



## Tutorial Week 07 – Tutor Dr. Farshid Keivanian

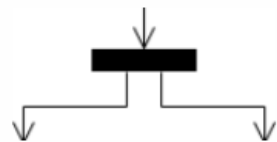
### Tutorial Week 7 and Preparation for Group Assignment:

**Initial Node:** Portrays the beginning of a set of actions or activities



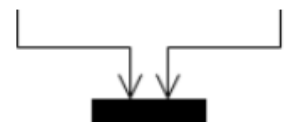
### Fork Node

Split behavior into a set of parallel or concurrent flows of activities (or actions)



### Join Node

Bring back together a set of parallel or concurrent flows of activities (or actions).



### Activity Final Node

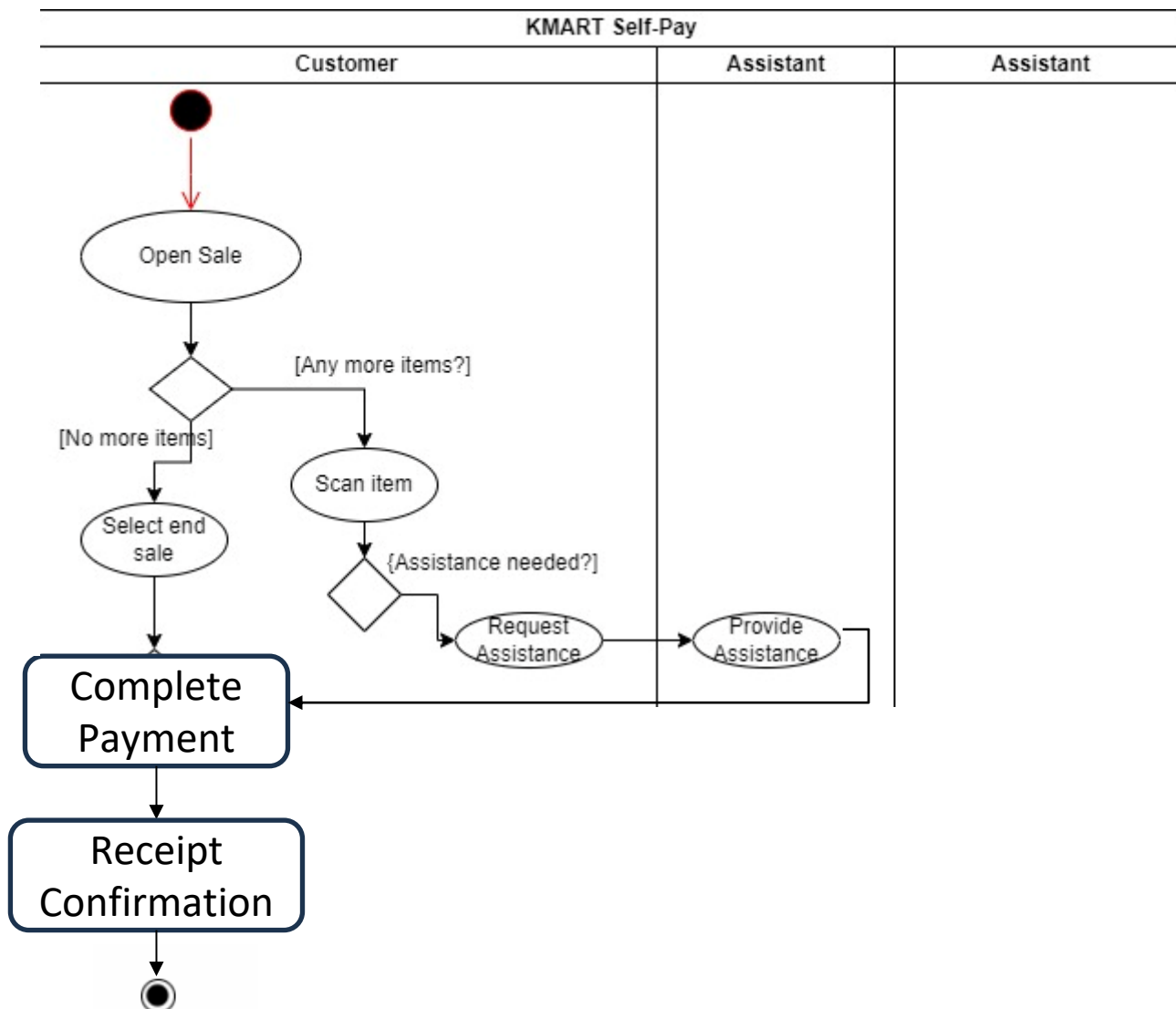
Stop all control flows and object flows in an activity (or action)



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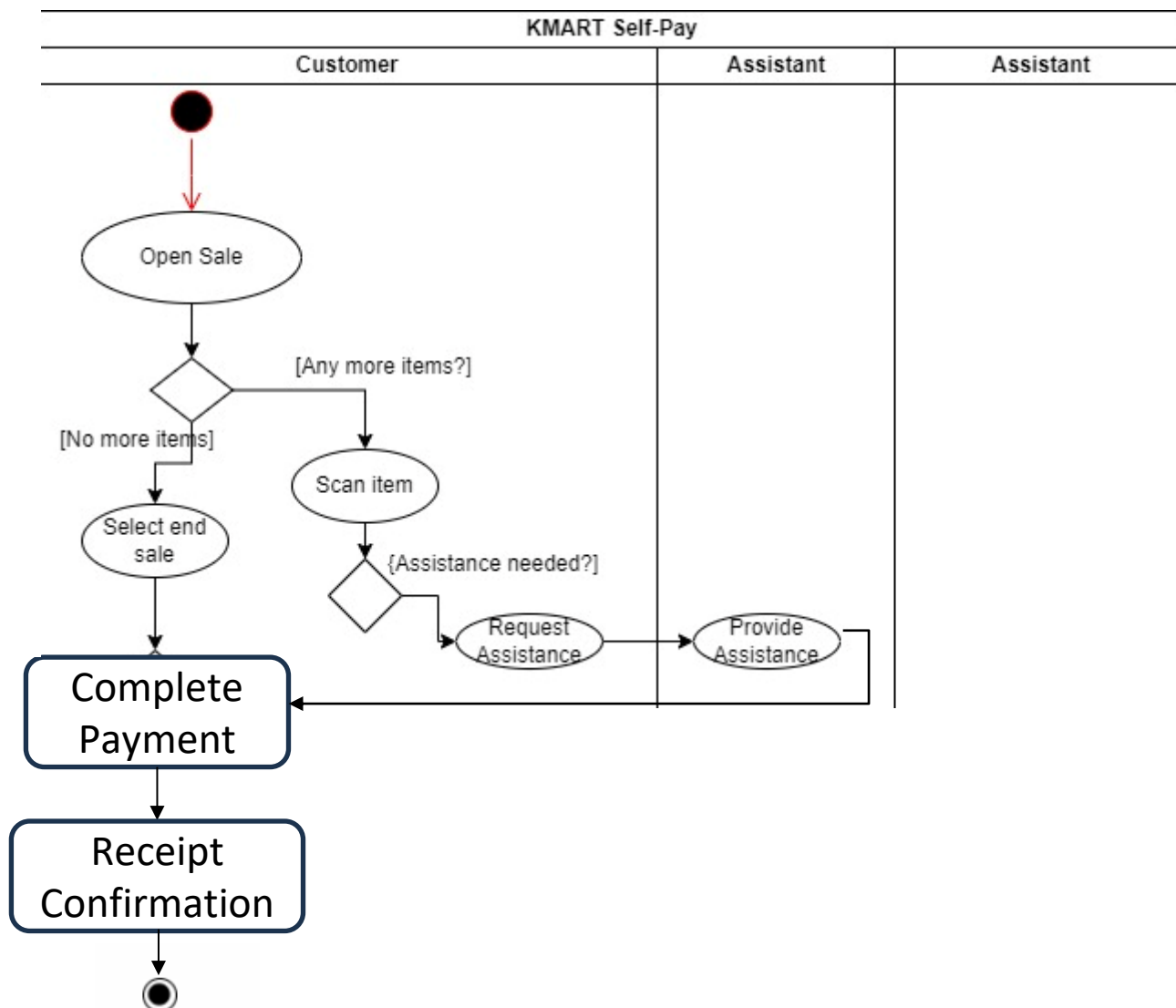
Exercise 4: Draw an activity diagram for this scenario:  
Customer uses KMART sales kiosk to pay for the goods he purchased.

