I proceeded to a decision to carry out the development of my task into the following steps:

1. Exploring the available development environments and techniques.
2. Database Analyzing.
3. Database design and Implementation.
4. Program's Structure Analyzing.
5. GUI (Graphical User Interface) constructing.
6. Bringing all the stuff together (controls data binding and functions implementation).
7. Tests.

Each one of these steps could be explained in some brief details as follows:

1. ***Exploring the available development environments and techniques***

   There are a lot of programming environments available to be used for such kinds of elaborations. The point is to choose such an environment that we will be able to operate within a convenient and easy way. This is more or less an optional and individual process, that depends on the developer's experience as well.

2. ***Database Analyzing***

   It concerns all of the demands put upon the database content and its functionality. The database should be designed and implemented in a way that the user would expect it to be.

3. ***Database design and Implementation***

   This step is tightly related with the previous one as it is completely determined by the requirements, analyzed and discussed in step2.

4. ***Program's Structure Analyzing***

   The application program as an interface between the users and the database should be an accurate "reflection" of the database on the screen; hence a well analyzed and defined structure is needed.

5. ***GUI Constructing***

   After analyzing the program's structure and defining what it should consist of, a graphical representation of this stuff is needed in order to enable the user to interact with the data.

6. ***Bringing all the stuff together***

   The next step that should be taken is connecting the program with the database and

performing the necessary functionality upon all of the controls.

7. ***Tests***

   To ensure that everything works properly and as it has been expected, test performance has to be done upon the system's functionality.

## 2.2 PROBLEM STATEMENT

This report's documentation goes through the whole process of both application program and database development.It also comprises the development tools that have been utilized for these purposes.

## 2.3 PROBLEM DISCUSSION

This system should consist of an application program, on one hand, and a database (repository of data) on the other. The program should perform the basic operations upon the database as retrieving, inserting, updating and deleting data. Any additional functionality is a goal of further module development.

It is a kind of strategy to start the development from designing and constructing the database, as this structure will determine the further structure of the application program.
The logical database model (tables, their content and the relationships between them) should respond to the given task and cover the basic requirements.
The Interface of the program should be user-friendly, and the program should be as easy for use as it is possible.

Both controls and forms should logically and functionally be related within the program and fully respond to the structure of the database.

Another problem is establishing the connections with the database, every time, when a query is needed to be performed upon it. Exception-handling should also be taken into account during the system's development due to eventual exceptions that may occur.

## 2.4 PROGRAMMING ENVIRONMENTS

The given task concerns a small company (organization). For instance, for the needs of a small company, we could use one set of tools, but for the needs of a larger one, it would be much better if we apply our approach by using something different, that could be more appropriate and would fit much better the requirements we have to satisfy.

I decided to use the Access Database Environment as a Database Management System and C# as a programming language for developing my project. Before proceeding to the explanatory notes of how I have developed the software, I would like to take a preview upon the programming tools (environments) that have been used during this project's development course.

## 2.5 DATABASE ENVIRONMENT

Access is a typical environment for constructing relational databases. The database is the skeleton and the underlying framework of most of the contemporary Information Systems. After taking a new and more effective approach, the Database and the Database Management System (DBMS) have been created. Most of the contemporary systems are based on the Database technology as a collection of logically related data and the DBMS as a software system allowing the users to define, create, maintain and control access to the Database.

The DBMS is a really powerful set of tools, enabling users to operate easily with data into a database as: Inserting, Updating, Deleting and Retrieving data. It prevents unauthorized access to the database and maintains the consistency of the stored data. The DBMS also restores the data in case of hardware or software failure and reduces the loss of data in this way.

## 2.6 FUNCTIONAL REQUIREMENTS

### 2.6.1 Authentication

- ***Login-*** The user can login to the HRMS system with his/her username and password.
- ***Logout-*** The user can log out from the HRMS system.
- ***Login failure***- If the user does not exist in the database or the user has not yet been authorized by the HRMS admin.

### 2.6.2 Authorization

- ***User role check***- After logging in, the user role will be checked from the database and the user interface will be displayed according to their role.

### 2.6.3 Process Data

- ***Display-*** Users with defined roles can display the content of the database. To Be more specific, an employee can only view his/her personal information. HOD can not only see his/her personal information but also employee's information who are under his/her department or school. Admin and HR can display their personal information and all employees' information.
- ***Edit-*** A user with an employee role can edit his/her specific personal information. Dean or HOD can only edit employees' personal information that is under his/her coverage except user role type. Admin can edit all information related to all employees' including their user role type.
- ***Search-*** User with a Dean/HOD role can search the content of the database for the employees' who are under his/her coverage. HR and

admin roles can search all the employees' information in the database. Search feature works on specific keywords showing employee's characteristics, peculiarities, skills, features, and etc. For example, HR wants to find employees' who are well trained in "Java Programming Language". He/she will write the specific keyword in the search bar and press the available search button. Afterwards, he/she will find a list of all the employees' who know "Java Programming". Update authentication- This feature can be used only by admin role type. Admin can update the role type of a specific user. For example, an employee got a promotion and his role type will be changed from employee role id to HOD or Dean role. Admin will be able to update this authentication mechanism.

### 2.6.3 Recruitment

- ***Add new employee-*** HR role type is able to add a new employee to the database. The new employee will have all the required personal information related to him/her. The new created employee will have an id.

- ***Add a new user-*** After a new employee has been created by the HR role, the admin role is responsible for creating a new user by the specified id assigned in the "Add a new employee" feature. The unique id will be given by the system. Admin will assign a new role such as employee, Dean, HOD, HR, and admin to the new created user.

### 2.6.4 Report generation

- ***Report generation-*** HR shall be able to generate a report in pdf format for each employee based on the information in the database.

### 2.6.5 Project Management

- ***Create project team:*** The HOD of the department or project manager shall be able to create a project and come up with a project team.

- ***Work Breakdown Structure (WBS):*** The HOD or project manager shall be able to assign tasks to the project team as well as monitor their progress.

### 2.6.6 Trainings and Task Management

- Training: The HOD shall create training and assign employees that are required to attend the training as well.

- Tasks: HOD shall assign tasks to employees in his/her department.

## 2.7 NON-FUNCTIONAL REQUIREMENTS

### 2.7.1 Performance requirements

There is no restriction on the number of the users to be added to the database.

### 2.7.2 Hardware requirements

EMS should be able to work on a computer with the following minimum hardware specifications:

- OS: Windows 10 and Linux
- CPU: CORE i3 and above
- RAM: 4GB and above Capacity
- HD: 4GB and above Capacity
- Network interface card, mouse, keyboard, and monitor

### 2.7.3 Software requirements

- Since EMS application is a web-based application, internet connection must be established.

The EMS software personal database model will support the Oracle environment as DBMS.

## 2.8 Design

### 2.8.1 Process Diagram

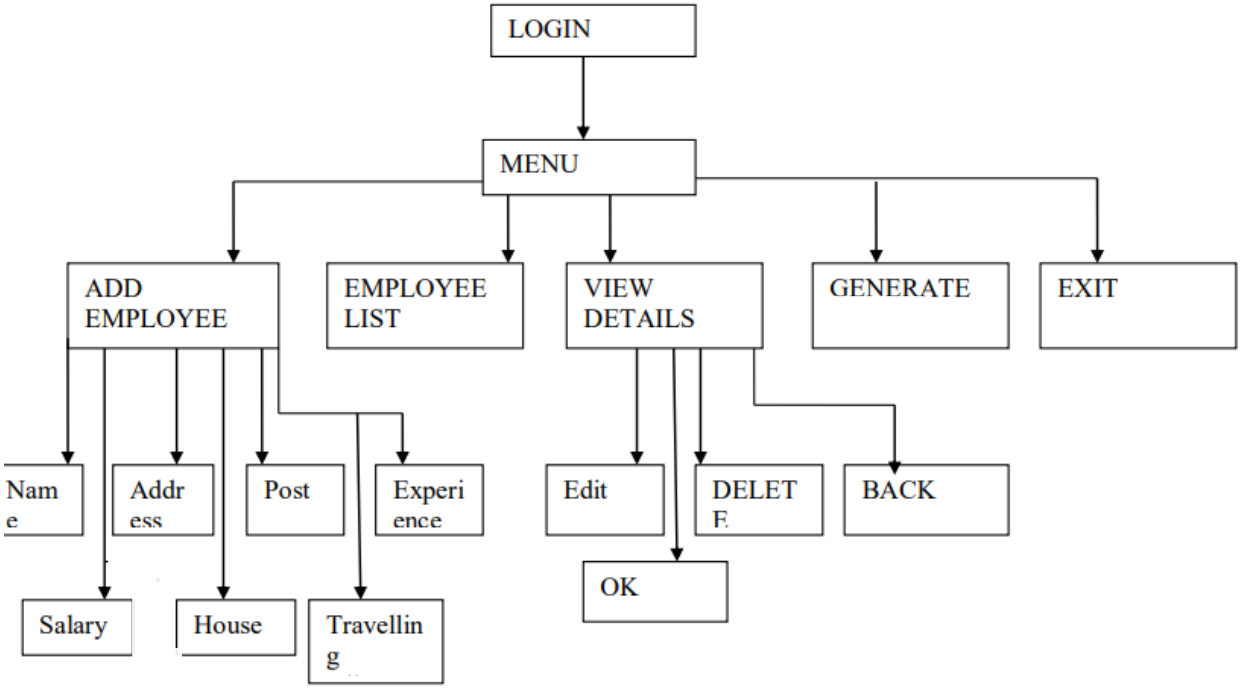



**Figure 2.8.1 : Process Diagram**

### 2.8.2 DF Diagram

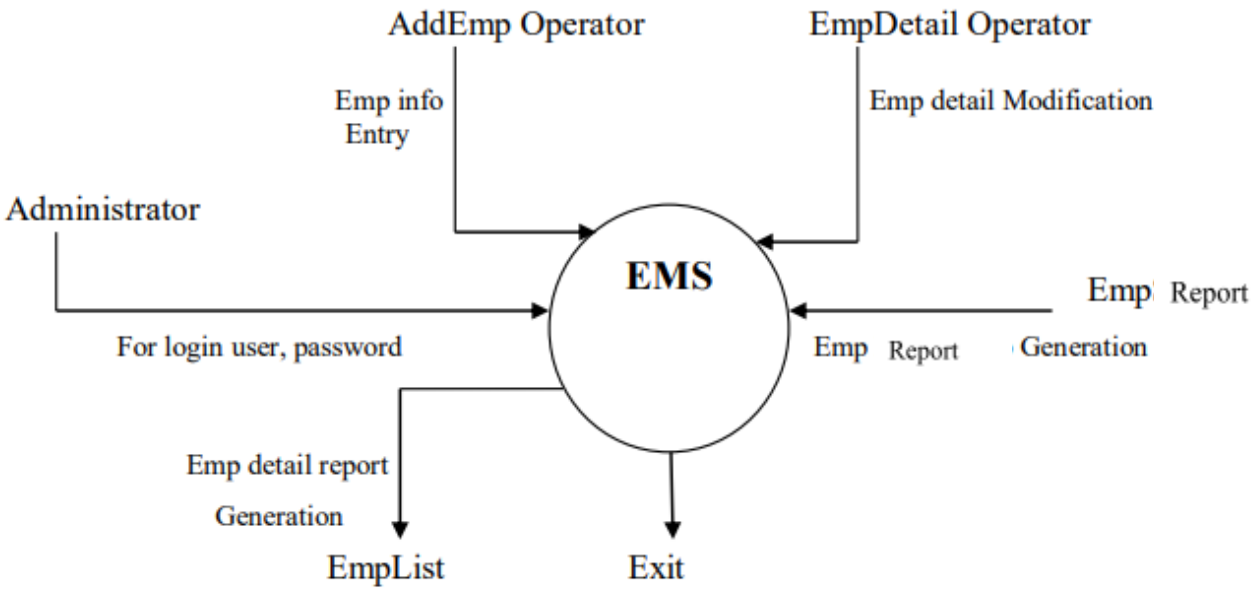



**Figure 2.8.2 : DF Diagram**

# 3. DEVELOPMENT TOOLS AND TECHNOLOGIES

The following are various development tools and software that could be used for the system.

