SOFTWARE REQUIREMENTS SPECIFICATION

FOR

HUMAN RESOURCE

&

PAYROLL

MANAGEMENT SYSTEM

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RECENT TRENDS IN SOFTWARE ENGINEERING

Aim:

Recent Trends in software engineering

Technologies discussed:

Software Testing- Acceptance testing, Automated Acceptance Testing-Agile software development- Testing in Agile software development

1. Software testing:

Introduction:

Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is Defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements.

Software testing is an investigation conducted to provide stakeholders with information about the quality of the software product or service under test.

1.1. Acceptance Testing:

Acceptance Testing is a method of software testing where a system is tested for acceptability. The major aim of this test is to evaluate the compliance of the system with the business requirements and assess whether it is acceptable for delivery or not.

Standard Definition of Acceptance Testing:

It is a formal testing according to user needs, requirements and business processes conducted to determine whether a system satisfies the acceptance criteria or not and to enable the users, customers or other authorized entities to determine whether to accept the system or not.

Use of Acceptance Testing:

- To find the defects missed during the functional testing phase.
- How well the product is developed.
- A product is what actually the customers need.
- Feedbacks help in improving the product performance and user experience.
- Minimize or eliminate the issues arising from the production.
- Automated Acceptance Testing:
- Automated acceptance testing is a quite recent addition to testing in agile software development holding great promise of improving communication and collaboration.

2. Automated Acceptance Testing:

Introduction:

Automated acceptance tests are an essential component of a continuous delivery style testing strategy, as they give an important and different insight into the behavior of our systems. Developers must own the responsibility to keep acceptance tests running and passing

2.1. Agile Software Development:

In software development, agile (sometimes written Agile) is a set of practices intended to improve the effectiveness of software development professionals, teams, and organizations.

It involves discovering requirements and developing solutions through the collaborative effort of self-organizing and cross-functional teams and their customers or end users.

It advocates adaptive planning, evolutionary development, early delivery, and continual improvement, and it encourages flexible responses to changes in requirements, resource availability, and understanding of the problems to be solved.

Testing in Agile Software Development:

Agile testing is software testing that follows the best practices of Agile development.

For example, Agile development takes an incremental approach to design. Similarly, Agile testing includes an incremental approach to testing. In this type of software testing, features are tested as they are developed.

Agile Test Methodology:

Tests come first in Agile development. When you create a user story, you need to define the acceptance criteria. These drives testing and validation of the user stories.

- **Test-Driven Development (TDD):**

  Test-driven development (TDD) starts with tests. This type of development begins by discussing what you want to test and then creating a user story. So, you start by writing a unit test. Then you write the user story. Finally, you write the code until the unit test passes.

  TDD is typically used on unit and component tests — which can be done with automated testing tools. TDD makes sure the features are working as they should be.

- **Acceptance Test-Driven Development (ATDD):**

  Acceptance test-driven development (ATDD) is similar. But ATDD starts with customer input on functionality. This type of development begins by discussing how the product will be used. So, you write a user acceptance test (UAT). And then you write the code until it passes the test.

  ATDD is typically used for acceptance tests. It verifies that the product functions as users would expect.

- **Behavior-Driven Development (BDD):**

  Behavior-driven development often stems from TDD and ATDD. In behavior-driven development, the purpose of development needs to be tied to a business outcome. So, you'll have a user story — but the user story needs to answer why (in business terms) this feature is being developed. And in BDD, tests are included in user stories as scenarios or specifications.

  BDD is also used for acceptance tests. It verifies that the product functions are necessary for the desired business outcome.

Testing in agile software development is fundamentally important as it enables visibility and enhances communication and feedback to developers. Unit testing and test-driven development are the most known, practiced and researched approaches to agile testing so far. However - over the past few years a complementary testing approach in agile development has emerged - automated acceptance testing (AAT).

In principle, the customer or his representative is given the role of expressing requirements as input to the software paired with some expected result. Whilst unit testing is about testing low level units such as methods, acceptance tests integrate at a higher level between the business logic and the user interface or directly with the user interface.

Doing acceptance testing manually will in most cases be tedious, expensive and time consuming. Automation of acceptance tests may thus seem as a promising initiative to ease and improve this process. The basic idea of AAT is to document requirements and desired

outcome in a format that can be automatically and repeatedly tested – very much based on the same philosophy as for unit testing.

Framework for Integrated Testing (FIT):

Fit is an example of framework to express acceptance test scenarios. Using this framework, the acceptance tests are written in the form of tables, which are called Fit tables. Besides Fit tables are used to represent test scenarios, they are also used for reporting the results of tests.

In experiments conducted using the tables of the Framework for Integrated Test (Fit). The results show that when software requirements are written in natural language and complemented by Fit tables, they become four times easier to understand by developers than when Fit tables are not used. However, the authors claim that Fit tables do not replace textual requirements, but rather, they suggest that these tables bridge the gaps of software requirements specification which are written exclusively using natural language, reducing the ambiguity and misinterpretation of them.

Results after few case studies conducted:

- **Easy to learn:**

  The intention of AAT and tools such as Fit or Selenium is among others to improve communication and collaboration, both internally in a software development team and with the customer. Expressing requirements as AAT is supposed to both make it easier for the customer-side to express their requirements and aid in knowing if the system under development meets those needs. One aspect of establishing an efficient practice of AAT is the ease of learning and introduction.

- **Security:**

  security and confidence amongst the developers as a result of having the system covered by tests explaining intended behavior. This effect is just the same as found in studies of unit testing as well as other studies in agile development in general. The tests help to reduce the fear or resistance of changing the code even if this would be

beneficial in development and maintenance of the code. While AAT shows to be beneficial.

- **Cost efficiency:**

  While AAT shows to be beneficial, we also find issues related to costs. Naturally, defining tests costs time and attention. Having established a test that is closely connected to the code also implies a need of maintaining the test to keep test and code synchronized. One team reported that using Fit helped them have a conversation about the features, so they would be both economically feasible and still correct.

- **Feasibility for developers:**

  Another important issue found, that applies to testing in general, is that it is easy to write a test that completes successfully, yet it may still not cover the code properly. Thus, writing tests requires careful consideration or else they can give a false sense of security. None of the studies forming the base for this discussion report quantitative data documenting the pivot point: net benefit of AAT. We here rely on developers' preference of continuing to use AAT based on their experience as an indication of the feasibility of this testing practice.

Conclusion:

Based on Case studies it seems that it is somewhat inappropriate for customers to actively express requirements in the form of automated acceptance tests. This does not necessarily reflect the feasibility of acceptance testing; it can be an issue of how this is prioritized on the customer side.

Automated acceptance testing surely holds a great promise. The limited experience base tells us that some important gains have been achieved. Yet there is still a great need for investigating this testing practice further.

Experiment 2

INTRODUCTION AND ANALYSIS

1.INTRODUCTION

1.1. Project Details:

HRMS refers to the systems and processes at the intersection between human resource management (HRM) and information technology. The Human Resource Management System HRMS can be used to manage the Human Resource of a company. The system helps a company to create vacancies and accept applications from the applicants, online. It also keeps the administrator updated with the progress of a team in the task assigned. It can also generate payroll automatically.

