1.0 Introduction

General Sir John Kotelawala Defence University is a leading university in Sri Lanka which is the only university offering graduate courses in defence studies in the South Asian region. KDU offers undergraduate and postgraduate courses in variety of fields such as Defence Studies, Engineering, Medicine, Law and etc. This document is the design report for the development of a computerized task management system for KDU. It contains details under 4 main chapters namely 'Overall System Architecture, Software Architecture, Data design & Interface Design.

In the Overall system architecture it is described about the presentation layer, application layer and the data link layer of the developing system with the aid of diagram. In the next section it is explained about the software architecture of the system. It contains the information about the modules which are presented in the system, roles and privileges of accessing these modules. First there is an overview of the overall software architecture which is followed by the list of modules and the detailed explanations about the key modules.

In this document 3rd section is dedicated for describing the data design of the system. It contains the conceptual data design, which is the EER model and then the conversion of EEP in to the relations. This section also contains the database relationship diagrams followed by a description of tables in the data base with their attributes and their data types with lengths.

As the final section it contains the interface designs for various forms available in the system with brief description about each of them followed by a summary of this document to end the report.

2.0 Overall System Architecture

Architectural design defines the overall structure of the system and form a solution before move on to the detail design or the low level design which includes the design of specific components details. The architectural design is given according to the three-tier-architecture where overall design is spilt in to three layers of Client Tier, Application Tier and Data Tier. The overall system architectural design for the proposed system is as follows;

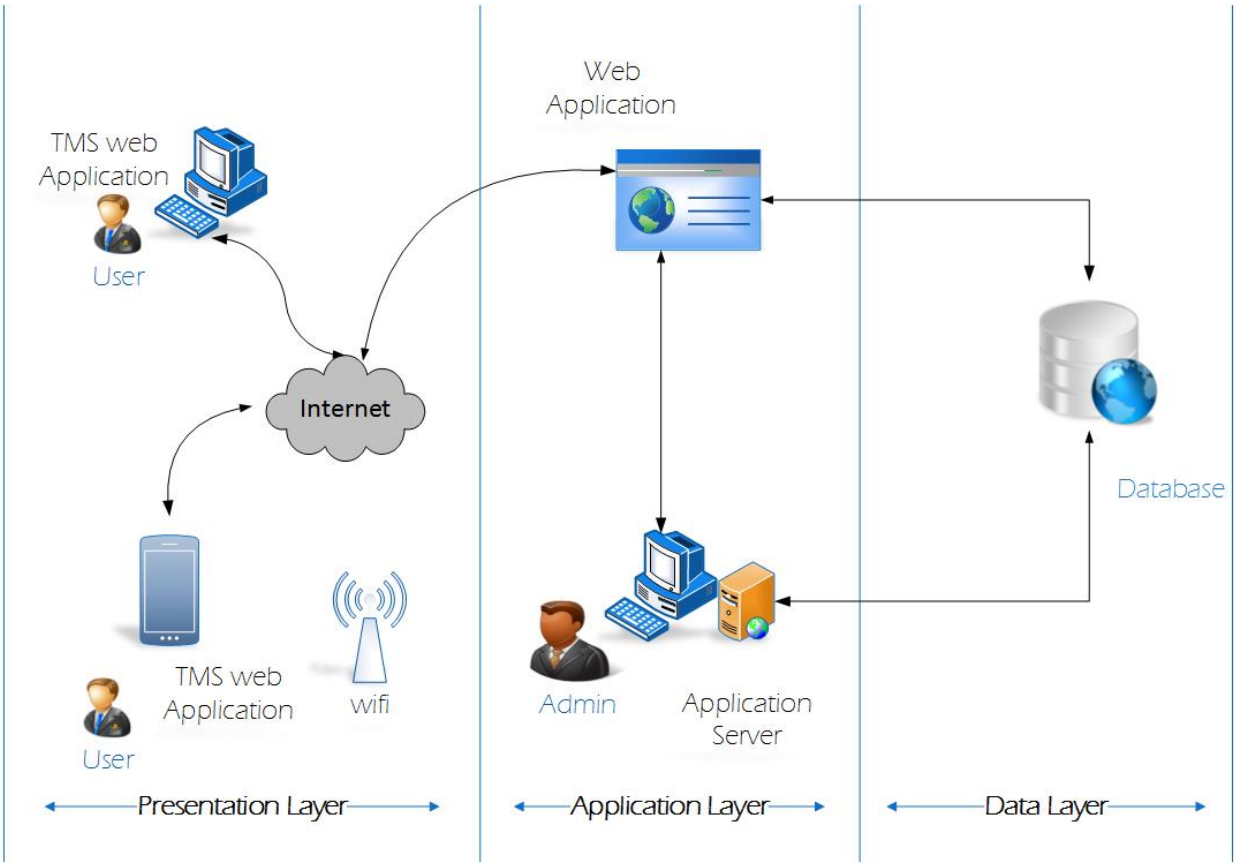

Figure 1.0: Overall System Architecture
Source: Author

The architectural design in the above figure shows essentially it would be a web based application. And for the purpose of accessing the proposed system would use the internet and Wi-Fi as data communication media. The web based application has being developed and hosted in a server computer and through internet users can access the TMS web application.

2.1 Application Layer

The logics and processes of the TMS will be executed at this application layer in order to achieve objectives of the TMS and this layer can be named as the heart of the overall system. Application layer will interact with both presentation layer where the interfaces of TMS are running and the data layer where the information is stored. The information gathered from user inputs will be stored according to the predefined operational instructions at this layer. The information about the employee and the tasks assigned for particular employee will be displayed in the application for the user who enters the information and particular user can update the information about the task.

2.2 Data Layer

Data layer manage the data storage operations of the overall system where the database management applications are running. A database containing the information about tasks and employees will be stored in several tables in the TMS in order to improve the efficiency. Information gathered from the interfaces of the application layer will be stored in respective tables after updating the information of the specific task at the application layer.

2.3 Presentation Layer

Presentation layer is responsible of control interactions with users by monitoring interfaces to current requested information and retrieve the inputs delivered by the user. Information gathered by this layer will be provided to the application layer in order to manipulate according to the given instructions. The presentation layer is the layer that registered users of TMS are interacting with. They will input the required facts for the Task Management System. The log in interface is same to all the access levels. Although other interfaces designed to get the inputs such as tasks details, employee details, login information, tasks assign details are similar, the access to the information will differ according to user access levels.

3.0 Software Architecture

Software architecture was based on modularized approach where the software is divided into parts. Each module is assigned to execute one or more tasks of the overall system in order to achieve the ultimate objectives expected. Since the program is developed using open resource platform such as PHP, HTML, CSS, and JEasy UI designs will ease the development and maintenance of the system.

3.1 Overall Software Architecture

Following figure represents the overall software architecture of the developing system.

