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Development of an Automated Employee Management System (Case Study of North-East Development Commission, (NEDC))

[1]Genesis Joshua & [2]Samuel Awuna Kile

[1]Department of Computer Science, National Open University of Nigeria, Abuja
[2]Department of Computer Science, University of Maiduguri, Maiduguri, Borno State

Corresponding Author: Samuel Kile
Email: awunkile2@gmail.com
Phone: +234-7039032499

Abstract

Employees are the backbone of any company or organisation. Often employee data such as personal details, salary, leaves, and work allocations are managed using manual methods. These manual methods generate a lot of paperwork and make it complex to effectively manage these tasks, as the volume of employees increases. Many traditional management strategies limit productivity, create more mistakes, and increase paperwork, creating a vacuum which this study seeks to achieve. The main aim of this research is the development of an employee management for North East Development Commission (NEDC). Specifically, the study will design the employee management system, implement the employee management system and evaluate the system using employee data of the NEDC. The research adopted the quantitative approach methodology. System development was achieved using agile software development, the design was implemented using the unified modeling language (UML), MySQL and PHP were the major implementation structures, and system testing was done using sample employee data of NEDC. Results showed that efficient and effective coordination of employee activities was realized, with the tendency to increase productivity to about 70% by the utilization of this prototype system, giving credence to the benefits of system automation, towards enhanced employee management of the NEDC.

Keywords: Automation, computerized system, development, employee and management.

1.0 Introduction

The primary goal of the project research effort is to investigate and improve Employee Management System (EMS) for the North-East Development Commission (NEDC). With the advent and the rise of remote work arrangements and diverse workforces, traditional EMS is not always able to meet to current demands.

The current study will assess the current functionality of Employee Management Systems, identify shortcomings in terms of user experience, and investigate the effects of emerging innovations, including Artificial Intelligence and data analytics, on employee motivation and general performance. We will be designing a framework for an efficient EMS, to achieve the satisfaction of employees, and to allow easier human resource management, and to ultimately foster higher levels of organizational production. The current system running in the NEDC is paper based. That is the Commission is still using cabinet files to store records of stock and employee information.

There are consequences of current manual employee management systems to decision makers, government agencies and organizations such as limited accessibility of data, increased error rates, inefficiency, compliance risks, data security concerns, resource allocation, employee satisfaction, scalability, e.tc.

As has been sadly observed, traditional or manual EMS pose tremendous challenges that impact the decision-making process, adherence to rules and regulations, as well as overall organizational efficiency. For this, a shift to automation-based solutions is quite necessary to overcome such challenges and ensure better working efficiency.

Due to being overburdened with data documents which had to be stored electronically, the information that would otherwise be stored in some employee files in the filing cabinet will occupy space in the filing cabinet. Since the data must be looked in a filing cabinet, there may be an extended retrieval time. It will result in resource wastages in the form of time and money expense. It will also be a hassle and a waste of time while working at a day job. In addition, for example, the human resource manager will be facing the difficulty of changing employee work schedule, report and leave request when necessary.

For an employee point of view, when he has to apply or request for leave, he needs to fill a leave request form manually and submit it personally to human resource manager and then wait for the confirmation which is very time consuming and cumbersome process. Specifically, if the schedule, the workers' type, the information about the hours of work and their changes, are modified, workers might have information about the time they are working that could not be completely updated, and for this reason, they could have a negative experience at the cooking front.

In particular, a close observation of operations at the North East Development Commission (NEDC) shows that personnel records management has majorly been manual, supported by paperwork, and lately, Excel spreadsheets. These have been found to be inefficient and extremely time-consuming, leading to higher downtime and productivity loss.

Practical dependence on the handling of some processes is bound to make human errors because the documents are easily lost or get into the wrong hands; it is also of primary importance to mention that the process is not very pleasant. The greatest most current system is not equipped with employee self-service, so an employee may access and manage his own information alone without assistance from the human resource personnel or his supervisor. Another problem is that employee data is kept at the headquarters of an Agency, resulting in accessing this information from remote places in urgent situations to be particularly challenging.

The main aim of this research is to develop an employee management system for the North East Development Commission (NEDC). Specifically, the study seeks to achieve the design, implementation and testing of the Employee Management System for the NEDC.

This study is very significant because the system to be developed will be deployed to be controlling the workforce at different State Offices in the North-East region (Borno, Adamawa, Yobe, Taraba, Gombe and Bauchi) from the Head Office in Maiduguri. It will contain data of NEDC Employees in the different State offices. It will manage the human resources information through field offices. This will ensure effective monitoring of the commission's manpower at head office.

2.0 Review of Related Literature

Several studies have been performed with respect to the design and implementation of employee management systems in different organizations, sectors and governmental and commercial facilities. Although an Employee Management System is yet to be created for the North East Development Commission. It is based on this fact that the study is conceived. However, in this work, some theories and models of employee management systems by other authors and the way EMS is achieved will be examined.

Yusof (2002) defined employee's management as "the field of management that is responsible for the proper creation, receipt, maintenance, use, and disposal of records to achieve efficient, transparent and accountable governance and management". Gunnlaugsdottir (2012) also defined employee's management system as "record that contain initial application forms, results of physical examination, interviewers' notations, test scores, periodical appraisals, transfer and promotions, disciplinary actions, releases and retiring wages, salaries, taxes paid, contributions and similar items". He further opined that employee record management system may also include some or all the following information: full name, address telephone number, age and sex, nationality, ethnic origin, religion, membership in trade union etc. In many organizations these records are poorly organized and under-utilized despite the vital or important information contained there. ISO15489 (2009) defined a record as information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or in the transaction of business. The ISO15489 document went on further to say that records are not just any document an organization produces or receives; they also include the editing, saving, reviewing, copying, deleting and tracking of these documents. Some experts estimate that of all the documents an organization creates; only 10 to 15 percent qualify as records. Records management procedures for each organization specify which documents or information become records based on classification of records.

From the foregoing definitions, one can conclude that the authors acknowledge the argument that records management is a core function of an organization in the same way that human resources or financial services are and that as such should be required to demonstrate a return on investment. Ira et al. (2016) supporting the assertion that "the records management program has to be in place because it is a need for just managing employees' data," stated that, "the records management programme cannot exist for unless employee's data is managed." The authors believe that the necessity and the benefits that can be obtained by taking sound records management practices to an organization are not called into question, but only because such views are so commonly held by information professionals, this certainly does not have to be the case with all that does, as employees' records management is a far less general practice than the usual practice of human resources or finance. Moreover, it should be recognized that measuring the benefits of a function need not question its validity or its status; and it should also be seen as

a standard management practice to understand the value added to the organization from the expenditure of its resources.

The evolution of EMS fortune is linked with the history of the Human Resource Information Systems (HRIS). According to Ngai & Wat (2006), HRIS is the base platform for present EMS which combines multiple HR functions on one platform. They asserted that EMS has now developed not only basic record-keeping systems but advanced systems which can be used for strategic decision-making in HR. Strohmeier (2007) noted that EMS now includes advanced features such as performance analytics, training modules, and employee engagement tools, demonstrating the transition from administrative to strategic HRM.

Many studies demonstrate the effects of EMS implementation such as, efficiency, accuracy, and employee involvement. For example, Ball (2001) found that organizations using EMS experienced improved data accuracy and reduced administrative workload, as automation minimizes human errors associated with manual data entry. In like manner, Kovach and Cathcart Jr, (1999) found that EMS systems assist HR departments in shortening, and thereby enhancing delivery of services to employees, which in turn improves overall productivity and satisfaction of work.

