# SMART MANAGER


Project BSCS
Session (2011-2015)

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# SMART MANAGER

A project submitted to the
Department of Computer Science
In
Partial Fulfillment of the Requirements for the
Bachelor's Degree in Computer Science
By


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No portion of this work presented in this report has been submitted in support any other degree or qualification of this or any other university or institution of learning.

I further declare that this application and all associated documents, reports, and records are submitted as partial requirements for the degree BS(CS).

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Heartfelt mention goes to my mother, father, sisters, brothers and all family members for their prayers, moral support and encouragement. Our success is possible only due to their prayers and support. Specially our mothers who really loves us and always pray for us in every moment of our life.

We are greatly in debt to our internal supervisor, Miss Sadia Kausar (Lecturer Computer Science Dep't. LGU) for giving remarkable suggestions, encouragement and moral support during the project and throughout the study session. We will never forget the role of our Dean of Department Mrs.Shazia Saqib. Their love and affection for us and their sincerity towards their profession rendered the whole department like a family.

We also thank our colleagues who have helped in successful completion of the project. In lasts our message for the Pakistani youth to work hard and continuously for the progress of their country until they are second to none on the globe.
Love for my homeland Pakistan.

Date: 12-November-2015

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# ABSTRACT

Smart Manager is a standalone application designed for Lahore Garrison University, which provides facility to fully automate salary management system. This software is capable of calculating monthly salaries, attendance record and employees information of that organization. On the basis of certain formulas it will generate files as an output such as attendance record and salary slips etc. The system is also capable to keep track of employees and keep complete information like personal information, department name, designation and all these things will be store in database as a track record.

The aim of this system is to develop a system with a lot of improvements and end user facilities. The system can overcome all the limitations of the existing system. The system provides proper security and reduces the manual work using facial recognition techniques. The existing system in organization has several disadvantages and many more difficulties to work well. The system tries to eliminate or reduce these difficulties up to some extent. The system helps the employees to work in a friendly operational environment.

The Application has main three components in this project includes Facial Recognition, Attendance management and salary management. The user can recognize its identity through a camera connected with our application in response, system will mark an attendance against the current date and time. Then the salary system will retrieve all the information of attendance through the database, after processing on that data it will generate reports i.e. monthly salary slips, attendance record etc.

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# List of Abbreviations

| Terms | Definitions |
|---|---|
| SM | Smart Manager |
| OCR | Optical Character Recognition |
| FDR | Face Detection and Recognition |
| ERSMS | Employee Record and Salary Management System |
| PMP | Project Management Plan |
| DFD | Data Flow Diagram |
| RMP | Risk Management Plan |
| CMP | Configuration Management Plan |
| QAP | Quality Assurance Plan |
| TP | Test Plan |
| GUI | Graphical User Interface |
| CCB | Change Control Board |
| PM | Project Manager |
| QA | Quality Assurance |
| RAM | Random Access Memory |
| CM | Configuration Management |
| SDS | Software Design Specifications |
| SPMP | Software Project Management Plan |
| SQA | Software Quality Assurance |
| FS | Functional Specification |
| SRS | Software Requirement Specification |
| LGU | Lahore Garrison University |

Table 1 List of Abbreviations

# Chapter1
# Introduction

# INTRODUCTION

## 1.1 Smart Manager

Smart Manager is a totally automated smart application, consisting on three modules, which brings information from three diverse sources in a unified way. This application will have the ability to dynamically provide information regarding the activities and happenings in the organization. Modules of the system are given below:

### 1.1.1 Employee Record and Salary Management System

Salary Management System is to provide an option to generate the salary slip automatically every month. The Employee Payroll System's objective is to provide a system which manages the employee details, the Payroll activity done in a company depending upon the employee's attendance and its calculation which is very huge. The users will consume less amount of time through computerised system rather than working manually. The system will take care of all the payroll activities like managing each employee's attendance, the number of leaves taken by that particular employee and calculation in a very quick manner. The system is user friendly and easy to use. All the important data's will be stored in the database and it avoids any miscalculation.

### 1.1.2 Attendance Management System

Attendance management system module is sandwiched between facial recognition and salary management system. This project is related to HR and Accounts Department especially for Salary management. Attendance can be managed manually as well it can be marked using facial recognition. Priory, there is no such computerized system in Pakistan. It is very difficult for attendance monitoring department to store, manage & retrieve data regarding attendance. There is no source visible for attendance analysts to resort to, when data is required to analyse any critical situation. This module will provide a centralized information and analysis of different types of attendance status and calculation of salary management.

### 1.1.3 Face Detection and Recognition

Facial recognition is attractive in industry now days. In our system FDR plays a very important role, we will use that system for two purposes.

**Attendance:**

Attendance will be marked in the real time environment, user will come in front of the webcam and it will mark the attendance against the current date and time.

**Surveillance:**

This module will be able to store the information of all the employees, who will enter into the organization, which can be used in case of any critical situation.

There are many areas where this application can be implement but the most hot implementation would be pension system etc.

## 1.2 Purpose

The purpose of this project is to make such a platform, which is user friendly, consisting of all the features and information about the above mentioned specifications, enabling the users' satisfaction with the services exactly according to their expectations. And to eliminate that paper-pencil environment and try to replace it with an automated system with a database where all employee's record stored safely.

## 1.3 Motivation

Many organizations are using salary management systems these days, all calculations such as employee salary, employee attendance, employee information keeping, employee recognition etc are being done manually at the moment which is a time consuming task. Hence, a system is required that can perform all above said operations automatically. Moreover, the system should be user friendly, flexible, fast and highly secure.

## 1.4 Scope

Firstly the smart manager will be able to handle all the aspects of salary management, attendance management and to some extent surveillance. All the information related to employees would be included; we can view the required information of an employee according to our need.

Current system will only deal with employee attendance and salary management only it does not include leave management, benefit calculation, accounts handling, tax calculation and

web access. It will take time to understand working of mentioned functionalities therefore these are not included for a time being but we aimed to enhance it later on.

## 1.5 Assumptions

- Images of the same person
  - With different angles
  - With different positions
  - With same background
  - Under required luminance conditions

## 1.6 Constraints

Following are some constraints of our project:

- Security from spams will not be given.
- Not handling recruitment department.
- Not responsible for the maintenance.

# Chapter 2
# Background Study

# BACKGROUND STUDY

## 2.1 Background History

Smart Manager is a Desktop Application that brings information from diverse sources in a unified way. Usually, each information source gets its dedicated area on the page for displaying information often the user can configure which one to display.

Apart from the standard salary management feature, smart manager offer other services such as employee attendance record and employee information etc. Smart Manager provide a way for enterprises to provide a consistent look and feel with access control and procedures for multiple applications and database, which otherwise would have been different entities altogether.

Examples of public pay roll systems are Simple X Payroll, Salaroo, and PaySoftR etc. (I)

## 2.2 Problem Statement

The manual record keeping of Salaries, Employees Database and other operational and administrative activities were tedious and time consuming. There was a lot of data duplication and common errors were faced while entering data, making it inconsistent and unavailable at times for future use. The data was kept locally and hence can't be accessed from any other places by higher authorities to review the progress of cases. In addition to this the retrieval of the information was slow and tired some task to perform. The security of data was also a concern as it was placed in cabinets that could be accessed by others.

The Human Resource Department has taken commendable steps to make the filling of Employee record possible and easy for anyone and has displayed directions. In this regard yet, it is still not easy to get an employee registered in an organization as the formalities and rules put the employees and administration to a great deal of trouble. The rules, procedures and formalities for registering an employee lodged with the organization are difficult and discouraging to the employees and administration at large.

The attitude of the attendance procedure operators at the organization is generally pleasant the procedures are inconvenience. Moreover the manual process for attendance was time consuming and was not reliable. Anyone can mark the attendance in the absence of attendance procedure operators, time is also one of the main factors which cannot be

compromised but in manual attendance system this was not possible to make sure that when an employee is coming and the time to leave the organization.

The inquiry by the employees sometimes takes a long time because of the duties and problems they are already coping with. The available resources to make attendance manually are not enough .When there is employee disorder or social disturbance. The attendance operator gets busy with it and cannot easily attend to each employee at the same time.

## 2.3 Face Detection and Recognition

The facial recognition has been a problem worked on around the world for many persons; this problem has emerged in multiple fields and sciences, especially in computer science, others fields that are very interested in this technology are, Mecha-tronics, Robotic, criminalities, etc. In this project we work in this interesting topic using EmguCV cross platform .Net wrapper to the Intel OpenCV image processing library and C# .Net, these library's allow us to capture and process image of a capture device in real time. We implement a face detector and recognizer in real time for multiple persons using Principal Component Analysis (PCA) with eigenface for implement it in multiple fields.

### 2.3.1 Background

Facial recognition is a computer application composes for complex algorithms that use mathematical and metrical techniques, these get the image in digital format and then process and compare pixel by pixel using different methods for obtain a faster and reliable results, obviously these results depend of the machine use to process this due to the huge computational power that these algorithms, functions and routines requires, these are the most popular techniques used for solve this modern problem.

### 2.3.2 Purpose of Plan

Our face is an important of who we are and how people identify us. Imagine how hard it would be to recognize an individual if all faces looked the same, except in the case of identification identical twins, the face is arguably a person's most unique physical characteristic. While human have had the innate ability to recognize and distinguish different faces for millions of years, computers are just now catching up.

The project plan is the top level controlling document for Face Recognition System. It encompasses problem definition, project scope, project performance, management and technical issues. This information helps us to conclude project main deliverables and main milestones.

Plan will provide enough information to understand the core requirements for the project and help project team to continue its next phase using information provided in this plan which is analysis modeling.

### 2.3.3 Market Research

Understanding the market today would give the idea of who would be potential users of the software. Therefore, it will help in requirements documentations and analysis. Also in this document is discussed about current market offering and criticizing major competitor vendors. Commonalities and differences of current competitor product are used to deduct the most suitable characteristics of the software that meet the market needs. Also strategies are laid to beat the competitors. But note that hopefully and probably face recognition software, like any good software product, will have to meet different market in time and therefore should have good modularity, and ability to prosper and follow future market needs.

Face recognition is a biometric recognition method. Other examples are hand/finger geometry, fingerprint or finger scan (verification), keystroke dynamics, retina scan, eye iris recognition, voice scan/recognition and signature verification. Face recognition is the third most marketed discipline among all of them. Face recognition software is software that has the capability to distinguish people faces. A “Face Database” or a “Face Bank” is a set of given pictures stored by the program. Software should compare input pictures given by user with the face database. (II)

## 2.4 Techniques

### 2.4.1 Traditional

Some facial recognition algorithms identify faces by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features. Other algorithms normalize a gallery of face

images and then compress the face data, only saving the data in the image that is useful for face detection. A probe image is then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation. Recognition algorithms can be divided into two main approaches, geometric, which looks at distinguishing features, or photometric, which is a statistical approach that distill an image into values and comparing the values with templates to eliminate variances. Popular recognition algorithms include Principal Component Analysis with eigenface, Linear Discriminate Analysis, Elastic Bunch Graph Matching fisherface, the Hidden Markov model, and the neuronal motivated dynamic link matching. (III)

An example of Eigen Faces:

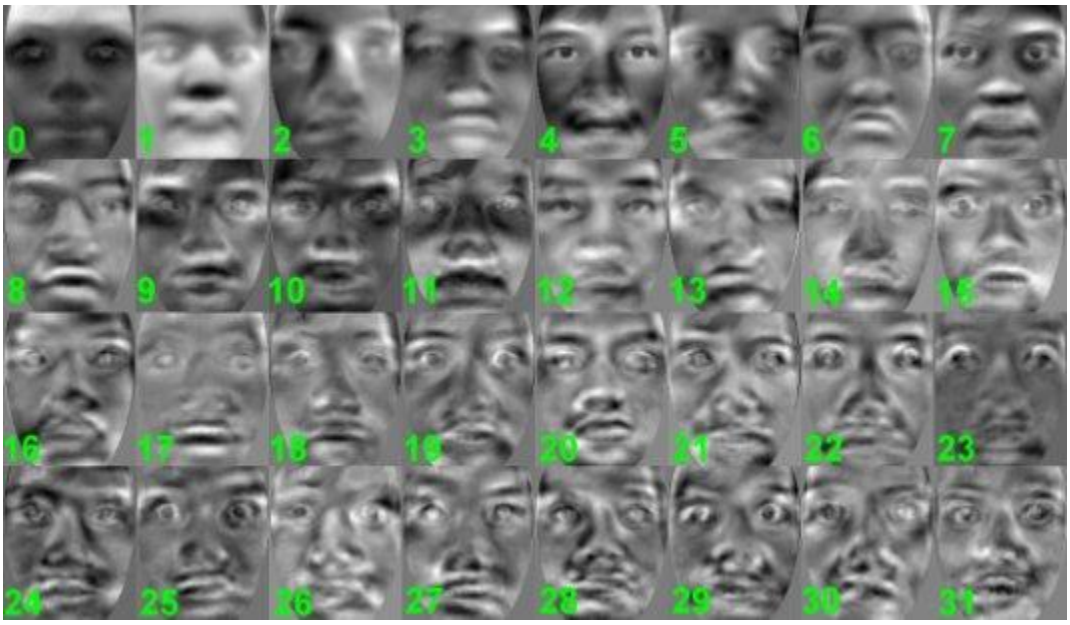
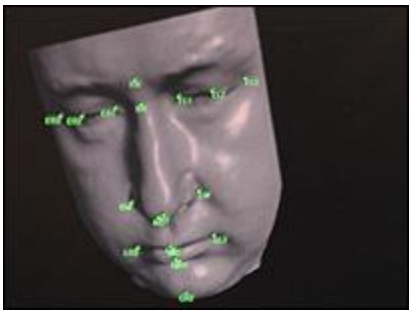



Figure 1: Eigen Faces

### 2.4.2 3-D

A newly emerging trend, claimed to achieve previously unseen accuracies, is three-dimensional face recognition. This technique uses 3-D sensors to capture information about the shape of a face. This information is then used to identify distinctive features on the surface of a face, such as the contour of the eye sockets, nose, and chin. One advantage of 3-D facial recognition is that it is not affected by changes in lighting like other techniques. It can also identify a face from a range of viewing angles, including a profile view. Even a

perfect 3D matching technique could be sensitive to expressions. For that goal a group at the Technion applied tools from metric geometry to treat expressions as isomerizes.



### 2.4.3 Skin Texture Analysis

Another emerging trend uses the visual details of the skin, as captured in standard digital or scanned images. This technique, called skin texture analysis, turns the unique lines, patterns, and spots apparent in a person's skin into a mathematical space Tests have shown that with the addition of skin texture analysis, performance in recognizing faces can increase 20 to 25 percent. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems.

### 2.4.4 EmguCV

Emgu CV is a cross platform .Net wrapper to the Intel OpenCV image processing library. Allowing OpenCV functions to be called from .NET compatible languages such as C#, VB, VC++, Iron, Python etc. The wrapper can be compiled in Mono and run on Linux / Mac OS.
In my own words EmguCV is an awesome Wrapper, this let make very interesting things and tasks of computer vision, this library set let do an unlimited amount of wonderful projects in this field, EmguCV have many functions that let us work with CPU and increases the performance dramatically with the latest mentioned. (IV)
This software project let work and does:

- Optical Character Recognition(OCR)
- Face Detection
- Pedestrian Detection
- Kinect projects
- 3D reconstruction and many more. (V)

### 2.4.5 Architecture

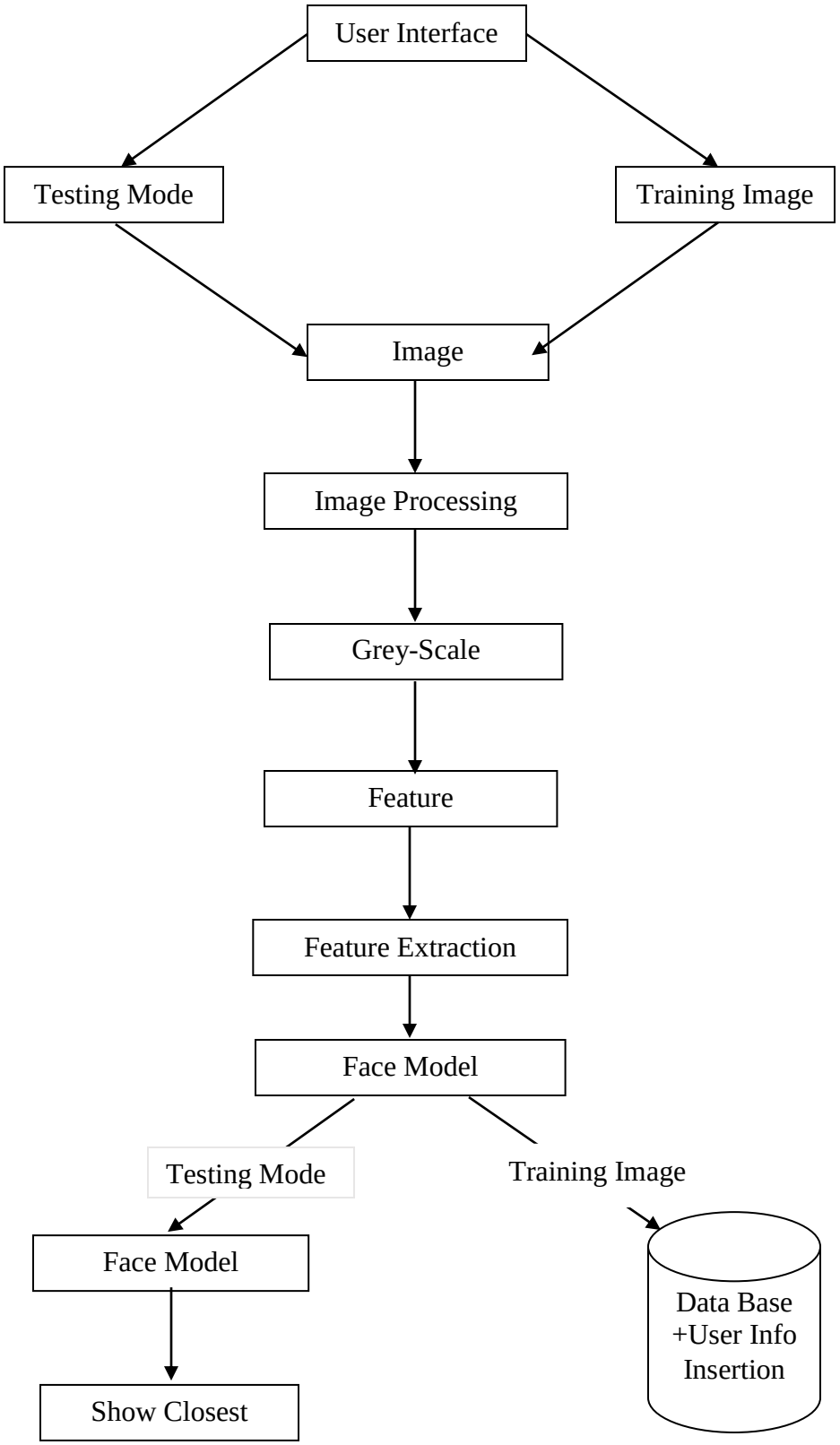



Figure 2: FDR Architecture

## 2.5 Attendance Management System

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# Chapter 3
# Project Methodology

# PROJECT METHODOLOGY

## 3.1 Selection of Methodology

As per project management there should be a proper selection of methodology so on that contrast we should have to select the methodology for our project i.e. tourism website. The method being used in developing the system is the system development life cycle(SDLC). The SDLC process includes project identification and selection, project introduction and planning, analysis, design, implementation and maintenance. (VI)

## 3.2 Purpose of Methodology

- It provides us with a framework for planning the project
- The quality of software development efforts is improved by using selection process techniques.
- It helps in software development with less error and therefore, provides shorter delivery times and better value.