The HRMS is a web-based application and it can be accessed over the internet. Job seekers can view job vacancies and they can apply for the jobs. Employees, HR team and administrator can login to the system by entering Login Id and password. The administrator is the main user of this web application and he can add employee details, vacancy details etc

1.2 Purpose:

This document aims to give a brief description about the HR Management System Project. With the help of this document the needs of the company and the solution that will be provided to those needs will be clearly presented. In other words, this document will provide a basis for validation and verification.

1.3 Scope:

This document covers the whole definition of the HR Management System (HRMS) project. It basically includes the requirements for managing the personal data,

controlling authentication and authorization mechanism, and evaluating employees' performance. After creating the new HRMS we have to accomplish data migration from their existing system to our new one. More specifically, our HRMS (HR Management System) controls and manages the personal database such that any user with different role types as manager, admin, employee, and human resource will be able to manipulate their personal data. In addition to manipulating the personal data, our HRMS will provide authentication and authorization mechanism. Every user with any role type can be able to login to the system with his/her username and password.

1.4. Definitions and abbreviations:

- **SRS**: Software requirements specification
- **HRMS**: Human resource management system
- **HR**: Human Resource

2. GENERAL DESCRIPTION

2.1 Product perspective:

HRMS which is an online intranet System will be used by four types of employees.
These types who have different roles can be stated as; admin, manager, HR, employee.
Every user enters the main authentication page and after that, the system will grant them authorization. After being authorized according to their permissions (role type) users will basically query and edit the database via HRMS.

2.2 Product functions:

HRMS implements some major functions in order to accomplish required tasks. These functions constitute a basis for the whole system. These functions can be stated as:

1) Authentication and Authorization:

Being connected to the internet, users will be able to get into the system. In order to see the interface related to his/her role type, the user's account should be authorized and also his/her username and password should be authenticated. These tasks are basically held by the functions implemented under the header of the Authentication

and Authorization major function.

2) HR Specification Requirements:

These functions can be used to Take information of employees, generating roster, gathering information of current projects, information about payments and deductions, updating vacancies and information about new applications and scheduling and tracking interviews. On the basis of gathered information creating relative databases and sending emails regarding salary slips and interviews to respective employees or candidates.

3) Process Data:

These functions which can be examined in that process data major function are basic provides the user to manage the database according to the desired task. These management tasks constitute the major feature of the HRMS. With the help of these functions a user can update some basic personal data like contact information, marital status etc. In addition to updating data, a user can also search the database in order to obtain the list of the users' which has the properties desired. Also, a user may also see the specific information about a user or all users which can be named as a report. In other words, searching is the operation with rows of the database while reporting is the operation with columns of the database**.**

2.3 User characteristics:

HR Team: The HR team is responsible for creating vacancies, processing the applications for the vacant posts, scheduling interviews, etc.

2.4 Assumptions and dependencies:

1] Hardware Limitations: There is no limitation in the operating system in which HRMS will work. However, the HRM system and the database will work on a server that needs to be always online. Users can access the system with any internet browser.

2]We assume that every user/employee is given a unique username and password as per his department.

Experiment 3

REQUIREMENT GATHERING

1.FUNCTIONAL REQUIREMENTS

1.1 Service Modules:

The HRMS has following Modules:

Payroll Module:

Payroll is an important module of HRMS. According to the organisation's financial activities, it has a large impact on the income of the organisation. The user keeps track of all the salaries given to employees. Users can make a deduction according to the organisation's policies. From HR point of view, it plays a major role because salaries given to them are on time so payroll focus is that salaries and other wages given to them are on time. This module is used to deal with the salaries and bonuses that the organisation gives to its employees. Users can calculate the salaries of employees using information e.g., employee working, time, etc. Data used for calculating employee salaries is gathered from other modules of HR. Users can make a different deduction from the salaries on the basis of this information.

Employee Record Module:

Users can access the record of employee performance and the information from this module helps in giving promotions, bonuses, and some other facilities to employees. Deductions are made on the basis of information from this module. This also helps HR managers to make decisions. From this module, the user gets information about whether the employee is working well or not.

Attendance Module:

The attendance module is an important part of the human resource management system. Keeping the record of employees' attendance is very important because it affects the salaries of employees. Leave deduction is made from the salaries of employees on the basis of their attendance record. This module of our system keeps track of employees'

attendance. Admin marks the attendance on a daily basis and generates the monthly report of that attendance. On the basis of that report, admin can make deductions from the salaries of employees.

Recruitment Module:

Recruitment is also a very important module of the human resource management system. This module deals with keeping a record of applicants' comings to our organisation. When applicants come to the organisation, the admin needs to keep a record of those applicants. Keeping their record is important because of the fact that it helps for later decision making. If they are eligible then HR hires them and adds their detailed information but if they are not eligible for the post then admin discards their record. Information from this module helps in decision making.

Reports generating Module:

This module contains all reports related to the HR department. This module is very important because reports from this module are used for the decision making by the upper staff and managers of the organization. It contains HR reports, Payroll reports, recruitment Reports, Attendance reports.

Salary maintenance Module:

Admin can calculate salary according to organization rules and regulations. They are allowed to update the salaries of employees.

1.2 HR specific Requirement:

Sign up and sign in	User can Sign-up and sign-out to the HRMS system with his/her username and password
Registration for Employee	Generating employee database using employee information such as name, contact info., date of joining, designation, department, payment and deduction and attendance
Generating Roster	Calculating attendance, Number of working hours and leaves taken in order to calculate salary
List of current projects	Keeping the record of current projects using project

	database
Performance report generation	Generating performance reports of employees according to their attendance, project performance.
Create Salary slips	Generating salary slips of employees using information in Roster and calculating payments, deductions and Bonus. Generating and forwarding emails to employees accordingly.
Track of vacancy	Keeping track of vacancies available in the company
Registering Applicants	Generating candidate database using applications received during hiring process
Interview Scheduling	Sending Emails to Candidates for the process using information in Interview Table like venue, date & time and subsequently updating Application Status
Log-Out	Users can logout from the HRMS system.

1.3 Process data:

Display	Users can display the content of the database. HR can display company information and data of all employee
Edit	HR can edit employee, vacancy, application, payments, projects data and information
Search	HR can search all the employees' information in the database. Search feature works on specific keywords showing employees' characteristics, peculiarities, skills, features, related projects, etc.
Report	This feature is basically used to filter the contents of the search mechanism. For instance, as we mentioned in the above search feature. The HR wants to get a report of some specific employees who know "java programming Language". The list of employees obtained from the result of the search feature he/she can get the specific report by selecting the corresponding checkbox available for each employee.

2. NON-FUNCTIONAL REQUIREMENTS

2.1. Usability:

- ➢ This function deals with the percentage of achievement on a test panel of users. The users should not be a master of computer science. System interface allows easy understanding of the system.
- ➢ Quick to Set-up: Within 5 minutes, the user should be able to set-up the application.

2.2. Learning

- ➢ Any user without computer skills should be able to login/register and then perform various functions of the system within the first 10 minutes of usage without referring to the user manual.

