A Performance Appraisal System for Managing the Promotion and Demotion of Employees

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Declaration and Approval

I declare that this work has not been previously submitted and approved for the award of a bachelor's degree by this or any other University. To the best of my knowledge and belief, the work contains no material previously published or written by another person except where due reference is made in the work itself.

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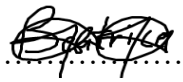

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Supervisor's approval:

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26th-JAN-2021 …….. [*Date*]

Abstract

Promotion of employees at work increases the productivity of the organization. It also enables competent employees to get the chance to be retained in the organization and it also helps the organization to focus on talented employees. Demotion of employees on the other hand is used as a disciplinary tool in most organizations. Promotion and demotion of employees is done by the Human Resource Manager and other times the director of that particular department is involved. Due to cases of favouritism, corruption and seniority at work, a system is required to help handle the situation.

The aim of the system is to provide a fair method for the promotion and demotion of employees. The system uses weighed points, arithmetic, and logical operations to rank the employees for either promotion or demotion positions.

Rapid Application Development (RAD) is the methodology that was used to develop the system. The system was developed using Hypertext Preprocessor (PHP) scripting language, Hypertext Markup Language(HTML) for the standard mark-up language and Cascading Style Sheet (CSS) for styling. My Structured Query Language (MySQL) is the database management system that was used by the system.

The system ranks employees and aids in finding a fit employee for a particular position. The system has helped promote fairness at work and hence employees are determined to put in ore effort as they work.

Acknowledgements

My sincere gratitude to God for enabling me to have the strength, guidance and endurance to do this project. I would also like to express my sincere gratitude to my supervisor, Allan Omondi, who has guided me in understanding this project and taking me through every step. My supervisor played a great role to ensure my project is a success, corrected me where necessary and in areas that needed improvement as well.

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Chapter 1: Introduction

1.1 Background

Promotion of employees at workplaces is not only a way to add responsibilities to an employee but is a major form that boosts an employee's motivation and morale at work (When and How to Promote Your Employees, 2015). Demotion of employees at workplaces is often not an easy task, but in most cases has to be done. In cases where an employee is not performing well at their current position, his or her responsibilities are reduced or the employee is terminated (Demoting an Employee | How to Demote an Employee Legally, 2017). There are various ways in which promotion and demotion of employees is done in an organization. However, the methods used for promotion and demotion of employees is still a significant issue in cases of favouritism, biasness, corruption and seniority.

The developed system, a performance appraisal management system for KEMRI-KISUMU (Kenya Medical Research Institute) organization stores educational records, career achievements, work discipline and the strengths and weaknesses of an employee at work which is used to manage the promotion and demotion of employees at work. The developed system has provided a fair method for promotion and demotion of all the employees. The developed system also monitors the organization's productivity at an acceptable standard.

This helps to promote good relation between the employees in KEMRI-KISUMU organization. The developed system creates a health competition among the employees since each employee looks forward to getting a promotion and hence puts in more effort towards the organization's productivity at an acceptable standard. The developed system has put in more emphasis on the best way in which the employees can be promoted and demoted fairly doing away with cases of favouritism, biasness, corruption and seniority. Putting into considerations the employee's loyalty and even length of services.

1.2 Problem Statement

Currently in KEMRI-KISUMU, management of the promotion and demotion of employees is done by the human resource manager. A problem arises when an employee is chosen based on personal preferences by the human resource manager as opposed to being chosen objectively based on the employee's performance. There are cases where this is caused by work favouritism. A problem also arises due to corruption deals, by an employee who is a potential fit for the position, to secure the position and avoid competition from his/her colleagues. There are cases where falsification of work required documents is presented to the human resource manager by an employee. There is also need for the organization to track how employees are performing at work and hence help the organization to monitor its productivity at an acceptable standard. It is therefore necessary to develop a system that evaluates performance of the employees fairly and hence aid in the process of promotion and demotion of employees.

1.3 Aim

The aim of this project is to develop a performance appraisal system to help manage the promotion and demotion of employees at work. The developed system uses performance appraisals to rank the employees and aid in finding a fit employee for a certain position. The developed system captures the employee's educational records, work discipline, career achievements and the strengths and weaknesses of the employee at work. This aids in monitoring the organization's productivity at an acceptable standard.

1.4 Specific Objectives

i. To identify the challenges faced by the human resource department when promoting or demoting employees in an organization.
ii. To review existing models and algorithms related to performance appraisals and employee promotion and demotions in an organization.
iii. To develop a system for performance appraisal and promotion/demotion of employees using the most optimum algorithm.
iv. To test the developed system through unit testing.

1.5 Justification

The developed system ensures that all the employees have a fair chance during the process of promotion and demotion at work. The developed system stores employee's educational records, work discipline, career achievements, strengths and weaknesses of all the employees in the organization. The developed system recognizes every employee and keeps track of their performances. The developed system reduces the rate of favouritism, corruption, biasness, and seniority during the process of promotion and demotion of employees. The developed system monitors the productivity of an employee and how it affects the productivity of the organization at an acceptable standard economically. Since records of performance appraisal used for either promotion or demotion of an employee are done on paper and can easily be lost or altered, this is the best solution. Hence the need for a system that will limit the level of tampering and misplacement of the employee's records.

1.6 Scope and Limitations

1.6.1 Scope

The developed system has educational records, work discipline, career achievements, the strengths and weaknesses of the employees in the organization stored in the system. The developed system uses the performance appraisal of the employees to rank them either on the promotion or demotion lists. The system also aids in monitoring the institution's productivity at an acceptable standard.

Outside the scope of this project, the financial team of the organization could use data from the system to help them in remunerating promoted or demoted employees. The developed system also makes it easier for supervisors in various departments to write recommendation letters especially for attachés using data from their performance appraisals in the system.

1.6.2 Limitations

The system faced a few limitations. The main limitation is that the intended users of the system may not fully embrace the system positively. Another limitation that was faced, was during the process of developing the system, a lot of errors emerged when coding which was difficult to predict and took a long time to rectify. Delays in communication with the organization due to distance and the current pandemic we are facing as a nation also lead to delays.

Chapter 2: Literature Review

2.1 Introduction

This chapter aims to review and analyse the performance appraisal for management of promotion and demotion of employees in an organization based on previous studies with regards to promotion and demotion of employees. Section 2.2 of the review presents the importance of objectivity when promoting and demoting employees, section 2.3 presents the challenges experienced when promoting and demoting employees. Section 2.4 presents a review on models and algorithms that are used in the process of promoting or demoting employees, section 2.5 presents the unbiased algorithm. Section 2.6 presents a preview on the system testing approaches and system section 2.7 presents the conceptual diagram.

2.2 Objective Promotion and Demotion of Employees

2.2.1 Performance Appraisal

Performance appraisal is a regular review of an employee's job performance and overall contribution to an organization (Performance Appraisal - Meaning, Objectives and Advantages, n.d.). It provides a periodic review and evaluation of an individual's job performance. This may be completed once a year and requires effective communication from both the supervisor and the employee. An employee's performance should not be discussed with other employees unless stated otherwise (Performance Appraisal - Meaning, Objectives and Advantages, n.d.).

Performance appraisal provides employees with critical feedback with which they can improve their performance. It is also used to determine the promotability of employees, validate tests used to recruit and select employees for job opportunities and demotion of employees. Performance standard is used to differentiate between acceptable and unacceptable job behaviours and are identified for each job element. Performance standard explains what satisfactory performance looks like. For example, "Acceptable", " Need Improvement" and "Excellent". Acceptable stands for above minimum requirement, Need Improvement stands for generally below acceptable standards and needs more input and Excellent stands for generally exceeding expectations (Performance Appraisal - Meaning, Objectives and Advantages, n.d.).

During the performance appraisal process, the employer and the employee have an understanding on how the process will proceed. They preview the job's description, then determine the jobs elements that should be rated and document the goals for the employee. As the year processes, the appraisal performance is conducted and both positive and negative events are recorded. Necessary action is taken to address any problem that may arise. Once appraisal is done, the employee's signature is recorded on the form, the employee is then provided with a copy of the same and the appraisal document is forwarded to the director of the department of the employee and send to the Human resource manager (Steps Involved in Process of Performance Appraisal, n.d.).

2.2.2 Promotion of Employees

Promotion is the upward movement of an employee from his or her current job position to another that is better in pay, responsibility and hierarchy within the organization. Promotion is based on the merits of an employee (Promotion & Demotion in HRM Notes, 2016).

The different types of promotion include:

i. Vertical Promotion

   Is the movement of an employee from their current job position to another which is higher in pay, status, responsibility, designation and job classification.

ii. Open/ Closed Promotion

   Open promotion is when the organization announces vacancies and opens the job position to all employees in the organization. Closed promotion is when the organization does not announce any vacancies and the job position is not open to all employees in the organization.

iii. Horizontal Promotion

   Is the movement of an employee from their current job position to another which is higher in pay, responsibility and designation. However, the job classification remains the same.

iv. Dry Promotion

   Is the increase in status of the employee without any increase in pay or other financial benefits (Promotion & Demotion in HRM Notes, 2016).

Promotion in organizations help to improve employee satisfaction by rewarding committed and hardworking employees. It develops a competitive spirit among employees to acquire skills and abilities required for higher level jobs. It utilizes the skills and knowledge of an employee at an appropriate level in the organization hierarchy. Promotion of employees boosts confidence, loyalty and morale of the employee. It also promotes self-development of employees and reduces labour turnover (Promotion & Demotion in HRM Notes, 2016).

2.2.3 Demotion of Employees

Demotion is the downward movement of an employee in a hierarchy with lower status and decreased responsibilities ("Demotion of Employees," 2014).

Demotion of an employee is caused when the employee is unable to meet the challenges posed by the new job. It can also be caused by the employee having low administrative skills. Demotion of employees may also be caused due to poor business conditions and continuous losses. A firm may therefore decide to lay off some of the employees and downgrade other employees. Demotion of employees is also often used as a disciplinary tool against offending employees ("Demotion of Employees," 2014).

The different types of demotion are:

i. Voluntary Demotion

This is when the employee requests the organization to lower his workload so that the employee can manage his or her personal life or requests the organization to terminate them form work.

ii. Compulsory Demotion

This is the lowering of a job title, authority, status or even salary of an employee as a disciplinary tool or due to adverse business conditions by the organization (Demotion of Employees, 2019)

2.3 Challenges experienced with the current promotion and demotion of employees

Challenges that are experienced by the current performance appraisal for promotion and demotion of employees are:

i. It is not easy to measure merit. Therefore, personal prejudices, biasness and union pressure come in the way of promotion and demotion of employees.

ii. The use of past performances that may not necessarily be a guarantee to the future success of an employee affect either the promotion or the demotion of an employee.

iii. Young employees who get ahead of senior employees in organizations tent to create frustrations to the senior employees. The senior employees often feel insecure and result to using bribes or even falsify their work required documents during the process of promotions and demotion of employees.

iv. When the loyalty and length of a service of an employee is not properly rewarded it affects the promotion of an employee (The Trouble with Promotions | AMA, n.d.).

2.4 Models and Algorithms Applied to Support Performance Appraisal of Employees

Models and schemes that are currently used by the Human Resource Management for promotion include:

i. Up-gradation Promotion or Out Promotion

This is a kind of promotion where an employee's salary increases but there is no change in the job or even in rank. This is the dry promotion.

Government jobs that consist of several departments use paper promotion. This is based on seniority of the employee and the employee's salary is increased. Cases of out promotion come about when the amount of pay of an employee increases without a change in the job and hence the employee seeks employment somewhere else (When and How to Promote Your Employees, 2015).

ii. Comparative models of promotion

The employees have to prove their worth to their employers for them to be promoted to higher ranks or positions. This model appeals the merit-based where promotion as well as the merit come seniority. The merit-based promotion is when the employee is promoted on the basis of his or her skills, performance, knowledge, hard work and qualifications. Merit come seniority is where the employee is prompted on a balance between the merits and his or her seniority (When and How to Promote Your Employees, 2015).

iii. Non-competitive model of Promotion

These are promotions that are based on achievements and accomplishments of the employees. Once the employee has reached a certain milestone in their career, they are promoted irrespective of their performance and dedication to the organization. This model tends to promote fairness among the employees. This model has the accretions of duties promotion, time scale promotion and the aphorism promotion. Accretion of duties is a kind of promotion given to an employee when their workload increase. Time scale promotion is the promotion that takes place after the employee has spent a standard number of years working for the organization and hence promoted. Aphorism promotion is the promotion that is given to an employee without any policy but just because the organization is in a critical condition (When and How to Promote Your Employees, 2015).

Current demotion models and criteria for employees are conducted by Human Resource Managers. In some organizations, they include the director of that particular department. This may be a termination or demotion on a job task.

The steps to demoting an employee are:

i. Tell the employee about the demotion

Create time to have a private conversation with the employee in question and clearly state the reasons as to what they are being demoted. Especially in cases that deal with performance.

ii. Explain the new position

After explaining to the employee why they are being demoted, explain to them their new position. Make the employee understand their job responsibilities and expectation. In case of a decrease in the pay, clear this with the employee at this point.

iii. Make a transition plan

Draft a plan of the work transition. If the employee has to hand over some projects, ensure this is done smoothly. Set a date on when they can officially begin working at their new position.

iv. Inform necessary people

It is not necessarily appropriate to announce the demotion publicly to all the other employees. This will affect the morale and self-confidence of the employee in question. In cases where the employee was a supervisor, talk to his or her supervisees and tell them who they will be reporting to now (Demoting an Employee | How to Demote an Employee Legally, 2017)

2.5 Unbiased Algorithms

The developed system uses weighed points, arithmetic and logical operations to rank the employees either on promotion lists based on the job requirements needed at that particular time or demotion lists. This ensures that there is no favouritism, biasness, corruption or even intimidation of young employees by the senior employees. The developed system provides an honest and transparent method of either promoting or demoting employees in an organization. This in turn promotes hard work among the employees. It has also helped in developing competitive spirit among the employees within the organization.