## 3.3 Scope of Methodology

- Methodology helps in giving direction.
- It saves time and it improves the quality of deliverable.

### 3.3.1 By using methodology we can

- Create roadmap of the project.
- Monitor quality and time.
- Minimize the risk and issues.
- Manage staff and suppliers.

### 3.3.2 Some of the common existing methodologies are

- Waterfall model
- Spiral model
- Hybrid Model

## 3.4 Structure System Analysis and Design Method

Each phase produced deliverable required by the next phase in the life cycle. Some phases are also inter-relates with other phases. Planning is done in the first and analysis of the system in continued after that. Analysis of the system is being translated into design. Code is produced during implementation that is driven by the design. Testing verifies the deliverable of the implementation phases.

## 3.5 Investigation and Research

The vast majority of investigation and research will take place in the early stages of the development process. There is a vast quantity of information to be found on the internet about windows desktop application development, .Net C-Sharp development and Visual Studio development. Various books will also be used when researching and learning about Windows App development (see References section for more details). Also MSDN forums help a lot in learning the fundamentals of Windows App Development. (VII)

### 3.5.1 Planning

It is the very first phase of the system, in which we decide what the task is for and what all things we have to do for completion of the project in an easier and healthy way.

### 3.5.2 Analysis

It is the second and also considered as an important phase of the life cycle model. In this phase, the existing system is studied by collecting the information through the internet and analyzed the information to get alternative for the use of proposed system.

### 3.5.3 Design

This is where the details on how the system will work are produced. Architecture, including hardware and software, communication are all parts of the deliverables of a design phase.

### 3.5.4 Testing

During testing of the system, the implementation code is tested to make sure that the product is actually solving the needs addressed and gathering the order information. Unit testing and system testing are done during this phase.

## 3.6 Requirement Management

The requirements of the project will be managed throughout the development of the project. It is a continuous process of documenting, analyzing, tracing and prioritizing the requirements. Requirements management will be an important process over the course of the project as it allows every requirement to be traced back to its original definition. The

requirements set should be feasible and realistic according to the project timescale. Once development is underway, some requirements may become less feasible or require updating or modifying. It will be important to document any changes to requirements in order to allow them to be traced back.

## 3.7 Implementation

This is the longest phase of the software development life cycle as the code is produced from the deliverables of the design phase during implementation. Below is a flow diagram to demonstrate the basic structure of how the App will run:

### 3.7.1 General Data Flow Diagram

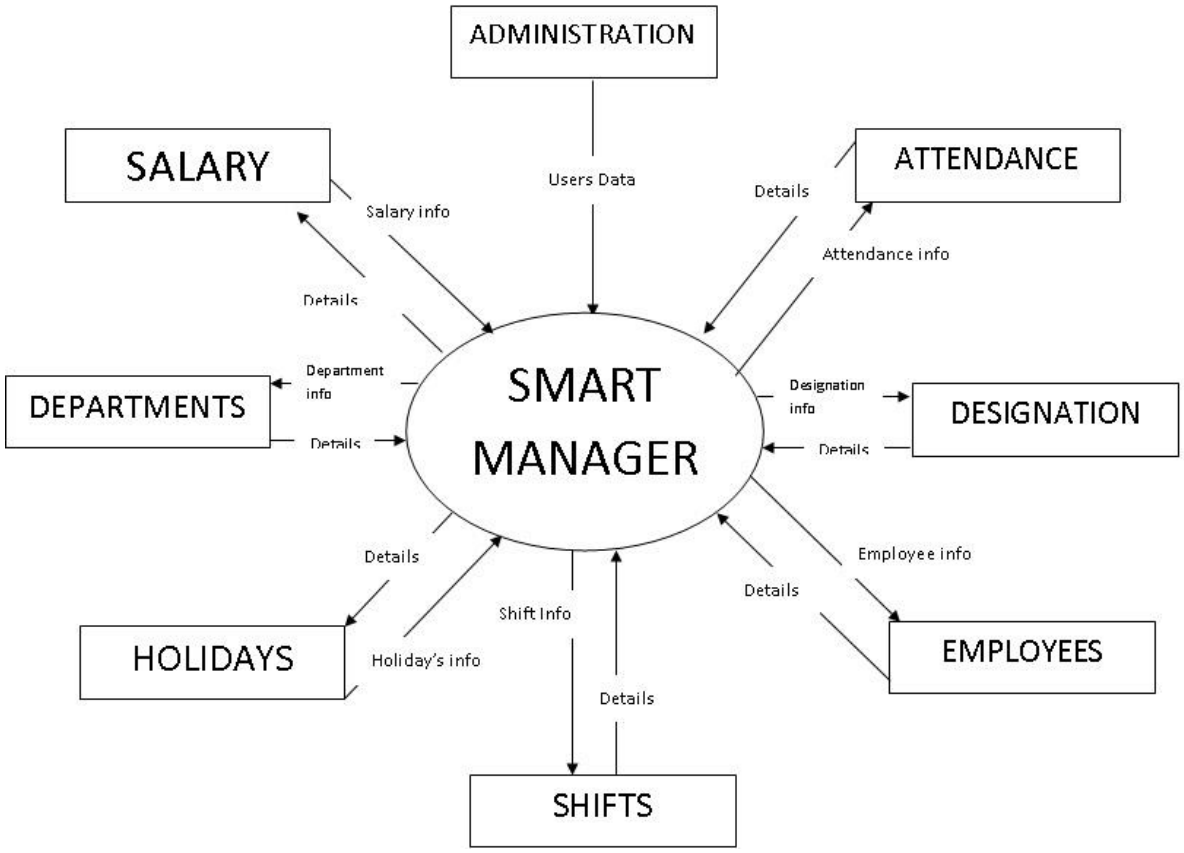



Figure 3: General DFD

### 3.7.2 Flow Diagram Password Recovery

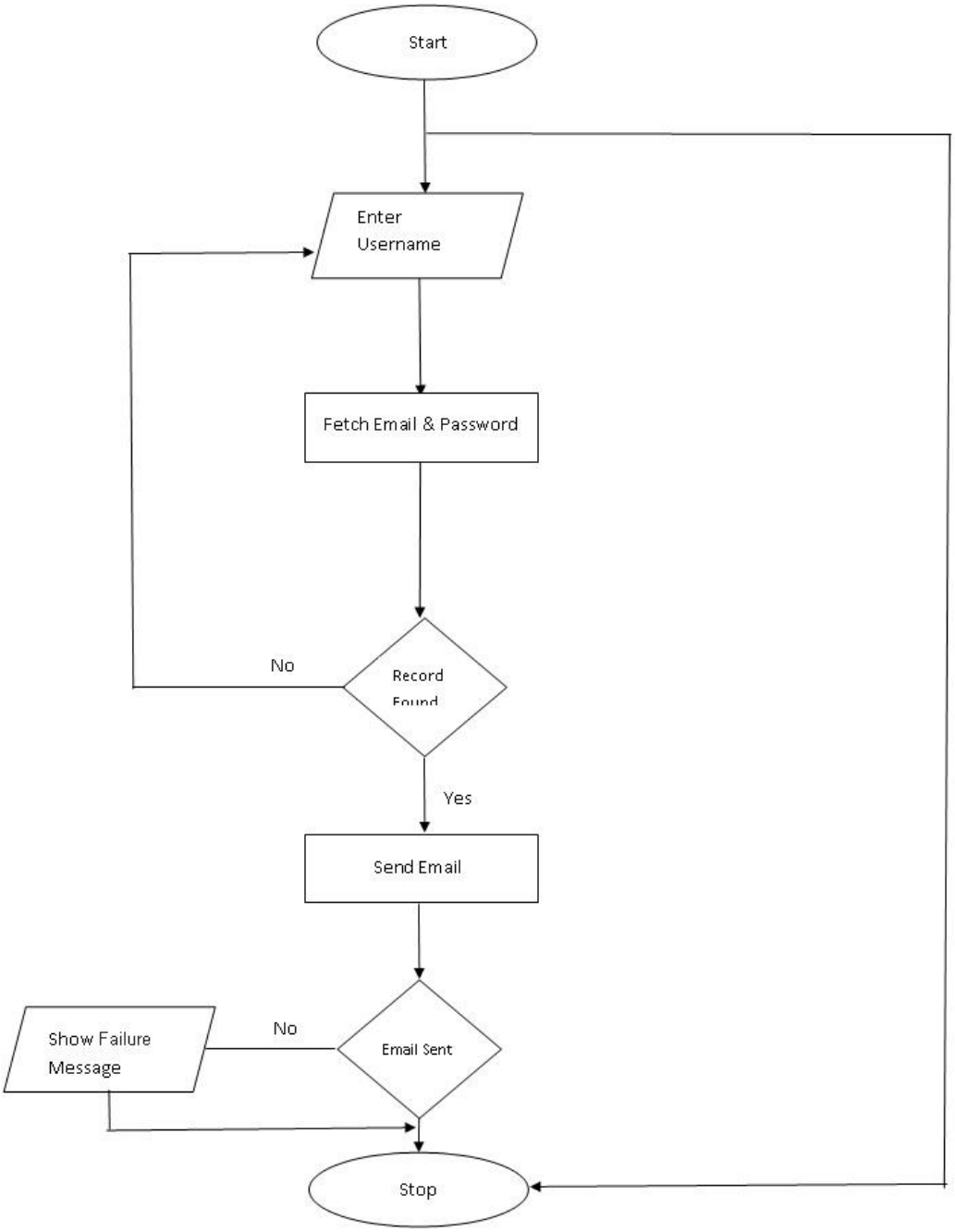



Figure 4: Password Recovery flow chart

### 3.7.3 Flow Diagram Salary Generation

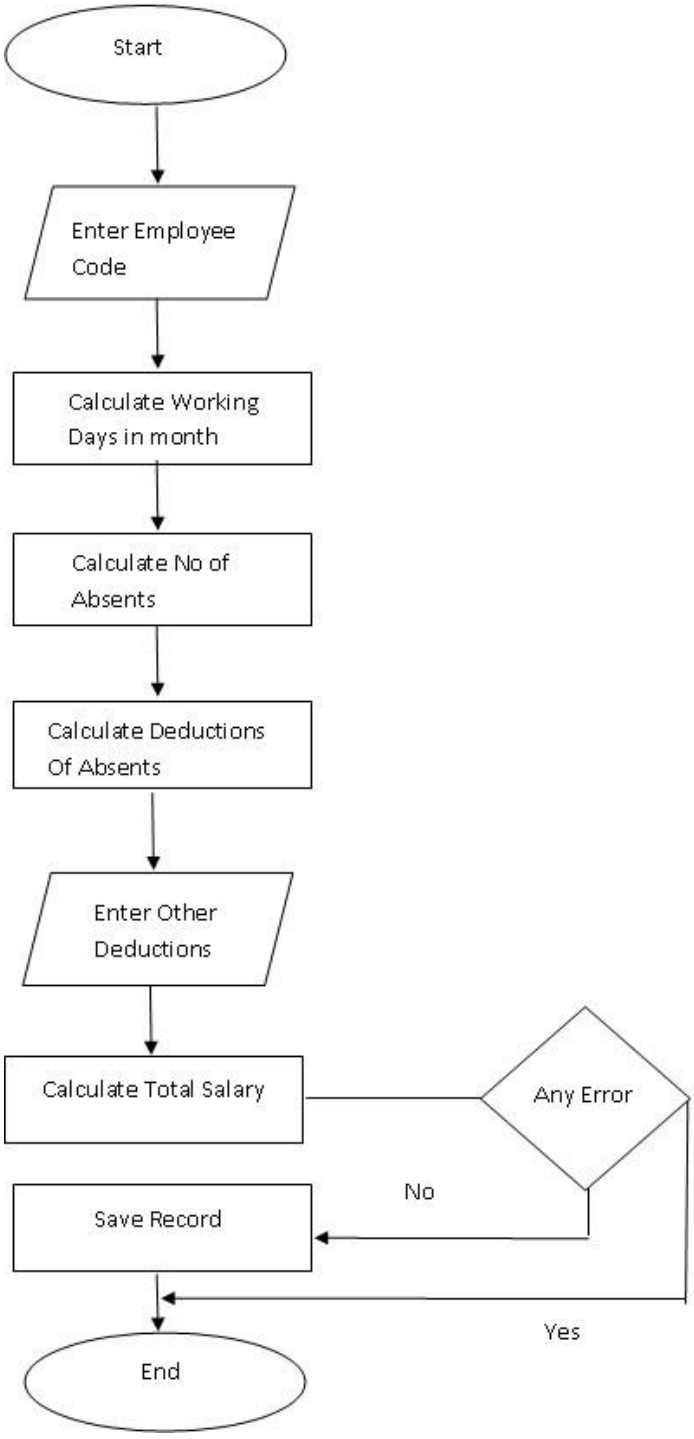



Figure 5: Salary Generation Flow Chart

### 3.7.4 Flow Diagram Attendance

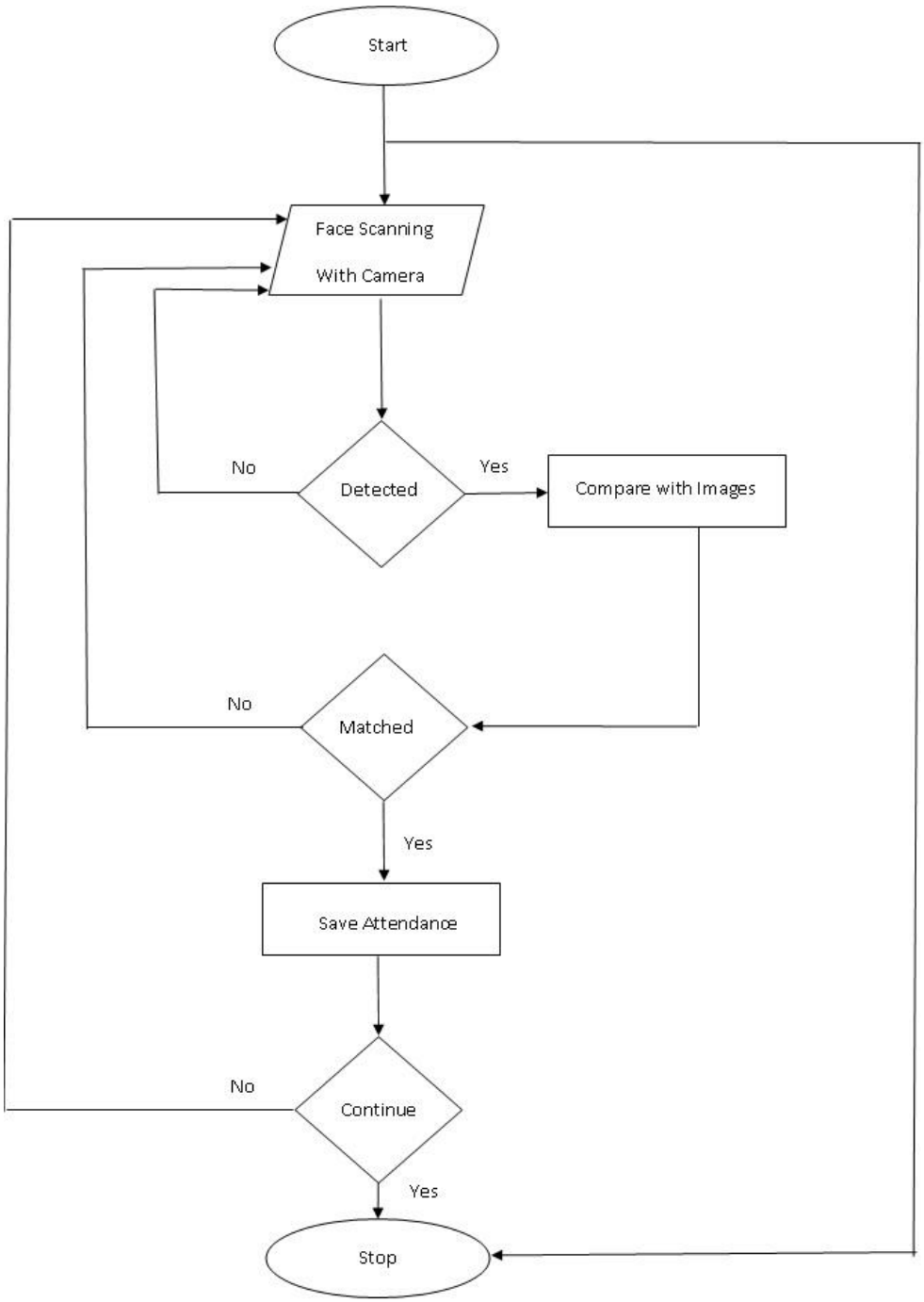



Figure 6:Attendance Marking Flow Chart

## 3.8 Project Techniques (Testing, Installation and Operation)

The application will be tested iteratively throughout development as features are added. It will be tested on the Visual Studio 2013 simulator (provided with the VS 2013 development kit from Microsoft) and on different laptops and PC's using Windows 8.1. This will help to eliminate bugs and check for memory leaks. The installation process onto the Windows device itself is very easy. The app needs to be run (compiled) into the computer, the Visual Studio generates an .exe file of the app and it automatically installed on your system. Next time when you need to run the app, you can either click the .exe file or you can do this by running your app through VS 2013 interface. When you run the .exe file a splash screen will be appeared which is basically the welcome or introductory screen, then after a few seconds the user will be moved to the main screen of the app from where the user can select its required operation to be performed.

## 3.9 Closing the Project

Once the project is complete, a presentation will be given to the lecturers and students of the department along with the final documentation for the project. This will demonstrate the development cycle and the final outcome of the application. There are several uses for the project once it has been completed. If the university permits it, the application will be submitted to the Windows App Store as a free download. The project code and documentation will also be used as a portfolio when applying for jobs after BS (CS).

# Chapter 4
# Software Requirement Specification

# SOFTWARE REQUIREMENT SPECIFICATION

## 4.1 Introduction

### 4.1.1 Purpose of the document

The Software Requirements Specification (SRS) is designed to express the behavioral, performance, and development requirements of Smart Manager and serves as the fundamental requirements document for the development of the product. The Software Requirements Specification includes a description of every input into the system, every output from the system and all functions performed by the system in response to input or in support of an output. The SRS is the exclusive requirements document to be used in development, all design and testing choices must be compatible with this document.