2.3. Performance Requirements

- ➢ **Robustness or Fault-Tolerance Requirements:** The application does not demand much reliability. We only need to take care that the Internet Information system (IIS) runs perfectly on the system.
- ➢ **Scalability or Extensibility:** The system will be highly scalable, i.e., as the number of clients connected will start to arise the hardware infrastructure can be expanded according to the needs.

3. SYSTEM REQUIREMENTS

3.1. Hardware Requirements

- ★ Processor: Intel P-IV based system or advanced.
- ★ RAM: 256MB
- ★ Hard Disk: At least 50MB free space of hard-disk

3.2. Software Requirements

- ★ Database: PostgreSQL
- ★ Operating System: XP/VISTA/7/WINDOWS SERVER 2003/200

Experiment 4

DETAILED PROBLEM STATEMENT

1. DPS OF HRMS:

The Human Resource Management System will address the Automation of the Performance of the Employees as regard to what is monitored on them. Their performance would be according to the qualities of what they're working on. In the present situation, the performance of the employees was poorly evaluated and monitored before, during and after every period of their jobs. Although HR departments would evaluate them, it is a very ideal thing for them to accomplish every evaluation of employees regularly to update their performance and their quality of work. Another thing is many companies on our days have conflict on giving their employees rightful bonuses on the hard works they produce for the welfare of the company, so the system would like to make a possible solution to this by the evaluation of the automation of the performance ratings of the employees, their bonuses would depend on their performance rate as what would be stated according to what would be their ratings in their automated performance rating in the system. This would be the basis of their salary bonuses whenever an employee has a high rating performance, he/ she could get bonuses on certain occasions as given by higher authorities of the company line with this, their automated performance rating could also be used if an employee is subject for a promotion. This would certainly base their nomination from what the HR Department would post about their performance. The higher the rating of the performance, the higher possibility that a certain employee would be enlisted first for a promotion that, of course, would be from the higher management of the company. Also, this part of the

1. Training

2. Performance of employees

3. Bonuses depend on employee's performance rate

4. Promotion of employee

5. Seminars

6. Eligibility

7. Leave

8. Attendance

9. Office of the employees

10. Salary Grade

User and Management Reports

1. List of Trainee

2. List of Employee

3. List of Promoted Employee

4. Personal Data Sheet

5. Performance Evaluation Sheet

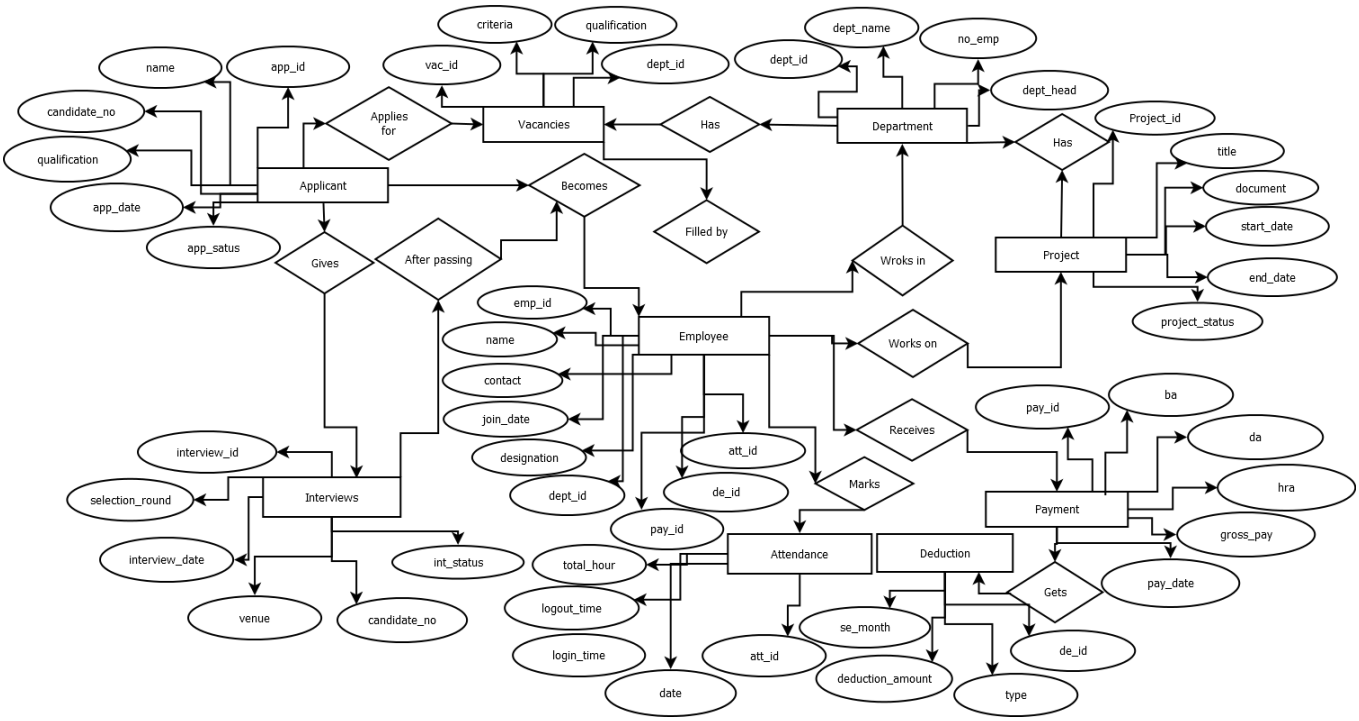
6. Contract of Service

7. Job Orders

8. Certifications

9. Leave

2. Entity Relationship (ER) Diagram:



Experiment 5

FEASIBILITY OF THE HRMS

It is important to consider whether or not the system will work. Although the system may meet all the requirements, as defined in the requirement specification, it still may not be able to implement the same for several reasons. Hence, it is important to undergo a feasibility study. This activity should comprise of the following major dimensions:

Economic Feasibility: The goal is to determine whether the cost of developing, implementing and running the system are worth the benefits realized from its use, generally demonstrated by a cost/benefit analysis. As this project uses basic database tools such as PostgreSQL which is free of cost and also MERN stack for other front end and back-end operations it is quite budget friendly.

Technical feasibility: It should focus on the current technological capabilities of the organisation and those that are required for the implementation of the proposed system. The project uses PostgreSQL and MERN stack technologies which are developer friendly and latest. Also, easy to use. The technologies used are very unlikely to become outdated. So, the risk of shifting to different technologies due to that is reduced. Also, easy technologies will make updating the software quite easy.

Legal and Ethical Feasibility: The best design and best implemented systems can end up causing major headaches for the organisation if it violates existing laws and regulations. The project is simple and basic so there are not any complications and the resources from other developers are not used. All the copyrights have been taken care of and software that legally and ethically belongs to the current developers has been made sure.