This diagram is an activity diagram that models a customer using a KMART self-pay kiosk. It depicts the process flow from the moment the customer begins the sale until they finish scanning items and potentially request assistance.



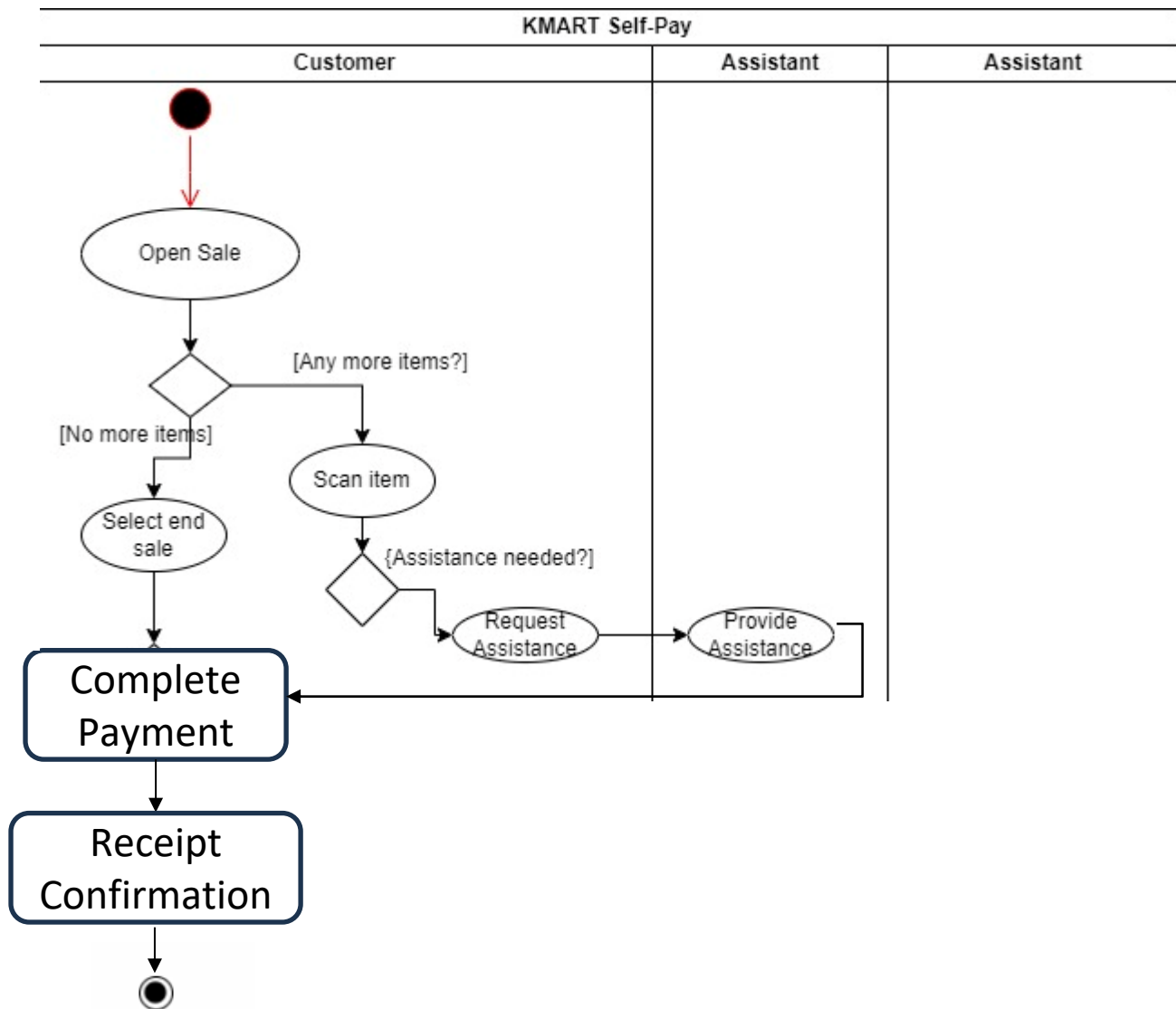
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The diagram represents the process a customer might follow when using a KMART self-pay kiosk. It captures the essential steps of opening a sale, scanning items, deciding whether to continue or end the transaction, and requesting assistance if necessary.



