

# **LEAVE MANAGEMENT SYSTEM**

A Project-II Report

Submitted in partial fulfillment of requirement of the

Degree of

**BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE &  
ENGINEERING**

BY

**Shubhi Miradwal  
(EN16CS301259)**

Under the Guidance of  
**Prof. (Dr.) Ruchi Patel  
Miss Niharika Dubey**



**Department of Computer Science & Engineering  
Faculty of Engineering  
MEDI-CAPS UNIVERSITY, INDORE- 453331**

**May, 2020**

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**May, 2020**

## **Report Approval**

The project work “**Leave Management System**” is hereby approved as a creditable study of an engineering subject carried out and presented in a manner satisfactory to warrant its acceptance as prerequisite for the Degree for which it has been submitted.

It is to be understood that by this approval the undersigned do not endorse or approved any statement made, opinion expressed, or conclusion drawn there in; but approve the “Project Report” only for the purpose for which it has been submitted.

Internal Examiner

Name:

Designation

Affiliation

External Examiner

Name:

Designation

Affiliation

## **Declaration**

I hereby declare that the project entitled “**Leave Management System**” submitted in partial fulfillment for the award of the degree of Bachelor of Technology in ‘Computer Science Engineering’ completed under the supervision of **Prof. (Dr.) Ruchi Patel, Department of Computer Science and Engineering**, Faculty of Engineering, Medi-Caps University Indore is an authentic work.

Further, I declare that the content of this Project work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University for the award of any degree or diploma.

**Date**\_\_\_\_\_

**Shubhi Miradwal( EN16CS301259)**

## Certificate

We, **Prof Ruchi Patel & Niharika Dubey** certify that the project entitled “**Leave Management System**” submitted in partial fulfillment for the award of the degree of Bachelor of Technology by **Shubhi Miradwal** is the record carried out by her under our guidance and that the work has not formed the basis of award of any other degree elsewhere.

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Prof. Ruchi Patel

Computer Science and Engineering

Medi-Caps University, Indore

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Niharika Dubey

Project lead

Promact Infotech Pvt. Ltd

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Dr. Suresh Jain

Head of the Department

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## **Acknowledgements**

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I would also like to thank to my team at Promact Infotech Pvt. Ltd Miss Niharika Dubey and Mr. Rushi Soni who extended their kind support and help towards the completion of this project.

It is their help and support, due to which we became able to complete the design and technical report.

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## **Abstract**

The purpose of Employee Leave Management System is to automate the existing manual system by the help of computerized equipment and full-fledged computer software, fulfilling their requirements, so that their valuable data/information can be stored for a longer period with easy accessing and manipulation of the same. The required software and hardware are easily available and easy to work with.

Employee Leave Management System, as described above, can lead to error free, secure, reliable and fast management system. It can assist the user to concentrate on their other activities rather to concentrate on the record keeping. Thus, it will help organization in better utilization of resources. The organization can maintain computerized records without redundant entries. That means that one need not be distracted by information that is not relevant, while being able to reach the information.

The aim is to automate its existing manual system by the help of computerized equipment's and full-fledged computer software, fulfilling their requirements, so that their valuable data/information can be stored for a longer period with easy accessing and manipulation of the same. Basically, the project describes how to manage for good performance and better services for the clients.

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## **Abbreviations**

Abbreviation	Description
API	Application programming interface
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol Secure
IDE	Integrated Development Environment
JSON	JavaScript Object Notation
LED	Light-Emitting diode
M2M	Machine-to Machine
MCU	Micro processing Unit
UML	Unified modelling language
USB	Universal serial bus

# **Chapter-1**

## **Introduction**

### **1.1 Introduction**

The "Employee Leave Management System" has been developed to override the problems prevailing in the practicing manual system. This software is supported to eliminate and, in some cases, reduce the hardships faced by this existing system. Moreover, this system is designed for the particular need of the company to carry out operations in a smooth and effective manner.

The application is reduced as much as possible to avoid errors while entering the data. It also provides error message while entering invalid data. No formal knowledge is needed for the user to use this system. Thus, by this all it proves it is user-friendly. Employee Leave Management System, as described above, can lead to error free, secure, reliable and fast management system. It can assist the user to concentrate on their other activities rather to concentrate on the record keeping. Thus, it will help organization in better utilization of resources.

Every organization, whether big or small, has challenges to overcome and managing the information of Leave, Employee, Payroll, Leave Type, Salary. Every Employee Leave Management System has different Employee needs; therefore, we design exclusive employee management systems that are adapted to your managerial requirements. This is designed to assist in strategic planning, and will help you ensure that your organization is equipped with the right level of information and details for your future goals. Also, for those busy executives who are always on the go, our systems come with remote access features, which will allow you to manage your workforce anytime, at all times. These systems will ultimately allow you to better manage resources.

### **1.2 Company Profile**

Promact Infotech Pvt. Ltd is an excellence driven company with a passion for technology where people love what they do. We take pride for being one of the few IT companies in Vadodara to adapt to the rapidly changing industry needs by implementing incremental and iterative approach.

It is a pioneer in digital transformation, technology services and consulting, has unlocked numerous opportunities in the ever-evolving world of cloud, digital and web platforms. Company services include IT Consulting, Software Development, Artificial Intelligence, Machine Learning & Blockchain. We deliver a full spectrum of solution frameworks along with application development (Web, Android & iOS), testing, enterprise solutions & business process consulting. Promact is proudly associated with NASSCOM and Gesia. Over the years company

has served clients in key market segments such as Automation, Supply-chain & Logistics, Education, Healthcare & eCommerce and many more.

## **1.3 Company Domain and Services**

Company provides services in the field of:

### **Product Engineering**

It is a combination of manufacturing Industry technology, engineering sciences and technology with management science. A production engineer typically has a wide knowledge of engineering practices and is aware of the management challenges related to production. The goal is to accomplish the production process in the smoothest, most-judicious and most-economic way.