Market Feasibility: It focuses on how well the proposed system fits in with the current and future organisational environment. In addition, it assesses the extent to which the project fits within the overall strategic plan of the organisation. The project is very market friendly. As long as companies exist the HRMS software is a must needed tool. This software helps in providing basic HR facilities to the customer such as payroll, attendance, interview tacking, performance reports etc. Hence the software has the ability to fulfil basic needs of any HR department of an organisation. Considering that this software is well fitted in the market.

Experiment 6

RISK MANAGEMENT & MONITORING

1. RISK MANAGEMENT APPROACH

The Risk Management Process

Risk management is a cycle. That means that it is not something that gets checked off a "to do" list but it is a continuous activity. Having a risk management process means that your organisation knows and understands the risks to which you are exposed. It also means that your organisation has deliberately evaluated the risks and has strategies in place to remove the risk altogether, reduce the likelihood of the risk happening or minimise harm in the event that something happens.

1.1 Risk Identification

All known risks and their associated strategies should be communicated in the beginning of the project or as soon as possible. Continuous attention must be given to potential risks and once identified, that risks will be categorised. Risk owners and appropriate strategies will be assigned. Risk identification will include the source of risk, risk events, and risk indicators. Strategies to handle individual risks will be incorporated into the response planning and monitoring procedures.

The very first step is to identify the risks. Ask yourself what can go wrong. Every activity of an organisation poses a risk so brainstorm and document the risks.

Consider both the general risks (that could happen to any organisation) and the risks specific to your organisation.

Risks can be:

- Abuse that is either one-time or ongoing (physical, emotional, psychosocial, sexual, financial)
- Personal injury

- Medical
- Environmental
- Property
- Financial
- Reputation/goodwill
- Other

1.2 Risk Analysis

In risk analysis, a qualitative risk analysis will be conducted to determine the probability of occurrence and impact to the project if the risk materialises.

If you have done a thorough job of identifying risks, you may end up with a long (and overwhelming) list.

The next step is to assess each of the risks based on the (1) likelihood or frequency of the risk occurring and (2) the severity of the consequences.

Using a risk map to plot the likelihood of occurrence and the severity of the consequences will help you prioritise your next steps.

1.3 Develop strategies for managing risks

Consider the most appropriate risk management strategies for each identified risk:

Avoidance – Stop providing the service or doing the activity because it is too risky.

Acceptance – Some risky activities are central to the mission of an organisation and an organisation will choose to accept the risks.

Modification – Change the activity to reduce the likelihood of the risk occurring or reduce the severity of the consequences. Policies and procedures are an important part of this risk management strategy because they communicate expectations and define boundaries. Learn more about writing policies and procedures.

Transfer or sharing – Purchase insurance or transfer the risk to another organisation through signing a contractual agreement with other organisations to share the risk (for

example, having a contractual agreement with a bus company to transport clients rather than staff driving clients).

1.4 Response Planning

During response planning, risk management and contingency plans will be developed. Strategies for handling each risk will be developed by the assigned risk owner. The approaches used in risk response are avoidance, transference, mitigation, and acceptance.

1.5 Risk Monitoring and Control

Action plans will be created, integrated, and monitored during the response planning phase. During risk monitoring and control, corrective action plans are developed, implemented, and monitored.

Risks:

- System failure
- Adapting to the new system
- Training the staffs on how to use new system
- Limited budget plan like the system needing to much money to run or not wanting to cover the cost or give budget
- Cooperation from staff

How to assess and give solutions:

For system failure:

- If the system failure occurs there will be one trained university staff officer for small maintenance.
- If the problem is too large then we will send our own technician and if there is data loss, we will prevent that by taking backup data from the beginning.

For adapting to the new system:

- Updating the system to regularly make it easy to use

2. MONITORING PLAN

Seven steps can be identified in the process of human resources planning.

2.1 Analyse Objectives

The human resources planning process starts with the identification of the objectives of the different departments in the organisation. Each department such as management, marketing, production, finance, and sales, etc. can have different objectives and they have specific expectations related to human resources. The objectives can include recruiting new employees for the process, reducing the number of employees by automating processes, or improving the knowledge and skill levels of existing employees.

By analysing the objectives of each department of the organisation, the human resources planning team can identify the changes that will be necessary for the future of the organisation.

2.2 Inventory current human resources

Once the necessary changes are identified, the Human resources planning team should create an inventory of the current human resources available in the organisation. This should include the current number of employees available in the organisation, their capacities, capabilities, and performance abilities. This helps the human resources team to identify the methods of filling the upcoming job requirements and to create estimates to internal and external recruitments that will be necessary.

2.3 Forecast the demand and the supply of employees

Based on the objectives of the different departments of the organisation and the inventory of the available resources, the Human resources planning team can forecast the demand of the employees. Apart from that, based on the availability in the

organisation and the employee market, the supply of the employees should be forecasted.

2.4 Estimate Gaps

Conducting a comparison between the demand and the supply of the employee availability can help the human resources team to identify the gaps that can arise in the foreseeable future. The gaps can arise as employment deficits as well as employment surpluses. Employment deficits indicate the number of employees that need to be recruited and the employment surpluses indicate the job terminations or transfers between departments. Apart from that, the gaps can be used as an indication of the training and development requirements for the employees.

2.5 Formulate Plan

Once the employment gaps are estimated, the Human resources planning team should formulate a plan for the recruitment, training, and development, termination, interdepartmental transfers, promotion, or early retirement of employees based on the requirements of the organisation. The employment plan can vary based on the deficit or the surplus estimated in forecasting the demand and supply stage.

2.6 Implement Plan

Once the human resources plan is formulated, the human resources department should implement the plan in the organisation. This should be aligned with the goals and objectives of the organisation as well as the goals and objectives of each department of the organisation.

2.7 Monitor, Control, and feedback

Once the human resources plan is implemented, the plan should be monitored continuously to ensure the alignment of the plan to the objectives of the departments. The necessary controls should be put in place and the feedback at each level should be obtained to measure any defects in the implemented human resources plan. The necessary changes should be implemented according to the feedback obtained in the ongoing process in order to make the human resources plan a success.

Experiment 7

COST ESTIMATION & DECISION TREE

1. COST ESTIMATION:

The development methodology and the cost estimation technique used for HR Software are similar to those used for web application development. To sum up, during this cost estimation we are going to consider the system with the following modules:

- Payroll management module
- Hiring management module
- Talent management module
- Wellness and rewards management module
- Time management module

Let's first define the IT specialists needed to build this application. For the web app, we will need:

- A project manager
- Backend and Front-end developer: these developer roles include payroll software developers
- QA engineer
- System Administrator

Today, the way employees interact with their work have changed, more and more employees have access to their work and information related to their work through a

mobile device. A mobile version of HR software can be useful. To develop an application with mobile compatibility we will need:

- Mobile developer: iOS and Android developers

The product we are going to estimate is comprehensive. But what about more exact numbers? For these cost estimations, we will take average hourly rates for the development services. So, here is an approximate cost estimation of the time, resource, and money you're going to need to develop a human resource management system.