As an investigation conducted by Fisher (2013) reported, EMS furnishes HR executives current data analytics which, in turn, allows them to take strategic and well-informed decisions related to workforce planning and talent management. Through the integration of modules such as performance appraisal, compensation management, and training EMS facilitates the ability of organizations to align their HR plans with business goals.

Although, there are the advantages, the literature has also made some recognized challenges in EMS uptake. Ngai & Wat (2006) highlighted that complexity of system integration and user aversion are major barriers. Quite a few organizations have difficulty, integrating EMS into existing IT infrastructure, the consequence of which is often delay, and higher costs.

A study by Hussain et al (2007) investigated user resistance as a significant result that is especially arousing when employees and HR personnel are resistant to change with regard to new technologies. Training and communication deficiencies are common sources of resistance

that emerge during the implementation phase. Change managers will need to give top priority to change management strategies to achieve successful user acceptance and reduce user resistance.

3.0 Methodology

The general methodology adopted for this study is qualitative research. In the software development, agile software development approach is used. The structure of the application is using unified modeling language, (UML). Database design will also be achieved using MySQL. The implementation will be done in PHP. Several system tests, including unit test and system test, will be carried out in order to verify the correct functioning of the system.

The existing system is composed of one in which the content of the data within should be manually manipulated. A common language is not spoken by those executing the task. Every person is different. Every person works differently. Therefore, workers of this type must be assigned tasks themselves according to their own capabilities to work their jobs effectively. At the moment a manual system is in use in North East Development Commission that will meet most of the needs of this project. It is the principle of the operations of NEDC, which is the "TRUST" system, that the employer trusts employees. In a manual system, information is written in paper and loaded in most of the records while most of the records are in a cabinet. Because of this, seminal papers can be lost and hidden. In addition, locating suitable files may be a quite difficult proposition, of course. Stock records are, however, rarely kept in a systematic way and therefore documents are disparate and difficult to locate.

The proposed system aims at removing all limitations of the current manual employee management system. It will be able to control information on NEDC Employee in an easier-to-use manner. This system will control data of employees in Six (6) State Offices located in the North-Eastern region and the Abuja Liaison Office located in the Administrative Head Office in Maiduguri.

The system shall be responsible for keeping track of the employee information. The brain-computer interface shall have leave management, all the way from leave request application to leave request approval/refusal, as well as all employee self-service functionality.

The main features to be developed include Employee Profiles, Department Management, Leave Management, System Notifications, Employee Self-Service (ESS). The system is expected to be

secured, streamline human resources operations, optimize employee data management and enhance productivity across the organization.

3.1 System Design

System design will be implemented using the Unified Modeling Language (UML), employing use-case, sequence and activity diagrams.

3.1.1 UML Use Case Diagram

Use Case Diagram: Use case diagrams map the functionality of a system using actors and use cases. Use cases are a collection of actions, services, and functionalities that the system is required to execute.

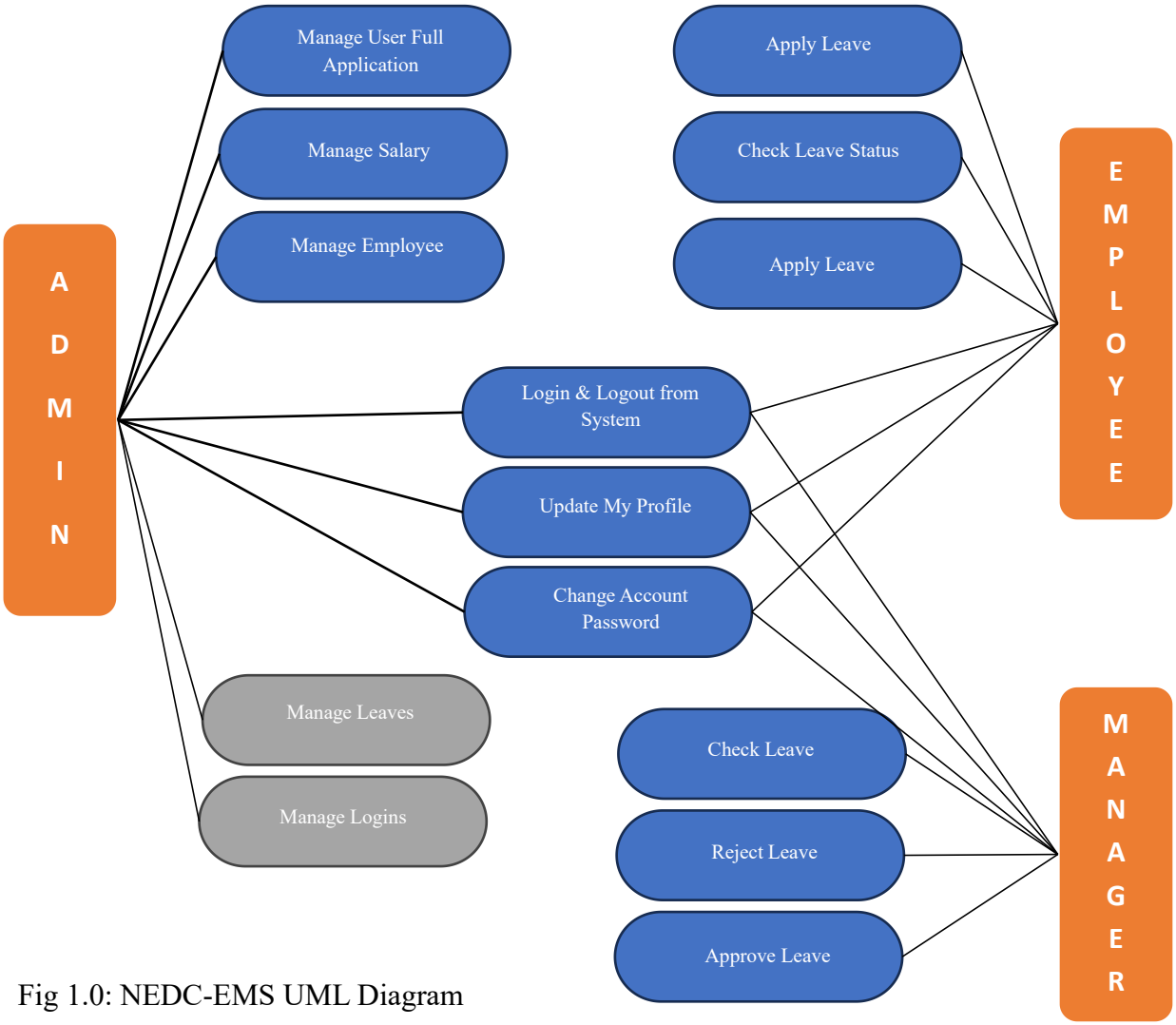

Fig 1.0: NEDC-EMS UML Diagram

In Fig 1.0 above is the Use Case Diagram of NEDC-EMS, which have Admin, HR-Manager and Employee as actors, performing functions as:

- **Admin:** Admin can manage the full application and user. It can manage salary, employee, and leave. It can update employee details and change the password.
- **Employee:** Employee can apply for leave, check leave status and check salary. Employee can also login and logout from the system, update their profile and change account password.
- **HR-Manager:** Manager can check leave, check timesheet and can approve leaves.

3.1.2 Sequence Diagrams

Sequence diagrams are useful for determining the fine granularity of the operations necessary to execute the functionality that is illustrated in a use case model. The sequence diagrams of the system are shown in figures 2.0 to 3.7.

Case 1: Admin new employee description describes the interactions in figure 2.0.

a. The user enters the system after providing a valid username and password.
b. Access to the system is denied if the username and password are not present in the database.
c. When the credentials match those in the database, the access is granted.
d. User enters the details of the new employee.
e. The user input is written to the database.

