UNIVERSITY OF GONDAR

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DEPARTMENT OF

COMPUTER SCIENCE

HUMAN RESOURCE MANAGEMENT SYSTEM FOR GONDAR COLLEGE OF TEACHERS EDUCATION

INDUSTRIAL PROJECT

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DECLARATION

This is to declare that this project is work which is done under the supervision of advisor Yonas and having the title Web based human resource management system is under the contribution of:

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No part of the project work has been reproduced illegally (copy and paste) which can be considered as plagiarism. All referenced parts have been used to argue the idea and have been cited properly. We will be responsible and liable for any consequence if violation of this declaration is proven.

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CERTIFICATE

This Industrial Project entitled “Human Resource Management System for Gondar college of teachers education” has been read and approved as meeting the preliminary project requirements of the Department of Computer science in partial fulfillment for the award of Bachelor of Science degree in Computer Science University of Gondar, Gondar, Ethiopia.

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ACKNOWLGEMENT

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Thirdly thanks for all employee of GCTE HRMS office workers for their permission to analysis the necessary data from the organization specially **Ms. Yaltashework Abebe** and lastly, we like to address great thank for all others who are help us for our project to be completed in best way.

ABSTRACT

This system document is prepared for human resource management system of Gondar college of teachers' education and concerned with the description of the existing Human Resource management system and different types of models used to model the new system under study. Web based human resource management system mainly provides effective and fast data processing. This web based system of managing human resource in the college is expected to help various services keep an updated data on the status of their employee information.

The project provides facilities like vacancy announcement, request permission, online registration, employee information management, leave management, employee requisition management, clearance management, attendance management system. This is used to reducing costs due to manual system and automating the current manual system in Human resource Management system by stating the problem, performing requirement analysis and by designing the system. In designing such a system, PHP has been engaged as a development language and MySQL as a backend database with CSS implemented for the interface.

Generally, the main goal of web based human resource management system for is to reduce errors, to improve the accuracy of input and to provide data reliability of the office with high satisfaction of employees.

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ACRONYMS

CPU: central processing unit

CSS: cascading style sheet.

Email: electronic mail

GCTE: Gondar college of teachers' education

HTML: hypertext markup language

PHP: Hypertext markup language

RAM: random access memory

SDD: system design document

SQL: structured query language

UML: unified modelling language

ABBRIVATIONS

BR: business rule

DID: department identification

HR admin: human resource administrator

HRMS: Human resource management System

HR officer: human resource officer

HTTP: Hypertext transfer protocol

Int: integer

UI: user interface

CHAPTER ONE

1. INTRODUCTION

Human resources management system is a suite of software applications used to manage human resources and related processes throughout the employee lifecycle. An HRMS enables the college to fully understand its workforce while staying compliant with changing tax laws and labor regulations.

In this world of growing technologies everything has been computerized. With large number of works opportunities the Human workforce has increased. Thus, there is a need of a system which can handle the data of such a large number of Employees. The aim of this project is to develop a web-based system for Gondar college of teacher's education human resource management. While GCTE has established it also opened an office which is called human resource management. Currently, the GCTE human resource offices process data manually. The manual processing system has many problems. In order to solve this issue; we have developed a web based human resource management system. The completed project solves the problems that had affected the human resource management offices. Since it is online it reduces a lot of costs, time to travel to the offices, work over load and it minimizes the space used to store the data. Online human resource management system enables to register applicants online, search, update employees' data, and online registration, and placement, online leave application and report generation.

In general, HRM office stores all the necessary information of every academic and non-academic employee in the College. In addition to this, it works with different office. It performs different tasks like vacancy announcement, register employee and applicants.

HRM in the college manage employee profile or biography of the employee, post vacancy, manages user accounts, recruitment management or employee requisition process, register applicants and employee, clearance management system, attendance management, permission management, performing resign application for the employees. It stands for those services that the college provides service to the employees and applicants. Since it is automated, it reduces a lot of costs,

1.1. Background

Gondar college of Teachers' education (GCTE) was first established as Teachers' Training Institute (TTI) in 1981. It is situated in an area of more than 300,000 square meters at Gondar City. As TTI, it had produced a great number of certificate teachers to the region in particular and Ethiopia in general.

In 1995 by Amhara Regional State proclamation number 9/1995, it was upgraded to college level according to the New Education and Training Policy of the country. This makes it is the first education college established in the region. It is accountable to Amhara National Regional Education Bureau. The College is producing professional teachers in certificate, diploma and degree levels for both primary cycle (1-4) and second cycle (grades 5-8) of primary education. Besides, GCTE has the mandate to conduct research activities in various aspects of education.

In order to achieve these goals, the college runs three separate programs: summer in -service teacher education, evening extension and regular programs. The summer mainly trains teachers of the first cycle for upgrading purposes, the evening extension and the regular programs are undertaking trainings for both cycles of primary education.

As the first education college established in Amhara National Regional State, Gondar College has accomplished several duties. Before being Teachers training institute, it started its activities in 1980 in summer program with 800 in-service teachers recruited by the Ministry of Education from Dire-Dawa, Addis Ababa and Amhara region. In 1981, it commenced its regular certificate program by 200 students assigned from the Ministry of education.

In 2003, the college had prepared regional instructional textbooks for grades 5, 7 and 8. Before the materials were implemented a series of workshops and trainings were given for primary teachers. In 2005, the college created a partnership/affiliation with Bahirdar University in offering courses in five subject areas for degree program students in three different programs: regular, evening and summer programs. This has enhanced the capacity of many high schools at Amhara region. Since 2005, Gondar College was the first to establish a model center for college-school partnership and establishing 9 different cluster centers covering all the cost it required. Moreover, it had given successive short-term trainings and workshops for primary school teachers coming from 19 linkage schools.

Sine 2017 Gondar College has signed a memorandum of understanding with University of Gondar to work together in many aspects including capacity building for college staff and similar cooperation works. In 2018 Gondar College was elected as center of excellence for Colleges of Amhara region after competing and winning the competition with nine regional colleges. Since then, it is conducting various activities to enhance its capacity as center of excellence for the Region

Human resource management in the college is established when the college is established to manage the workforce in the college. Currently the human resource management has 98 employees. These employees give service manually. there is work overload on the employees.

1.2. Vision and Mission

1.2.1. Vision of the College

We envisage the college be center of excellence by training professionally competent, academically efficient and able teachers who can emancipate the people of the region from ignorance and backwardness.

1.2.2. Mission of the College

The college strives to produce well competent and skilled primary school teachers and ensure quality education and access throughout the region by conducting various educations, training, research and community service

1.3. Statement of the problem

Since the current system is manual there are a number of problems in the human management system .it is difficult to manage employees, employee's information, difficult to announce the news. the current system uses notice board to announce news and related notices, the user consumes much amount of time to perform certain task .it is tedious and boring for employees to perform a task due to the loads of work on staff workers. Since it is manual it is exposed to security problems that means unauthorized person can access it.it is full of data Redundancy and data inconsistence and also it difficult to search and to update or modify the employee's information because there is large amount of data records in the office so it may take several times to search a single record.

Generally, currently HRMS in Gondar college of teachers' education is exposed to many problems like: -

Performance related problems

- Poor performance: - to perform a certain task it takes long time.
- The productivity is not effective.
- The work procedure is exposed to error.

Information related problems

- data is not easily accessible
- data is not well organized
- data is not secured from accident or damage.

Economic related problems

- manual handling of data is expensive
- cost in terms of time is high
- needs many workers in the staff

Service related problems

- the users do not get better service as their needs
- work load on the staff members

Storage problem

Since there are enormous amount of data records, there is need of large space to store. During storing there is incorrect placement of data, data loss. If there is emergency in this storage place the information totally disappeared there is no buck up so the current system is full of problems.

As a result, we are motivated to automate the current business operations of the Gondar college of Teachers' education. HRM. Therefore, the aim of this project is to solve the abovementioned problems by automating the manual work. To this end, we aim to develop a web-based HRMS entitled called web-based HRMS for GCTE.

1.4. Objective of the project

1.4.1. General objective

The general objective of our project is to develop web Based human resource management system for Gondar college of teachers' education.

1.4.2. Specific objectives

To achieve our general objective, we have to follow the following specific objectives: -

- Identify the problems of the existing system
- Gathering required information regarding to the human resource management system.
- Studying the current manual task or current state and changed into automated new system.
- Propose alternative solution & select the best solution.
- Designing the prototype on the basis of the identified requirement.
- Design the artifacts of the proposed system for the overall view of the structure.
- Design a system that considers the current situation
- Designing user friendly interface.
- Implementing the proposed new system and testing based on the current requirements.
- Test and evaluate the developed system
- Finally giving recommendation on further studies to be conducted on the areas of human resource management system.

1.5. Scope and limitation of the project

1.5.1. Scope of the project

The scope of this project is focus on developing Web-based HRMS for Gondar college of teachers' education. The web-based system performs the following tasks: vacancy announcement process, online registration applicant and employee, manage employee profile, leave management, permission management, attendance management, recruitment management or employee requisition management, clearance management system.

1.5.2. Limitation of the Project

Because of time constraint the system has some limitations.

- It doesn't handle pay roll system.
- It doesn't handle online examination system.

1.6. Methodology the project

To achieve the general and specific objectives of the project, the following methodology is used.

1.6.1. Data gathering Techniques

Data collection technique is a method of acquiring the required information's that are crucial to design the system. The Group member has used different methods to gather data. Data collection is the most important part of the project to find the main requirement of the system and to understand how the system does. To collect data, we used the following data collection techniques:

1. **Interview:** To determine the objective and scope of the system we have interviewed the HRMS officer and those responsible employees for handling HRMS**.** We prepared some questions to the HRM officer **Ms. Yaltashework Abebe** to get the information about the current system. To obtain correct information from users and administrators, we used the interview process. We have the opportunity to ask various questions to the association's employee. We have gathered enough details, and we can schedule another appointment if we need more information about the current method.

Which help us to collect information about the current situation from HRM officer face to face by asking questions prepared by the team. Generally, we asked the following questions: -

- How it works in the manual task or flow of work?
- What are the problems faced when working manual task?
- How to manage Applicants and employees?
- Where data is stored?
- What is the responsibility of department manager and employee?
- What is the rule and regulation (business rule) of Gondar college of teachers' education human resource managements system?
- What works are currently being done in HRMS office?
- How many workers are there in the office?
- What is the work flow to do a certain task example to hire an employee?
- How much is comfortable the current work for you?
- Is there any system that you are using?
- Is there any document that tells the overall work process in the office?
- Could you give us different forms that you are currently using?

2. **Analyzing current document (record review)**: In addition to the interview we have observed current documents that include organizational rules form and queries for allocating and controlling resources used by the system. This method of collecting a data is analyzing the document prepared and stored in the current system. We will analyze different documents like forms (registration forms, employee manual forms, leave application forms, employee requisition forms, vacancy announcement forms, and permission request forms). We identified the problems of the existing task and develop the new system standing from what we have analyzed from the Document about activities and functions performed by the human resource officer.
3. **Observing the working environment**: Finally, we have observed the working environment to assure those requests gathered using the interview and existing document stated above. During our observation we have seen the data management in the college, how any employee information are stored and the activity of HRMS in the office.

1.6.2. System Analysis and Design Approach

In this project we use Object Oriented Approach (OOA) and Object-Oriented Design (OOD)

Object Oriented Analysis (OOA): During this phase the team uses to model the function of the system (use case modelling), find and identify the objects, organize the objects and identify the relationship between them and finally model the behavior of the objects in detail.

Object Oriented Design (OOD): During this phase our team uses Edraw Max and MS Visio to refine the use case model and for designing the sequence, activity diagrams and to model object interactions and behavior that support the use case scenario.

The main reasons behind selecting this approach are the following:

- To enable a high degree of reusability of designs and software codes.
- To decrease the cost of software maintenance.
- Increase reusability.
- Reduce maintenance burden.
- Increased consistency among analysis, design and programming activities.
- Improved communication among users, analysis, design and programming.
- It is better way to construct, manage and assemble objects that are implemented in the system.

1.6.3. System development model

In this project we use the iterative model to develop the project because

- It is good for correcting the errors from feedback that comes from our user and also simple model from other methodology.
- Iterative process starts from simple implementation of a software requirements and iteratively enhance the evolving versions until the system is implemented.

The advantage of this model is that is a working model of the system at early stage of development which it makes easier to find functional and design flows. Finding issue at each stage of development enables to make measures in a limited budget.

1.6.4. System Development Tools

Hardware tool used

Hardware	Specification	Application
Flush	16GB	To move data from one to the other
OptiPlex 3040 desktop computer	Processor:Corei5-6100CPU@3.70GH RAM 4GB 64-bit operating system	To develop the documentation as well as the implementation**.**
Printer		For print the document
Mobile	Infinix HOT 7	used for capture the image and also to store document.

Table 1.1 hardware specification

Software Tool Used

- **Word 2019:** used to write document
- **Xampp server:** The application server used with MySQL database
- **Firefox browser:** used to browse user interface and other references
- **Edraw-Max and MS Visio 2013:** To develop the UML (Unified Modeling Language) diagrams the project group member used this software.
- **Notepad++, sublime:** sublime is important to write our html code and PHP codes.

Languages used to develop the system

- **JavaScript:** JavaScript is very interesting language used to validate data and develop different messages. We used to validate our data which we used in html code.
- **PHP version 5.6 and above:** Is used to develop or create a dynamic website.
- **HTML 5, CSS 3: -** is used to design the user interface of the system at the front end.

Database management system:

- **MYSQL**: -we used MYSQL as DBMS to manipulate the data.

Back End

MySQL software of the data base system and PHP language was used in developing and managing the back end of the system.

Front End

The user interface had been developed using html, java script, CSS since it easily designing the front end and connected in to database easily.

1.7. Significance of the project

We know that information is the back bone of the success an organization, but it should be accurate and timely data about its operation. Therefor once we complete this project the following existing problem of Gondar college of Teachers' education HRMS will be completely solved.

- Easily access employee information organized and centralized data base.
- Easily backup system in case of damage or loss of data employee information.
- In the proposed system announce vacancy to Gondar teacher's college Human resource officer post online. Therefore, the employee sees notice board easily online, this leads to reduces work over load of the human resource officer and also for applicants.
- The system can approve employee permission and leave fastly.
- Information accessing will be easy.
- Make the performance of the work more efficient and faster than the manual system.
- The system simplifies the attendance management in the college.

1.8. Benefits and Beneficiaries of the Project

The software will give information to those who have the authority to see it. This is done by giving Account to those who assumed to be the proper user. Then the data base will be secured and easily.

- **Benefits the project developers (our team member)**

The project has initiated our team to get knowledge of how to develop the required system. As a result, team got a lot of experience of solving problem while they are facing with some difficulties.

- **Benefits for the User (Applicant)**

The applicant has an account to login the system and they can view announce vacancy position easily. In addition to this, they can apply vacancy easily and save time.

- **Benefits for the human resource office**

In the manual task much document in the office due to this problem the system can solve the problem easily by Enhance security mechanisms to protect employee information, to handle the employees effectively consumption like paper and penwork, and avoiding data loss employee profile. Generally, to reduce time consuming, reduce human labor and save human resource officer cost in the office.

- **Benefits for the employee**

The employee can view permission request easily from the department and human resource officer receives. The employee also be able to view posted information's from anywhere at any time. In addition, s/he can be able to fill in permission application form in the appropriate fields online easily and also view her/his own personal profile through the system.

- **Benefits for the Department**

The department can send job request easily to human resource officer through the system online. In addition, reduced workload of the office activities and simplified process for managing employee information.

1.9. Feasibility study of the project

The feasibility study is the study of how much the system is use full in different manner such as, does the system provides user with proper information, easy to operate.

The crucial part is deciding upon the requirement, to provide the possible solution. The system should meet the user needs, the system should be economical, and the system should be easily

maintained and enhanced. In this project, the feasibility study is conducted to test the operational, organizational, economical, technical feasibility of the system.

1.9.1. Organizational Feasibility

The new system will provide efficient searching of information, easy modification of employees' information and proposed system help the organization by providing permission request online, announce vacancy. In general, it has a positive attitude toward the developed system because it saves time, cost usage and human labor can be reduced. So, the system feasible for the organization.

1.9.2. Economic Feasibility

The system to be developed is economically feasible. Since this project already computerizes the existing task, by now the reduction of cost for repeatedly buy Materials used in manual operation become beneficiary to the organization.

In the current manual task is deliver to unnecessary economic wastage, however post announce vacancy, applicant registration, job request this needs a lot of paper, pen and printer. In addition, the task needs the shelf to store employee information. The proposed system avoids this problem using the current task change computerized system. Therefore, the new system is economical feasible.

1.9.3. Technical feasibility

The proposed system is human resource manager easy to modify employee information and upgrade to cope with developing new technology since the system is developed using familiar programming languages and technologies. Since the project developers are familiar with those programming languages and technologies, they are technically able to develop the system. There are also enough resources to deploy the system. Therefore, we can say that the system is technically feasible.

1.9.4. Operational Feasibilities

It determines how this project satisfies the college needs and it also offers Secure, accurate and efficient system to the college. The system in which we have developed is also compatible to all operating systems and web browsers. We consider "what new skills will be required? Do the existing staff members have these skills?" in order to make operationally our system feasible. The proposed system has user-friendly and simple navigation interface to be operated by the users. And the proposed system has capability of working on less complex operating system used in computer system. Since this is web-based system the user only needs to open

web browser to run. In addition, the system will reduce the needed time and manpower to give service and the Applicant, employee, and administrator can operate the system easily. So, the system is operationally feasible.

1.9.5. Legal feasibility

Our system is not contradicting with the college's law, policies and rules. We are only focused on improving the working abilities of the college's human resource management by automating computerized system to full capacity.

1.9.6. Schedule Feasibility

Within the time duration, we have identified the activities of the project in order to accomplish the project objective within their schedule requirement which is on the table below.

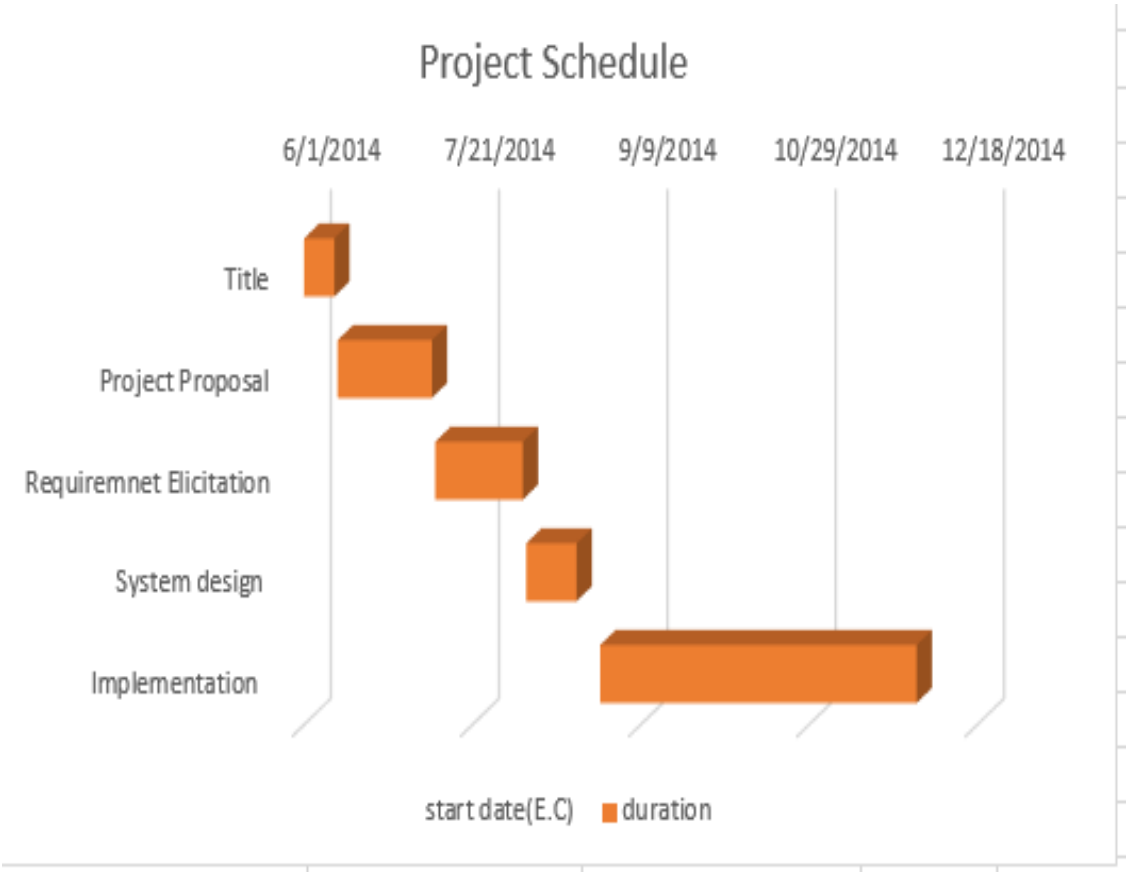


Figure 1.1 Time schedule for software development

1.10. Budget

Material Used	amount	price for single (birr)	total
Desk top	1	12000	12000
Paper	1 package	500	500
Pen	10	12	120
Print	100	2	200
Flush	1 32gb	320	320
Transport			50
Mobile	1	5000	5000
Total budget	18290		

Table 1.2 budgets

1.11. Management issue

This technique is used for managing the project team for effective team performance. The team configuration refers to the members of the team which is determined by the active and passive language of the meeting and participation of the group often refers to a managing strength, team configuration, in the narrow sense refers to the team strength that is the number of interpreters required for a given team depending on the language used. our team has five members that do this project. Each member has the following contribution on the project.

Task name	Contributor
Requirement analysis	Debekulu Melesse
System analysis	Shumiye Tadesse
System design	Abel Kefale
Implementation	Abel Kefale and Debekulu Melesse
System test	Hylemariam Aschale

Table 1.3 Task contribution

CHAPTER TWO

2. Requirement Analysis

2.1. Introduction

In this chapter the existing system of Gondar college of teacher's education HRMS was clearly defined by answering how existing system is working? In what way the employee managed? What are techniques being used to handle personnel file? What are the business rules of the existing system? And what are the problems in the existing system? After studying the existing system, it is possible to understand that how the proposed system can solve the existing system problems. Studying the existing system will also use to determine both functional and non-functional requirements.