2.6 System Testing Approaches

System testing is testing the entire system to see if there are any errors and to check and see if it is functioning as expected. System testing approach defines how the testing is to be done. It is a strategy (Scribd, 2018). Test strategies are high level documents that define the approach for software testing (Testing et al., 2018).

System testing can be done either using black box testing or white box testing. Black box testing tests the external work of the software from the user's perspective. White box testing is testing the internal work of a software application. Beta testing can also be used to test a system. It is a type of test that is conducted by the customer and is done in a real-world environment before having to release the system to the market to its users. Most developers prefer to use alpha testing. This test identifies all the possible issues before releasing it to the market or to its users (Awan et al., 2018).

2.7 Conceptual Framework

A conceptual diagram is a diagram the illustrates how the concepts of the developed system operates. The Human Resource Manager keys in information of an employee after being accepted as an employee in the organization. The records of the employee can then only be updated by the Human Resource Manager once approved by the director of the department upon merit. Therefore, during promotion or demotion, listed employees will be ranked by the system according to the required qualifications. Figure 2.1 shows the conceptual diagram.

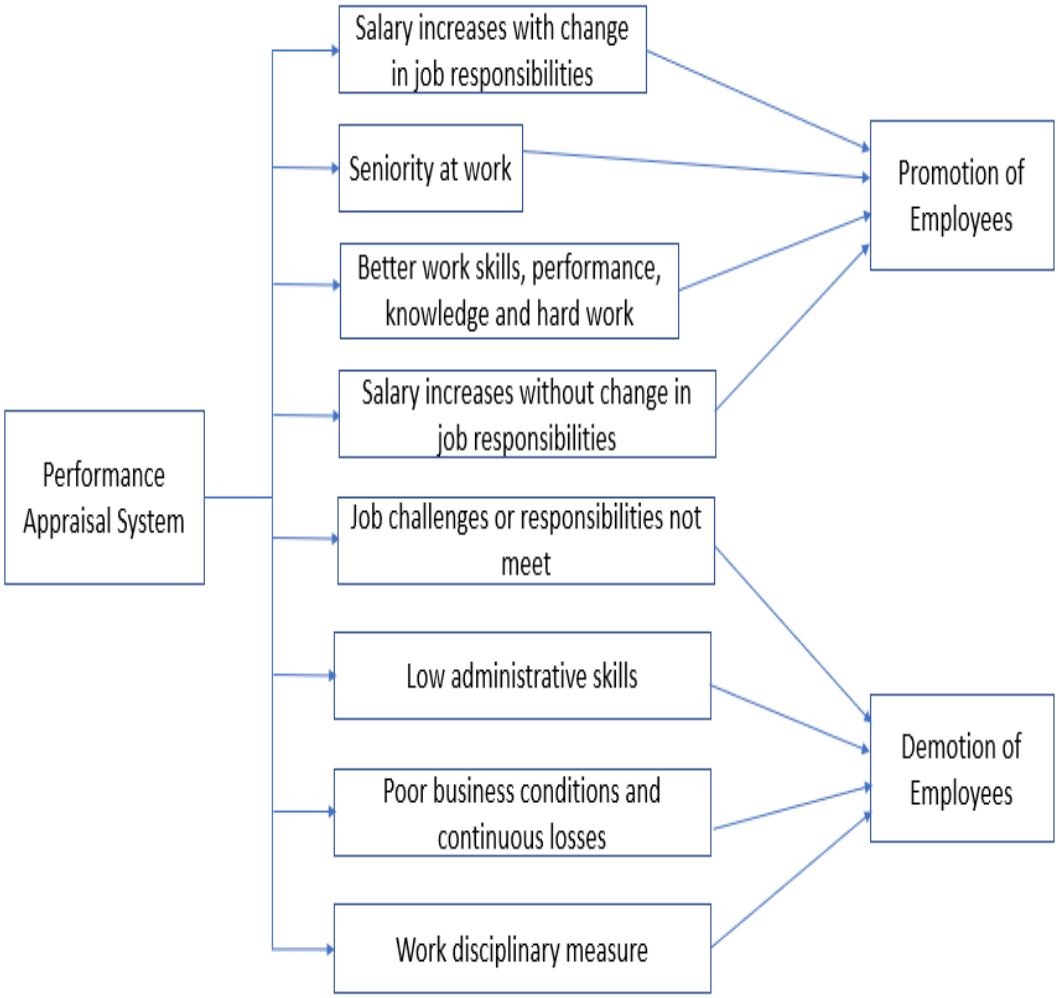


Figure 2:1: Conceptual Diagram

Chapter 3: Research Methodology

3.1 Introduction

Research Methodology are the specific techniques or procedures that are used to identify, select, process and analyse a particular problem or an idea. Research methodology helps in critical evaluation of literature. It helps to develop special interests and also helps to create awareness of the special needs of the research process.

The developed system has adapted the Structured Systems Analysis and Design (SSAD) approach. This approach enabled the developer to understand the system and its functionalities in a more logical way. The approach is very easy to implement. It is visual, hence makes it easier for users to understand the developed system. It also has good quality software that has helped met the system requirements.

The developed system has used the Rapid Application Development (RAD) as the system development methodology. It has emphasized on rapid prototyping and iterative delivery. RAD has fast user feedback, measurable progress and is also flexible for adaptability. RAD is simple to adapt, all these were important in the development process of the system.

3.2 Research Design

Research design is a plan, structure and strategy of investigation conceived to obtain answers to research questions or problems. Research design can either be quantitative or qualitative. Quantitative designs are designs that are well structured, specific and have been tested for their validity. Whereas qualitative designs are less specific, less precise and do not have much structural depth.

The developed system implemented the quantitative study design which was examined from three different perspectives that include:

i. The number of contacts with the study population (Use the Cross-sectional study)
ii. The reference periods (Use Prospective)
iii. The nature of the investigation (Use Experimental)

Based on the number of contacts, the developed system used the cross-sectional study design. With the Cross-sectional study design look, it looked at data from a population at a specific time in point. It does not involve the use of manipulative variables. It helped to provide information about what was happening in the current population. Cross-sectional study design allowed the researcher to have a look at the numerous characteristics all at once. It is often used to make inferences about possible relationships.

Reference period is the time frame in which a research explores a problem. The developed system used the prospective reference period. This referenced period attempt was to establish the outcome of the various events.

The developed system applied the use of the experimental study. This is the study of a relationship from its cause to its effects. Since experimental design has various designs, comparative experimental design was used to develop the system. Comparative experimental design was used to compare the various models and algorithms and the best was thereafter identified.

3.2.1 Experiment Procedure

The Experiment procedure conducted for the developed system is explained step by step below:

1. A review was done on the already existing models and algorithms in relation to performance appraisal and promotion and demotion of employees.
2. The models and algorithms were then compared.
3. After comparison, the best identified algorithm and model was used in the development of the system.

Experiment procedure is a step-by-step guide on what was done to finally have the developed system.

3.2.2 System Development Methodology (RAD)

System development methodology is a framework used to structure, plan and control the process of developing an information system. It helps to provide good quality maintainable software within reasonable time frame at an affordable cost.

RAD is a method of software development that highlighted on the iterative delivery and rapid prototyping. It focused largely on planning and sequential design practices. The use of prototypes in the development process enabled feasibility, user involvement, error reduction and debugging. Use of RAD allowed for early system integration and was also simple to adapt. It also had rapid and constant user feedback. It helped to quickly generate productive code and also allow for measurable progress. RAD was developed for software that conforms to the user requirements. The development process suited for the adaptability to accommodate new information that was gained during the project's lifetime. RAD followed a recurrent process of four steps which were Planning Requirements, User design, Rapid Construction and Cutover (Ftms.edu.my, 2018). Figure 3.1 below shows the four phases of Rapid Application Development.

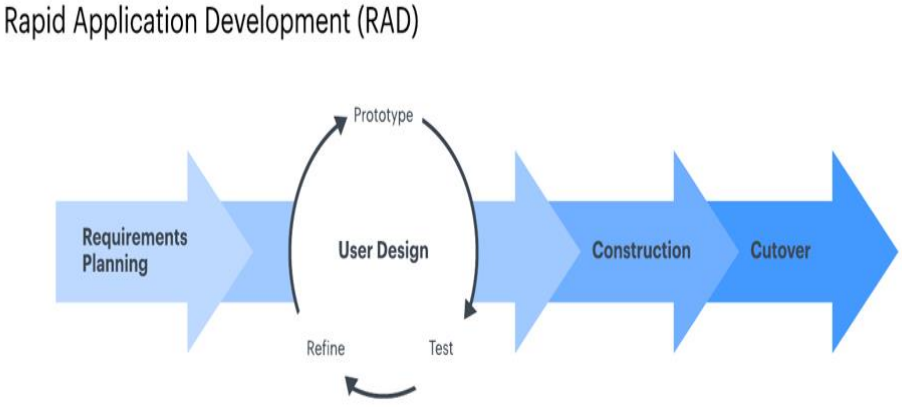


Figure 3:1: Four phases of the Rapid Application Development (RAD) (Adapted from lucid chart, 2018)

3.2.2.1 Planning Requirements

During this phase, the clients, developers and the team members determined the expectations and goals of the system. They looked into the issues that needed to be addressed as the development process continued. The involvement of both parties at this particular phase was important as it helped to avoid miscommunication. Planning requirements phase had the following steps, researching current situation, defining the requirements, and finalizing requirements. Figure 3.2 below shows the tasks involved in the planning requirements phase.

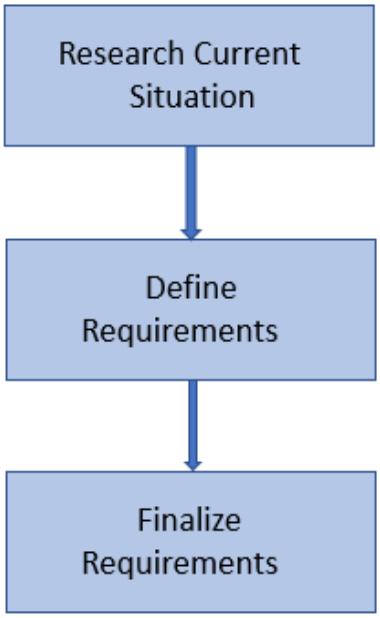


Figure 3:2: Tasks in Requirements Planning Phase (Adapted from lucid chart, 2018)

a) Research Current Situation

Member(s) who were involved in the project had to acquaint themselves with the environment. Investigation of current approaches, models and architecture was thereafter done to see if any could be reused.

b) Define Requirements

The system model and scope were developed at this moment. Issues that might have affected the system were identified while performing this task. Data that the system supported together with the functionalities were expressed.

c) Finalize Requirements

Preparation on cost and estimation and the duration to implement the system was determined. The scope of the system was officially documented and an approval was obtained to proceed to implement the system. Being that the cost and duration of the system were well defined, the system was viable.

3.2.2.2 User Design

In this phase, an implementation plan, a detailed system area model and an outline system design was produced. The user design phase involved producing a detailed system area model, developing the outline system design, refining the system's design, preparing implementation strategies, finalizing system design and obtaining approval for construction. Figure 3.3 below shows the tasks in the user design phase.

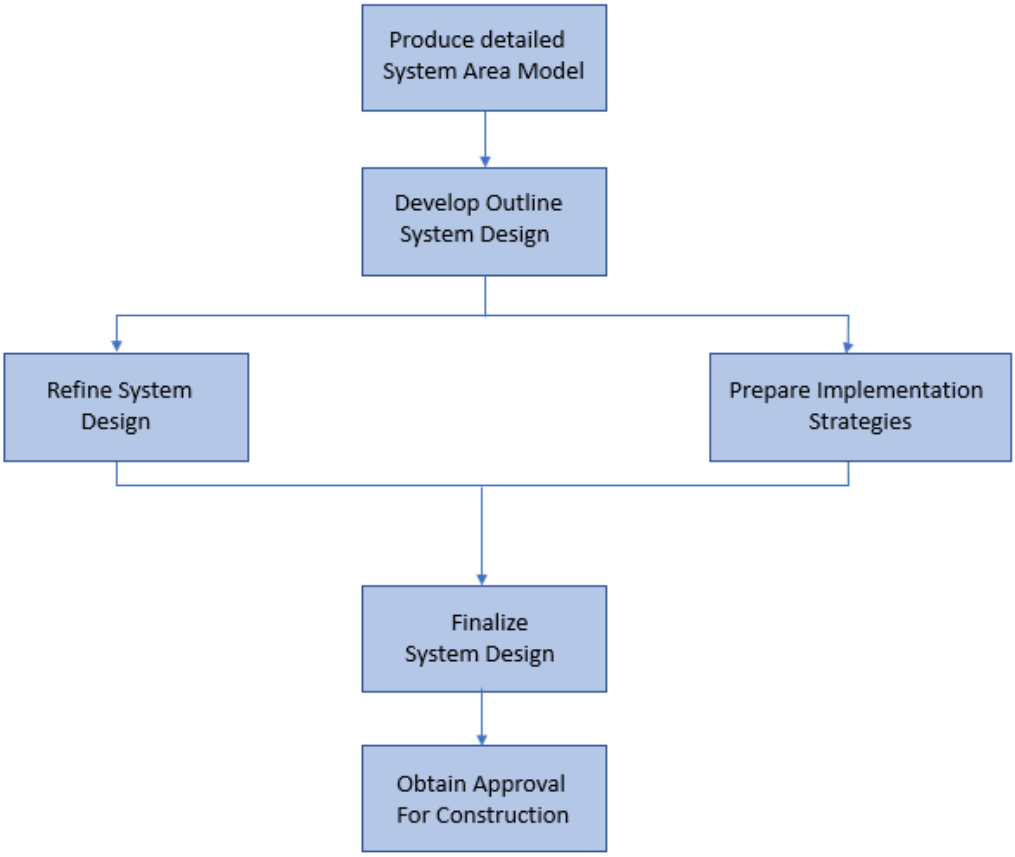


Figure 3:3: Tasks in the User Design Phase (Adapted from lucid chart, 2018)

a) Produce Detailed System Area Design

Analysis of activities and data associated with the developed system was completed which led to the production of a detailed system area model. Thereafter, the scope was refined to ensure that functions were delivered at the required time.

b) Develop Outline System Design

Once system area model was developed, it was then used to come up with an outline system design. Interactions between procedures and data were then identified. Data usage per function were also defined. Deliverables that were produced during this task are reusable design components, functions that were required for the system, layouts for the screen, reports that were supported by the system and system structures.

c) Refine System Design

The design was then reviewed by the project supervisor. Interactions between data and functions were analysed to identify any missing data or function. Verification of the system design was then done by the supervisor.

d) Prepare Implementation Strategies

An implementation plan for the system was then developed after the system design was reviewed. The implementation plan listed all the tasks that were performed to develop the system and have the system in operation. An overall project cost estimate was then done.

e) Finalize System Design

The project supervisor reviewed the developed system and suggested any changes that were made to the system to enable it to work more efficiently.

f) Obtain Approval for Construction

Incorporation of the system design was done and an approval to proceed was obtained.