### 4.1.2 Overview

This document is providing information about our Smart Manager in terms of its general consideration and its specific function requirements.

Firstly the application will be able to handle all the aspects of just accounts department. All the information required by an employee or an administrator would be included, moreover they can upload/downloads documents or files. The recruitment procedure isn't included. Moreover other aspects whose scope goes beyond the accountant department and we have to consult other departments for gathering information are also not included for a time being but we aimed to enhance it later on.

## 4.2 Product Perspective

The Objective of this project is to create a Desktop application for Lahore Garrison University to help accountants and employee's to interact in a simpler way, receive and upload information. In general the whole set up of the department is to be organized and computerized.

This Desktop Application will be self-contained and will use C# and EmguCV which is a wrapper in a way that will let it be moved to any personnel computer that supports the correct

version of the EmguCV. To access the application, a system needs some basic requirements listed below:

1) CPU 2.5
2) EmguCV
3) Webcam 720p
4) SQLServer2014
5) Crystal Reports

## 4.3 Product Features

This Desktop application will have the following functions:

- Control user access and authentication
- An area for administrator to store and organize information and mange users.
- An area for administrator to train the images for face recognition.
- An area for administrator to manage the information of employees.
- An area for administrator to manage salaries of an employee.
- An area for administrators to manage the attendance of the employees.
- An area for administrator to manage holidays in the firms.
- An area for administrator to manage shifts.
- An area for administrator to manage departments.
- An area for administrator to manage designations of employees.
- Provides the facility of password recovery by email.
- The application will be usable within almost any computing environment. That means most computers should be able to quickly run and load the information quickly.

## 4.4 User Characteristics

The users of the system are accountants, HR Managers and the admin who maintain the system.

- The users are assumed to have basic knowledge of the computers.

• The admin of the system to have more knowledge of the internals of the system and is able to rectify the small problems that may arise due to disk crashes, power failures and other catastrophes to maintain the system.

The proper user interface and training session will be sufficient to install and maintain the application.

## 4.5 Operating Environment

There should be proper commitment of Hardware and software gears should equally coupe with each other, it may help to prevent many inconveniences during the processing.

### 4.5.1 Operating Systems and Versions

• Windows 7, 8, 10 all versions.

## 4.6 Assumptions and Dependencies

The following list presents the general assumptions and dependencies that are imposed upon the implementation of our product.

### 4.6.1 Requirement

- User requirements will remain stable.

### 4.6.2 End Product

- User should have an internet connection for password recovery.
- Response time of camera will be completely dependent on the machine in use.
- Recognition accuracy is dependent on camera resolution.
- Users should be authenticated to access the system.

### 4.6.3 Resource

- Project resources will be available when and as they are needed.
- Required hardware resources will be available when and as they are needed.
- Required user resources will be available when and as they are needed.

- A significant percentage of the project members will be experienced with the technical environment.
- Access to software experts and specialized skills will occur as needed.

### 4.6.4 Delivery

- Deliverables will be subject to no more than a specific number of review cycles.
- Tools are known and will be available.

### 4.6.5 Environmental

- Issues will be resolved in a timely manner.
- The project members described in the project plan will be put in place.

### 4.6.6 Budgetary

No outside consulting will be required or outside consulting will be limited to a specified number of days without any rate.

## 4.7 User Documentation

An essential part of the application will be the instructions that show how much this app easy to use. It will provide specific instructions on how to use the Smart Manager app, including strategy, and specific controls for the Smart Manager. The first section of the manual will begin with a note representing some essential facts of Smart Manager followed by an explanation of how Smart Manager will respond to the control. A set of instructions with reference pictures is also available for the ease of user.
At this time there are no plans to provide any type of online tutorials or user manuals.

## 4.8 Interface Requirements

### 4.8.1 User Interfaces

**Login Screen**

The Login page will allow the user to login to the application. They must give a valid username and password in order to login. Once they have successfully logged in, the administrator will be redirected to the appropriate home page.

**Password Recovery Screen**

The Password Recovery page will allow the user to recover his password by clicking recover password button. An email will be sent to user email address.

**Home Screen**

Home screen will display lists of options to different available functionalities added in application. There will be menus and drop downs to perform those functionalities. Admin of the system can add or delete new users. All the functionality is available in an organized and interactive way.

**Employee Screen**

On employee screen there is a list of employees. User can add, view, edit, delete employee record, employee based reports can be generated. There are different search options like by name, by code, etc. Screen will also display total no of working employees in organization.

**Department Screen**

Department screen will display department list. It will also have option to view, edit, delete and update a department. This screen will also display total no department and total no employees against each department. A list of employees for each department can be displayed and printed.

**Designation Screen**

Designation page will display designation list. It will also have option to view, edit, delete and update a designation. This screen will also display total no designation and total no employees against each designation. A list of employees for each designation can be displayed and printed.

**Holiday Screen**

Holiday screen will display holiday list. It will also have option to view, edit, delete and update a holiday.

**Attendance Screen**

Attendance screen will display attendance list. It will also have option to view, edit, delete and update attendance. User can view detail list for each attendance. There are different search options and filter available for searching and generating reports

**Salary Screen**

Salary screen will display salary sheets list. It will also have option to view, edit, delete and update salary sheet. User can view detail list for each salary sheet. There are different search options and filter available for searching and generating reports

**Shift**

Shift screen will show the list of shifts with their starting and end time. User can make changing in the record.

**Auto Attendance Screen**

Auto attendance screen will show camera output and it will mark the attendance as a person is detected and recognized. It will have the option to add new faces.

### 4.8.2 Hardware Interfaces

The physical characteristics of the application consist of Webcam, PC that run the Windows 8.1 operating system and EmguCV. The application will only require the minimal hardware requirements to operate fully.

### 4.8.3 Software Interfaces

**Visual Studio**

- Language: C#
- Version: 2012

This software will be used in conjunction with EmguCV, SAP Crystal Report. EmguCV will get the features of Open CV for image processing. It will be used to upload, retrieve and process data from the database. Crystal Report will help in generating reports.

**Microsoft SQL Server**

- Language: SQL
- Version: 2014

This software will be used to store information submitted by the user or administrator using Smart Manager.

## 4.9 Non-Functional Requirements

### 4.9.1 Performance Requirements

- The system should update data of the employees in less than a second.
- The system must be successful run on windows.
- The system must be display employee record in only one page.
- The user can view the list of all employee's at a time
- Average response time of any page of the system should not be minimum.
- The database may get crashed at any certain time due to virus or operating system failure. Therefore, it is required to take the database backup.

### 4.9.2 Safety Requirements

- We are going to develop a secured database for the smart manager. There are different categories of users.
- Depending upon the category of user the access rights are decided. It means if the user is an administrator then he has a full access. There are other users with access level read only or read/edit only or read/edit/add only.
- System must be providing access to the any user through a login password.
- No user can view the data of the other user through any report or view provided by the system.
- Only admin can update the database of the system.
- Unauthorized user cannot access the system.

### 4.9.3 Software Quality Attributes

- The Quality of the database is maintained in such a way so that it can be very user friendly to all the users of the database.

### 4.9.4 Hardware Constraints

- The system requires a database in order to store persistent data. The database should have backup capabilities.

| No. of records | Hard disk space required |
|---|---|
| 100 | 2Mb |
| 10,000 | 2 GB |
| 1,000,000 | 20 GB |

### 4.9.5 Design Constraints

- Design Constraints restrict options of design, behavior, appearance or operation. They become requirements due to factors outside the normal problem domain. It describes how the product operates inside various circumstances and limits the options designers have if building the product. The system must be designed in such a way that it looks user friendly at every platform.

### 4.9.6 User Interface Constraints

Using this system is fairly simple and intuitive. A user familiar with basic computer navigation skills should be able to understand all functionality provided by the system.

### 4.9.7 Software Constraints

The system is designed to run using EmguCV for image processing so, it should be installed on the system. System must have access to the included database.

### 4.9.8 Software System Attributes

There are a number of attributes of software that can serve as requirements.

### 4.9.9 Availability

User can directly access the smart manager application, to make the system secure.

### 4.9.10 Security

Only the authorized users can access the information designed for them. All the administrators will be provided with their individual logins and no users can have the access to other's information.

### 4.9.11 Portability

Smart Manager, as the name implies it is smart, it provides easy portability.

## 4.10 Functional Requirements

Smart Manager functional requirements group will define the appropriate specifications for a HR Department implementation. The group will work with end users to identify desirable services and, in parallel, with the smart technology that will choose an appropriate technological approach. Major reasons for moving in this direction are that our users expect more efficient, integrated, unified, “anytime, anyplace” access to content and services. The requirement specifications are a set of functions that the application should be implemented to support. It describes general requirements that are not specific to any one part of the application.

### 4.10.1 Users

- Employee of time office, HR manager and Accountant.
- Each user will have an editable set of Profiles to be used for identifying.
- Each user consists of a name, user id, email address, etc.

### 4.10.2 Profiles

- Special users will have their profiles.
- A profile is persistent until it is deleted by admin.
- The profile is created by administrator.
- Only administrator can add or delete user profile.
- A profile contains personal information about a member such as their name, email Address, location, etc.
- Each role in a profile is set with an availability of status such as time officer, HR Manager, Accountant etc.
- A profile contains an editable set of information.
- The set of profiles is unique such that not two profiles can be identical.
- A profile contains access right information about the member that is used to provide security access to various protected parts of the system.

### 4.10.3 Login

- The system must provide a means for members to login
- The login must comprise of two fields, username and password.
- The password field must be hidden.
- Once a user is logged in his username will be displayed at the bottom of MDI screen.

### 4.10.4 Project Components

- A project component is a unique item, product or task that makes up the work of Lahore Garrison University, Desktop application Requirement Specification completing the project.
- Each component in a project is unique.
- A component has a name, version, priority, status, creation date, and owner identified by a Profile.

### 4.10.5 Project Administration

- The admin screens are accessible only to the project administrator role.
- An administrator can edit members of application.
- An administrator can edit the application data.
- An administrator can add new data.
- An administrator can delete data.
- An administrator can update application data.
- An administrator can view the application data.
- An administrator can take back-up of database.
- An administrator can restore the database.
- An administrator can restore the database.

### 4.10.6 Attendance

- Attendance screen will provide a list of attendance sheet.
- There will be one sheet for one day.
- An attendance sheets can be filtered by dates i.e. (From Date, To Date).
- The attendance screen will provide an option for detail view of attendance screen.
- Administrator and Time officer can make any type of changing in the attendance.
- Attendance screen will has option for mark attendance.
- Attendance sheet will has option for mark attendance.
- Attendance screen will show options of View, Edit, Delete and Generate New.
- An administrator and Time officer will has right to print an attendance sheet.

### 4.10.7 Project Services

A project's repository is accessible based on the roles (developer) that are part of the project.

## 4.11 General Constraints

The following list presents the general assumptions and dependencies that are imposed upon the implementation of our product..

- Not handling leave management
- Not handling benefits calculations
- Not handling tax calculations
- Scope limitations
- Not handling accounts
- Security for spam’s will not be given
- Training images are required for proper working of FDR.