2.2. Existing system description

The existing human resource management system performs the following function with manual system and this leads to less security issues. Because of the manual system recording system is time consuming and boring. The current task involved in HRM that performs every activity can be done manually this leads to less user satisfaction and less interactive system. Because the existing system of organization using manual system to perform many of their tasks such as data storage, data retrieval and the recording system is manually due to this fact, it is time consuming and boring. This is the result of lack of computerized system or web-based system.

2.2.1. Stake holders of the existing system

Personnel officer: - is a person who is in charge of controlling and following up all the employees' Activities and departmental communications using acceptable and approved documents.

Staff workers: -are those employee works in HRMS office.

Section/Department: - A business unit in which all employees is included.

Applicants (job seekers): -they are person who find job.

Employees: -they are person who works in the institution (could be lecturers, accountants, technicians or any other who is working in the college).

2.2.2. Major function of current system

Regarding to the working flow in the current system is involved starting from the human resource officer to the employee in every branch office. If the branch office need man power they send request to human resource officer then HR officer announces vacant position on the notice board and the new applicant come to the office and perform registration then based on some criteria the office take the available applicant to take the examination or interview after this the office select the person who satisfy the criteria of the branch office, finally new employee can be take two bill ID from human resource one bill to check their medical status and another bill used to check they are free from any criminal from police ,after all over activity performed the human resource manager or somebody in the HRMS record the specific information about the employee in manual based system. After hiring the employee then send the hire employee data to department who require the employee in letter format. And the departments accept the employee and place them to their tasks. If the employee shall get training, he/she will train in manual or paper-based system. This is the one activity that can be performing to take new employee.

There are some many activities that can be done like leave management, generate report, recruitment, registration, permission request, and announce vacancy and attendance management those have their own process to being satisfied.

2.2.3. Problem of current System

Every record of document in the current task is stored in the manual way, so, it is difficult to control and secure these manual records, because the files and the forms that have the employees' information could be anywhere and it may be lost. The HR officer wants to search a specifying document or file he/she must review a lot of documents file that set in the HRM office this take a lot of time.

In the current task there is no easy way to get an employee's file so to access or to search the employees' information is very challenging. In the current task many operations done on the paper and use a lot of man power. This cause high consumption of resources like papers, man power, time, pen etc. Therefore, the current task cost is in terms of the above issues very high.

The manual task tedious and boring data management system. Since there are a lot of employee documents in the office, so that it is difficult to manage such huge data manually and there is

a problem in procedures such as permission management. When an employee is required to fill the form, which may take several time or date to be approved.

The manual task difficult to searching and modifying employee information. Since there are a lot of employee documents in the office it's hard to manage such huge data manually and loss of document is happened.

Manual work to announce vacancy to college the office visualizes only notice board. It is limited to someone who visit always the notice board. It leads to all employee and applicant not access the up-to-date information. Besides this the selected applicant must exist in office of HR office to register for employment by the HR officer .it leads to work overload on the officer and employee loss of time.

If the HR officer absents from work due to some reason, there is no way to get to do the task that an employee can request permission, leave request, department head ask for job request and applicant apply for vacancy.

Loss of employee file the current office uses manual work, the mechanism of data handling is unsecured this leads to the loss of data or document and also shortage distribution of information for applicants.

Generally, the existing system has many problems. Those problems are: -

- Lack of accurate data,
- The system has problems related to security.
- It takes long time to search data,
- Lack of efficiency, effectiveness,
- Since it operable manually it uses large amount of space to store data.
- Lack of portability's,
- Redundancy of data

Therefore, the aim of this project is to solve the above-mentioned problems by automate the HRM manual work with web-based HRMS which is called web-based HRMS for Gondar Teacher's college.

2.2.4. Work Flow of the Existing System

The work flow in the existing system is performed starting from the human resource manager to the employee in every department. The human resource announces vacant position

and hired employee and record the specified information about the employee in manual based system. After hiring the employee then send the hired employee data to that of departments who require the employee in letter form. And the applicant departments accept the employee and place them to their tasks. If the employee gets training, done projects the departments update the new information of the employee in manual or paper-based system. As we see the existing system all activity is done from the human resource office to every departments in the institution are manual base system.

2.2.5. The business rule of the organization

In every organizations or institutions there are rules and policy, which used to govern all activities in specified work flow, control the work flow, and performed in the work environment.

BR1: To get employee the departments who needs employee should write an application letter for their vacant position to department head.

BR2: when the vacant position is announced to external applicant on notice board on mass media externally for consecutive 10 work days.

BR3: To be employed applicants should bring a clearance letter from previous Employer.

BR4: when the human resource hired the new employee to that of departments who needs an employee they must send a letter that has full documents about the new employee.

BR5: Access of information depends on the authority of the user.

BR6: the employee must have full reason to apply leave application.

BR7: if the employee wants to leave from the college for different reason first they must apply to the dean and the dean must send their application to the human resource.

BR8: if one wants to leave from the college before he/she fills the form leave form he/she must return all working material to respected department otherwise they will be rejected.

BR9: By any means the employee can leave the organization HRMS post notice on the board.

BR10: Applicant comes to HR office and makes registration

BR11: The applicant comes to the department for the evaluation

BR12: Department evaluate applicants based on evaluation criteria

BR13: HR place passed applicant and record their information.

BR14: Employee can leave until finishing the permission day. After finishing their break time, they should be present on their working environment.

2.3. Proposed system description

2.3.1. Overview of proposed system

By observing problem in the office, we proposed web-based system which is easy to use and an automate system for Gondar Teachers College HRM. Instead it is decided to develop web-based HRMS for Gondar Teachers College to easy the operation that can be involved. A system is required which is being capable of elimination all the problems and become useful to job seeker and thus the new system is derived. The organization needs to manage the entire job to be appointed and job seeker resumes details in a faster manner so that time is saved. The employees must exercise full control over these activities. The project enables the web user to exercise full freedom in browsing for their options. The system that performs posting announcement, recording biography of employees that can the member of the organization, registration of the details of new applicants, hiring new employees, attendance management, and managing information about employees to their personal profile. And also, the system shall incorporate permission management, leave management all the way from application to acceptance permission request and leave requests respectively. All these features include the ability to add user, update (edit), and retrieve through search results.

2.3.2. Purpose of the new system

The system has provided

- **Security:** since the system requires verification of logon form, sensitive information's will not be accessed or modified by unauthorized users.
- **Efficient retrieval of employee files:** since the system record each and every employee's information on the data base, retrieval of employee files from the database at any time is a very easy process.
- **Efficient way of employee's data management**: -Since the system uses database system there is no loose of data. The employee information is highly secured, the search and update of employee is simple.

- **Give online information registration**: -The system gives online information about vacant position for the applicant from the college, so to know the criteria that must be full fill to register and also can register online at a time.
- **Give's Notification information**: -the system gives notification through posting in the website.

2.3.3. Functional requirements

Functional Requirements are those that refer to the functionality of the system, i.e., what services it will provide to the user. Statements of services the system should provide how the system should react to particular inputs and how the system should behave in particular situations.

- **Posting announcements:** the system shall allow HRM to post vacancy announcements for the applicants in order to make them informed.
- **Register applicant online:** The system shall allow registers applicants' who wants to be hired in the college with appropriate information. Without coming to the office, they can be able to register online by using the system.
- **Add new employee:** the system shall allow to record the new employed applicants.
- The system shall allow to place to their respected position.
- **Manage employee information:** The system shall allow to search, delete and update the hired employee information when it is needed.
- **Manage user account:** The system shall to allow the system administrator can manages all system user accounts.
- **Recruitment (employee requisition):** A process asking new employees based on the requirements of the department.
- **Manage attendance:** the system allows the department head and HR officer to fill attendance and to print the attendance report.
- **Send feedback:** the system allows the employee and the applicant to send feedback to HR officer and to Department head.
- **Leave Application/Approval**
    - Leave application- The System allows the user to fill in leave application form in the appropriate fields.
    - Leave approval- The system allows the HR officer to approve leave applications based on the reasons stated.

- **Permission management:** The system allows to the employee able to fill in permission application form in the appropriate fields and the human resource manager allow permission approval application based on the reason what the employee can be illustrated.
- **Clearance management:** The system allows to the employee to request clearance and the department head and dean clear the request.

2.3.4. Non-functional requirements

Non-functional requirements are requirement, which has no essential for the system, but it can support and give more quality for the system.

A. **Performance:** We are implementing this system will give the response to the users in the duration of a few seconds without delaying much time. The system is reliable and accurate in providing information to the users. Unless we make sure information is secure from unauthorized access. The workstation PC should be able to handle the flow of information. If an error occurs, the system should identify the error and notify the user so that the user can take the appropriate measure. the system if it doesn't get error the system gives a response in less than 30 seconds.

B. **Usability**
   - use windows graphical user interface it should be easily understand by the user.
   - User interface should be Simple to learn the system.
   - User interface should be menu driven and attractive.
   - The interface should be user friendly.
   - The system should support error-handling mechanism that display graphic approach and the system guide the user what will be the next action.

C. **Security:** The proposed system is secure that any users who haven't an authentication can't access the system. Any user who wants to login to the system must have a user name and password. This protects the system from any unauthorized access. Any user who has no privilege cannot access the system. And we have full back technology to prevent the data loss if the physical part of the servers is damaged in a different case.

D. **Environmental:** The system should the Users can easily input and retrieve their profile and history. The proposed system Works on any environment.

E. **Error handling requirement**

Our proposed system has error handling mechanisms that is, as errors occur it will not stop functioning rather provide error manages and should guide the user through what to do next.

F. **Interoperability:** The system shall able to work together with other systems if any compatibility and integrity without any spatial customization. our system is interoperable to other systems in the College-if any.

G. **Maintainability:** After the deployment of the project if any error occurs then it should be easily maintained by the software developer. The proposed must be system maintainable when system failure happens, a re-initialization of the program will be done. And system handles an error done by any user of the system and display error message Also; the software design is being done with modularity in mind so that maintainability can be done efficiently.

H. **Scalability:** The system can be easily extensible to change the organization principles, add new functionality.

I. **Availability:** All data in the system will be available all the time on the internet 24 hours a day 7 days a week and 365 days in a year. Due to the system is web based the user can access the information at anyplace and at any time if the servers are not failed and the internet connection available.

J. **Reliability***:* The proposed system must be reliable which means it must meet the promised results expected from the system. The reliability of the overall program depends on the reliability of the separate components. The main part of the reliability of the system is the backup of the database which is continuously maintained and updated to show the most recent changes.

CHAPTER THREE

3. SYSTEM MODEL

3.1. Introduction

In this chapter we will briefly discussed about some system model UML diagram, about use case model of the system and description of the use case, activity diagram, sequence diagram, object model and data dictionary, about the class model, and the user interface parts using a prototype sample.

3.2. Scenario

Scenarios are narrative description of how the system and an actor are interacting. People usually find it easier to relate to real life examples than to abstract descriptions. They can understand a scenario of how they might interact with a software system. Scenarios are an instance of a use case explaining a concrete major set of actions [5 It describes an interaction between a user and a system that produces some useful outcome [4]. Use Case Scenario is a description that illustrates, step by step, how a user is intending to use a system, essentially capturing the system behavior from the user's point of view.

Scenario 1:

Scenario Name: login

Participating actors: user

Flow of Event:

User select login link and system displays login form. then users enter their user name and password the system checks whether the user name and password are valid. If it is valid the user login to the system and the system displays all available operations. if the entered value is incorrect the system displays error message.

Scenario 2:

Scenario Name: announce vacancy

Participating actors: HR officer

Flow of Event:

HR officer logged to the system using his/her username and password and click post announcement link. the system displays announcement form and HR officer fill the form and

then click post button. If the entered information is valid the vacancy is successfully posted. If the entered information is incorrect the system displays error message.

Scenario:3

Scenario Name: leave request

Participating actors: an employee

Flow of Event:

An employee logged in to the system using his/her user name and password and then click leave request link the system displays the request form and an employee fill the form then click on request button if the form is correctly filled the request is successfully requested. if the form is not correctly formed the system displays error message.

Scenario:4

Scenario Name: create account

Participating actors: admin

Flow Event: create account

The administrator login to the system the admin page with its operation is displayed and the admin click on create account link then system displays create account form then the admin fills the form and click create button if an admin fills the form correctly an account is created. If the form is not correctly filled the system displays error message.

Scenario:5

Scenario Name: employee registration

Participating actors: applicant

Pre-condition: an applicant must be selected for employee

Flow of Event:

An applicant logged to the system using his/her account and click on employee registration link the system displays employee registration form then an applicant enters the detail of him/her self and then click on register button. If the form is correctly filled with the required information an employee is successfully registered. If the form is not filled correctly the system displays error message and asks the HR officer to enter the correct information.

Scenario:6

Scenario Name: employee requisition

Participating actors: department head

Pre-condition: the department head should login into the system

Flow of Events:

Department head logged in to the system using his/her account the system displays the department page with its available operation then department head clicks the job request link. the system displays job request form and then department head fill the form and click on request button. If the form is correctly filled the request is sent if the form is not correctly filled the system displays error message.

Scenario: 6

Scenario Name: fill attendance

Participating actors: HR officer and department head

Pre-condition: HR officer and department head must login into the system

Flow of Event:

HR officer and department head logged to the system and click on fill attendance link the system displays fill attendance form and then HR officer and department head fill the form and click on submit button if the form is correctly filled attendance is filled else the system displays error message.

Scenario: 7

Scenario Name: clearance request

Participating actors: an employee

Pre-condition: an employee should login to the system

Flow of Event:

An employee logged to the system and click on clearance request link the system displays clearance request form then click on request button the system displays successfully submitted if something went wrong the system displays error message.

Scenario: 8

Scenario Name: clear clearance

Participating actors: dean, department head

Pre-condition: dean and department head should login to the system

Flow of Event:

dean and department head logged to the system and click on clearance request link the system displays clearance request then click on clear button the system displays successfully approved if something went wrong the system displays error message.

Scenario: 9

Scenario Name: apply vacancy

Participating actors: Applicant

Pre-condition: an applicant should login to the system

Flow of Event:

An applicant logged to the system and click on vacancy announcement link the system displays available vacancies if there then click on apply button the system displays apply form then an applicant enters all the required information then click apply button the system displays successfully applied if the form is not correctly filled the system displays message to enter all the required information.

3.2.1. Use Case Model

Use case diagram shows the varies activities the users can perform on the system. the system is something that performs a function. They model the dynamic aspect of the system.

It is used during the analysis phase to represent the external behaviors (actors, the boundary and use cases including the association between them) [4].

A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. The use case diagram is concerned with the interaction between the system and actors (objects outside the system that interact directly with it). It is a collection of use cases, external actors and their relationship.

Actors of the system are:

Department head

HR Admin

HR officer

Applicant

Employee

Dean

3.2.2. Use Case Identification

HR officer:

- View applicant information
- Announce vacancy
- Post exam schedule
- Post event
- Approve job ranking
- View post

- View feedback
- Fill attendance
- view attendance
- view employee information
- view notification

Employee:

- Request permission
- Request job ranking
- Request leave
- View post
- Send feedback
- Request clearance
- View notification

Applicant:

- View exam schedule
- Apply vacancy
- View exam result
- Registration
- View post
- Send feedback

Department head:

- Request employee
- Fill attendance
- Manage permission
- Post event
- View post
- View feedback
- Approve clearance
- Submit job ranking
- View employee information
- Clear clearance requests
- view notification

HR admin:

- Manage user account

Dean:

- approve employee requisition
- Clear clearance requests
- Manage department

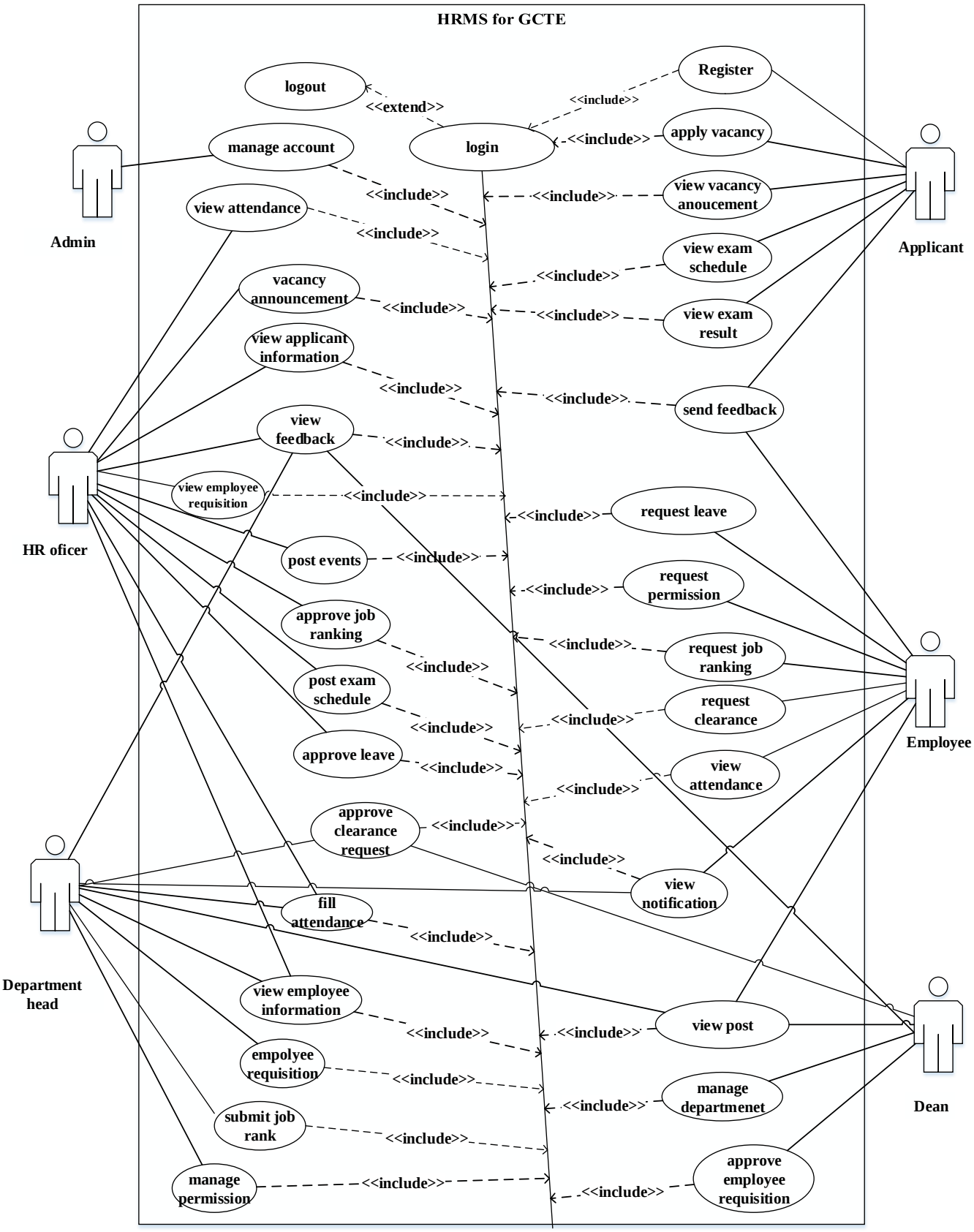
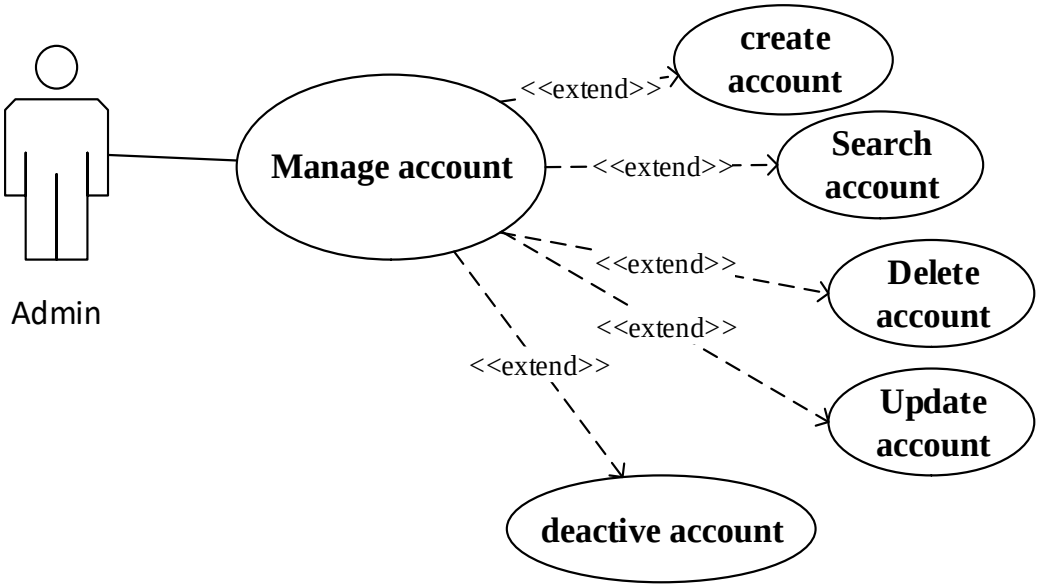
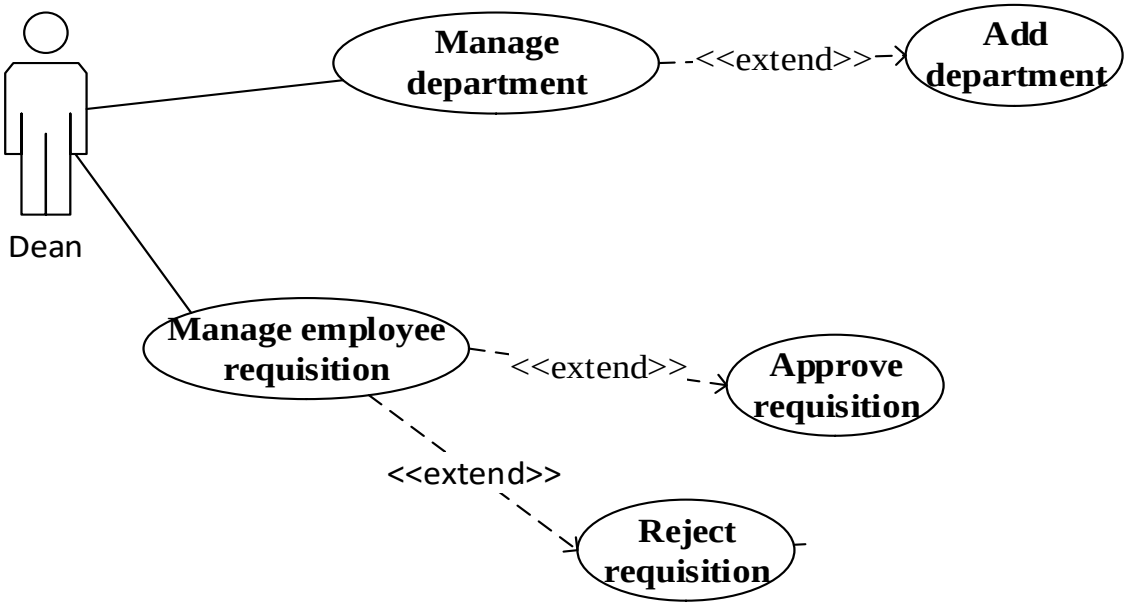