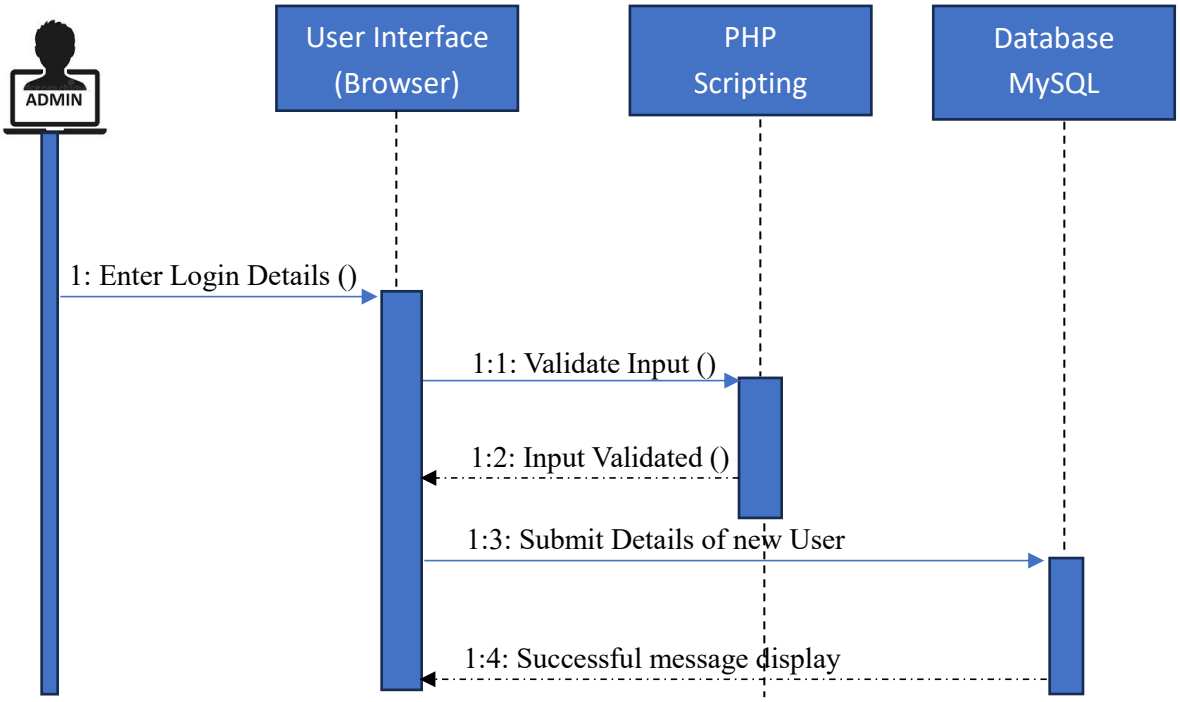

Figure 2.0: Add new user sequence diagram

Case 2: Employee leaves application captures the interactions in figure 3.0

a. The user enters into the system through username and password authentication.

b. If both the username and the password are not present in the database access to the system is refused.

c. That is, if the credentials match those in the database, access is allowed.

d. User requests for leave form.

e. User enters leave details.

f. Details are written to the database.

g. The user sees a message that a confirmation of the details submitted is now ready.

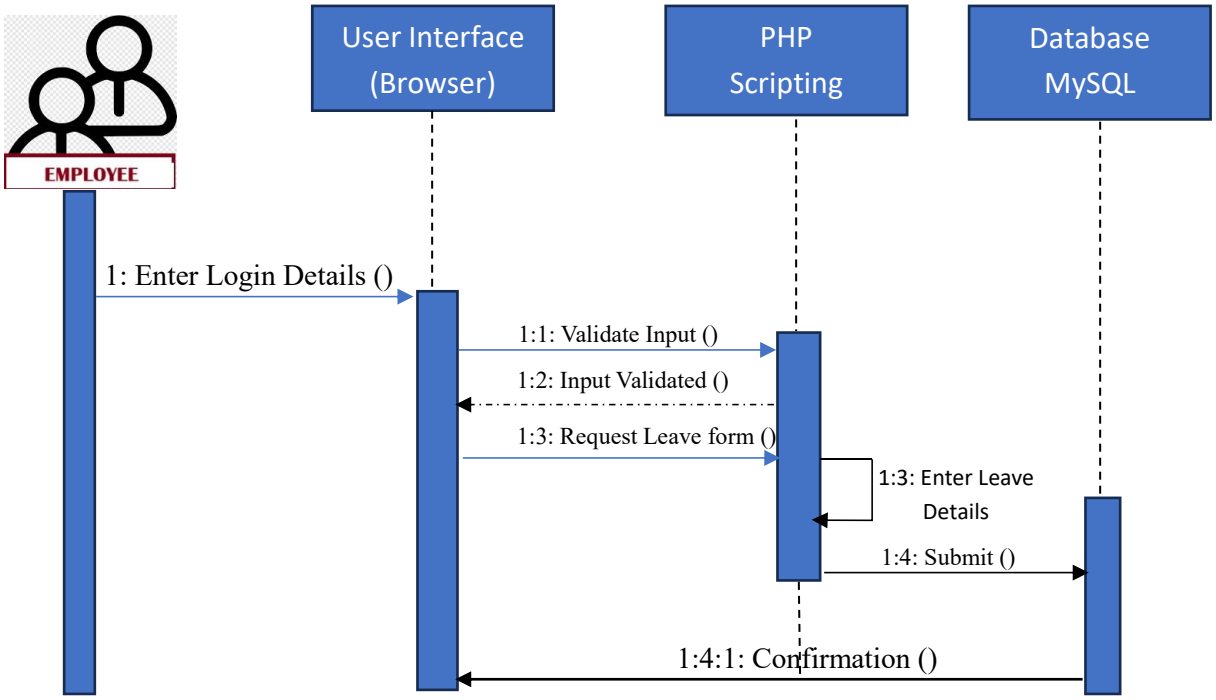

Figure 3.0: Employee Leave Application Sequence Diagram

Case 3: Edit Account Details reflects the details contained in figure 4.0.