## 4.12 Use Cases

### 4.12.1 Use case Diagrams

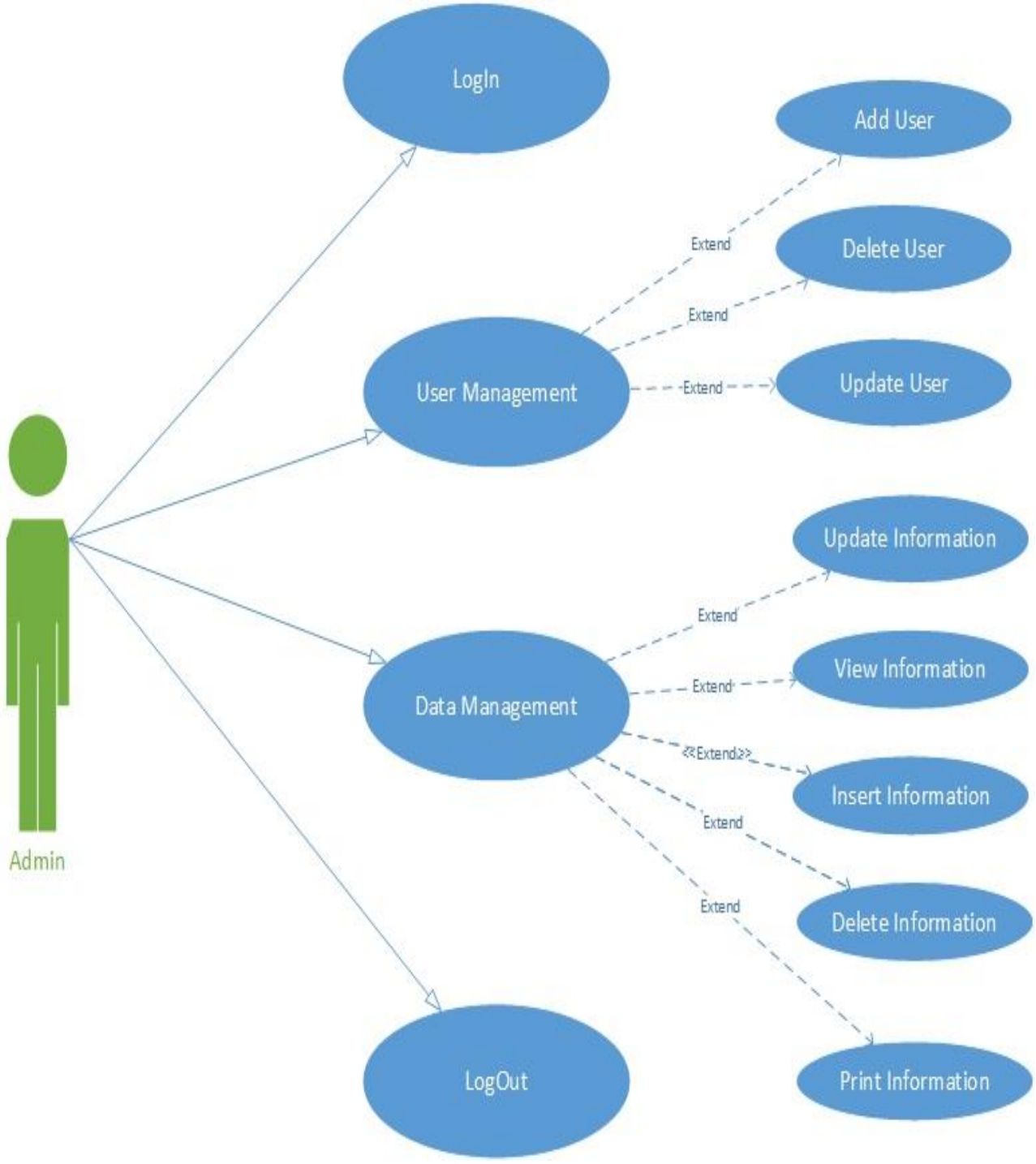



Figure 7: Admin Use Case Diagram

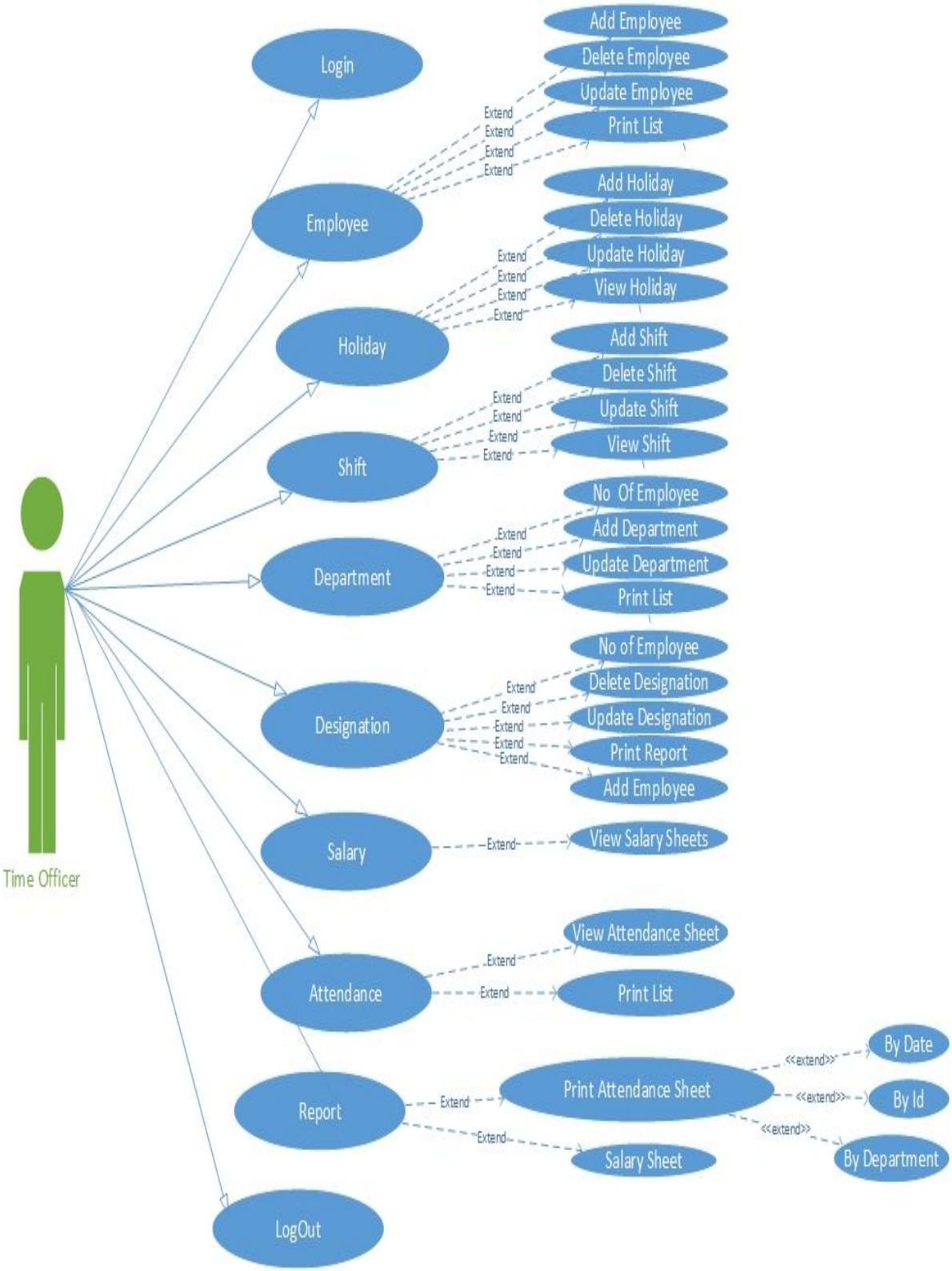



Figure 8: Time Officer Use Case Diagram

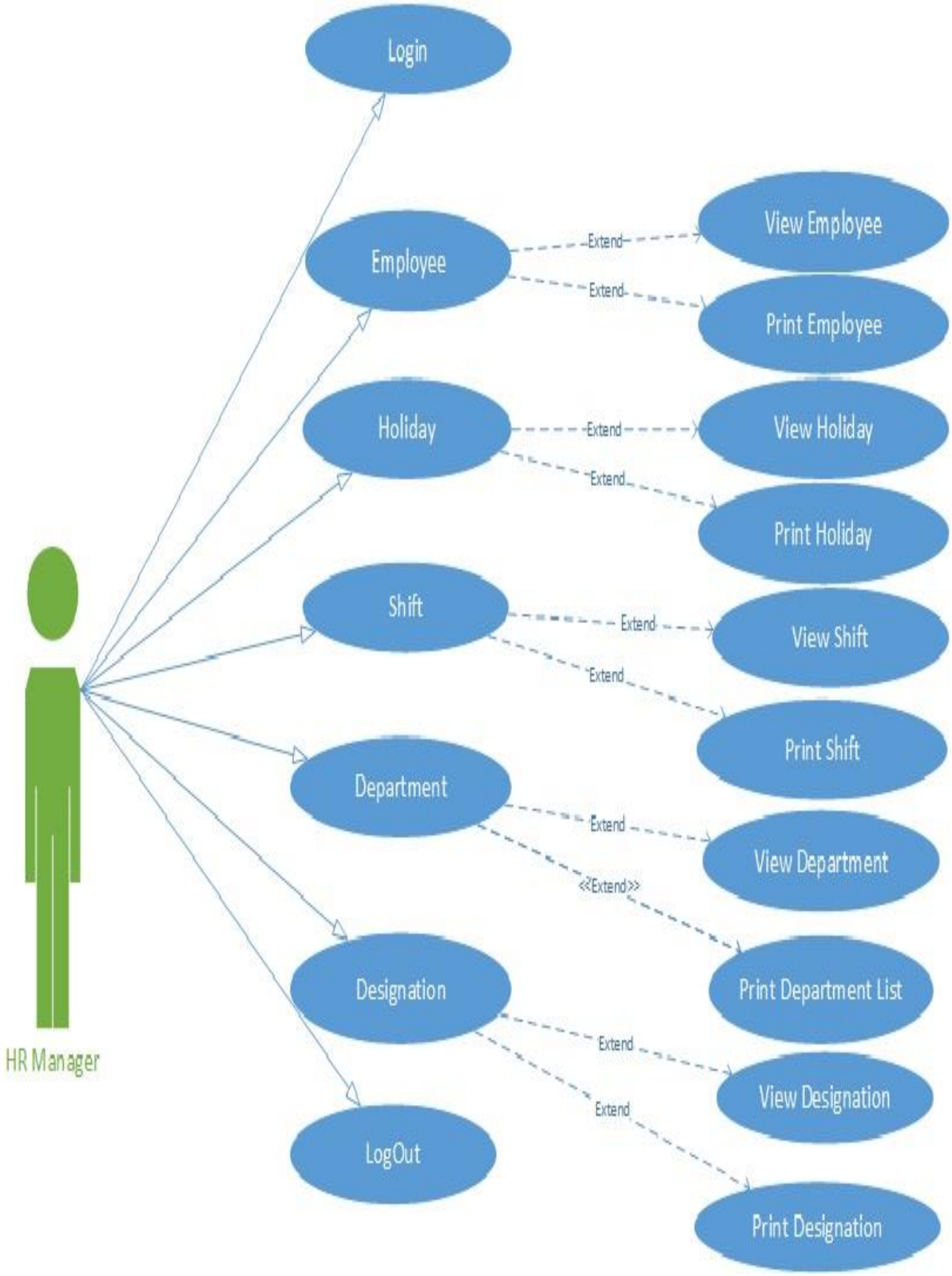



Figure 9: HR Manager Use Case Diagram

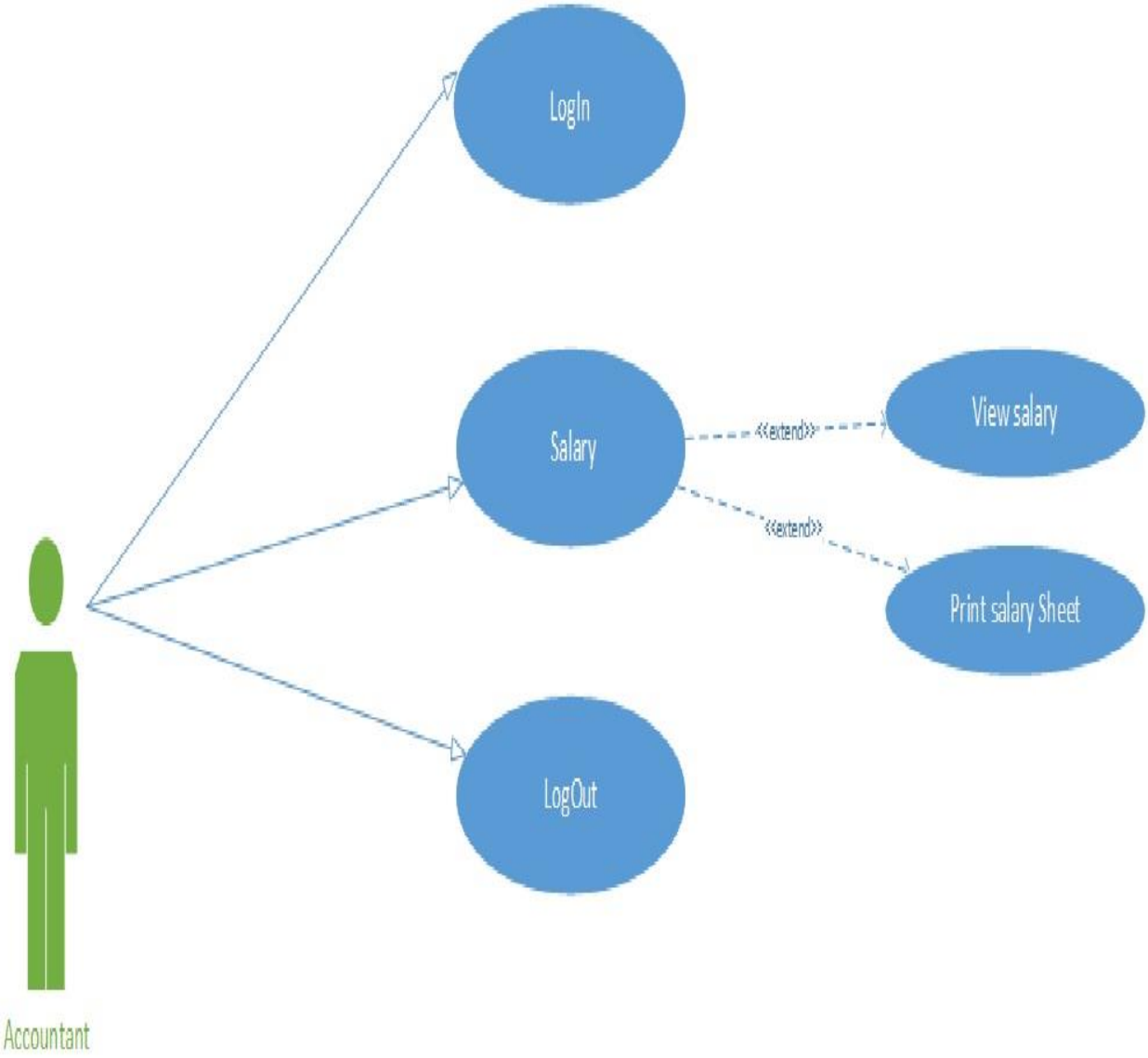
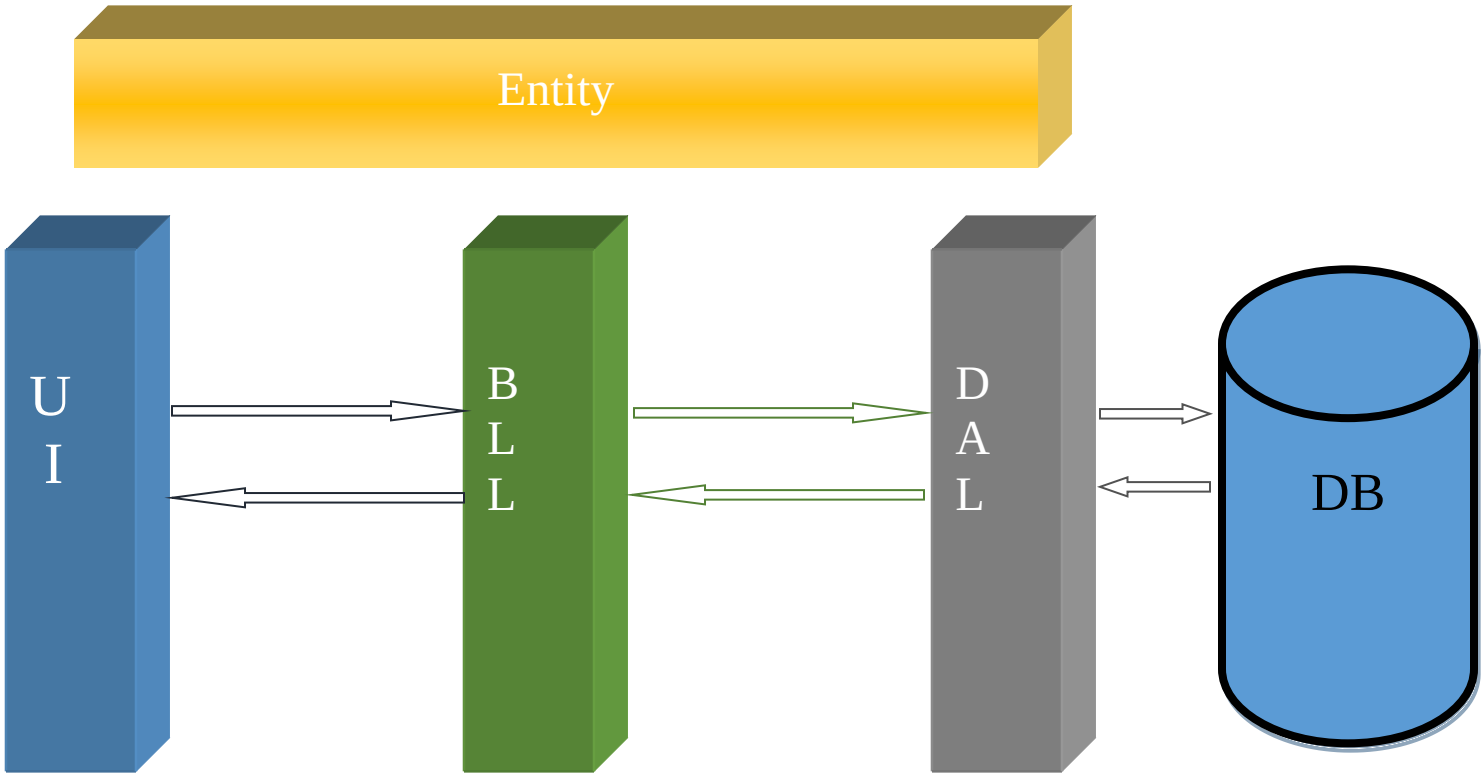



Figure 10: Accountant Use Case Diagram

## 4.13 Application Architecture




System Architecture

The user cannot access database directly. Application program provides facility to the user to interact with the database. Application program provides the facility of user interface so that user can easily interact with the application in a user friendly way.

# Chapter 5
# Software Design Specification

# SOFTWARE DESIGN SPECIFICATION

## 5.1 Introduction

### 5.1.1 Design Strategies

The Design development phase will begin with the composition of Software Design Specifications document (SDS). The document provides information about the Design specifications of Smart Manager.

In our Desktop application, basically we are using three layers. First is the layer of Database above this layer is the BLL layer and the top most layer is the Front end layer. The user can not directly interact with the database objects. The data entered by the administrator is stored in database using BLL, and the data is retrieved from the database using BLL. Therefore no direct link exists between user and the database.

### 5.1.2 Proposed Strategies

It can be combination of existing strategies or modification of some existing strategy.

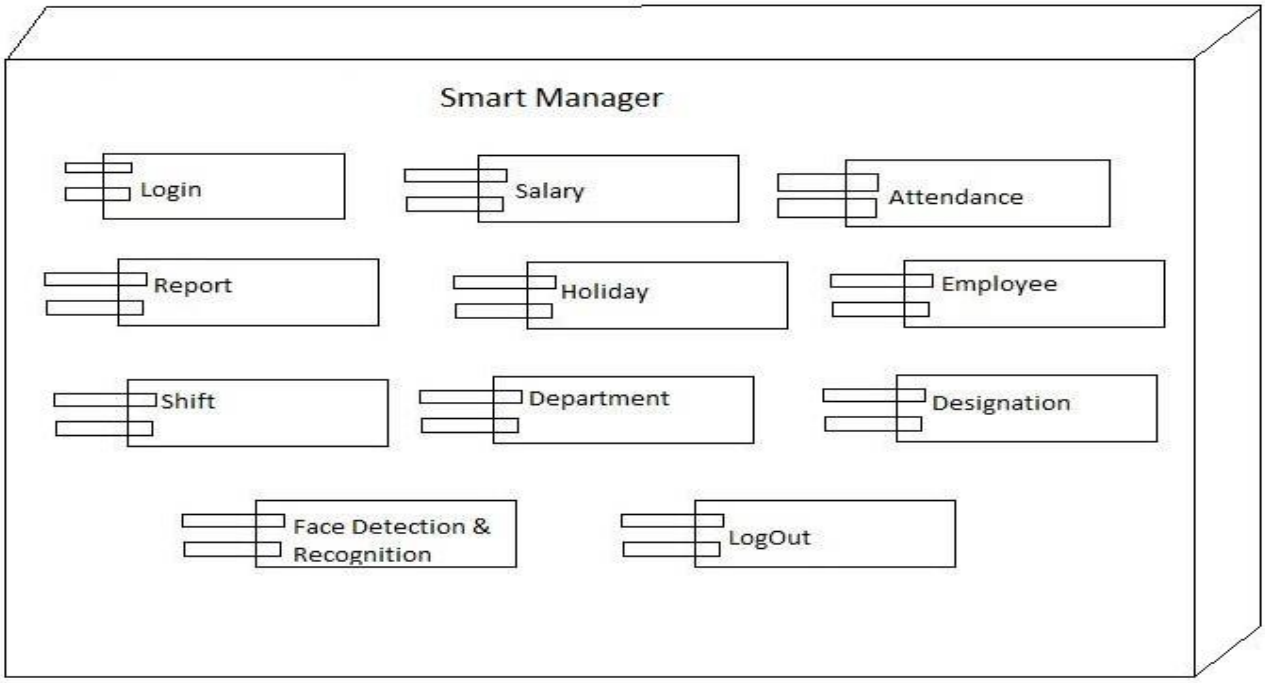



Figure 11Component Diagram

In the above figure, all components that we will have for this project our written and finally when our software interact with the operating system is shown in the following figure.

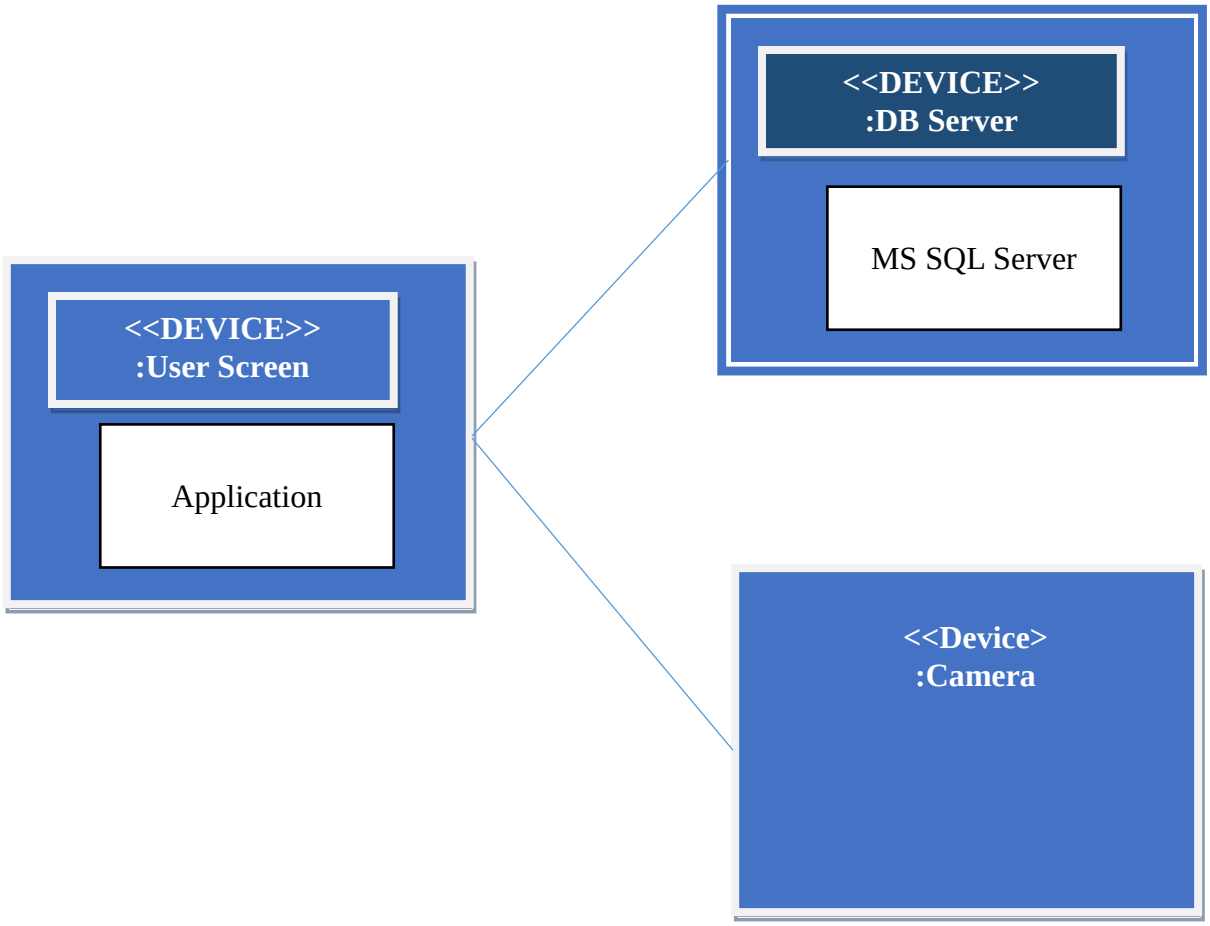



Figure 12: Deployment Diagram

## 5.2 Graphical User Interfaces

| U101: Login | |
|---|---|
| Interface ID | 01 |
| Remarks | Login |
| Snapshot | |