### **Mobile Development**

Mobile app development is the act or process by which a mobile app is developed for mobile devices, such as personal digital assistants, enterprise digital assistants or mobile phones. These applications can be pre-installed on phones during manufacturing platforms, or delivered as web applications using server-side or client-side processing (e.g., JavaScript) to provide an "application-like" experience within a Web browser. Application software developers also must consider a long array of screen sizes, hardware specifications, and configurations because of intense competition in mobile software and changes within each of the platforms. Mobile app development has been steadily growing, in revenues and jobs created. A 2013 analyst report estimates there are 529,000 direct app economy jobs within the EU than 28 members (including the UK), 60 percent of which are mobile app developers.

### **Web Development**

Web development is the work involved in developing a website for the Internet (World Wide Web) or an intranet (a private network).<sup>[1]</sup> Web development can range from developing a simple single static page of plain text to complex web-based internet applications (web apps), electronic businesses, and social network services. A more comprehensive list of tasks to which web development commonly refers, may include web engineering, web design, web content development, client liaison, client-side/server-side scripting, web server and network security configuration, and e-commerce development.

### **DevOps**

DevOps is a set of practices that combines software development and information-technology operations which aims to shorten the systems development life cycle and provide continuous delivery with high software quality.

### **Blockchain Technology**

Blockchain technology is most simply defined as a decentralized, distributed ledger that records the provenance of a digital asset. Blockchain is most simply defined as a decentralized, distributed ledger technology that records the provenance of a digital asset.

## Artificial Intelligence

Artificial Intelligence (AI) is a computer or machine that has been created to "think" like a human. The idea behind it is that human reasoning can be understood and defined based on input (your experiences) and output (your actions). When a human makes a decision, they consider certain important variables

Apart from these company also has its own products named:

### Questy

Questy is a reliable, scalable, and flexible multi-disciplinary recruitment system providing both enterprise and education solutions. It cuts costs, removes geographical constraints, and speeds up the recruitment process. It has amazing features such as live interviews, a diverse question bank, and an online coding test that supports seven programming languages.

### Probot(Synchronous Standup Meetings & Task Tracker Slack Bot)

Lead consistent scrums and track team members' task in an interactive and user-friendly way, with no hassle. Our Probot Ninja does all the iterative and boring activities for you in the background

## 1.4 Objectives

1. It offers the users accurate details about leave trends, and leave balances. Thus, this system allows users to forecast available resources at any time.
2. Being unaware of the organizational leave policies result in the negligence of the rules of leave policy by the employees and managers of the companies.
3. By using the leave management system, the HR departments of companies can define the leave policy rules such as least/the greatest number of days, and management of holiday calendar according to the location. Besides, the employees can also refer to their leave policy before they apply for vacation days.
4. The leave management system allows both the HR and managers of the companies to have a look at the leave history of the applicants.

## 1.5 Significance

It can be very time consuming and cumbersome for the employers to deal with the leave applications, to process the leave application of every employee and to ensure that the employees follow the company's leave policy. It is necessary to deal with the leave application on a regular basis. And this process involves checking the leave history of every employee, the availability of leave in future and the leaves used by the employees in a certain period of time. In this case,

considering the Leave Management System can be a faster and simpler method of making leave management simpler for HR managers. With this software, denying or granting leave requests is only one click away. This is why this method brings in adherence and transparency to the leave policy of an organization.

The leave management system helps both the employees and the managers of the companies. This way it helps to maintain transparency. Here the employees can access their leave balance and leave history along with the managers.

The visibility of online leave balance helps the employers to get rid of the tension of dealing with different queries on the leave balance for the employees.

When the leaves are paired with the location-specific holiday calendars, these help to calculate the right number of days when the employees applied for leaves. Some of the leave management software solutions support holiday management of multi-location companies while making it easier for the employers to calculate the due leaves of the employees.

As this system pairs leave with attendance, thus it can build discipline and improve accuracy in a company. This ensures that the payslips reflect the right amount to be received by the employees as salaries once the leave application rules.

## **Chapter 2**

### **System Analysis and Design**

#### **2.1) Problem Domain**

You have to build a web application which will be used by Admin and Employees to manage employee details and leave application.

- Admin should be able to Add, Update, Delete Employee.
- Admin can create type of leaves, for example Casual Leave, Sick Leave and Restricted Leave etc. Each leave type must have a name and there will be a maximum number of days allowed per leave type. For example, if maximum number of days allowed for Casual Leave is 14 days then any employee cannot avail more than 14 casual leaves in a year.
- Employees can view and update their details. Employees can also apply for leave which will be Approved or Rejected by the Admin. Employees can view the status of applied leaves.

#### **2.2) Information Gathering**

Implementation Methodology that is to be used:

Model View Controller or MVC as it is popularly called, is a software design pattern for developing web applications. A Model View Controller pattern is made up of the following three parts:

- Model - The lowest level of the pattern which is responsible for maintaining data.
- View - This is responsible for displaying all or a portion of the data to the user.
- Controller - Software Code that controls the interactions between the Model and View.

MVC is popular as it isolates the application logic from the user interface layer and supports separation of concerns. Here the Controller receives all requests for the application and then works with the Model to prepare any data needed by the View. The View then uses the data prepared by the Controller to generate a final presentable response. The MVC abstraction can be graphically represented as follows.