3.2.2.3 Rapid Construction

In this phase, after the completion of the design of the system was done, a software application to implement the design was then developed. Preparations to transit the system to production was then be measured. The steps involved in this phase were preparing for rapid construction, constructing the system, generating data and system documents, preparing for transition and verifying system construction. Figure 3.2 below shows the tasks in the rapid construction phase.

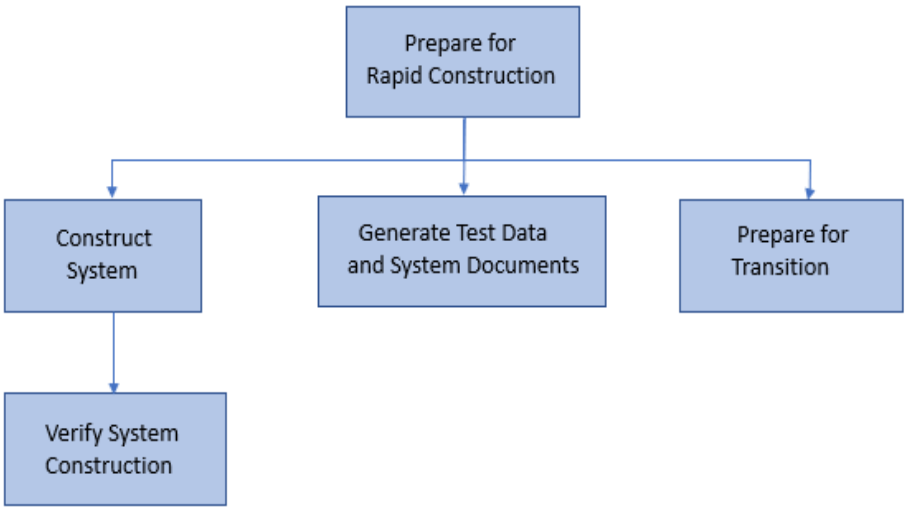


Figure 3:4: Tasks in the Rapid Construction Phase (Adapted from lucid chart, 2018)

a) Prepare for Rapid Construction

The database was designed based on the data structure that was developed in the user design phase. Acquisition of facilities to operate the developed system was done and the testing strategies for the system were then identified.

b) Construct System

Based on the analysed requirements, the designs of each function were completed. The automated functions were developed and tested using the software that was implemented.

c) Generate Test Data and System Documents

A necessary test data was developed to verify the operational capacity of the system. The computer operational personnel were then provided with a documentation explaining how the system is to be operated on by both the end users and the computer operational personnel.

d) Prepare for Transition

A detailed work plan for the transition of activities was then prepared. Software that was used in converting data from existing formats to formats that were used by the application was developed. A training session for the users of the system was thereafter planned.

e) Verify System Construction

The developed system was put to test to ensure that all the functionalities were working to be able to meet the system's requirements identified earlier.

3.2.2.4 Cutover

Preparation of existing data for the system was done. Users were trained on how to operate the system using existing data that was prepared. Support to solve any arising issues after the application shall have been implemented was provided. The cutover phase tasks were conducting user training, performing data conversion, installing production system and accepting system installation. Figure 3.5 below shows the tasks in the cutover phase.

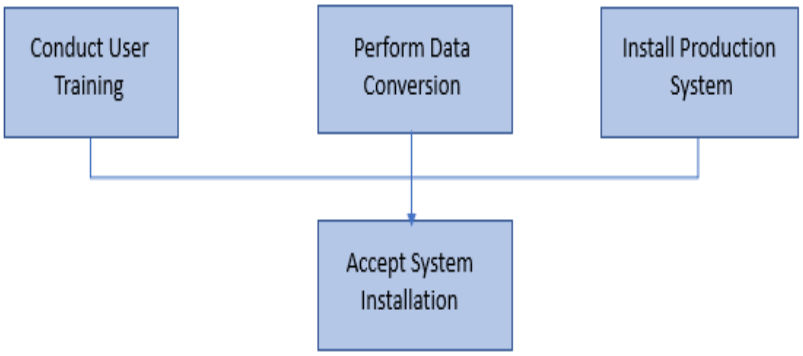


Figure 3:5: Tasks in the Cutover Phase (Adapted from lucid chart, 2018)

a) Conduct User Training

A training session was conducted to explain to the users how the developed system operates. The training was completed before the application was put to action.

b) Perform Data Conversion

Converting of existing data to a format accessible by the new system that has been developed was necessary for the operation of the system. Converted data was then loaded into data structures within the system.

c) Install Production System

The hardware of the developed system had necessary adjustments done to it and the system software configuration were completed as well. Computer operation personnel were given instructions on how to operate the developed system and the software libraries were loaded with production versions of the application software.

d) Accept System Installation

Acceptance of the developed system was mainly based on how it performed. If the developed system meets the tolerance for performance, usability and error route, the developed system will be accepted.

3.2.2.5 List of Design Diagrams that will be drawn in Chapter 4

Design diagrams help to identify the essential components of a system. Design diagrams that were used to develop the system were Context Diagram, Data Flow Diagram (Level 1), Data Flow Diagram(Level2), Entity relationship diagram (ERD), Database schema and Graphical user interface (GUI).

i. Context Diagram

Context Diagram shows the data system as a whole and have more emphasis on how it reacts with the external entities.

ii. Data Flow Diagram(Level 1)

Level 1 data flow diagrams break the main processes into sub processes that can be analysed and improved on a more intimate level. They are more detailed that level 0 data flow diagrams.

iii. Entity Relationship Diagram

An entity relationship diagram is a visual representation of different entities within a system and how they relate to each other. The use of entity relationship Diagrams helped in designing the database schema that was used for the developed system. Entity relationship diagrams are easy to understand therefore, this enables the designer to easily communicate to the developer and even the customers.

iv. Database Schema

The database schema provides a means to display functions, fields and relations. It defines the entity and the relation among them. It is a local and visual architecture of a database created on a database management system to provide graphs for the entire database.

v. Graphical User Interface (GUI)

Graphical user interface has interactive visual components. They provide users with immediate feedback about the effect of each action taken. Graphical user interface is much easier to use since one does not necessarily have to memorise the commands. Graphical user interface allows for multiple programs or instances to be displayed simultaneously. Users do not need to know any programming language to be able to use them and they make computer operation more intuitive.

3.2.3 Experiment Test Data

Test data is the data the developer intends to use in the process of testing the developed system. The comparative experimental design compares the effectiveness of different modalities. Sample data of at least 20 employees from a given organization was used. The comparative experimental design was used to compare the various models and algorithms related to performance appraisals and employee promotion and demotions in an organization. The test data was required to conduct these experiments. The performance appraisal and subsequent promotion or demotion of employees was obtained as an output of the experiments and compared with real data from the organization to determine the accuracy of the algorithm. This was to enable us establish whether the algorithm promotes or demotes correctly.

The developed system used unit testing to test the system. Unit testing is a software testing method where the functionalities of a system are tested. This unit testing method was performed using the Black box unit testing. Black box unit testing tests the functional or the non-functional components of the system. Unit testing is preferred because the codes are reusable, and it makes debugging easier. The cost of having to fix a defect during testing is less costly compared to fixing defects after deployment. Unit testing also increases the confidence of changing the code and its maintenance.

3.2.4 Experiment Test Bed

Experiment test bed are the equipment or tools the developer uses to conduct the experiments. The development tools that were used for the developed system were bootstrap for the framework that will be developed using Hypertext Mark-up Language (HTML) and Cascading Style Sheets (CSS), PHP programming language, Structured Query Language (MySQL) for the database management system and JavaScript for the Integrated Development Environment (IDE) that worked hand in hand with sublime text and Laravel. The developed system is a wed based application and the domain used is a desktop. This is because it has centralized data, it is secure, and it is easy to back up. Figure 3.6 below shows the architecture of the test bed.

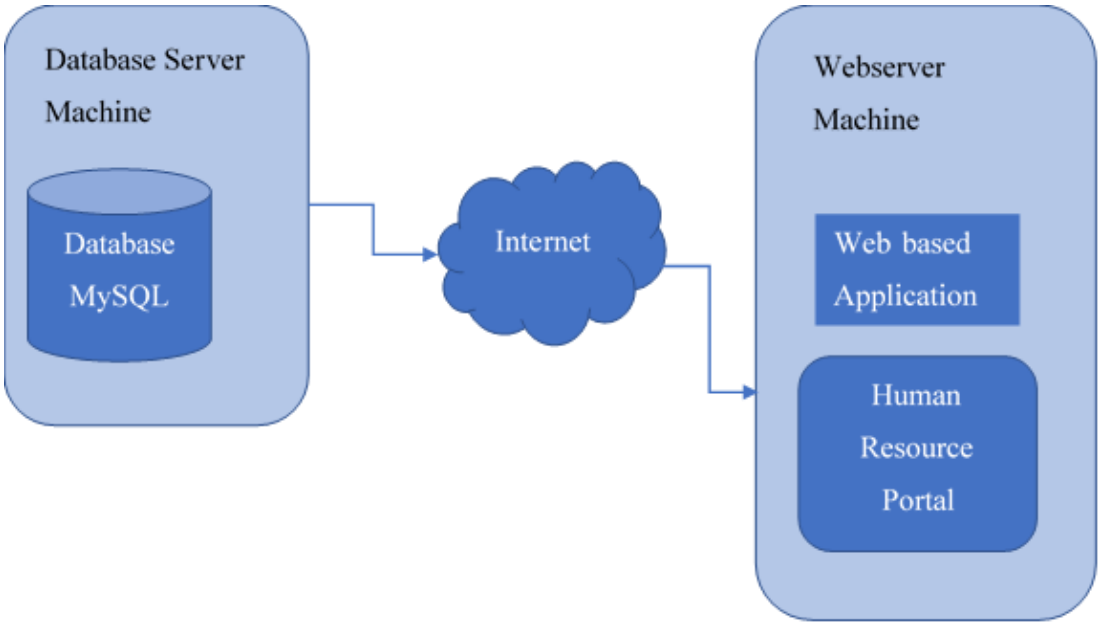


Figure 3:6 : Architecture of the Test Bed

Modules are software components that contain one or more routine and each module serves a unique operation. The developed system has the human resource module. Figure 3.7 below shows the system architecture of the developed system.

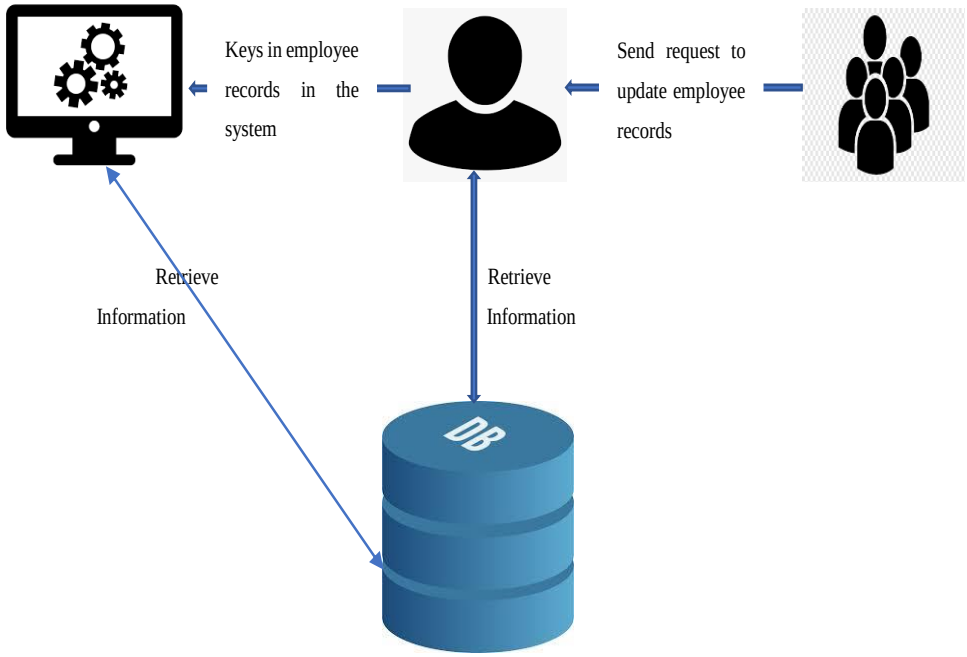


Figure 3:7: System Architecture of the developed system

3.3 Data Collection Methods

Data collection methods are the processes of gathering information from all relevant sources on a particular topic to find answers to a research problem. The hypothesis is then tested and the outcome of the findings are evaluated. Data can either be collected from a primary source (data or finding that have already been published) or a secondary source (first-hand information). Primary data collection can either be quantitative or qualitative. Quantitative data is data that can be measured while qualitative data is data that is descriptive. It can be observed and not measured.