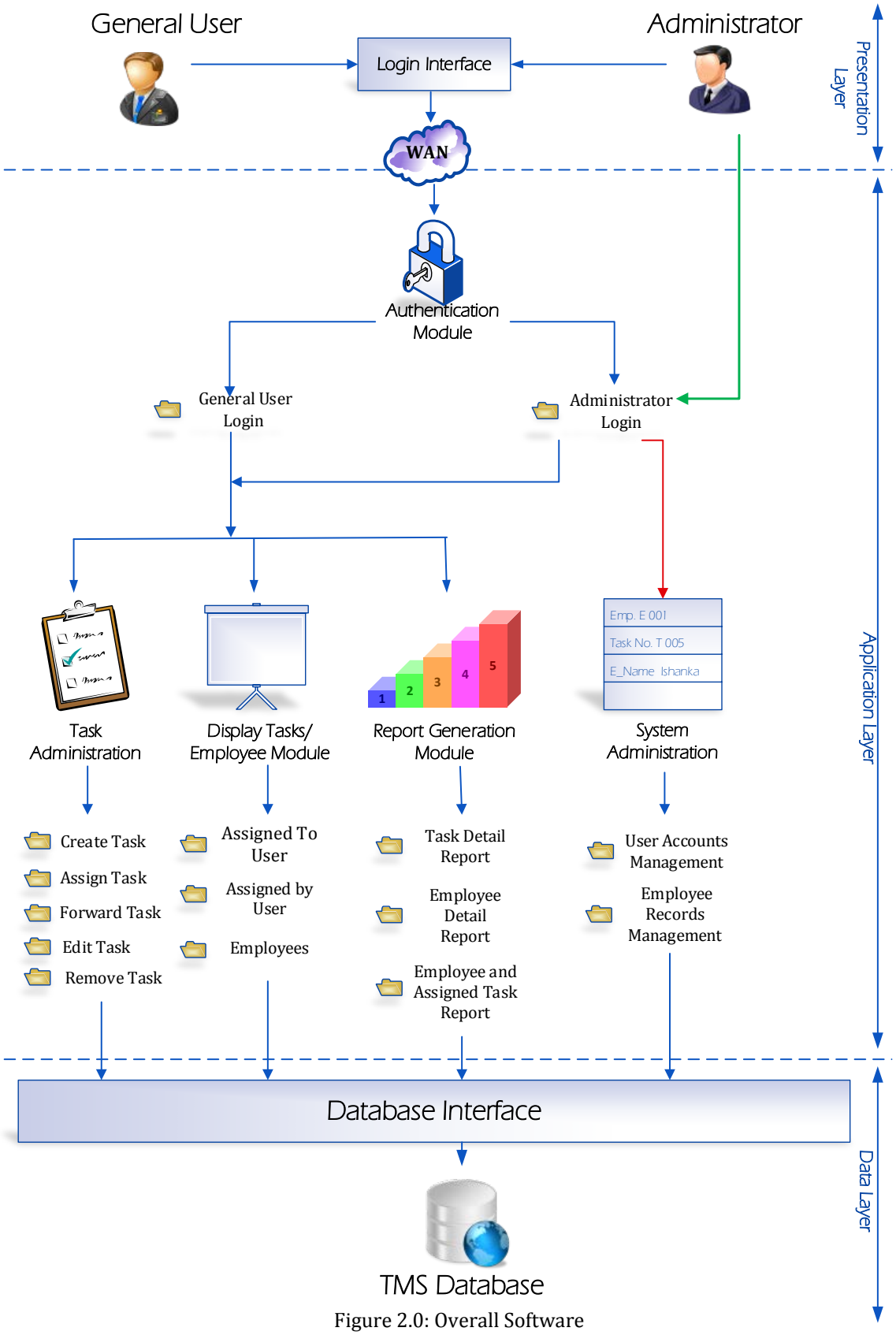

Figure 2.0: Overall Software Architecture

The TMS will be developed according to two main approaches, Administrative user approach and General user approach. The TMS interface module will be differ through User Authentication module which ensures the security of the system. Both main approaches of the system are then break into core modules to perform required tasks of the system. Further details of these modules and their tasks will be discussed in detailed in below sections

3.2 Module Architecture

The developing computerized TMS contains several modules to make the complete system. This section will describe about the organization of the modules that it consists.

3.2.1 An Overview of Module Architecture

In the below shown is an enumerated list of requirements for the new system development.

Module 1: "Authentication/Login Module"

- 1.1: Administrator Login
- 1.2: User Login

Module 2: "System Administration"

- 2.1: Manage user accounts for employees.
- 2.2: Manage employee records.
    - 2.2.1 Add new employees
    - 2.2.2 Edit old employee details
    - 2.2.3 Remove employees
    - 2.2.4 View employee records

Module 3: "Task Administration"

- 3.1: Create a task
- 3.2: Assign a task
- 3.3: Forward a task
- 3.4: Edit a task
- 3.5: Remove a task

Module 4: “View Tasks & Employee Records”

4.1: View all the task assigned to/by user
4.2: View Employee Records

Module 5: “Report Generation”

5.1: Produce task detail reports
5.2: Produce employee detail reports
5.3: Produce Employee and assigned tasks reports

3.2.2 Module Architecture in Detail

There are several modules for various functions in the developing TMS. In the below it is described in detail about those modules.

Module1: “Authentication/Login Module”

Mod 1.1 Administrator Login

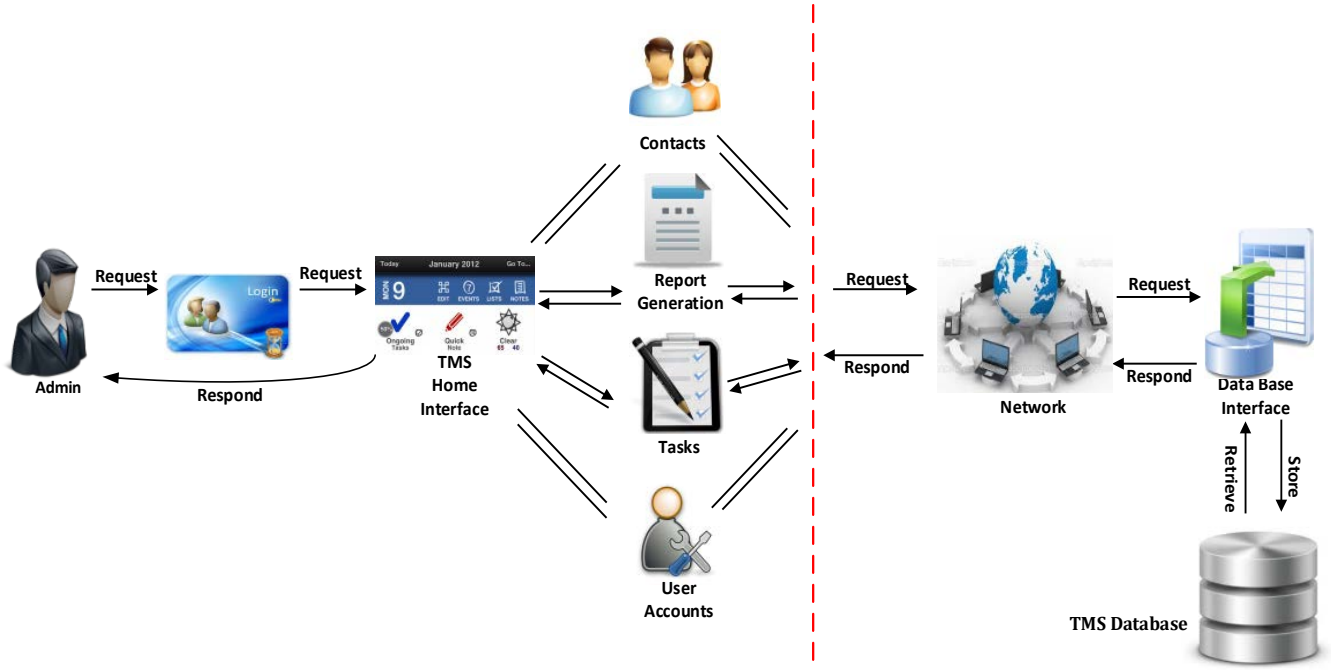

Figure 3.0: Administrator Login Module
Source: Author

Administrator can log into the system and access every module that a user can access and an additional module called Administration module. At the login screen when the username and password are entered in will verify it from the database and redirect it into the administrators' home page.