## MVC (Model View Controller Flow) Diagram

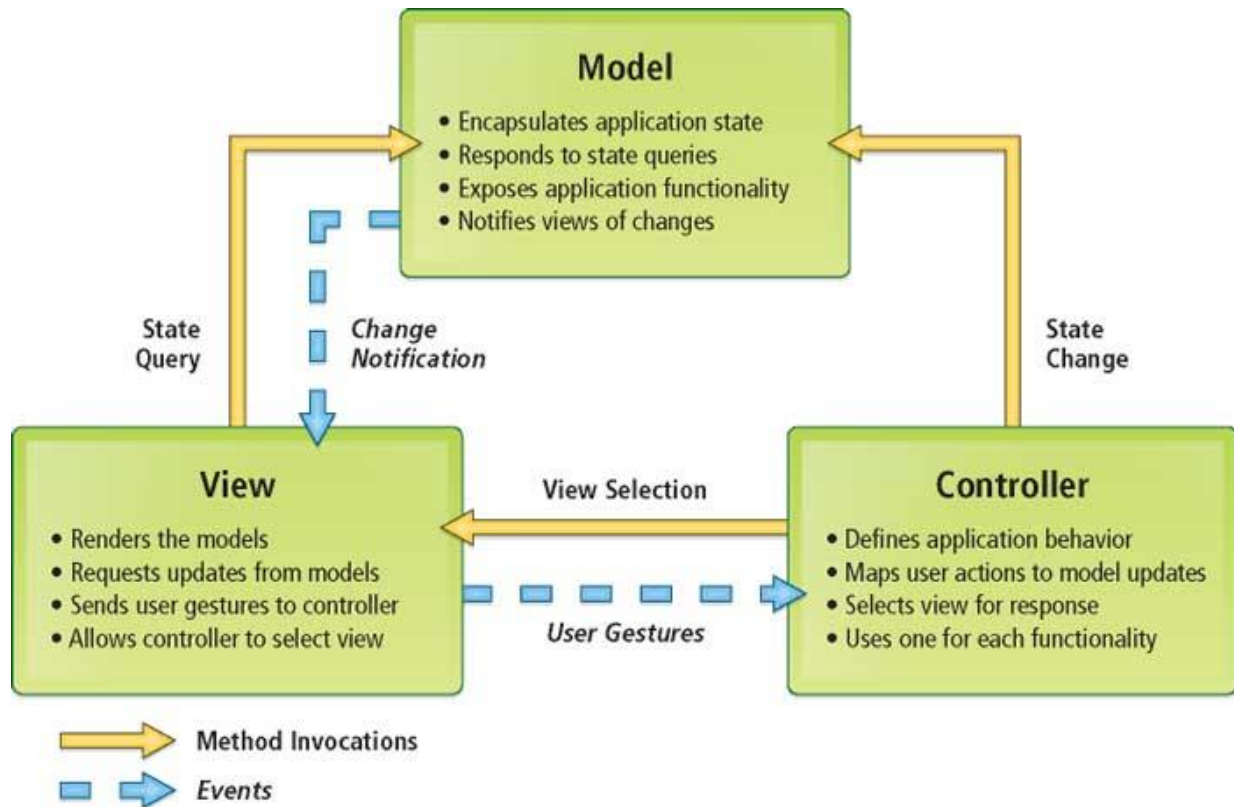


Fig 2.2 Data Flow

## Project scheduling using Gantt chart

An elementary Gantt chart or Timeline chart for the development plan is given below. The plan explains the tasks versus the time (in weeks) they will take to complete.

	January				February				March			
Requirement Gathering												
Analysis												
Design												
Coding												
Testing												
Implement												
	W1	W2	W3	W4	W1	W2	W3	W4	W1	W2	W3	W4

Fig 2.3 Gantt chart

## 2.3) System Feasibility

### 2.3.1) Economical

Software cost comprises a small percentage of overall computer-based system cost. There are a number of factors, which are considered, that can affect the ultimate cost of the software such as - human, technical, Hardware and Software availability etc.

The main point that was considered during the cost estimation of project was its sizing. In spite of complete software sizing, function point and approximate lines of code were also used to "size" each element of the Software and their costing.

The cost estimation done by me for Project also depend upon the baseline metrics collected from past projects and these were used in conjunction with estimation variables to develop cost and effort projections.

We have basically estimated this project mainly on two bases -

- 1) Effort Estimation - This refers to the total man-hours required for the development of the project. It even includes the time required for doing documentation and user manual.
- 2) Hardware Required Estimation - This includes the cost of the PCs and the hardware cost required for development of this project.

### 2.3.2) Technical

- Supported server-side software configuration (see above)

- Full trust permissions for the ASP.NET application (hosting in a medium trust environment is not supported)
- Hosting plan parameters:
- Minimum: 4 GB memory (RAM), 200 MB database size
- Recommended: 8 GB memory, 1 GB database size
- Client Software: Chrome or other latest web browser which support service worker and web worker
- API: ASP.NET Web API Entity Framework

## **2.4) Platform Specification**

### **2.4.1 Development**

#### Hardware

- Intel i5 8<sup>th</sup> generation
- 16 GB Random Access Memory

#### Software

- Visual Studio 2017
- Microsoft SQL
- Angular-CLI

#### Language

- ASP.NET Core using C# (Back End)
- Angular 6 (Front End)

### **2.4.2 Deployment**

#### Server Hardware

- 6 core processor
- 64 GB Random Access Memory
- Fast internet connection

#### Server Software

- DOT NET Core Deployment service
- Microsoft SQL

#### Client Hardware

- 2 core processor
- 4 GB Random Access Memory

#### Client Software

- Chrome or other latest web browser which support service worker and web worker

## API

- ASP.NET Web API Entity Framework

## LIBRARY

- Bootstrap

# Chapter 3

## System Analysis

### 3.1 Information Flow Representation

In project ASP.NET, model-view-controller (MVC) is used as main methodology or design pattern for efficiently relating the user interface to underlying data models. It is responsible for maintaining the data and behaviour of the application or it can be called the Business Layer. The classes in Models have properties and methods which represents the application state and rules and are called Entity classes or Domain classes, as well as these are independent of the User Interface (UI).

Database Tables:

Employee:

- 1) Id
- 2) Name
- 3) DOB
- 4) DOJ
- 5) Salary

Email Leave:

- 1) Id
- 2) Name
- 3) MaximumLeavesAllowed

EmployeeLeaveMapping:

- 1) Id
- 2) Employee
- 3) LeaveId
- 4) LeaveStartDate
- 5) LeaveEndDate
- 6) Status.

#### 3.1.1 Admin Level Control

- Admin should be able to Add, Update, Delete Employee.
- Admin can create type of leaves, for example Casual Leave, Sick Leave and Restricted Leave etc. Each leave type must have a name and there will be a maximum number of days allowed per leave type. For example, if maximum number of days allowed for Casual Leave is 14 days then any employee cannot avail more than 14 casual leaves in a year.