3.3.1 Population Description

Population description are people within the same given area. These people are subject to similar environmental constraints, they mostly rely on the same resources and depend on each other over time.

The population for the developed system were the employees and the human resource manager in KEMRI-KISUMU organization.

3.3.2 Sampling Distribution

Sampling distribution is a static that is arrived at by repeated sampling from a larger population. Data from sample distribution are used to make inferences about the overall population. Sampling helps to save on time. Sampling distribution was done using a sample formula. Given that the population description was identified as the employees and the human resource manager at KEMRI-KISUMU, a sample of at least 3 employees in each department was used. The results from the employees helped in knowing how often the employees are promoted or demoted and what are the characteristics that are taken into consideration during promotion and demotion of employees. The results from the human resource manager helped in knowing how often the human resource manager takes bribe, favour other employees, rig the results or if they have a fair process.

3.3.3 Methods used to Gather the Functional and Non-Functional Requirements

Functional Requirements describe how the system is to work, its components and functionalities. Non-functional requirements describe the general characteristics of the system and its quality attributes. Methods that were used to gather the functional and non-functional requirements for the developed system were:

i. Questionnaires

Questionnaires are a series of questions prepared by the researcher and are to be answered by the participants. Confounding variables were not included in the questionnaires. Confounding variables are outside influences that happen to change the aim of the questionnaire. The questionnaire used was truthful, simple, logical and direct. A draft of a questionnaire that was used has been provided in Appendix B.

ii. Prototyping

Feedback form the questionnaire aided in developing the system. From the responses given, the functionalities were well stated and expectation of the organization on what the system was to do was clear.

3.3.4 Functional and Non-Functional Requirements

Functional requirements are basically what the system is supposed to do. The developed system has the following functional requirements.

i. Authentication

The developed system gives access to the human resource manager (admin) and the employees (including the Head of Departments, HOD).

ii. Administrative Functions

The developed system allows the human resource manager (admin) to edit the employee's records.

Non-functional requirements are the qualities attributed to a system. They are not necessarily affected by the specific services delivered by the system to its users. The developed system has the following non-functional requirements.

i. Usability

The developed system is easy to use and understand.

ii. Reliability

The developed system clearly explains the consequences of a failure, how to protect from a failure and a strategy for error detection.

iii. Security

The developed system is able to protect data in the system against any possible attack.

iv. Performance

The developed system is able to perform its tasks efficiently.

3.4 Data Analysis Methods

Data analysis is the process of cleaning, transforming and modelling data to discover useful information and help in making decisions. Challenges that were faced during the process of promotion and demotion of employees were identified through the questionnaires that were given. Also, from the reviews made through existing algorithms and models used for promotion and demotion of employees. Use of correlation analysis was applied and used to learn the relationship between the results obtained and the challenges that were identified.

3.5 Ethical Considerations

Research ethics applies moral rules and professional codes when collecting, analysing and publishing findings. It was considered right from the beginning of the project to the end of the project.

Some of the ethical issues that were put into considerations for the developed system were:

i. Informed Consent: During collection of information about how promotion and demotion of employees is done, the participants involved were informed about the aim of the research and allowed to give their consent to participate.

ii. Confidentiality: Information was only made available to the people involved in the research and not otherwise. There was no revealing of identities of the participants who were involved.

iii. Voluntary Participation: Participants were able to decide if they wanted to participate in the research or not. There was no forced participation in the research.

iv. Right to Withdraw: Any of the participants who was involved in the research and wished to withdraw, were allowed to do so.

v. No Harm: The research ensured that all the participants were protected from any kind of harm be it physical, emotional or even psychological.

Having these ethical considerations during the research enhanced the validity and reliability of the developed system.

Chapter 4: System Analysis and Design

4.1 Introduction

This chapter majorly focused on data collection and data analysis, system analysis and system design sections. System data section has more information on the questionnaire that was issued. System analysis section has more information on both the functional and non-functional requirements. These are basically the characteristics the system needed to have and what the system must do. The system design section has figures showing the diagrams that were identified earlier in chapter 3 illustrating more about the system. The diagrams are Context diagram, Data flow diagram level 1, Data flow diagram level 2, Entity relationship diagrams, Database Schema and Graphical user interface (GUI).

4.2 Data Collection and Data Analysis

The questionnaire had 7 respondents. Below is a sample of the results and the impact they had on the system.

The figure 4.1 below shows the results of question 3 from the questionnaire provided.

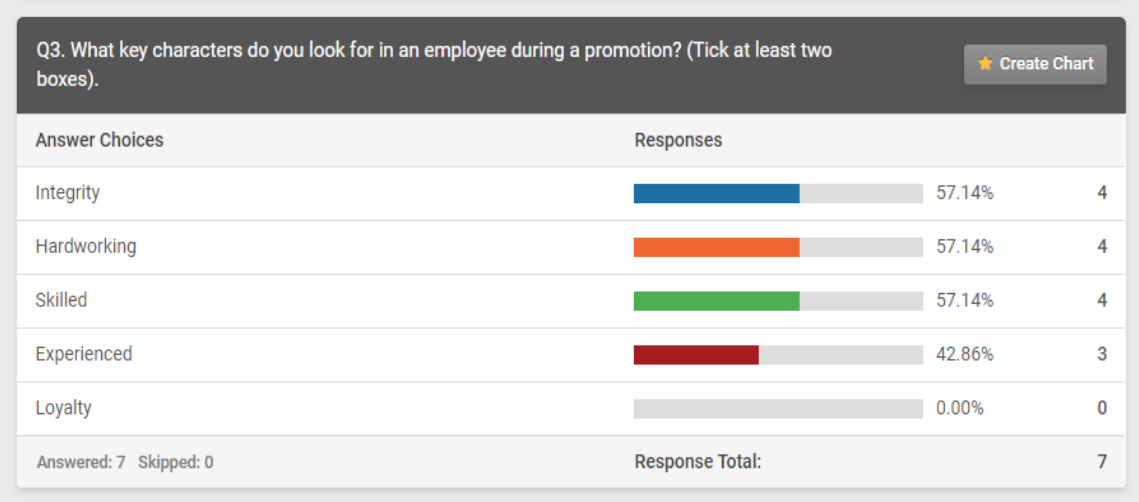


Figure 4:1: Results of question 3 from the questionnaire provided

From the results, when creating an algorithm that worked in the system to aid in the process of promotion, hard work, integrity and work skills are the key characters that were included in the algorithm.

The figure 4.2 below shows the results of question 4 from the questionnaire provided.

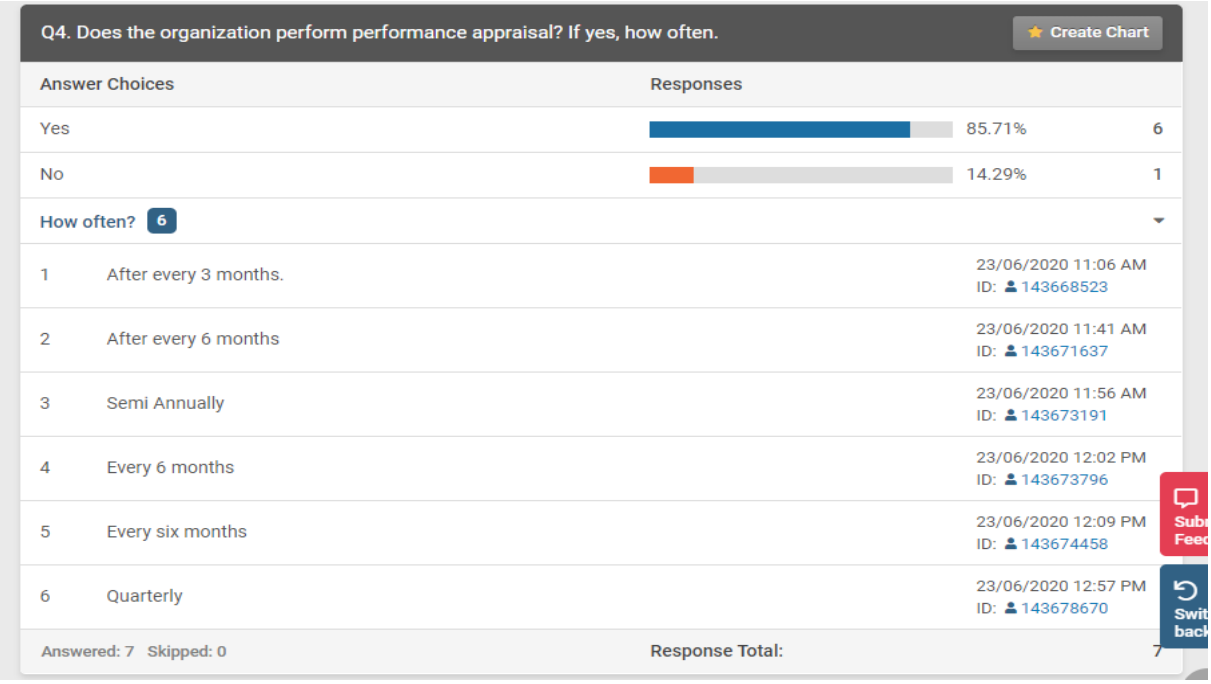


Figure 4:2: Results of question 4 from the questionnaire provided

From the results, it was important to include time for performance appraisal in the algorithm. Preferably, the performance appraisal was stated be done after every six months.

The figure 4.3 below shows the results of question 10 from the questionnaire provided.

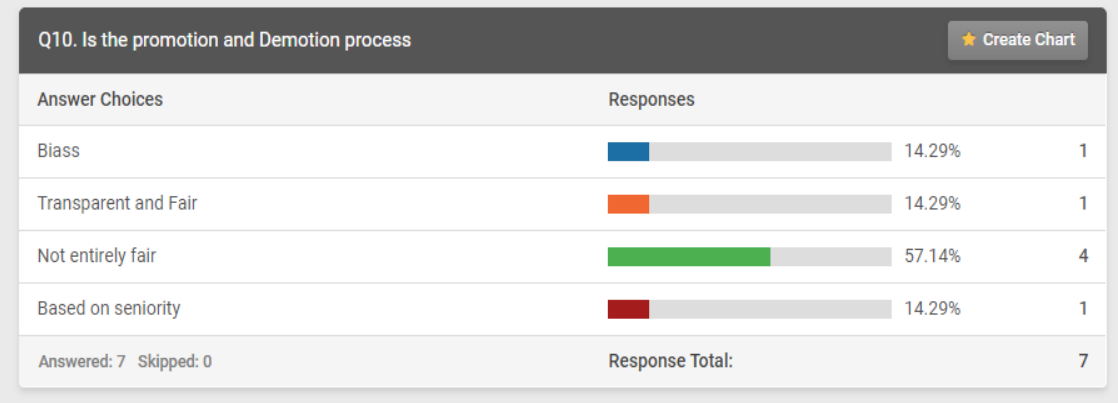
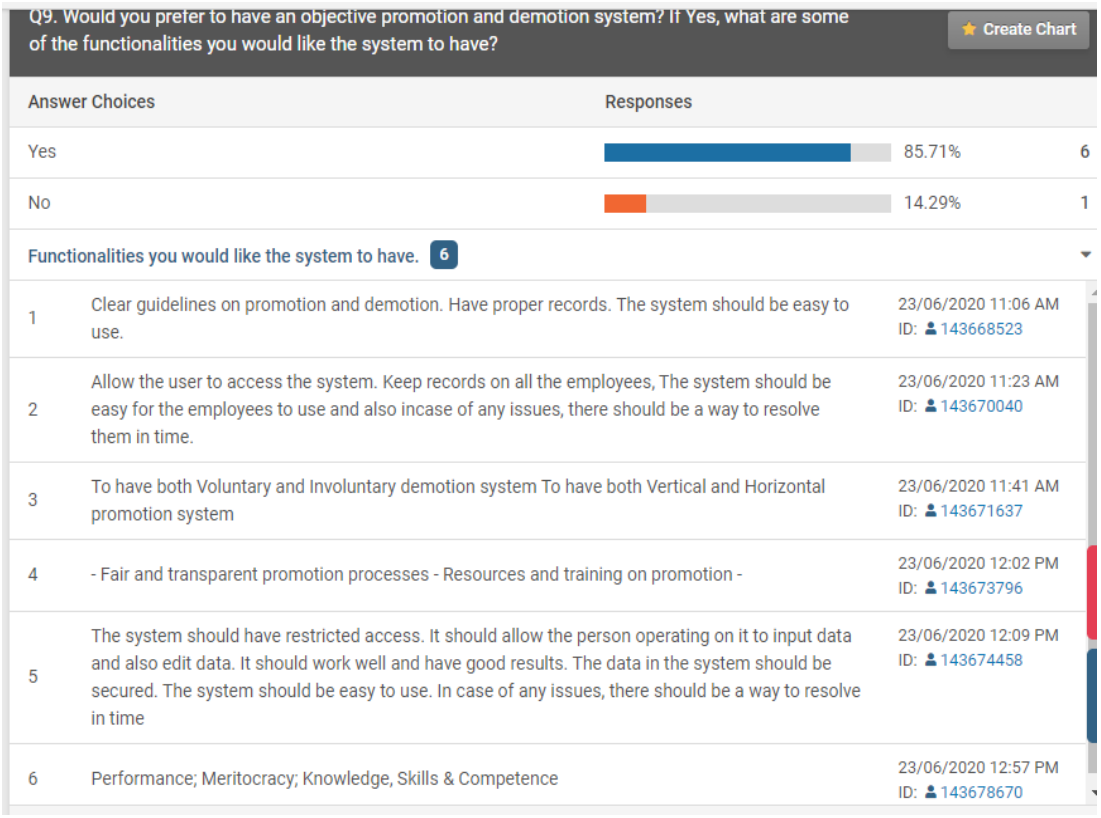


Figure 4:3: Results of question 10 from the questionnaire provided

From the results, this helped to back up the challenges that were stated earlier leading to the need for a performance appraisal system for managing the promotion and demotion of employees. This stated the need for a performance appraisal system for managing the promotion and demotion of employees in the organization.