Mod 1.2 General User Login

Each and every general user of the system needs to be logged on to the system before using the system. Each user will be provides with a unique username and password to access the system by the administrator. When they are entered in the login interface those values will be verified using the data in the data base and redirect the user to the system with relevant access levels.

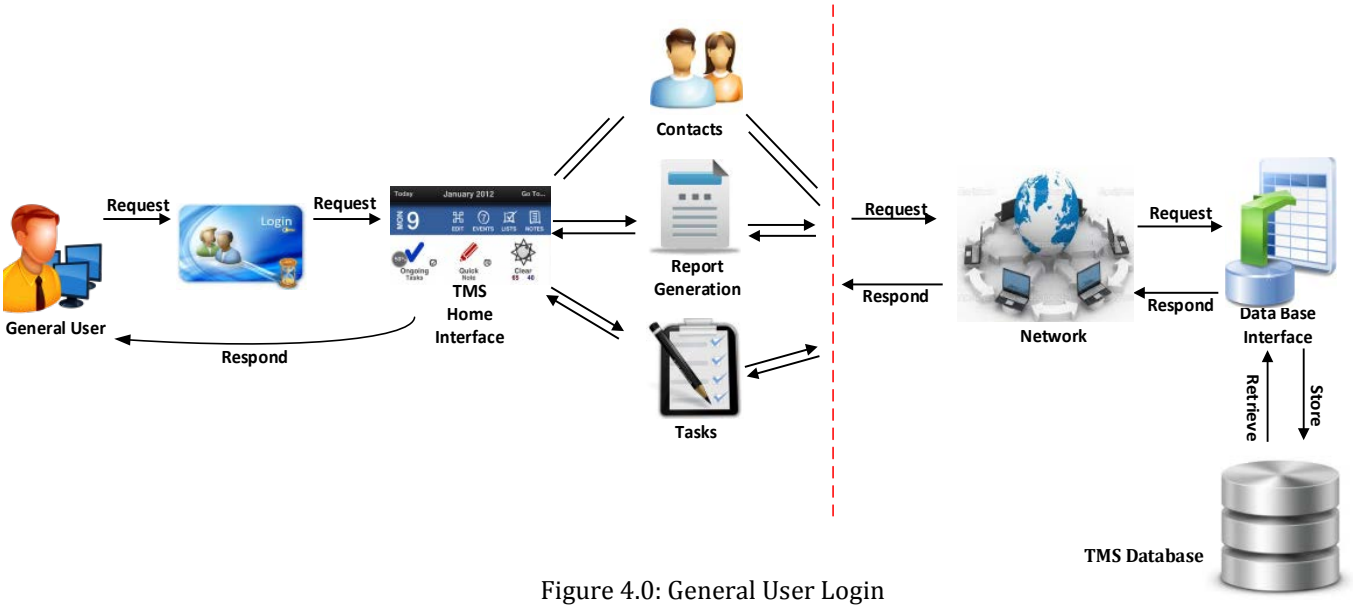

Figure 4.0: General User Login
Source: Author

Module 2: "System Administration"

Mod 2.1 Manage user accounts for employees

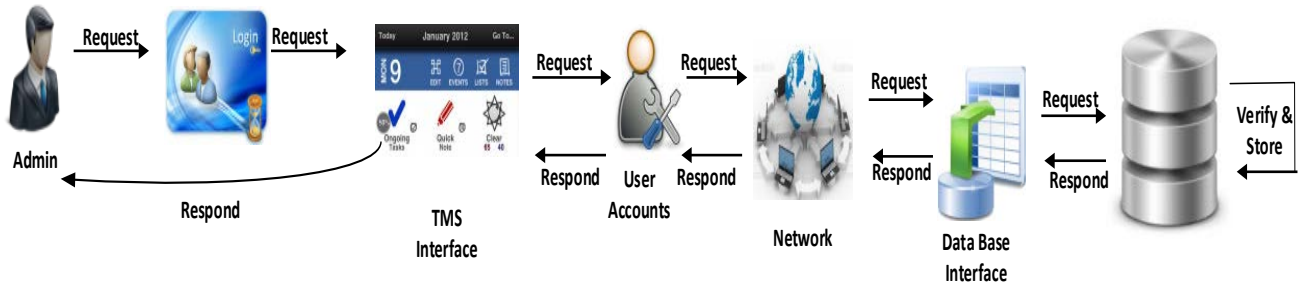

Figure 5.0: Manage user accounts for employees
Source: Author

Using the username and password administrator will be able log into the administrators' home page. Only administrator can create a user account with username and password to access the system. Each user account t is relevant to an employee records. Administrator can access all the modules which can be accessed by the general users of the system, with the additional administration module. Administrator is the only person who will be able to manage the employee records of the database.