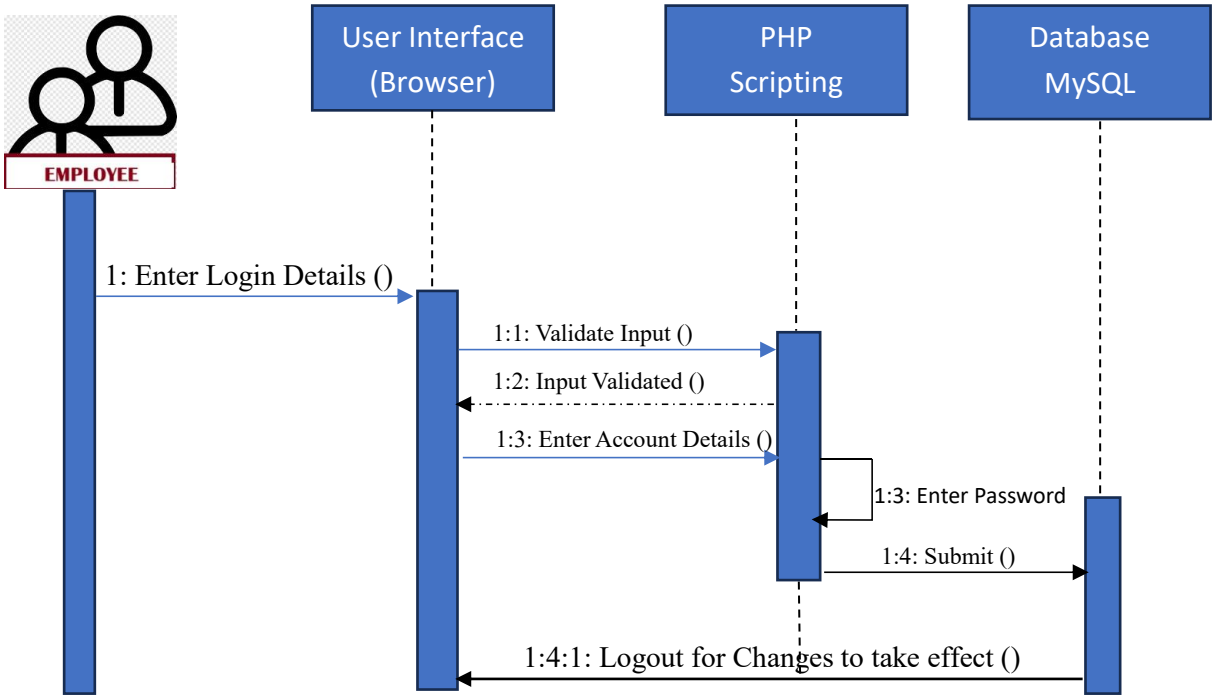

Figure 4.0: Edit Account Details Sequence Diagram

3.1.3 Activity Diagrams

Activity Diagrams are applied to represent various EMS aspects. The activity diagram below is used to model User, Admin and Leave application functionality.

