Southeast University (SEU)
Department of Computer Science & Engineering (CSE)

Petrol Pump Management System

Information System Design
&
Software Engineering Lab(CSE346.3)

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INTRODUCTION

The Petrol Pump management system is a web-based application designed to streamline and automate the processes involved in running a petrol station. The system aims to assist employees in their day-to-day tasks by providing a comprehensive solution for managing the petrol pump's daily records. With this system, the manager will be able to monitor and manage various aspects of the petrol pump's operations, including staff attendance, fuel sales, financial transactions, and more. The development of this system aims to increase the efficiency and productivity of the petrol pump, ultimately leading to better management and profitability.

GOAL OF THE PROJECT

The primary goal of the Petrol Pump management system project is to computerize the reporting work of the petrol pump, which is currently done manually. This aims to ease the workload of the manager and make it easier for them to maintain daily records. Additionally, the project aims to:

1. Increase the efficiency of the petrol pump by automating various processes and reducing manual errors.
2. Provide the manager with real-time information about the petrol pump's operations, allowing for better decision-making and management.
3. Improve the accuracy and reliability of financial transactions and reporting.
4. Provide a user-friendly interface for employees to input and access data, making it easier for them to do their work.
5. The Petrol Pump management system aims to enhance the overall performance of the petrol pump by providing the ability to monitor and track the quantity of fuel sold and the storage of the fuel. This will allow the manager to make more informed decisions about fuel inventory and ensure that the petrol pump is operating at optimal levels.

Overall, the Petrol Pump management system is developed to help the manager to manage the petrol pump more efficiently, accurately, and productively.

CASE STUDY

Mohammad Bahar Uddin is the owner of a petrol pump located in the main road area in Netrokona. His petrol pump has been experiencing a steady increase in sales over the past few months. However, the pump currently relies on manual methods for recording sales and transactions, such as using a record book and pen. This process is time-consuming and prone to errors, as the increasing fuel sales make it difficult for employees to accurately and promptly record all of the data.

As a result of this, Mohammad Bahar Uddin is facing several challenges in managing the data and running his petrol pump efficiently. He is struggling to keep track of the different types of fuel and manage his employees effectively. The manual system is not sufficient to keep up with the growing sales and the increasing complexity of the business.

In order to overcome these challenges, Bahar is looking for a more efficient and accurate solution for managing his petrol pump. The Petrol Pump management system will help him to automate the sales and transaction process, making it easier for employees to record data and for the manager to access real-time information about the operations of the petrol pump. This will help Mohammad to improve the performance and profitability of his business.

PROBLEM STATEMENT

The current manual system used at the petrol pump is not efficient enough to keep up with the growing sales and the increasing complexity of the business. The manager is facing several challenges such as:

1. Difficulty in accurately tracking the amount of fuel sold and inventory levels.
2. Difficulty in managing and monitoring the attendance and work of employees.
3. Time-consuming process of recording and calculating sales data.
4. Lack of real-time information about the petrol pump's operations.
5. Difficulty in maintaining accurate financial records and reporting.

These challenges lead to inefficiency in the management of the petrol pump and difficulty in making informed decisions about the business. The need for a more efficient and accurate solution for managing the petrol pump is crucial for improving the performance and profitability of the business.

ISSUES/LIMITATIONS

Issues	Weight
1. The current manual system of maintaining records is time-consuming and prone to errors, which can lead to inaccuracies in the data.	10
2. Inconsistencies in the data may occur as orders might be missed or entered incorrectly.	9
3. The data is maintained on a record book which is prone to corruption and takes a lot of time to retrieve.	7
4. There is a lack of proper information about the prices of different types of fuel, which can lead to pricing errors.	6
5. Difficulty in managing employees, including monitoring attendance and work performance.	5
6. Lack of security in the manual system, which can lead to unauthorized access to sensitive information.	3

These limitations of the manual system can negatively impact the performance and profitability of the petrol pump, and the need for a more efficient and accurate solution is crucial.