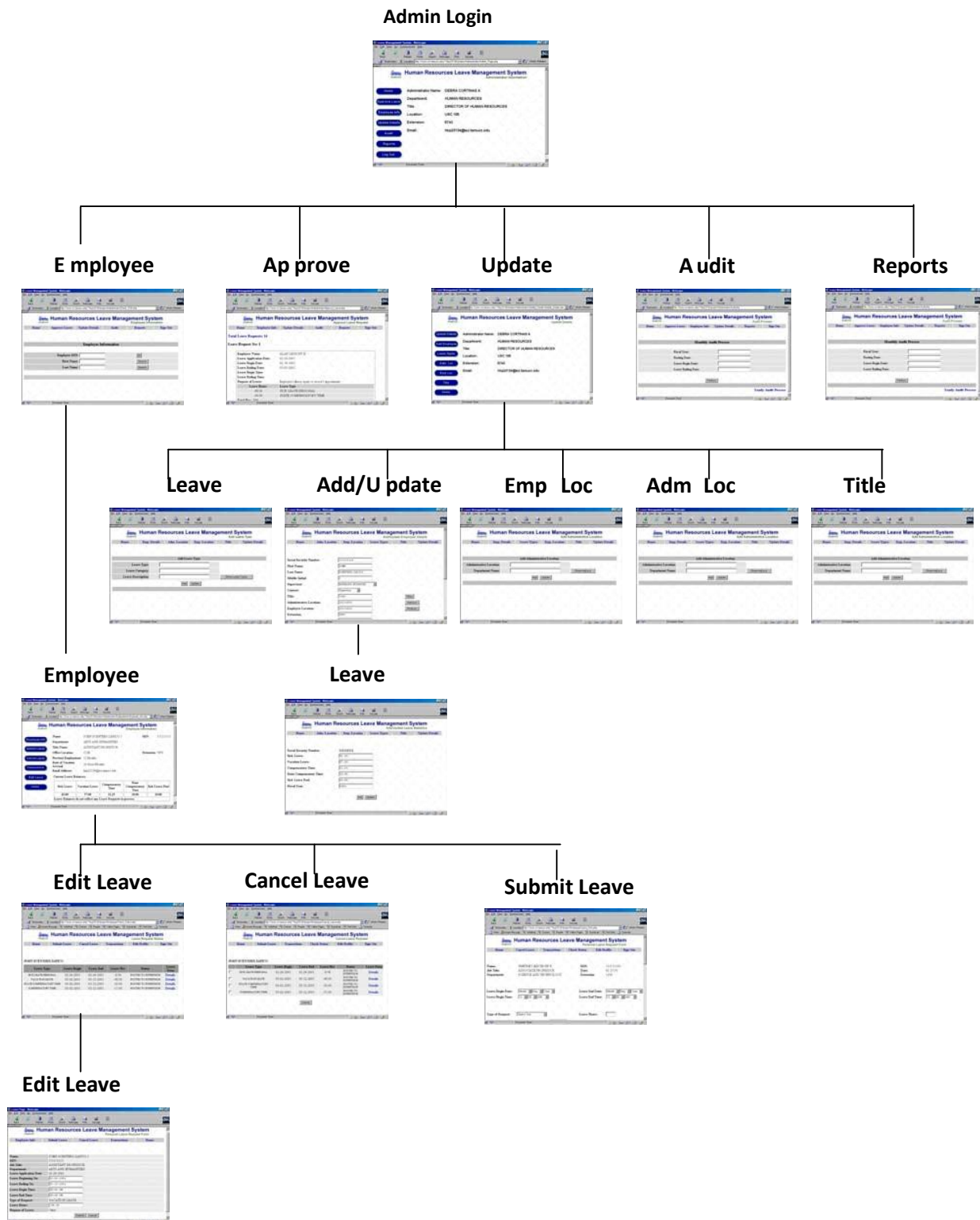


Fig 3.1.1 Admin Level Control

### 3.1.2 Employee Level Control

- Employees can view and update their details. Employees can also apply for leave which will be Approved or Rejected by the Admin. Employees can view the status of applied leaves.