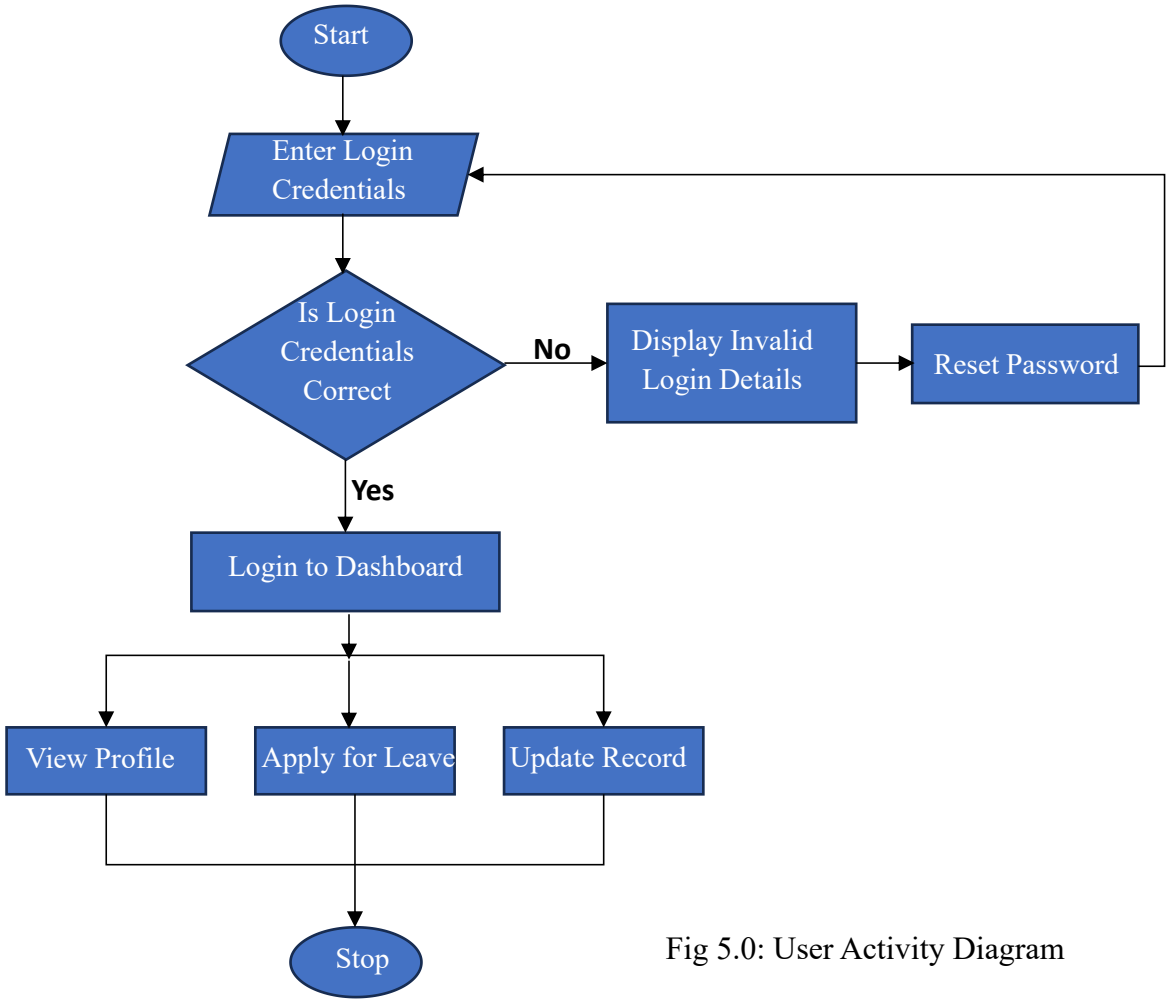

Fig 5.0: User Activity Diagram

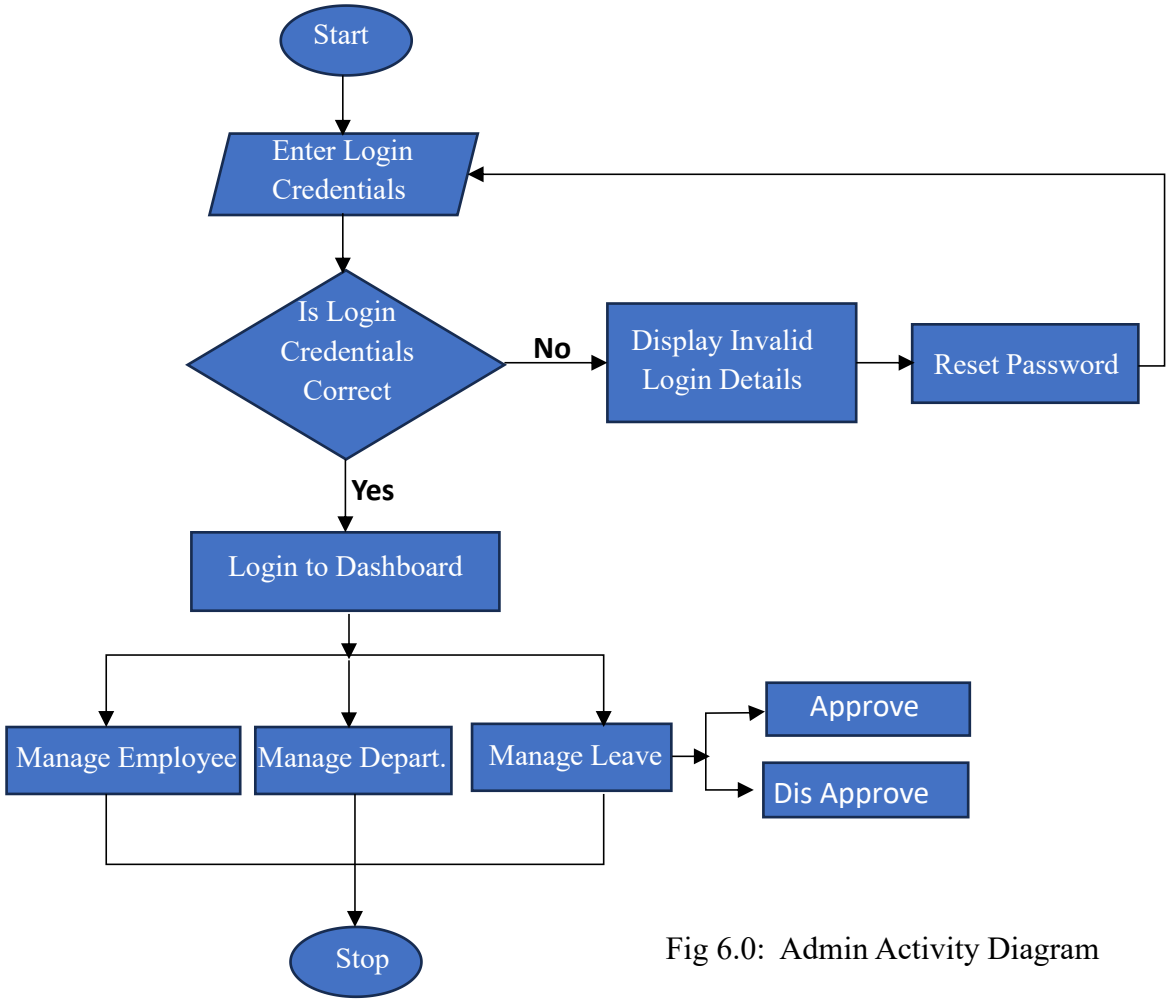

Fig 6.0: Admin Activity Diagram

In Fig 6.0, ER diagram of NEDC-EMS, there are five different entities, and each entity have its own-own attributes and relationship between them. The first entities are admin, and its attribute are admin id, admin name and admin password. The second entities we have employee, and its attribute are employee name, employee id, employee phone number, employee address, employee department, employee salary, employee leave, employee password. And the relationship admin and employee are “can add” that is admin can add employee. The third entities are employee details and the relationship between admin and employee details “can update” that is admin can update the employee details. The fourth entities we have is NEDC-HR-Manager and its attribute are manager id, manager password, manger name and the relationship between admin and NEDC-HR is “can add” that is admin can add any NEDC-HR- Manger. The last entity is the leave and its attribute are leave id, leave reason, leave type and leave date and the relationship between employee and leave are “can apply’, that is, employee can apply for

leave and the relationship between NEDC-HR-Manager and leave is "can approve/reject", that is, HR Manager can either approve or reject employee leave.

3.2 Database Design and Structure

Database systems have been built with the ability to handle lots of data in mind. Structuring mechanisms for the storage of information and means of handling information are all part of data management. Furthermore, the integrity of the data stored needs to be guaranteed by the database system, even when there are system crashes and attempts to access by unauthorized persons. The system must avoid possible anomalies result, if data are to be shared among several users. This section reports on the database design of the NEDC EMS.

Basic database operations for the system are represented in figure 7.0.

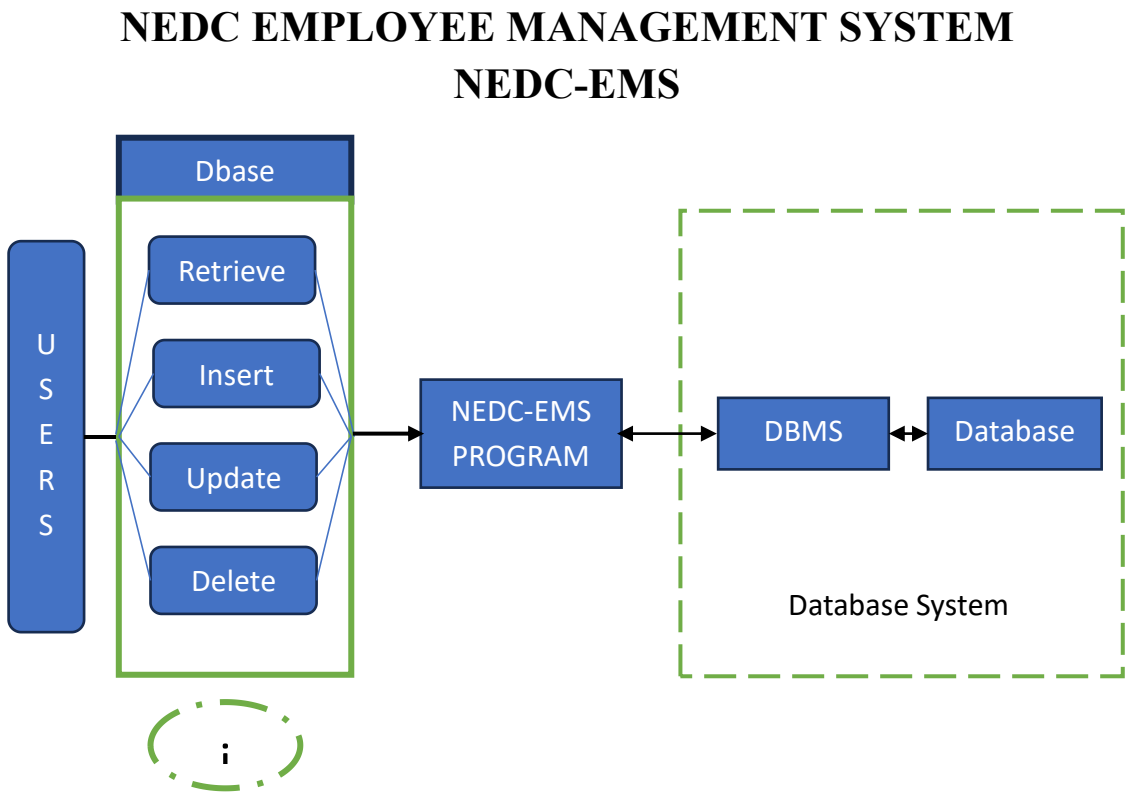

Figure 7.0: Basic NEDC EMS Database Operations

3.3 System Algorithm: Pseudo Code

Pseudocode provides a language-independent, generalized block of code. The details of the language are not an issue. Basically, it is a means of demonstration, or a method of illustrating, how we can then move from the diagrams to programming details.

Pseudo code for Admin Login

```
Begin
    If (admin ID exists in the database and password
    matches)
    Allow access to employee management page

    Else

    Display "Invalid admin
    ID/password". End if
End
```

Pseudo code for HR-Manager login page

```
Begin
    If (User id exists in the database and password
    matches)
    Allow access and redirect to hr-manager dashboard

    Else

    Display "Invalid User id or password"
    End if
End
```

Pseudo code for Employee login page

```
Begin
    If (Employee id exists in the database and password
    matches) Allow access and redirect to employee
    dashboard
```

Else

Display “Invalid User id or password” End if

End

4.0 System Implementation and Results

The previous section dealt with the general methodology for system development. This section presents the results obtained from the system being developed. User interfaces and the components required to satisfy the user needs are described. Screenshots shown are the results of the integrated EMS developed.

4.1 Home and Login Page

Home Page: This is the Employee Management System (EMSL) page and users of the EMSL (including employees, administrators and the like) log in.

Login Page: To gain access to the system every user needs to be *authenticated*. If the user enters the website URL into the browser, the login page appears.