OBJECTIVE

Objectives:

1. To design and develop a web application with a user-friendly interface that will make it easy for employees and managers to access and input data.

2. To provide different features and functionality that will be easily accessible to both employees and managers.

3. To ensure that all information about sales and purchases is properly maintained and organized in the system.

4. To automate the manual calculations of sales and money management, reducing the chance of errors and increasing efficiency.

5. To design a system that can hold a large amount of data and is scalable to accommodate future growth.

6. To implement a database application that will store all of the data and make it easily accessible.

7. To solve the problems and limitations of the manual system by providing an efficient and accurate solution for managing the petrol pump.

FEASIBILITY ANALYSIS

1. Technical: The system we are planning to develop is technically feasible as the technologies used to develop it already exist and there are available resources on how to use them. We have the capability to develop the system and it will be able to provide long-term service and can be easily updated as needed.

2. Economical: The system will be economically feasible as most of the resources used to develop it are free and cost-efficient. The system can help to reduce the cost of manual labor and increase efficiency, ultimately resulting in cost savings for the petrol pump.

3. Operational: The system will have an easy interface and be user-friendly, so users will not require any training to use it. This makes it operationally feasible as it can be easily adopted and used by employees and managers at the petrol pump. Additionally, the system can help to improve the overall performance of the petrol pump by providing real-time data and analytics, which will enable better decision-making and ultimately improve the profitability of the business.

COST-BENEFIT ANALYSIS

I) Tangible Cost:

The cost of resources, equipment, and programmer's time required to develop and implement the system are tangible costs. This includes costs such as hardware, software, and any additional equipment needed.

II) Intangible Cost:

The cost of electricity required to run the system is an intangible cost.

III) Tangible Benefit:

The system will bring tangible benefits such as an increase in the speed of processing, the advantage of the computer's automatic calculating power, and a decrease in the amount of employee time required to manually perform calculations and record data. This can help to improve the efficiency and accuracy of the petrol pump's operations.

IV) Intangible Benefit:

The system will also bring intangible benefits such as improved customer service, increased employee job satisfaction, and better decision making through real-time data and analytics. This can help to improve the overall performance of the petrol pump and increase employee morale.

TYPES OF STAKEHOLDERS

1. Developers: The developers are responsible for creating and implementing the petrol pump management system. They are responsible for designing, coding, testing, and maintaining the system.

2. Manager: The manager is responsible for the overall operation of the petrol pump. They will be the main user of the system and will use it to manage the daily operations of the petrol pump, such as tracking fuel sales, employee attendance, and financial transactions.

3. Employees: Employees are the individuals who work at the petrol pump, such as cashiers and attendants. They will be using the system to perform their daily tasks, such as recording sales and managing inventory. They will also benefit from the system as it will simplify their work and make it more efficient.

Functionality grouping according to the Type of Users

i) Developers: Developers will have access to the system's source code and will be responsible for maintaining and developing the system following the system owner's instructions. They will also be responsible for troubleshooting and resolving any technical issues that may arise.

ii) Manager: The manager will be the admin of the system and will have access to all the features of the system, including the ability to view and manage employee information, track fuel sales and financial transactions, and generate reports.

iii) Employee: Employees will have more limited access to the system and will be responsible for entering sales data and managing fuel sales and inventory. They will need to provide valid login credentials to access the system and will only have access to the features and information that are necessary for their job function.

NON-FUNCTIONAL REQUIREMENTS(NFRs)

1. Security: The system must protect sensitive data such as financial transactions and employee information from unauthorized access. This can be achieved through the use of secure login credentials and encryption.

2. Performance: The system must be able to handle a large volume of data and transactions, and respond quickly to user requests. This can be achieved through the use of optimized database design and efficient algorithms.

3. Reliability: The system must be available and accessible to users at all times, with minimal downtime for maintenance or repairs. This can be achieved through the use of redundant systems and disaster recovery procedures.

4. Usability: The system must be easy to use and understand, with a user-friendly interface that is intuitive and easy to navigate. This can be achieved through the use of clear and consistent design principles and testing with a representative sample of users.