Figure 3.1 Use case diagrams


Admin
Manage account
create account
Search account
Delete account
Update account
deactive account
<<extend>>
<<extend>>
<<extend>>
<<extend>>
<<extend>>


Dean
Manage department
Add department
Manage employee requisition
Approve requisition
Reject requisition
<<extend>>
<<extend>>
<<extend>>

3.2.3. Use case description

Use case name	Login	
Participant actors	All users	
Description	To use the system all users should enter to the system	
Precondition	Users should have their user name and password	
Post condition	Users entered to the system with their role	
Basic course of action	Actor action	System response
	1. The user opens the main home page by writing the URL of the website 3.the user click on login link 5.the user enter correct username and password 6.click login button	2.the system display home page 4. the system displays login form 7.the system validate the account 8. the system displays successfully entered message 9. use case ends
Alternative course action	1.if the entered username and password are incorrect 3.the use case goes to step 5 in the basic course of action	2.The system displays error message

Table 3.1 Use case description for login

Use case name	Logout	
Participant actors	All users	
Description	Any user who use the system can logout from the system	
Precondition	Users should be logged in the system	
Basic course of action	Actor action	System response

	1. Execute browser 2. Open the system 3. Perform activities 4. Activities completed 5. the user clicks on logout button	6. the system takes the user out from the system 7. use case ends
Alternative course action		
Post condition	Users logged out from the system	

Table 3.2 Use case description for login

Use case name	**Create account**	
Participant actors	HM Admin	
Description	To protect the system from an authorized person account is needed and provide by Admin	
Precondition	HR admin should be logged in to the system	
Basic course of action	Actor action	System response
	1. The HR admin click create account link. 3. The HR admin fills full Information about users. 4. HR admin click create button	2. The system displays create Account page. 5.The system validates the form 6.the system created account 8. use case ends

Alternative course action	1 if the form not filled correctly goes to step 3 in basic course of action	2. The system displays enter the required information 3. If the employee is not available in the database, the system displays the employee is not exist.
Post condition	User account is created	

Table 3.3 Create account use case description

Use case name	**Employee requisition**	
Participant actor	Department head	
Description	When any Department needs to an employee that work for that department the department head request for recruiting new employee to the HR officer.	
Precondition	Department head should be logged in the system	
Basic course of action	Actor action	System response
	1.Department head click the job request link 3. The department head Fill the form 4. department head click on submit	2. the system displays job request form. 5.the system validate the form 6.the system displays successfully send message 7. use case ends
Alternative course action	1. if the department head entered job request information not valid. 2. the system displays “incorrect input” to the department head 3. The use case goes to step 3 in the basic course of action 4. Use case end	
Post condition	The employee requisition is sent to HR officer	

Table 3.4 employee requisition use case description

Use case name	**Leave request**	
Participant actor	Employee	
Description	An employee can request leave application when they want exit from the college	
Precondition	An employee should be logged in the system and enough reason for leaving	
Basic course of action	Actor action	System response
	1. An employee click the leave request link 3. an employee Fill the form 4. an employee click on submit button	2. the system displays leave request form. 5.the system validate the form 6. the system displays successfully send message 7. use case ends
Alternative course action	1. if an employee entered leave request information not validate, the system displays “incorrect input” to the department manager 2. The use case goes to step 3 in the basic course of action 3. Use case end	
Post condition	The leave request is sent to HR Officer	

Table 3.5 use case description for leave request

Use case name	**Employee Registration**
Participant actor	Applicant
Description	Applicant can register online as employee during the hiring of the employee in the college.
Precondition	An applicant should be ensuring that he is selected for employee.

Basic course of action	Actor action	System response
	1.applicant click the employee registration link 3. applicant fill the form 4. applicant click on submit button	2 the system displays employee registration form 5.the system validate the form 6.the system displays successfully registered as employee message 7. use case ends
Alternative course action	1. if applicant entered information not valid, the system displays “incorrect input” to applicant. 2. The use case goes to step 3 in the basic course of action 3. Use case end	
Post condition	Store the employee biography in the database	

Table 3.6 use case description for leave request

Use case name	**Vacancy announcement**	
Participant actor	HR officer	
Description	HR officer announces applicants by posting vacant positions.	
Precondition	employee requisition should be approved by dean	
Basic course of action	Actor action	System response
	1. HR officer click vacancy announcement link 3. HR officer Fill the form 4. HR officer click on post button	2. the system displays vacancy announcement page. 5.the system validate the form 6.the system displays successfully post announcement. 7. use case ends
Alternative course action	1. if HR officer entered information not Valid, the system displays “incorrect input” to HR officer. 2. The use case goes to step 3 in the basic course of action	

	3. Use case end
Post condition	Vacancy announcement is posted

Table 3.7 Announcement use case description

Use case name	**Permission request**	
Participant actor	An employee	
Description	When An employee wants to take permission, they can send permission request to the department head.	
Precondition	An employee should be login to the system	
Basic course of action	Actor action	System response
	1. an employee click permission request link 3. an employee Fill the form 4. an employee click on submit button 7. use case ends	2. the system displays permission request form page. 5.the system validate the form 6. the system displays successfully send permission request
Alternative course action	1. if an employee entered information not validate, the system displays “incorrect input” to an employee 2. The use case goes to step 3 in the basic course of action 3. Use case end	
Post condition	Permission request is sent	

Table 3.8 Announcement use case description

Use case name	**Approve leave application**
Participant actor	HR officer
Description	After the employee requests leave application to the HR officer, HR officer view and approve their application.
Precondition	HR officer must login into the system

Basic course of action	Actor action	System response
	1.Officer click the view leave application page. 3. read the reason for applying leave 4. check leave status 5.approve the leave application	2. the system displays leave application. 6.the system displays successfully approve message 7. use case ends
Alternative course action	1. if an employee has not sufficient reason HR officer rejects leave application	
Post condition	Application is viewed and approved	

Table 3.9 Use case description to approve leave application

Use case name	**Clearance request**	
Participant actor	An employee	
Description	When An employee wants to leave from the college, s/he should fill the clearance form.	
Precondition	An employee should be login to the system	
Basic course of action	Actor action	System response
	1. an employee click clearance request link 2. fill the form 4. click on clearance request button	3. the system displays clearance request form. 5.the system displays successfully sent message 6. use case ends
Alternative course of action		

Post condition	Clearance request is sent

Table 3.10 Use case description for clearance request

Use case name	**Fill attendance**	
Participant actor	Department head and HR officer	
Description	Department head and HR officer fills attendance to follow up the employee.	
Precondition	HR officer and department head should be login to the system	
Basic course of action	Actor action	System response
	1. department head and HR officer click on fill attendance link 3. department head and HR officer fill attendance. 4. click on submit button	2. the system displays attendance form. 5.the system displays successfully filled message 6. use case ends
Alternative course of action	1. if an employee entered information not validate, the system displays “incorrect input” to an employee 2. The use case goes to step 3 in the basic course of action 3. use case ends	
Post condition	Clearance request is sent	

Table 3.11 Use case description for fill attendance

3.2.4. Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language, activity diagrams are intended to model both computational and organizational processes (i.e. workflows). Activity diagrams show the overall flow of control. So, it consists of activities and links. The flow can be sequential, concurrent or branched [5].