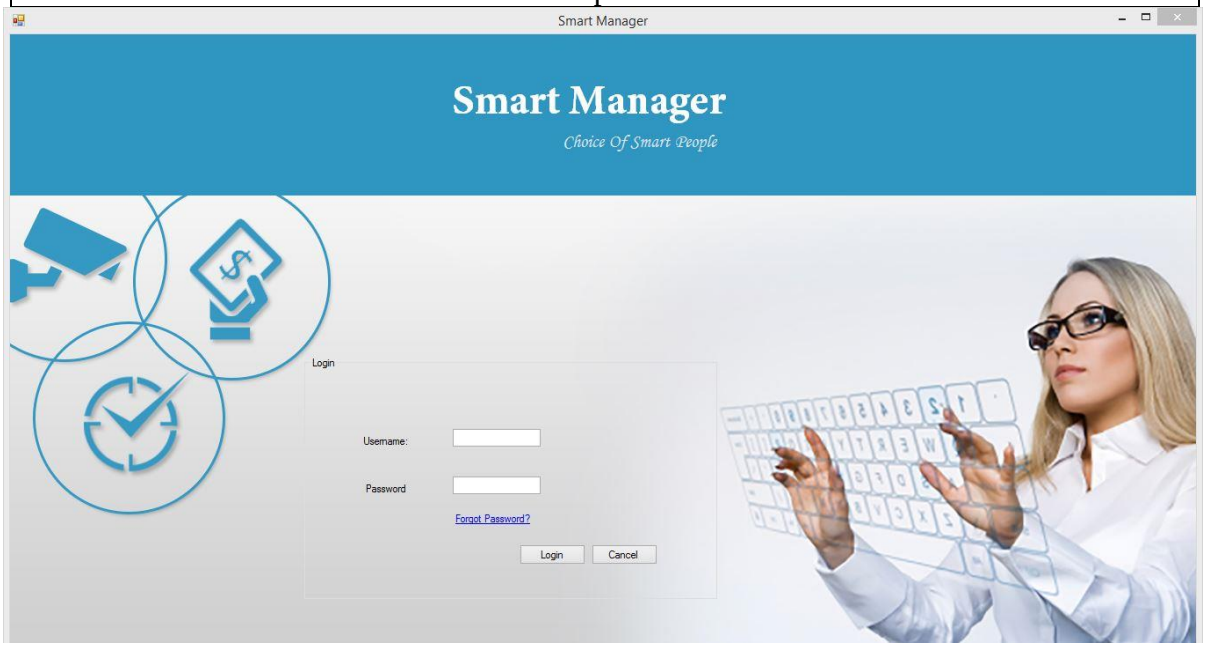



Figure 13: Login Interface

| U102: Home Page | |
|---|---|
| Interface ID | 02 |
| Remarks | Homepage |
| Snapshot | |

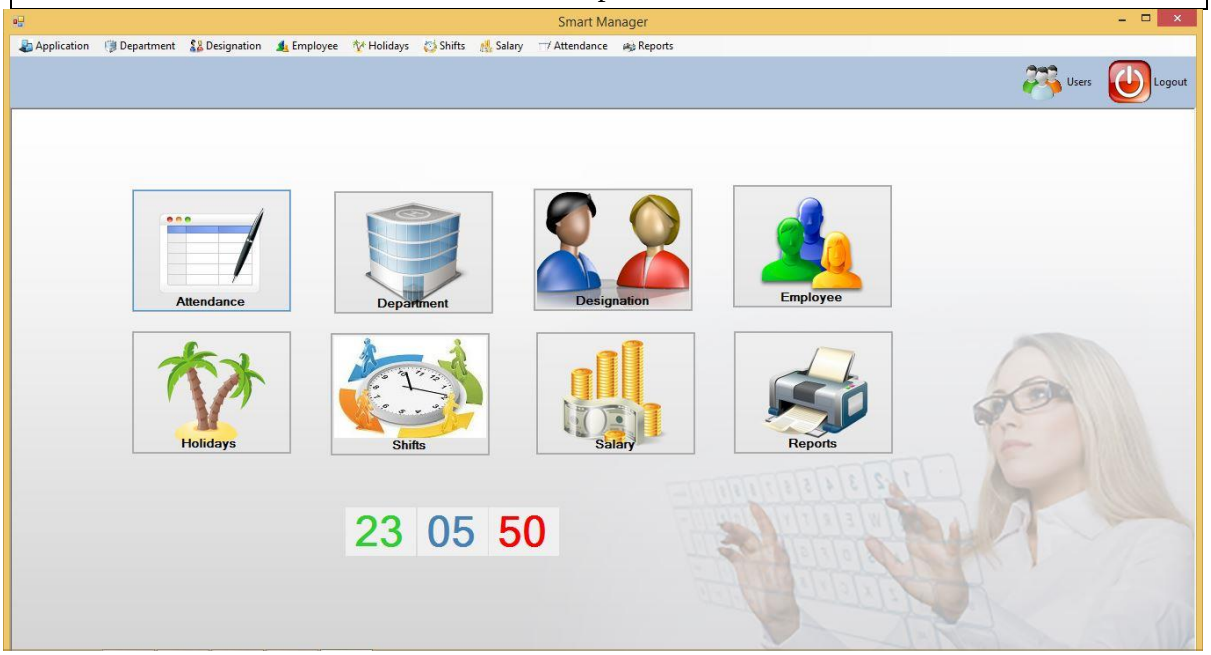



Figure 14: Home Page Interface

| U103: Department | |
|---|---|
| Interface ID | 03 |
| Remarks | Department |
| Snapshot | |

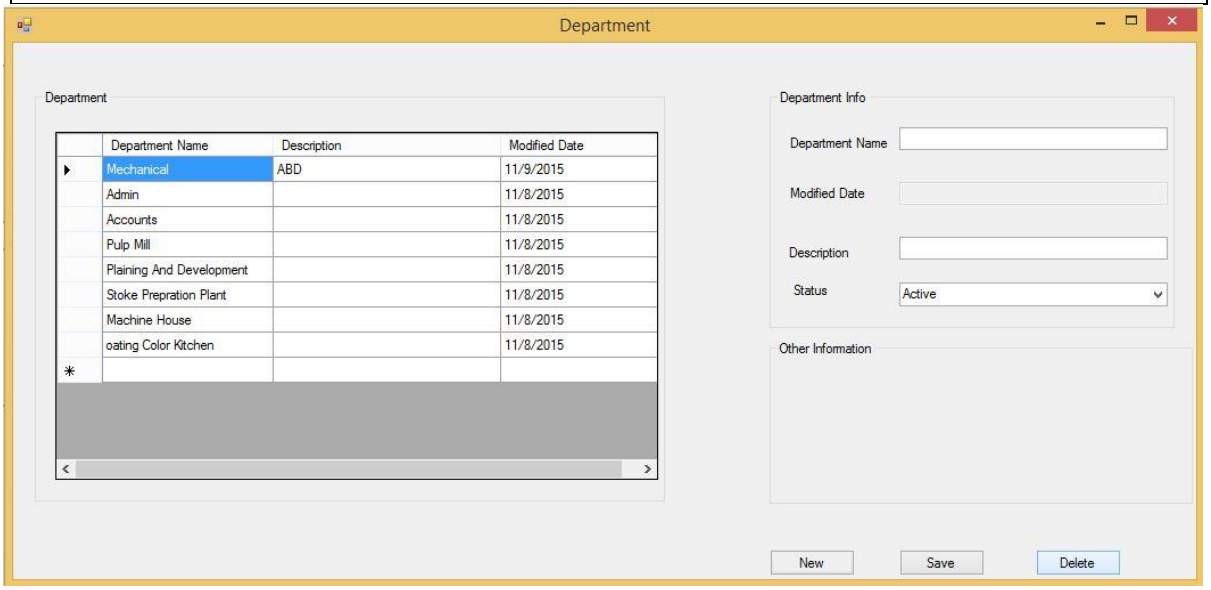



Figure 15Department Interface

| U104: Shift | |
|---|---|
| Interface ID | 04 |
| Remarks | Shift |
| Snapshot | |

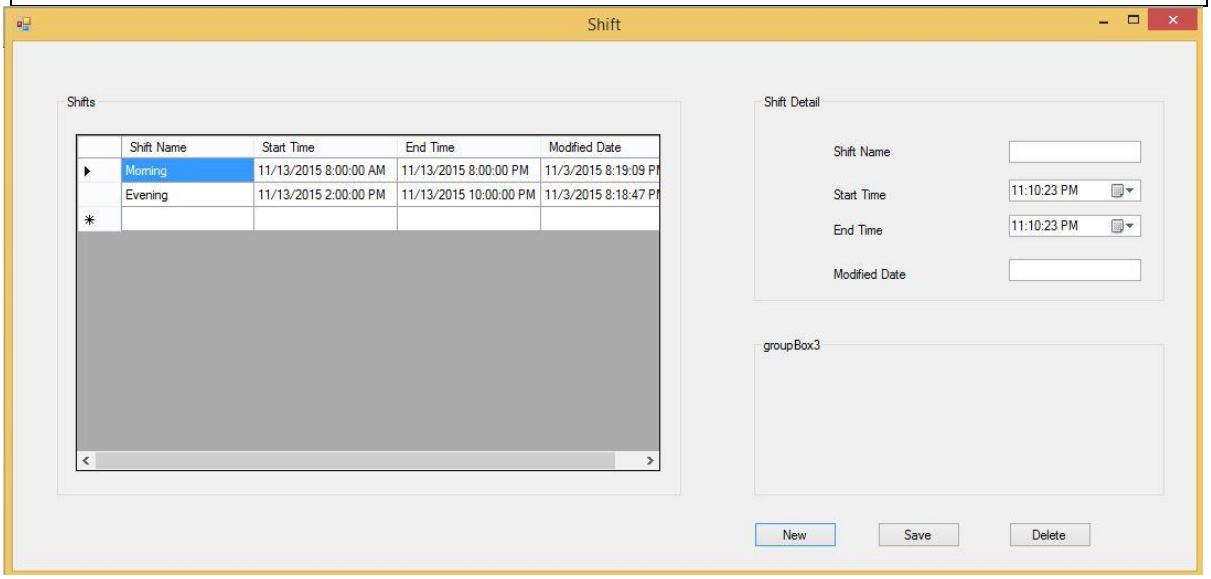



Figure 16: Shift Interface

| U105: Attendance | |
|---|---|
| Interface ID | 05 |
| Remarks | Attendance |
| Snapshot | |

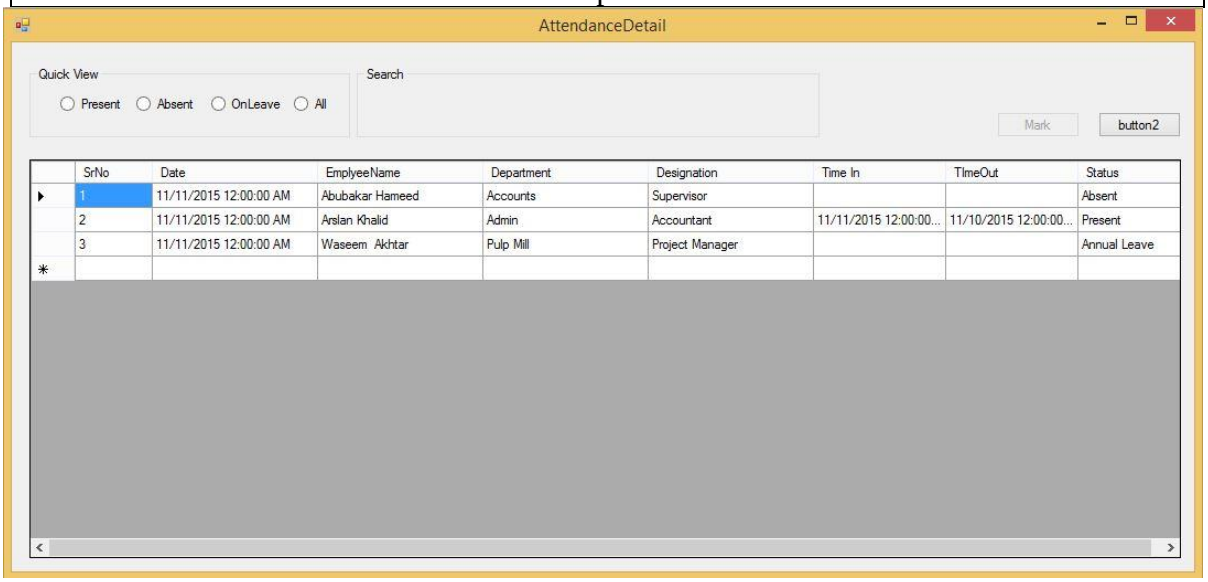



Figure 17: Attendance Interface

| U106: Designation | |
|---|---|
| Interface ID | 06 |
| Remarks | Designation |
| Snapshot | |

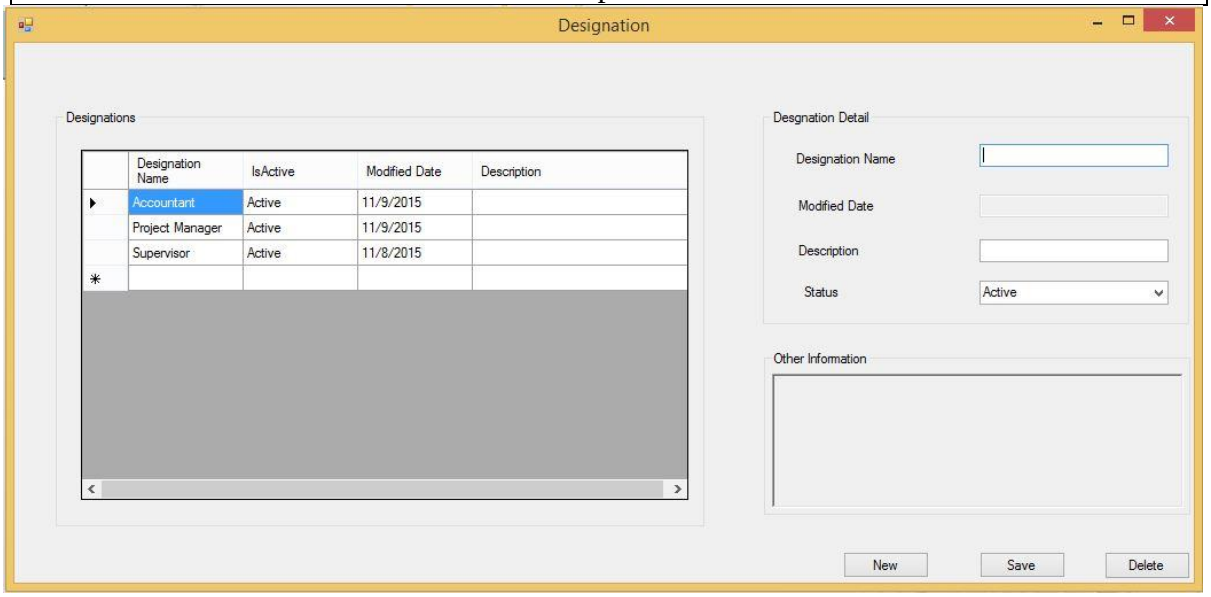



Figure 18: Designation Interface

| U107: Employee Info | |
|---|---|
| Interface ID | 07 |
| Remarks | Employee Info |
| Snapshot | |

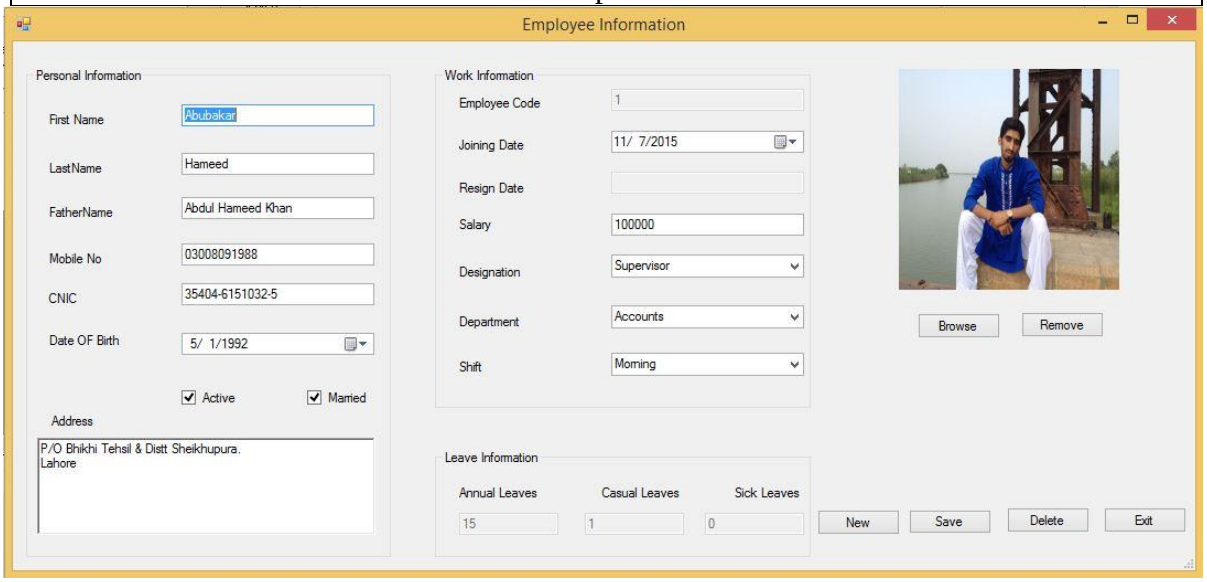



Figure 19: Employee Info Interface

| U108: Employee Form | |
|---|---|
| Interface ID | 08 |
| Remarks | Employee Form |
| Snapshot | |

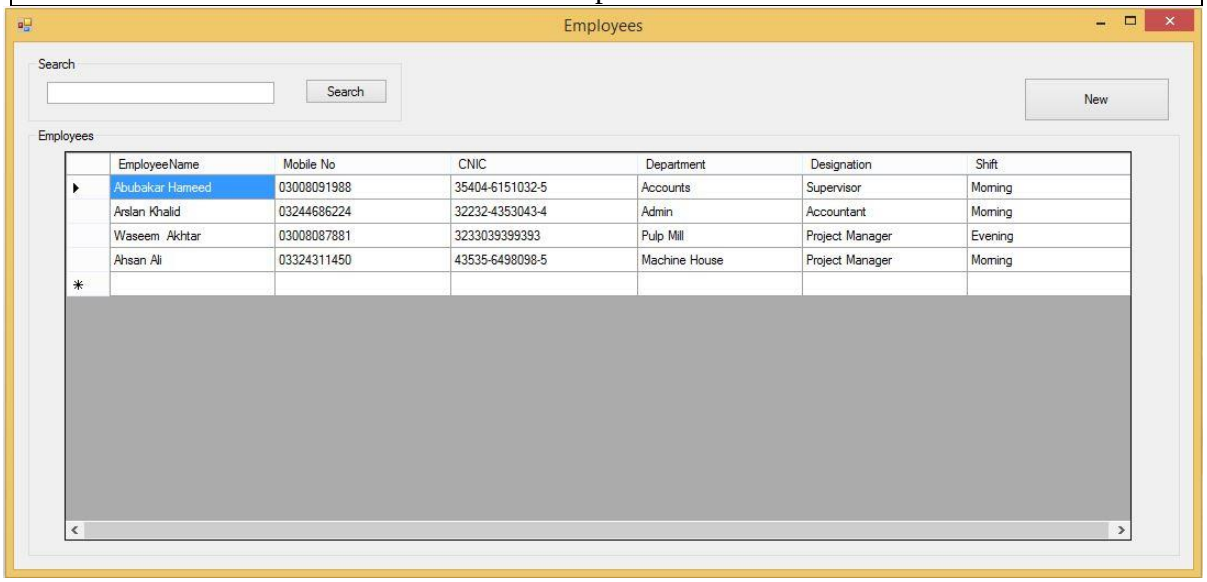



Figure 20: Employee Form Interface

| U109: Holidays | |
|---|---|
| Interface ID | 09 |
| Remarks | Holidays |
| Snapshot | |