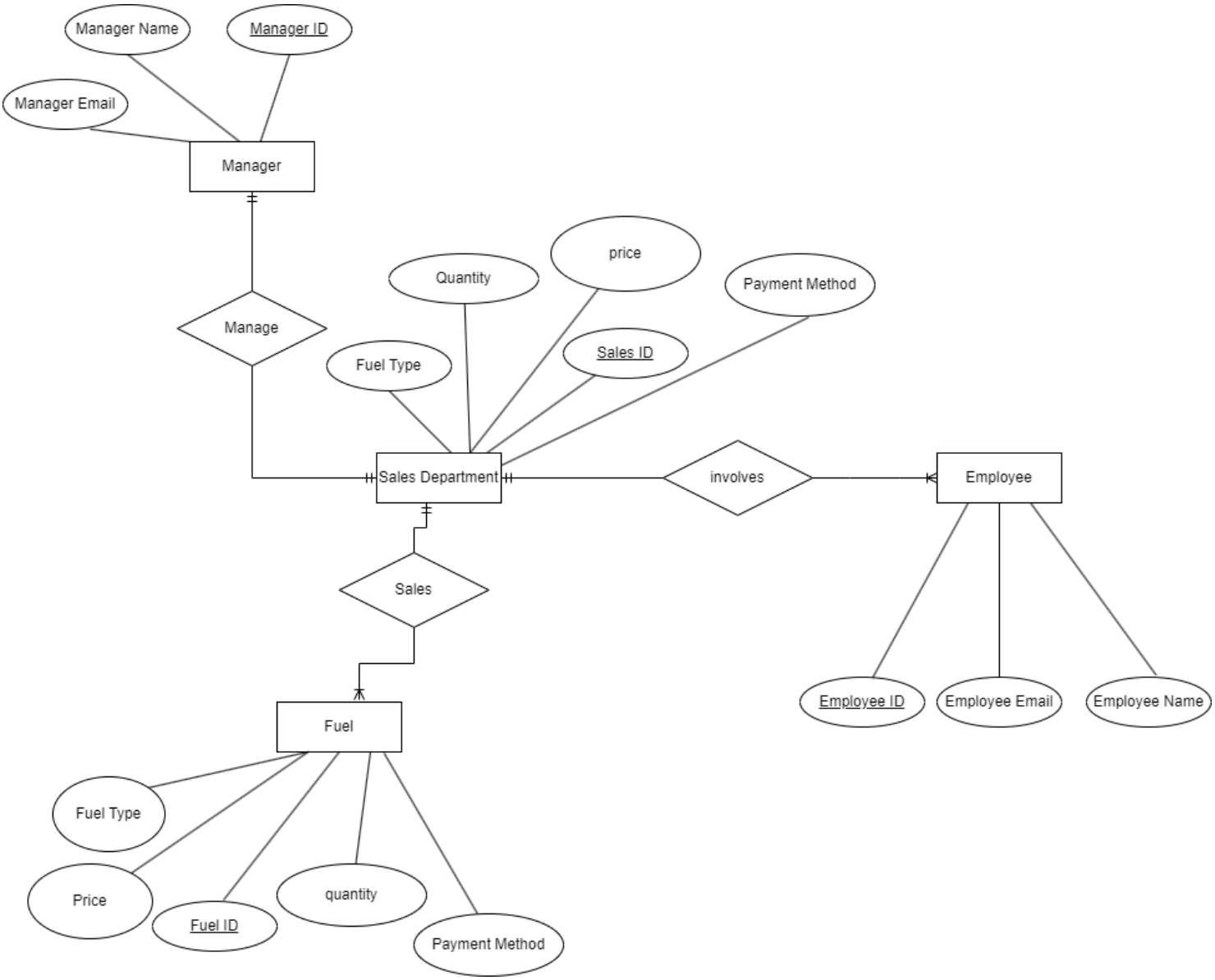
5. Maintenance and Support: The system must be easy to maintain and troubleshoot, with clear documentation and support available for users and developers. This can be achieved through

the use of clear and consistent design principles and testing with a representative sample of users.