## Breakdown of the Activity Diagram:

**1. Open Sale:** The process begins with the customer initiating a sale, likely by interacting with the kiosk.

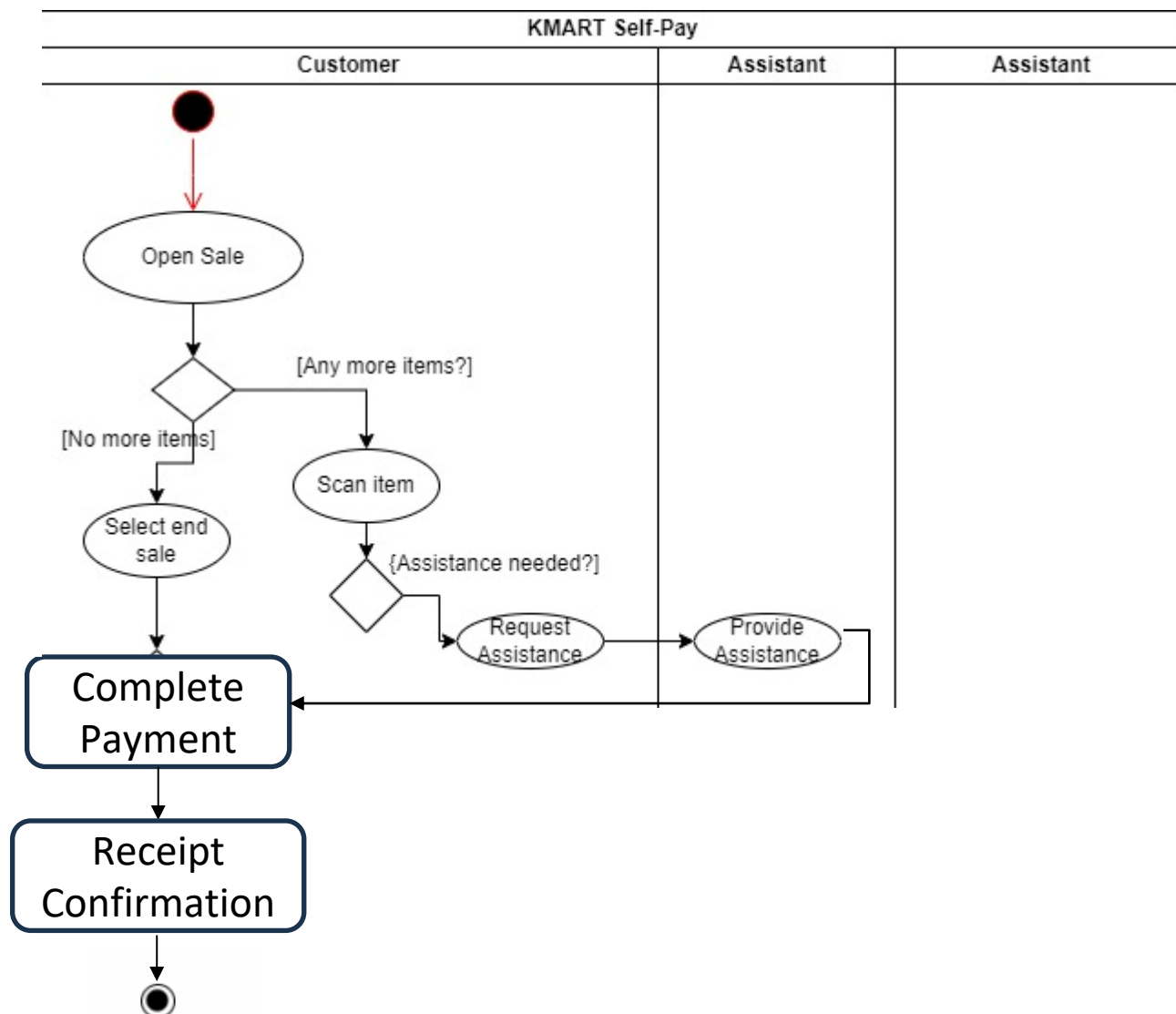


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**2. Scan Item:** The customer then proceeds to scan each item.

**3. Decision - Any more items?:** After each scan, the diagram checks if there are more items to be scanned.

- If there are more items, the customer continues scanning.
- If there are no more items, the customer selects to end the sale

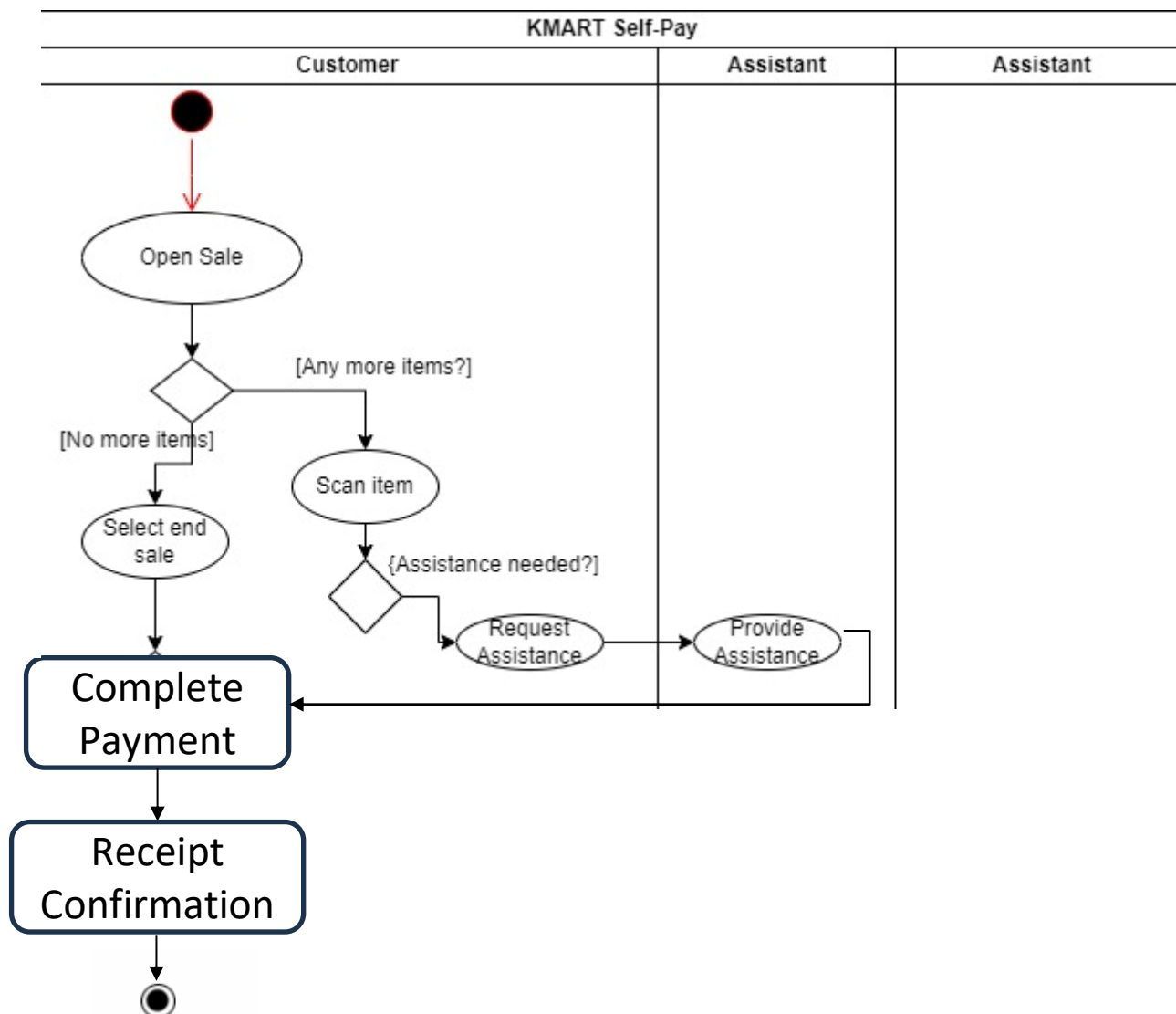


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**4. Select End Sale:** This step indicates the customer's choice to complete the transaction.