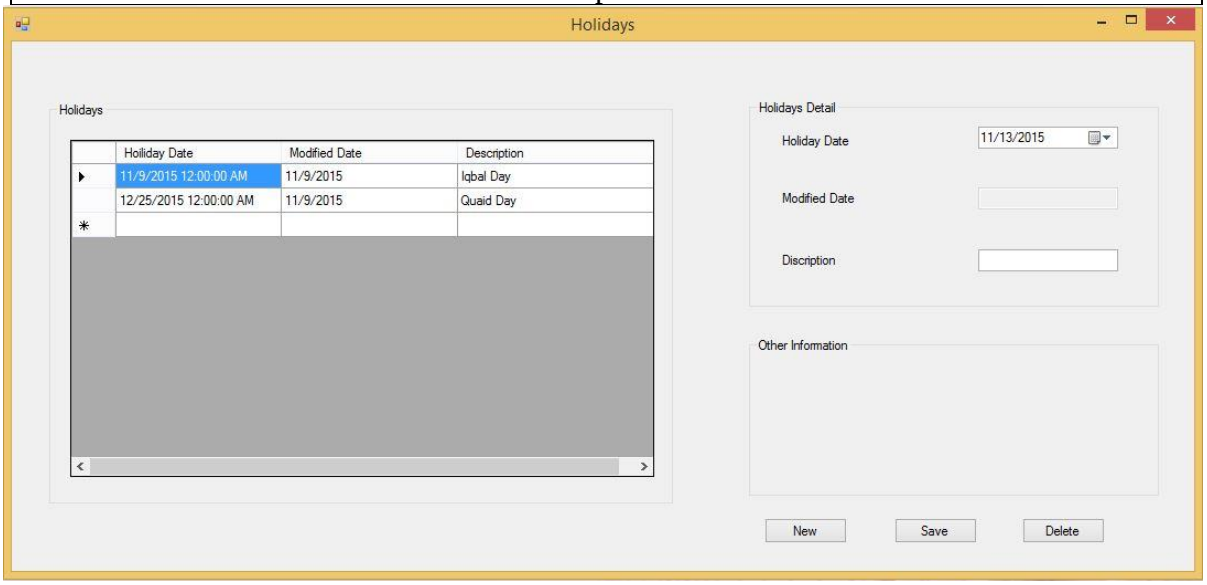



Figure 21: Holidays Interface

| U110: Password Recovery | |
|---|---|
| Interface ID | 10 |
| Remarks | Password Recovery |
| Snapshot | |


Figure 22: Password Recovery Interface

## 5.3 Input Strategies

### 5.3.1 Input from the Users

A user will perform following actions or inputs.

- User can login into the application
- The specified user will open the page to add, update and delete the information of employee, attendance and salary.
- The user will recover their password using internet.
- The user will train the images for face detection and recognition.

## 5.4 Output Strategies

### 5.4.1 Output to the User

- The user can view the information of employee, attendance and salary.
- The user will be finally logged into the Smart Manager.
- The user will view the required information.
- The user will download the required reports of employee, attendance and salary.

# 5.5 Detailed Design System

## 5.5.1 Class Diagrams (Entities)

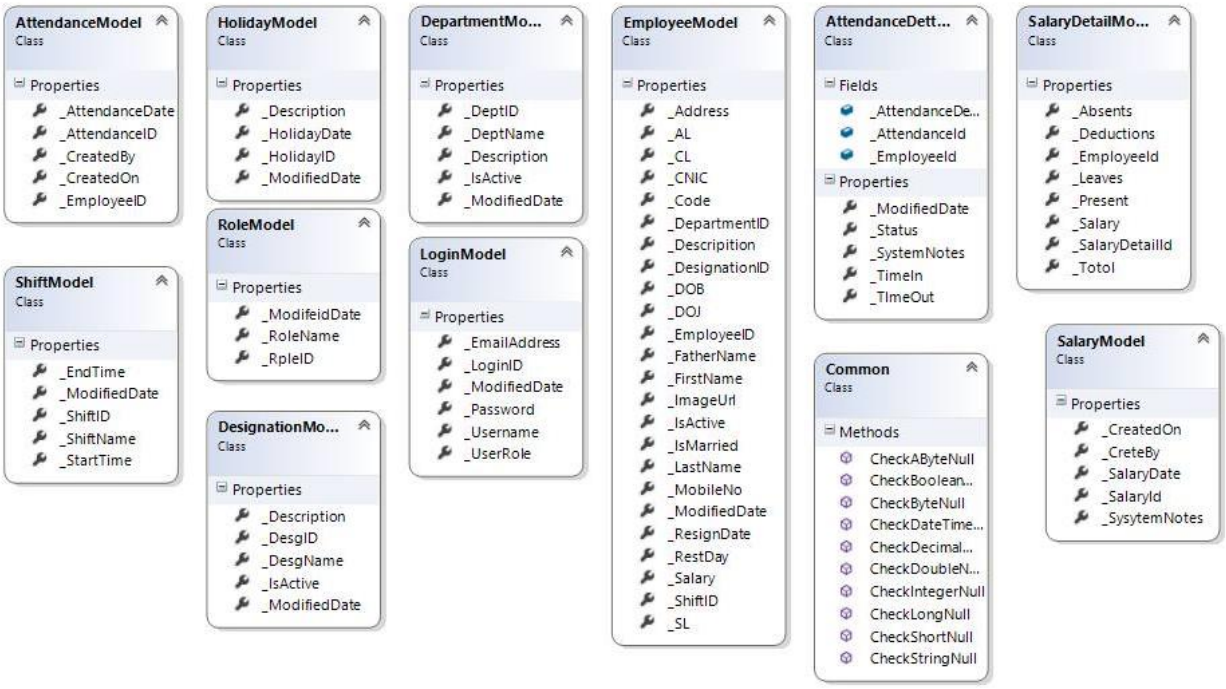



Figure 23: Class Model Diagram

## 5.5.2 Class Diagrams (DAL)

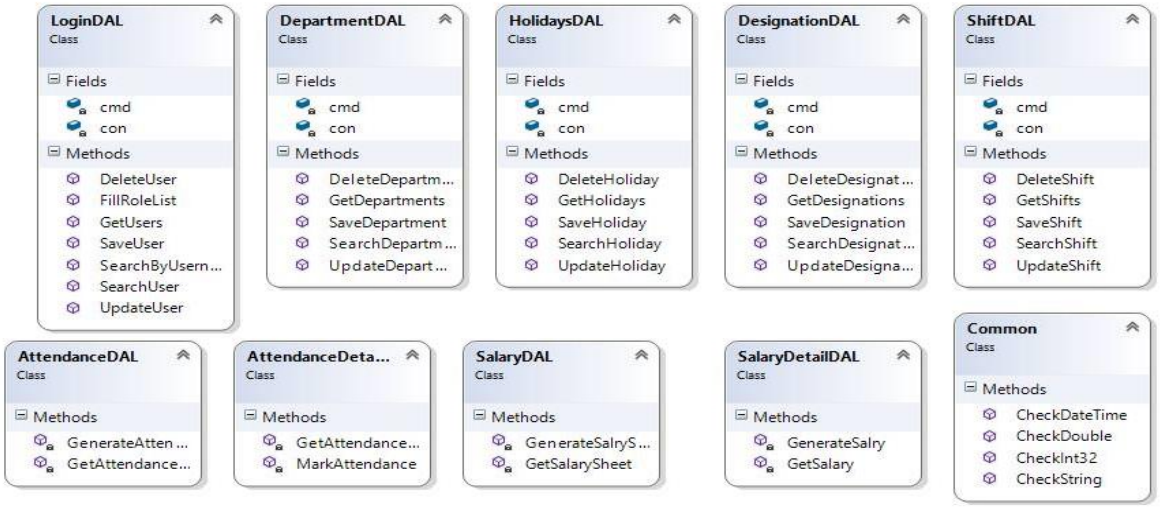



Figure 24: Class Diagram (DAL)

### 5.5.3 Class Diagram (BAL)

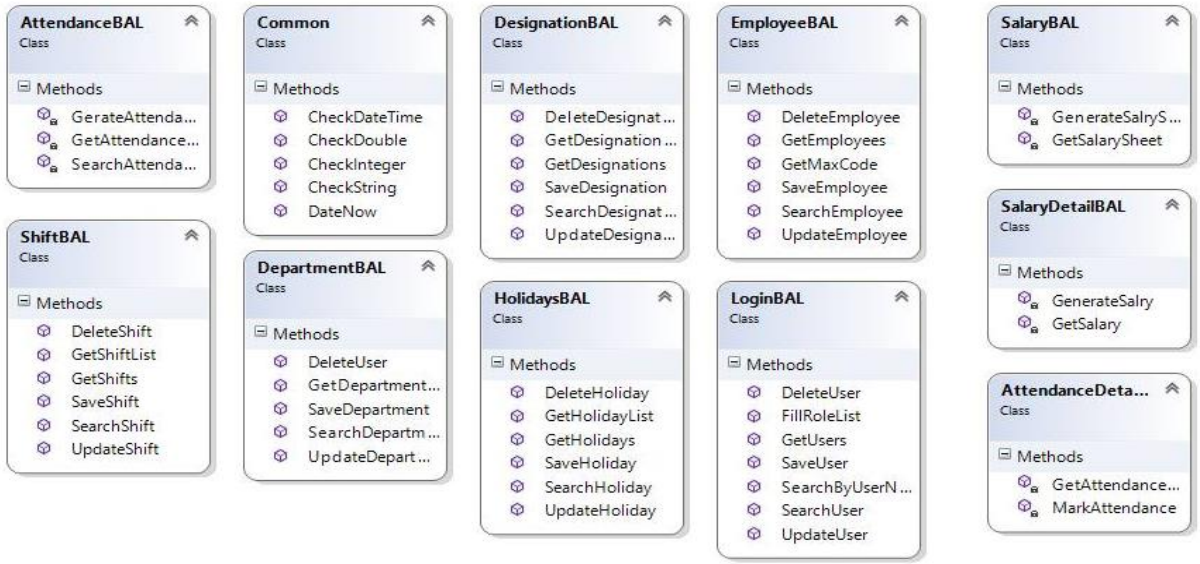



Figure 25: Class Diagram (BAL)