OVERALL CONSTRAINTS

1. The system is only available for web browsers and is limited to specific hardware and software configurations.
2. Access to the system is restricted to employees, managers, and developers.
3. The system may require a certain level of internet connectivity and bandwidth.
4. There are limitations on the amount and type of data that can be stored and processed.
5. The level of customization and flexibility may be limited.
6. Budget constraints may limit the scope of the project and resources allocated for its development and maintenance.

ENTITY-RELATIONSHIP DIAGRAM(ERD)



Here,

Entities:

- Manager
- Employee
- Sales Department
- Fuel

Relationships:

- Manager manages the Sales Department- (one to one)
- Sales Department involves Employee- (one to many)
- Sales Department records Fuel sales – (one to many)

Attributes:

- Manager: ID, Email, Name.
- Employee: ID, Email, Name.
- Sales Department: ID, Quantity, price, payment method
- Fuel: ID, Type, Quantity, Price, payment method

The ERD shows that the Manager is the main entity that manages the Sales, which involves the Employee and records the Fuel. The Sales entity has a relationship with the Employee, which means that the employee is involved in the sales department. The Sales also records the fuel that is sold, which means that it has a relationship with the Fuel entity. Each entity has its own attributes, such as the Manager's ID, Name, and Email.

Relationship Matrix:

	Manager	Employee	Fuel	Sales Department
Manager				✓
Employee				✓
Fuel				✓
Sales Department	✓	✓	✓	

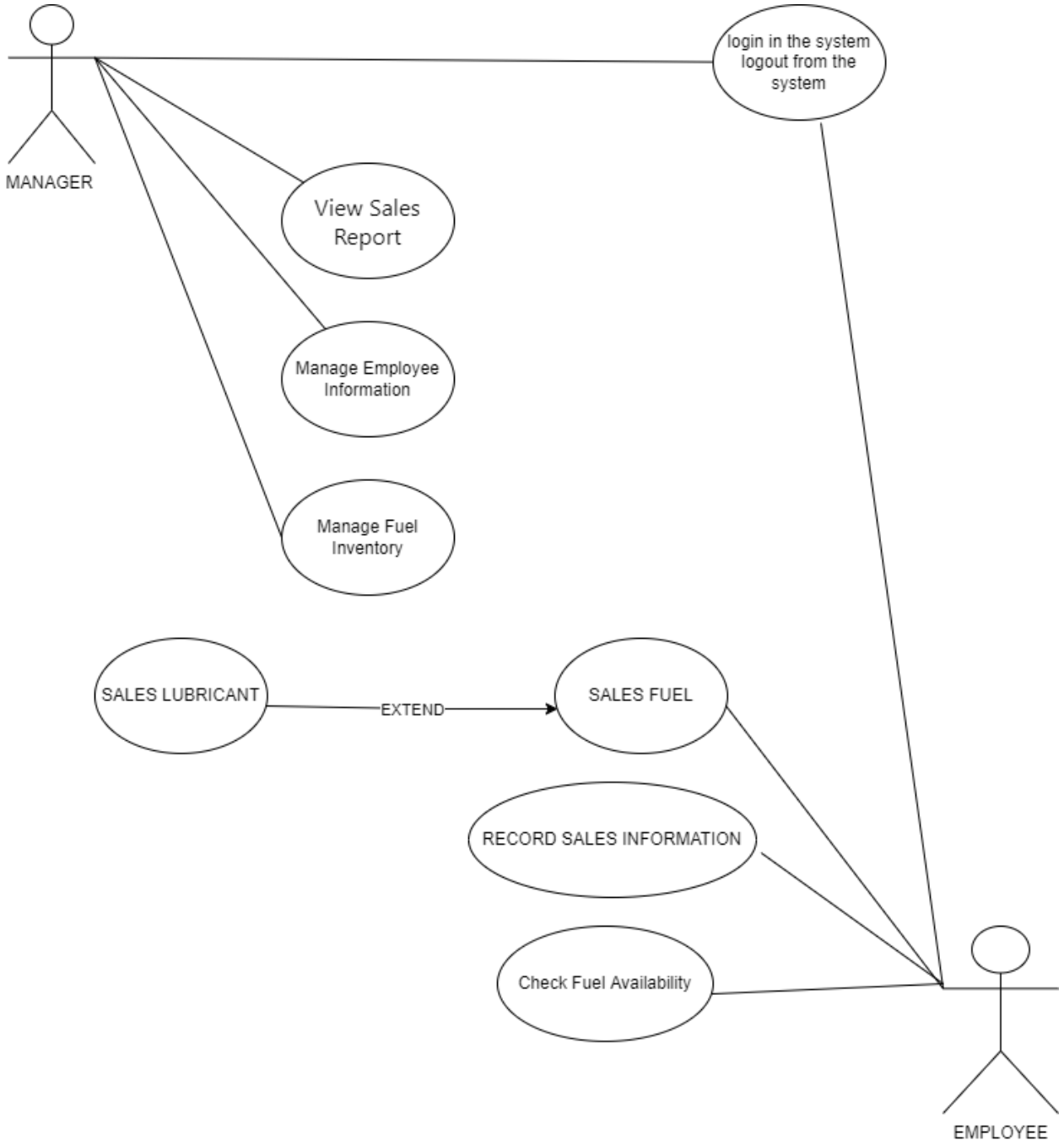
The relationship matrix shows the relationship between the Manager, Fuel, Employee, and Sales Department entities. The matrix shows the cardinality of the relationship between each pair of entities, such as