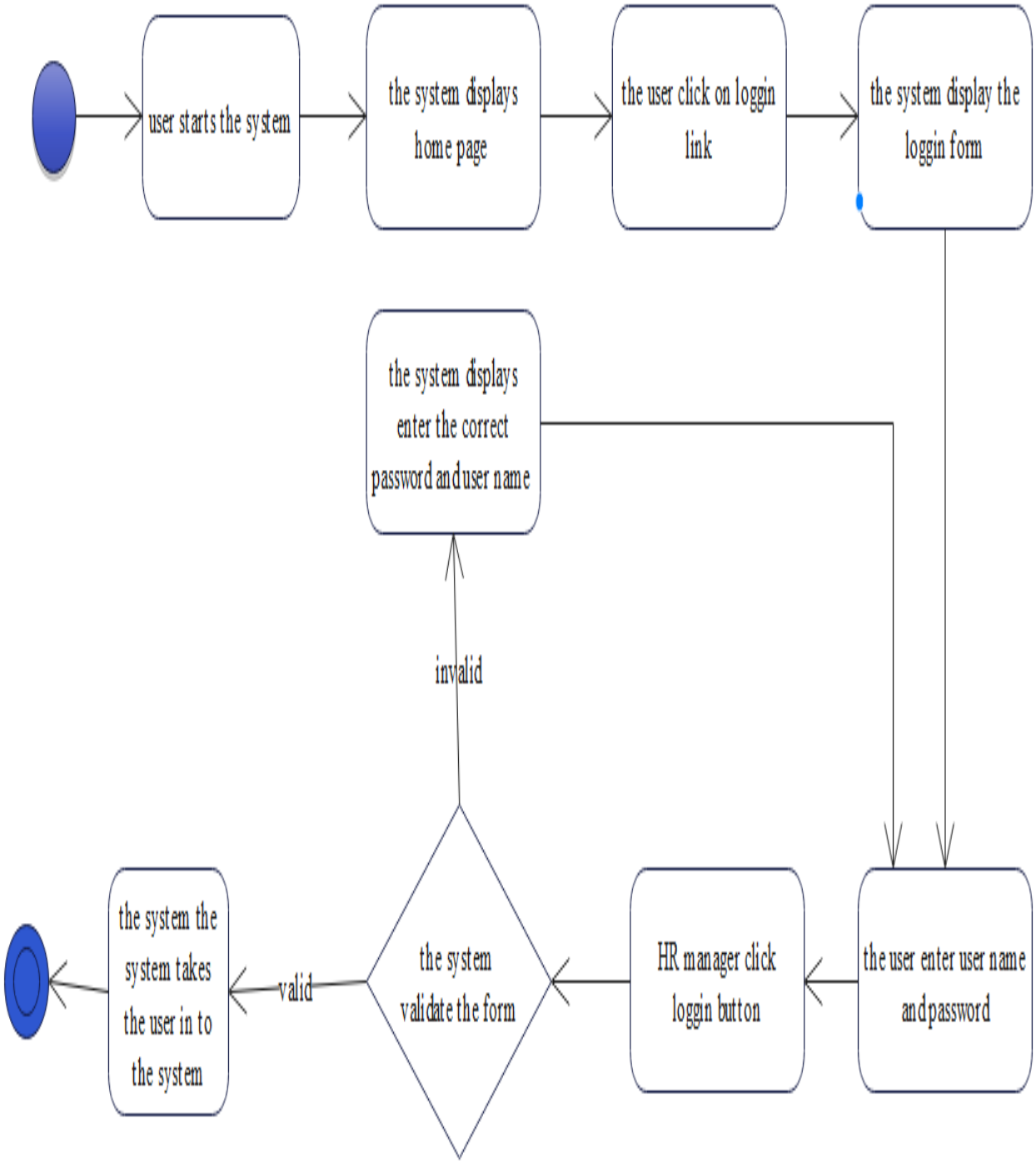


Figure 3.2 Activity diagram for login

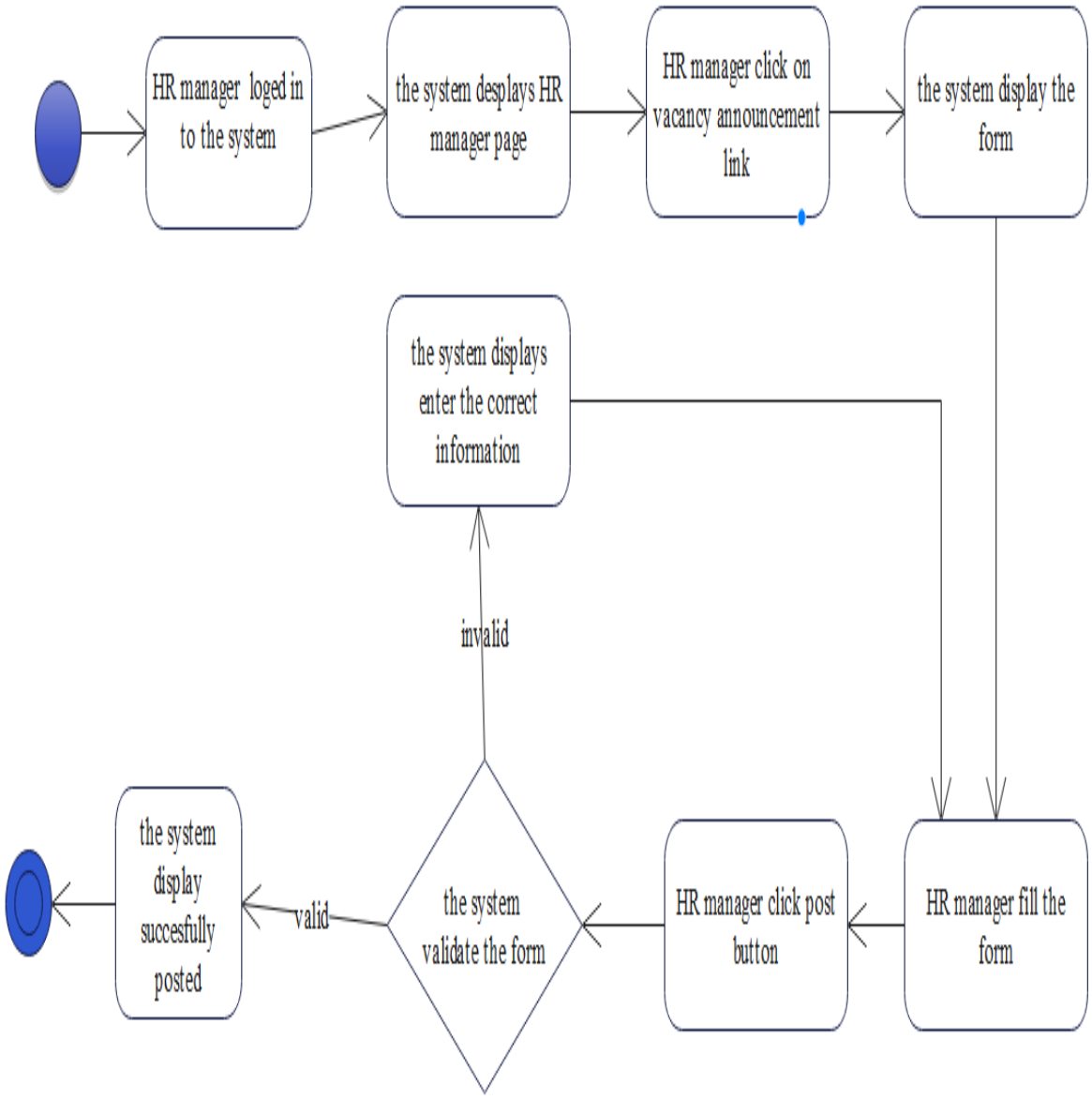


Figure 3.3 Activity diagram for vacancy announcement

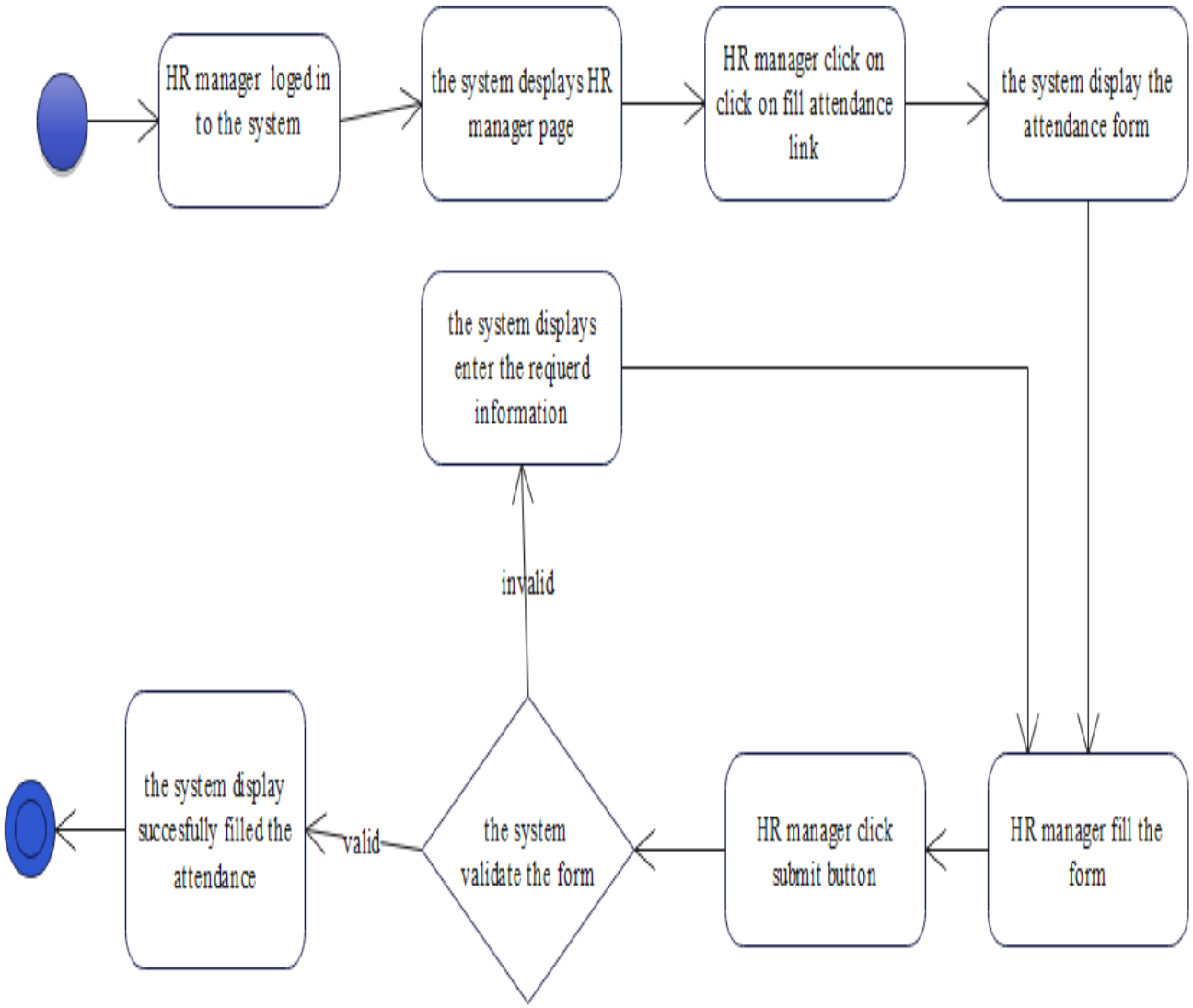


Figure 3.4 Activity diagram for fill attendance

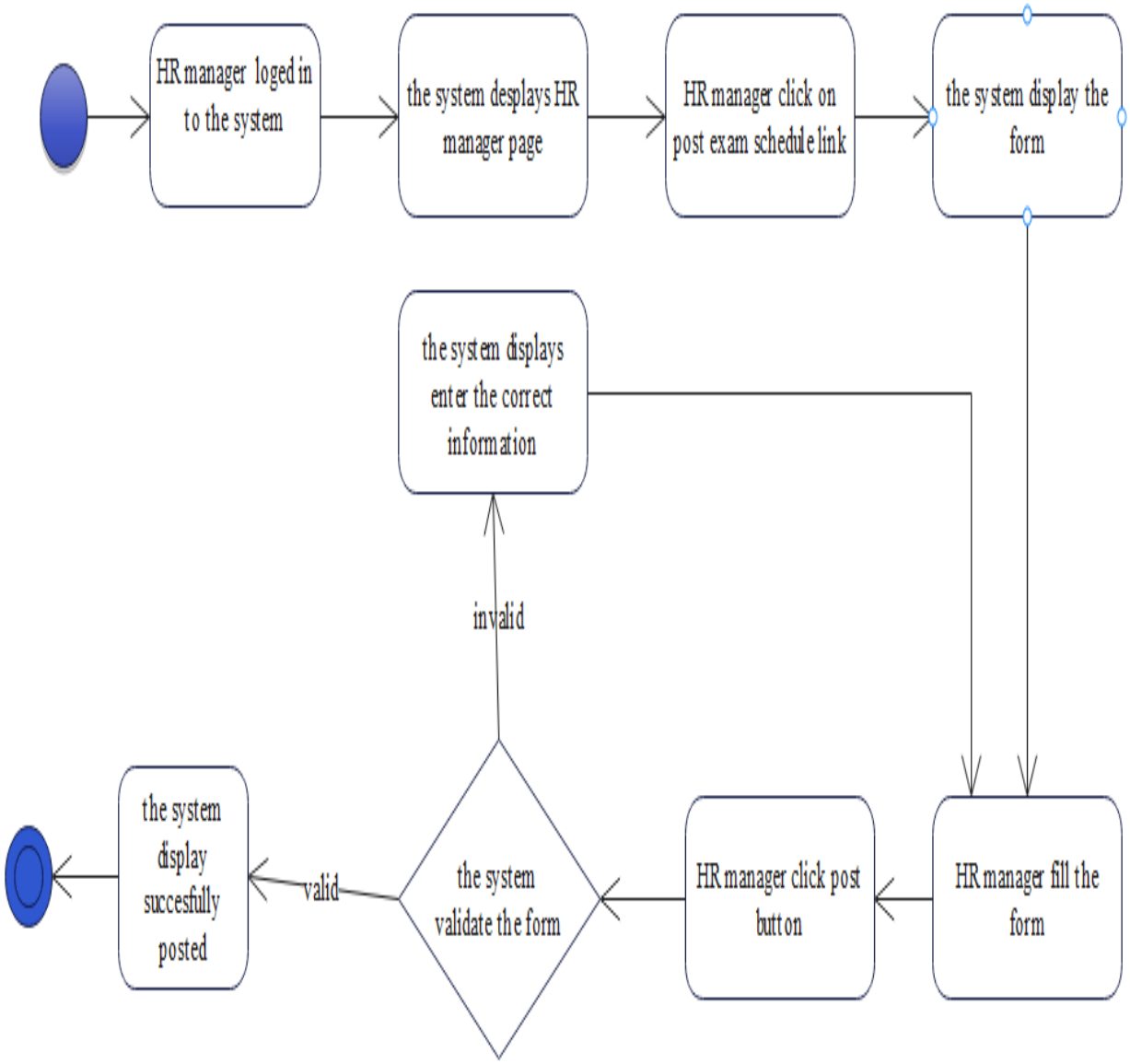


Figure 3.5 Activity diagram for post exam schedule

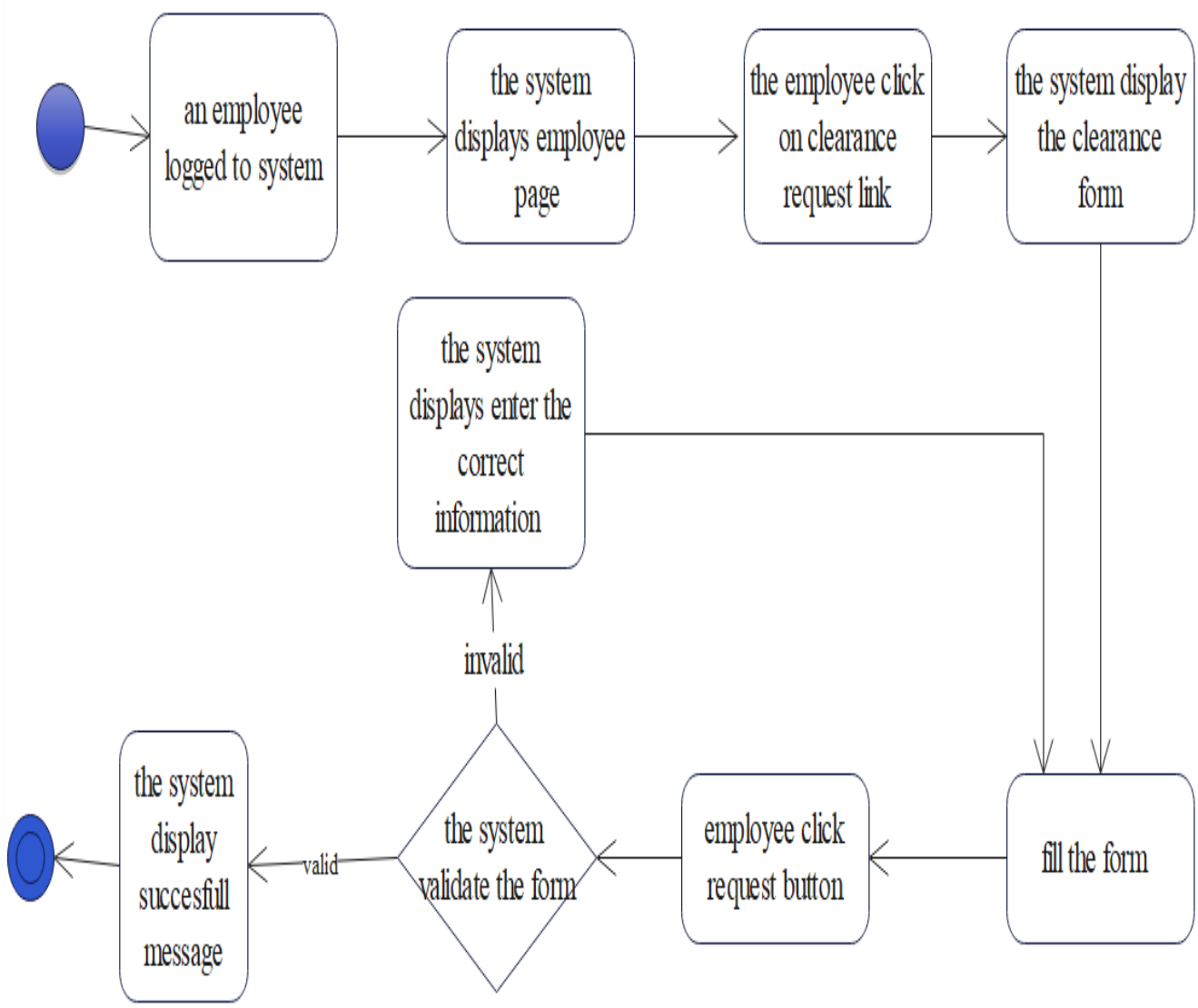


Figure 3.6 Activity diagram for clearance request

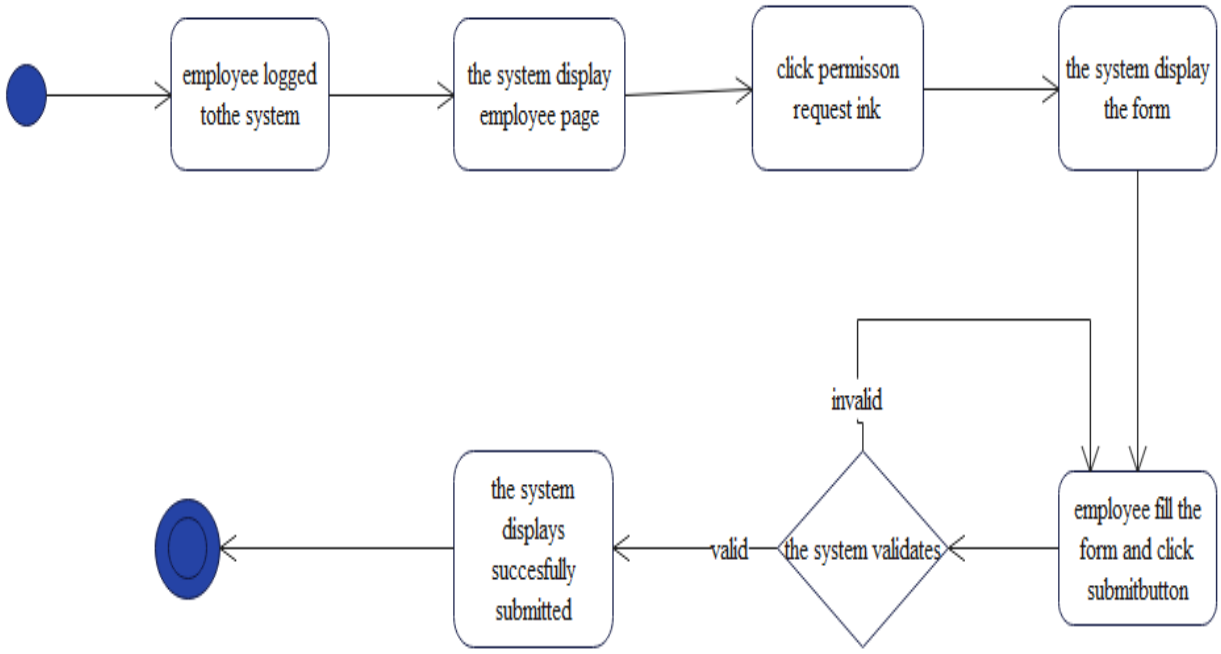


Figure 3.7 Activity diagram for permission request

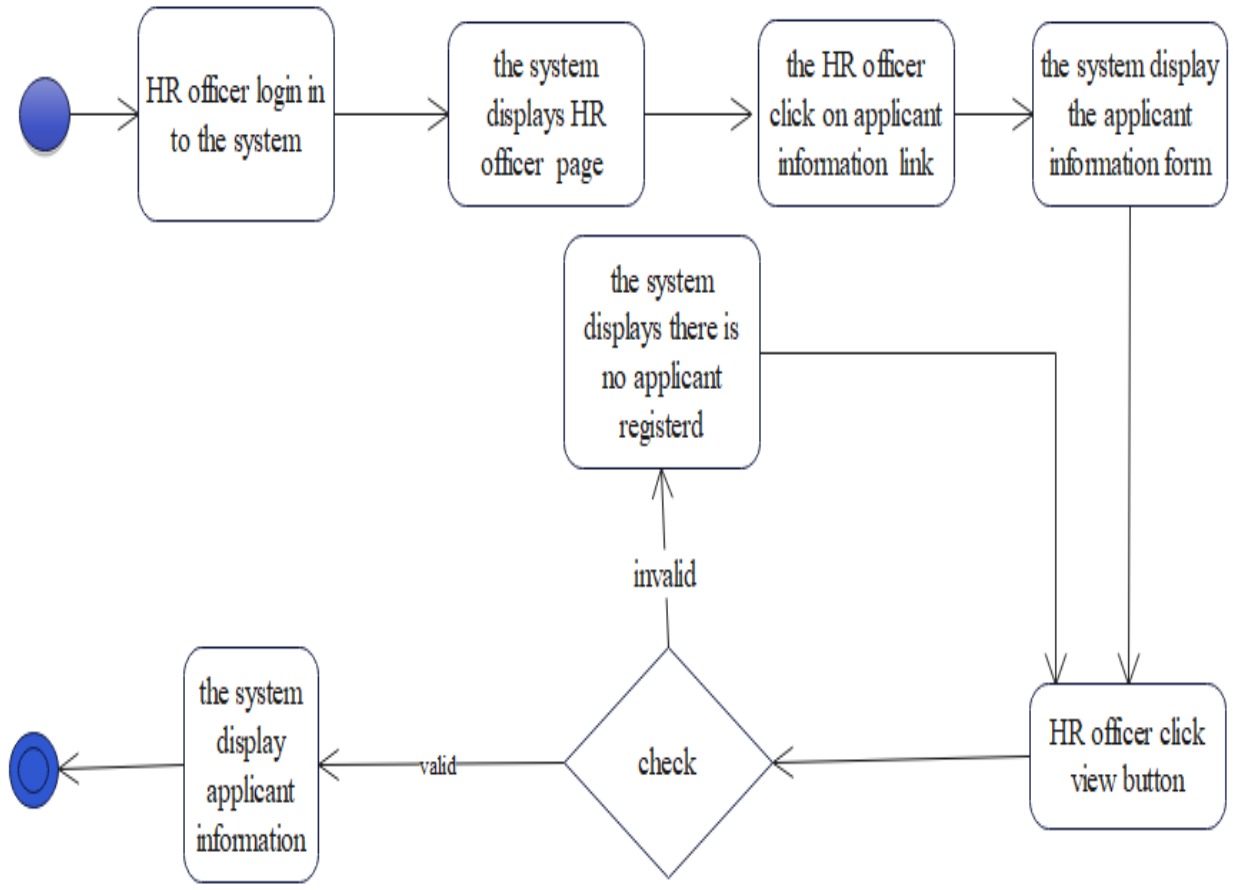


Figure 3.8 Activity diagram for view applicant information

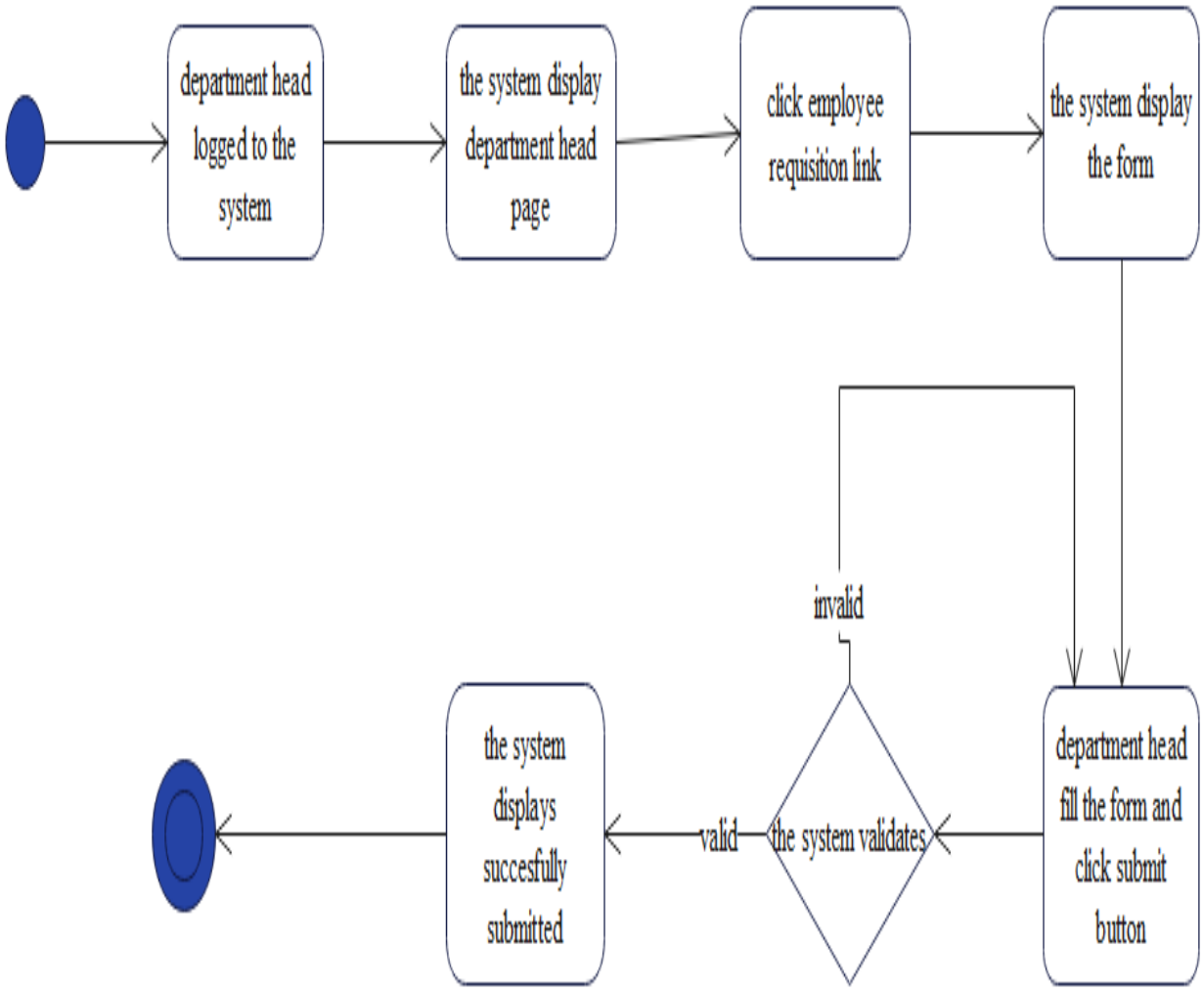


Figure 3.9 Activity diagram for employee requisition

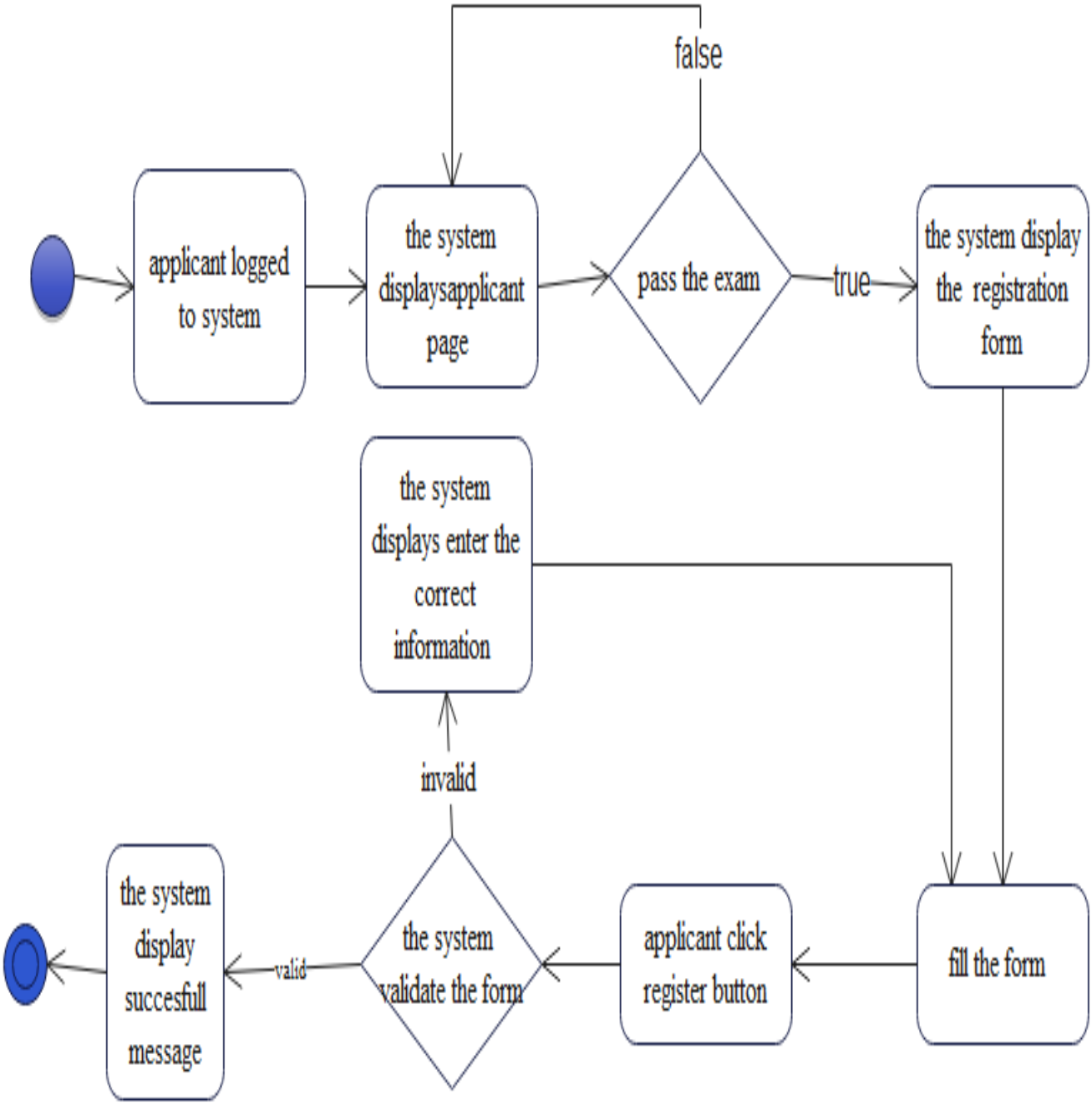


Figure 3.10 Activity diagram for employee registration

3.2.5. Object Model

An object model is a visual representation of a system's objects, actions, and associated attributes. An object model can be used, in conjunction with a design system, to create a consistent experience across a system's higher-level constructs**.**

In this section we will describe the class diagram depicting the inheritance relationships and associations that exist between the entities objects that are available on the system. The class diagram focuses mainly on the relationship among application domain concepts.

3.2.6. Data Dictionary

A data dictionary is a collection of descriptions of the data objects or items in a data model for the benefit of programmers and others who need to refer to them. Often a data dictionary is a centralized metadata repository. The customers of the database normally don't interact with the data dictionary; it is only handled by the database administrators.

We have the following data dictionaries in our system: -

Object	Attributes	Description
An employee	First name	Describes It describes first name of an employee
	Last name	Describes the last name of an employee
	Middle name	Describes the middle name of an employee
	Employee id	Describes the id of an employee
	Sex	Describes the sex of an employee
	Email	Describes the email of an employee
	Age	Describes the age of an employee
	Username	Describes the username of an employee
	Password	Describes the password of an employee
	Position	Describes the position of an employee
	Department	Describes the department of an employee where included
HR officer	First name	It describes first name of an employee
	Middle name	Describes the middle name of an employee
	Last name	Describes the last name of an employee
	HRID	Describes the id of HR officer
	Sex	Describes sex of HR officer
	Email	Describes Email of HR officer
	Username	Describes User name of HR officer
	Password	Describes Password for HR officer
	Age	Describes Age of HR officer

	Address	Describes Address of HR officer
	Phone number	Describes Phone number of HR officer
Applicant	First name	Describes First Name of the applicant
	Middle name	Describes Middle name of the applicant
	Last name	Describes Last name of the applicant
	applcantId	Describes Id of an applicant
	Sex	Describes Sex of applicant
	Email	Describes Email for applicant
	Username	Describes Username for applicant
	Password	Describes Password for applicant
	Phone number	Describes Phone number for applicant
	CV	Describes Curriculum vita for the applicant
	CGPA	Describes Cumulative GPA the applicant have
	Age	Describes Age of the applicant
	Address	Describes Address of an applicant
HR admin	First name	Describes First name for admin
	Middle name	Describes Middle name for admin
	Last name	Describes Last name for admin
	Admin Id	Describes Id for admin
	Sex	Describes Sex for admin
	Email	Describes Email address for admin
	Age	Describes Age for admin
	Phone number	Describes Phone number for admin
	Address	Describes Address for admin
	Username	Describes Username for admin
	Password	Describes Password for admin
	First name	Describes First name of the department head
	Middle name	Describes Middle name of the department
	Last name	Describes Last name of the department

Department head	department ID	Describes Id of the department head
	Email	Describes Email for the department head
	Sex	Describes Sex for the department head
	Age	Describes Age for the department head
	Phone number	Describes Phone number for department head
	Address	Describes Address for department head
	Username	Describes Username for department head
	Password	Describes Password for department head

Table 3.12 data dictionary

3.2.7. Class model

Class is the backbone of almost every object-oriented method including UML.