### 5.5.4 Database Diagram

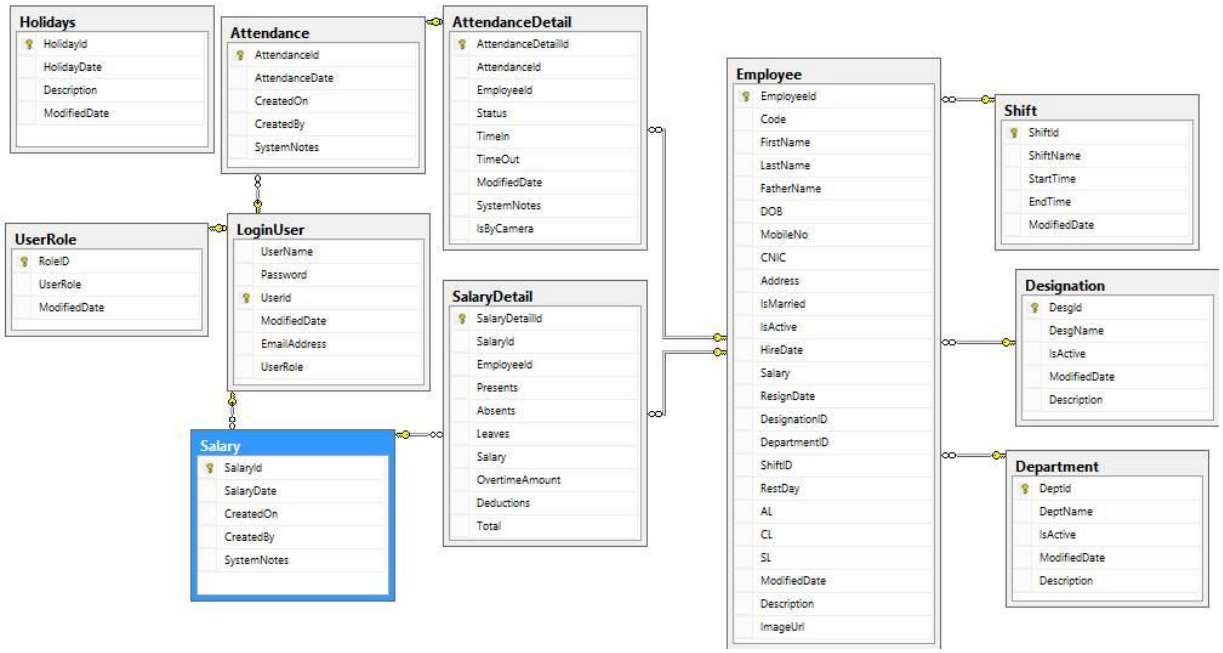



Figure 26: Database Diagram

## 5.6 Interaction Sequence Diagrams

### 5.6.1 Password Recovery

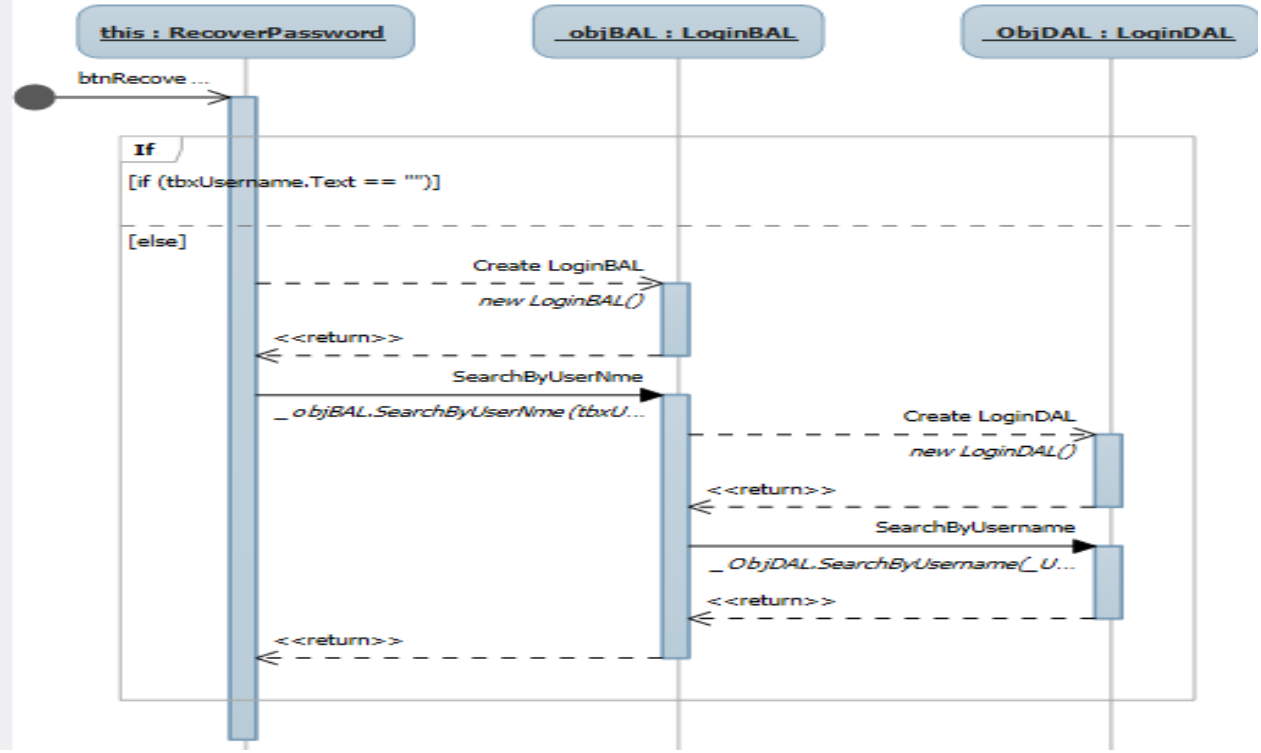



Figure 27: Password Recovery Sequence Diagram

### 5.6.2 Auto Attendance

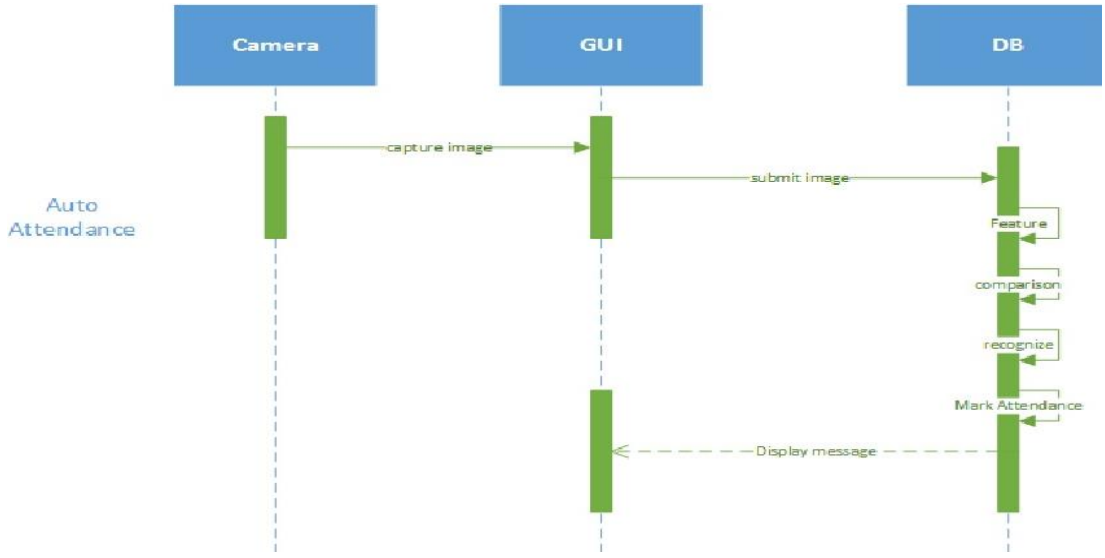



Figure 28: Auto Attendance Sequence Diagram

### 5.6.3 Attendance

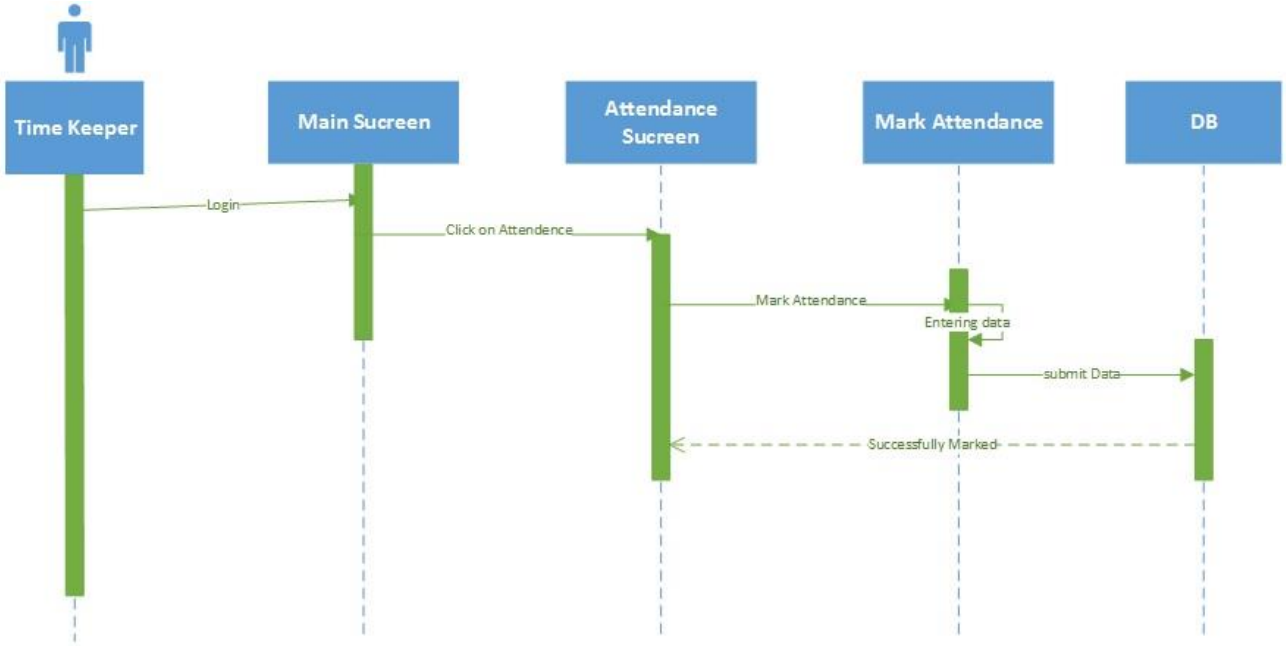



Figure 29: Attendance Sequence Diagram

### 5.6.4 Salary

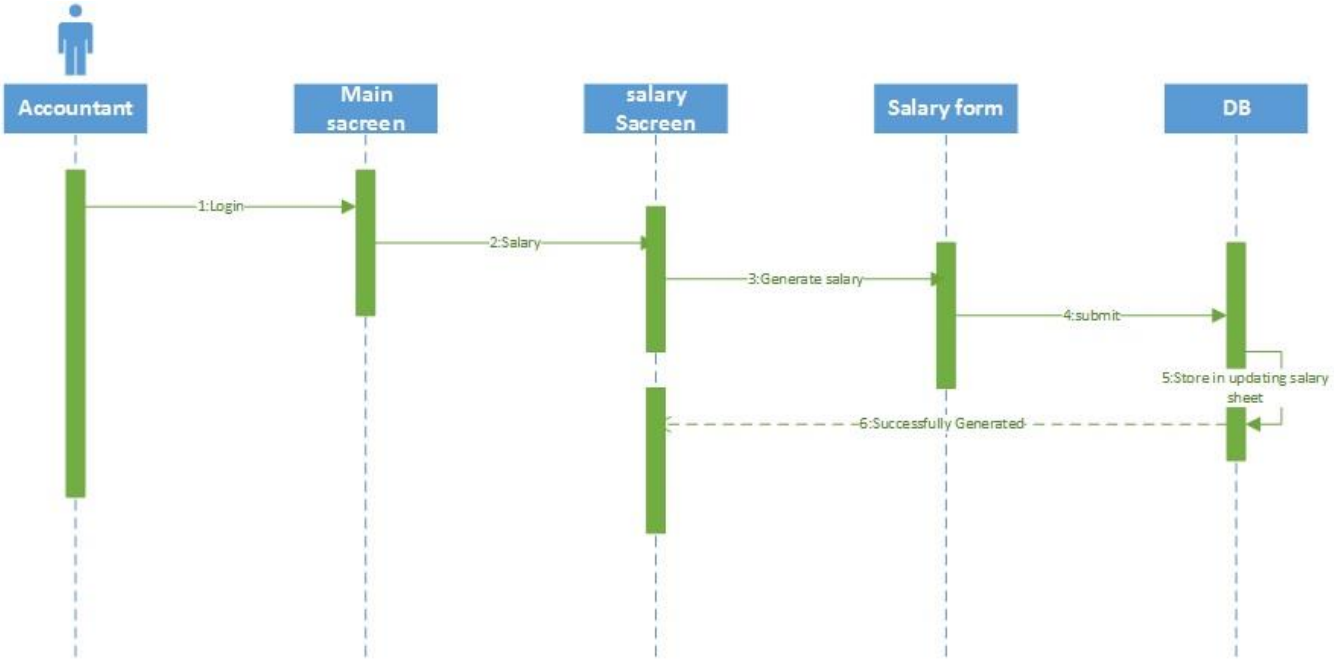



Figure 30: Salary Generation Sequence Diagram

## 5.7 Entity Relationship Diagram

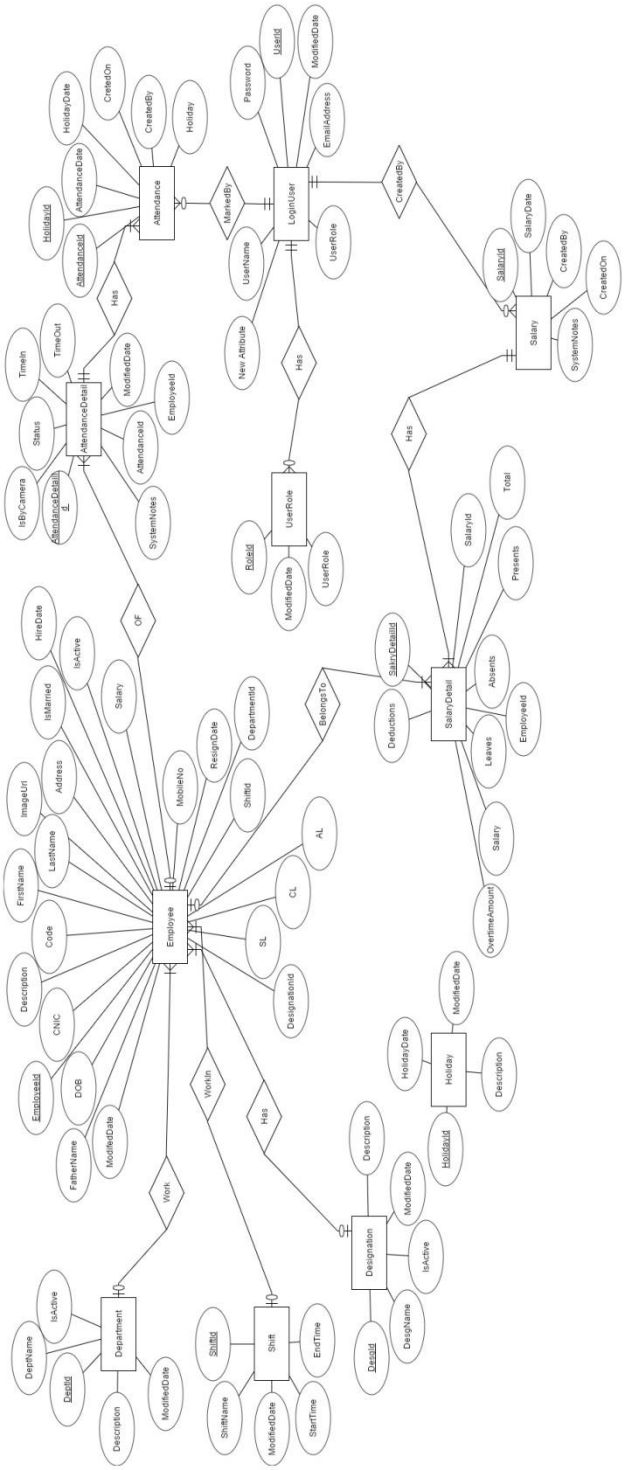



Figure 31: Entity Relationship Diagram

# Chapter 6
# Project Management Plan

# PROJECT MANAGEMENT PLAN

## 6.1 Project Definition

### 6.1.1 Purpose of Document

This document provides the detailed information about the ongoing working of our project. It provides complete information about the project milestones and deliverables. About the different phases from which project is evolve.

### 6.1.2 Project scope

Firstly the smart manager will be able to handle all the aspects of just accounts department. All the information required by an employee would be included moreover they can add attendance, download documents or reports. The main functionality is to facial recognition and salary management.

### 6.1.3 External Milestones

External milestones include different milestones we achieve to complete final project on time and meet tight deadlines, following table no will show the details about external milestones.

#### 6.1.3.1 Customer Input

This application will be provided to the accounts department of Lahore Garrison University. The application will be accessible to only the authenticated administrators to use this application.

| No. | Milestone | Deliverable / Description / Comment | Date(s) |
|---|---|---|---|
| 1. | Initial project proposal presentation | All advisors meeting and review | 20thApril, 2015 |
| 2. | Final project proposal presentation | All advisors meeting and review | 25thApril, 2015 |
| 3. | Project proposal | Submit final copy of project proposal. | 29thApril, 2015 |
| 4. | Software Requirement Specification document | Submission of SRS to the advisor. | 5th May, 2015 |
| 5. | Presentation on SRS | All advisors and co-coordinator meeting and review | 7th May, 2015 |
| 7. | Initial software design | Submission of initial SDS | 13th Aug, 2015 |
| 8. | Final Project Plan submission | Submission of final PMP | 07th Sep, 2015 |
| 9. | Presentation on final PMP and SDS | All advisors and co-coordinator meeting and review | 11th Sep, 2015 |
| 10. | Final Software Design Specification | Submission of final SDS and codes | 21st Sep, 2015 |
| 12. | Test case document | Final version 1.0 | 2nd Nov, 2015 |
| 13. | Internal evaluation | All advisors and co-coordinator meeting and review | 10th Nov, 2015 |
| 14. | Final project submission | Submission to internal advisor after revision | 10th Nov, 2015 |
| 15. | Final project submission | Submission to internal coordinator | 10th Nov, 2015 |
| 16. | External evaluation | All external and internal meeting | 18th Nov, 2015 |
| 17. | Submission of final project | Submission to coordinator with proper binding and CD. | 12th Nov, 2015 |

Table 2: External Milestones

### 6.1.4 Deliverable Artifacts

The following will be delivered for each functionality

| Deliverable | Deliverable/description/comment | Dates available |
|---|---|---|
| Software Requirement Specification (SRS) | This document contains the requirement specification and definitions for software application. It is written to specify the requirement of the software to be developed and is necessary for successful completion of the project. The SRS will act as a template for the proper design of the application | 10th Feb, 2015 |
| Project Management Plan (PMP) | This document is indented to be guide about project development plan. The plan should be dynamic, changing as project changes, but keeping overall development plan documented. | 8th June, 2015 |
| Risk Management Plan (RMP) | This document describes the job of managing risk of project will be performed. It defines roles and responsibilities for participants in the risk process, the risk management activities, schedule and budget for risk management activities, tools and techniques that will be used. | 8th June, 2015 |
| Configuration Management Plan (CMP) | The purpose of this document is to define or reference, the steps and activities that describe how configuration and change control management (CM) is to be performed in the development of the project. | 16th July, 2015 |
| Software Quality Assurance Plan (SQA) | The purpose of this plan is to define the project quality assurance, SQA task and responsibilities; provide references documents and guidelines to perform the SQA activities; provide the standard practices and conventions used in carrying out SQA activities; and provide the tool and techniques and methodologies to support SQA activities, and SQA reporting. | 17th Aug, 2015 |
| User Manual | The manual shall act as a guide for the end user to use the product and work in it. | 19th Oct, 2015 |
| DEMO | This is a visual demonstration of the complete application and would help the user quickly understand the project functionality. | 06th Nov, 2015 |

Table 3:Deliverable Artifacts

### 6.1.5 Risk Identification and Mitigation Plan

**ROLES AND RESPONSIBILITIES**

**TEAM LEADER:** Abubakar Hameed

**RISK OFFICER:** Hafiz M. Waseem Akhtar

**PROJECT MANAGEMENT TEAM:**

| SR. | Designation | Description |
|---|---|---|
| 1 | Team Leader | The team leader and other members of the project Management team shall meet after 10days to review the status of all risk mitigation efforts, review the exposure assessments for any risk items, and redefine the project Risk List. |
| 2. | Risk Officer | The risk officer has the following responsibilities and authority:<br>• Coordinating risk identification and analysis activities.<br>• Maintain the project risk list.<br>• Notifying project management team of new risk items, reporting risk resolution status to management. |
| 3. | Project Members (assigned risk) | The risk officer will assign each newly identified risk to a project member, who will assess the exposure and probability for the risk factor and report the results of that analysis back to Risk Officer. Assigned project members are also responsible for performing the steps of the mitigation plan and reporting project to the risk officer bi weekly. |

Table 4: Risk Identification & Mitigation Plan

## 6.2 Requirement Change Management

- Unpredictable changes can occur with any kind of structural and functional changes that may occur in the Lahore Garrison University with the passage of time.
- In addition to any kind of changes in the nature of salary management.
- Changes may also occur with the advancement of technology in addition to make the application at par with the standard of modern technologies.
- Any change in attendance, leave policies.

## 6.3 Quality Plan

### 6.3.1 Purpose

The main purpose of this quality plan is to provide the in-depth view of techniques and technologies and, processes and methodology used in the project at hand, and also the details of software and it's in time provision in the form of documentation that will be provided to meet the specific objectives that the project is destined to provide.

### 6.3.2 Documentation:

- Detailed preview of the project will be provided in the documentation.
- Strategies will be devised to make the project milestones achievable and manageable.
- Supervisor-trainee meetings will be planned in order to meet the milestones.
- Strengths of the project and its expected weaknesses will be formulated in order to make it more suitable for the users.
- Achievement of each milestone will then be evaluated and communicated to properly.
- Changes will then be made where appropriate.

### 6.3.3 Standards

#### 6.3.3.1 Documentation Standard

IEEE standards for software documentation are followed.

#### 6.3.3.2 Coding Standard

Visual Studio 2012

#### 6.3.3.3 Code Review:

Developer or review intending makes the initial code review version. Code review is very important in development and is also important for managing code quality of application. This document must be revised by other team members. On the basis of this document the source code must be modified by the code owner and checked by the review intending for its compliance with the final code review version.

### 6.3.4 Tools and Methodologies

#### 6.3.4.1 Tools

- Visual Studio 2013
- SQL Server 2014
- Microsoft Office

#### 6.3.4.2 Methodologies

In our application, basically we are using three-tier architecture. Which is client–server architecture in which presentation, application processing, and data management functions are physically separated. It provides a model by which we can create flexible and reusable applications. By segregating an application into layers, developers acquire the option of modifying or adding a specific layer, instead of reworking the entire application. Three-tier architecture is typically composed of a presentation tier, a domain logic tier, and a data storage tier.

### 6.3.5 Inspections

Team Leader: Abubakar Hameed

Quality Team Leader: Hafiz M Waseem Akhtar

| TESTERS | |
|---|---|
| **INTERNAL ADVISOR:** | Ms. Sadia Kauser |
| **CORE TEAM MEMBERS** | |
| Hafiz M Waseem Akhtar<br>Abubakar Hameed<br>M. Arslan Khalid<br>Farzan Masood | |

### 6.3.6 Lay out of Plan

The following inspections will take place for this project

| Review | Reviewed By |
|---|---|
| Project Plan | Core team |
| Functional Specification | Core team |
| Software Requirement Specification | Core team |
| Code Reviews | Core team |
| Test Plan | QA Manager |
| Configuration management plan | Core team |

Table 5: Review Plan

### 6.3.7 Configuration Management Plan

#### 6.3.7.1 General Information

##### 6.3.7.1.1 Purpose

The purpose of the Configuration Management Plan is to describe how configuration management (CM) will be conducted throughout the project lifecycle. This includes documenting how CM is managed, roles and responsibilities, how configuration item (CI) changes are made, and communicating all aspects of CM to project stakeholders.

##### 6.3.7.1.2 Objectives of Configuration Management Plan

Broad objectives of configuration management plan can be defined as follows:

- This plan helps to keep an up-to-date record of all the components in the Software configuration and the interrelations between different components.
- To ensure that no unauthorized requirement, design or code change after deadline.
- To ensure that the impact of any change on the plan and schedules evaluated, understood and managed.

| Roles and Responsibilities | |
|---|---|
| **TEAM LEADER** | Abubakar Hameed |
| **CONFIGURATION MANAGER** | Hafiz M Waseem Akhtar |
| **CHANGE CONTROL BOARD** | |
| **INTERNAL ADVISOR** | Ms Sadia Kauser |
| **QUALITY MANAGER** | Farzan Masood |
| **ORIGINATOR** | Ms Sadia Kauser |
| **CORE TEAM MEMBERS** | |
| Abubakar Hameed<br>Hafiz M Waseem Akhtar<br>M. Arslan Khalid<br>Farzan Masood | |

#### 6.3.7.1.3 Role of Configuration Manager:

The configuration manager is responsible for defining and managing the configuration management plan. This includes managing the repositories that store items under configuration control and the tools that support the processes associated with change management. The emphasis of the configuration manager's role is on protecting the integrity of important versions of artifacts in an efficient and effective manner.

The responsibilities of the configuration manager are itemized to include:

The Configuration Manager will be appointed by the Program Management Office (PMO). The Configuration Manager is responsible for:

- Overall management of the Database.
- Identification of Configuration Items.

- Providing configuration standards and templates to the project team.
- Providing any required configuration training.

The Configuration Manager shall provide mechanism to control changes to its configuration items by performing the following activities:

- Providing each member with a copy of the configuration management policy.
- Acting as a resource for accesses to change management related reference.
- Ensuring that each member has access to the necessary repositories by working with the configuration management specialist.

The Project Manager is responsible for:

- Overall responsibility for all Configuration Management activities related to the project for Lahore Garrison University.
- Identification of Configuration Items.
- All communication of Configuration management activities to project stakeholders
- Re-base lining, if necessary, any items affected by Configuration Management changes.
- Identified the de-tracking from milestones.

## 6.4 Project Tracking

### 6.4.1 Issue Tracking

Issue tracking will be carried out using the standard Issue Log. Open issues are reviewed as part of the weekly conference call or meeting.

### 6.4.2 Status Reporting

Weekly status will be reported using the standard status report. The team will submit status report to the Team Leader and the project Advisor.

## 6.5 Communication Plan

Weekly conference call will be held. The following will participate:

- Project advisor
- Project coordinator
- Team leader
- Team members
- Developers

## 6.6 Resource Plan

### 6.6.1 Team Members

Team consists of Four Members

### 6.6.2 Project Manager (PM)

PM leads the whole project.