## 3.1 BACK-END TECHNOLOGIES

### 3.1.1 C# (CSharp)


C# is a modern, general-purpose, object-oriented programming language developed by Microsoft and approved by European Computer Manufacturers Association (ECMA) and International Standards Organization (ISO).

C# was developed by Anders Hejlsberg and his team during the development of .Net Framework.

C# is designed for Common Language Infrastructure (CLI), which consists of the executable code and runtime environment that allows use of various high-level languages on different computer platforms and architectures.

The following reasons make C# a widely used professional language −

- It is a modern, general-purpose programming language
- It is object oriented.
- It is component oriented.
- It is easy to learn.
- It is a structured language.
- It produces efficient programs.
- It can be compiled on a variety of computer platforms.
- It is a part of .Net Framework.

➢ **Strong Programming Features of C#**

Although C# constructs closely follow traditional high-level languages, C and C++ and being an object-oriented programming language. It has strong resemblance with Java, it has numerous strong programming features that make it endearing to a number of programmers worldwide.

Following is the list of few important features of C# −

- Boolean Conditions
- Automatic Garbage Collection
- Standard Library
- Assembly Versioning
- Properties and Events
- Delegates and Events Management

- Easy-to-use Generics
- Indexers
- Conditional Compilation
- Simple Multithreading
- LINQ and Lambda Expressions
- Integration with Windows

➢ **C# - Environment**

In this chapter, we will discuss the tools required for creating C# programming. We have already mentioned that C# is part of the .Net framework and is used for writing .Net applications. Therefore, before discussing the available tools for running a C# program, let us understand how C# relates to the .Net framework.

### 3.1.2 The .Net Framework

The .Net framework is a revolutionary platform that helps you to write the following types of applications −


- Windows applications
- Web applications
- Web services

The .Net framework applications are multi-platform applications. The framework has been designed in such a way that it can be used from any of the following languages: C#, C++, Visual Basic, Jscript, COBOL, etc. All these languages can access the framework as well as communicate with each other.

The .Net framework consists of an enormous library of codes used by the client languages such as C#. Following are some of the components of the .Net framework −

- Common Language Runtime (CLR)
- The .Net Framework Class Library
- Common Language Specification
- Common Type System
- Metadata and Assemblies
- Windows Forms
- ASP.Net and ASP.Net AJAX
- ADO.Net
- Windows Workflow Foundation (WF)
- Windows Presentation Foundation
- Windows Communication Foundation (WCF)
- LINQ

### 3.1.3 ASP.NET MVC

ASP.NET supports three major development models: Web Pages, Web Forms and MVC (Model View Controller). ASP.NET MVC framework is a lightweight, highly testable presentation framework that is integrated with the existing ASP.NET features, such as master pages, authentication, etc. Within .NET, this framework is defined in the System.Web.Mvc assembly. The latest version of the MVC Framework is 5.0. We use Visual Studio to create ASP.NET MVC applications which can be added as a template in Visual Studio.

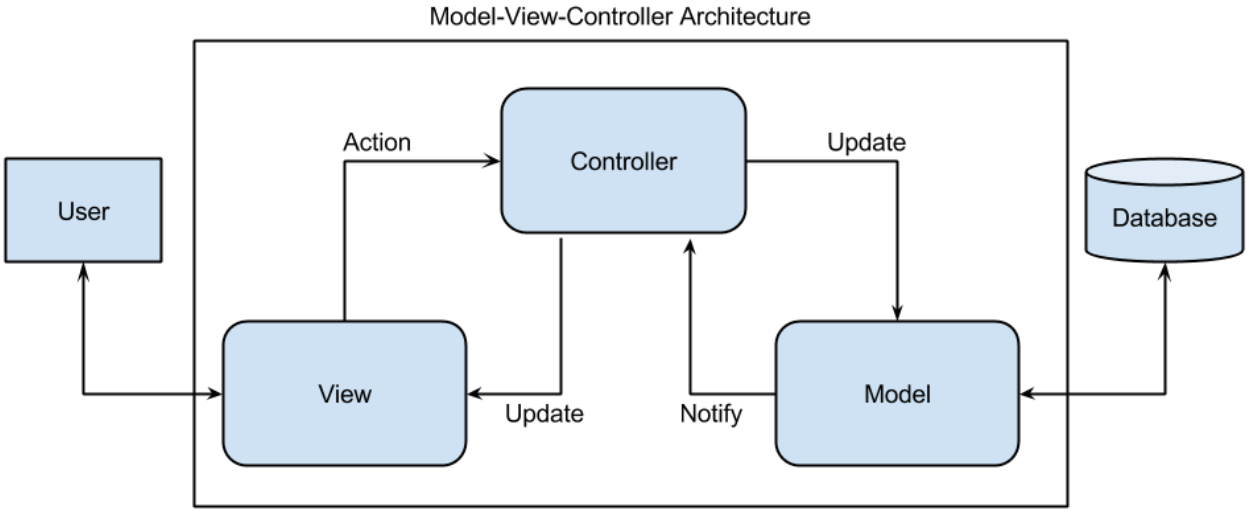



**Figure 3.1.30 : MVC Architecture**

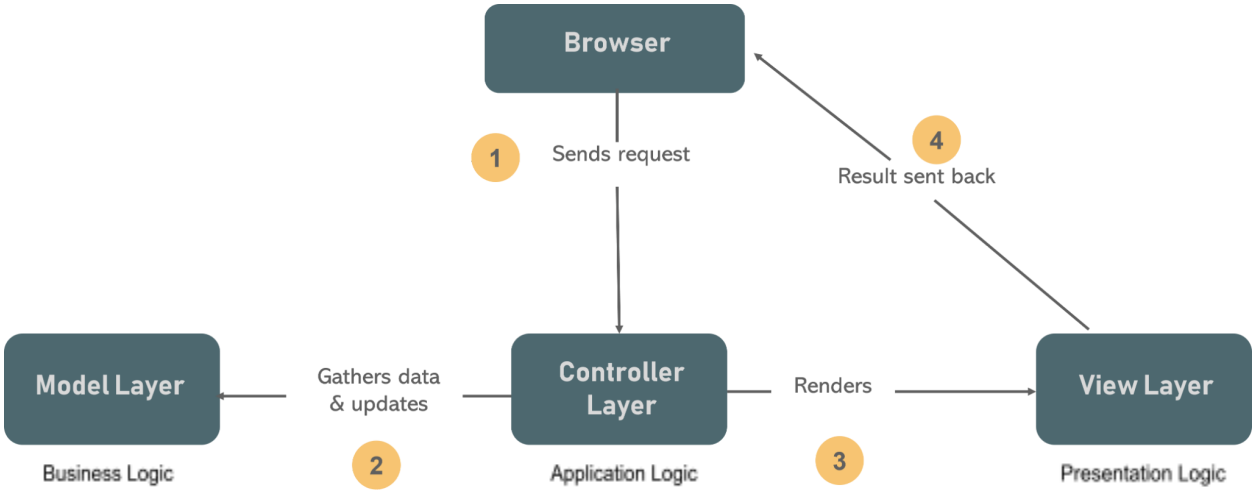



**Figure 3.1.31 : MVC WorkFlow**

➢ **ASP.NET MVC Features**

- Ideal for developing complex but lightweight applications.
- Provides an extensible and pluggable framework, which can be easily replaced and customized. For example, if you do not wish to use the in-built Razor or ASPX View Engine, then you can use any other third-party view engines or even customize the existing ones.
- Utilizes the component-based design of the application by logically dividing it into Model, View, and Controller components. This enables the developers to manage the complexity of large-scale projects and work on individual components.
- MVC structure enhances the test-driven development and testability of the application, since all the components can be designed interface-based and tested using mock objects. Hence, ASP.NET MVC Framework is ideal for projects with a large team of web developers.
- Supports all the existing vast ASP.NET functionalities, such as Authorization and Authentication, Master Pages, Data Binding, User Controls, Memberships, ASP.NET Routing, etc.
- Does not use the concept of View State (which is present in ASP.NET). This helps in building applications, which are lightweight and gives full control to the developers.

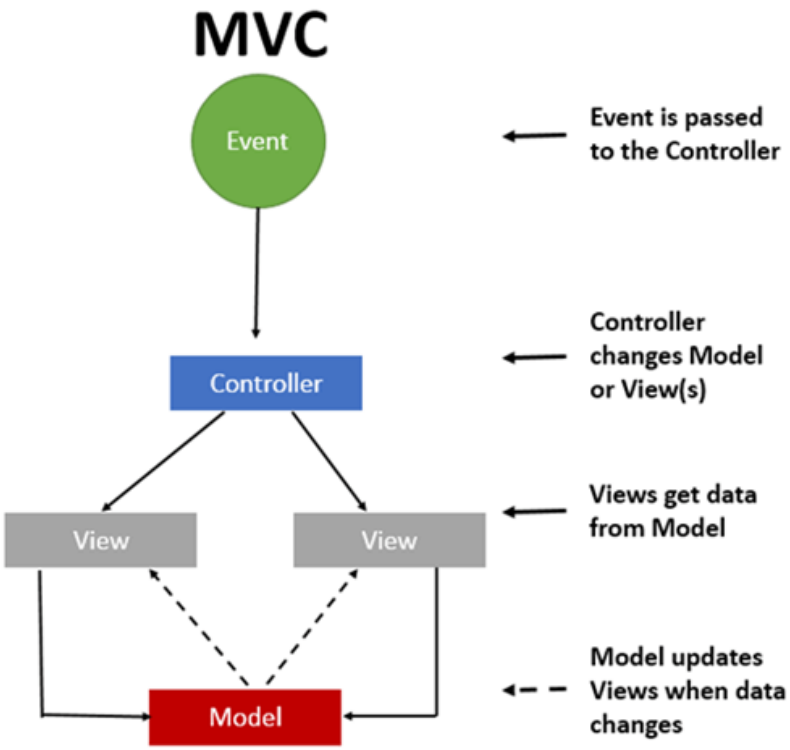



**Figure 3.1.32 : MVC Components**

➢ **MVC Components**

- **Model**

  The Model component corresponds to all the data-related logic that the user works with. This can represent either the data that is being transferred between the View and Controller components or any other business logic-related data. For example, a Customer object will retrieve the customer information from the database, manipulate it and update its data back to the database or use it to render data.

- **View**

  The View component is used for all the UI logic of the application. For example, the Customer view will include all the UI components such as text boxes, dropdowns, etc. that the final user interacts with.

- **Controller**

  Controllers act as an interface between Model and View components to process all the business logic and incoming requests, manipulate data using the Model component and interact with the Views to render the final output. For example, the Customer controller will handle all the interactions and inputs from the Customer View and update the database using the Customer Model. The same controller will be used to view the Customer data.

## 3.2 FRONT END TECHNOLOGIES

Front end-is a term used to characterize program interfaces and services relative to the initial user of these interfaces and services. It usually refers to the client side of an application. A front end application is one that users interact with directly. Turban et al (2008, p45) defines front end as the portion of an e-seller's portal, electronic catalogs, a shopping cart, a search engine and a payment gateway.

### 3.2.1 HTML


HyperText Markup Language (HTML) is a computer language devised to allow website creation. These websites can then be viewed by anyone else connected to the Internet. It is relatively easy to learn, with the basics being accessible to most people in one sitting; and quite powerful in what it allows you to create. Having the basic knowledge of HTML could help make or develop m-commerce websites and will also prove to be handy especially for editing and modifying web pages. Furthermore, it has some low cost benefits because of its many free online tutorials and advice support which is vital for m-commerce development.

### 3.2.2 JavaScript


JavaScript is a scripting language that is browser based and was developed by Netscape to enable web masters/authors to add interactivity and enhance behavior of web pages [11]. Some of the dynamic behavior that can be generated by JavaScript is validating form, performing specific actions e.g. after a mouse click, adding timestamps etc. JavaScript is an open language and anyone can use it. It also shares many of the features and structures of the Java programming language, though it is not really related to Java. It was developed independently.

### 3.2.3 CSS


CSS is a style sheet language used to describe presentation and layout of HTML tags. CSS is used to enable separation of document content from document presentation. This refers to the separation of document presentation aspects such as colors, layouts and fonts from the actual document content. CSS helps us achieve layout design and control much easier.