Class diagram are the most common diagrams used in UML. class diagram consists of classes, interfaces, associations and collaborations. It basically represents the object-oriented view of the system, which is static in nature. It also represents the object orientation of the system, so it is generally used for development purpose. dependency relationships are used when no direct relationship (inheritance, aggregation, or association) exist between the two classes [10].

Class is depicted by boxes composed of three parts that are

- The top part displays the name of the class.
- The center part displays its attributes.
- The bottom part displays its operations.

The purpose of the class diagram is: -

- Analysis and design of the static view of an application
- Describe responsibilities of a system.
- Base for component and deployment diagrams.

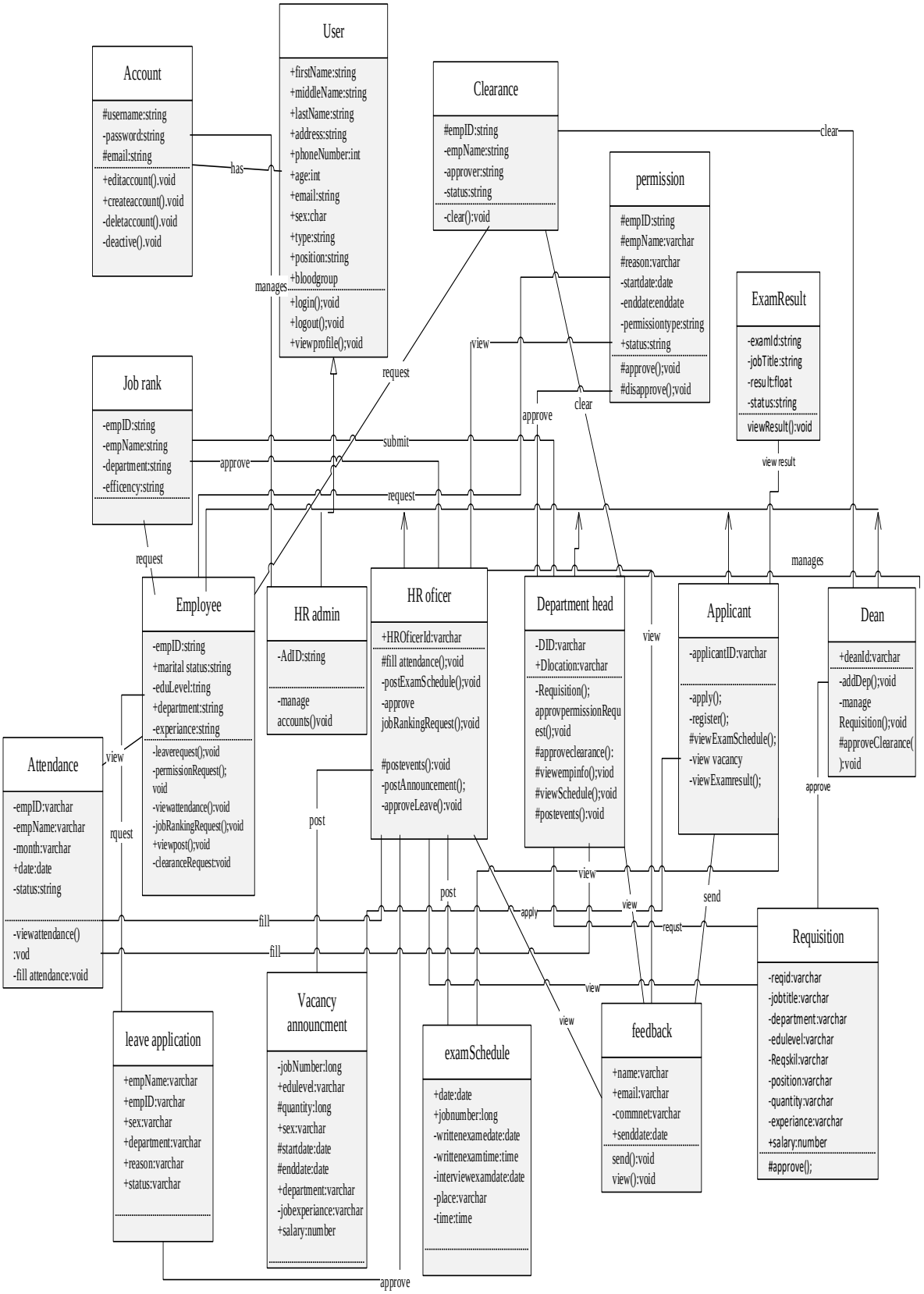


Figure 3.11 Class diagram

3.2.8. Dynamic Modeling

The dynamic model is used to express and model the behavior of the system over time. It includes state diagrams, and sequence diagrams.

3.2.9. Sequence Diagrams

Sequence diagrams are used to display the interaction between users, objects and entities within the system. It provides a sequential map of message passing between objects over time. Sequence diagram which is also known as interaction diagrams are one of the diagrams seed in UML, for modeling the dynamic aspects of the system. It shows an interaction consisting of a set of objects and their relationship including message that may be dispatched among them.

Frequently these diagrams are placed under Use Cases in the model to illustrate the use case scenario - how a user will interact with the system and what happens internally to get the work done.