**5. Decision - Assistance Needed?:** At any point, the customer may need assistance.

- If assistance is required, a request is made to an assistant.
- The assistant then provides the necessary assistance.





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### Exercise 1

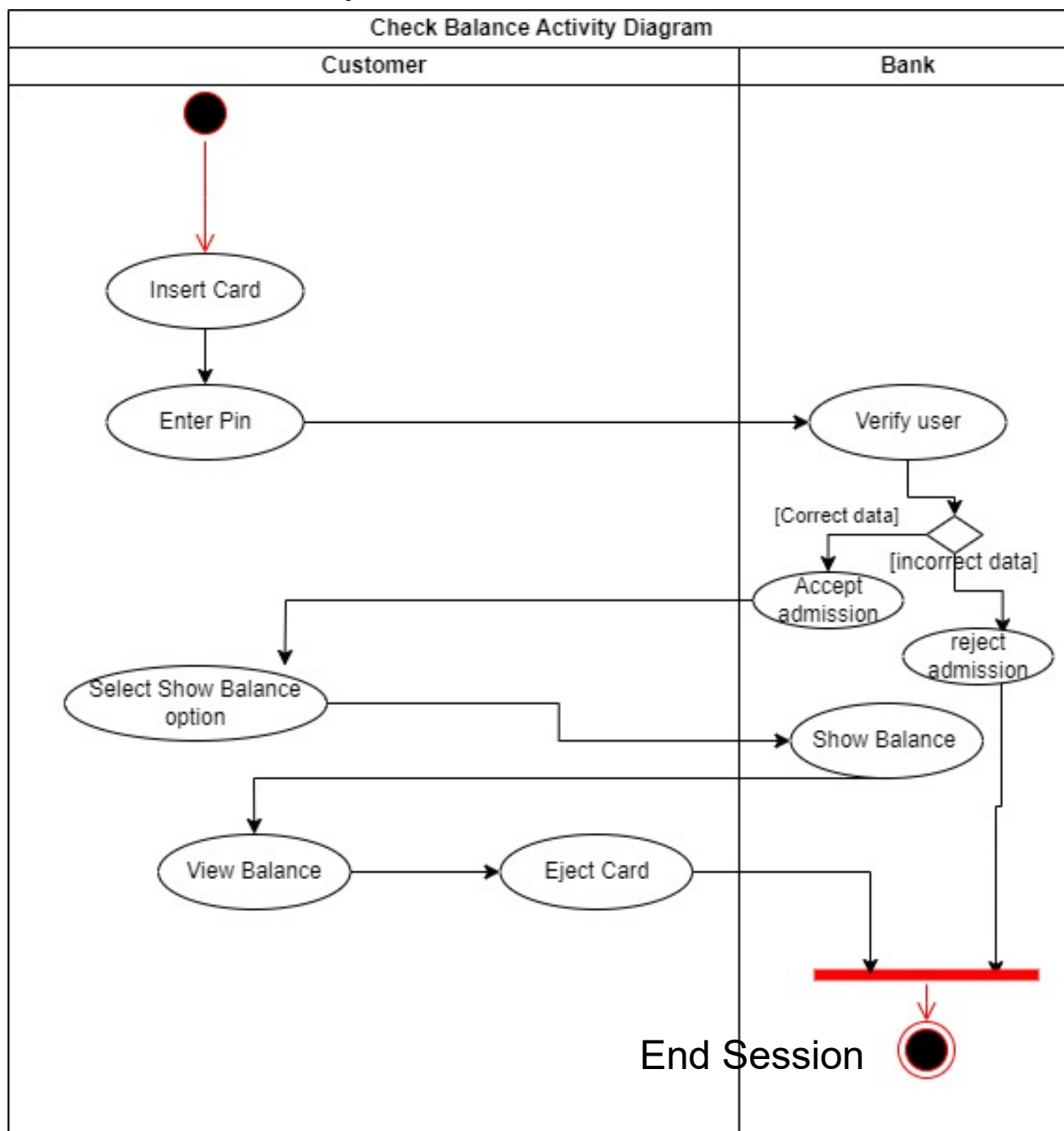
An automated teller machine (**ATM**) or the automatic banking machine (**ABM**) is a banking subsystem that provides bank customers with access to financial transactions in a public space without the need for a cashier, clerk, or bank teller.

Draw activity diagrams and a system sequence diagrams for the following use cases.

- *Customer* uses bank ATM to *Check Balances* of his/her bank accounts
- *Customer* uses bank ATM to *Deposit Funds*
- *Customer* uses bank ATM to *Withdraw Cash* and/or *Transfer Funds*.

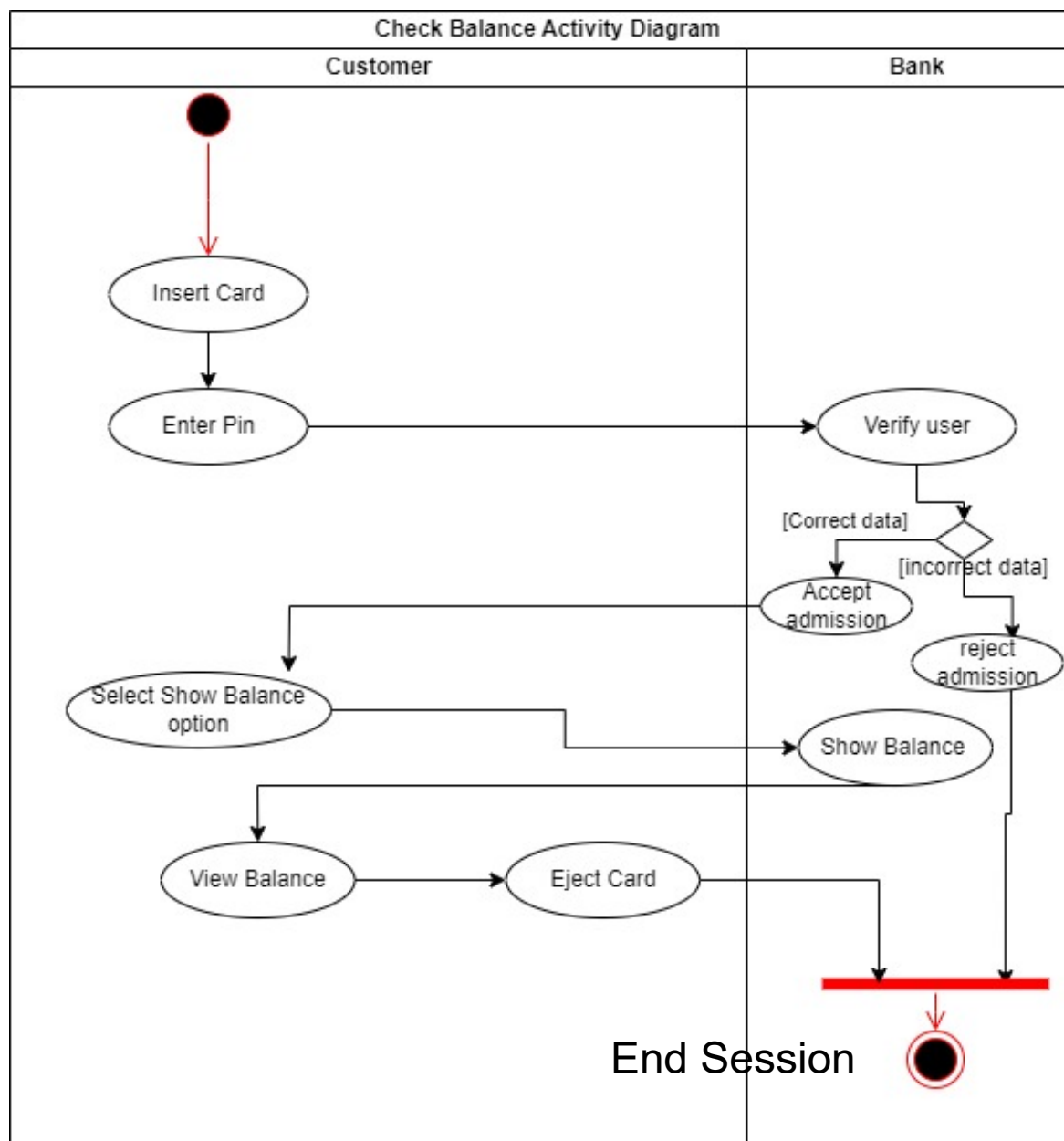
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The activity diagram outlines the process a customer would follow when using an ATM to check their bank account balance. Let's break down the diagram and evaluate whether it correctly answers the question.