The figure 4.4 below shows the results of question 9 from the questionnaire provided.



Q9. Would you prefer to have an objective promotion and demotion system? If Yes, what are some of the functionalities you would like the system to have?

Create Chart

Answer Choices	Responses		
Yes		85.71%	6
No		14.29%	1

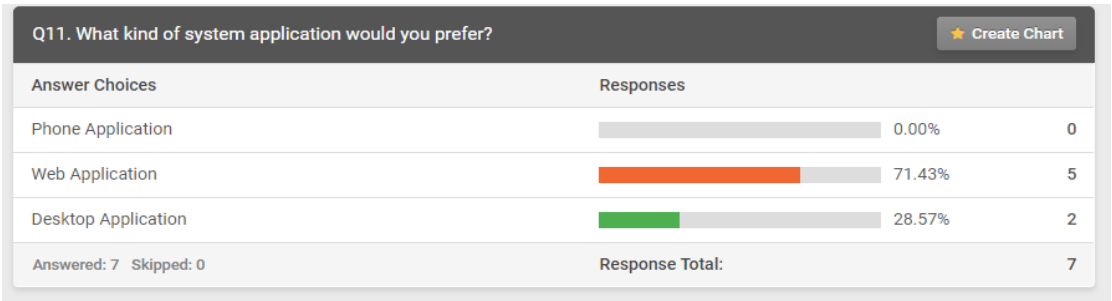
Functionalities you would like the system to have. 6

1	Clear guidelines on promotion and demotion. Have proper records. The system should be easy to use.	23/06/2020 11:06 AM ID: 143668523
2	Allow the user to access the system. Keep records on all the employees, The system should be easy for the employees to use and also incase of any issues, there should be a way to resolve them in time.	23/06/2020 11:23 AM ID: 143670040
3	To have both Voluntary and Involuntary demotion system To have both Vertical and Horizontal promotion system	23/06/2020 11:41 AM ID: 143671637
4	- Fair and transparent promotion processes - Resources and training on promotion -	23/06/2020 12:02 PM ID: 143673796
5	The system should have restricted access. It should allow the person operating on it to input data and also edit data. It should work well and have good results. The data in the system should be secured. The system should be easy to use. In case of any issues, there should be a way to resolve in time	23/06/2020 12:09 PM ID: 143674458
6	Performance; Meritocracy; Knowledge, Skills & Competence	23/06/2020 12:57 PM ID: 143678670

Figure 4:4: Results of question 9 from the questionnaire provided

From the results, a system was highly recommended to aid in the process of promotion and demotion of employees. From the responses, functional and non-functional requirements were easily identified.

The figure 4.5 below shows the results of question 11 from the questionnaire provided.



Q11. What kind of system application would you prefer?

Create Chart

Answer Choices	Responses		
Phone Application		0.00%	0
Web Application		71.43%	5
Desktop Application		28.57%	2
Answered: 7 Skipped: 0	Response Total:		7

Figure 4:5: Results of question 11 from the questionnaire provided

From the results, a web-based application system was the most preferred.

The figure 4.6 below shows the results of question 12 from the questionnaire provided.

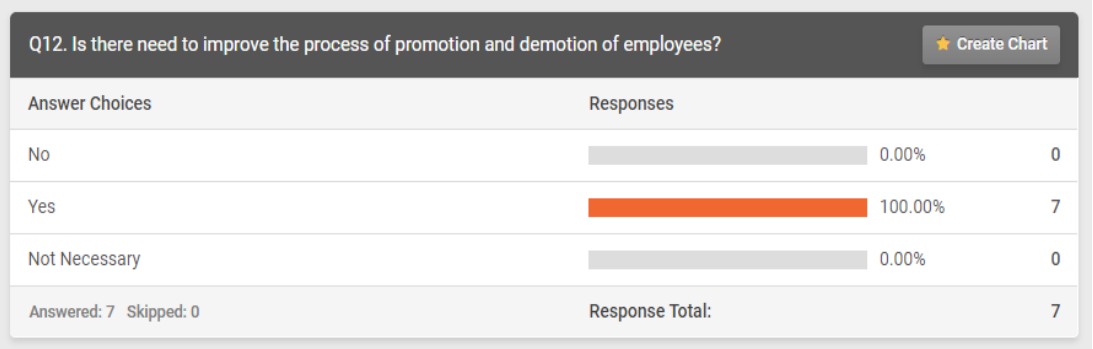


Figure 4:6: Results of question 12 from the questionnaire provided.

From the results, there was need to improve the process of promotion and demotion of employees.

4.3 System Analysis

4.3.1 Functional Requirements

The project identified the following functional requirements by engaging with the stakeholders. The table 4.1 below shows functional requirements identified for the system.

Requirement ID	Requirement Category	Requirement Description
FRQ1	Authentication	The system is to give access to the human resource manager (admin) and the employees (including the head of department).
FRQ2	Administrative Functions	The system is to allow the human resource manager (admin) to add new employees into the system, edit already existing data, produce promotion list, produce demotion list and delete employees from the system and perform performance appraisals.

Table 4:1: Functional requirements for the system

4.3.2 Non-Functional Requirements

The project identified the following non-functional requirements by engaging with the stakeholders. The table 4.2 below shows non-functional requirements identified for the system.

Requirement ID	**Requirement Category**	**Requirement Description**
NFRQ1	Usability	The system is to be easy to use and understand for the users.
NFRQ2	Reliable	The system is to be reliable. It has to clearly state consequences in case of a failure, how to solve the failure and how to prevent the failure from occurring.
NFRQ3	Security	The system is to protect data in the system from any possible form of attack.
NFRQ4	Performance	The system is to perform all tasks effectively.

Table 4:2: Non-functional requirements for the system

4.4 System Design

4.4.1 Context Diagram

Context diagram shows what the human resource manager (admin) and the employees (including the head of department) do in the system. Figure 4.7 below shows the context diagram for the performance appraisal system for managing the promotion and demotion of employees.

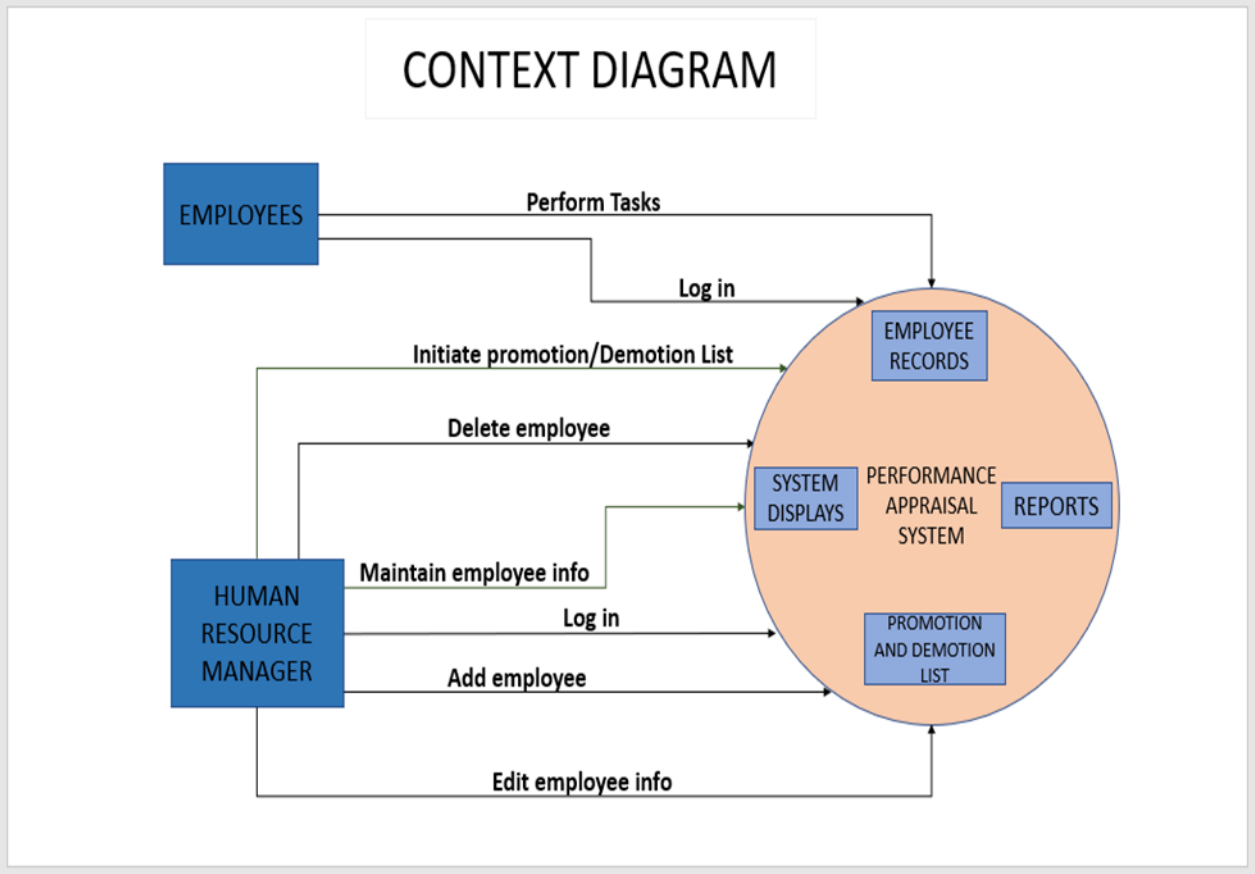


Figure 4:7: Context diagram for the performance appraisal system

4.4.2 Data Flow Diagram (Level 1)

Data Flow Diagram (Level 1) shows the different processes in the system. Figure 4.8 below shows the data flow diagram (level 1) for the performance appraisal system for managing the promotion and demotion of employees.

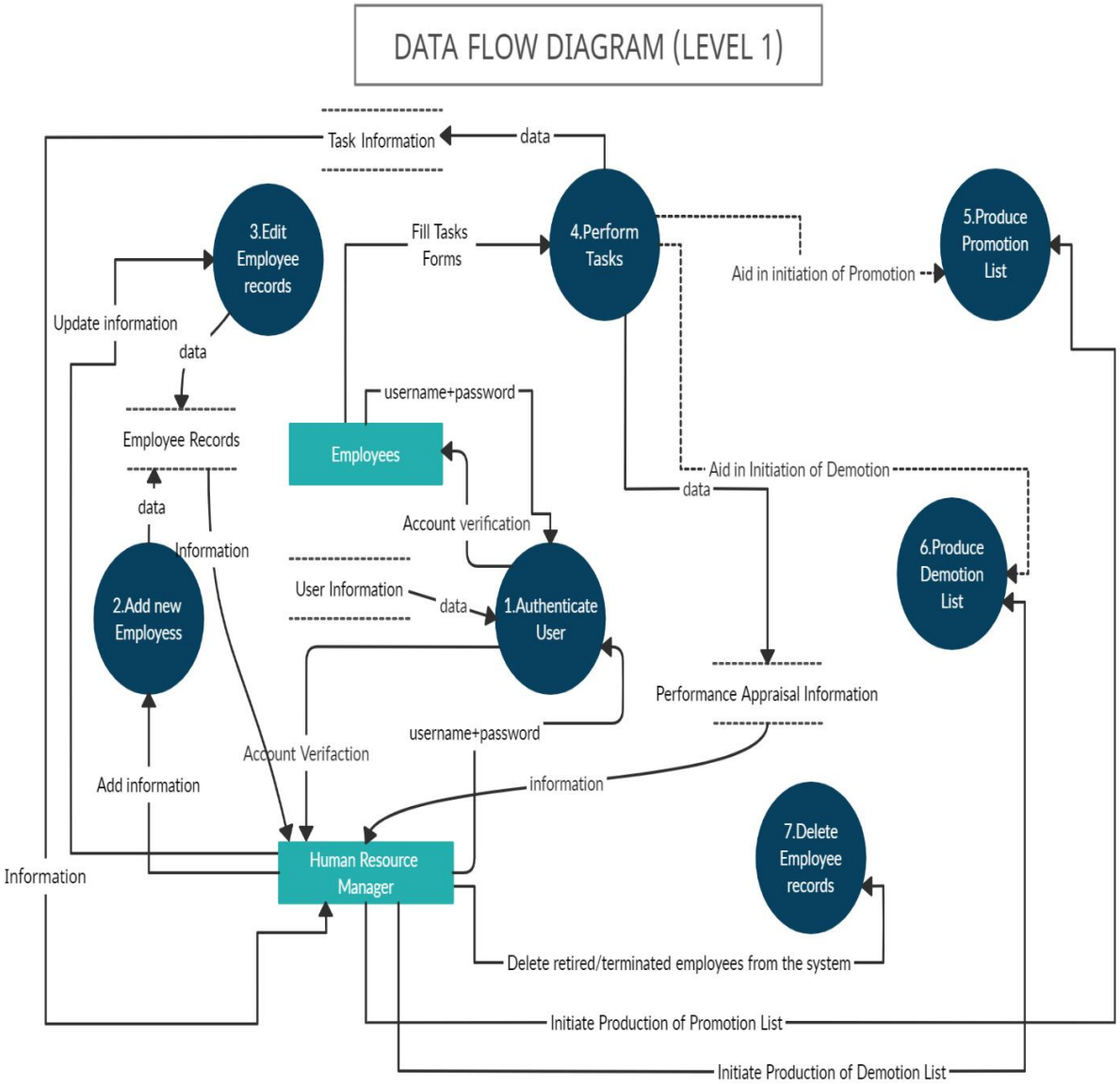


Figure 4:8: Data Flow Diagram (Level 1) for the performance appraisal system

4.4.3 Data Flow Diagram (Level 2)

Data Flow Diagram (Level 2) shows more information about the process in the system. Figure 4.9 below shows the 1st data flow diagram (level 2) for the performance appraisal system for managing the promotion and demotion of employees.