Mod 2.2 Employee Records Management

Mod 2.2.1 Add new employees

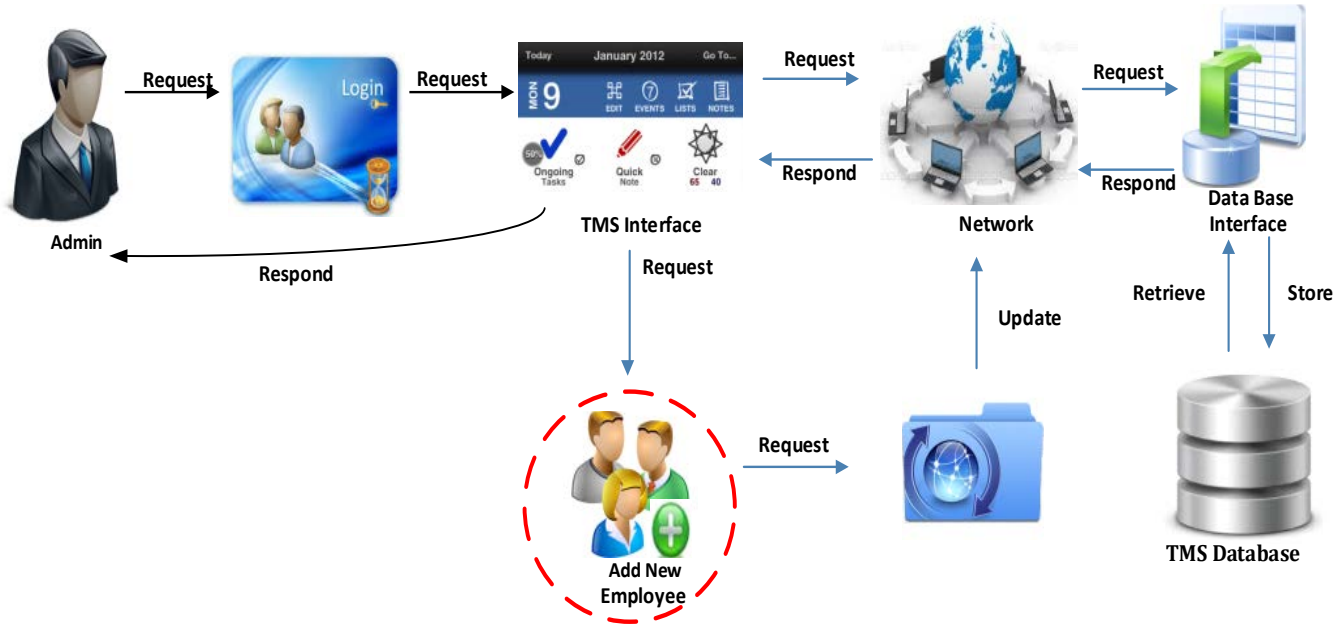

Figure 6.0: Add New Employee
Source: Author

This module is for adding new records to the employee records table. Admin can fill the new employee form and submit the relevant data in to the database through the network.

Mod 2.2.2 Edit old employee details

Figure 7.0: Edit old employee details

Source: Author

The admin who responsible for this module should view all the employees list in order to edit an old employee. From the list of employees in the database admin can select a record to be edited. The edited employee details are updated and move in to the database through the network.

Mod 2.2.3 Remove employees

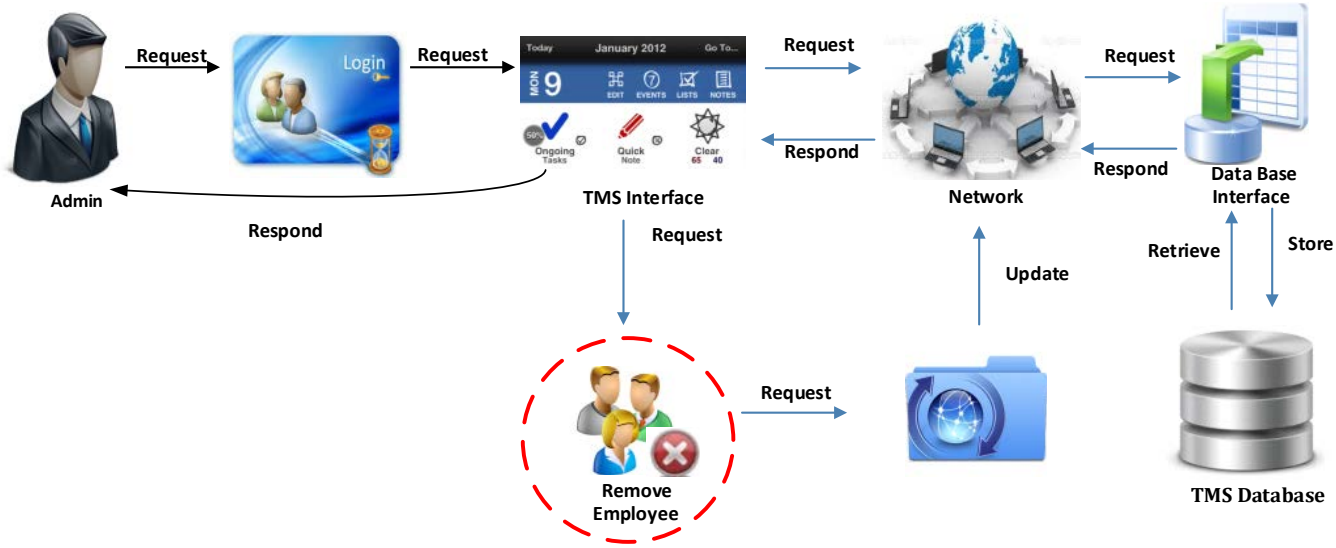

Figure 8.0: Remove employees

Source: Author

Remove Employee module is for delete records of the employees. Only the administrator can remove employees from the database. Before deletion of an employee the admin should view all the tasks which stored in data base connecting through the network. After deleted the employees the updates are stored in to the database through the network. Then user can view the updated information of the employees table which provided by the database.

Module 3: "Task Administration"

Mod 3.1 Create a task

Create Task module is to input records regarding to the task. Users can create the tasks and assign them to their subordinates. The user access levels are defined by the log in function. Before create a task the user should view all the tasks which stored in data base connecting through the network. After creating a task the updates are stored in to the database through the network. Then user can view the created task information of the tasks table which provided by the database.