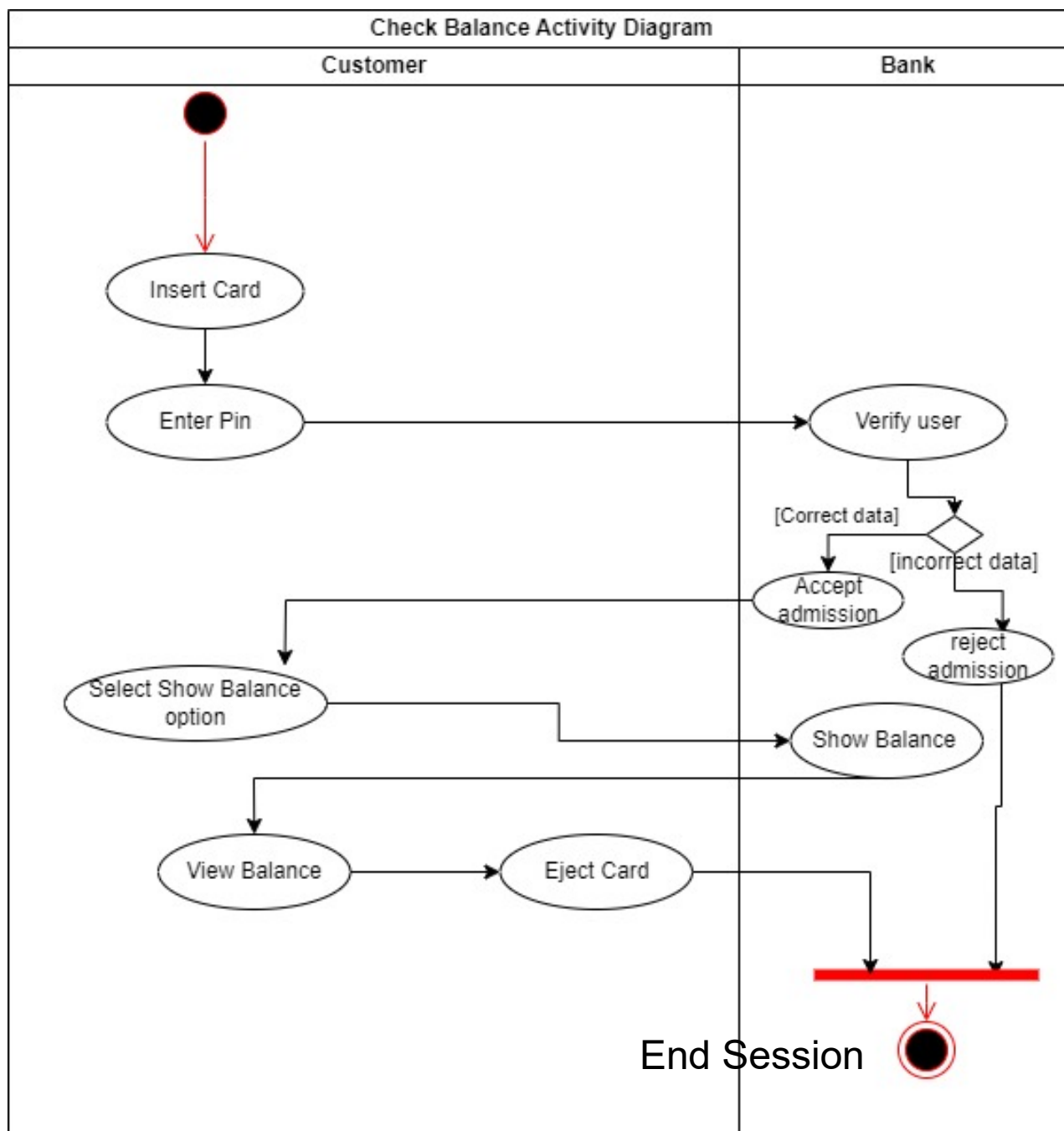
The diagram captures the steps involved in checking the balance of a bank account using an ATM. It includes all necessary actions a customer would take, including card insertion, PIN entry, selecting the balance option, viewing the balance, and ejecting the card.