- **1 back-end developers** working full time for 6 months charging Rs. 600/hr.= Rs.6,33,000
- **1 front-end developer** working full-time for 6 months charging Rs. 500/hr. = Rs. 5,28,000/-
- **1 QA engineers** working full-time for 5 months charging Rs. 400/hr. = Rs. 4,22,000/-
- **1 Project manager** who manages the project from design to project closure for 6 months charging Rs. 500/hr. = Rs. 5,28,000/-
- **1 System administrator** working full-time for one week charging Rs.600/hr. = Rs. 28,000/-

Additionally for the mobile application part:

- **1 iOS developer** working full time for 6 months charging Rs. 550/hr. = Rs. 5,80,000/-

- **1 Android developer** working full-time for 6 months charging Rs. 450/hr. = Rs. 4,22,000/-

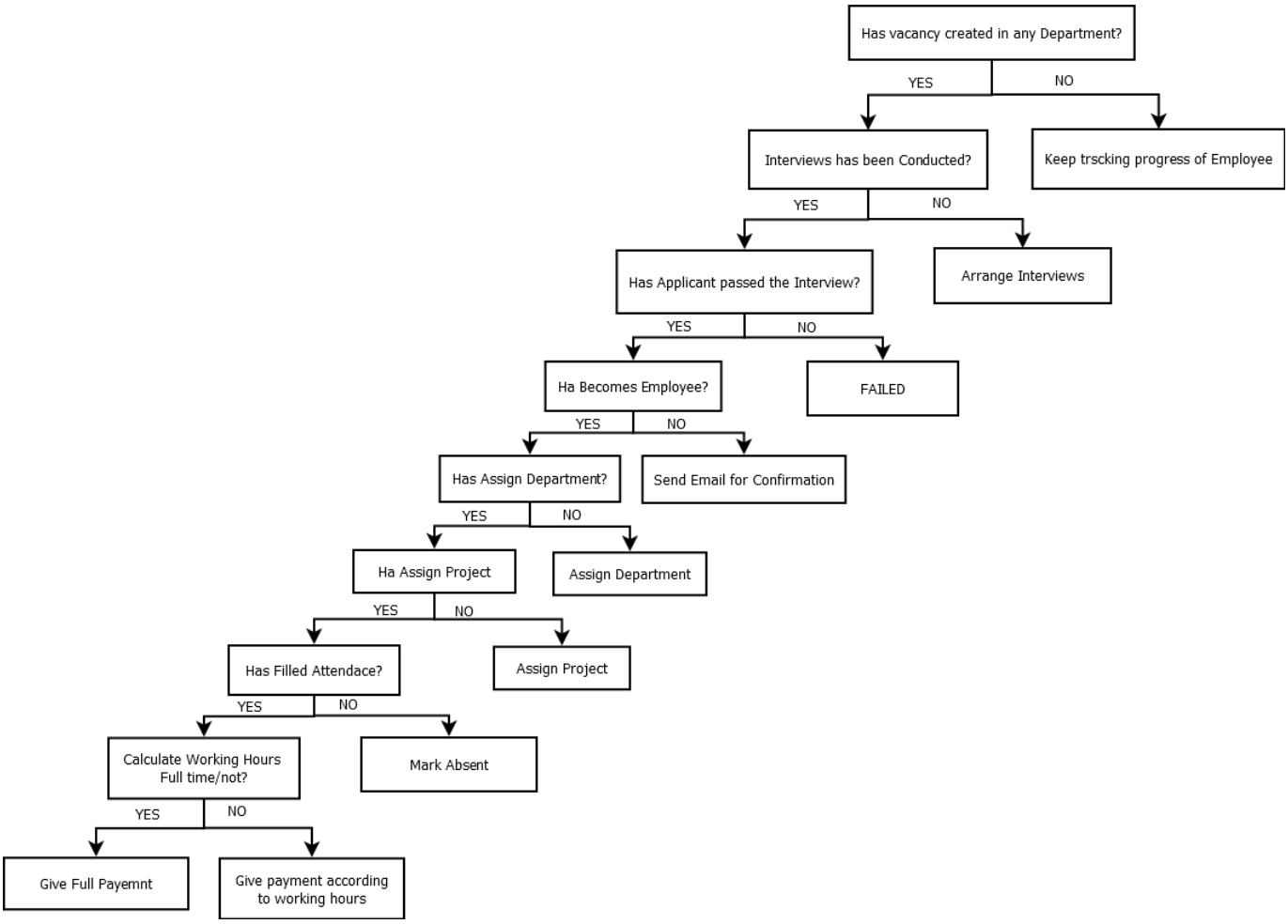
The overall HR software cost will be approximately **Rs. 30,00,000/-.**

Specialist	**Number of devas**	**Months**	**Rate/hr**	**Total**
Back-end developer	1	6	600	6,33,000
Front end developer	1	6	500	5,28,000
iOS developer	1	6	550	5,80,000
Android developer	1	6	450	2,75,000
System administrator	1	1	600	28,800
Project manager	1	6	500	5,28,000
QA	1	6	400	4,22,000
TOTAL				29,94,800

2. DECISION TREE

Decision tree is the analysis that is used by operations research practitioners in firms. Decision tree establishes decision alternatives for decision makers. There are possible situations for each alternative indecision tree and practitioners set expected value for each possible situation. Then, decision makers compare the value of situations and choose one option.

There are lots of HRM practises applied in organisations. This study aims to apply decision trees in HRM practises, for example, decision tree analysis will be applied in training decisions, performance appraisal decisions, and career planning decisions.



Experiment 8

STRATEGY FOR CONFIGURATION

1. Tasks in SCM process

- Configuration Identification
- Baselines
- Change Control
- Configuration Status Accounting
- Configuration Audits and Reviews

1.1 Configuration Identification:

Configuration identification is a method of determining the scope of the software system. With the help of this step, you can manage or control something even if you don't know what it is. It is a description that contains the CSCI type (Computer Software Configuration Item), a project identifier and version information.

Activities during this process:

- Identification of configuration Items like source code modules, test case, and requirements specification.
- Identification of each CSCI in the SCM repository, by using an object-oriented approach
- The process starts with basic objects which are grouped into aggregate objects. Details of what, why, when and by whom changes in the test are made
- Every object has its own features that identify its name that is explicit to all other objects
- List of resources required such as the document, the file, tools, etc.

1.2 Baseline:

A baseline is a formally accepted version of a software configuration item. It is designated and fixed at a specific time while conducting the SCM process. It can only be changed through formal change control procedures.

Activities during this process:

- Facilitate construction of various versions of an application
- Defining and determining mechanisms for managing various versions of these work products
- The functional baseline corresponds to the reviewed system requirements
- Widely used baselines include functional, developmental, and product baselines

1.3 Change Control:

Change control is a procedural method which ensures quality and consistency when changes are made in the configuration object. In this step, the change request is submitted to the software configuration manager.

Activities during this process:

- Control ad-hoc change to build a stable software development environment. Changes are committed to the repository
- The request will be checked based on the technical merit, possible side effects and overall impact on other configuration objects.
- It manages changes and making configuration items available during the software lifecycle

1.4 Configuration Status Accounting:

Configuration status accounting tracks each release during the SCM process. This stage involves tracking what each version has and the changes that lead to this version.