"One Manager manages one Sales Department."

"Many Employees are involved in one Sales Department."

"Many Fuel are sales and record in one Sales Department."

USE CASE DIAGRAM



The manager use case diagram includes use cases such as "View Sales Report," "Manage Employee Information," and "Manage Fuel Inventory" to monitor the overall performance of the petrol pump by providing the ability to monitor the quantity of fuel sold and storage of the fuel.
The employee use case diagram includes use cases such as "Sales Fuel," "Check Fuel Availability," and "Record sales Information" which would be used by the employee to record the data of the sold fuel and check the availability of the fuel.
Both the manager and employee use cases would also include a "Login" use case, as well as "Logout" use cases, to secure the data and only authorized personnel can access the system.

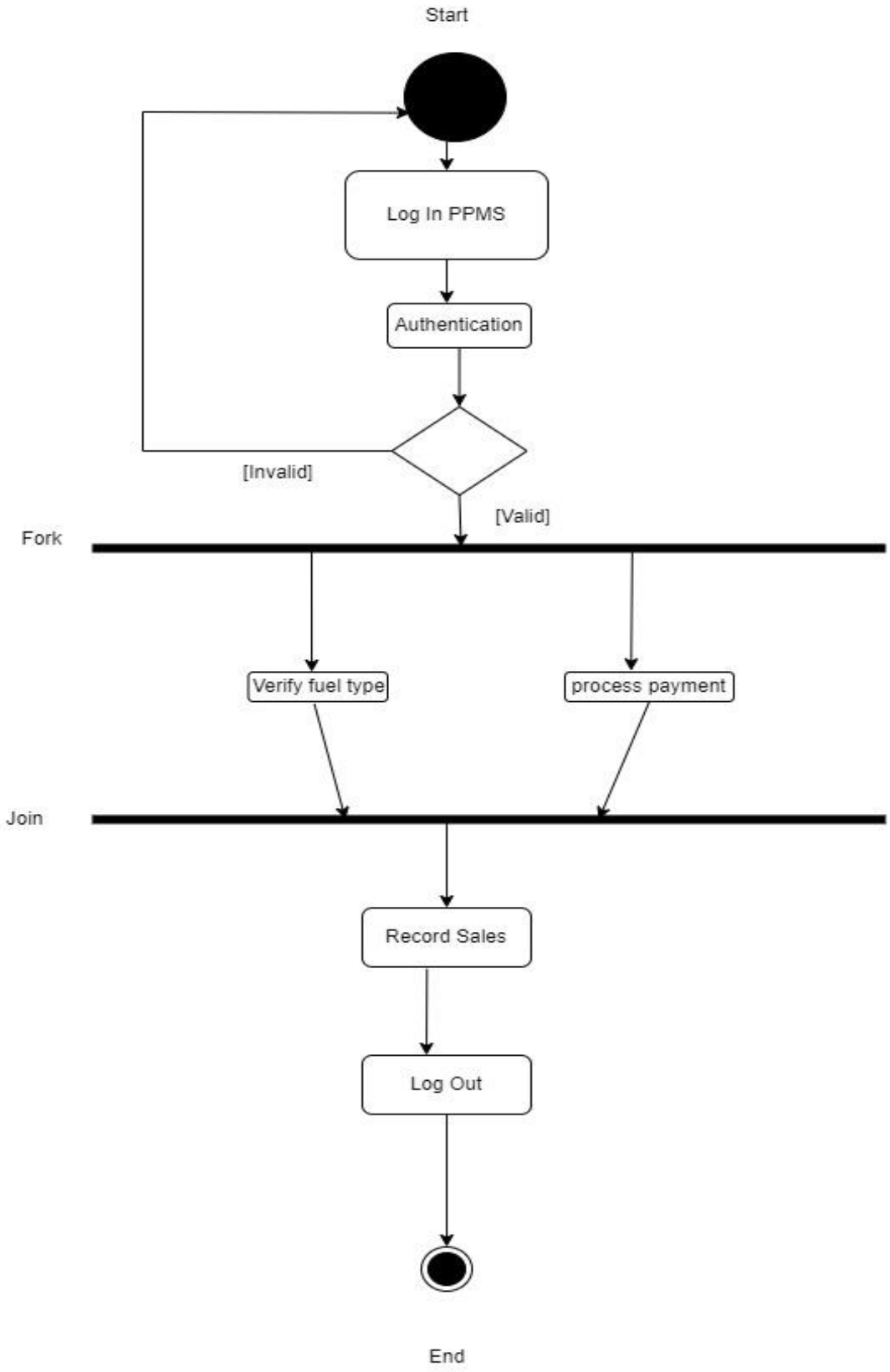
ACTIVITY DIAGRAM

THE EMPLOYEE:

The activity diagram for an employee logging in would include the

following steps:

1. Employee enters their login information (username and password)
2. System verifies the login information.
3. If the login information is correct, the employee is granted access to the system if not the return to the start.
4. Employee can then verify fuel availability.
5. Employee can then process payment for the fuel.
6. Employee can then record the sales information.
7. Employee can then log out of the system.


Start
Log In PPMS
Authentication
[Invalid]
[Valid]
Fork
Verify fuel type
process payment
Join
Record Sales
Log Out
End

For Manager:

The activity diagram for a manager would include the following steps:

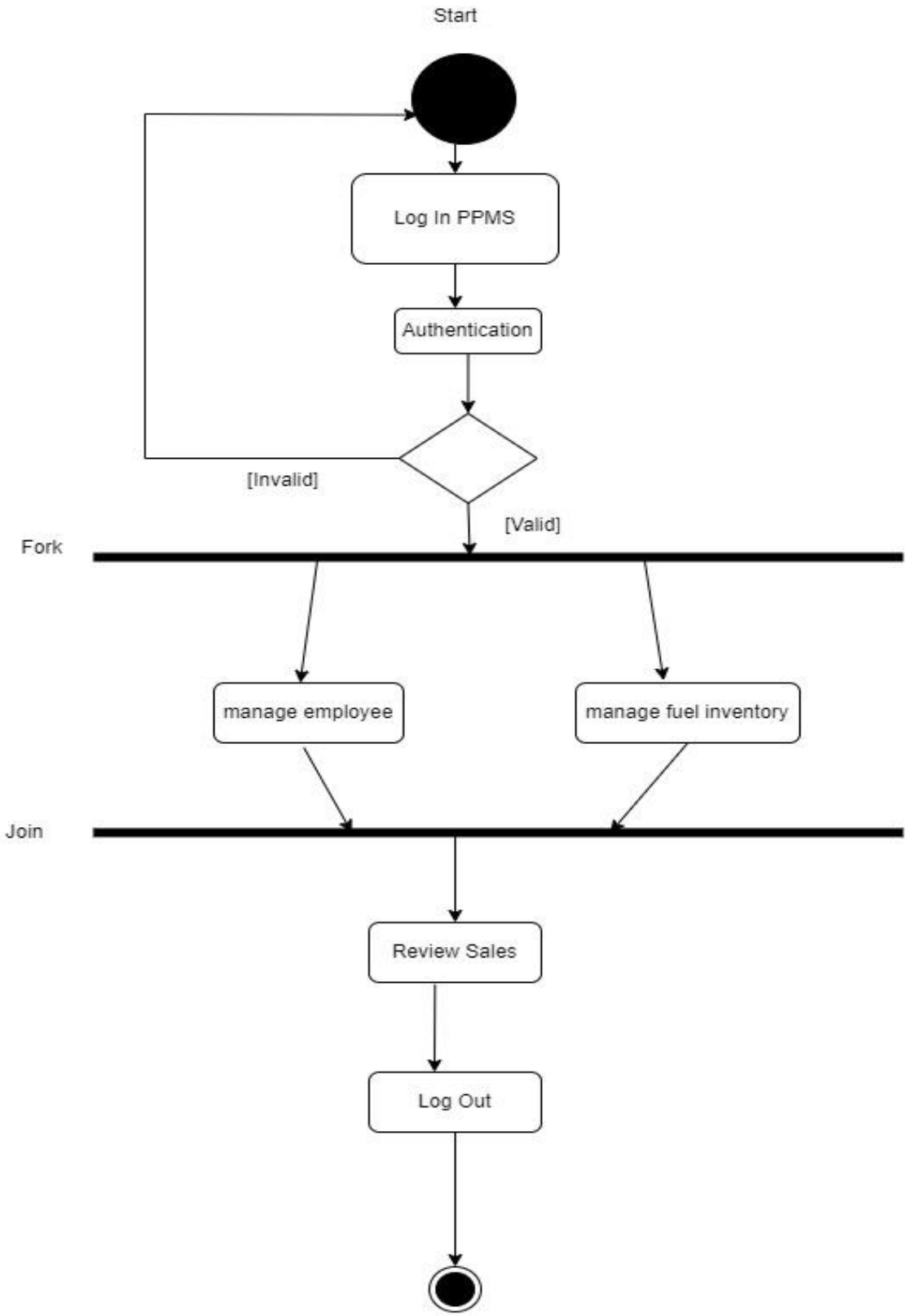
1. The manager starts by logging into the system using their username and password.

2. Once logged in, the manager can access the "Manage Employee Information" feature to add, edit, or delete employee information.

3. The manager can also access the "Manage Fuel Inventory" feature to update the fuel stock, set prices for different types of fuel, and track fuel sales.