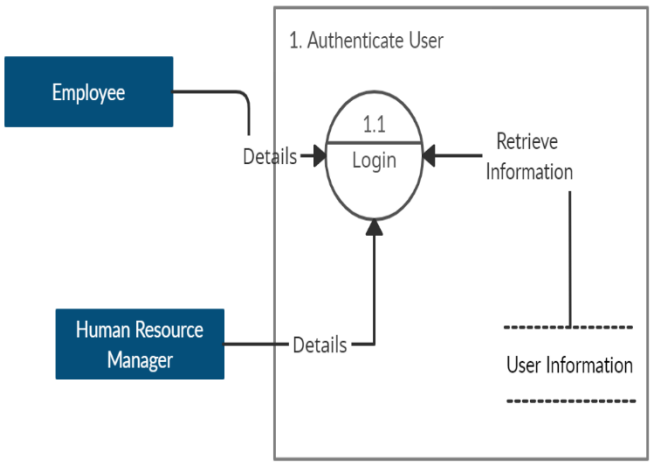


Figure 4:9: 1st Process of Data Flow Diagram (Level 2) for the performance appraisal system

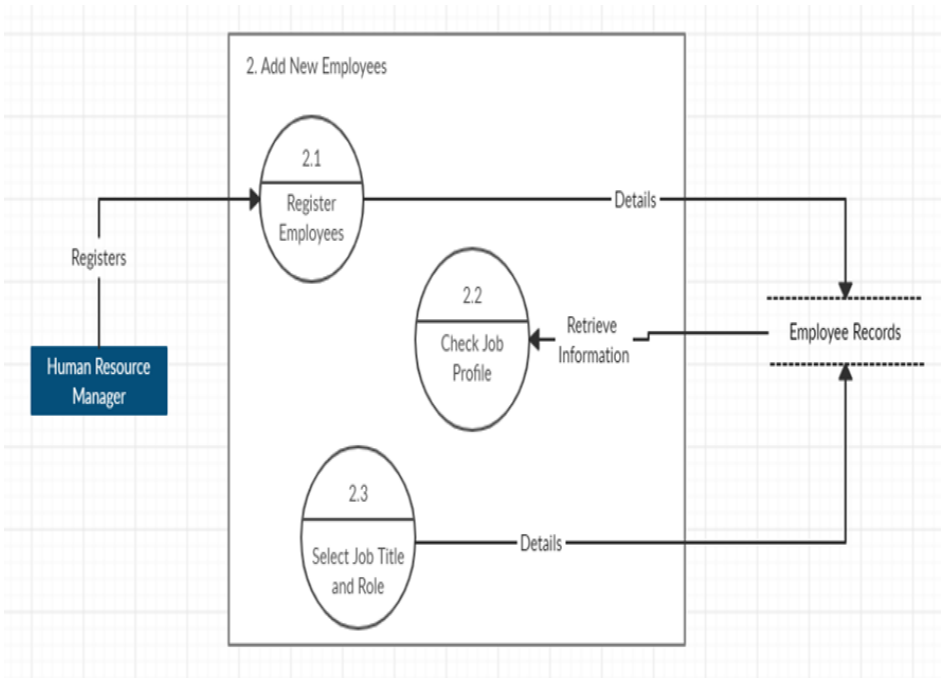


Figure 4:10: 2nd Process of Data Flow Diagram (Level 2) for the performance appraisal system

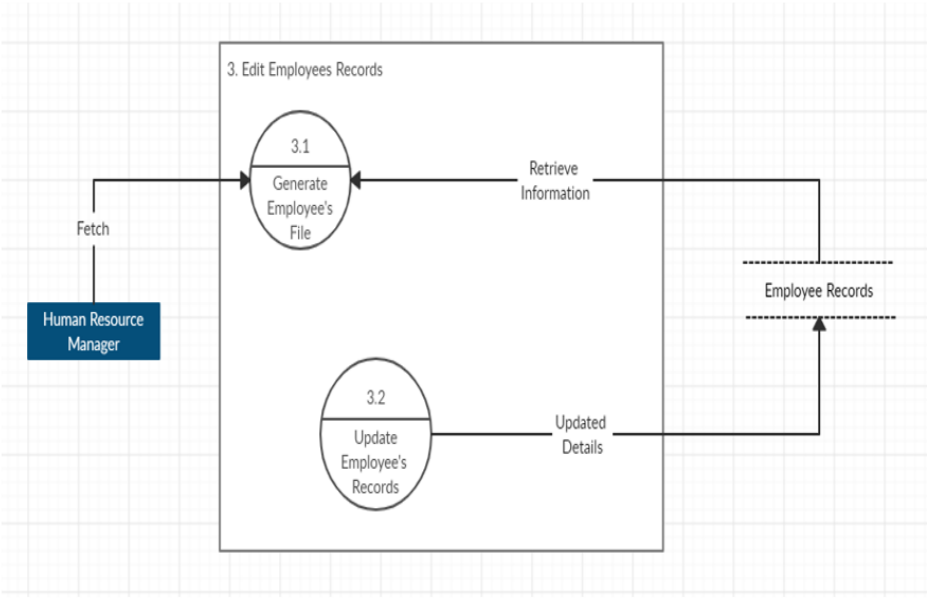


Figure 4:11: 3rd Process of Data Flow Diagram (Level 2) for the performance appraisal system

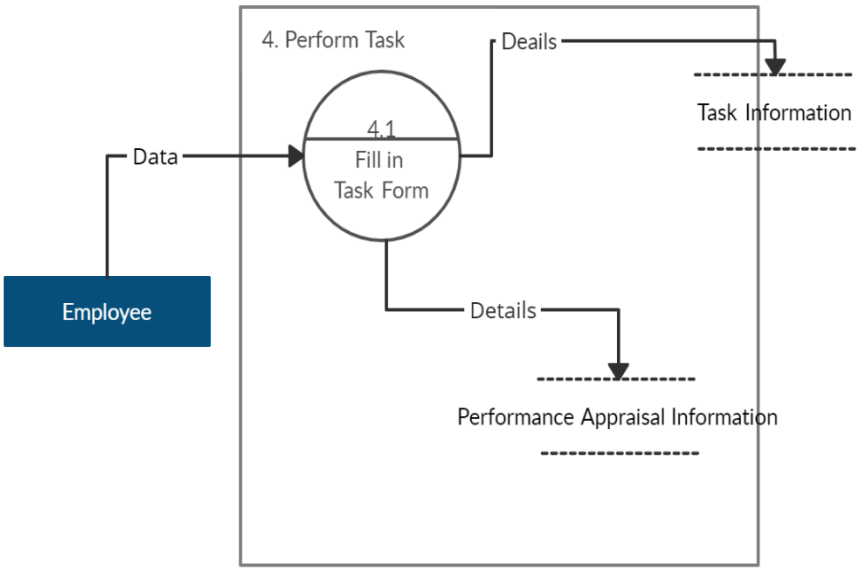


Figure 4:12: 4th Process of Data Flow Diagram (Level 2) for the performance appraisal system

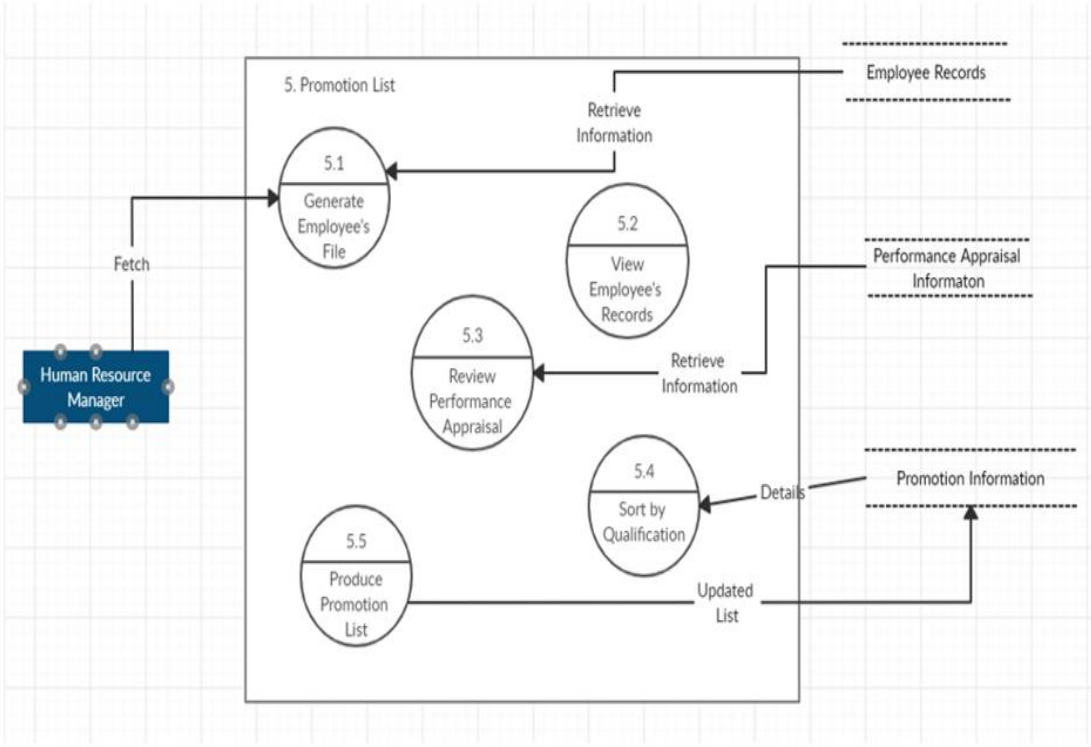


Figure 4:13: 5th Process of Data Flow Diagram (Level 2) for the performance appraisal system

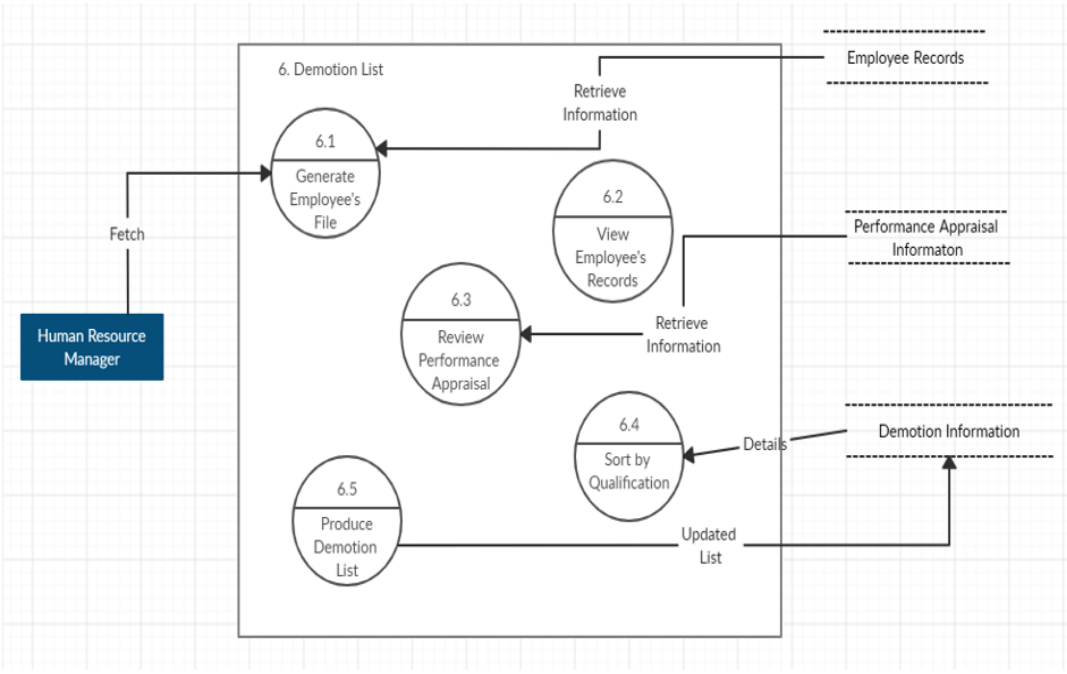


Figure 4:14: 6th Process of Data Flow Diagram (Level 2) for the performance appraisal system

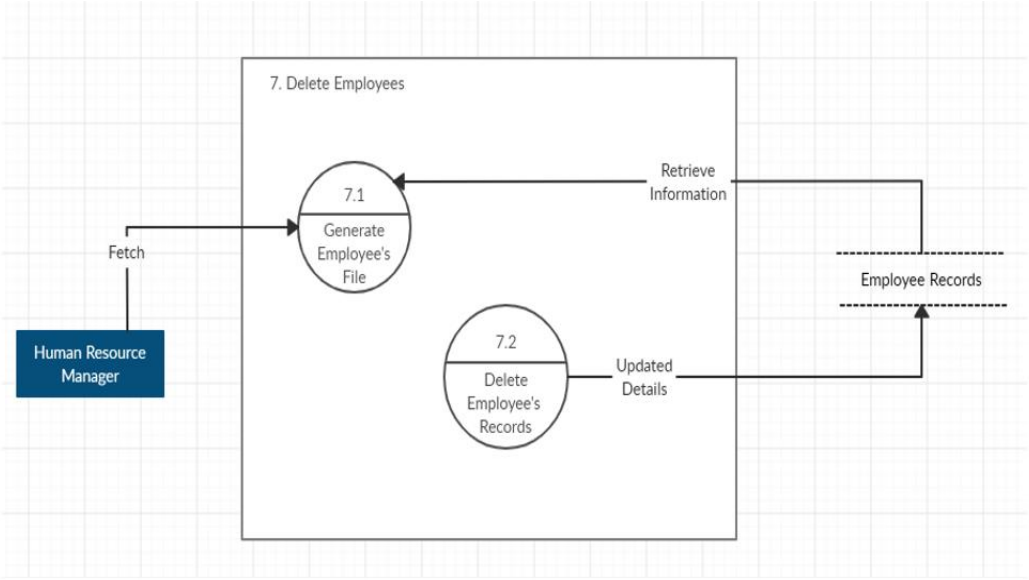


Figure 4:15: 7th Process of Data Flow Diagram (Level 2) for the performance appraisal system

4.4.4 Entity Relationship Diagram

Entity Relationship Diagram gives us a visual representation of the different entities within the system. Figure 4.16 below shows the entity relationship diagram for the performance appraisal system for managing the promotion and demotion of employees.