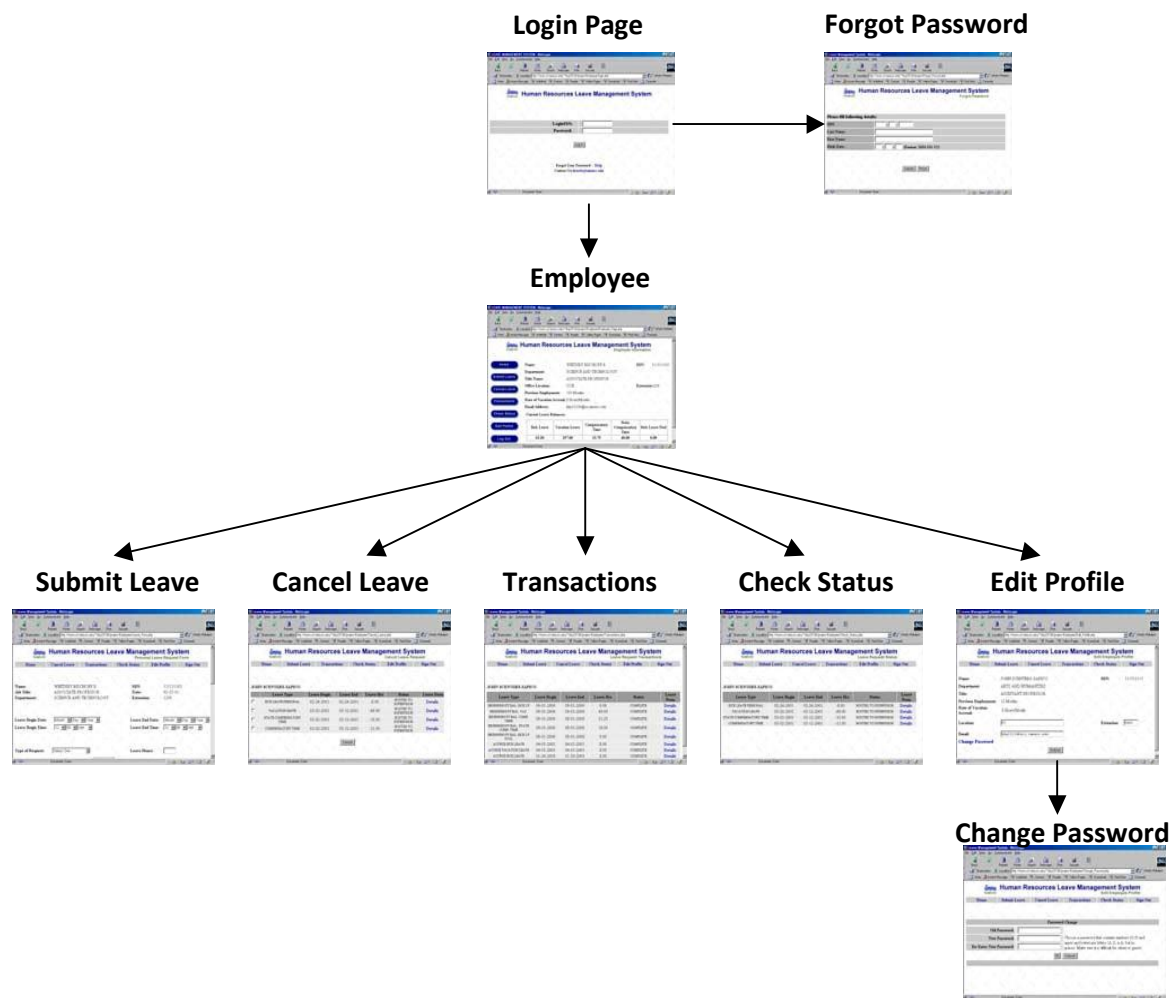


Fig 3.1.2 Employee Level Control

### 3.1.3 Entity Relationships

The Leave Management System database was designed to meet the constraints of the relational model. The Leave Management System enforces referential integrity to preserve database consistency and prevents the user from deleting a record that has records referencing it, thus making sure no archive data is lost. Table 1 presents a listing of the MySQL database tables used in the Leave Management System database and briefly describes the contents of each table.

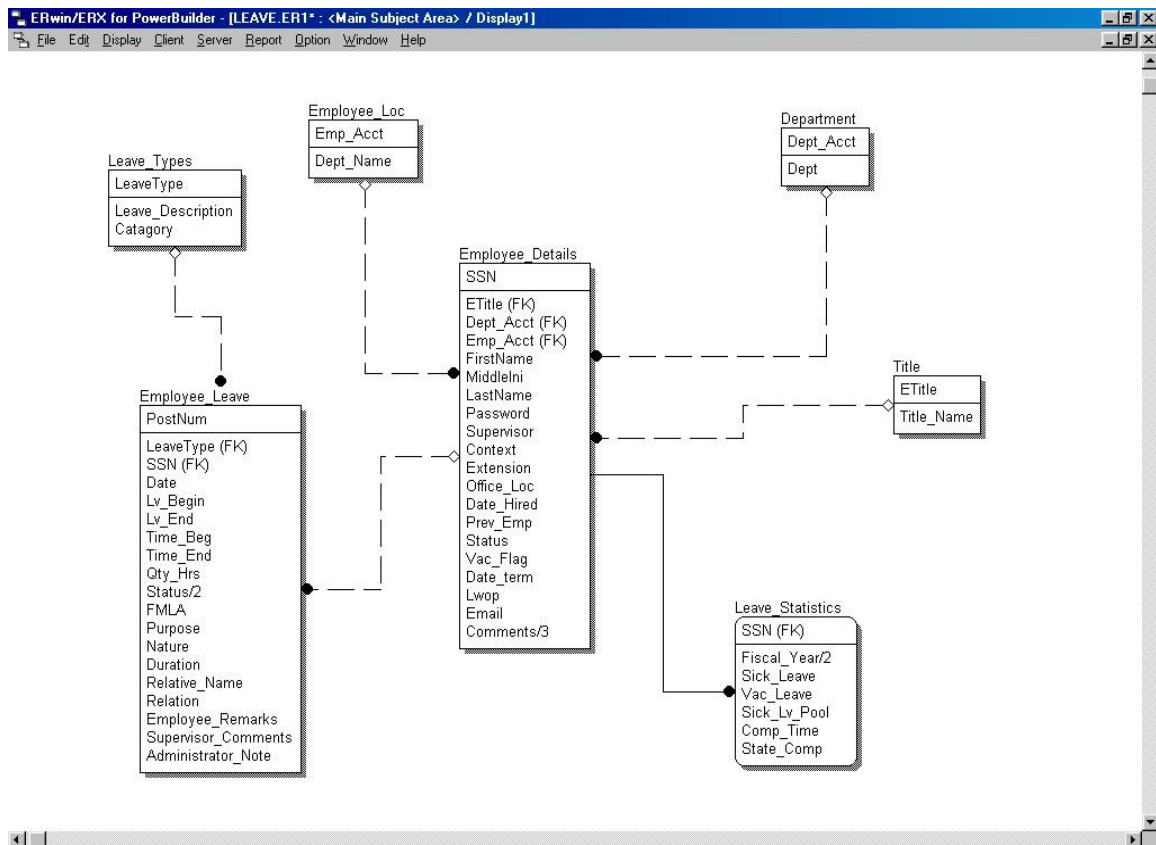


Fig 3.1.3 Entity Relationship Diagram



# Chapter 4

## Implementation and Design

### 4.1 Implementation

Front End: Angular

Angular is a platform and framework for building single-page client applications using HTML and TypeScript. Angular is written in TypeScript. It implements core and optional functionality as a set of TypeScript libraries that you import into your apps. There are five major releases of Angular. The first version that was released is Angular 1, which is also called AngularJS. Angular 1 was followed by Angular 2, which came in with a lot of changes when compared to Angular 1. The structure of Angular is based on the components/services architecture. AngularJS was based on the model view controller. Angular 6 released in May 2018 proves to be a major breakthrough and is the latest release from the Angular team after Angular 5.