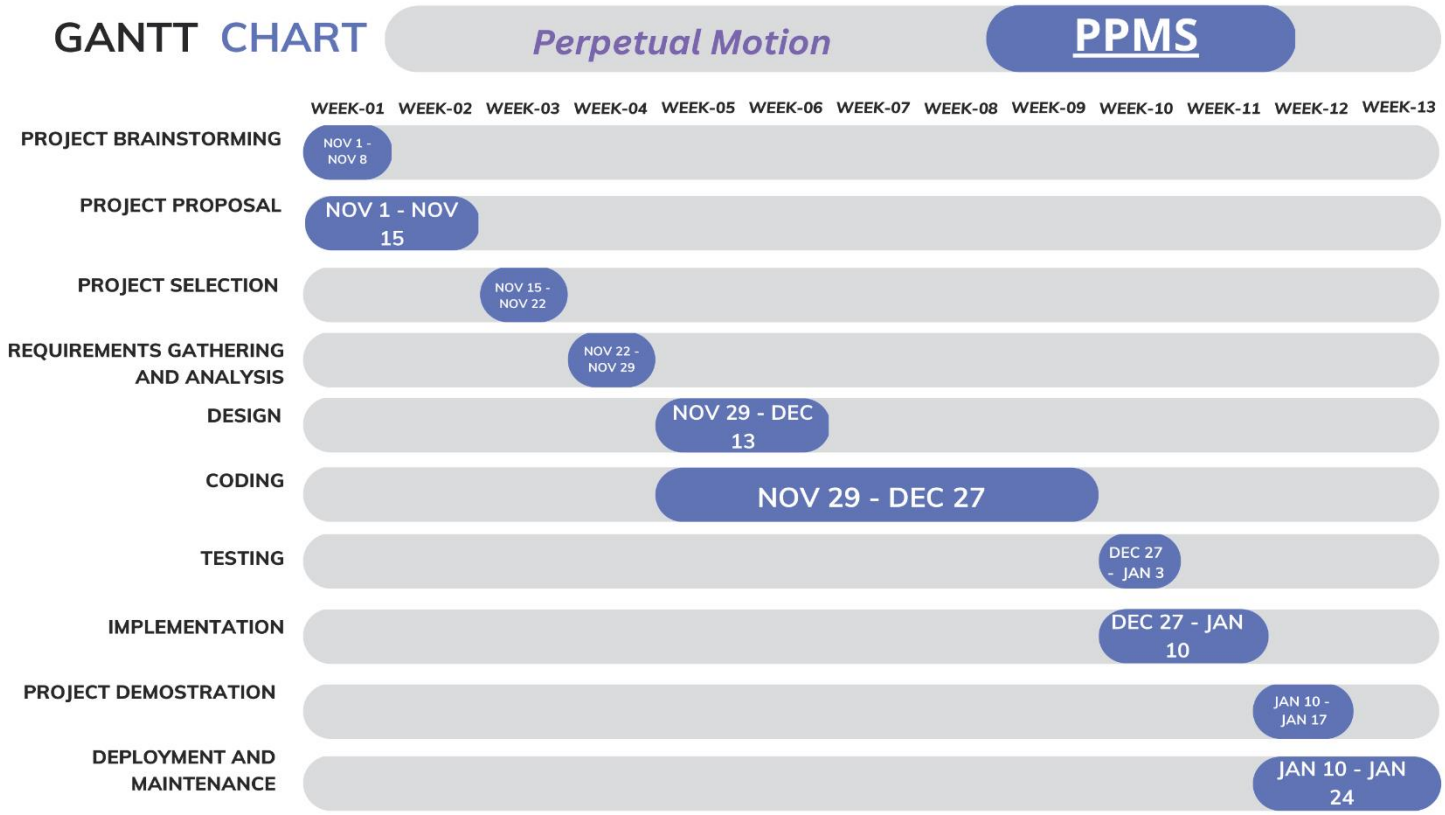
4. The manager can also access the "Review Sales" feature to view sales reports and track performance.

5. Once finished with their tasks, the manager can log out of the system.


Start
Log In PPMS
Authentication
[Invalid]
[Valid]
Fork
manage employee
manage fuel inventory
Join
Review Sales
Log Out
End

GANTT CHART

A GANTT Chart is a visual representation of a project schedule that displays the start and end dates of each task, as well as



their dependencies. In our project, we have allocated a total of 16 weeks for the complete lifecycle of the project, starting with a 1-week brainstorming session, followed by a 2-week project proposal, 1 week for project selection, 1 week for requirements gathering, 2 weeks for design, 4 weeks for coding, 1 week for testing, 2 weeks for implementation, 1 week for project demonstration, and finally 2 weeks for deployment and maintenance. This GANTT Chart provides a clear and concise overview of the project schedule, allowing us to track the progress of each task and ensure that the project is completed within the specified timeline."