Activities during this process:

- Keeps a record of all the changes made to the previous baseline to reach a new baseline
- Identify all items to define the software configuration
- Monitor status of change requests
- Complete listing of all changes since the last baseline
- Allows tracking of progress to next baseline
- Allows to check previous releases/versions to be extracted for testing

1.5 Configuration Audits and Reviews:

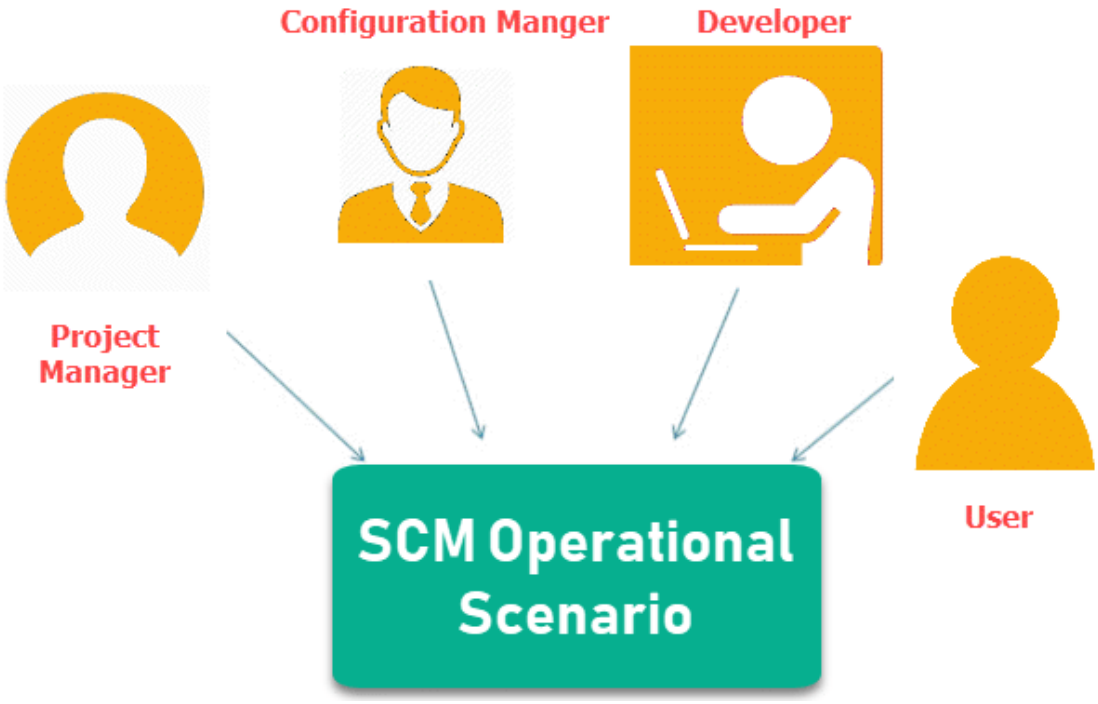
Software Configuration audits verify that all the software product satisfies the baseline needs. It ensures that what is built is what is delivered.

Activities during this process:

- Configuration auditing is conducted by auditors by checking that defined processes are being followed and ensuring that the SCM goals are satisfied.
- To verify compliance with configuration control standards. auditing and reporting the changes made
- SCM audits also ensure that traceability is maintained during the process.
- Ensures that changes made to a baseline comply with the configuration status reports
- Validation of completeness and consistency

2. Participant of SCM process:

Following are the key participants in SCM



2.1. Configuration Manager

- Configuration Manager is the head who is Responsible for identifying configuration items.
- CM ensures team follows the SCM process
- He/she needs to approve or reject change requests

2.2. Developer

- The developer needs to change the code as per standard development activities or change requests. He is responsible for maintaining configuration of code.
- The developer should check the changes and resolves conflicts

2.3. Auditor

- The auditor is responsible for SCM audits and reviews.
- Need to ensure the consistency and completeness of release.

2.4. Project Manager:

- Ensure that the product is developed within a certain time frame
- Monitors the progress of development and recognizes issues in the SCM process
- Generate reports about the status of the software system
- Make sure that processes and policies are followed for creating, changing, and testing

2.5. User

- The end user should understand the key SCM terms to ensure he has the latest version of the software

3. Change Management Strategies:

1. **Communication**: This is one of the most important considerations when embarking on a new project. You need to tell employees and all stakeholders affected by the change why you are doing it, how it will impact them and why they should care. In the absence of honest communication, rumours and assumptions will appear. These may or may not resemble reality, but people will discuss them and likely believe them until you tell them otherwise. If the change will affect employees, explain to them early in the project how it will affect their roles and what the company is planning to do with them.
2. **Training**: Like communication, training is one of the most important change management strategies for ensuring a successful rollout. Develop a plan outlining how you intend to train existing and new employees, and provide multiple training options to ensure your employees are ready to use the HRMS and can refer to training material when needed. This may include in-person sessions, e-learning courses, documentation and one-page work instructions to perform specific tasks. In addition, employees may have access to the online help and other training supplied by the vendor which can help employees learn how to use the new system.
3. **Quick wins:** As much as possible, you want to have quick wins you can share with employees and stakeholders. This will reinforce the benefits of the new HRMS and help alleviate some of the anxiety associated with change. This may be in the form of a pilot project, completing a phase of the project or successfully hitting an important milestone.

4. **Executive support**: Executive support is one of the most effective change management strategies. It reinforces the importance of the project to the organisation and provides the project team with the backing it needs to move people from current state to future state. Messaging is significantly more powerful when you have the backing of the CEO and other executives, especially when you are adding a new process that might not be welcome to employees, such as the introduction of timesheets
5. **Change management plan**: Most importantly, take the time to develop a change management plan. Find a template or model that you like and use it. A change management plan will help you consider multiple points that might not have been obvious before you started writing your plan. With the change management plan, you will be able to identify multiple areas of concern and develop mitigation plans should they arise. And in the event unexpected issues arise, you will have a process outlining how to handle them.