### 3.2.4 JSON

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It is easy for humans to read and write. It is easy for machines to parse and generate. It is based on a subset of the JavaScript Programming Language. JSON is a text format that is completely language independent but uses conventions that are familiar to programmers of the C-family of languages, including C, C++, C#, Java, JavaScript, Perl, Python, and many others. These properties make JSON an ideal data-interchange language.

JSON is built on two structures:

- A collection of name/value pairs. In various languages, this is realized as an object, record, struct, dictionary, hash table, keyed list, or associative array.
- An ordered list of values. In most languages, this is realized as an array, vector, list, or sequence.

These are universal data structures. Virtually all modern programming languages support them in one form or another. It makes sense that a data format that is interchangeable with programming languages also be based on these structures.

### 3.2.5 jQuery


jQuery is a fast, small, and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers. With a combination of versatility and extensibility, jQuery has changed the way that millions of people write JavaScript.

## 3.3 DATABASE MANAGEMENT SYSTEM

### 3.3.1 Oracle Database

Oracle database is a powerful relational database management system that has a number of features. In today's market, oracle database management systems are one of the most popular and full featured databases. Oracle databases are widely used as backend database systems for most enterprise applications because they are robust and secure. Oracle is a power hungry database that requires a lot of system resources to function properly. One of its major advantages is that it is platform independent. An Oracle database will work well with any web based system as long as there are enough resources required for it to run on.

### 3.3.2 PL/SQL

PL/SQL stands for "Procedural Language extensions to the Structured Query Language". SQL is a popular language for both querying and updating data in relational database management systems (RDBMS). PL/SQL adds many procedural constructs to SQL language to overcome some limitations of SQL. Besides, PL/SQL provides a more comprehensive programming language solution for building mission-critical applications on Oracle Databases. PL/SQL is an embedded language. PL/SQL only can execute in an Oracle Database.

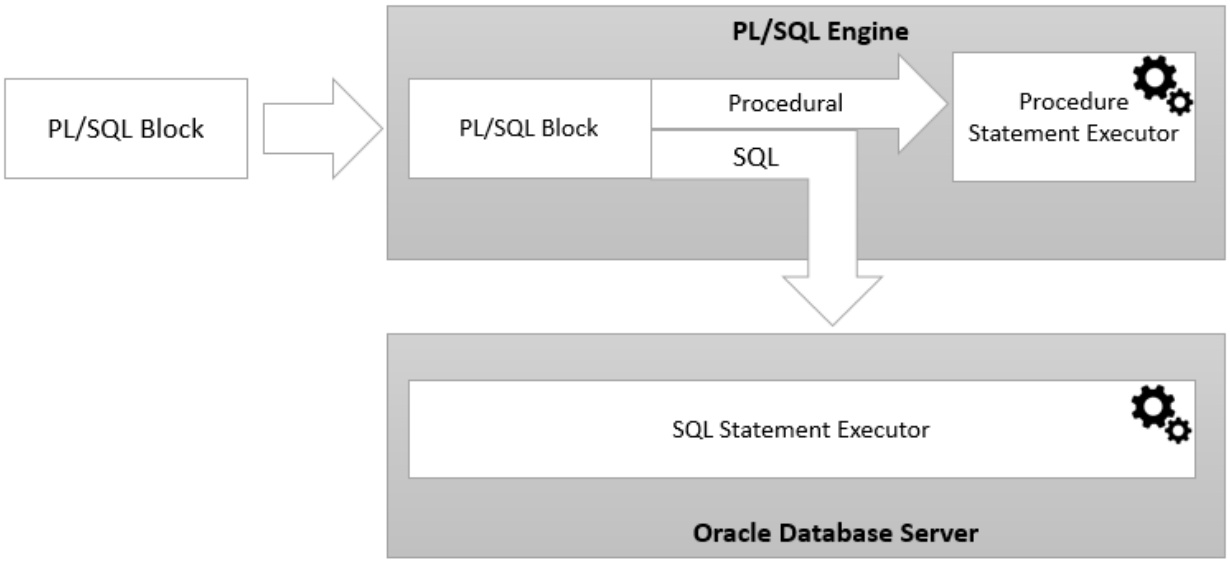



**Figure 3.3.2 : PL/SQL architecture**

# 3.4 DEVELOPMENT TOOLS

Integrated Development Environment (IDE) for C#
Microsoft provides the following development tools for C# programming −

### 3.4.1 Visual Studio 2015 (VS)

The last two are freely available from Microsoft official website. Using these tools, you can write all kinds of C# programs from simple command-line applications to more complex applications. You can also write C# source code files using a basic text editor, like Notepad, and compile the code into assemblies using the command-line compiler, which is again a part of the .NET Framework. Visual C# Professional and Visual Web Developer Express editions are trimmed down versions of Visual Studio and have the same appearance. They retain most features of Visual Studio. In this tutorial, we have used Visual C# 2015 Professional. You can download it from Microsoft Visual Studio. It gets installed automatically on your machine.

Note: You need an active internet connection for installing the professional edition.

### 3.4.2 Oracle SQL Developer

Oracle SQL Developer is an Integrated development environment (IDE) for working with SQL in Oracle databases. Oracle Corporation provides this product free; it uses the Java Development Kit. Schema Visualizer allows you to create fully featured Entity Relationship Diagrams (ERD).

### 3.4.3 Crystal Report

We use Crystal Report in Visual Studio to create the reports. Crystal Reports for Visual Studio .NET provides a comprehensive reporting solution for .NET developers that is thoroughly integrated with both the Visual Studio .NET IDE and the .NET Framework. Crystal Reports supports ADO.NET, XML Web Services, and ASP.NET server controls and caching. It also integrates seamlessly with the Visual Studio .NET Server Explorer, toolbox, and design environment. It has a rich programming model and flexible options for customizing and deploying reports. These major features and others covered here take the drudge work out of data representation in your own applications.

# 4. IMPLEMENTATION

Implementation is the process of having systems personnel check out and put new equipment into use, train users, install the new application and construct any files of data needed to use it. This phase is less creative than system design.

## 4.1 SYSTEM REQUIREMENTS

- Visual Studio 2015
- Oracle 12c release 2
- ODP.NET Data Provider For VS 2015
- Oracle Developer Tool For VS 2015
- Oracle Client
- Crystal Report for VS2015
- Enable IIS
- Enable .NET SDK

## 4.2 ENABLING IIS

Enabling Iis And Required Iis Components On Windows 10

1. Open Control Panel and click Programs and Features > Turn Windows features on or off.
2. Enable Internet Information Services.
3. Expand the Internet Information Services feature and verify that the web server components listed in the next section are enabled.
4. Click OK.

The system was developed and tested on a laptop computer running Windows 10, and the Internet Information Server (IIS). In order for the Web application to be accessible via the Internet it will have to be installed on a Web Server running IIS, C# and Oracle. The suitable operating system for the web server will be Linux as it is more stable and less prone to viruses but a windows based platform will equally do the job just as well. A suitable domain name will have to be chosen and registered in order for the web application to be accessed via a URL and hosting and administration fees paid to the web hosting company of choice either annually or monthly depending on the package and terms agreed upon. The web application will be accessible via most of the popular web browsers on the market. A suitable web browser e.g. Google Chrome will have to be installed on the client machine wishing to access the web application.

## 4.3 MAINTENANCE

Maintenance is necessary to eliminate errors in the working system during its working life and to tune the system to any variations in its working environment. Often small system deficiencies are found as a system is brought into operations and changes are made to remove them. System planners must always plan for resource availability to carry out these maintenance functions. The importance of maintenance is to continue to bring the new system to standards.

## 4.4 DATABASE CONNECTIONS AND CODE-IMPLEMENTATION

This subsection represents the main approach that has been made up in order to establish the connections with the database:
The Razor View control could be previewed as first:

```
<div class="form-group">
        @Html.EditorFor(model => model.EMPLOYEEID, new { htmlAttributes = new {
        @class = "form-control", @name = "EMPLOYEEID", @type = "text", @placeholder =
        "Employee ID*" } })
</div>
```

We have a data-record into the model. In order to be able to perform such kind of operations, concerning the process of uploading data into a data-table, or into a text-box field and so on, we need to establish a connection to the database, upload the desired data-fields into our buffer (the dataset) and afterwards perform the necessary data-binding operations:

➢ **Establishing the data-connection:** For this purpose, a DBLayer folder has been created and also created several separate classes to access the database through – "Oracle.ManagedDataAccess.Client" reference. In these classes, not only functions dealing with retrieving data are included, there are also functions for saving data into the database, updating data, etc. On a first time, we have to manage to the connection with the data source, which one is the database ("EMS"):

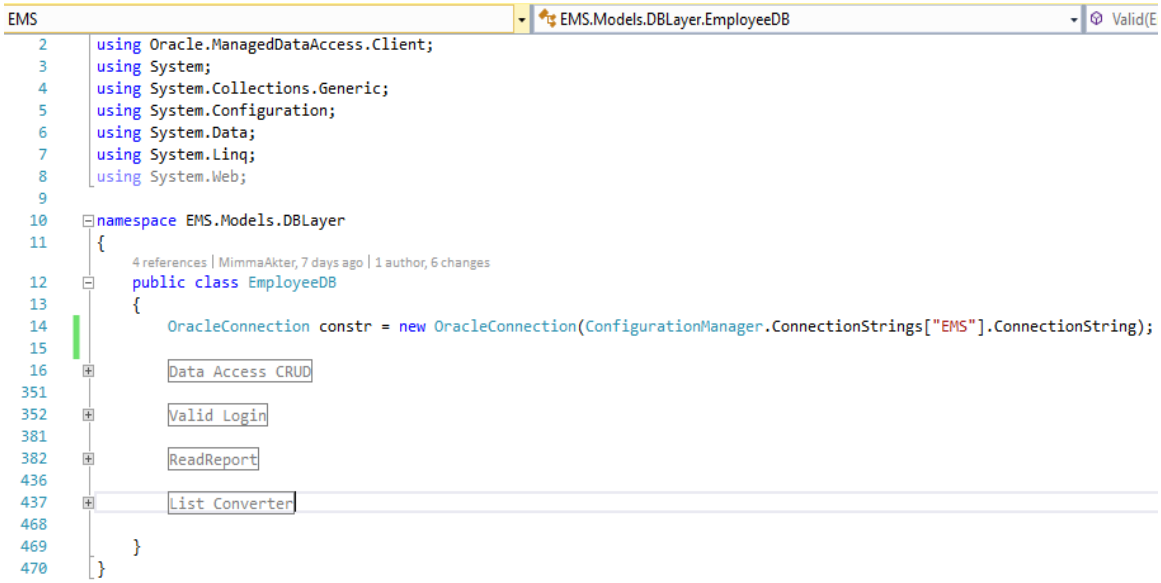



**Figure 4.40 : Database Connection**

There are few steps until the data source get connected to the application program's components:

➢ **Specifying the connection string:**

```
OracleConnection constr = new
OracleConnection(ConfigurationManager.ConnectionStrings["EMS"].ConnectionString
```

➢ **Creating a data adapter to communicate between the dataset and the database using the already specified connection- and query-strings:**

```
OracleCommand com = new OracleCommand("GetEmployeeList", constr);
com.CommandType = CommandType.StoredProcedure;
com.Parameters.Add("data_cursor", OracleDbType.RefCursor, DBNull.Value,
                                  ParameterDirection.Output);
OracleDataAdapter da = new OracleDataAdapter(com);
```

- **A bit more about the data adapter:**
  "The ADO.NET DataSet is a memory-resident representation of data that provides a consistent relational programming model independent of the data source. The DataSet represents a complete set of data including tables, constraints, and relationships among the tables. Because the DataSet is independent of the data source, a DataSet can include data local to the application, as well as data from multiple data sources. Interaction with existing data sources is controlled through the DataAdapter…The Fill method of the DataAdapter is used to populate a DataSet with the results of the SelectCommand of the DataAdapter...".