## Breakdown of the Activity Diagram:

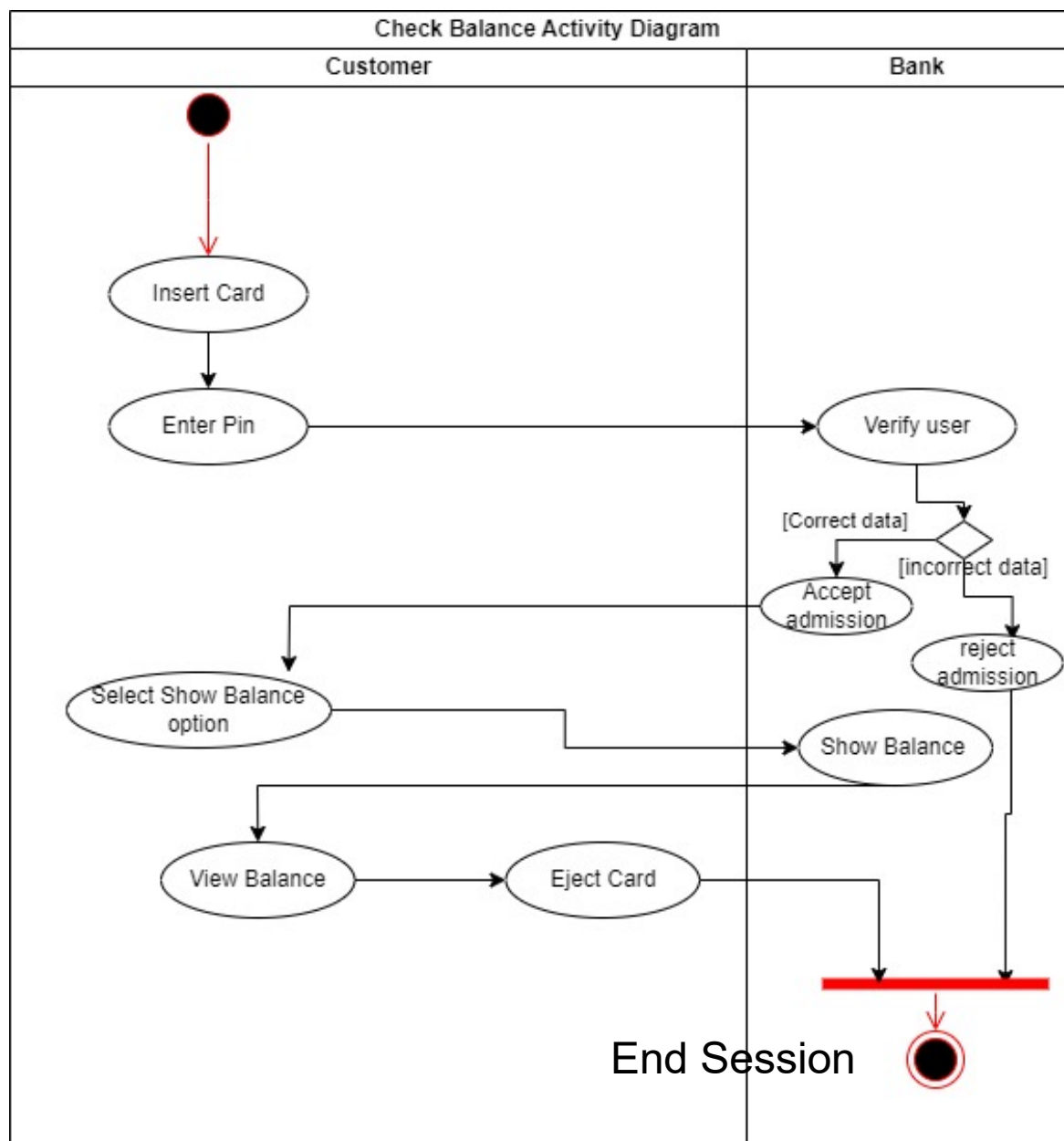
**1.Insert Card:** The process starts with the customer inserting their card into the ATM.

**2.Enter PIN:** The customer is then prompted to enter their PIN.



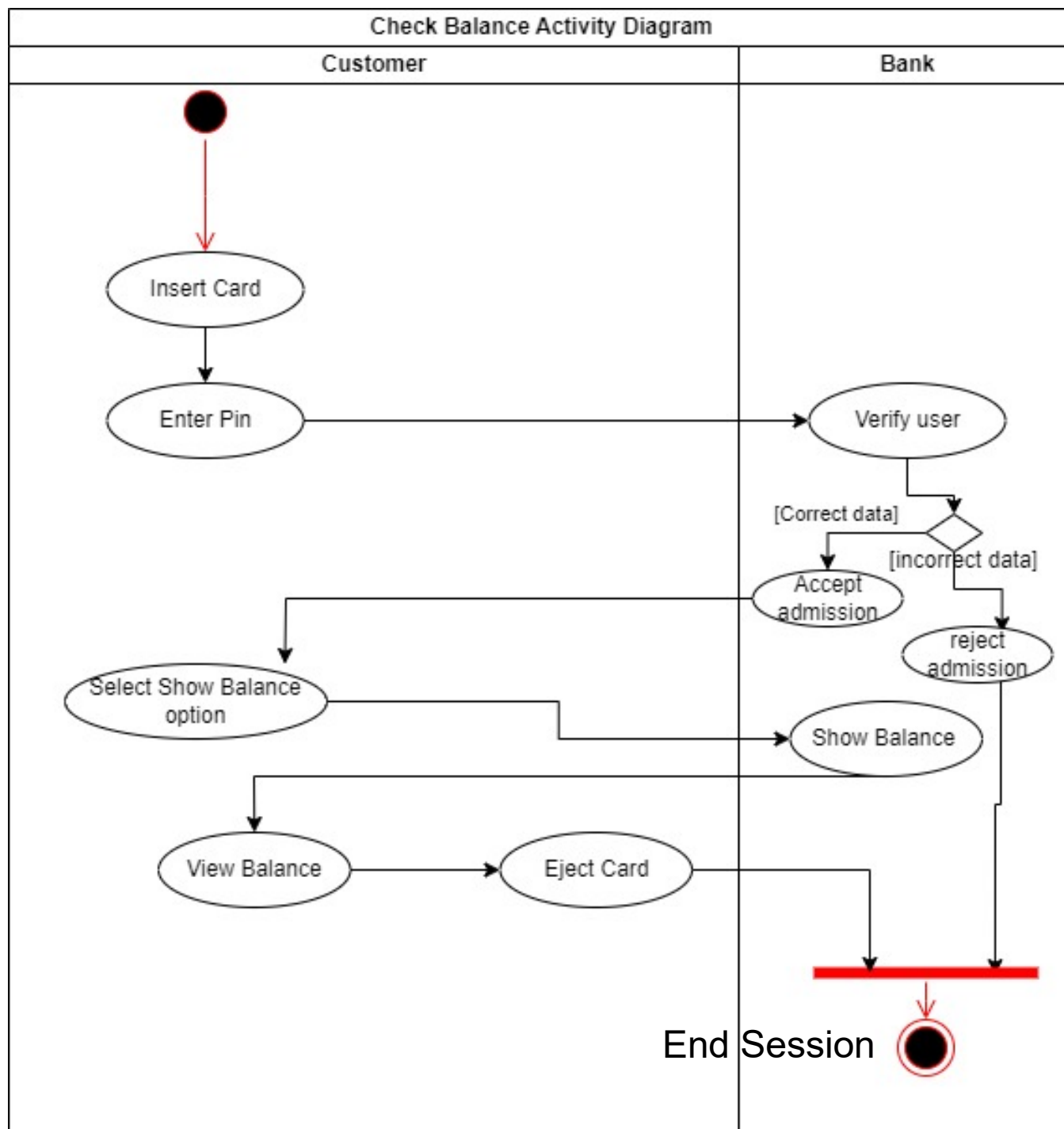
**3. Verify User:** The bank verifies the entered PIN to ensure it's correct.