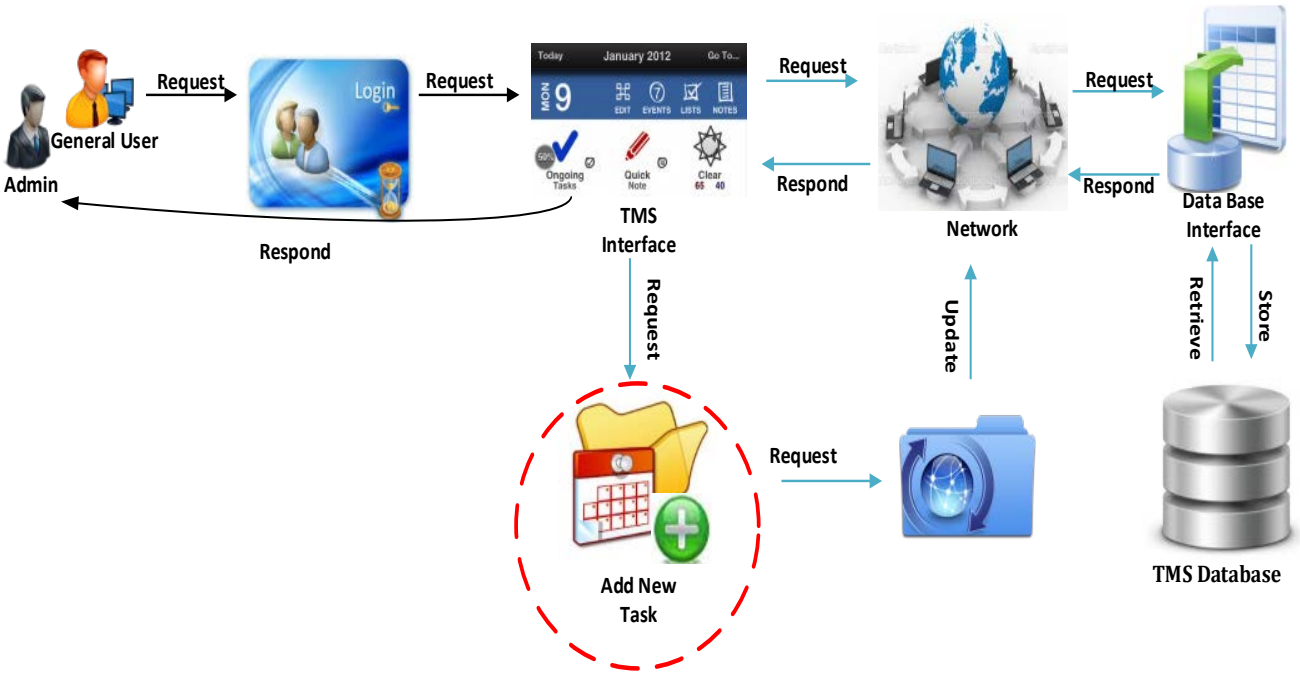

Figure 9.0: Create a task
Source: Author

Mod 3.2 Assign a task

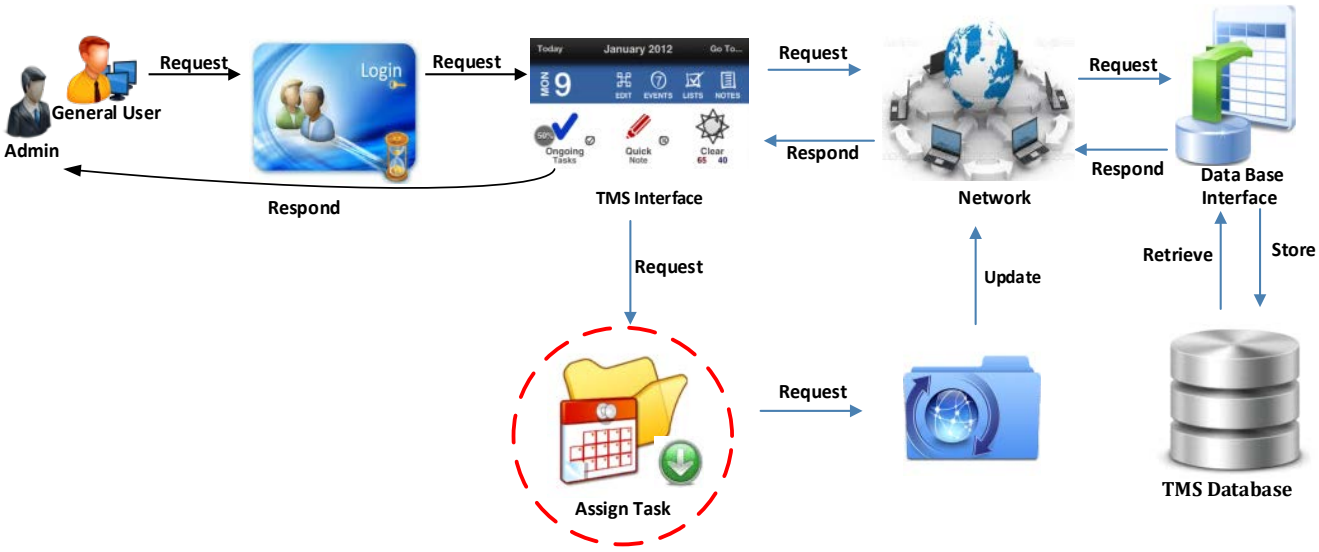

Figure 10.0: Assign a task
Source: Author

Assign Task module is to assign the tasks to employees which are created. Users can assign tasks only to their subordinates. After assigned a task the updates are stored in to the database through the network.

Mod 3.3 Forward a task

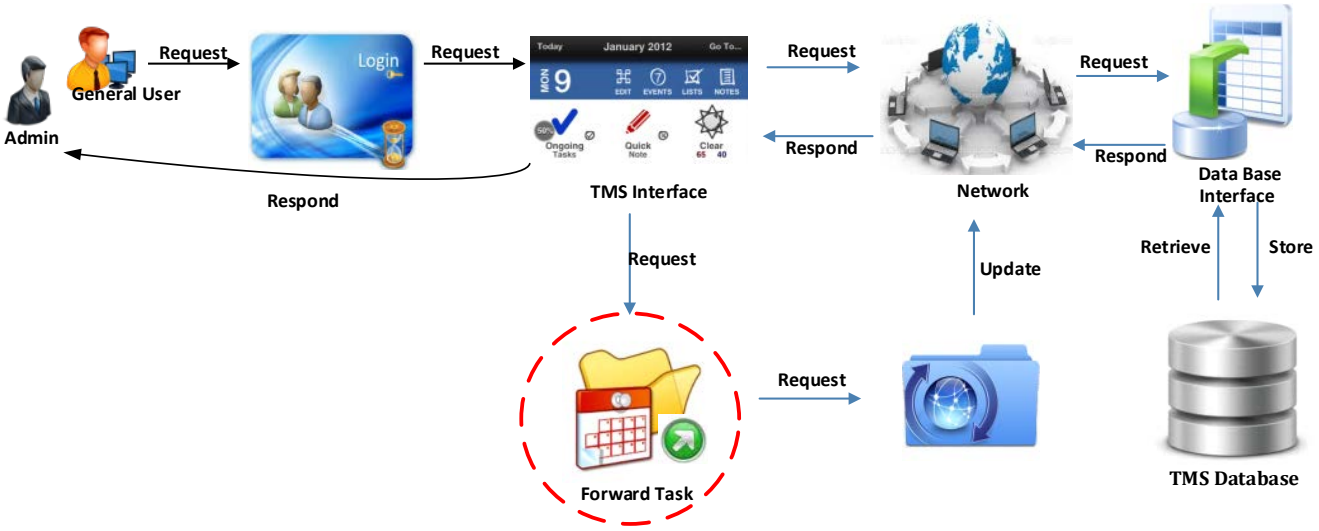

Figure 11.0: Forward a task Assign a task
Source: Author

A task received by a user can be forwarded to another user in the system. After successfully logging into the system user can select a task which is assigned to him and can be forwarded in to a subordinate. After forwarding a task the updates are stored in to the database through the network.

Mod 3.4 Edit a task

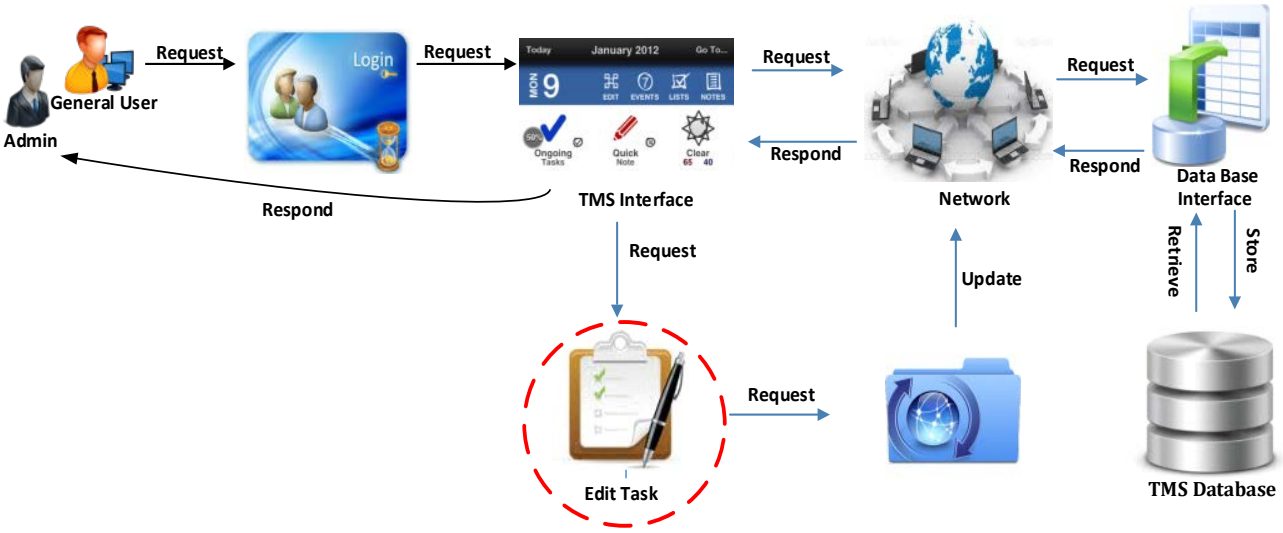

Figure 12.0: Edit a task

Source: Author

Details of the created tasks can be edited again or updated. There will be a restriction such that only the user who created the task can edit the details of the task. After editing a task the updates are stored in to the database through the network.