- **Creating the Dataset to be populated with data:**

```
DataSet ds = new DataSet();
```

- **Populating the Dataset with data using the so constructed Data-adapter:**

```
da.Fill(ds);
```

After getting the connection established and populating the desired data-fields into the Dataset, we can pass the model via controller to the view and binding with form element with the Dataset by explicitly showing the data source :

```
#region Profile
0 references | MimmaAkter, 12 days ago | 1 author, 2 changes
public new ActionResult Profile(string id)
{
    var emp = _dbLayer.GetEmployee(id).Find(smodel => smodel.EMPLOYEEID == id);
    if (emp.ImageUrl == null)
    {
        emp.ImageUrl = "~/hrms_master/img/No_Image_Available.jpg";
    }
    emp.DepartmentList = new SelectList(bsDepartment.DepartmentLookUp(), "DEPARTMENTID", "DEPARTMENT");
    emp.DesignationList = new SelectList(bsDesignation.DesignationLookUp(), "DESIGNATIONID", "DESIGNATION");
    emp.GenderList = new SelectList(bsGender.GenderLookUp(), "SEXID", "SEXNAME");
    emp.BankList = new SelectList(bsBank.BankLookUp(), "BankId", "BankName");
    emp.BloodList = new SelectList(bsBlood.BloodLookUp(), "BLOODGROUPID", "BLOODGROUPNAME");
    emp.ReligionList = new SelectList(bsReligion.ReligionLookUp(), "RELIGIONID", "RELIGIONNAME");
    emp.PaymenttypeList = new SelectList(bsPaymentType.PaymentTypeLookUp(), "PAYMENTTYPEID", "PAYMENTTYPE");
    //emp.MARITALSTATUS = (emp.MARITALSTATUS == null) ? false : emp.MARITALSTATUS;
    return View(emp);
}
```

**Figure 4.41 : Passing Model from Controller to the View**

After loading the available data records from the database, we are already able to take a preview upon them:

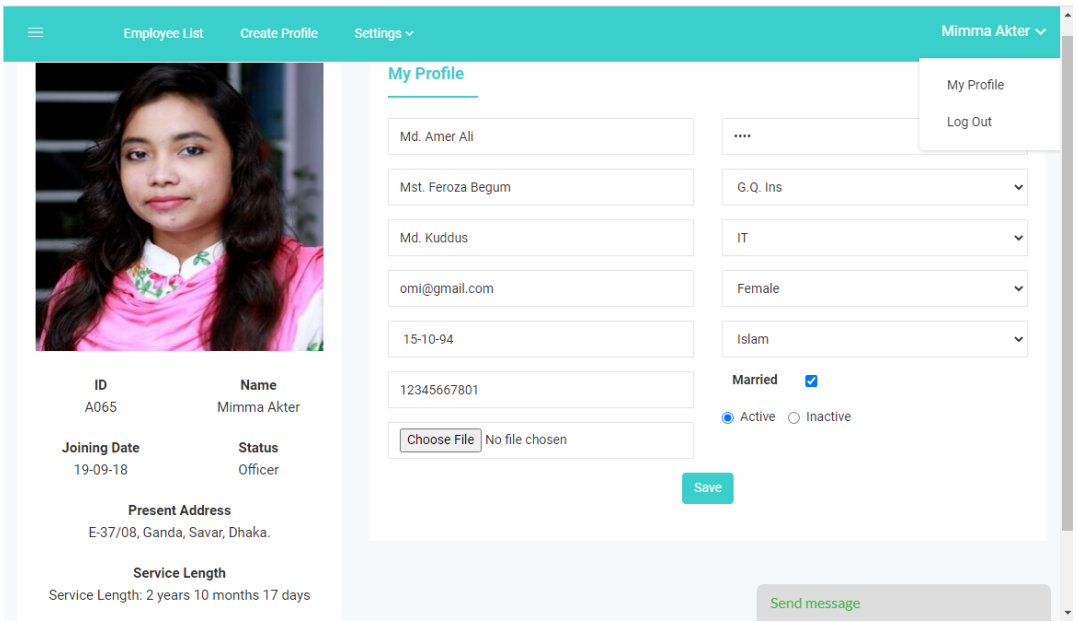



**Figure 4.42 : Data records uploaded into the form control**

## 4.5 FOUR BASIC FUNCTIONS UPON THE DATABASE

The four basic functions upon the database will be the main subject to be discussed:

1. Retrieving data.
2. Saving data.
3. Updating data.
4. Deleting data.

### 4.5.1 Retrieving data from the database

Retrieving data from a database is less or more tightly related to dealing with the SELECT query that should be applied to the database in order to extract the desirable result, which one should satisfy certain conditions. This SQL query has the following structure:

SELECT <column_name>
FROM <table_name>
WHERE [(condition_1), (condition_2), …..(condition_n)].

Into the WHERE-statement, the following logical and arithmetic operators are included as well: [AND, OR, <, <=, >, >=, =].

➢ **The data from the database is retrieved in three different ways:**

1. Procedure ( "GetEmployeeList" ) is implemented. The SELECT query here retrieves all data from T_Employee table. This data is uploaded into the data table and all text fields of Profile details and Other pages, which ones are related to the content of T_Employee table.

**Employee Data Table**

Print List

Export Basic

Search

| EMPLOYEE ID | EMPLOYEE NAME | GENDER | NID | BASIC SALARY | GROSS WAGES | ACCOUNT NO | SETTINGS |
|---|---|---|---|---|---|---|---|
| EEE | Ayaan | M | 1234566780 | 10000 | 15000 | | |
| TG17101 | Md. Abdullah Al Mamun | | | 0 | 0 | 0 | |
| TA4825 | Md. Anowar Hosen | | | | 0 | 0 | |
| TG17637 | Md. Golam Rabban | | | | 0 | 0 | |
| TG17668 | Md. Habibur Rahman | M | 7311257224997 | 4998 | 9347 | | |
| TG17096 | Md. Ibrahim Islam | | | | 0 | 0 | |
| TG17095 | Md. Jahangir Alam | | | | 0 | 0 | |
| TG17702 | Md. Jahidul Islam | M | 2379105717 | 3964.29 | 6650 | | |
| TG17671 | Md. Mahatab Ali | M | 1016731662562 | 4998 | 9347 | | |

**Figure 4.5.10 : Employee Data Table**

2. After loading the available records existing into the main table, we can proceed to upload and other existing records from another table by switching from one tab-page to another. That performs a SQL query for retrieving data from the main table plus data from its related (child) table. Procedure performing the select query expression.

   In this expression, we use the primary and the foreign key values from the parent and the child tables, as the relationship between them should be explicitly specified. We also use a WHERE- statement in order to specify the person these records belong to. Afterwards, a result table is constructed by joining the records from the child table to their related record from the parent data table.

   Procedure ( "GetEmployeeInfo" ) performed in this way is a kind of convenience as the data source is still T_Employee and it is not necessary to switch our data-binding process to another source of data every time, when we go to any other table of the database. It is very important to know which person (employee) these records belong to. In accordance with that, the procedure above takes one input parameters :

   EMPLOYEEID=pEmployeeID

   and apply it to the WHERE-statement's condition.

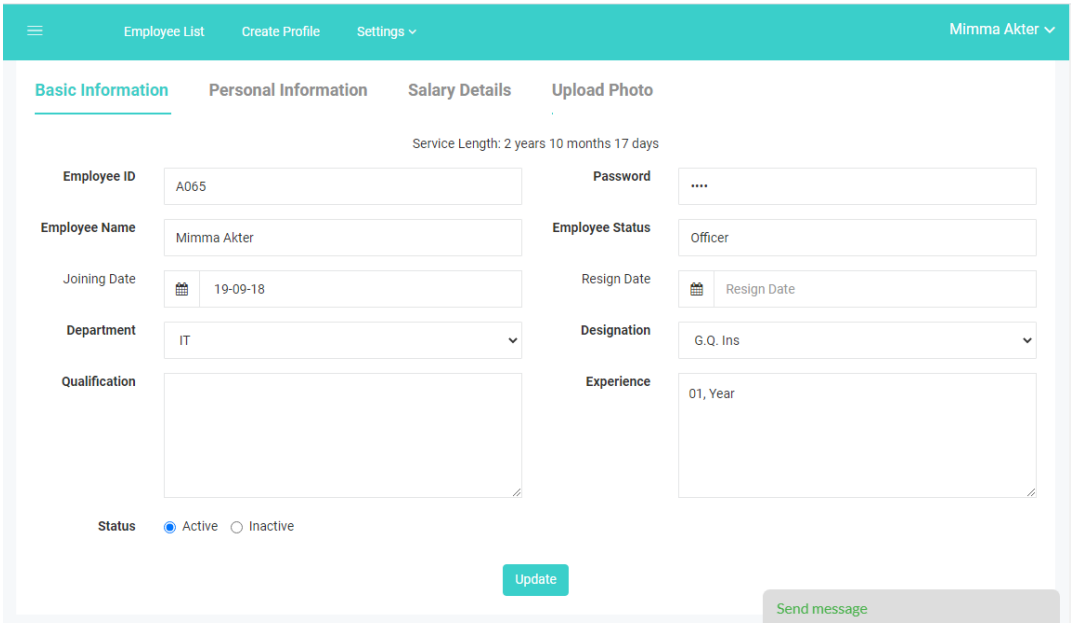



**Figure 4.5.11 : Data records retrieve after clicking edit button**

3. The last way of retrieving data into the program is by the Search field, provided for seeking certain employee's data. Search by certain condition (given values): The search field consists of two functional buttons and three text fields for giving the input parameters as string values through which ones the search process will be performed. The first functional button is located above the data grid and put in a line with other functional buttons. Actually, it unlocks the search field and enables it to receive data.

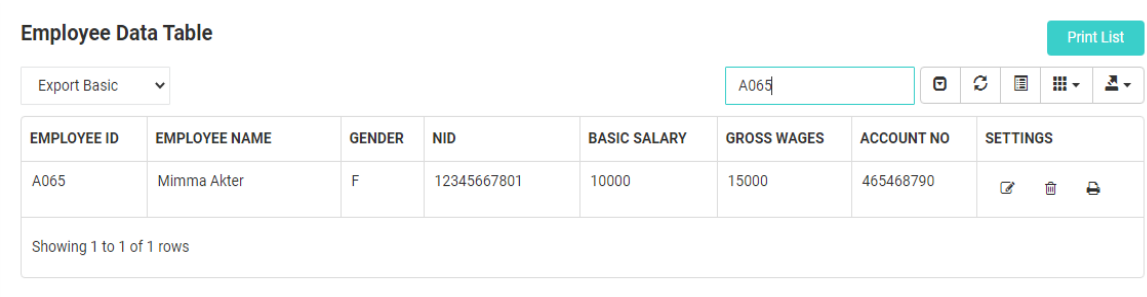



**Figure 4.5.12 : Search Result**

### 4.5.2 Saving data into the database

This kind of operation upon the database is subdivided into two groups:

1. Create a record to an employee's data records.
2. Saving a New employee's records (Populating all of the tables with data)

1. Create a record to the database:
   We need to press the "Create Profile" button in order to enable the "Save" button and to prepare the fields for the input stream of data.


**Figure 4.5.20 : Create Employee/Profile Nav bar**

2. **Saving new employee's records:**

   The whole process comprises a few actions, but not all of them are compulsory to be accomplished at once! First of all, to unlock the fields in order to get them prepared for accepting new data, the ("Create Employee") button has to be clicked. Afterwards, we can go to the desired form and fill the required data in.