### 6.6.3 Requirement Analyst (RA)

The task of RA is to collect and analyze requirements of the whole project.

### 6.6.4 Developers

The task of developer is to deliver technical skills that are necessary to engineer the project.

### 6.6.5 Quality Assurance Engineers (QAE)

The task of QAE is to provide management with the data necessary to be informed about product quality.

### 6.6.6 Testing Engineers (TE)

The task of TE is to test the whole project for removal of errors.

### 6.6.7 Configuration Engineers (CE)

The task of CE is to identify change, control change, ensure that change is being properly implemented and report changes to others.

### 6.6.8 Project Organization

Project organization will visually represents the flow of roles and responsibilities from project advisor to team members and all in between.
Following chart will show the pictorial flow:

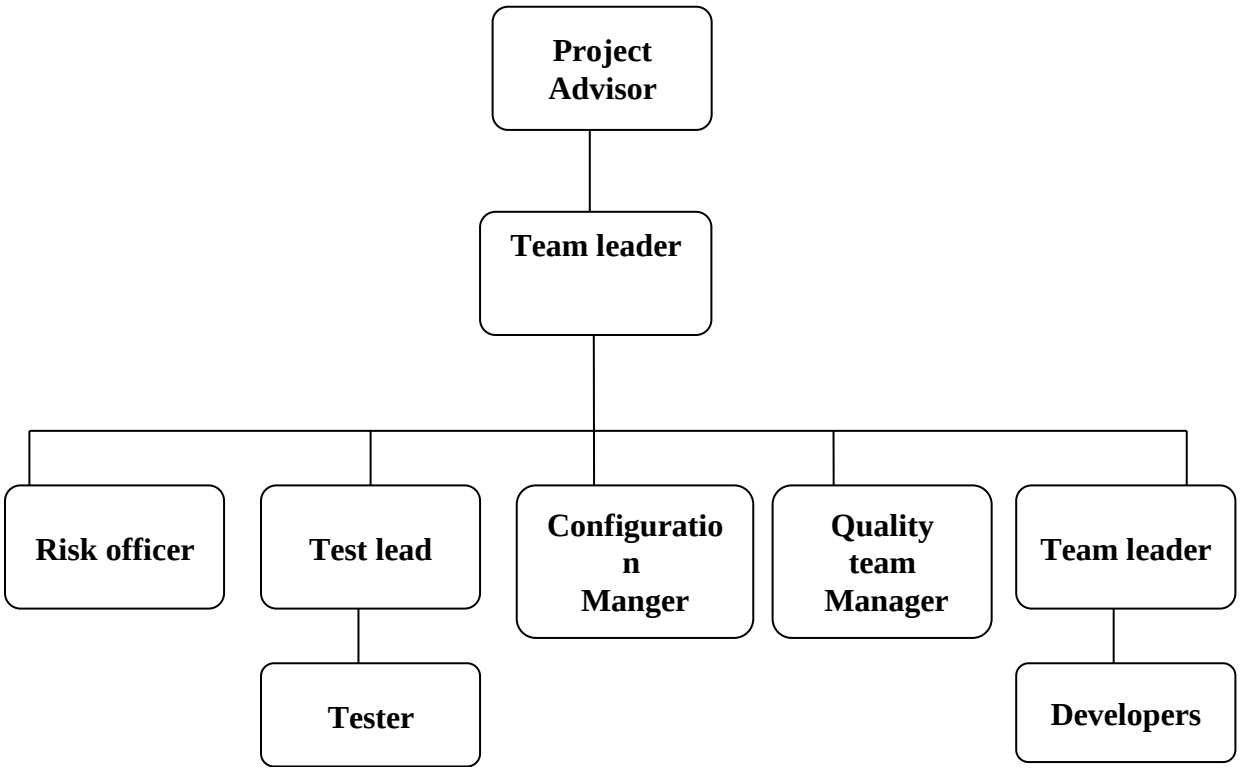



Figure 32: Development Team

### 6.6.9 Team Members

| | |
|---|---|
| **PROJECT ADVISOR** | Ms Sadia Kauser |
| **TEAM LEADER** | Abubakar Hameed |
| **QUALITY MANAGER** | Farzan Masood |
| **RISK OFFICER** | M. Arslan Khalid |
| **CONFIGURATION MANAGER** | Hafiz M Waseem Akhtar |

### 6.6.10 Test Team:

| | |
|---|---|
| **TEST LEAD** | Abubakar Hameed |
| **TESTERS** | Hafiz M Waseem Akhtar |

### 6.6.11 Core Development Team

| | |
|---|---|
| Abubakar Hameed | M. Arslan Khalid |

### 6.6.12 Core testing team

| | |
|---|---|
| Hafiz M Waseem Akhtar | Farzan Masood |

### 6.6.13 Software Test Engineers (Quality Assurance)

| | |
|---|---|
| Hafiz M Waseem Akhtar | Farzan Masood |

## 6.7 Infrastructure Plan

### 6.7.1 Development environment

The development environment consists of the following

| | |
|---|---|
| Processor | Intel® Core™ i7-5500U CPU @ 2.40GHz |
| Disk | 500GB |
| RAM | 4GB |
| Operating System | Windows 10 |
| Software Specification | EmguCV |

### 6.7.2 Development Tools:

The operating system, which ensures that the hardware connectivity with the system is windows 7 because it provides the higher security options. And we will use these tools for making a project.

| Tools | Purpose | Version |
|---|---|---|
| Visual Studio | Visual Studio 2012 is used for our project coding and development as it is used for developing websites and web applications in C#. | Visual Studio 2012 |
| SQL Server | SQL Server Management Studio is an integrated environment for accessing, configuring, managing, administering, and developing all components of SQL Server. | SQL Server 2014 |
| MS Office | MS Office is used for documentation of the project. | MS Office 2010 |
| MS Visio | The MS Visio is used to complete the OOAD of the system. It provides the facility of easy drawing of diagrams at several phases of the design and development. | 2013 |

Table 6: Development Tools

### 6.7.3 Test Environment

| | |
|---|---|
| Processor | Intel® Core™ i7-5500U CPU @ 2.40GHz |
| Disk | 500GB |
| RAM | 4GB |
| Software specification | EmguCV |
| Windows | WINDOWS 8.1/10 |

### 6.7.4 Testing Tools

The operating system, which ensures that the hardware connectivity with the system is windows 7 because it provides the higher security options and we will use these tools for making a project.

| Tools | Purpose | Version |
|---|---|---|
| Visual Studio | Visual Studio 2013 is used for our project coding and development as it is used for developing websites and web applications in C#. | Visual Studio 2012 |
| SQL Server | SQL Server Management Studio is an integrated environment for accessing, configuring, managing, administering, and developing all components of SQL Server. | SQL Server 2014 |
| MS Office | MS Office is used for documentation of the project. | MS Office 2010 |
| MS Visio | The Visio is used to complete the OOAD of the system. It provides the facility of easy drawing of diagrams at several phases of the design and development. | MS Visio Edition 2013 |

Table 7: Testing Tools

# Chapter 7
# Configuration Management Plan

# CONFIGURATION MANAGEMENT PLAN

## 7.1 General Information

### 7.1.1 Purpose

A Configuration Management Plan is used to establish and maintain consistency in a software product by coordinating performance, functional and physical attributes with its requirements, design, and operational information. Manage security features and assurances through change controls made to software, documentation, test, and documentation throughout the life cycle of an IT system. Identify attributes that define every aspect of a configuration item. Establish change control processes and approval stages required to change a configuration item's attributes. Record and report on the configuration baselines associated with each configuration item at any moment of time.

### 7.1.2 Scope

A Configuration Management Plan is produced for most software projects at Department X and, if produced, must conform to this template. In cases where the project is small, the Project Plan may include the necessary configuration management planning information. There are several issues related to our project scope is that the changes can occur but as we defined scope limited so it has to be. We can introduce further features in smart manager. Interface can be changed according to different situation but this is not a time taking job so we would consider it as minor change.

### 7.1.3 Project Reference

Provide a list of the references that were used in preparation of this document. Examples of references are:

- Project proposal
- Software requirement specification document
- Software designing specification document
- Functional specification document
- Project management plan

## 7.2 Configuration Control

The Configuration control for our project is the systematic evaluation, coordination, approval or disapproval, and implementation of all proposed changes in the configuration of a configuration item after formal establishment of its baseline. Procedures must be established to ensure that changes are accomplished in an organized manner with traceability and accountability so that project CM requirements are properly implemented. Requested changes to software or documentation are formally reviewed and approved in order to allow evaluation of the effect of the change on security, performance, interfaces, acceptability, completeness, and documentation.

### 7.2.1 Roles and Responsibilities

| | |
|---|---|
| **CONFIGURATION MANAGER** | Hafiz M Waseem Akhtar |
| **CHANGE CONTROL BOARD** | |
| **INTERNAL ADVISOR** | Ms. Sadia Kausar |
| **CORE TEAM MEMBERS** | |
| Abu Bakar Hameed<br>Hafiz M Waseem Akhtar<br>M. Arslan Khalid<br>Farzan Masood | |
| **QUALITY MANAGER** | Farzan Masood |
| **ORIGINATOR** | Ms. Sadia Kausar |

### 7.2.2 Role of Configuration Manager

The configuration manager is responsible for defining and managing the configuration management plan. This includes managing the repositories that store items under configuration control and the tools that support the processes associated with change management.

The emphasis of the configuration manager's role is on protecting the integrity of important versions of artifacts in an efficient and effective manner.

The configuration Manager shall provide mechanism for Smart Manager the team to control changes to its configuration items by performing the following activities:

- Providing each member with a copy of the configuration management policy and the salary management plan.
- Acting as a resource for accesses to change management related reference.
- Ensuring that each member has access to the necessary repositories by working with the configuration management specialist.

| No. | Designation | Responsibilities |
|---|---|---|
| 1. | Configuration Manager | The individual responsible for managing the Change Management activities of the project team. |
| 2. | Change Control Board | A group responsible for reviewing changes requests for approval or disapproval. For project it is the whole team, and necessary changes are discussed during the weekly team meetings. |
| 3. | Originator | Anyone with whom a change request originates and the person informed when the change request is closed-out or deferred to the Change Control Board. |
| 4. | Quality Manager | The individual who oversees the inspection of configuration items and reviews change requests. |

Table 8: Configuration Control

## 7.3 Change Control Process

### 7.3.1 Change Classifications

Describe how change classifications will be determined and assigned in terms of the level of severity of their impact. Selection factors may include:

- Criticality
- Interface requirements
- Change sensitivity
- Schedule
- Ownership
- Scope and complexity

### 7.3.2 Configuration Audits

Informal configuration audits for our project are conducted at certain predetermined points as specified in the Project Plan. The purpose of the audit is to certify that the design, development, and integration meet the system's technical requirement; that they are accurately documented; and do not include unauthorized changes.

With complex administrative systems, informal audits should be performed to minimize the impact on project schedules and to identify deficiencies as soon as possible. Deficiencies noted during the informal audit, as well as recommendations for any corrective actions, are made available for CCB review during the configuration audit.

Configuration audits validate compliance of development requirements by comparing the functioning system to its technical documentation.

- The first audit will be held with the internal advisor on Dated: 29th May, 2015.
- The final audit will be held in November, for the evaluation and viva.

### 7.3.3 Tools

- Visual Studio 2012
- SQL Server 2014

- Microsoft Office 2010
- Adobe Photoshop CS 6
- MS Visio 2013

# Chapter 8
# Test Cases

# TEST CASES

## 8.1 Test # 1

**Test case of Login Screen**

| | |
|---|---|
| ***Screen Name*** | **Login Screen** |
| ***Test Case ID*** | TC: 01 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | To check whether user login is properly working and check that the username and password is correct. |
| ***Scenario*** | Input to the given fields to proceed further through login. |
| ***Environment*** | Visual Studio 2012 / PC<br>MS SQL SERVER 2014 |
| ***Pre- Requisite*** | 1. Must Open Login as user opened up the application.<br>2. Database of username and password is stored on Database Server. |
| ***Strategy*** | 1. Click on "Login" button to go the next screen for further processing. |
| ***Expected Results*** | Next (Search) Screen is displayed successfully by clicking Login button. |
| ***Observations*** | Related screens are displayed on the clicking button. |
| ***Result*** | Login screen has no bug |
| ***Re-Test Results*** | As above |

Table 9: Test Case - Login Screen

## 8.2 Test # 2

**Test case of Password Recovery Screen**

| | |
|---|---|
| ***Screen Name*** | **Signup Screen** |
| ***Test Case ID*** | TC: 02 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | To check either user is getting mail for password recovery. |
| ***Scenario*** | In case of password failure, user can send an email by using his username to recover his password. |
| ***Environment*** | Visual Studio 2012 / PC<br><br>MS SQL Server |
| ***Pre- Requisite*** | 1. Must Open login Screen.<br>2. As user click on forget password link.<br>3. It will ask the username and will send an email of password on store id against username. |
| ***Strategy*** | 1. Click on "Forget Password" link to go the next screen for further processing. |
| ***Expected Results*** | Next (Username) Screen is displayed successfully by clicking Forget Password link. |
| ***Observations*** | Related screens are displayed on the clicking link. |
| ***Result*** | Password link screen has no bug |
| ***Re-Test Results*** | As above |

Table 10: Test Case - Password Recovery

## 8.3 Test # 3

**Test case of Search Screen**

| | |
|---|---|
| ***Screen Name*** | **Search Screen** |
| ***Test Case ID*** | TC: 03 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | To check whether Employee Search Screen is properly working and check that the area and category provided by user is correct and exist in database. |
| ***Scenario*** | Input to the given fields to proceed further through Search Screen. |
| ***Environment*** | Visual Studio 2012 / PC<br>MS SQL SERVER 2014 |
| ***Pre- Requisite*** | 1. Must Open Search Screen as user Login to the application.<br>2. Must check through database that area and category provided by user is valid or not.<br>3. If area and category are valid then display a list of employee from database to screen searched on the basis of provided area and category. |
| ***Strategy*** | Click on "Search" button to go the next screen for further processing. |
| ***Expected Results*** | Next (Searched List of Employees) Screen is displayed successfully by clicking Search button. |
| ***Observations*** | Related screens are displayed on the clicking button. |
| ***Result*** | Search screen has no bug |
| ***Re-Test Results*** | As above |

Table 11: Test Case - Search Screen

## 8.4 Test # 4

**Trace Mode distance range Screen**

| | |
|---|---|
| ***Screen Name*** | **Search Screen** |
| ***Test Case ID*** | TC: 04 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | Test distance of the trace mode under good luminous interior and exterior environment. |
| ***Scenario*** | One test subject in straight line path |
| ***Environment*** | Visual Studio 2012 / PC<br>MS SQL SERVER 2014 |
| ***Pre- Requisite*** | Webcam and system are working fine. |
| ***Strategy*** | Click on "Start" button to go the next screen for further processing. |
| ***Expected Result*** | The system will trace contours at 3 meters distance. |
| ***Observations*** | System starts to identify subject at 3.5mts and complete the contour of the body at 2.5mts from the camera. |
| ***Result*** | Tracing mode has no bug |
| ***Re-Test Results*** | As above |

Table 12: Test Case - Trace Mode Distance Range

## 8.5 Test # 5

**Test case of Attendance Screen**

| | |
|---|---|
| ***Screen Name*** | **Attendance Screen** |
| ***Test Case ID*** | TC: 05 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | To check whether attendance is being marked perfectly against current date and time. |
| ***Scenario*** | Input to the attendance sheet to proceed further through login. |
| ***Environment*** | Visual Studio 2012 / PC<br>MS SQL SERVER 2014 |
| ***Pre- Requisite*** | 1. Must Open Login as user opened up the application.<br>2. Database of employee's information is stored on Database Server. |
| ***Strategy*** | 1. Click on "Attendance Report" button to go the next screen for further processing. |
| ***Expected Results*** | Next Screen is displayed successfully by clicking attendance report link. |
| ***Observations*** | Related screens are displayed on the clicking button. |
| ***Result*** | Attendance screen has no bug |
| ***Re-Test Results*** | As above |

Table 13: Test Case - Attendance Report Screen

## 8.6 Test # 6

**Test case of Salary Screen**

| | |
|---|---|
| ***Screen Name*** | **Attendance Screen** |
| ***Test Case ID*** | TC: 06 |
| ***Engineer*** | Farzan Masood |
| ***Application Name*** | Smart Manager (Desktop Application) |
| ***Testing Cycle*** | 01 |
| ***Purpose*** | To check whether salary is being calculated perfectly according to the assumed conditions. |
| ***Scenario*** | Input of attendance sheet will be fetch to calculate the estimate time on which the salary of the employee's depend. |
| ***Environment*** | Visual Studio 2012 / PC<br>MS SQL SERVER 2014 |
| ***Pre- Requisite*** | 1. Must Open Login as user opened up the application.<br>2. Database of employee's information is stored on Database Server.<br>3. Database of attendance sheet is stored on Database Server. |
| ***Strategy*** | 1. Click on "Salary Report" button to go the next screen for further processing. |
| ***Expected Results*** | Next Screen is displayed successfully by clicking Salary report link. |
| ***Observations*** | Related screens are displayed on the clicking button. |
| ***Result*** | Salary screen has no bug |
| ***Re-Test Results*** | As above |

Table 14: Test Case - Salary Report Screen

# CONCLUSION

The project that we developed is an automated Salary Management System formally known as ‘Smart Manager’. This is a Desktop project which is made on the objectives for providing certain facilities to the users for their ease. To get the best appropriate results of the all tests, we almost tried variation of techniques before the actual result. All the methods were producing results but they were not accurate and were lacking at some points especially in FDR module.

Some of the results, their problems and then finally the approximation according to the techniques will be shown so that difference in all applied techniques along with results should be almost clear. And on the basis of these results and final accurate result, we conclude our project. The criteria set for goals are to generate salaries, marking attendance, performance and efficiency issues of the system. The major goal we have achieved is to generate the salary report information and under limited environment we get our required results. This shows that this application is efficient and performing well.

# REFERENCES


[I] Market Research

http://www.capterra.com/payroll-software

http://www.transparencymarketresearch.com/facial-recognition-market.html

[II] Facial Recognition

http://en.wikipedia.org/wiki/Facial_recognition_system

[III] EmguCV

http://www.emgu.com/wiki/index.php/Main_Page

[IV] Facial Recognition Techniques

"Firms point to biometric future" By Dominic Bailey, BBC News, at Biometrics 2006, n.d

Arduino Forum, http://forum.arduino.cc

http://fewtutorials.bravesites.com/tutorials

http://www.slideshare.net/rajarshisbaisthakurforever/facedetectionandrecognition

[V] Ian Sommerville. Software Engineering .8th Edition

[VI] Craig Larman. Applying UML and Patterns.3rd Edition

[VII] Software Methodology Selection

http://www.softresources.com/resources/software-selection-tips

[VIII] C# Help Forum

https://social.msdn.microsoft.com/Forums/vstudio/en-US/home?forum=csharpgeneral

[IX] Software Testing Techniques

https://en.wikipedia.org/wiki/Software_testing#cite_note-Kaner_1-1