Angular 6 is almost the same as Angular 5. It has a backward compatibility with Angular 5. Projects developed in Angular 5 will work without any issues with Angular 5.

Let us now see the new features and the changes made in Angular 5.

Angular 5 and its Features

Angular 5 was released in Nov 2017. As per its goal of speed and size, It was way faster and of smaller size than that of Angular 4. Following are the features that were introduced in Angular 5.

HTTPClient API – HTTPClient API was introduced to deprecate the HTTP library. HTTPClient API is much faster, secure and efficient than HTTP library.

Multiple export aliases – A component can be exported using multiple aliases to ease the migration process.

Internationalized Pipes for Number, Date, and Currency – New pipes are introduced for better standardization.

Lambda support – lambda expressions with proper names can be used instead of functions.

Build Optimizer - Build Optimizer introduced. It optimizes the build size and improves the application speed. Angular CLI uses Build Optimizer automatically.

Improved Compiler – Compiler from Angular 5 onwards supports incremental compilation leading for faster compilation. Compiler uses TypeScript transforms, a new feature of TypeScript 2.3 available onwards.

Let us now see the new features added to Angular 6 –

Updated Angular CLI, Command Line interface – New commands added, like ng-update to migrate from previous version to current version. ng-add to quickly add application features to make application a progressive web apps.

Updated CDK, Component Development Kit – Supports creating custom UI elements without need of angular material library. Supports responsive web design layouts. Supports overlay packages to create pop-ups.

Updated Angular Material – New Tree component added, mat-tree, a styled version and cdk-tree, a unstyled version, to represent a hierarchical structure like tree.

Usage of RxJS, a reactive JS library

Angular Element – Allows Angular Components to be published as Web Components which can then be used in any HTML page. Using Angular Element package, native custom elements can be created easily.

Multiple Validators – Allows multiple validators to be applicable on a form builder.

Tree Shaking on Services – Now tree shaking can be applied on services as well to remove the dead code.

Back End: ASP.NET

ASP.NET is an open-source server-side web-application framework designed for web development to produce dynamic web pages developed by Microsoft to allow programmers to build dynamic web sites, applications and services. ... NET Framework, and is the successor to Microsoft's Active Server Pages (ASP) technology.

Database: Microsoft entity framework

Entity Framework (EF) is an object-relational mapper that enables .NET developers to work with relational data using domain-specific objects. It eliminates the need for most of the data-access code that developers usually need to write.

## **4.2 Project Design**

### **4.2.1) Admin Screen**

- a. Login
- 1 Email

The image shows a web browser window titled "Leave Management". The address bar contains "http://". The main content area displays "Admin Login" in the center. Below this, there is a form with two input fields: "Email" and "Password". Below the "Password" field is a blue button labeled "Login".

Fig 4.2.1(a)Login Page

- b. Employee (Add/Edit)
1. Name
  2. Email
  3. Date of Joining

The image shows a web browser window titled "Leave Management". The address bar contains "http://". The main content area has a dark blue header with "Leave Management" and a power icon. Below the header, there is a sidebar with three menu items: "Employee", "Leave Configuration", and "Leave List". The "Employee" menu item is selected. The main content area displays "Add Employee" in the center. Below this, there is a form with five input fields: "Name", "Email", "Password", "Date of Joining", and "Date of birth". The "Date of Joining" and "Date of birth" fields have calendar icons next to them. Below the "Date of birth" field is a blue button labeled "Save". There is also a "Back" button in the top right corner of the form area.

Fig 4.2.2(b) Employee (Add/Edit)

c) Employee List (Admin should be able to filter list by Employee Name)

Leave Management

Employee List

Employee Name

Name	Email	Date of Joining	Date of Birth	
Employee1	employee1@gmail.com	20-5-2018	15-2-1996	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
Employee2	employee2@gmail.com	02-9-2019	5-8-1993	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
Employee3	employee3@gmail.com	01-11-2019	19-6-1995	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
Employee4	employee4@gmail.com	01-05-2018	14-12-1996	<input type="button" value="Edit"/> <input type="button" value="Delete"/>
Employee5	employee5@gmail.com	26-05-2014	05-08-1990	<input type="button" value="Edit"/> <input type="button" value="Delete"/>

Fig 4.2.1(c) Employee List

d. Leave Configuration (Add/Edit)

1. Name
2. Maximum Number of Days

Leave Management

Employee

Leave Configuration

Leave List

Leave Add

Back

Leave Name

Number of Days

Save

Fig 4.2.1 (d) Leave configuration (Add/Edit)

- e. Leave Configuration (List)
  - i. Name
  - ii. Maximum number of days

Leave Management

Employee

Leave Configuration

Leave List

Leave Configuration

+ Add New

Leave Name	Number of Days	
Casual Leave	20	
Sick Leave	9	
Restricted Leave	3	

Fig 4.2.1 (e) Leave configuration (List)

f. Leave List

(Admin should be able to filter the list by Leave Type and Employee Name)

- 1 Employee Name
- 2 Start date and end date of Leave
- 3 Leave Balance
- 4 Leave Type
- 5 Number of Days
- 6 Status
- 7 Actions (Dropdown)
  - i) Approve
  - ii) Reject

The screenshot shows a web browser window titled "Leave Management". The address bar shows "http://". The page has a dark blue header with "Leave Management" and a power icon. On the left, there is a sidebar with three menu items: "Employee", "Leave Configuration", and "Leave List" (which is highlighted). The main content area is titled "Leave List". It contains a search bar with two dropdown menus labeled "Leave Type" and "Employee Name", and a "Search" button. Below the search bar is a table with the following data:

Employee Name	Start Date	End Date	Leave	Leave Type	Number of Days	Status	Actions
Employee3	12-5-2020	17-5-202	15	Casual	6	Schedule	Select Action ▼
Employee2	1-10-2019	2-10-2019	6	Sick Leave	2	Taken	--

Fig 4.2.1(f) Leave List

## 4.2.2) Employee Screen:

- a). Login
  1. Email

The image shows a web browser window with the title "Leave Management". The address bar contains "http://". The main content area displays the "Employee Login" form. The form is enclosed in a rectangular box and contains the following elements:

- A label "Email" followed by a text input field.
- A label "Password" followed by a text input field.
- A purple "Login" button.