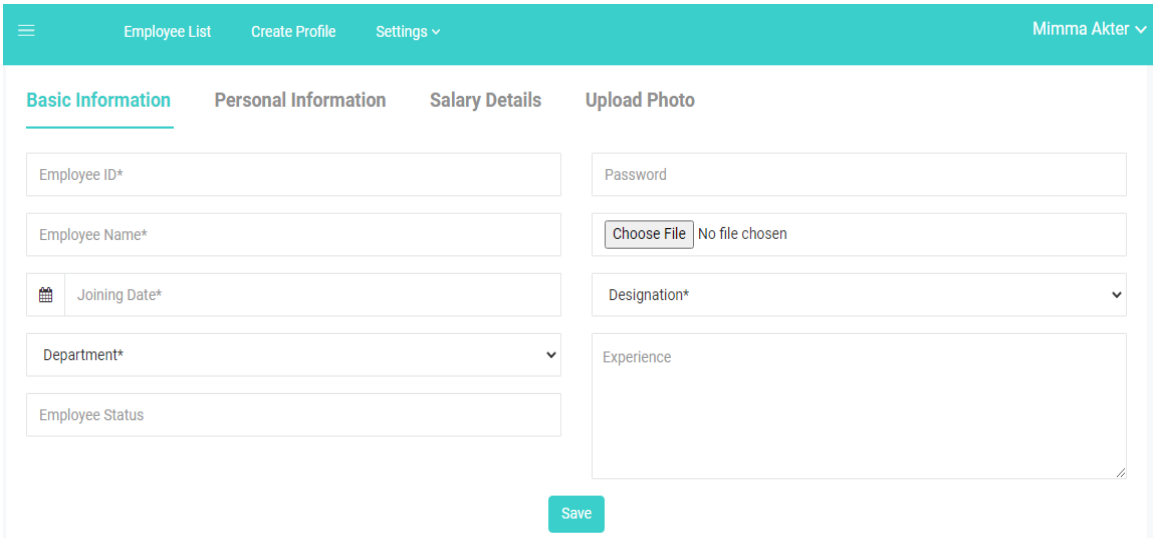



**Figure 4.5.21 : Save Employee/Profile Form**

It's not necessary to fill in all of the forms with an exception of the two first, which ones hold the data for the parent table into the database, and to be able to perform a successful save into the database, we need to fill in all of the fields required there! Of course, if not all of the rest forms are populated with data, a message appears on screen asking the user whether he would like to proceed anyway saving only the data, filled till the moment, or go back and fill them in.

**The next approach has been made to resolve the saving problem:**

Firstly, it is known that the primary key values in all tables are automatically generated by saving a record as they have been set to an AutoNumber type. When data is saved into the parent table, we have the primary key, which one is the EmployeeID, but this value is also needed for proceeding to another (child) table and populating it with data as the DBMS needs to know the responding record into the parent table! Apparently, we need to specify to which employee (person) from the parent table, the current record we are trying to save, belongs to.

As it concerns all child tables into the database, it could be done in the following way: When a record is populated into the parent table and we try to save another one into a child table, the primary key's value is taken and put into the child table where we want to save the current record. Afterwards, we go to the child table and save the record there. To implement this in code, a few functions have been constructed (one for each child table and one for establishing the connection between the parent and the child tables).

After filling the required information into the text fields, all of the fields are checked whether sufficient information is given or not. That's all concerning the Save-data process as such as it has been implemented into my program.

### 4.5.3 Updating records into the database

This operation, performed upon a database, is less or more essential as it is tightly related to the "Edit"- and "Refresh"-modes of operating with data. One thing should always be taken into account when we deal with records-updating: We need to know the primary key's value of the current record that we would like to get updated by the system, as in other way a rather different record would be updated.

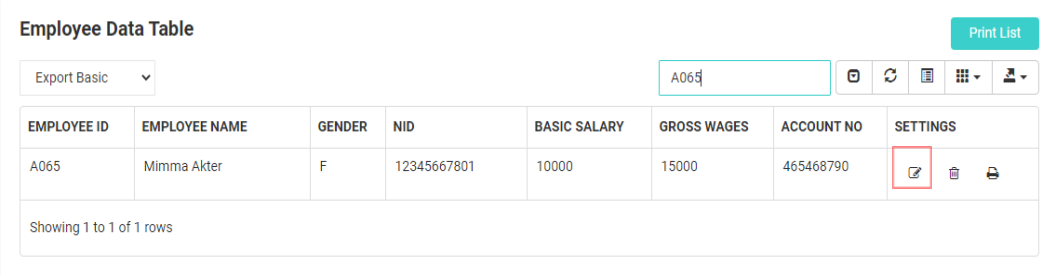



**Figure 4.5.30 : Showing Edit button**

The Update() function - invokes the Procedure ( "UpdateEmployee" ). As it could be noted, this method calls another one within itself, which one actually executes the SQL query upon the database. This method has the next body SQL implementation for updating records into the parent table.

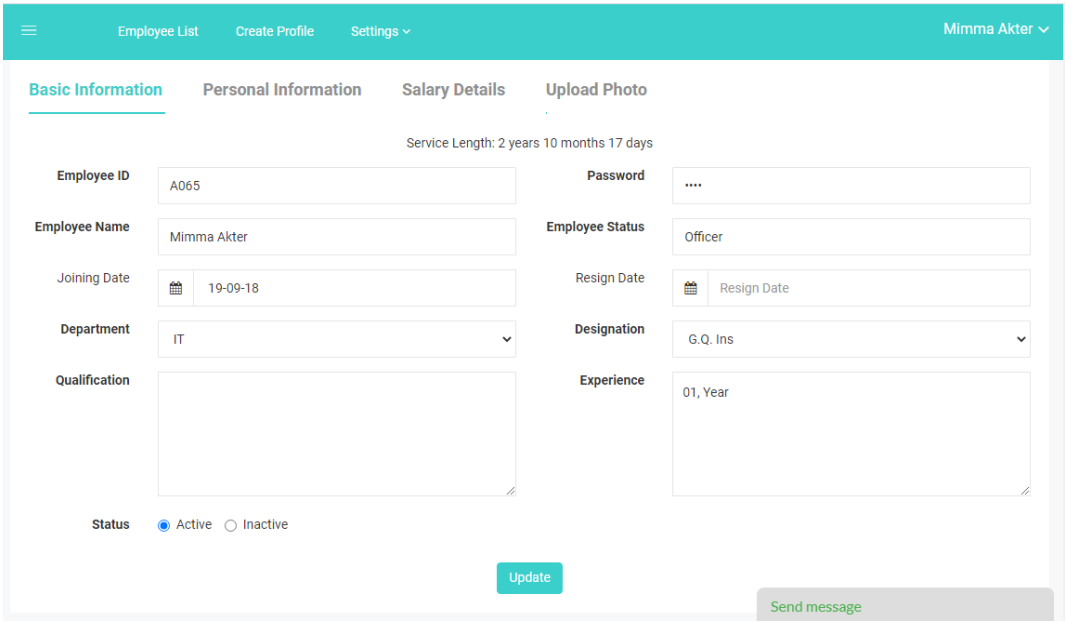



**Figure 4.5.31 : Update Records**

### 4.5.4 Deleting data from the database

Deleting a single record from the database means moving to a certain child table, selecting the record we want to be deleted and pressing the “Delete” button. The result is instantly reflected into the database and back into the program as well.

I have constructed a delete function for every single record, erasing all of the records of the selected employee. The function will erase the record into the parent table by invoking the Procedure ("DeleteEmployee")

```
public ActionResult Delete(string id)
{
    _dbLayer.Delete(id);
    return RedirectToAction("Index");
}
```

```
1 reference | MimmaAkter, 25 days ago | 1 author, 1 change
public void Delete(string id)
{
    OracleCommand cmd = new OracleCommand("DeleteEmployee", constr);
    cmd.CommandType = CommandType.StoredProcedure;
    cmd.Parameters.Add("pEMPLOYEEID", OracleDbType.Varchar2).Value = id;
    constr.Open();
    cmd.ExecuteNonQuery();
    constr.Close();
}
```

**Figure 4.5.40 : Delete Record using StoreProcedure**

Single Record Deletion means that only the current record we want to delete, shall be removed from the database. For this purpose, we can use the functional buttons, related to a record in each data table. The click-event of such a button is shown.

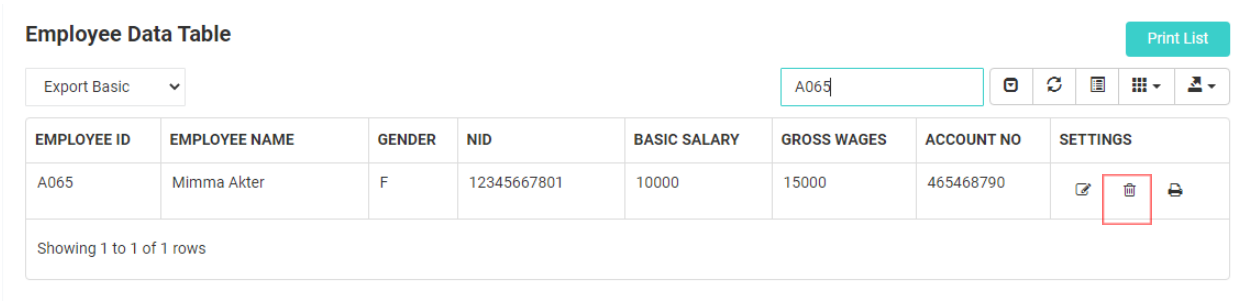



**Figure 4.5.41 : Showing Delete Button**

## 4.6 EXPORT REPORT

You can export a standard or custom report to your local workstation. Reports can be exported as a PDF.

```
#region Report
0 references | MimmaAkter, 10 days ago | 1 author, 1 change
public ActionResult Print(string id)
{
    ReportDocument rd = new ReportDocument();
    rd.Load(Path.Combine(Server.MapPath("~/Reports/Employee"), "EmployeeCV.rpt"));
    //rd.SetDataSource(ListToDataTable(_dbLayer.GetBankListRpt().ToList()));
    rd.SetDataSource(_dbLayer.ReadForPrintCV(id));
    Response.Buffer = false;
    Response.ClearContent();
    Response.ClearHeaders();
    try
    {
        Stream stream = rd.ExportToStream(CrystalDecisions.Shared.ExportFormatType.PortableDocFormat);
        stream.Seek(0, SeekOrigin.Begin);
        return File(stream, "application/pdf", "EmployeeCV.pdf");
    }
    catch
    {
        throw;
    }
```

**Figure 4.60 : Print Report**

Click on the Print icon Print() method will generate an export of the fully formatted report. Data will generate an export of only the underlying data in a report in a PDF file. All formatting, such as images or titles, will be excluded.

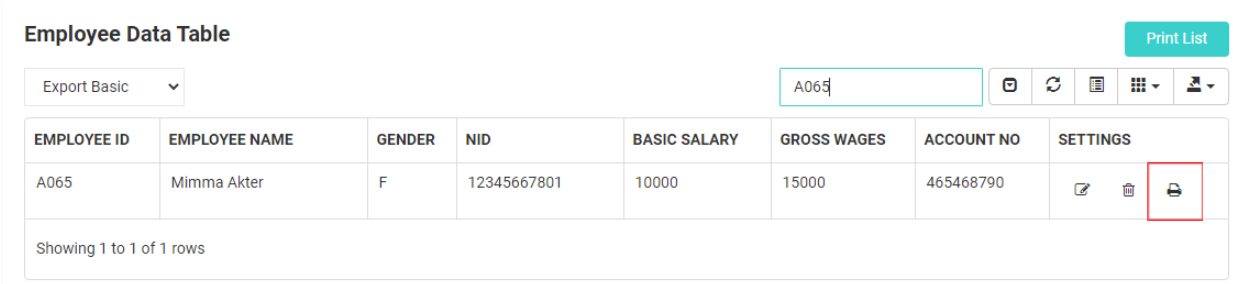



**Figure 4.61 : Showing Print Button**

***Mimma Akter***

*CV*

| | | | |
|---|---|---|---|
| *Employee ID* | : A065 | | |
| *Employee Name* | : Mimma Akter | | |
| *Father's Name* | : Md. Amer Ali | | |
| *Mother's Name* | : Mst. Feroza Begum | | |
| *Marital Status* | : Married | *NID* | : 12345667801 |
| *Spouse Name* | : Md. Kuddus | *Date of Birth* | : 15-Oct-94 12:00:00AM |
| *Joining Date* | : 19-Sep-18 12:00:00AM | *Designation* | : G.Q. Ins |
| *Gender* | : Female | *Department* | : IT |
| *Resign Date* | : | *Contact No* | : 01632007085 |
| *Job Status* | : Officer | | |
| *Qualification* | : S.S.C. | | |
| *Experience* | : 01, Year | | |
| *Parmanent Address* | : House-28/2, Rajabari, Savar,Dhaka-1340 | | |
| *Present Address* | : E-37/08, Ganda, Savar, Dhaka. | | |