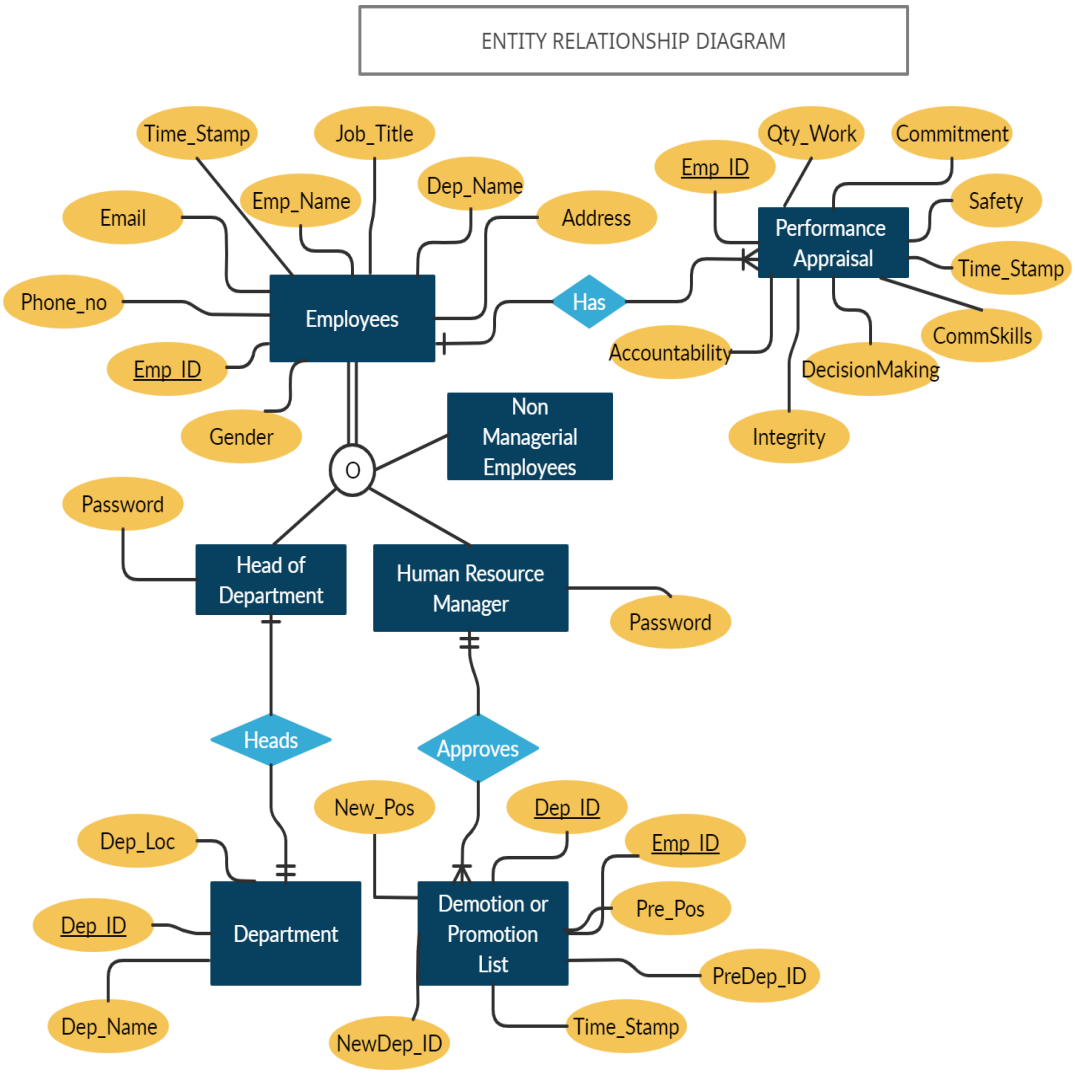


Figure 4:16: Entity Relationship Diagram for the performance appraisal system

4.4.5 Database Schema

Database schema displays the fields and relations in the system. Figure 4.17 below shows database schema for the performance appraisal system for managing the promotion and demotion of employees.

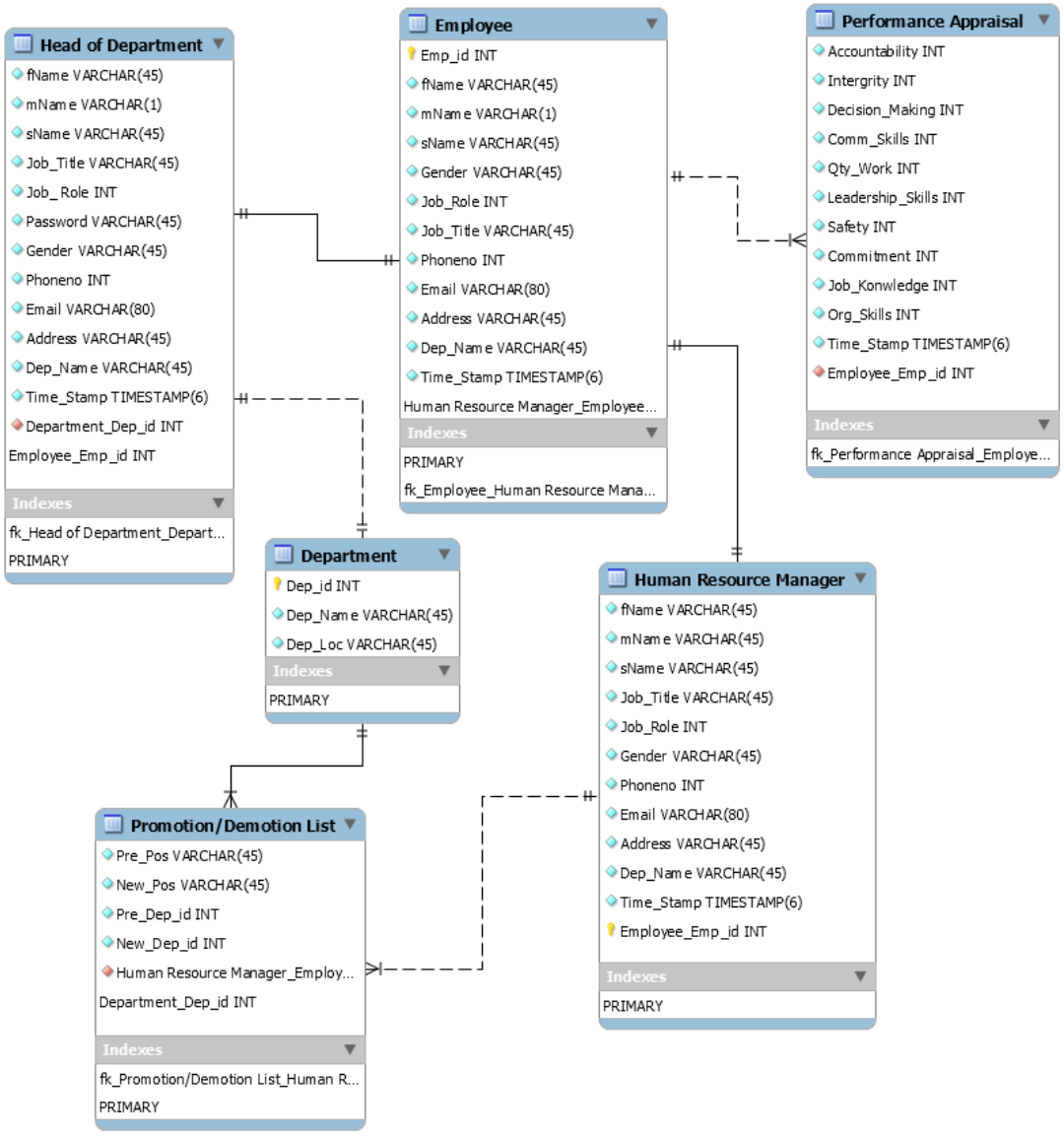


Figure 4:17: Database Schema for the performance appraisal system

4.4.6 Graphical User Interface

Graphical User Interface shows the interactive visual components of the system. Figure 4.18 below shows graphical user interface for the performance appraisal system for managing the promotion and demotion of employees.

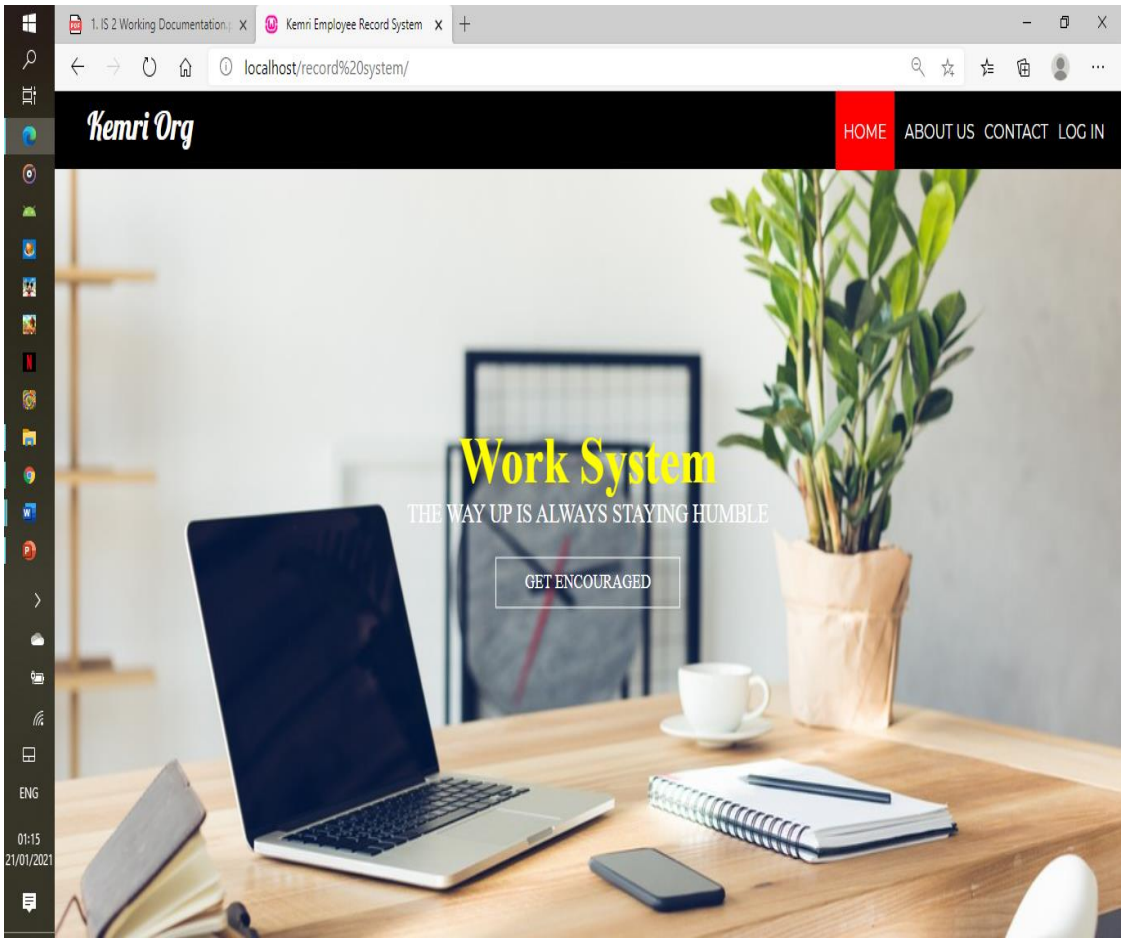


Figure 4:18: Graphical User Interface for the performance appraisal system

Chapter 5: System Testing

5.1 Introduction

This chapter focuses mainly on the functional and non-functional requirements earlier mentioned to see if they have been met or not and that the different modules are working. In addition to that, testing processes were used to ensure each unit in the developed system had a successful outcome as per the expectations. More focus was also put in the test environment, the test cases and the test results. To test the success of the system, module testing, integration testing and usability testing was done.

Usability testing was done to ensure that the intended users of the system were satisfied by the user-interface. Integration testing was done to show how the different modules communicated in the system. Module testing was to test that all the modules in the system have met their functionalities as was required.

5.2 Test Environment

The system used the hardware and software specifications to ensure an effective and efficient performance of the system. The designed web application system uses a web browser to run. The browser checks for any errors and tests the system's functionalities. Any device that is able to run a browser can also be able to run the developed system.

5.2.1 Hardware Specifications

The table 5.1 below shows the hardware specifications that were used in the development process.

Hardware	**Characteristics**
Machine	The machine that was used to run the developed system was Lenovo Yoga 510-14 AMD A6 in 1-1 TE HDD, Black.
Processor	The processor that was used in running the developed system was Intel® Core ™ i3-6006U CPU@2.00GHz.
Primary Memory	4GB

Table 5:1: Hardware Specifications for the developed system.

5.2.2 Software Specifications

The table 5.2 below shows the software specifications that were used in the development process.