Mod 3.5 Remove a task

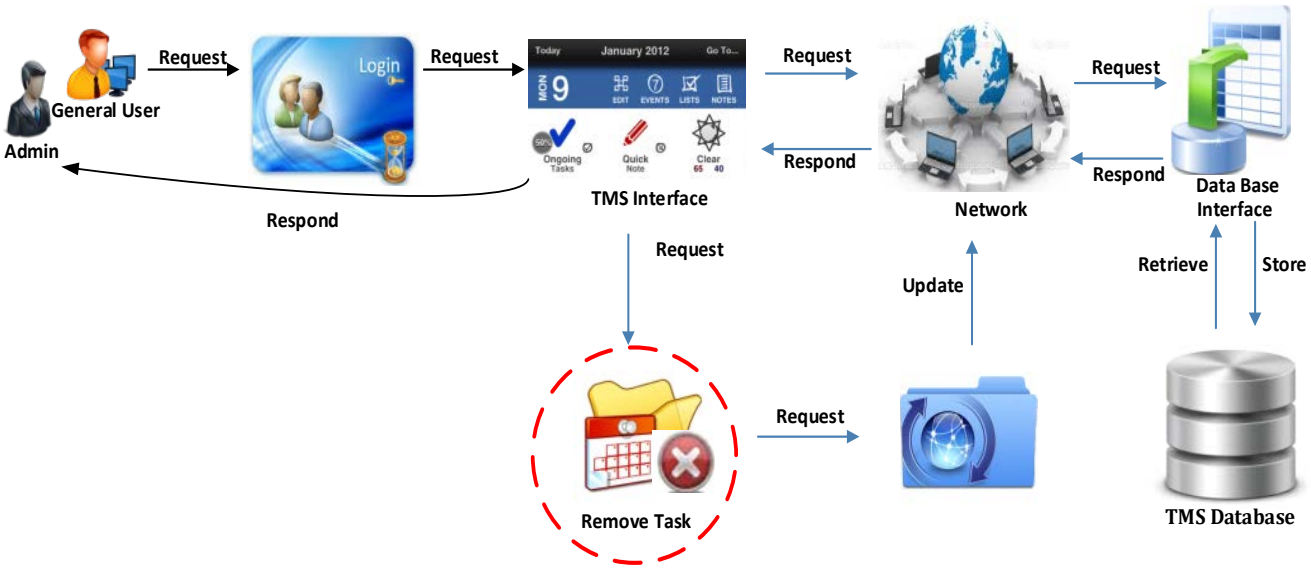

Figure 13.0: Remove a task

Source: Author

Remove Task module is for delete records regarding to the task. Removing a task will move it into a history table. Only the user who created the task can remove the task. For removing the task purpose user can select the task from the grid and choose remove task option. After removing a task the updates are stored in to the database through the network.

Module 4: "View Tasks & Employee Records"

Mod 4.1 View tasks assigned to/by user

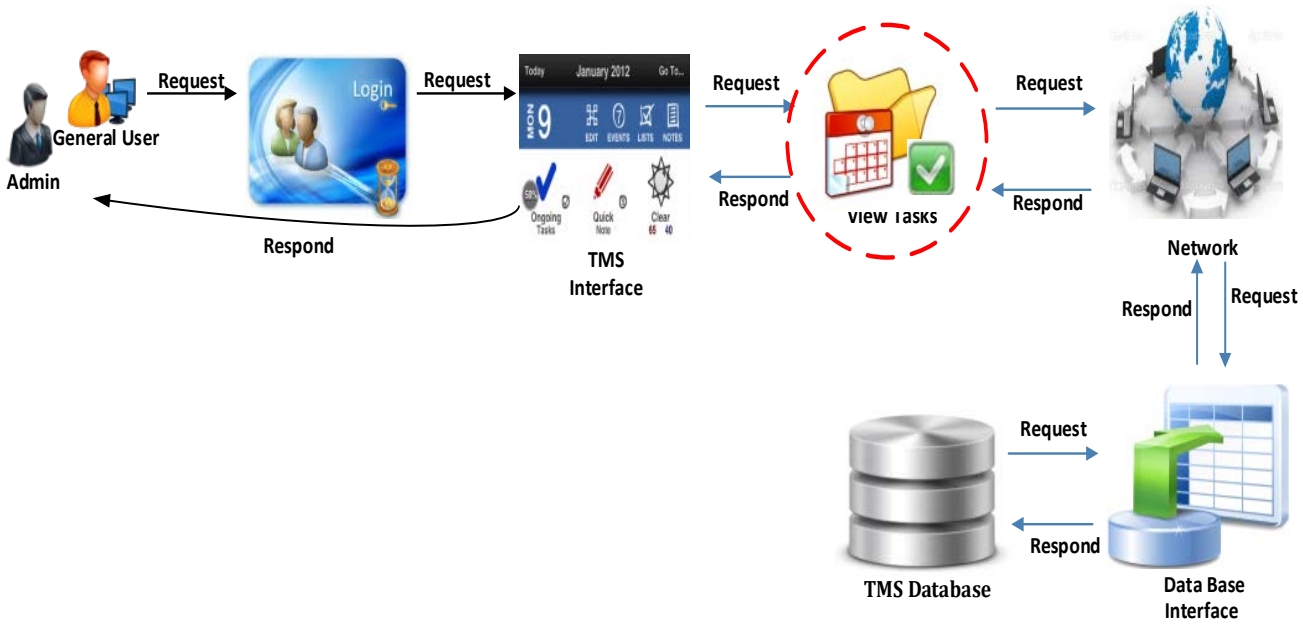

Figure 14.0: View all the task assigned to/by user
Source: Author

View Task module includes 4 sub modules to view all the tasks assign to user, view all tasks assign by user, tasks can be viewed by searching by the title or assigned employee and by using start date, due date, status, priority and assigned employee the task can be filter viewed.