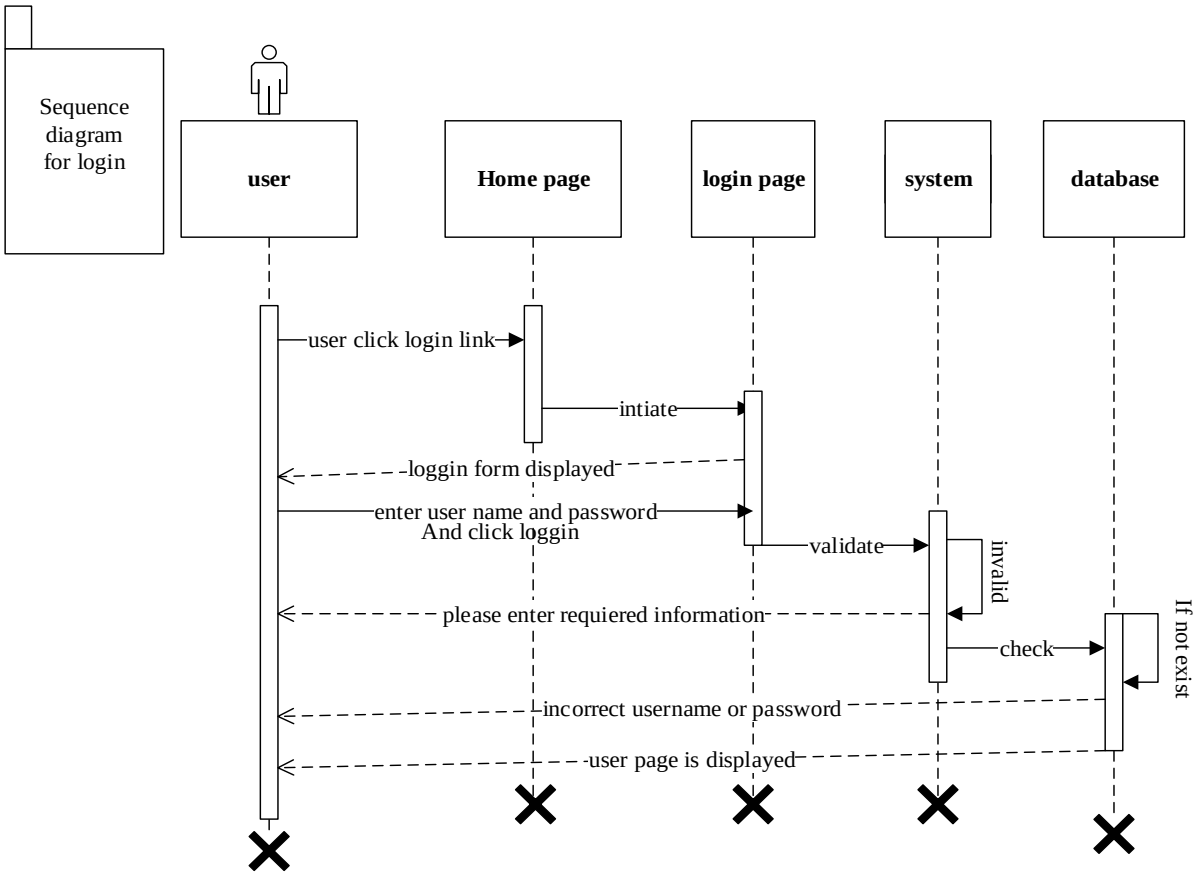


Figure 3.12 Sequence diagram for login

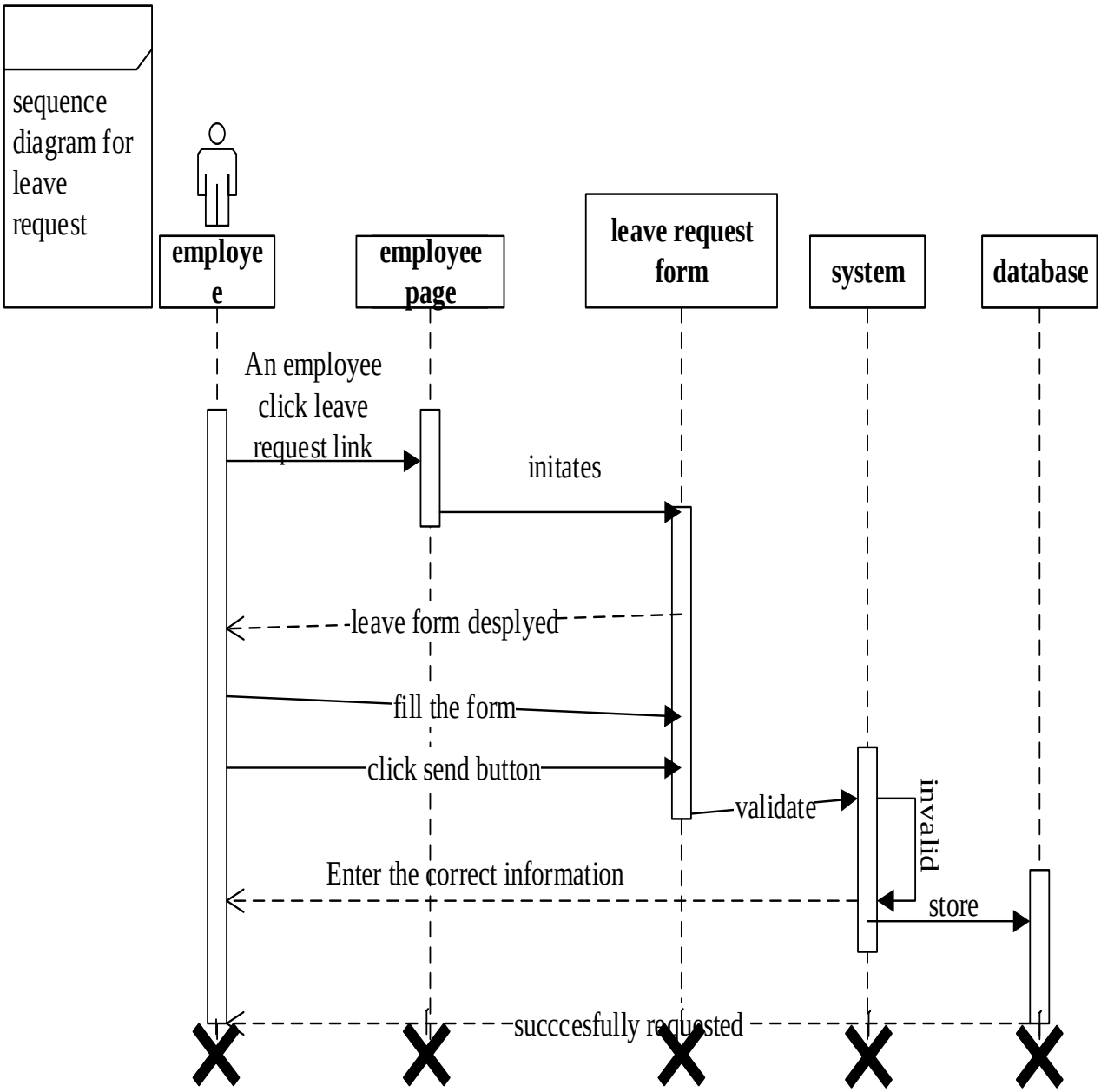


Figure 3.13 sequence diagram for leave request

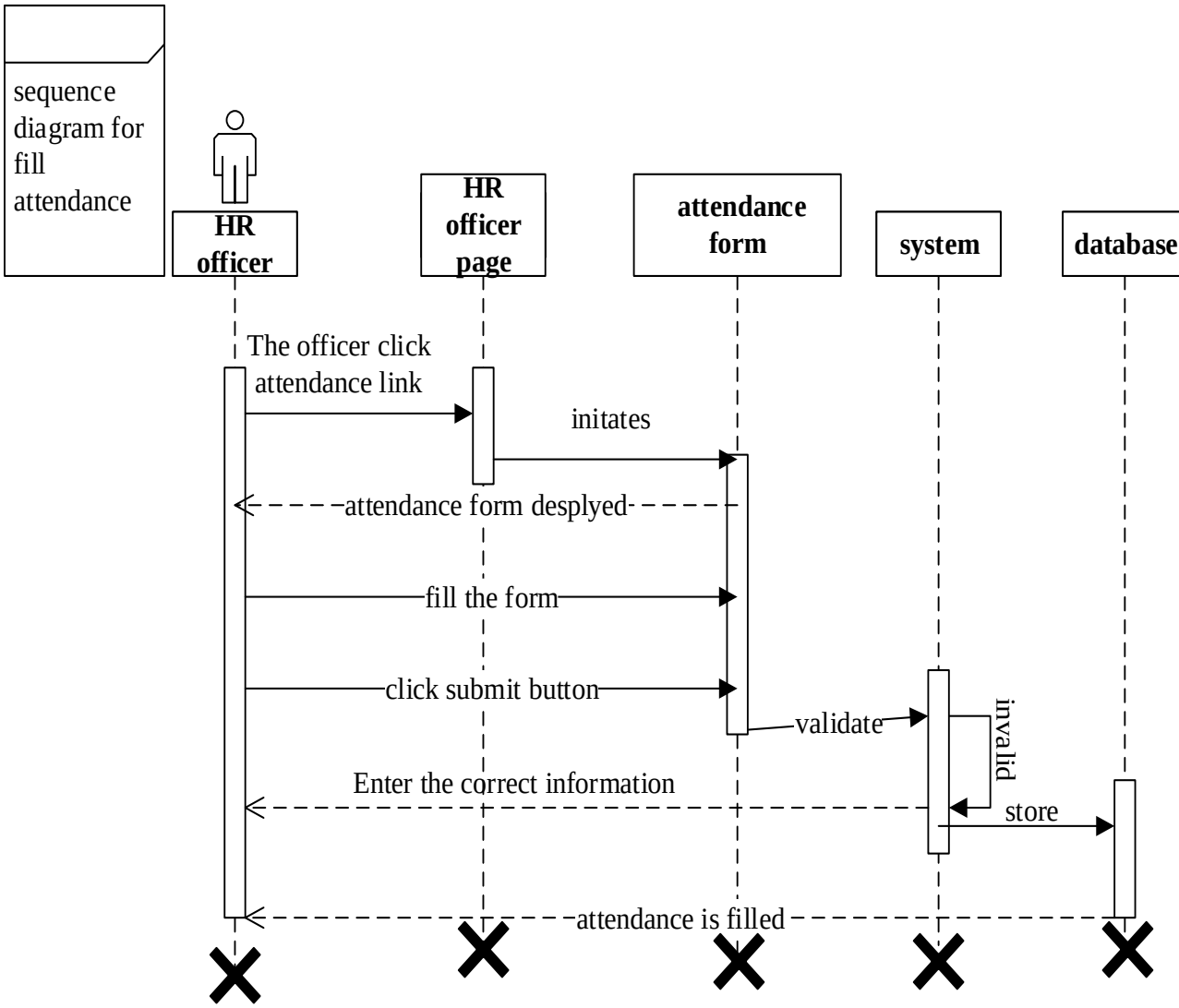


Figure 3.14 sequence diagram for fill attendance

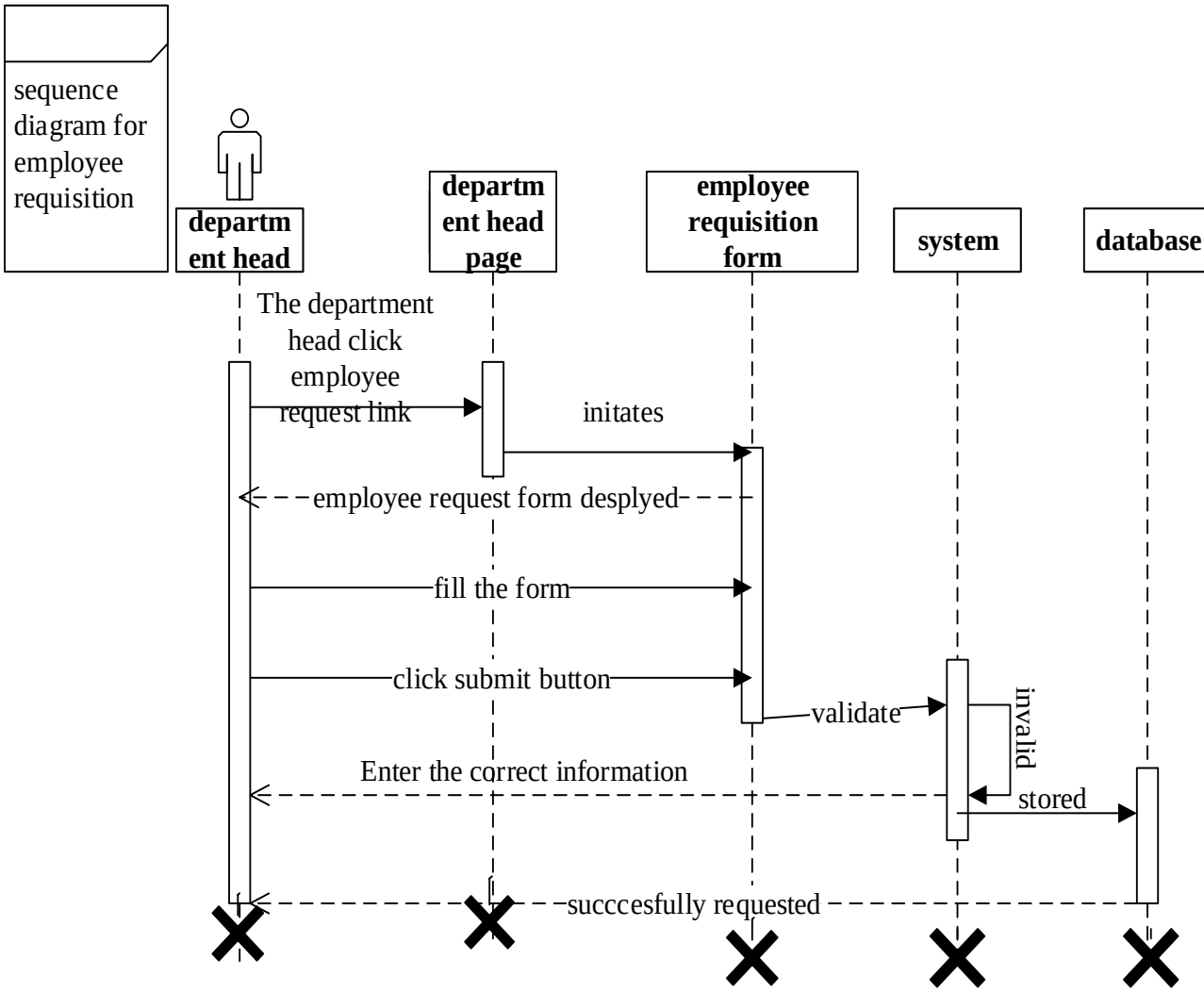


Figure 3.15 Sequence diagram for employee requisition

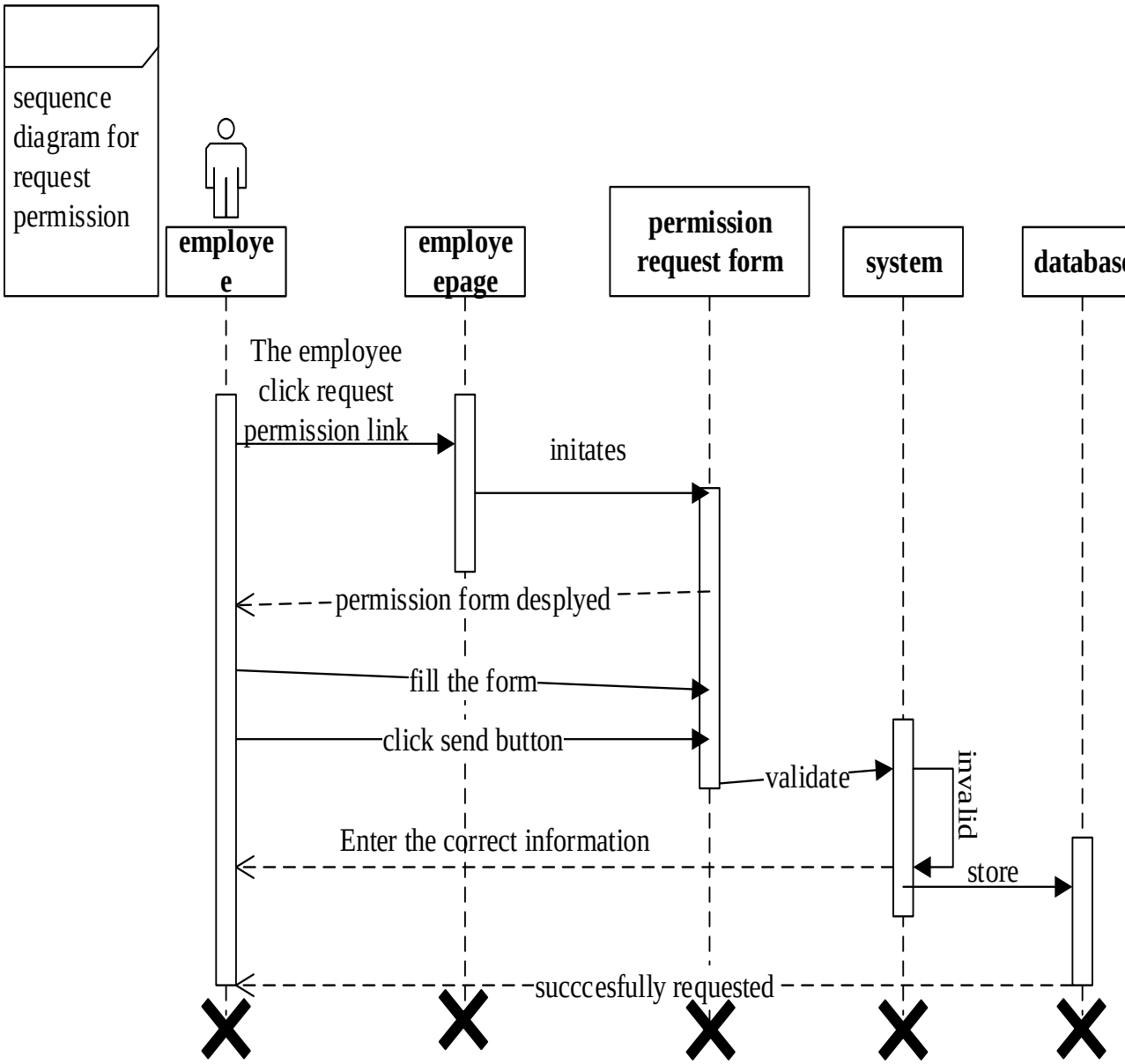


Figure 3.16 sequence diagram request permission

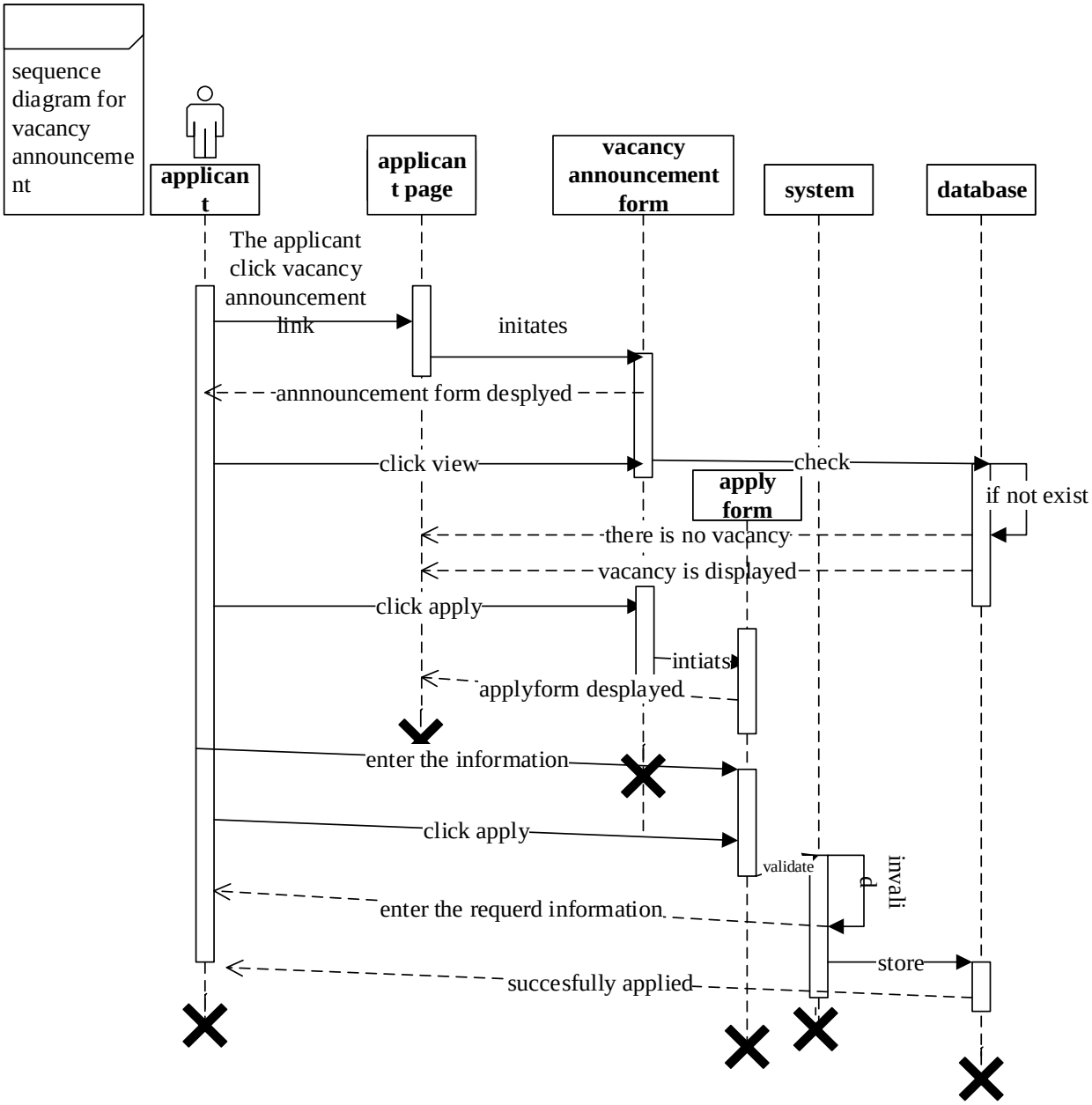


Figure 3.17 Sequence diagram to apply

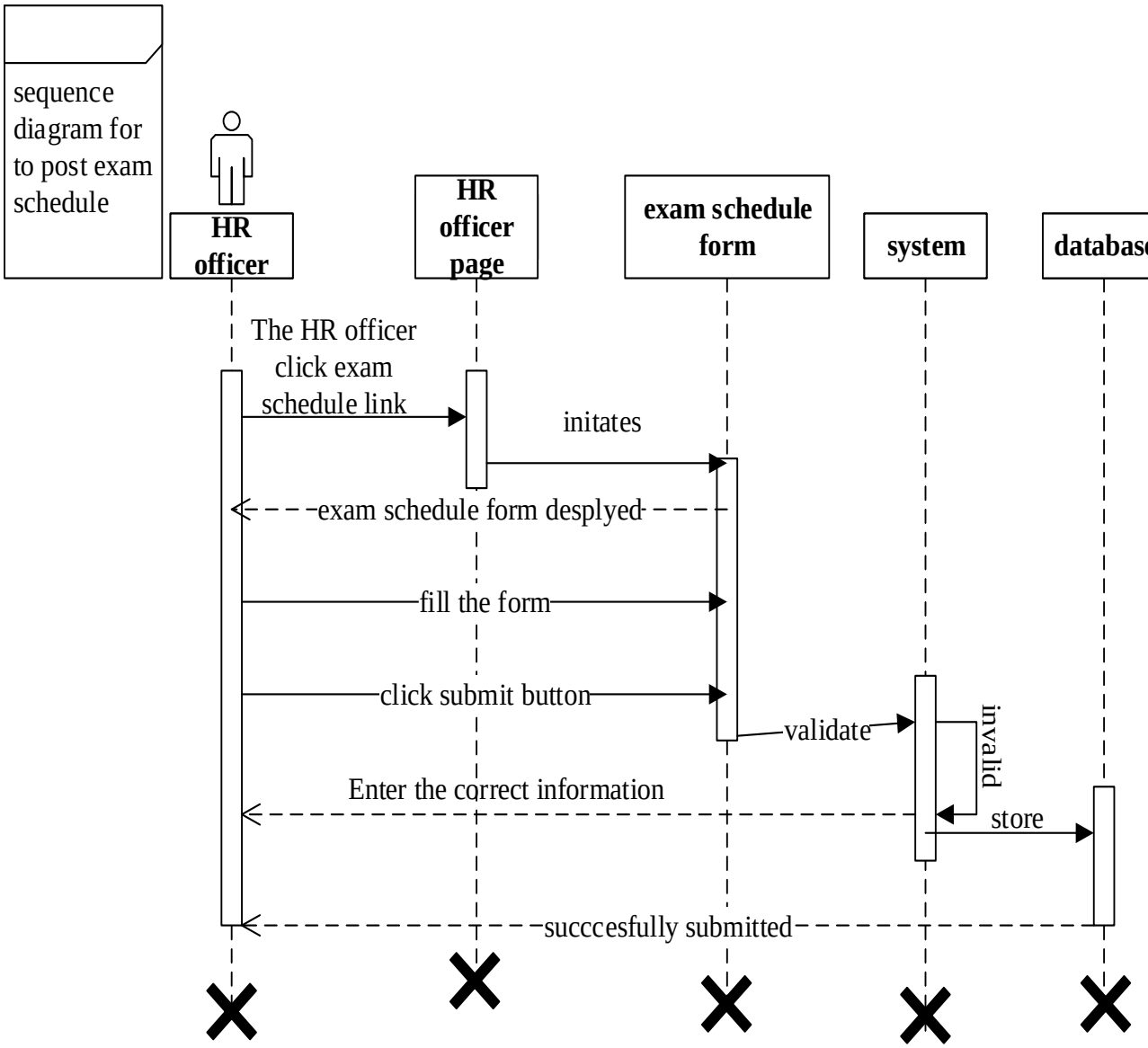


Figure 3.18 Sequence diagram for post exam schedule

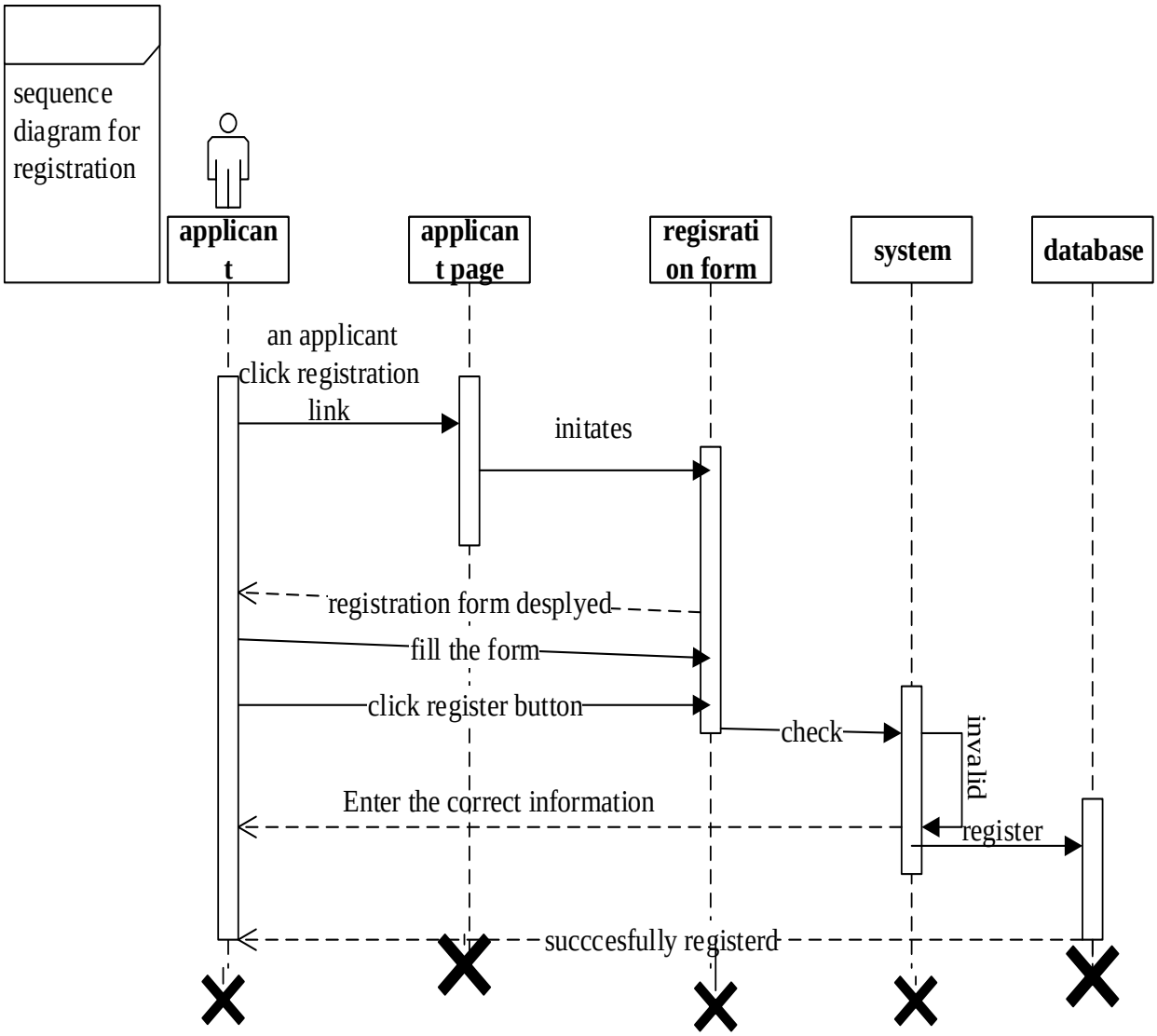


Figure 3.19 Sequence diagram for applicant registration

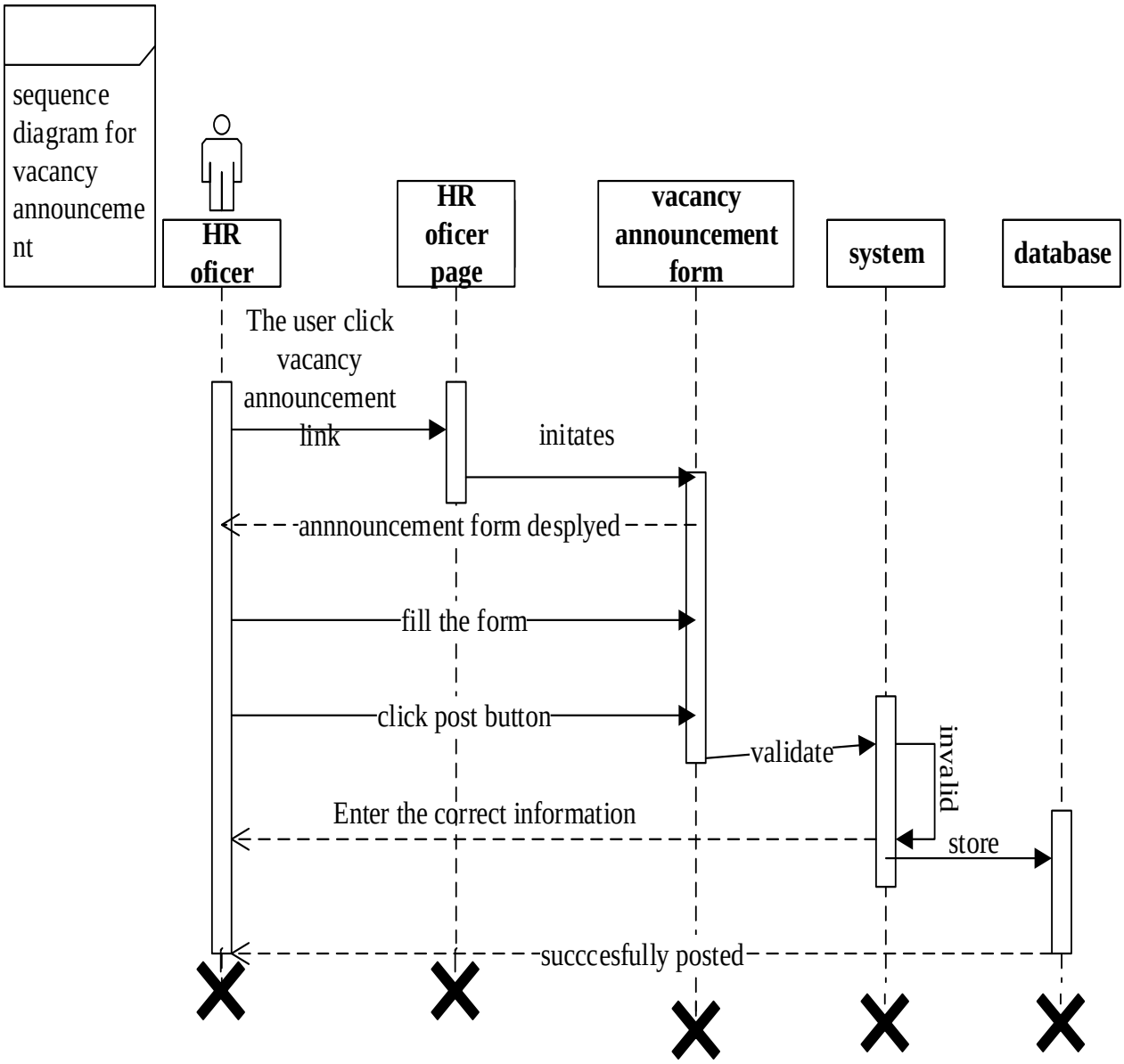


Figure 3.20 Sequence diagram for vacancy announcement

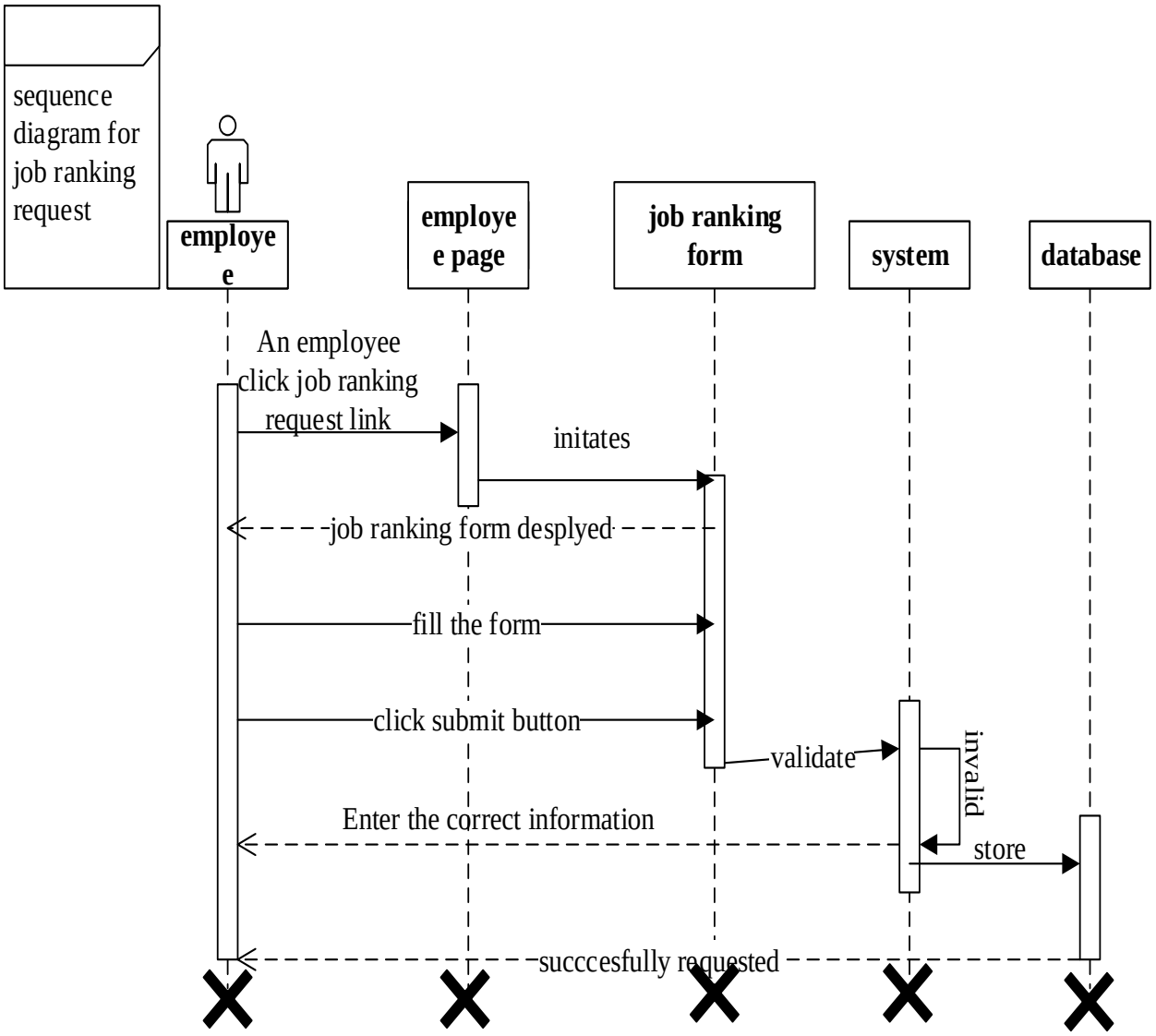


Figure 3.21 Sequence diagram for job ranking request

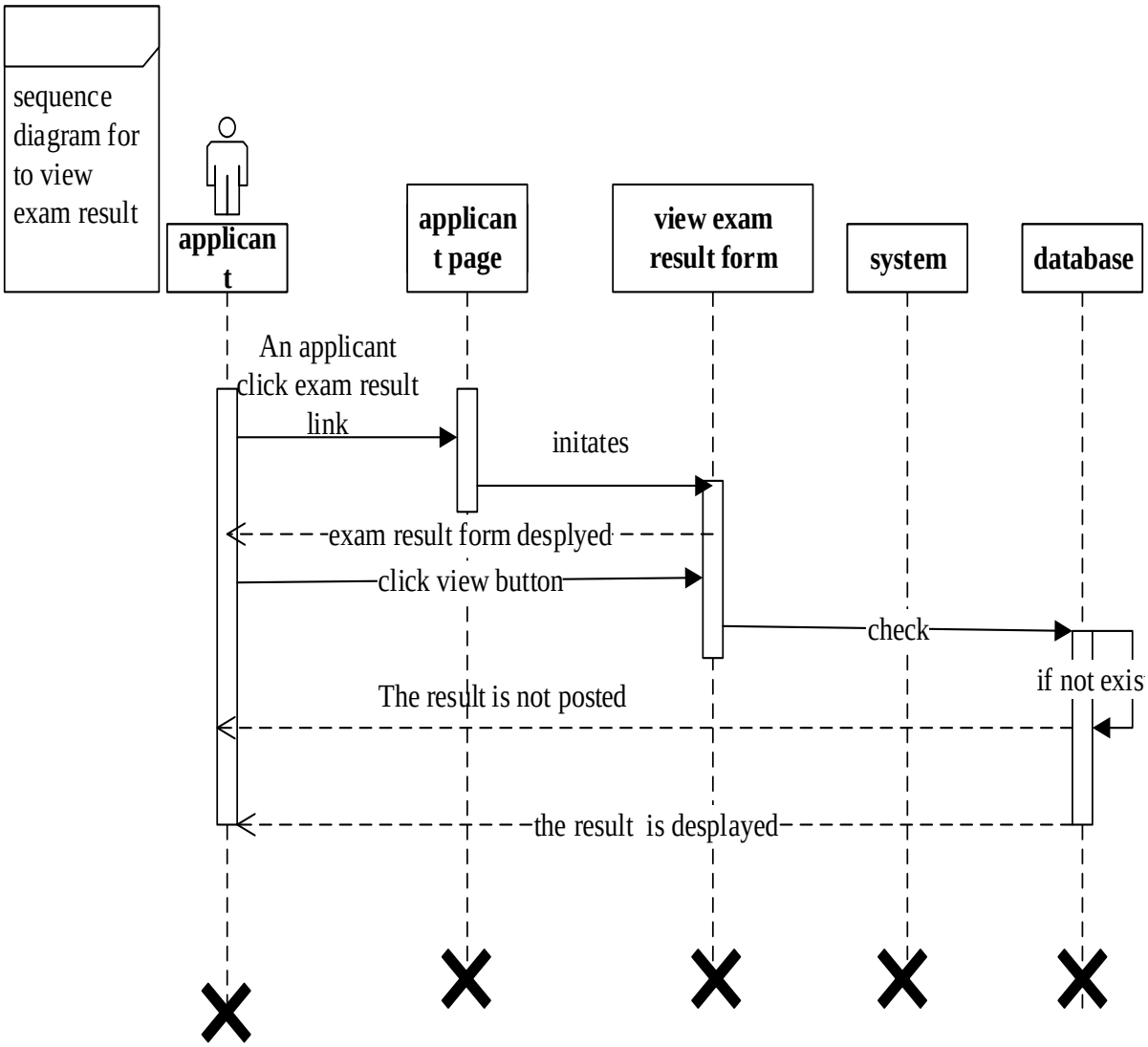


Figure 3.22 Sequence diagram for view exam schedule

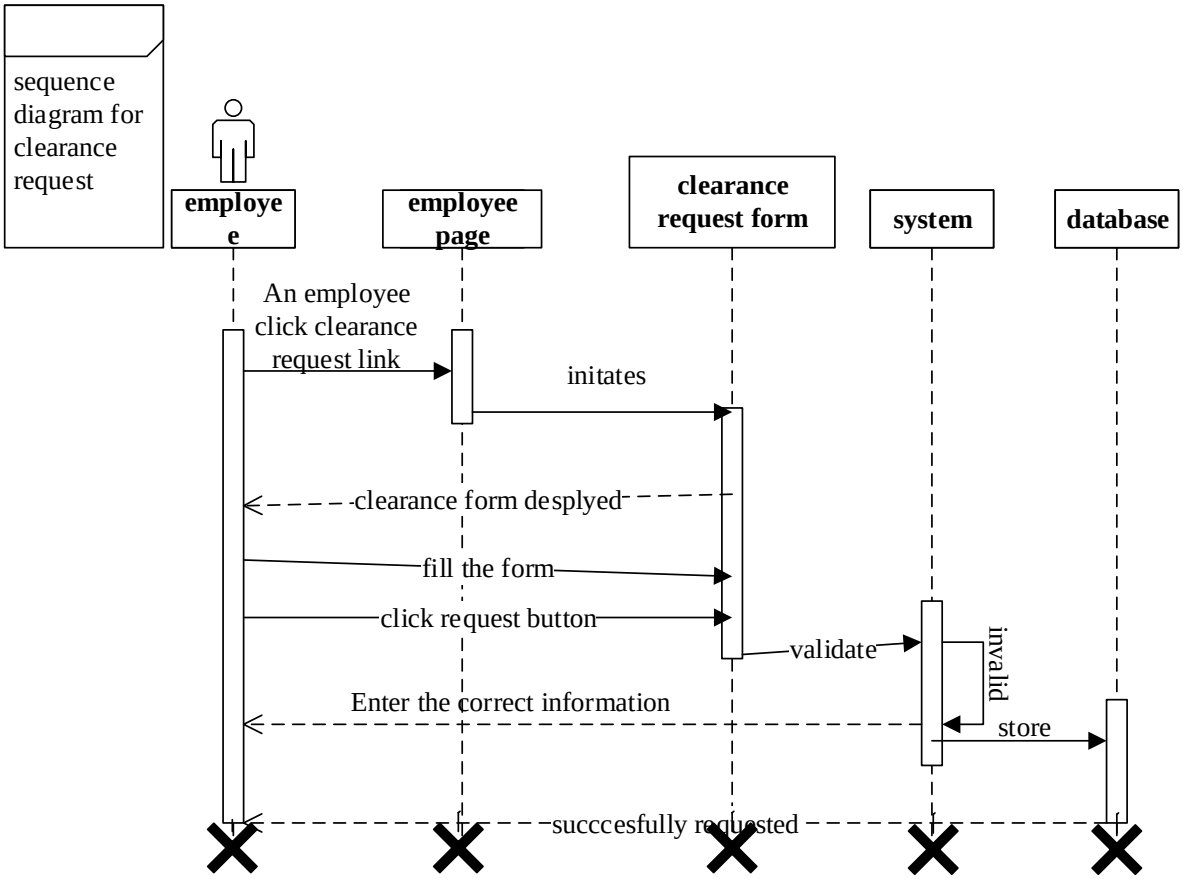


Figure 3.23 Sequence diagram for clearance request

3.2.10. User interface

Business and life in general has become increasingly dependent on the internet, web apps and mobile apps. As a result, companies have found that the best way to compete on the web is to prioritize building an attractive and efficient user interface (UI) that optimizes the user experience (UX).

The user interface (UI) is the point at which human users interact with a computer, website or application. The goal of effective UI is to make the user's experience easy and intuitive, requiring minimum effort on the user's part to receive maximum desired outcome. [(11)]

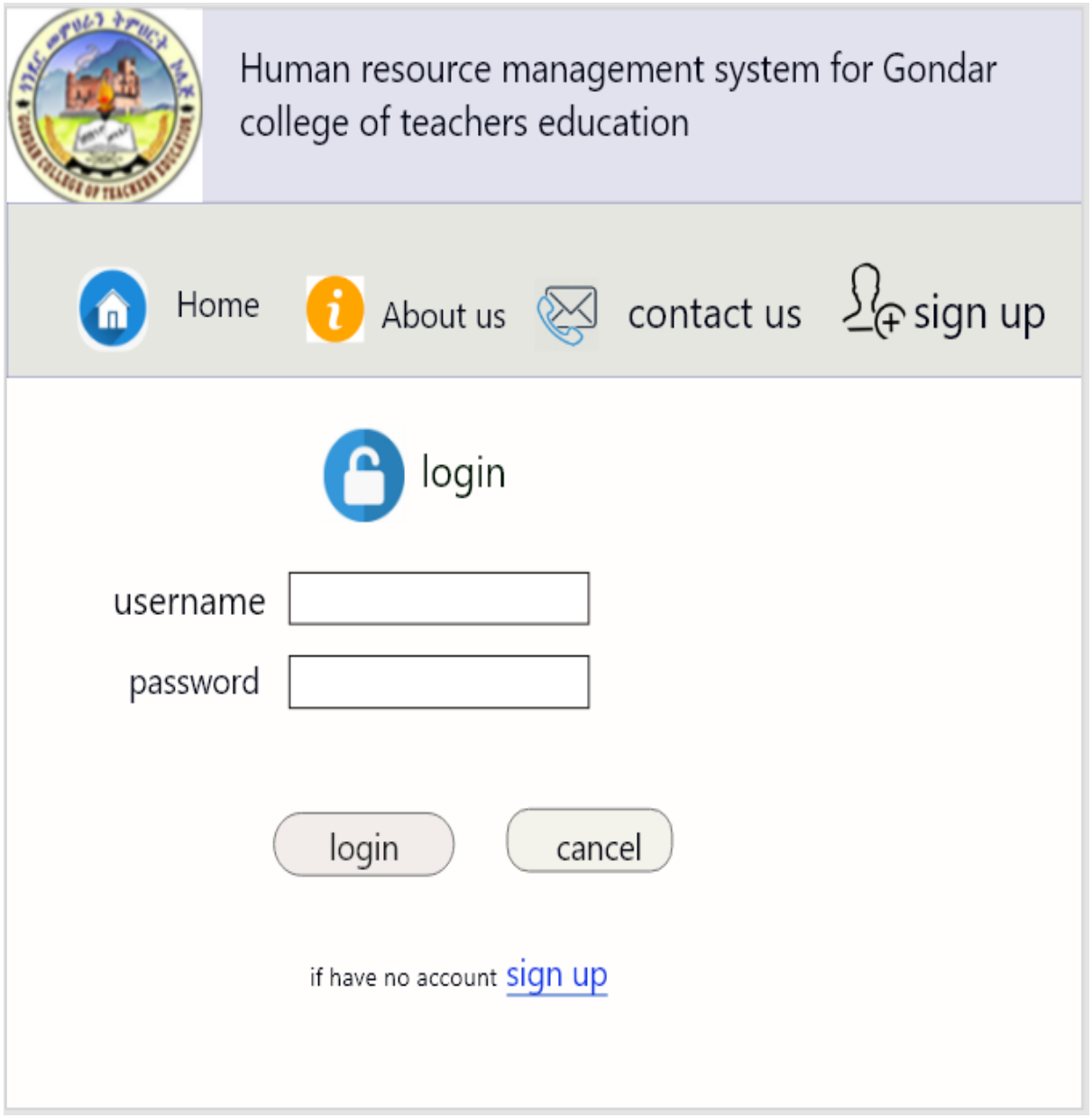


Figure 3.24 Login page

CHAPTER FOUR

4. SYSTEM DESIGN

4.1. Introduction

System design is the transformation of the analysis model into a system design model. System design is the first part to get into the solution domain in a software development.
The purpose of designing is to show the direction how the system is built and to obtain clear and enough information needed to drive the actual implementation of the system. It is based on understanding of the model the software built on. The objectives of design are to model the system with high quality. Implementing of high-quality system depend on the nature of design created by the designer. If one wants to change to the system after it has been put in to operation depends on the quality of the system design. So, if the system is design clearly, it will be easy to make changes to it.

Systems design is multi-step process that focuses on data structure software architecture, procedural details and interface between modules [6]. The design process also translates the requirements into the presentation of software that can be accessed for quality before coding begins. It is the process of defining and developing a system to satisfy specified requirements of the user. Designers in all disciplines draw on fundamental design concepts and principles. This document describes the requirements for developing the HRMS for the GCTE**.**

4.2. Design goal

The objectives of design are to model the system with high quality. The design goals are derived from non-functional requirements that means non-functional requirement is the description of the feature characteristics and attribute of the system as well as any constraints that may limit the boundary of the proposed solution. Design goals describe the qualities of the system that the developers should consider.

- **Response time:** the system should be fast and taking less time to respond to the request.
- **End user criteria:** The system should have simple and understandable graphical user Interface such as forms and buttons, which have descriptive names. It should give reliable response for each request.

- **Modifiability or extensivity: -** the system should be modifiable for further modification and enhancement of the application.
- **Reliability:** the system must perform its intended functions and operations in a system's environment. Without experiencing failure or system crash.
- **Security:** the system must be protected from un authorized access, threats, attacks and vulnerabilities.
- **Fault tolerance:** the system must have the ability to satisfy requirements despite failures such as hardware, software or network failures.