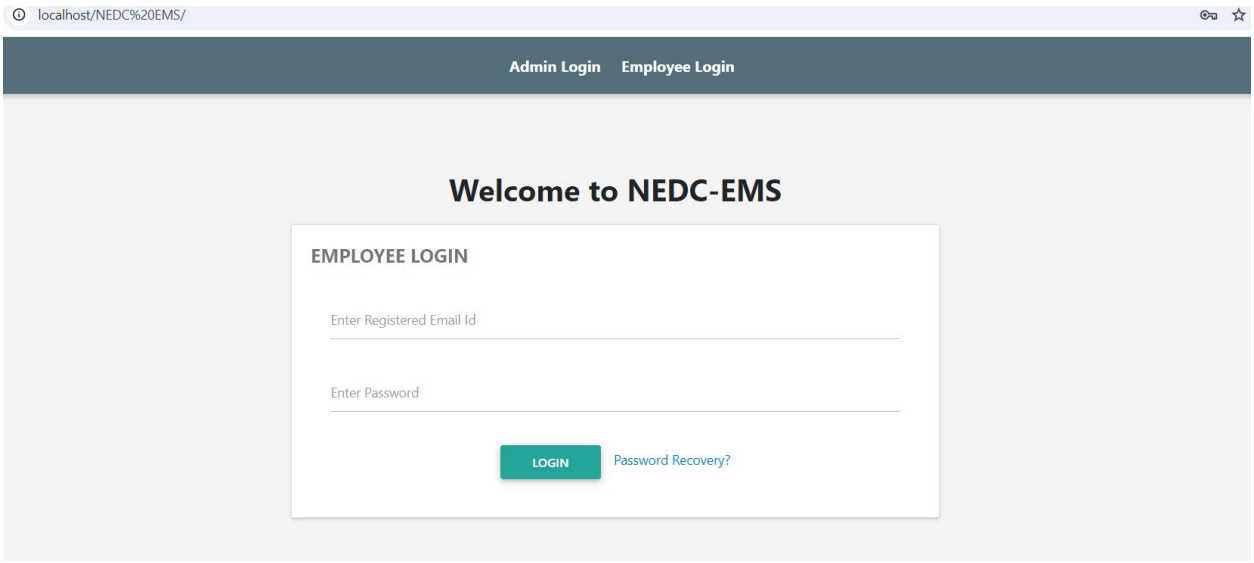

Fig 8.0: Home and Login Page

4.2 How the User Interface Function

All of these applications require the user to be authenticated before they are granted access — when users enter their username and password. When the user does not enter the correct username or password, an error message is displayed. The prompt also tricks the user to type an valid username or password. If the password and username are accurate, the intended user can access the application.