- **Correct Data:** If the PIN is correct, the system proceeds to accept the user.
- **Incorrect Data:** If the PIN is incorrect, the system rejects the user.



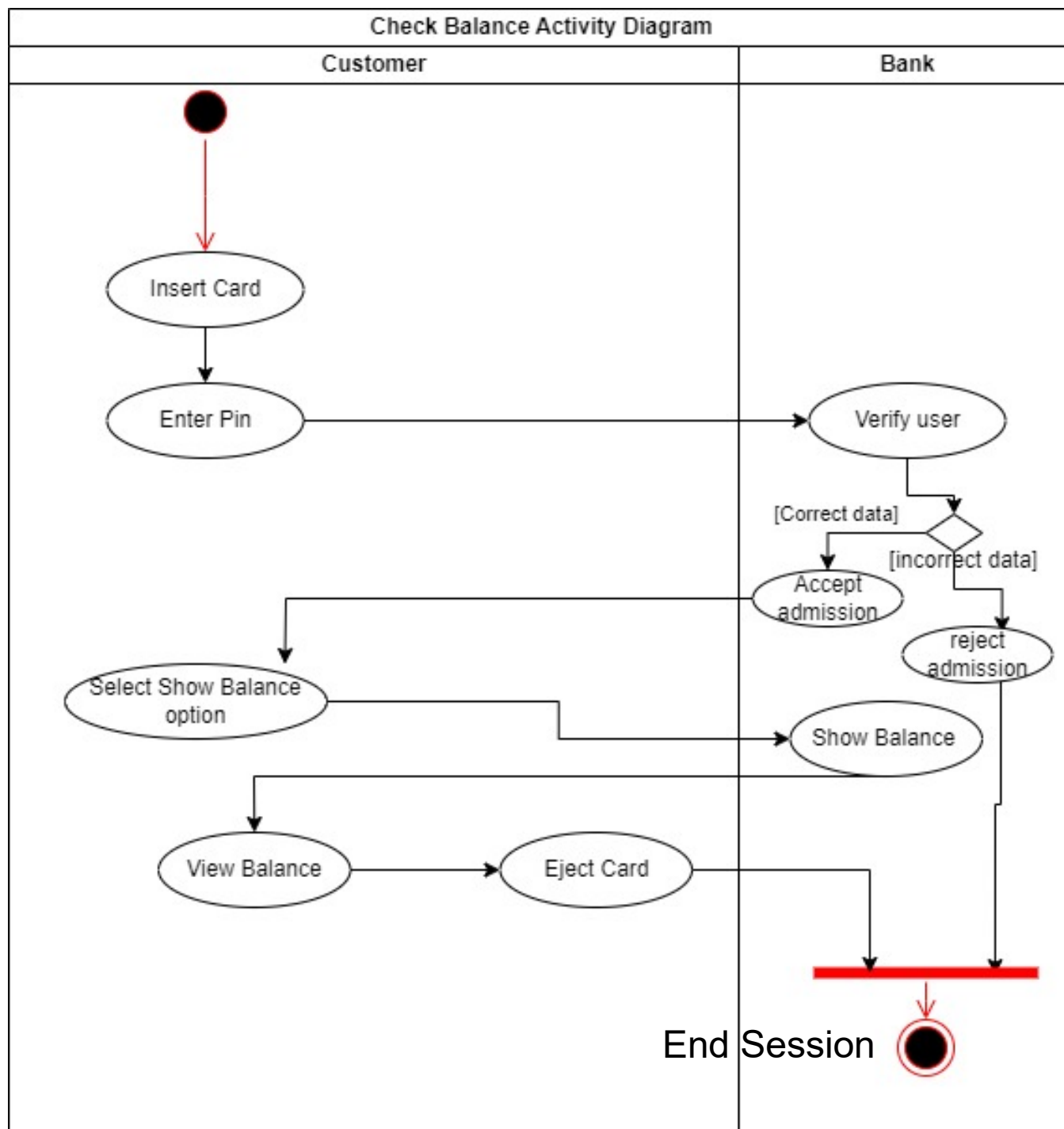
**4. Select Show Balance Option:** The customer selects the option to check their balance.