Fig 4.2.2(a) Employee Login

- a) Profile Page
  - 1. Name
  - 2. Email
  - 3. DOJ
  - 4. DOB

The screenshot shows a web browser window titled "Leave Management". The address bar contains "http://". The page has a dark blue header with the text "Leave Management" and a power icon. On the left, there is a sidebar with two menu items: "My Profile" (highlighted) and "Leave". The main content area is titled "Profile" and displays the following information:

Name: Employee1	Date of Joining: 20/01/2020
Email: employee1@gmail.com	Date of Birth: 05/06/1998

Fig 4.2.2(b) Employee Profile

c) Leave Apply

- 1 Leave Type
- 2 From Date
- 3 To Date

The screenshot shows the "Apply Leave" page in the "Leave Management" system. The sidebar on the left has "My Profile" and "Leave" (highlighted). The main content area is titled "Apply Leave" and includes a "Back" button in the top right corner. The form contains the following fields:

- Leave Type:** A dropdown menu with "Select Type" as the current selection.
- From Date:** A text input field with the placeholder "DD / MM / YYYY" and a calendar icon.
- To Date:** A text input field with the placeholder "DD / MM / YYYY" and a calendar icon.
- Save:** A blue button to submit the application.



Fig 4.2.3(c) Employee (Apply Leave)

d) My Leaves (Displays Leave Balance as well)

- 1 Leave Dates
- 2 Leave Type
- 3 Number of Days
- 4 Status

Leave Management

Leave Management

My Profile

Leave

My Leaves

**Leave Balance**

Casual: 16 Sick: 7 Restricted: 3 [Apply](#)

Leave Dates	Leave Type	Number of Days	Status
28/03/2020 to 31/03/2020	Casual Leave	4	Pending
18/01/2020 to 22/01/2020	Casual Leave	5	Rejected
08/12/2019 to 09/12/2019	Sick Leave	2	Approved

Fig 4.2.4 (d) Employee (My Leaves)

# Chapter 5

## Testing

### 5.1 Testing objective

Software testing helps in finalizing the software application or product against user as well as the business requirements. As it is very important to have good test coverage in order to test the software completely and make it sure that it's performing well and as per the specifications.

Major five objective of software testing are:

1. Finding defects which may get created by the programmer while developing the software.
2. Gaining confidence in and providing information about the level of quality.
3. To prevent defects.
4. To make sure that the end result meets the business requirements.
5. To gain the confidence of the customers by providing them a quality product.

### 5.2 Testing Scope

Software testing is a matured process of verification or validation of software against the features, requirements or specifications, which are both functional as well as non-functional. It involves creating test plans, test specifications, test code development, execution of tests and checking the documentation. Also, making sure that the product code changes doesn't cause the regressions, which means failure of earlier working features.

Software quality means the expected level of meeting the specifications or requirements, which are both functional as well as non-functional. The different levels of low, medium and high represent overall quality. In general, high-quality products will have higher customer satisfaction and recognition in the same line of low-level products. Software testing contributes to determining or assess the product quality.

The scope of software testing itself is to cover both functional and non-functional aspects of the entire product under development/test.

The functional requirements are the use cases relevant to the end user visible features of the product. For example, bank transactions in an online banking site.

Non-functional requirements are the ones that needed to have the system/software functioning correctly. The examples are security, performance, reliability, availability, and scaling, etc.

## 5.3 Testing Principles

Basic principles of software testing:

1. Testing shows presence of defects:

The goal of software testing is to make the software fail. Software testing reduces the presence of defects. Software testing talks about the presence of defects and doesn't talk about the absence of defects.

2. Exhaustive testing is not possible:

It is the process of testing the functionality of a software in all possible inputs (valid or invalid) and pre-conditions is known as exhaustive testing. Exhaustive testing is impossible means the software can never test at every test case.

3. Early testing:

To find the defect in the software, early test activity shall be started. The defect detected in early phases of SDLC will very less expensive.

4. Defect clustering:

In a project, a small number of the module can contain most of the defects. Pareto Principle to software testing state that 80% of software defect comes from 20% of modules.

5. Pesticide paradox:

6. Repeating the same test cases again and again will not find new bugs. So it is necessary to review the test cases and add or update test cases to find new bugs.

7. Testing is context dependent:

Testing approach depends on context of software developed. Different types of software need to perform different types of testing. For example, the testing of the e-commerce site is different from the testing of the Android application.

8. Absence of errors fallacy:

If a built software is 99% bug-free but it does not follow the user requirement then it is unusable. It is not only necessary that software is 99% bug-free but it also mandatory to fulfil all the customer requirements.

## 5.4 Testing Methods Used

The development process repeats this testing sub process a number of times.

- Unit Testing
- Integration Testing
- System Testing
- Acceptance Testing

Test Driven Development promotes developing with intent rather than procedure. By doing this, lots of complexity of stitching an entire experience together is removed. React components already do a great job at compartmentalizing logic, making them suited to Test Driven Development whereby unit tests and integration testing can be carried out on a per-component basis.

Test strategy:

- Functional Testing: To check that the Functionality of the APP is matching the customer Requirement.
- Integration testing: To check that there is no merge conflict and all the modules are working as expected after Integration
- GUI Testing: To check that UI of the APP is user-friendly and Customer can easily navigate throughout the UI.
- API Testing: To check that the data we are using through API is Correct.
- Performance Testing: To check that the APP works with the minimum required Configurations.
- Compatibility Testing: To check that the APP works on all supported OS and Browsers.