Mod 4.2 View Employee Records

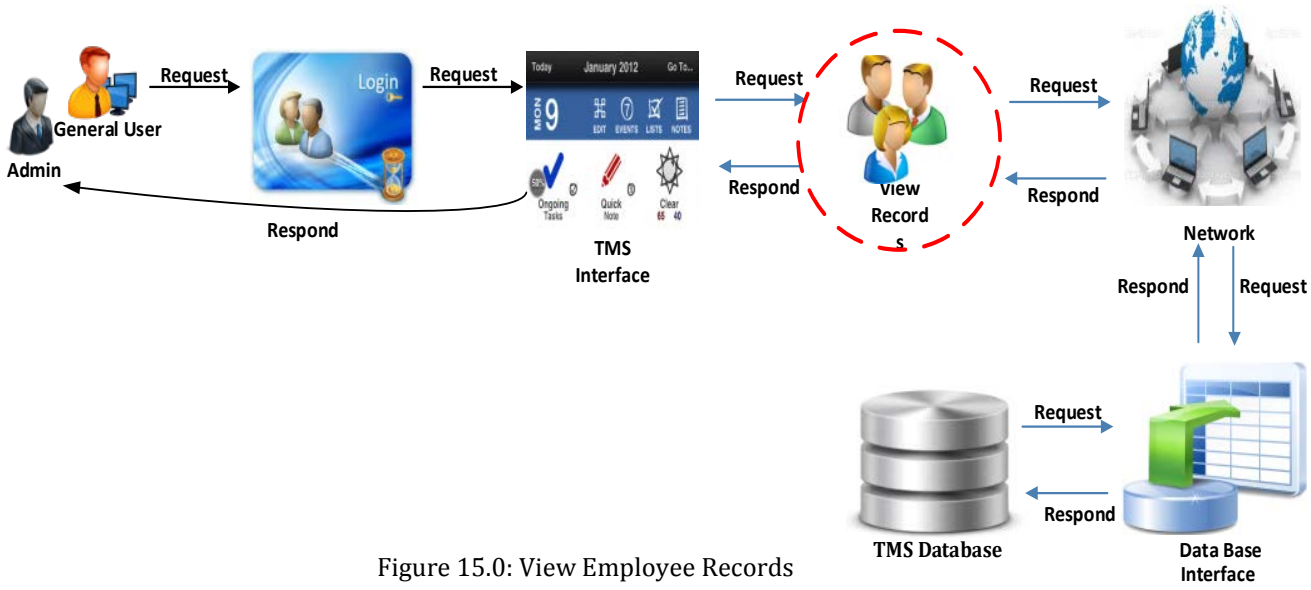

Figure 15.0: View Employee Records
Source: Author

Users can view the record off the employees in the database. There are restrictions such that a user will be able to view the records of the officials working under them.

Module 5: Report Generation

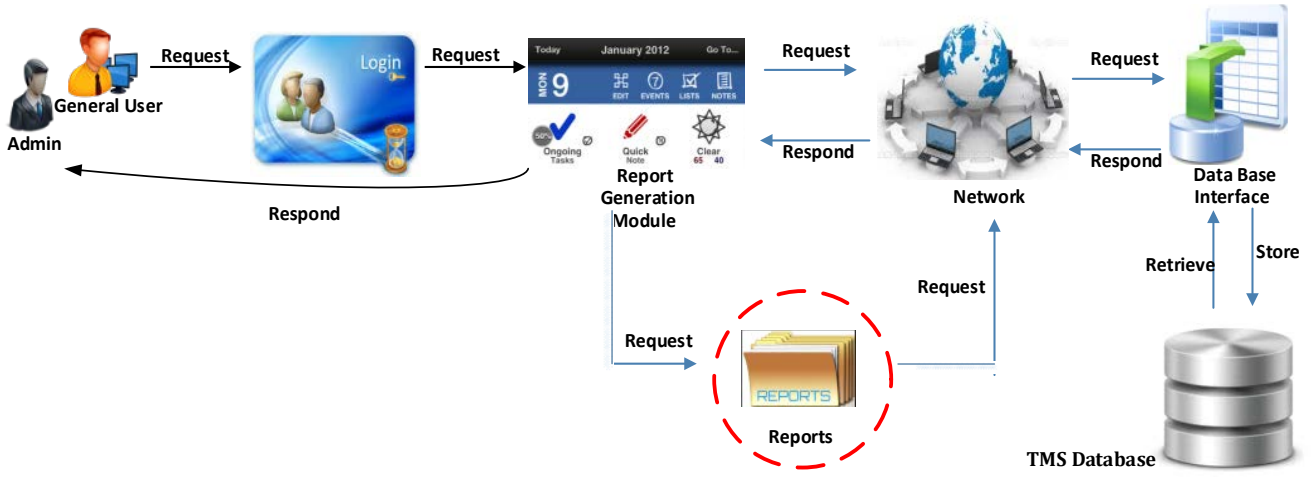

Figure 16.0: Report Generation
Source: Author

The report producing module for generate reports to assess tasks progress. Reports can be produced only by higher and mid user levels according to their requests. According to the user requests reports are produce by the application layer by gathering data from database.

4.0 Data Design

The TMS will have a one centralized database in the server. MySQL database will be used for this purpose. This section of the document represents the conceptual data design of the system, the process of converting the EER diagram in to tables and the database relationship diagram. Furthermore, the tables of the database are also stated with their attributes and data types.

4.1 Conceptual Database Design

Following figure shows the EER model for the TMS database.

Figure 17.0: Conceptual Data Design

Source: Author

4.2 Mapping of Logical Database to Relations

The above shown EER model is converted into relations using the 8 step process.

1st Step-Reguler Entity Types

DESIGNATION (Desg_id,Desg_desc,Desg_value)
EMPLOYEE (Emp_id,First_name,Middle_name,Last_name,Salutation,e-mail,office_tel)
EMP_TEL (Emp_id,Mob)
USER (User_name, User_password,User_type)
TASK (Task_id, Task_desc,Start_date,Task_title,Due_date,Priority,Task_status,Create_on,Create_by)
OFFICE (Office_id, Office_desc)

2nd Step-Weak Entity Types

USER (User_name,User_password,User_type)
LOGIN_HISTORY (Login_date_time, User_name)

3rd Step-Binary One To One

EMPLOYEE (Emp_id,First_name,Middle_name,Last_name,Salutation,e-mail,office_tel)
USER (User_name,User_password,User_type, Emp_id_FK)

4th Step-Binary One To Many

EMPLOYEE (Emp_id,First_name,Middle_name,Last_name,Salutation,e-mail,office_tel,Office_id_FK)
OFFICE (Office_id,Office_desc)

DESIGNATION (Desg_id,Desg_desc,Desg_value)
EMPLOYEE (Emp_id,First_name,Middle_name,Last_name,Salutation,email,office_tel, Desg_id_FK)

USER (User_name, User_password,Emp_id_FK)
LOGIN-HISTORY (Login_date_time,User_name)

5th Step-Binary Many To Many

EMPLOYEE (Emp_id,First_name,Middle_name,Last_name,Salutation,e-mail,office_tel)
TASK (Task_id,task_desc,start_date,Task_title,due_date,priority,task_status,create_on,create_by_id)
EMP_TASK (Emp_id,Task_id,Assign_by,Assign_date)

6th Step Mapping of Unary Relationships
No unary relationships

7th Step Mapping of Ternary Relationships
No ternary relationships

8th Step Mapping Super/Sub type Relationships
No super/sub type relationships.