Experiment 9

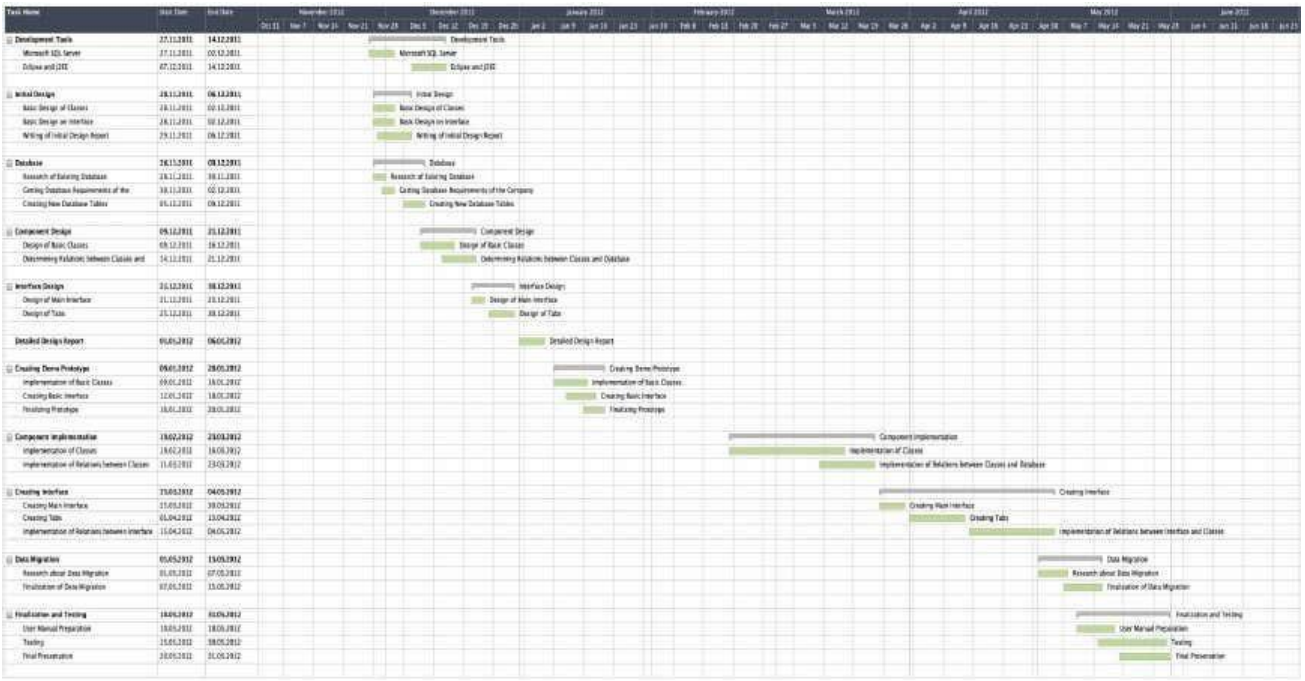
SCHEDULING, TRACKING AND DESIGN PLAN

1.Planning:

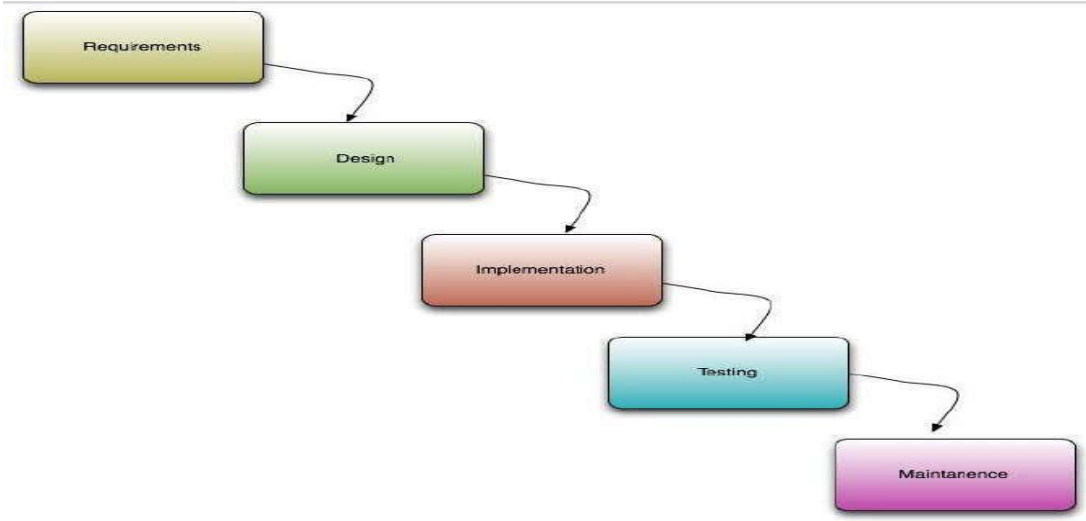
1.1Team Structure:

We worked in a team. Organised the meetings to accomplish the task of writing SRS. In each time we met we arranged the tasks randomly. In other words, all of us worked on both design and documentation.

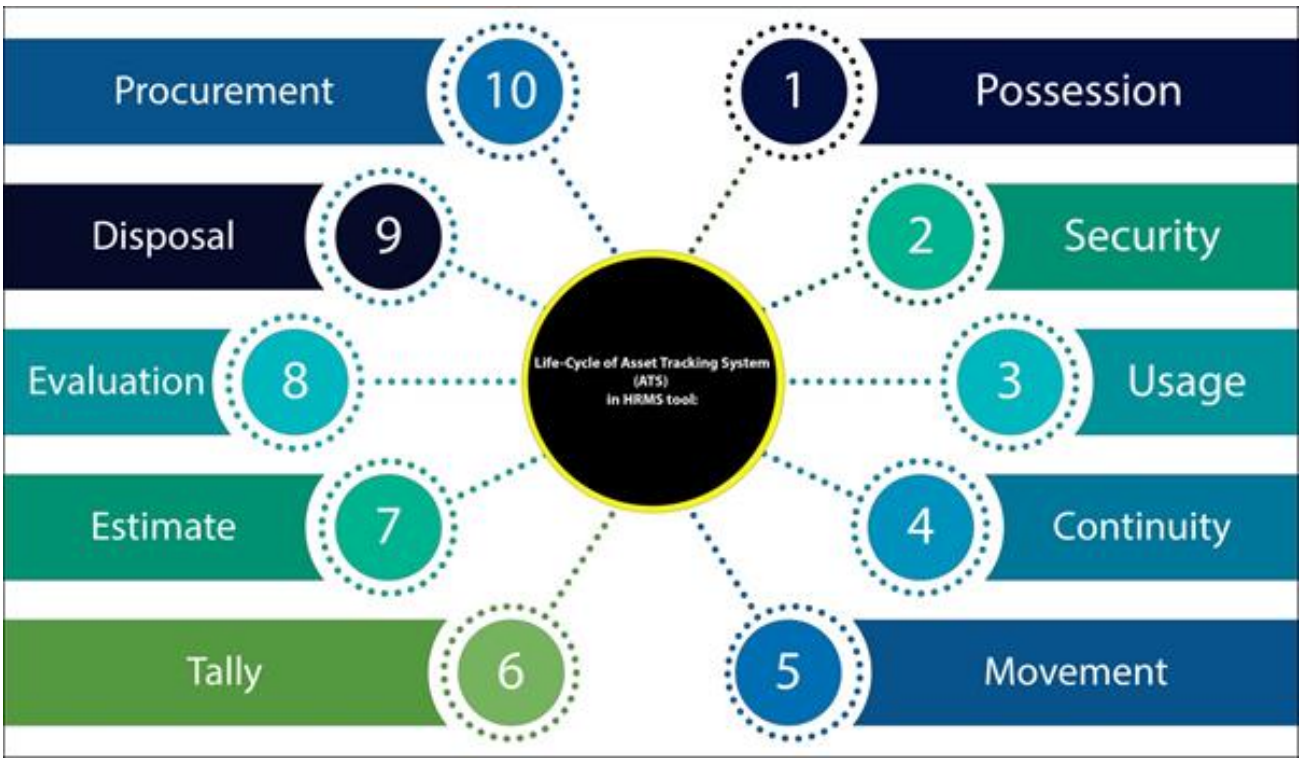
1.2Estimation (Basic Schedule)



1.3 Process model:



2.Tracking:



2.1 Possession:

First, each and every asset item is uniquely identified. Most assets like electronic equipment have a unique serial number. If required, we can also print our own or buy pre-printed barcode labels and associate the assets with company location, vendor name, purchase order and other details can be easily processed into HRMS SaaS application with the assistance of electronic data processing (EDP).