*Signature of*
Mimma Akter

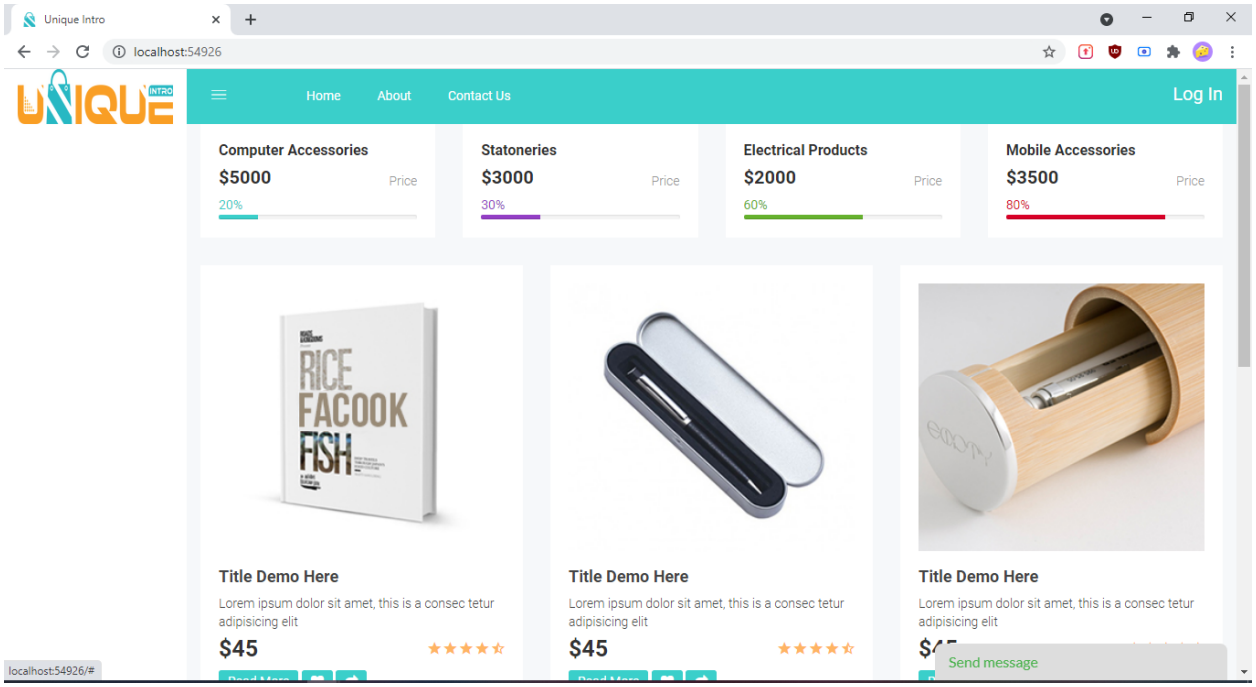
## 4.7 ERROR LIST

List of errors that I have faced during the development.

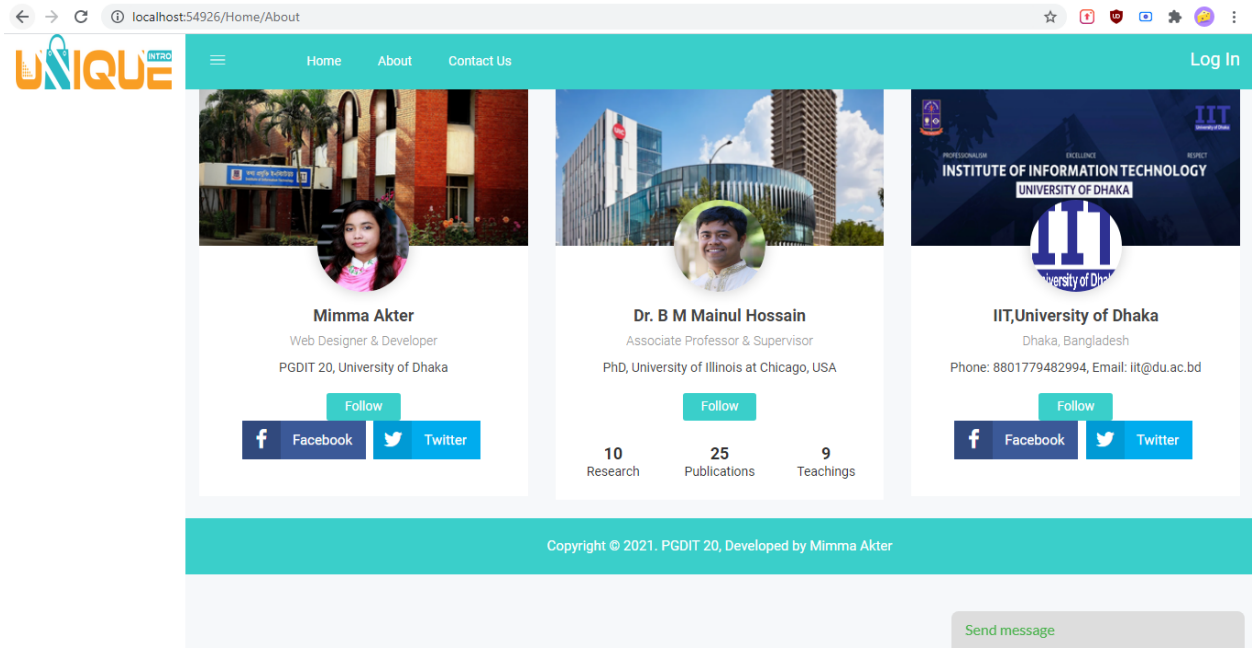
- Object reference not set to an instance of an object.
- ORA-01400: cannot insert NULL into ("EMS"."T_EMPLOYEE"."EMPPRESADDRESS")
- ORA-00001: unique constraint (EMS.UNIQUE_EMPLOYEE_NID) violated
- Unable to cast object of type 'System.DBNull' to type 'System.Byte[]'.
- Object cannot be cast from DBNull to other types
- Value cannot be null.
- Parameter name: inArray
- Compilation Error
- Compiler Error Message: CS1525: Invalid expression term '='
- Error in File EmployeeList 6724_9596_{824B6ECA-55D0-41E5-B226-F08CDA54BE69}.rpt:
- Specified cast is not valid.
- Input string was not in a correct format.
- String was not recognized as a valid DateTime.
- Error(4,7): PLS-00103: Encountered the symbol "," when expecting one of the following: current delete exists prior
- String was not recognized as a valid DateTime.
- String was not recognized as a valid Boolean.
- Value cannot be null or empty.
- Parameter name: contentPath