- **Cost:** - The system should be developed, deployed, administered and maintained with minimum cost as possible.

4.3. Current system architecture

There is no a specified software architecture for the current HRM in Gondar teacher college. Because data is managed and handled manually on papers.

4.4. System architecture

In this project the team uses a three-tier architecture which has three layers. These three layers are the Application or Presentation layer, the business layer and the data access layer. Application or presentation layer is the form which provides the user interface to either programmer or end user. The business layer is the class which the team uses to write the function which works as a mediator to transfer data from application layer or presentation layer to data layer. which implements the business logic, controller logic and presentation logic to control the interaction between the application's clients and data. The controller logic processes client requests such as requests to view customer's request, to record or to retrieve data from the database. Business rules enforced by the business logic dictate how clients can and cannot access application data and how applications process data.

The third tire is the data access layer which is also a class to get or set data to the database queries back and forth. This layer only interacts with the database. The database queries or stored procedures will be written here to access the data from the database or to perform any operation to the database.

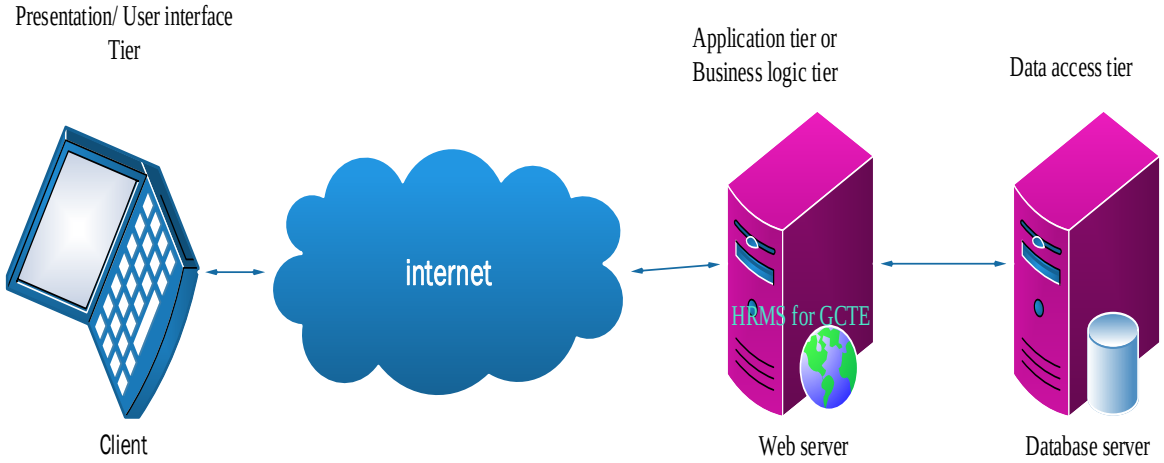


Figure 4.1 system architectural diagram

4.4.1. System decomposition

System decomposition is undertaken to reduce the complexity of the system and gaining insight into the identity of the constituent components. The system is decomposed in to sub-systems which are a collection of classes, associations, operations, events and constraints that are closely interrelated with each other [8]. The proposed web based HRMS for Gondar college of teachers' college is decomposed in to smaller sub-system as shown in the following figure. These sub-systems are further decomposed in to other subsystems. The major sub-system identified includes: -

- **Registration management system:** - this sub system concern with the registration employee and applicant.
- **Vacancy Management System:** - In this sub system the HR officer can post vacancy announcements to hire an employee.
- **Employee requisition Management System:** - In this sub system that department head manage employee requisition a process asking new employees based on the requirements of the department.
- **Permission Management System:** - The sub system controls the employee permission include permission request, view permission and manage permission application activity.
- **Employee Management System:** - this sub system manages employee detail in the database.

- **User Account Management System:** -this sub system allow admin to administer user accounts and create account, update, search, view and block user accounts.
- **Attendance management system:** - in this sub system department manager and HRM officer manage attendances.
- **Feedback management system:** in this sub system employee and applicant can send feedback and HR officer can view the feedback and can delete the feedback.
- **Job rank management system:** - in this sub system an employee can request job rank and HR officer approve the request.
- **Clearance management system:** The system allows to the employee to request clearance and the department head and dean approve the request.

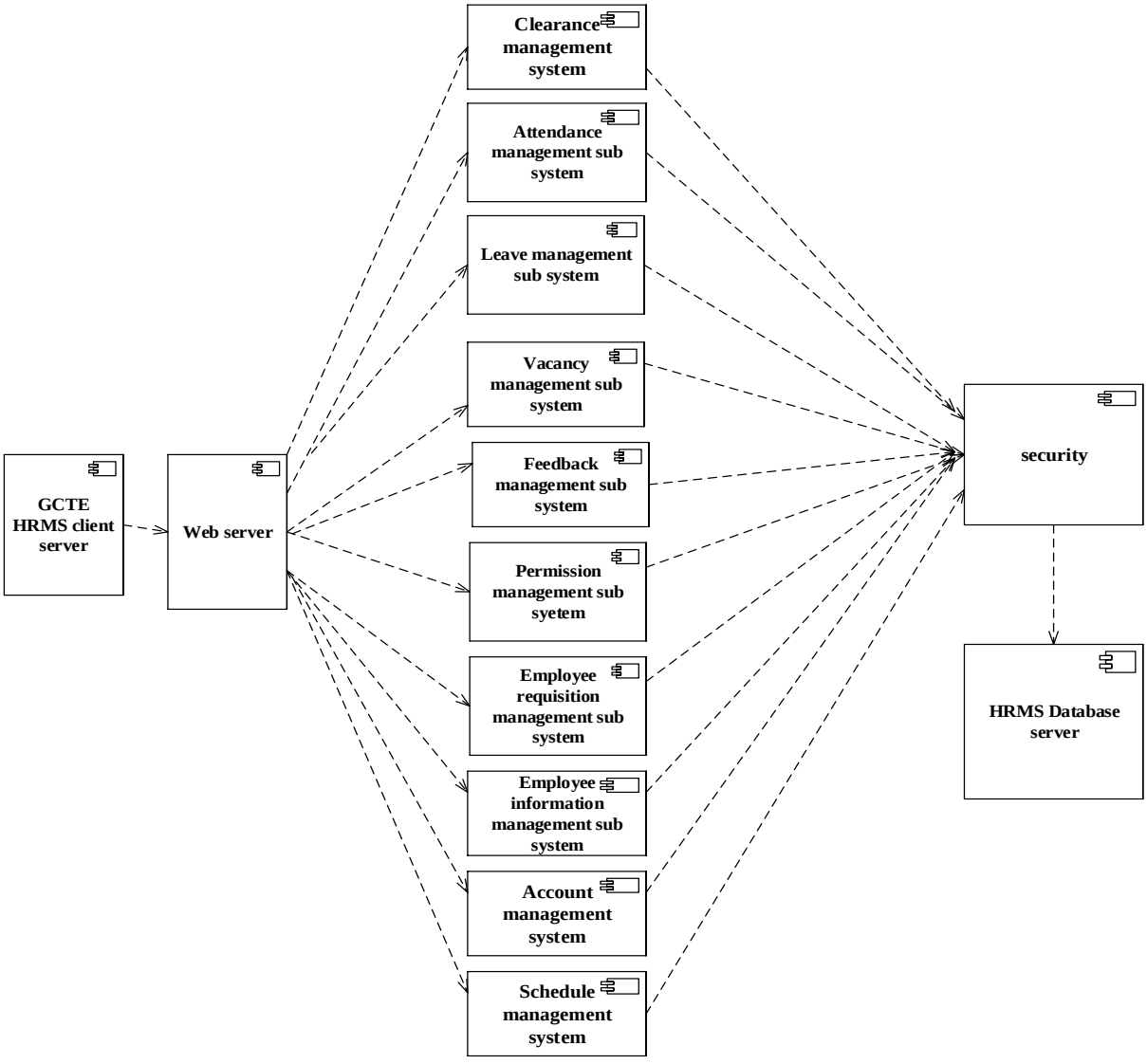


Figure 4.1 Component diagrams

4.4.2. Hardware/ software mapping

Hardware/software mapping for the system, it describes how subsystems are assigned to hardware and off-the-shelf components. It also lists the issues introduced by multiple nodes and software reuse. A deployment diagram of a system shows the hardware/software mapping. In this system design mainly, there are three hardware components. The client side, server side and database when the group team applies the system, necessary software will be loaded to each side hardware components. Network should be installed between each side. Then each sub system software will be assigned and configured to the mapped hardware. Then the local area network will be connected to the internet and the system will be functional.