2.2 Security:

Assets should be insured in order to protect company assets from theft or damages due to fire accidents or other such calamities. These details along with intellectual property or agreements are secured into HRMS application that helps to avoid such sudden losses by claiming the damages against the insurance policy.

2.3 Usage:

In HRMS, employee onboarding involves action items like asset assignment to new joiners of the company. What item has to be assigned, who has what item, when they had it, date of expiry of possessing the item, location of the asset etc. are all controlled and the movement can be tracked via HRMS records.

2.4 Continuity:

It is necessary for certain assets to bear maintenance/services for the enhancement of particular asset performance and it’s vitally important to get email notification or SMS alert to the asset admin. The HRMS application can raise the comprehensive report related to assets maintenance due dates.

2.5 Movement:

HRMS tracks the movement of every asset from the employee usage to its return. Where each asset is located and sees who the assigned employee is, this enhances security by taking control of company assets at a lower cost and will increase company efficiency.

2.6 Tally:

The total list of items in a selected location such as assets purchased, assets assigned, assets not in use, damaged assets can be tracked, controlled and record will be stored in the HRMS application. It also provides tangible proof of transactions and receipts and also customizable to include critical information such as contract/legal terms, itemised lists, asset ownership, due dates, etc.

2.7 Estimate:

The life of any tangible asset is not fixed. Over time assets age need to be ascertained. These activities are needed to ensure assets retain value and remain usable to the business. Calculating each asset's value can be done in the HRMS application at any time, with client choice of depreciation method.

2.8 Evaluation:

For the purpose of finding out the valued asset, one will have to refer to the original invoices, cost accounts and market prices, which can be ascertained, form the financial papers, etc. HRMS, quickly provide commonly requested goods and repurpose returned assets. Create a purchase order with a single click for requested items that are not in stock. Ordered assets are tracked and, once received, are automatically updated in the system

2.9 Disposal:

Assets that are returned by the employee because of an employee off-boarding process or to be replaced for its maintenance, are tracked in the application and we can create, run, schedule and share reports.

2.10 Procurement:

HRMS enables asset managers to merge their procurement needs and provide a comprehensive and configurable procurement workflow, which includes tracking asset requirements and send a request for quotes. Vendors can submit quotes online. Comparison of vendors' quotes for products and services with regards to price and quality, release of purchase orders with dynamic approvals from configurable authority sequence in an organisation can be managed from HRMS. Ordered assets are tracked and once received are automatically created in the system. This creates a new cycle for that product.

Experiment 10

SOFTWARE TESTING

1. Testing plan:

The objective of the system testing is to ensure that all individual programs are working as expected, that the programs link together to meet the requirements specified and ensure that the computer system and the associated clerical and other procedures work together. Systems are not designed as entire systems but they are tested as single systems. The analyst must perform both unit and system testing.

Different types of testing methods are available. We have tested our system for different aspects like Does the application meet the goals for which it has been designed? This was a very important question that stood before us as the application was designed to be implemented on such a large network.

To fulfil its goal of being able to run on different systems we went through a series of tests at different places where this is supposed to be used the most. As we need to make our system efficient enough, we need to test it thoroughly.

Finally, we tested the system with real-time data, for which it is actually designed. We are successful in satisfying our needs as it was designed according to client's requirements. But it is very necessary to maintain this application and so our work is still not over.

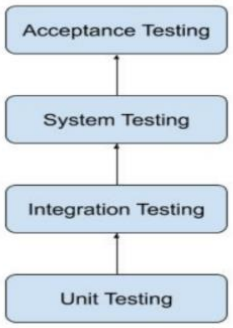


Fig: Testing Plan

2. Testing Strategy:

Once source code has been generated, the software must be tested to uncover as many errors as possible before delivery to the customer. Our goal is to design a series of test cases that have a high likelihood of finding errors. Software testing techniques provide systematic guidance for designing tests that (1) Exercise the internal logic of software components (2) Exercise the inputs and outputs domains of the program to uncover errors in program function, behaviour and performance.

During the early stages of testing, a software engineer performs all tests. However, as the testing process progresses, testing specialists may become involved. Reviews and other activities can and do uncover errors, but they are not sufficient. Every time the program is executed, the customer tests it! Therefore, you have to execute the program before it gets to the customer with the specific intent of finding and removing all errors. In order

to find the highest possible number of errors, tests must be conducted systematically and test cases must be designed using disciplined techniques.

Testing Objectives

- Testing is a process of executing a program with the intention of finding an error.
- A good test case is one that has a high probability of finding an as-yet undiscovered error.
- A successful test is one that uncovers an as-yet undiscovered error.

Unit Testing

Unit testing is a software development process in which the smallest testable part of an application, called units, are individually scrutinised for proper operation. Unit testing is often automated but it can also be done manually. This testing mode is a component of Extreme Programming (XP), a pragmatic method of software development that takes a meticulous approach to building a product by means of continual testing and revision.

Unit testing involves only those characteristics that are vital to the performance of the unit under test. This encourages developers to modify the source code without immediate concerns about how such changes might affect the functioning of the units or the program as a whole. Once all of the units in a program have been found to be working in the most efficient and error free manner possible, larger components of the program can be evaluated by means of integration testing.

System Testing

Now, it's time for whole System testing. We have found some cosmetic bugs and minor bugs. We have fixed it and tested it again. We worked on each error and exception that we got while testing and most of them are resolved or handled programmatically.

Recovery Testing

It is a system test that forces the software to fail in a variety of ways and verifies that recovery is properly performed.

Performance Testing

It is designed to test the run-time performance of software within the context of an integrated system performance testing occurs throughout all steps in the testing process.

3. Testing Methods

We Used Acceptance Testing

Acceptance testing can be connected by the end user, customer, or client to validate whether or not to accept the product. Acceptance testing may be performed as part of the hand-off process between any two phases of development. The acceptance test suite is run against the supplied input data or using an acceptance test script to direct the

tester. Then the results obtained are compared with the expected results. If there is a correct match for every case, the test suite is said to pass.

4. Test Cases

To minimise the number of errors in software, a rich variety of test design methods have evolved for software. These methods provide the developer with a systematic approach to testing. More importantly, methods provide a mechanism that can help to ensure the completeness of the test and provide the highest likelihood for uncovering errors in software. An engineering product can be tested in one of the two ways:

● Knowing the specified function that product has been designed to perform, tests can be conducted that demonstrate each function is fully operational while at the same time searching for errors in each function.

● Knowing the internal workings of a product, tests can be conducted to ensure that “all gear mesh “, that is, internal oppression are performed according to specifications and all internal components have been adequately exercised.