Final Set Of Tables

USER (User_name,User_password,User_type,Emp_id_FK)
LOGIN-HISTORY (Login_date_time,User_name)
EMPLOYEE
(Emp_id,First_name,Middle_name,Last_name,Salutation,email,office_tel,Office_id_FK,Desg_id_FK)
EMP_TEL (Emp_id,Mob)
TASK (Task_id,
Task_desc,Start_date,Task_title,Due_date,Priority,Task_status,Create_on,Create_by_id_FK)
EMP_TASK (Emp_id,Task_id,Assign_by,Assign_date)
DESIGNATION (Desg_id, Desg_desc, Desg_value)
OFFICE (Office_id ,Office_desc)

After the normalization into 3rd normalized form there were no changes in the tables. Therfore the final 3NF tables are indicated below.

USER (User_name,User_password,User_type,Emp_id_FK)
LOGIN-HISTORY (Login_date_time,User_name)
EMPLOYEE
(Emp_id,First_name,Middle_name,Last_name,Salutation,email,office_tel,Office_id_FK,Desg_id_FK)
EMP_TEL (Emp_id,Mob)
TASK (Task_id,
Task_desc,Start_date,Task_title,Due_date,Priority,Task_status,Create_on,Create_by_id_FK)
EMP_TASK (Emp_id,Task_id,Assign_by,Assign_date)
DESIGNATION (Desg_id, Desg_desc, Desg_value)
OFFICE (Office_id ,Office_desc)

4.3 Database Relationship Diagram of the Database

The diagram shown in the next page indicated the relationship among tables in the database.

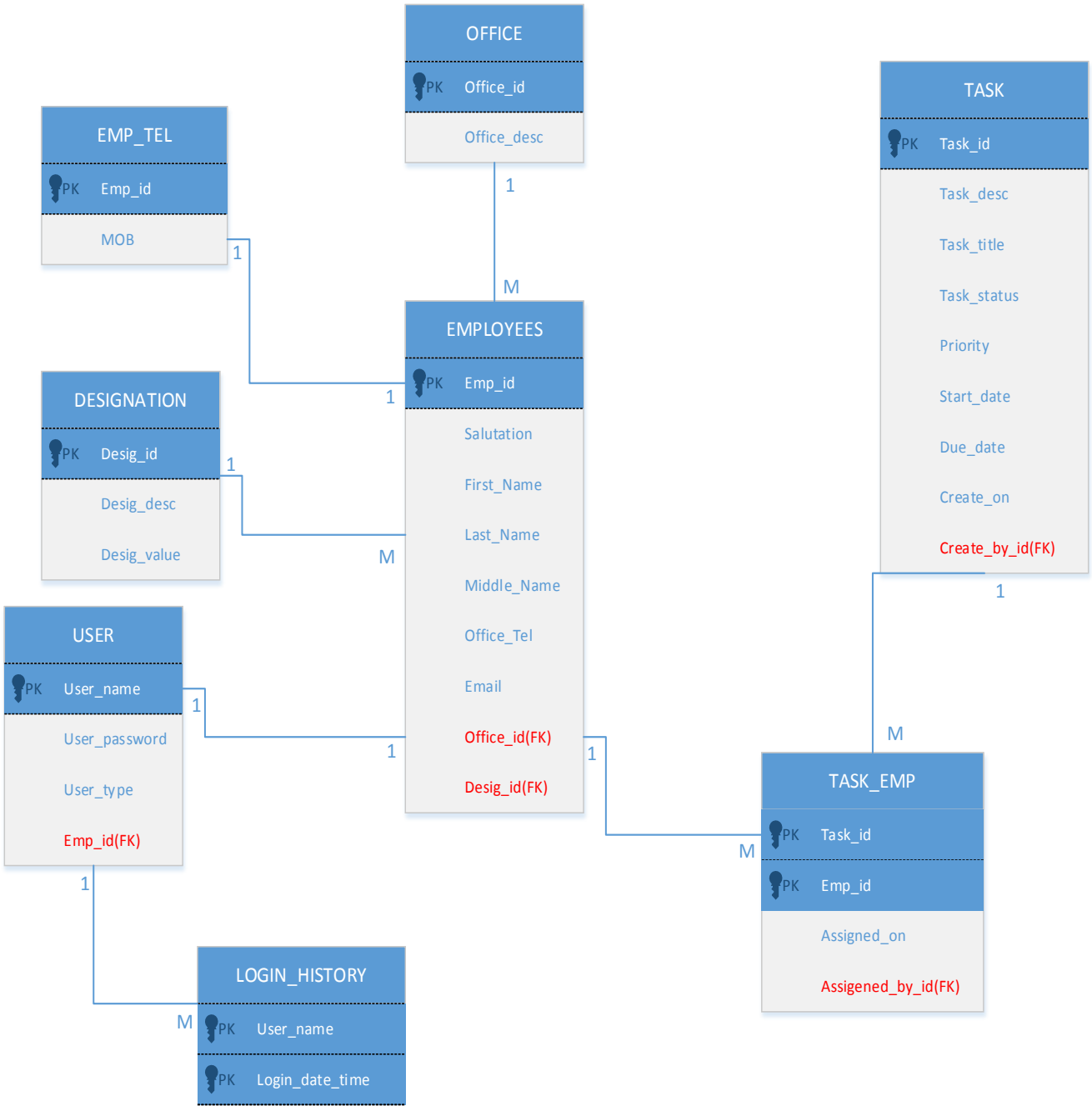

Figure 18: Database Relationship

Source: Author

4.4 Data Type Design for the Database

This section shows the tables of the TMS database with their attributes and respective data types.

TABLE: USER		
Attribute	**Data Type**	**Length**
User_name	varchar	20
User_password	varchar	20
User_type	varchar	10
Emp_id	bigint	15

Table 1.0: User

Source: Author

TABLE: TASK		
Attribute	**Data Type**	**Length**
Task_id	bigint	15
Task_title	varchar	200
Task_desc	varchar	400
Start_date	date	-
Due_date	date	-
Priority	varchar	10
Task_status	varchar	10
Create_on	date	-
Create_by_id	bigint	15

Table 2.0: Task

Source: Author

TABLE: EMPLOYEE		
Attribute	**Data Type**	**Length**
Emp_id	bigint	10
Salutation	varchar	10
First_name	varchar	25
Middle_name	varchar	25
Last_name	varchar	25
Email	varchar	50
Office_tel	varchar	15
Office_id	varchar	10
Desg_id	varchar	10

Table 3.0: Employee

Source: Author

TABLE: EMP_TEL		
Attribute	**Data Type**	**Length**
Emp_id	bigint	15
Mob	varchar	15

Table 4.0: Emp_Tel

Source: Author

TABLE: EMP_TASK		
Attribute	**Data Type**	**Length**
Emp_id	bigint	15
Task_id	bigint	15
Assign_by	bigint	15
Assign_date	date	-

Table 5.0: Emp_Task

Source: Author

TABLE: DESIGNATION		
Attribute	**Data Type**	**Length**
Desg_id	varchar	10
Desg_desc	varchar	30
Desg_value	int	5

Table 6.0: Designation

Source: Author

TABLE: OFFICE		
Attribute	**Data Type**	**Length**
Office_id	varchar	10
Office_desc	varchar	50
Emp_id	bigint	10

Table 7.0: Office

Source: Author

TABLE: LOGIN_HISTORY		
Attribute	**Data Type**	**Length**
User_name	varchar	20
Login_date_time	datetime	-

Table 8.0: Login_History

Source: Author