Software	**Characteristics**
Database management system	The database management system that was used to store data was phpMyAdmin.
Internet Browser	Main browsers which were used in testing the developed system were internet explorer and Google Chrome.
Operating System	The operating system that was to run the developed system was Windows 10. A 64-bit type operating system.

Table 5:2: Software Specifications for the developed system.

5.3 Test Cases

The following tests were carried out to find out how the developed system was working. The table 5.3 below shows a summary of the test cases.

Test ID	**Related Requirements**	**Inspect Element**	**Pre-Condition**	**Test Data**	**Priority Level**
1	The developed system was to authenticate users.	Was the developed system able to authenticate users?	Only registered users to the system were able to have access to the system.	The user's email address and password were the details to be used to authenticate the user to the system.	High Priority Level.
2	The developed system was to allow users to change their password.	Was the developed system able to allow users to change their password?	For a user to change their initial password, they first had to login into	The default password was required.	High Priority Level.

			the system using their default password.		
3	The developed system had to register new users (employees).	Was the developed system able to register new users?	The human resource manager (admin) was the one to register new users in the system.	User personal details for the users.	High Priority Level.
4	The developed system had to rank employees for promotion or demotion.	Was the developed system able to rank the employees?	The human resource manager was the one to initiate the ranking of the employees for promotion or demotion.	Users work performance details were required for ranking.	High Priority Level.
5	The developed system had to keep users' records.	Was the developed system able to keep records for the details of the users?	The human resource manager was the one to key in the users details and any update where necessary.	Users details were required.	High Priority Level.

Table 5:3: Test Cases for the developed system.

5.4 Test Results

Test results of how the system was recorded after the test scores were carried out. The Table 5.4 below shows the test results of the system.

Test ID	Expected Results	Actual Results	Status	Remark
1	Authentication was to direct different users to their respective web pages.	Authentication was able to direct the different users to their respective web pages.	Pass	Good performance.
2	The users were to be able to change their password.	The users were successfully able to change their password after their first login.	Pass	Good performance.
3	The human resource manager was to register new users.	The human resource manager was successfully able to register new users into the system.	Pass	Good performance.
4	The system was to rank employees for either promotion or demotion.	The system was able to rank employees but not as per expected	Pass	Good Performance.
5	The system was to keep records for the details of the users.	The system was successfully able to keep the records for the details of the users.	Pass	Good performance.

Table 5:4: Test Results for the developed system.

Chapter 6: Conclusions and Recommendations for Future Work

6.1 Conclusions

The system for managing the promotion and demotion of employees was developed with an aim to help ensure fairness in the process of promotion and demotion of employees. By the use of performance appraisal, the developed system ranks the employees and aids in finding a fit employee for a particular position. The developed system was to help cub cases of personal preferences, work favouritism, corruption deals, seniority complex and falsification work documents. The developed system has managed to achieve this with a few areas that need improvement with time.

The developed system was able to achieve its aim. The developed system is useful as it is able to promote fairness at work hence all the employees are determined to put in more effort as they work. It helps to build a good working and healthy competition among the employees and this increase the organization's productivity at an acceptable standard. The developed system makes it easy for department heads to write recommendation letters to attachés and is also effective in keeping records. There is therefore need for a system to ensure fair promotion and demotion of employees in organizations.

6.2 Recommendations for Future Work

The developed system was able to cub personal references, work favouritism, corruption deals, seniority complex and falsification of work required documents for either promotion or demotion of employees. The system should be able to completely do away with these listed cases to ensure 100% fair process in the near future.

In addition to this, the developed should be able to provide sustainable data to the finance department to help them in remunerating promoted or demoted employees. It will also assist them in planning for the next financial year appropriately. The system should also create a platform where the employees can anonymously air any complaints and have feedback from the organization.

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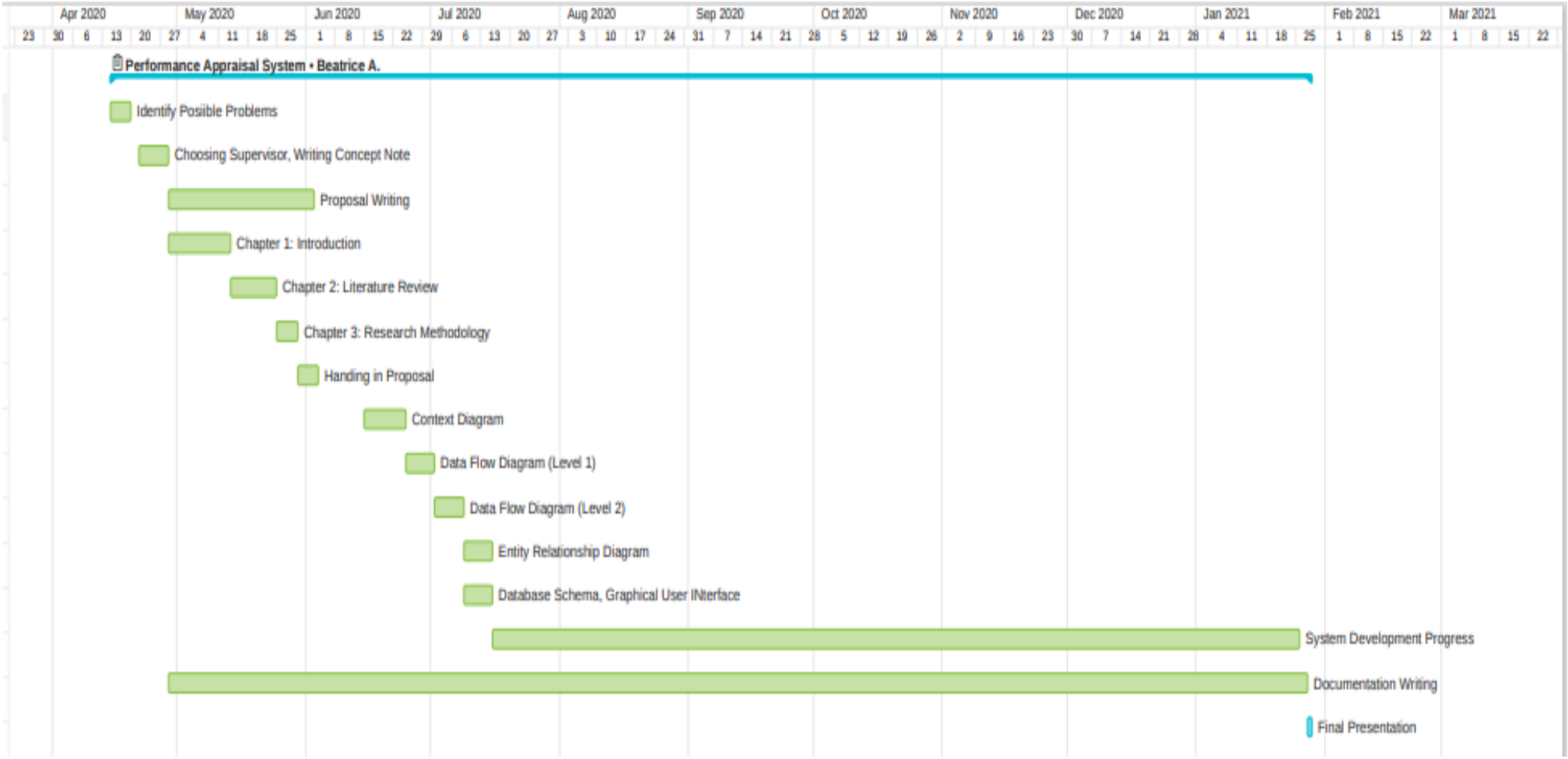
Appendix A: Timeline of Activities

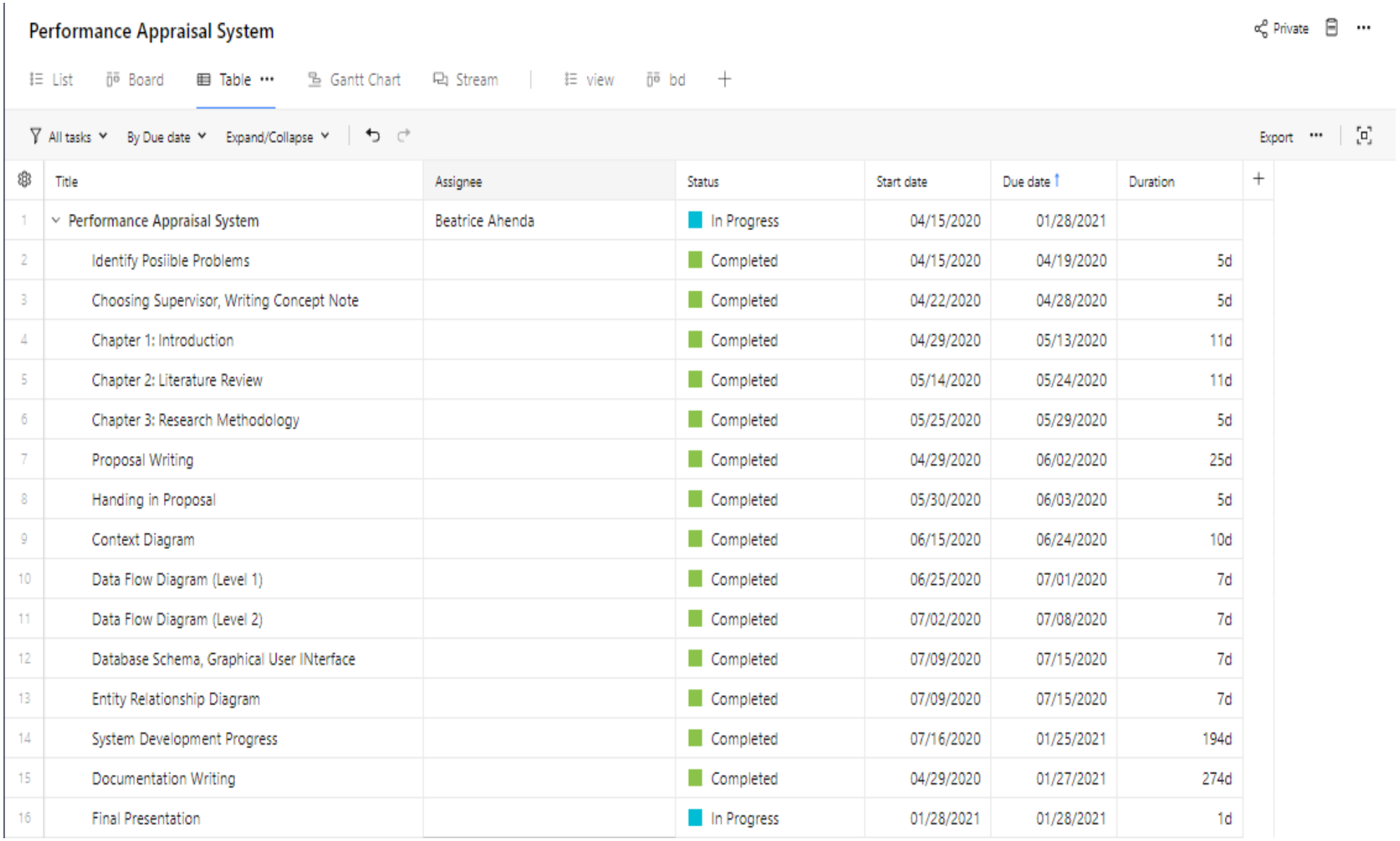
Gantt Chart



KEY

 Shows Tasks that have been completed.

 Shows Tasks that are in progress.



Performance Appraisal System

Private

List | Board | Table | Gantt Chart | Stream | view | bd

All tasks | By Due date | Expand/Collapse | Export

	Title	Assignee	Status	Start date	Due date	Duration
1	Performance Appraisal System	Beatrice Ahenda	In Progress	04/15/2020	01/28/2021	
2	Identify Posible Problems		Completed	04/15/2020	04/19/2020	5d
3	Choosing Supervisor, Writing Concept Note		Completed	04/22/2020	04/28/2020	5d
4	Chapter 1: Introduction		Completed	04/29/2020	05/13/2020	11d
5	Chapter 2: Literature Review		Completed	05/14/2020	05/24/2020	11d
6	Chapter 3: Research Methodology		Completed	05/25/2020	05/29/2020	5d
7	Proposal Writing		Completed	04/29/2020	06/02/2020	25d
8	Handing in Proposal		Completed	05/30/2020	06/03/2020	5d
9	Context Diagram		Completed	06/15/2020	06/24/2020	10d
10	Data Flow Diagram (Level 1)		Completed	06/25/2020	07/01/2020	7d
11	Data Flow Diagram (Level 2)		Completed	07/02/2020	07/08/2020	7d
12	Database Schema, Graphical User INterface		Completed	07/09/2020	07/15/2020	7d
13	Entity Relationship Diagram		Completed	07/09/2020	07/15/2020	7d
14	System Development Progress		Completed	07/16/2020	01/25/2021	194d
15	Documentation Writing		Completed	04/29/2020	01/27/2021	274d
16	Final Presentation		In Progress	01/28/2021	01/28/2021	1d

Appendix B: Data Collection Tool

Employee Promotion and Demotion

1. What is the promotion process in your organization?

2. How often does the organization have promotion opportunities?

3. What key character do you look for in an employee during a promotion?

- [ ] Integrity
- [ ] Hard Working
- [ ] Skilled
- [ ] Experienced
- [ ] Loyalty

4. Does the organization perform appraisal performance? If Yes, how often.

- ◯ Anually
- ◯ Quaretly
- ◯ NO
- ◯ Every 6 Months

5. What is the demotion process in your organization?

6. Does the organization use termination as a discplinary tool?

- ◯ Yes
- ◯ No

7. Does the organization encourage voluntarty demotion?

- ◯ Yes
- ◯ No

8. What are some of the behaviours that attract demotion to an employee?

9. Would you prefer to have a promotion and demotion system? If Yes, what are some of the functionalities you like the system to have?

10. Do you prefer a web based application, phone application or a desktop application.

Finish Survey