# 4.8 USER INTERFACE

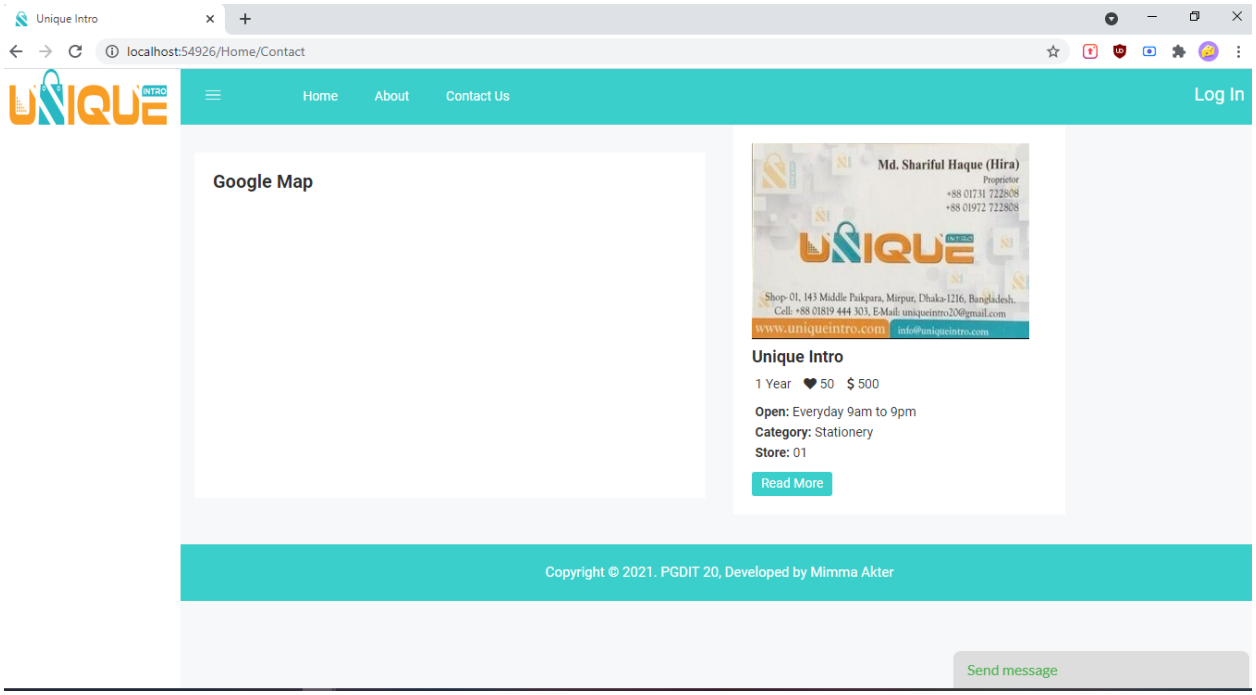
➢ **Home Page**



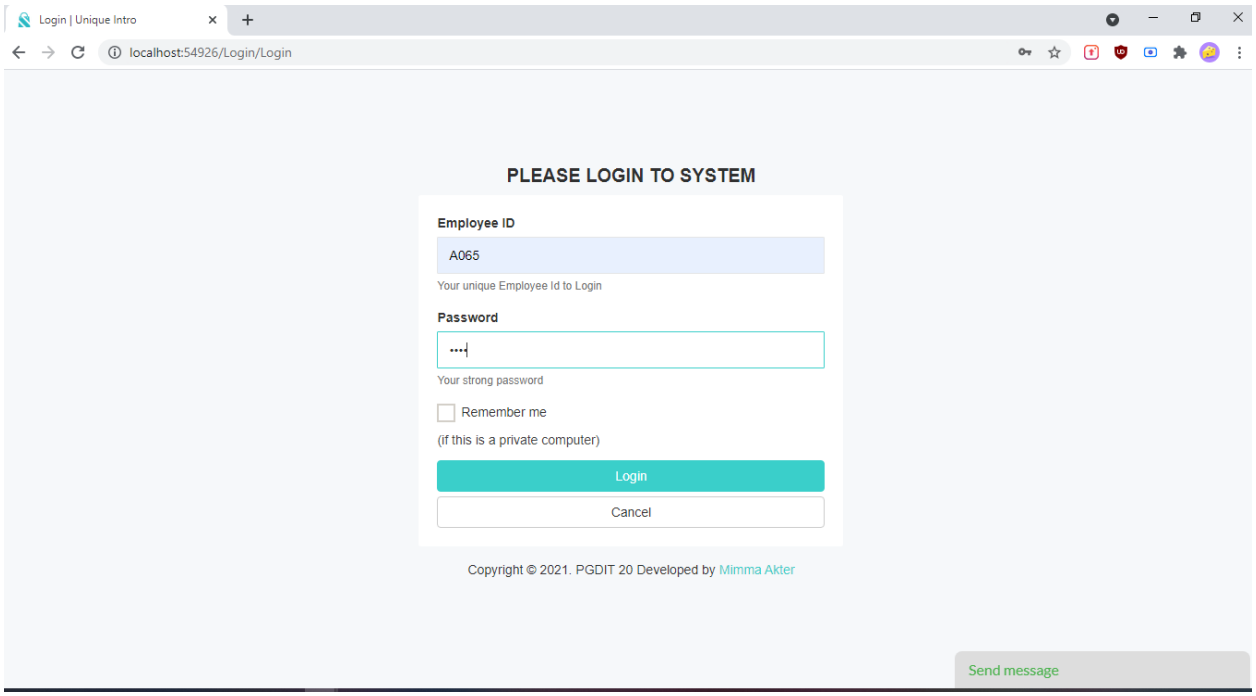

➢ **About Page**



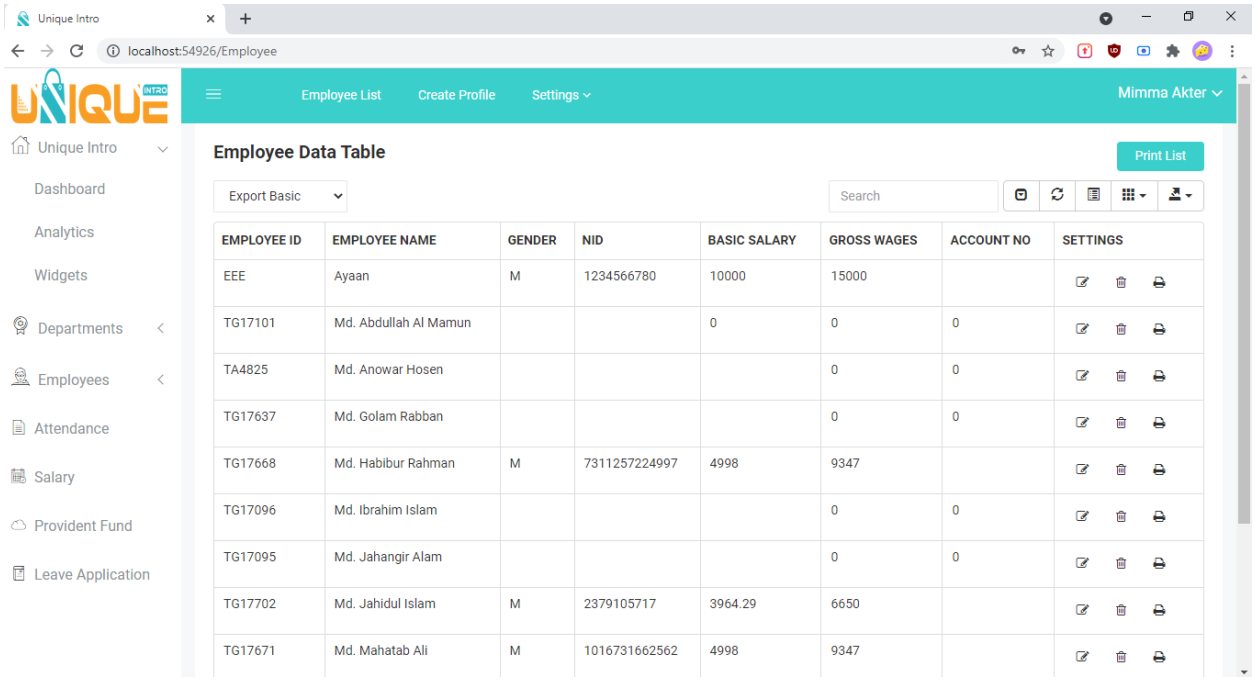
## ➢ Contact Us



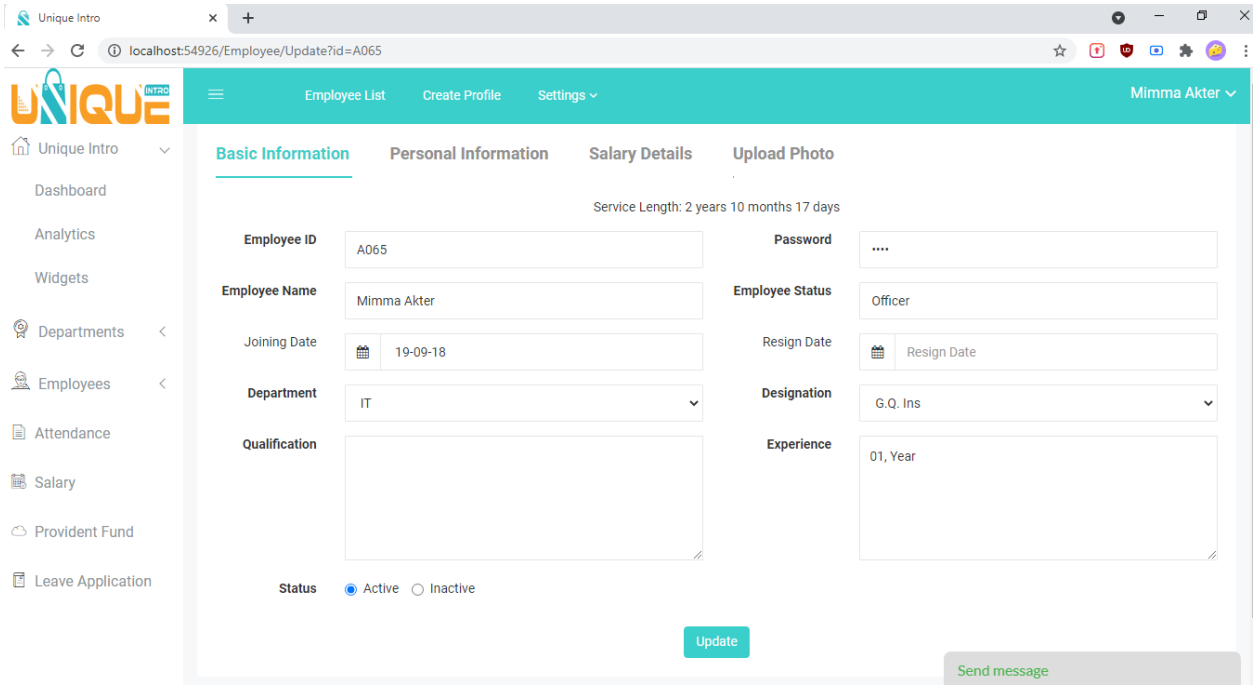

## ➢ Login Page



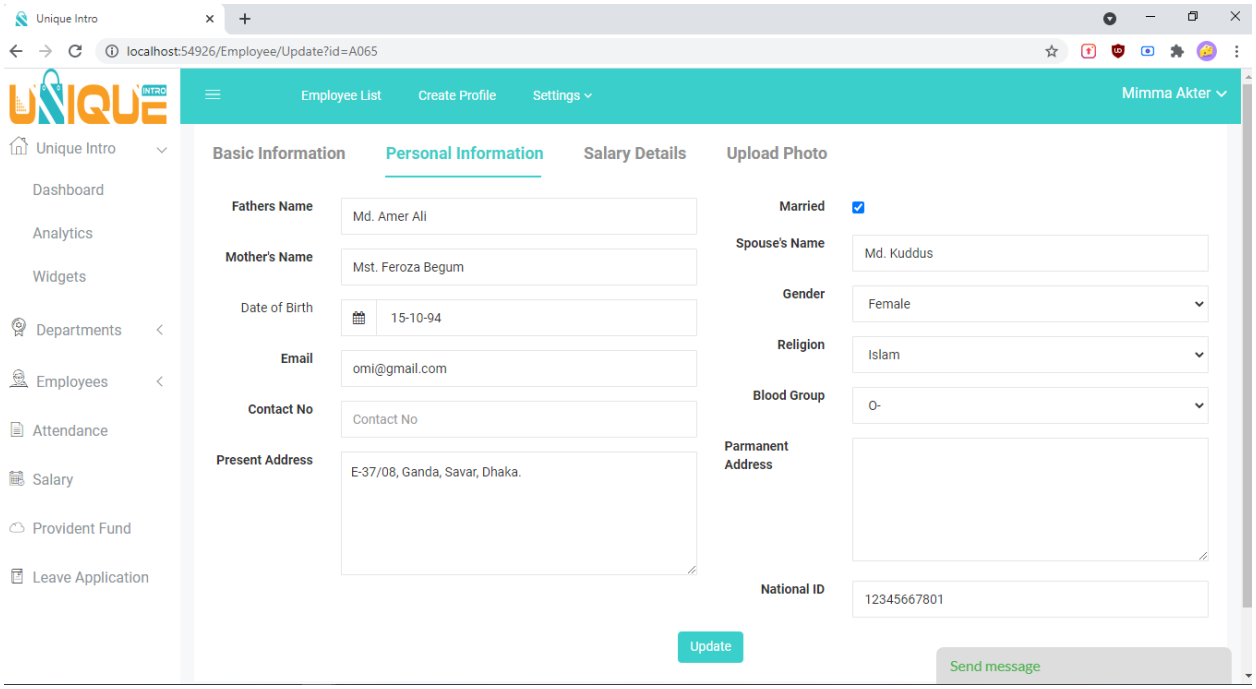
## ➢ Employee List



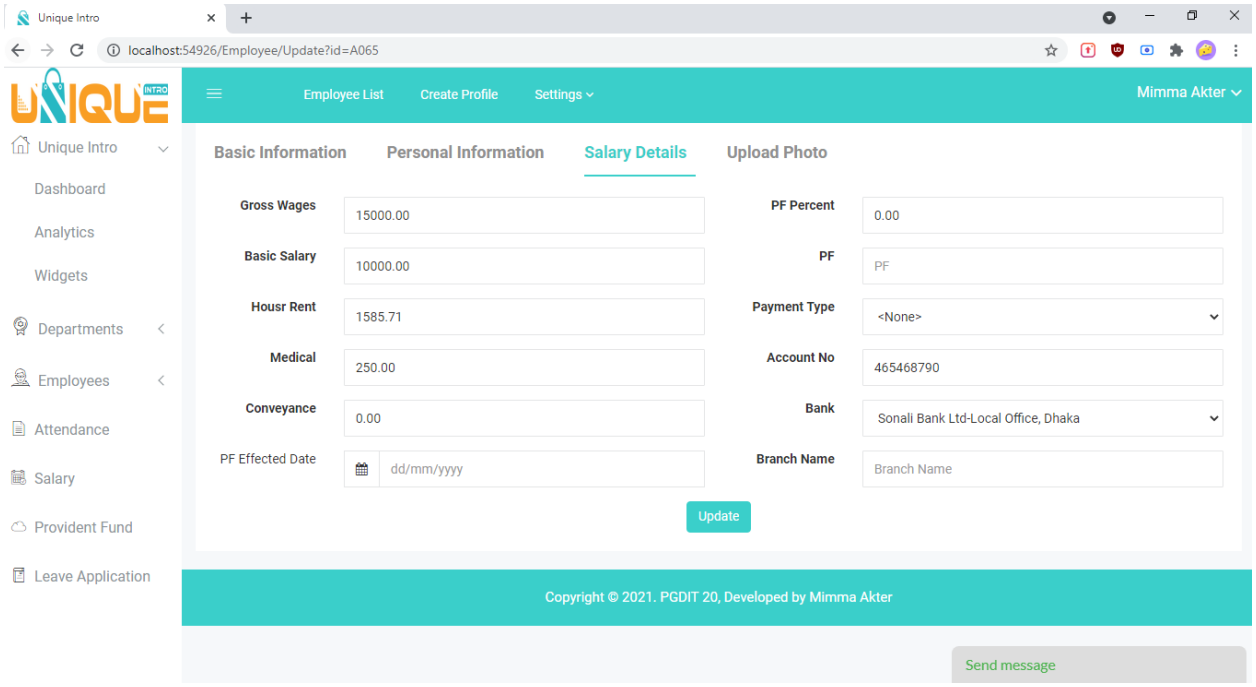

## ➢ Basic Information



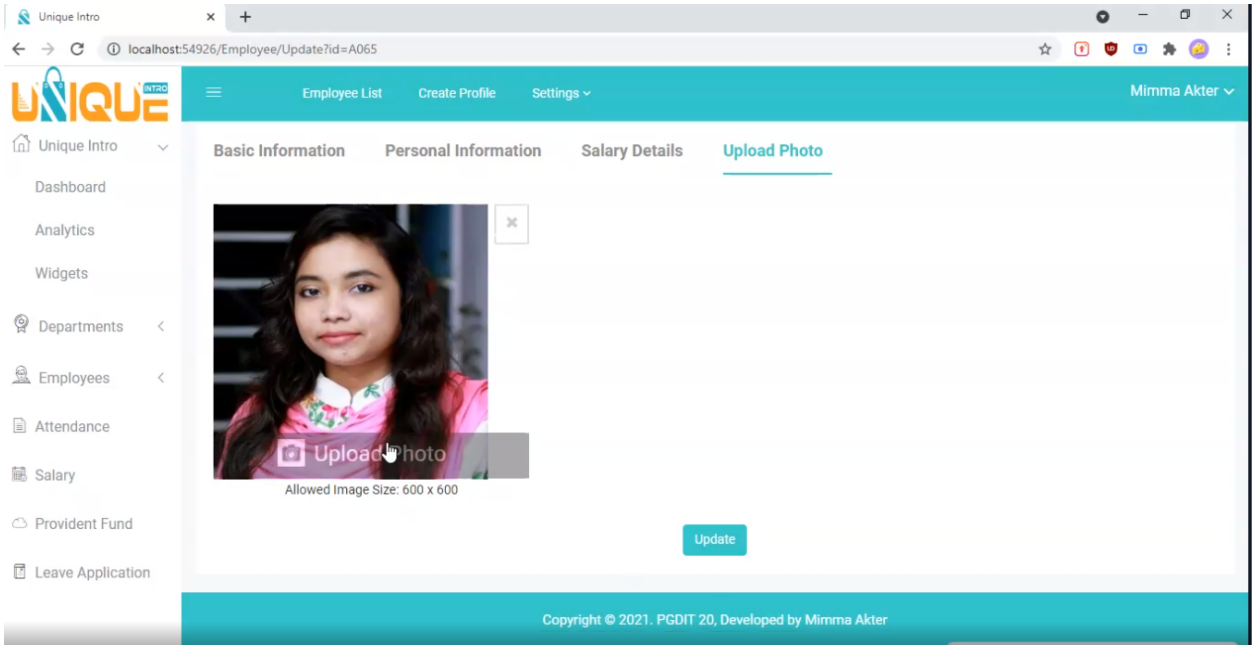
## ➢ Personal Information



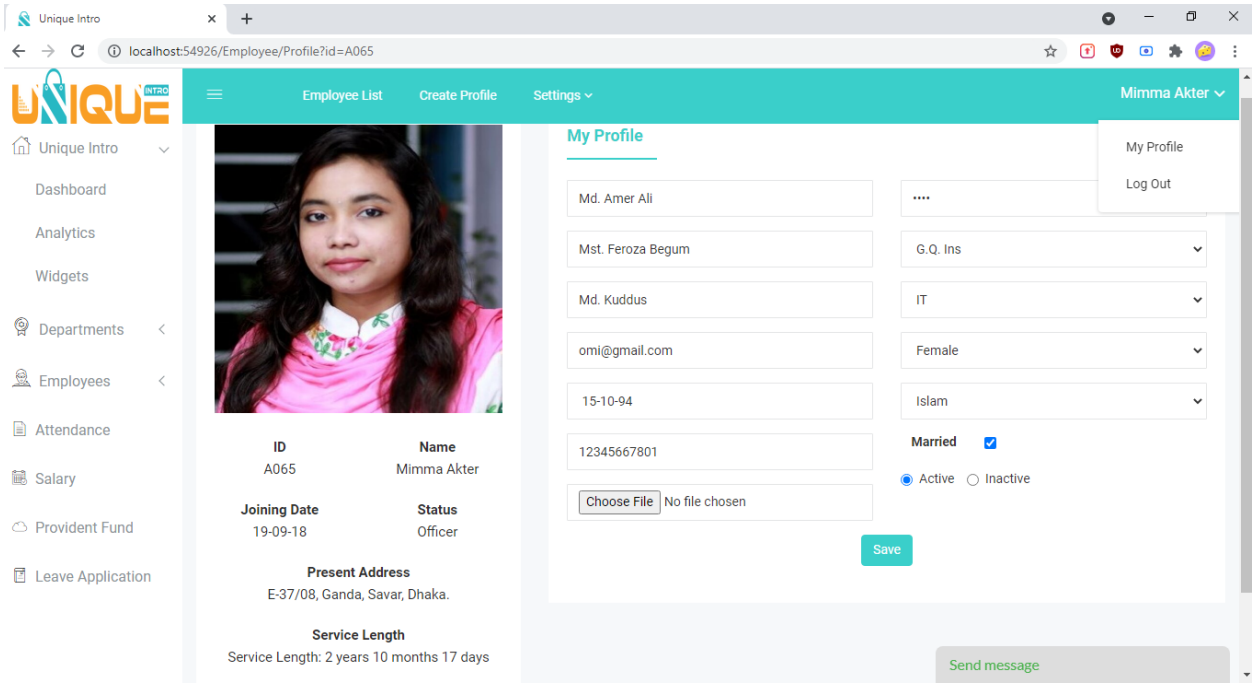

## ➢ Salary Details



## ➢ Upload Photo

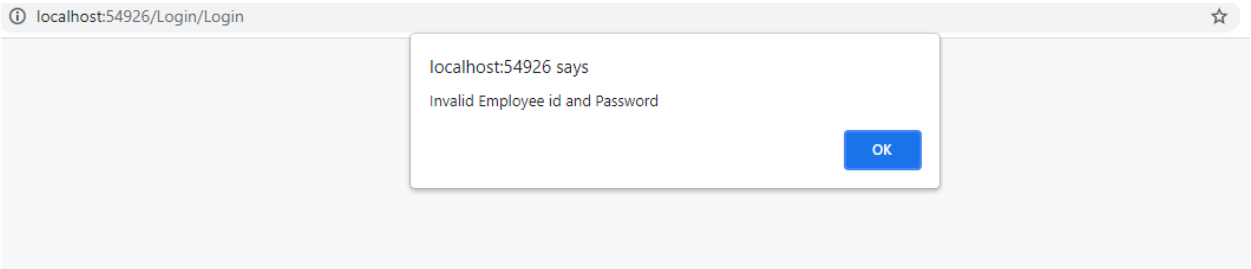



## ➢ My Profile

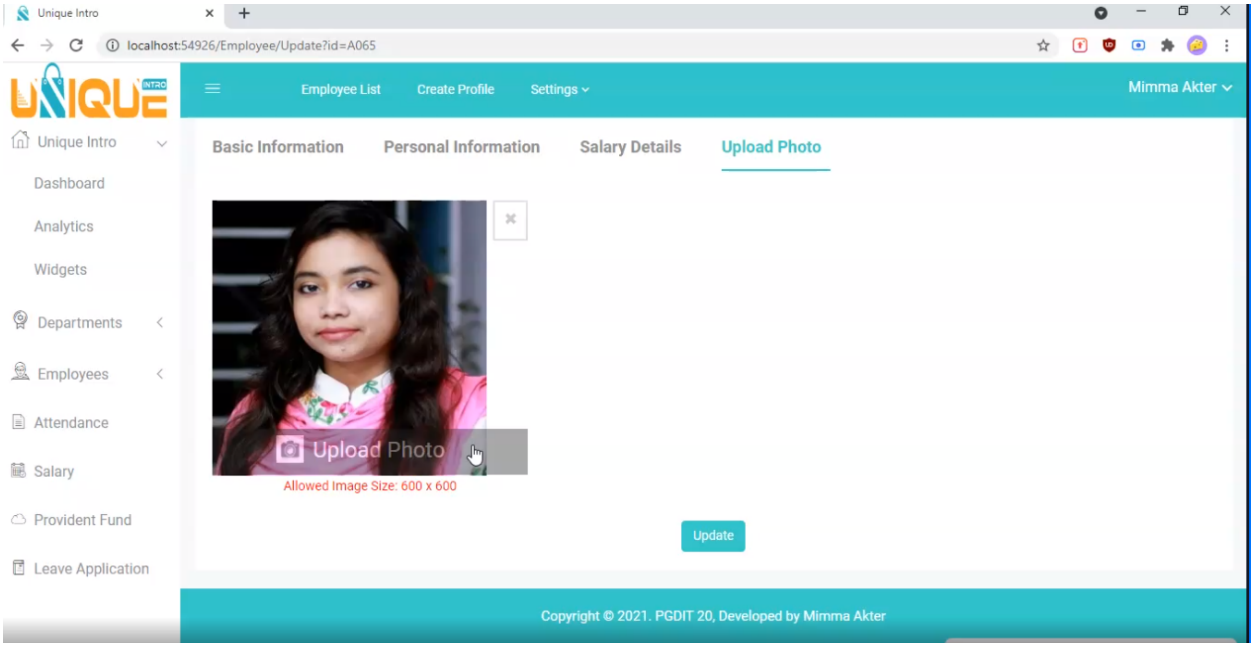


## ➢ Custom Error Messages

- Invalid Employee id and password




- Allowed Image Size 600 x 600



## 4.9 SOURCE CODE LINKS

➢ **Project**

All my open source code are available at:

https://github.com/MimmaAkter/EMS

➢ **Document**

Source code of this document can be found at:

https://github.com/MimmaAkter/EMS_Report.git

➢ **Demonstration**

Demonstration video of this EMS project can be found at:

**https://youtu.be/ECofHEwZH5U**

# 5. TEST PLANS AND RESULTS

The Test Plan is derived from the Requirements, Functional Specifications, and detailed Design Specifications. The Test Plan identifies the details of the tests, identifying the associated test case areas within the product.

**Table 5.0 : Test Plans And Results**

| Test Case | Test Purpose | Test Condition | Expected Outcome | Actual Result |
|---|---|---|---|---|
| Login | Check username and Password | If user details are not correct, display error message | Grant Access to the applicable main system | User successfully logs into the system upon submission of correct login credentials. |
| Add new user | To ensure that a new user is added to the system successfully. | If user already exists in the system, error message should display. | New user should be successfully added to the system. | If email address entered already exists in the system, error message is displayed. If the email address of the new employee does not exist in the system, new employee is successfully added. |
| Edit personal details | To ensure that once different details are provided on the edit personal details form and submitted, these details | On the edit personal details form provide different information from what is currently being displayed | When the form is altered the details should be altered in the database and a confirmation message of the change should | Once the data in the form is altered and the submit button clicked the details in the database are altered and a confirmation message of the |

| | | | | |
|---|---|---|---|---|
| | are altered in the database to reflect the recent changes | | be displayed. | change is displayed. |
| Upload picture | Test if users can upload a profile picture associated to their account | Employee should be able to upload a profile picture if they so wish. | Employee is able to upload profile picture. | Message of success is displayed when employee uploads picture and they are asked to log out and back in for changes to take place. |
| Generate reports | Test if HR can generate employee reports. | To ensure that the selected report is displayed | Once a choice of report is made by clicking the link of choice the report should be displayed. | When the choice of report is made and link clicked a report is displayed. |