### TEST CASES

- Log in Page
  - Check Email verification algorithm. Allows only email before API call.
  - Check Password field is appropriate and also check its hash value is correct.
- Leave Management /Admin page
  - Given list is accurate or not.
  - Team will not be creating if admin name or team name is already registered.

- Check negative balance button works.
- Leave Management/ Employee Page
  - Check creator of question is valid or not
  - Questions tag has to be published before use
- Leave Management/List Page
  - Name of Employee and id has to be true
  - Percentile has to be true.
- Client-side background Process
  - Service worker should work at offline
  - Check Service worker is updating data at the end of test

# **Chapter 6**

## **Learning Outcome**

This Internship was a full package of lots of learnings it was so executed that it covers most of the topics which we were familiar only in the books. With the help of this internship I got an opportunity to apply what I have learnt in our course curriculum. This internship was not only restricted to a particular domain in technical domain but covered many important aspects in management field as well. Also, this internship helped in soft skills as well, as I was exposed to the office culture and it made me learn about the corporate culture. After my internship, I had a better idea of the appropriate way to behave as a professional.

Here are a few key points which I got to learn during my internship:

### **Improving Communication Skills**

Don't underestimate yourself; make sure you make the most of your internship and take advantage of all the opportunities that come with it.

Also, unglue yourself from your desk every once in a while, and get to know other interns. Not only will you end up creating great memories and making friends, but you will widen your professional network.

Be proactive, and if you are invited to work functions introduce yourself to people.

This is the only way people will know who you are and what you're all about and most importantly – remember you.

### **Taking constructive criticism well**

Naturally, no one likes to be criticized and performance evaluations can be quite scary. You will probably make a few mistakes and receive constructive criticism about your work from both your colleagues and your boss.

Always remind yourself that it's not personal. It is for your own good and growth and it will improve the quality of your work.

### **Work hard no matter what you're doing**

Always work hard even if your task is small and seems unimportant. It will help you build a good work ethic, and people will notice the effort you put in.

It's not nice being told what to do all the time, but your superiors (mostly) know better. Following the rules and instructions they give you makes it easier for everyone.

## Independence

Often, we think being spoon-fed is the way to learn, but working independently has proved to be very important. Your internship will teach you to make my own decisions and do things on your own.

Being able to work independently with little guidance is very important in the working world.

## Making connections

In addition to the people who will be your references in the future, try to leave your internship with new connections: senior employees, clients, fellow interns, etc.

These people can provide guidance, advice and help you in future job searches. Keep them in the loop on where you are in your career, and offer to help them whenever you can.

To do this, you'll need to make an effort during the course of your internship to build relationships with people around the office. By doing this internship, apart from technological knowledge, it exposed me to the knowledge of management domain of work which is very much essential to be working in any organization. It also helped me in my personality development as I was exposed to the office culture of the organization as well.

## **Chapter 7**

### **RESULT AND DISCUSSION**

During the internship period you can discover the various opportunities in the corporate sector and also learn about the latest technological trends, along with this it also teaches you the value of time management and self-independence.

An interactive Web-based Leave Management System is implemented for the Human Resources Department at Texas A&M University-Corpus Christi. The system keeps track of multiple types of employee leaves and enables the employees to request leave via the Web and check their leave-time balances. The system allows the employees to check the current status of the submitted leave requests and also displays a transaction listing of the leaves taken during the current calendar year. The system keeps running leave balances of each employee's account, accrues employee vacation and sick credits and provides individual reports on employee's leave accruals. The system allows monitoring, routing and online approval of the leave applications from the applicants to the supervisors, and from supervisor to the Human Resources Department administrator, eliminating time consuming inquiries. The system ensures that employees accrue the right amount of "leave" that they are entitled to receive, and provides a quick and efficient validation method that saves precious time and eliminates a cumbersome paper process. The Leave Management System will be installed on University Web Server. All the existing employee information will be transferred to the database. A pilot test group will be selected which will consist of employees from some of the departments. The employees of the pilot group will be using the Leave Management System to apply for leave and also apply leave according to the current procedure. As the first employees become comfortable with the new system, more employees will be added to the system and over a span of time, the current procedure will be replaced with the Leave Management System.



## **Chapter 8**

### **SUMMARY AND CONCLUSION**

The Leave Management System was successfully designed and implemented for the Human Resources Department. However, in the current system, some of the employees fill out time cards. The time cards are used to keep track of employees' working hours. The Human Resources Department collects cards at the end of the month and enters the information into the Leave Management System. This system is very labour intensive, error prone, and therefore expensive. It can be replaced by an extension of Leave Management System in which the employees can submit work hours on-line. All employees can view their records on-line and submit corrections. Supervisors and Human Resources Department administrators can review and approve records and the current leave balances of the employees can be maintained and calculated automatically.

You've studied, you've learned and now you're ready to figure out if the career path you're on is the right one for you. Doing an internship, is a great way to explore the career you're interested in. The purpose of an internship is to provide real-world experience that enables you to put everything you've learned into action.

## **Chapter 9**

### **Future Scope**

It may help collecting perfect management in details. In a very short time, the collection will be obvious, simple and sensible. It will help a person to know the management of passed year perfectly and vividly. It also helps in current all works relative to Employee Leave Management System. It will be also reduced the cost of collecting the management & collection procedure will go on smoothly.

Our project aims at Business process automation, i.e. we have tried to computerize various processes of Employee Leave Management System.

- In computer system the person has to fill the various forms & number of copies of the forms can be easily generated at a time.
- In computer system, it is not necessary to create the manifest but we can directly print it, which saves our time.
- To assist the staff in capturing the effort spent on their respective working areas.
- To utilize resources in an efficient manner by increasing their productivity through automation.
- The system generates types of information that can be used for various purposes.
- It satisfies the user requirement
- Be easy to understand by the user and operator
- Be easy to operate
- Have a good user interface
- Be expandable

Delivered on schedule within the budget.

## Chapter 10

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