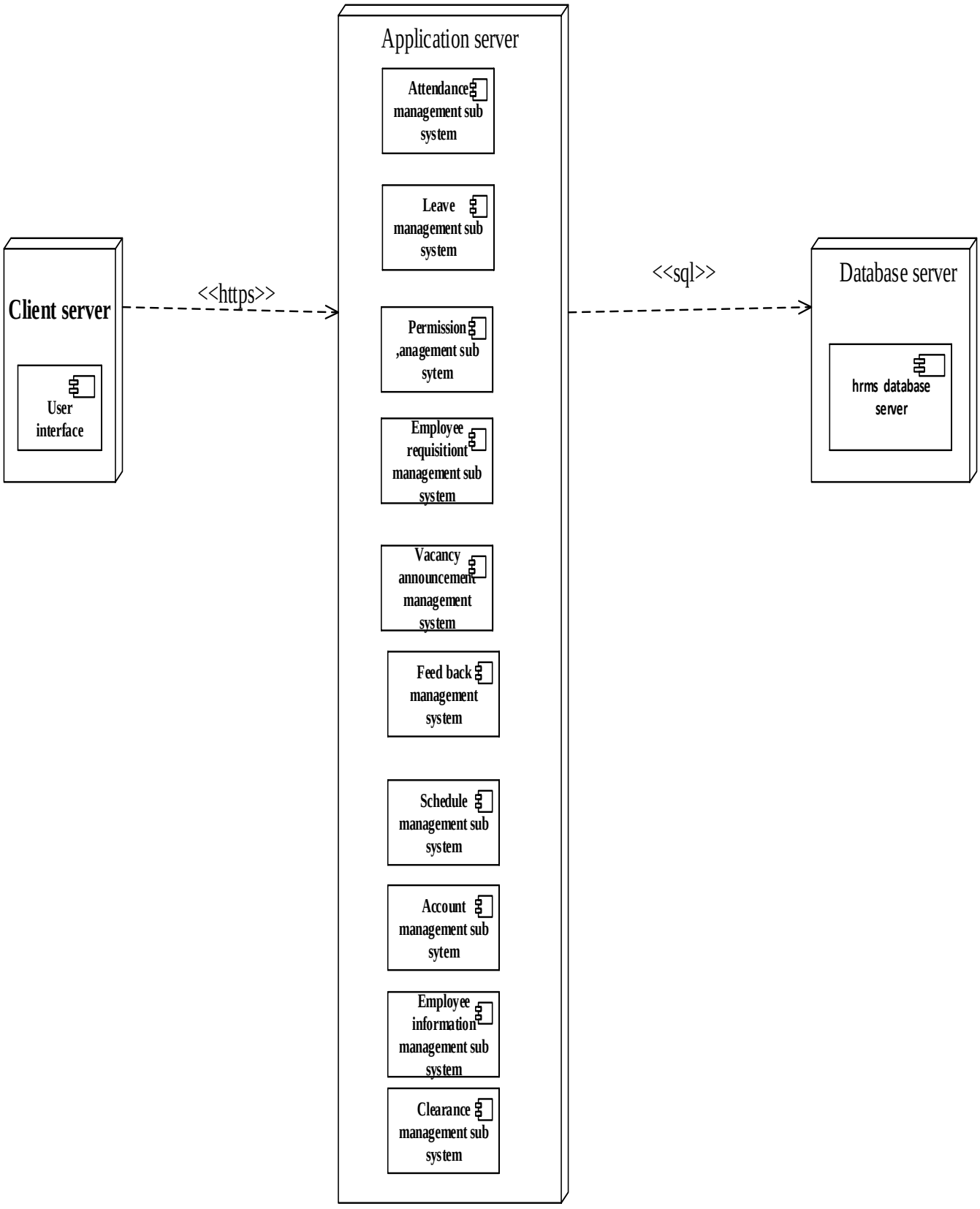


Figure 4.2 hardware/software mapping using deployment diagram

4.4.3. Persistent data modeling

This section typically includes the description of data schemes, the selection of database, and the description of the encapsulation of the database. In the GCTE HRMS, data such as employee registration, announce vacancy, applicant registration, post announcement, job request, comments, and users are persistent. In order to manage this, we have selected a relational database is the right choice. We have also selected SQL Server as our database management system. Persistence data model are used to communicate the design of a database to both users and other developers.

Object oriented is based on the concept of objects, which are data structures that contain data, in the form of fields. Object diagram is a diagram that shows a complete or partial view of the structure of a modeled system at a specific time. It's a graph of instances, including objects and data values. An object diagram is an instance of a class diagram; it shows a snapshot of the detailed state of a system at a point in time. Persistence layer encapsulate the capability to store, retrieve, and delete objects/data permanently without revealing details of the underlying storage technology. In the current database system, we have used different tables as object and each object is related to each other and enforced by referential integrity by the use of foreign key and primary key. This schema enables as data manipulation activity such as select, search, delete, update on the data base.

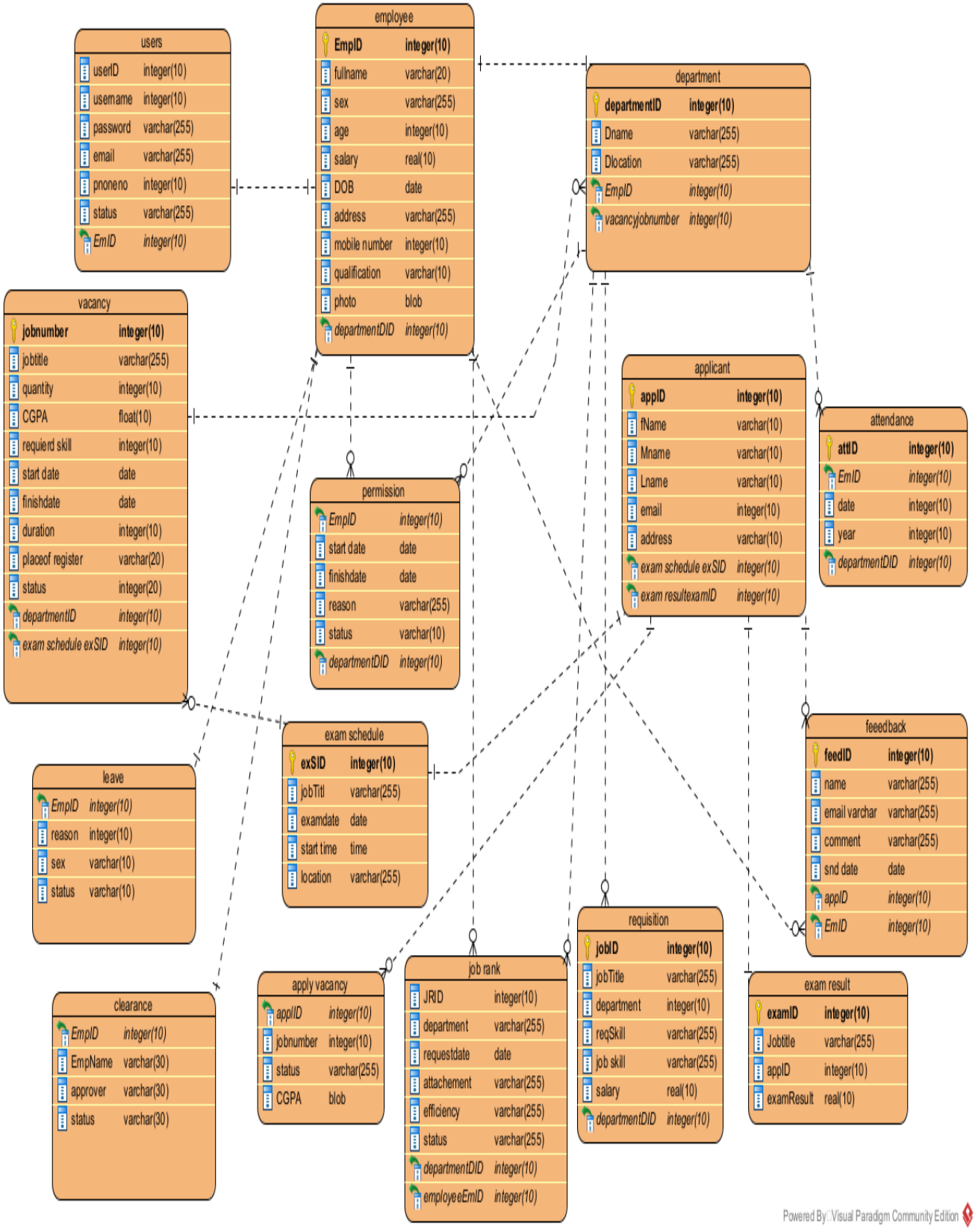


Figure 4.3 Persistence data model

4.4.4. Access control and security

In the systems, different actors have access to different functionality and data. Therefore, these privileges prevent unauthorized users from accessing data's which they don't have granted to access. Authentication: This take place by assuming users to insert their user name and password in the displayed login form. In this system, the admin is authenticated with password and username which is uniquely identify him.

This password and username are not accessed by any other person. The visitor is authenticated with password and user name which is set when he/she registered. Authorization: This takes place by preventing users from participating in specific tasks on which he/she doesn't have grant to access.

function	Actor					
	HRM officer	Department head	Employee	Applicant	Dean	Admin
Manage account						✓
Approve employee requisition	✓					
Approve leave request	✓					
Approve permission		✓				
Post exam schedule	✓					
View exam schedule				✓		
Announce vacancy	✓					

Apply vacancy				✓		
Manage employee requisition					✓	
View post	✓	✓	✓	✓		
Leave request			✓			
Permission request			✓			
Job ranking			✓			
Post events	✓	✓				
Send feedback			✓	✓		
Clearance request			✓			
Clear clearance		✓			✓	

Table 4.1 access control and security

4.4.5. Detailed class diagram

A class diagram in the UML is the type of static structure diagram that describes the structure of the system by showing the system's classes, their attributes with data types, operations (or methods) and relationships among objects. Class diagram depicts the system's object structure. They show object classes that the system is composed of as well as the relationships between those object classes. UML class diagram show the classes of the system, their inter-relationships, and the operations and attributes of the classes. In this section we use the symbols: -

- (+) used to represent public means accessed by every class.
- (-) used to represent private means only accessed by this class only.
- (#) used to represent protected means accessed by that class and subclass only.

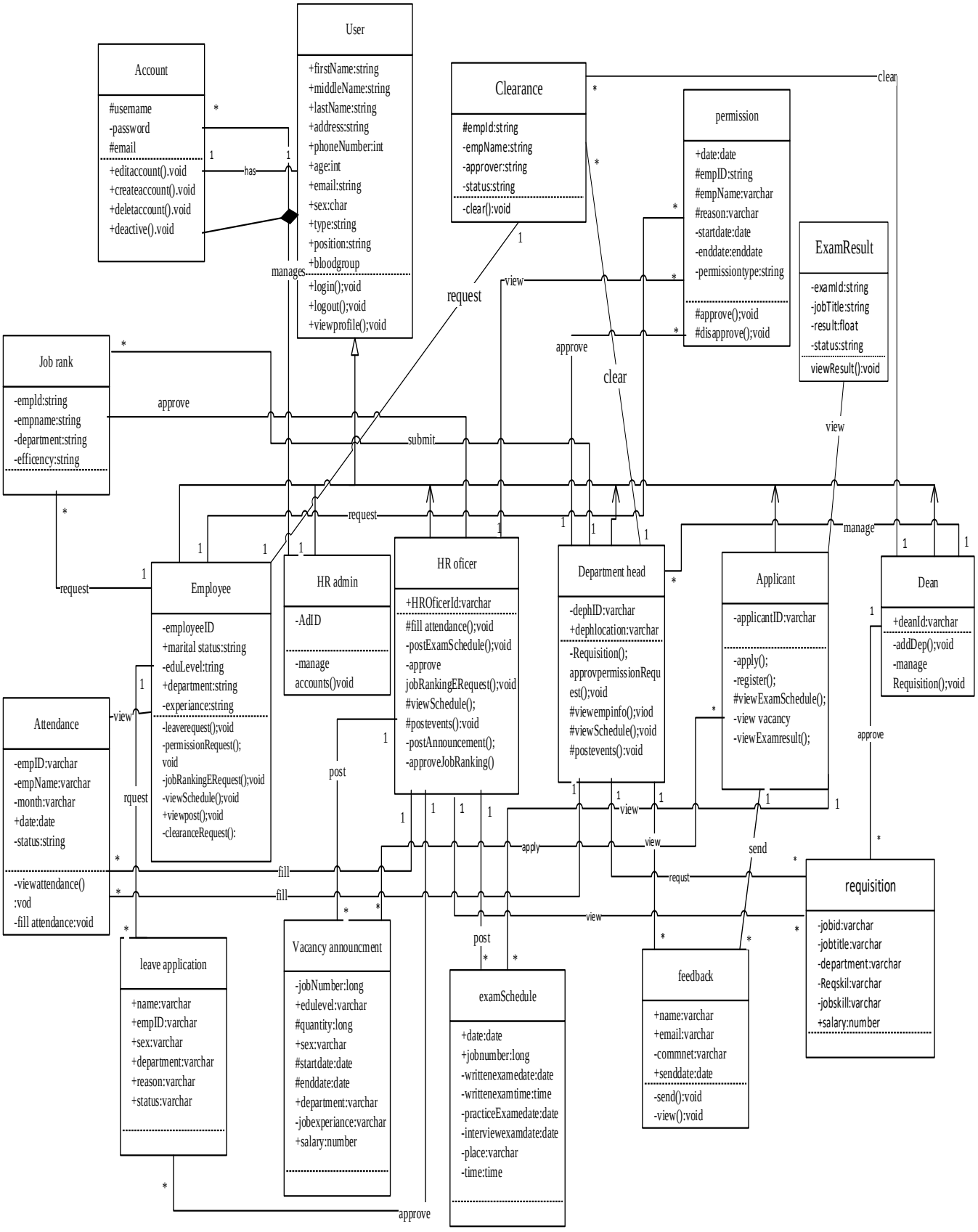


Figure 4.4 detailed class diagram

4.4.6. Package diagram

A package diagram in the UML depicts the arrangement, organization and dependencies between the packages that make up a model. Package: a general proposed mechanism for organizing model statements into groups. It provides an encapsulated name space within which all the names must be unique. It is used to group semantically related elements. HRMS for GCTE takes 3 tier architecture styles, that means there are sub systems listed above and the dependency between them is described also the subsystems can be divided into three packages.

- Interface package layer is client tier that is user interface. This package is responsible for providing front end user interface for users to initiate use cases.
- Application package layer is middle tier that contain subsystem.
- Database package layer is data tier that is that stores persistence system information.

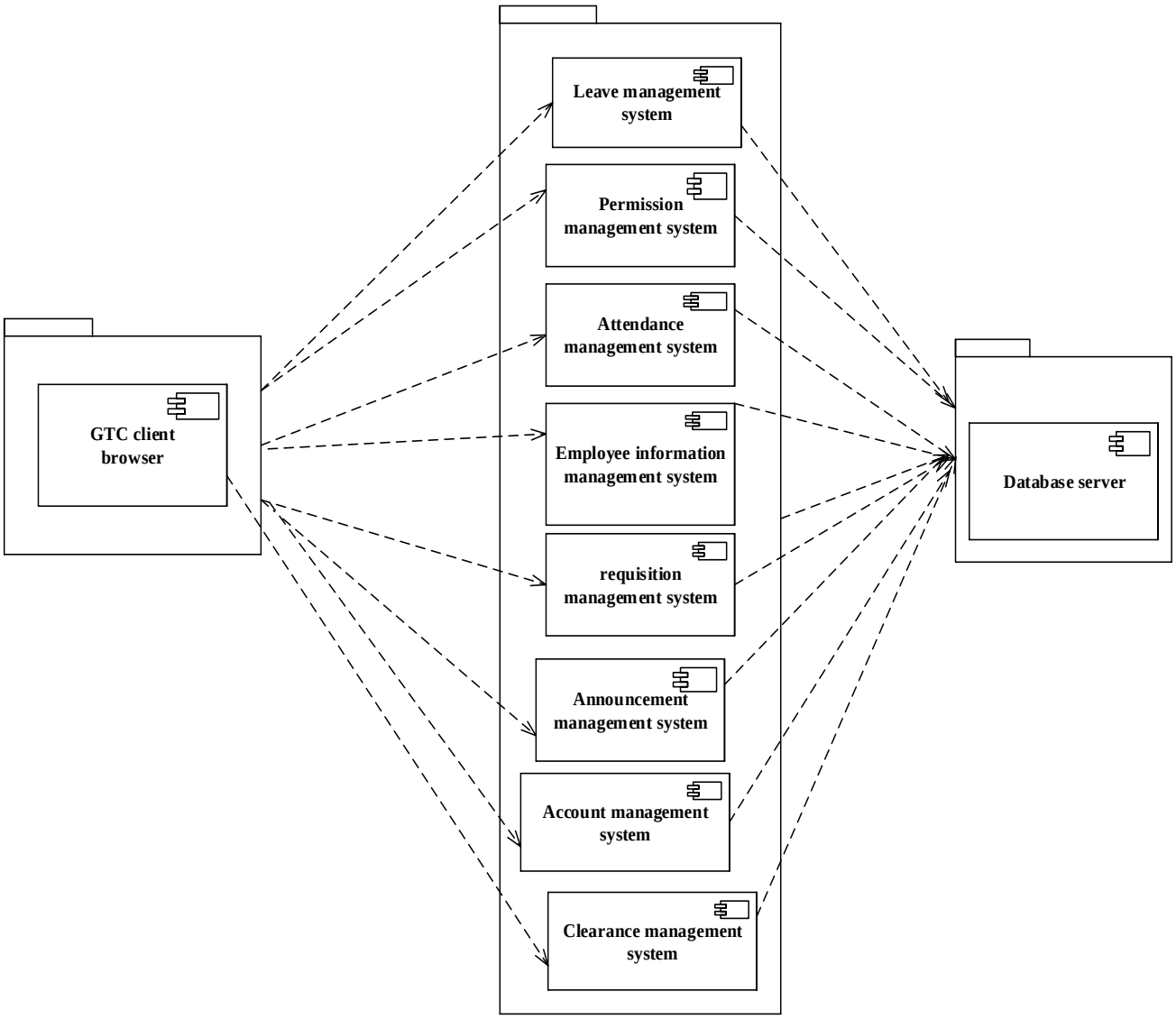


Figure 4.5 package diagram

4.4.7. Deployment diagram

A deployment diagram is a UML diagram type that shows the execution architecture of a system, including nodes such as hardware or software execution environments, and the middleware connecting them. Deployment diagrams are typically used to visualize the physical hardware and software of a system. Using it you can understand how the system will be physically deployed on the hardware. Deployment diagrams help model the hardware topology of a system compared to other UML diagram types which mostly outline the logical components of a system. Deployment Diagrams represent the run time architecture of our system. It can be made up of nodes that represent a piece of hardware that generally has memory and a processor built in [9]. The client/server architecture of the system enables different clients to connect to the server remotely through Internet connection. Server side there is web server that is always connected with the internet for listening HTTP requests and accepts connection request and uses Apache HTTP server manipulates data from the database using PHP programs and answers user's request. There is a database server that has MySQL program which enable to communicate with the web server.

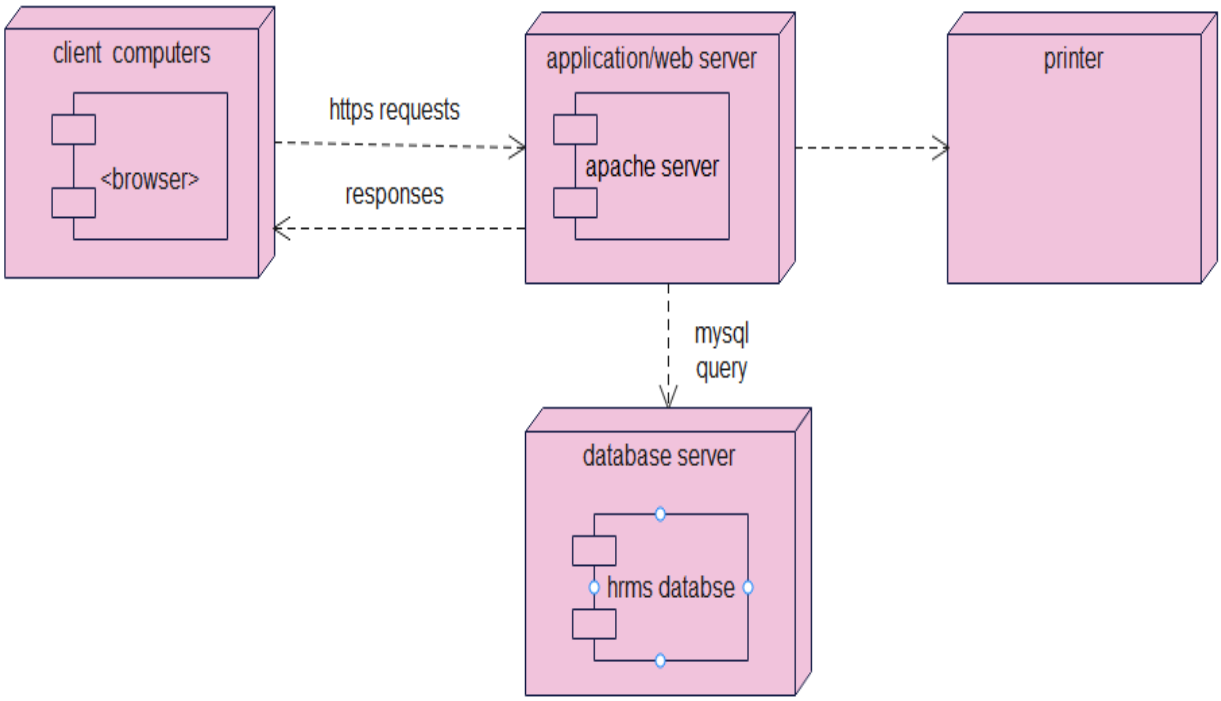


Figure 4.6 Deployment diagram

5. CONCLUSIONS

Human resource Management System allows Gondar college of teachers' education human resource office and department to store employee's detail information properly. This project is also able to provide different services like leave management, permission management, attendance management, human resource office. And also, HR officer is able to post vacancy announcement and view posted announcement to the user. An applicant gets up to date vacancy information. The implementation of the system in the organization has considerably reduce manual data entry and time.

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7. APPENDIX

Interview Questions

What are the problems faced when working manual task?

How to manage Applicants and employees?

Where data is stored?

What are the services needed to support the system?

What is the responsibility of department manager and employee?

What is the rule and regulation (business rule) of Gondar college of teachers' education human resource managements system?

How it works in the manual task or flow of work?

What works are currently being done in HRMS office?

How many workers are there in the office?

What is the work flow to do a certain task example to hire an employee?

How much is comfortable the current work for you?

Is there any system that you are using?

Is there any document that tells the overall work process in the office?

Could you give us different forms that you are currently using?