# 6. CONCLUSION

In this report, an information system's development has been presented. It was emphasized on the basic steps, consequently taken during the project's development course as a particular attention was turned to the basic operative functions performed upon the data into the database.

The report's content comprises the whole task solution, starting from the programming environments have been selected, going through the database, the application's analysis and construction, and finishing with the code-implementation and test-samples, shown separately in Appendix chapters.

As a future work, some additional stuff could be implemented and integrated into the application code making it much more reliable and flexible; especially what concerns a pay-roll module, for instance.

Apparently, the role of such systems is basic and essential within each company that wants to keep a really good control and record concerning its personnel data, functionality and performance on all levels in its structure. Every organization, nowadays, has the necessity of managing its staff on a really good level as the staff has definitely the greatest merit of building up a company as such as it is. The well managed staff means giving the appropriate financial award-ness and all kinds of benefits as such as they have been deserved. That's why the development of such systems is not just a programming business – a lot of people are ordinarily involved in such projects and one of the basic requirements is the reliability of the system, especially what concerns the storage of data and all of the operations that will be performed upon it.

# 7. FUTURE SCOPE

- **Leave Management**
  The leave management module can be improved by having all leave requests approved by the head of department before submission rather than going straight to the HR manager. This feature is important because the HOD /Supervisor should know which of his/her employees to go on leave.

- **Integration With Payroll System**
  In order for the system to be more comprehensive, I'd recommend an integration of the system to a payroll system that will enable employees to view and download their pay slips on demand.

- **Employee Performance**
  The designed system provides the HOD with the ability to assign tasks to project members. If further worked on, this functionality can assist in determining the performance of employees based on their ability to finish tasks on time.

- **Information archiving**
  A system holding all the employee information should have some form of archiving system so that retired, suspended or fired employees are archived rather than being completely deleted from the system. This is so because cases may occur where details of an ex-employee may be required especially in cases where an employee did several projects and their details are required for future reference.

- **Learning Experience**
  This project assisted me to gain practical experience and apply the knowledge assimilated from the previous courses undertaken. Putting the knowledge gained earlier and applying different techniques from past courses was interesting and certain concepts, tools and techniques only made sense after seeing their application in a real world scenario. It was extremely challenging at times but it has been a great and worthwhile learning experience.

There is not at all any doubt that the employee management system would be an asset to any company, small or large.

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