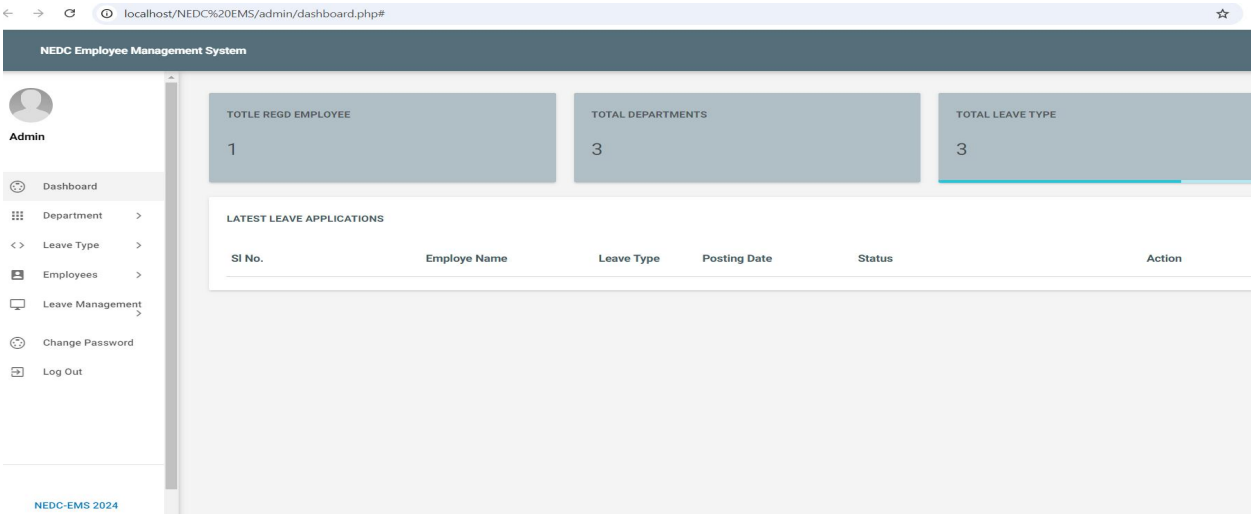

Figure 9.0: Landing Page of the EMS

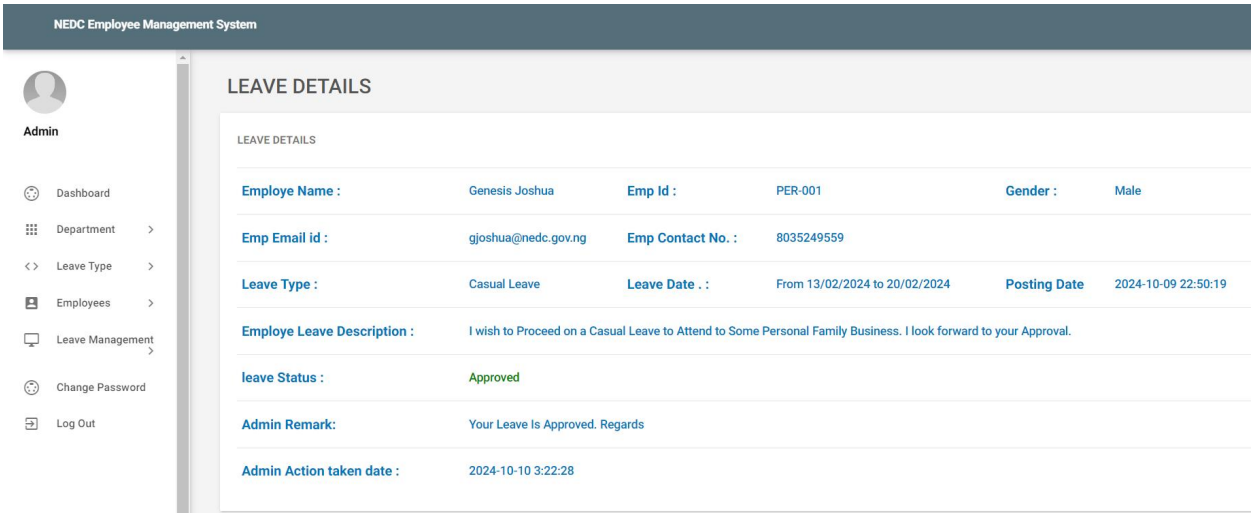

Fig. 10.0: Employees Leave Management

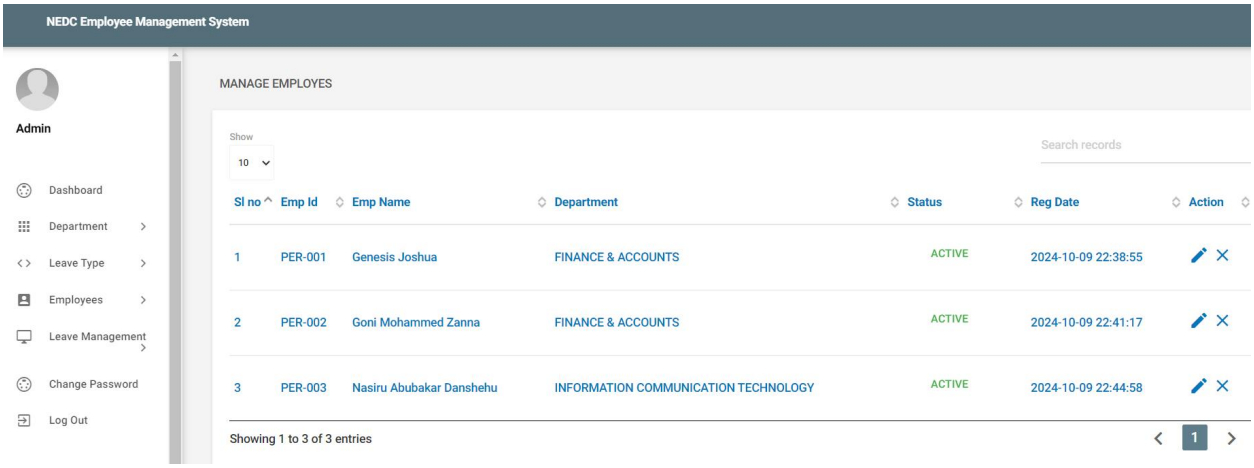

Fig.11.0: General Employee Management

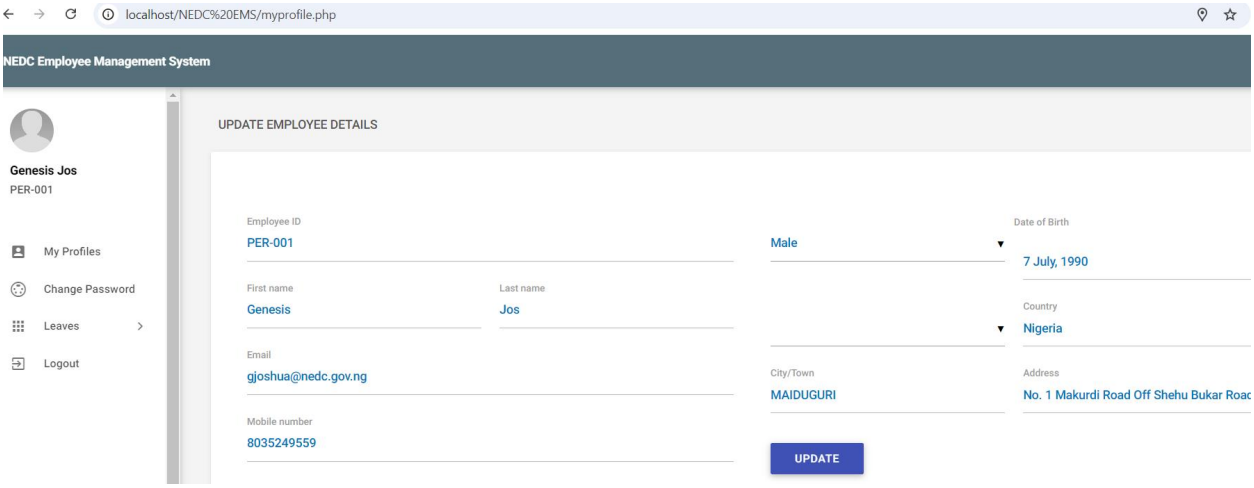

Fig. 12.0: Employee Update Management

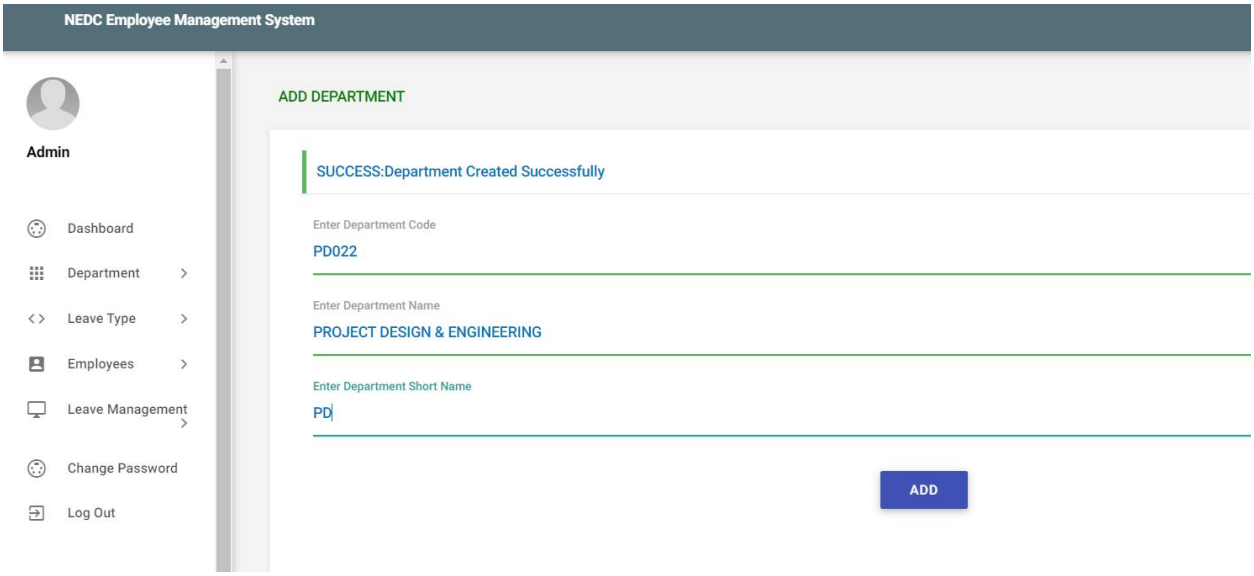

Fig. 13.0: Employee Departments Management

4.3 User Interaction with GUI

This all starts with logging into the system. The user inputs employee id and password. The input is authenticated by the system and when it's been successfully authenticated then the privileges are checked. The privileges are verified to show the appropriate main page for each user.

4.4 Dashboards

ADMIN: In this admin dashboard, the following modules will be shown:

1. Dashboard
   - Total No of Registered Employee
   - Total No of Departments
   - Total No of Leave Type
2. Department
   - Add Department
   - Manage Department
3. Leave Type
   - Add Leave Type
   - Manage Leave Type
4. Employee
   - Add Employee
   - Manage Employee
5. Leave Management
   - All Leaves
   - Pending Leaves
   - Approved Leaves
   - Not Approved Leaves
6. Change Password
7. Logout

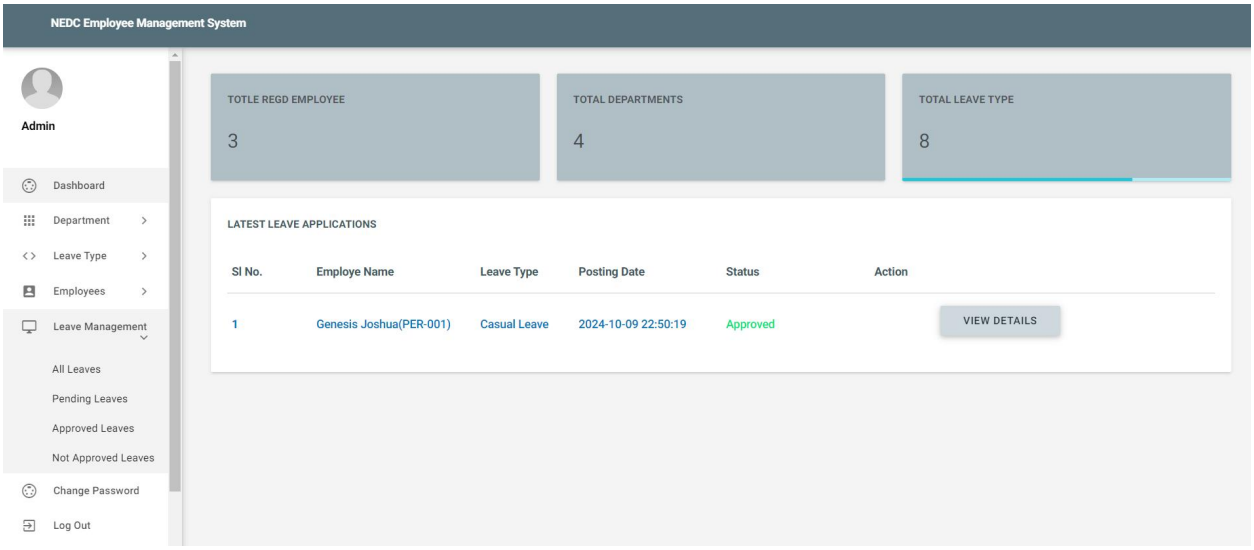

Fig 14.0: Admin Dashboard

Employee: In this Dashboard, we have the following modules:

1. My Profile
2. Change Password
3. Leaves
   - Apply Leave
   - Leave History
4. Logout

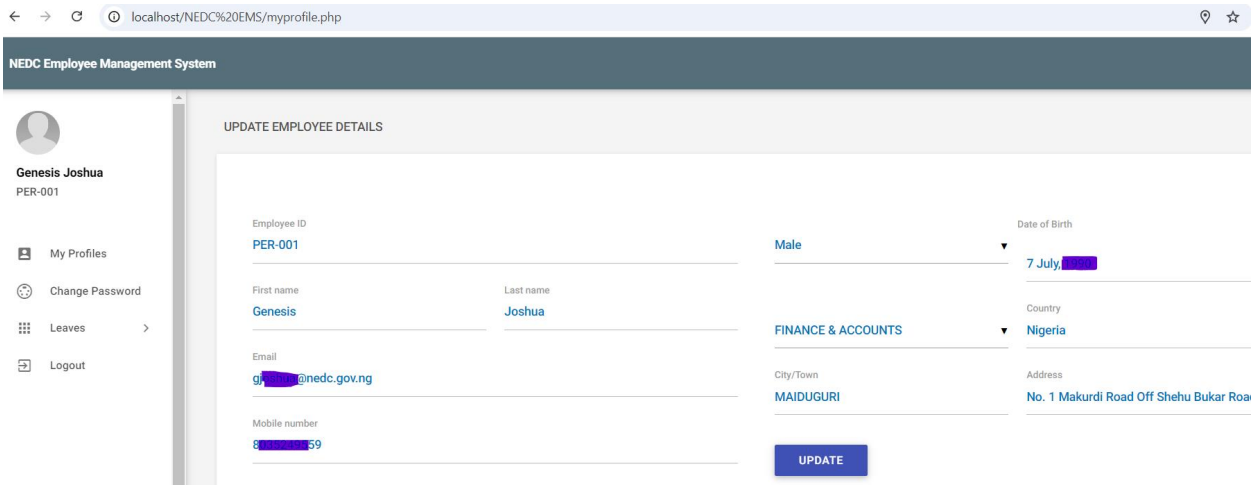

Fig 15.0: Employee Details Management Dashboard

4.5 Coding

Database Connection

```php
<?php
// DB credentials.
define('DB_HOST','localhost');
define('DB_USER','root');
define('DB_PASS','');
define('DB_NAME','nedc_ems');
// Establish database connection.
try
{
$dbh = new PDO("mysql:host=".DB_HOST.";dbname=".DB_NAME,DB_USER, DB_PASS,array(PDO::MYSQL_ATTR_INIT_COMMAND => "SET NAMES 'utf8'"));
}
catch (PDOException $e)
{
exit("Error: " . $e->getMessage());
}
?>
```

Admin Logout

```php
<?php
session_start();
$_SESSION = array();
if (ini_get("session.use_cookies")) {
    $params = session_get_cookie_params();
    setcookie(session_name(), '', time() - 60*60,
        $params["path"], $params["domain"],
        $params["secure"], $params["httponly"]
    );
}
unset($_SESSION['alogin']);
session_destroy(); // destroy session
header("location:../index.php");
?>
```

Homepage Login

```php
<?php
session_start();
error_reporting(0);
include('includes/config.php');
if(isset($_POST['signin']))
{
$uname=$_POST['username'];
$password=md5($_POST['password']);
$sql ="SELECT EmailId,Password,Status,id FROM tblemployees WHERE EmailId=:uname and Password=:password";
$query= $dbh -> prepare($sql);
$query-> bindParam(':uname', $uname, PDO::PARAM_STR);
$query-> bindParam(':password', $password, PDO::PARAM_STR);
$query-> execute();
$results=$query->fetchAll(PDO::FETCH_OBJ);
if($query->rowCount() > 0)
{
 foreach ($results as $result) {
    $status=$result->Status;
    $_SESSION['eid']=$result->id;
  }
    if($status==0)
    {
    $msg="Your account is Inactive. Please contact admin";
    } else{
    $_SESSION['emplogin']=$_POST['username'];
    echo "<script type='text/javascript'> document.location = 'emp-changepassword.php'; </script>";
    }
}else{

  echo "<script>alert('Invalid Details');</script>";

}

}
```

```php
    <main class="mn-inner mt-5">
        <div class="row d-flex justify-content-center align-items-center">
<h4 class="font-weight-bold text-center blue-gray-text text-darken-2">Welcome to NEDC-EMS</h4>

            <div class="col-md-12">
                <div class="row">
    <div class="col-md-3"></div>

                <div class="col-md-6 d-flex justify-content-center align-items-center">
                    <div class="card white darken-1">

                        <div class="card-content ">
                            <span class="card-title blue-gray-text text-darken-2" style="font-size:20px;">Employee Login</span>
                              <?php if($msg){?><div class="errorWrap"><strong>Error</strong> : <?php echo htmlentities($msg); ?> </div><?php }?>
                             <div class="row">
                                <form class="col col-md-12 " name="signin" method="post">
                                    <div class="input-field col s12">
                                        <input id="username" type="text" name="username" class="validate" autocomplete="off" required >
                                        <label for="email">Enter Registered Email Id</label>
                                    </div>
                                    <div class="input-field col col-md-12">
                                        <input id="password" type="password" class="validate" name="password" autocomplete="off" required>
                                        <label for="password">Enter Password</label>
                                    </div>
                                    <div class="col col-md-12 center m-t-sm">

                                        <input type="submit" name="signin" value="Login" class=" waves-effect waves-light btn blue-gray darken-4">
                                       <a class="waves-effect waves-grey" href="forgot-password.php" style="margin-bottom: 10px; margin-left: 10px;">Password
                                    </div>
                                </form>
                            </div>
                        </div>
                    </div>
```

5.0: Summary, Conclusion and Recommendations

5.1 Summary

The study achieved the development of an EMS that can perform different functionalities and meet the requirements. Some of the highlights of our system are: user friendly, because it is simple and easy to use, and efficient functioning, because it is capable of producing a result.

5.2 Conclusion

The research successfully produced a web-based Employee Management for the North East Development Commission, which is demonstrated in a way so that all the employee details are stored securely, employee can send the leave easily and can generate the leave advise. The system was developed and implemented based on web technologies such as CSS, JS, Bootstrap, HTML, MySQL, and PHP. The system is an enhancement in employee management, which maintains accuracy, transparency as well as the importance of incorporating state-of-the-art technology in employee record. The developed system enables the employees to request and track their leave at their own convenient time in timely manner. Above officers of the Commission or the administrative department can establish working schemes, verify transparency and organize affairs beforehand. Employee Leave Management System will offer an efficient solution for handling the various employee leave. The system, through eliminating all the issues in the manual approach, can also improve business operations of the Commission much better.

5.3 Recommendations and Suggestions for Further Improvement

It is recommended that the model implemented here by adopted and used by organizations to enhance their services.

The NEDC-EMS can be further developed to include more modules and improve on its user-friendly interfaces. This can be done by integrating modules that will capture employee documents by scanning and submission/upload on the system, and also incorporates the application's ability to send notification through SMS and E-Mail.

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