**5. Show Balance:** The ATM displays the customer's account balance.

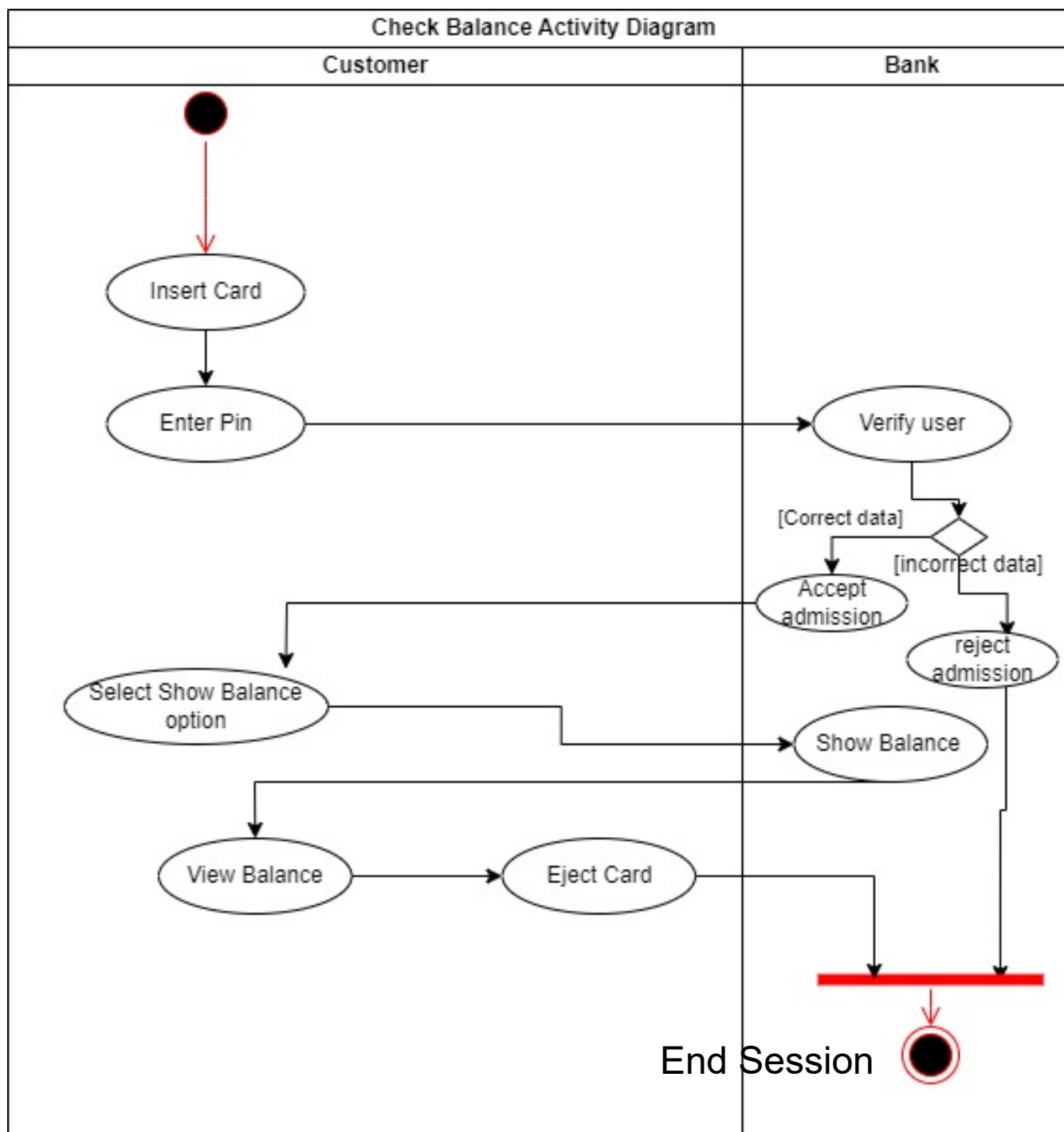


**6. View Balance:** The customer views their account balance.

**7. Eject Card:** The ATM ejects the card after the transaction is complete.



**8. End Session:** The process concludes, ending the session.





## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

## **Systems Analysis and Design Report: Optimizing**

### **Tool Rental Processes for Tool-Share Co-op**

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## **Preparation for Group Assignment:**

### Case Study 4 - Tool-Share Co-op

#### 5. Process Modelling and System Design

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## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

#### **1. Introduction**

The Tool-Share Co-op provides members with the ability to borrow tools for personal use. However, inefficiencies in the existing manual process, such as delays in tool returns, inaccuracies in inventory tracking, and difficulties in managing membership details, have led to operational challenges. This report aims to propose an optimized information system that will streamline these processes, improving overall operational efficiency, reducing costs, and enhancing service delivery for the Tool-Share Co-op.



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

## **2. Project Objectives**

The primary objective of this project is to develop a comprehensive information system for Tool-Share Co-op that addresses the identified inefficiencies. The system will:

- Automate the tool borrowing and return process, ensuring timely returns and accurate tracking.
- Improve inventory management by maintaining an up-to-date list of available tools.
- Enhance member management by efficiently storing and updating personal and payment details.
- Provide user-friendly interfaces for both customers and staff, making the system easy to use and accessible.



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

## **3. Requirement Specifications**

### **Functional Requirements**

#### **1. Automated Tool Borrowing and Return Process:**

The system should allow members to borrow and return tools with their membership card, automatically calculating late fees for overdue returns.

**2. Real-Time Inventory Management:** The system should maintain an accurate inventory list, updating tool availability as tools are borrowed and returned.

**3. Member Management:** The system should store and update member personal details, payment information, and borrowing history.

**4. Late Fee Calculation:** The system should automatically apply late fees to a member's account if tools are not returned on time.



## **Preparation for Group Assignment:**

### Case Study 4 - Tool-Share Co-op

## **Non-Functional Requirements**

**1. Usability:** The system should have an intuitive interface that is easy to navigate for both members and staff.

**2. Scalability:** The system should be scalable to accommodate a growing number of members and tools.

**3. Security:** The system should ensure that all member data, including payment information, is securely stored and accessed.

**4. Reliability:** The system should have minimal downtime and be available whenever members need to access or return tools.



## **Preparation for Group Assignment:**

### Case Study 4 - Tool-Share Co-op

#### **Constraints**

**1.Budget Limitations:** The development of the system must stay within the Co-op's limited budget.

**2.Integration with Existing Systems:** The new system must integrate seamlessly with any existing software or databases currently in use.

**3.Data Migration:** All existing member and inventory data must be successfully migrated to the new system without loss or corruption.



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

#### **4. Proposed System Description**

The proposed system will automate the key processes within Tool-Share Co-op, addressing the inefficiencies identified during the requirements gathering phase. The system will consist of several components, including a member management module, an inventory management module, and a tool borrowing and return module, all of which will be accessible through a user-friendly interface.



## **Preparation for Group Assignment:**

### Case Study 4 - Tool-Share Co-op

## **Logical Model Design**

### **Data Flow Diagrams**

**Context Diagram:** The context diagram represents the system's interaction with external entities, such as members, staff, and the payment gateway.

*Insert Context Diagram Here*



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

**Diagram 0:** This diagram provides a detailed view of the system's processes, data stores, and data flows.

*Insert Diagram 0 Here*

### **Data Dictionary**

The data dictionary for the level 0 DFD includes the following key data stores and selected data flows:

- **Data Store 1:** Member Information (Stores personal details, payment information, borrowing history)
- **Data Store 2:** Tool Inventory (Stores details of tools available for borrowing, including current status)
- **Data Store 3:** Transaction Records (Stores records of all borrowing and returning transactions)
- **Data Flow 1:** Borrow Tool (Transfers data between Member Information and Tool Inventory during tool borrowing)
- **Data Flow 2:** Return Tool (Transfers data between Tool Inventory and Transaction Records during tool return)
- **Data Flow 3:** Late Fee Calculation (Calculates and updates the member's account with any applicable late fees)





## **Preparation for Group Assignment:**

Case Study 4 - Tool-Share Co-op

## **5. Process Modelling and System Design**

### **Use Case Diagrams**

The use case diagram illustrates the interactions between the system and its users (members and staff).

*Insert Use Case Diagram Here*

### **Activity Diagrams**

Activity diagrams are provided for two key use cases: "Borrow Tool" and "Return Tool."

*Insert Activity Diagrams Here*



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

#### **Class Diagram**

The class diagram provides an overview of the system's structure, showing the system's classes, attributes, methods, and relationships.

*Insert Class Diagram Here*

#### **System Sequence Diagrams**

System sequence diagrams for the "Borrow Tool" and "Return Tool" use cases are provided to show the interactions over time.

*Insert System Sequence Diagrams Here*

#### **User Interface Design**

Four main functionalities were selected to develop the user interface: Member Registration, Tool Borrowing, Tool Return, and Inventory Management.

*Insert Wireframes/Screen Designs Here*

Each interface is designed with the user in mind, ensuring ease of use and accessibility. The Member Registration screen will capture personal and payment details, the Tool Borrowing screen will display available tools and borrowing history, and the Tool Return screen will allow members to return tools with a simple scan of their membership card.



## **Preparation for Group Assignment:**

### Case Study 4 - Tool-Share Co-op

## **6. System Architecture and Prototyping**

### **Finalized System Architecture**

The finalized system architecture details how the different components of the system interact. It includes the database, application server, web interface, and payment gateway.

*Insert System Architecture Diagram Here*

### **Prototype Screenshots**

A basic prototype was developed to demonstrate key functionalities, focusing on the user interfaces for Member Registration, Tool Borrowing, and Tool Return.

*Insert Prototype Screenshots Here*

Each screenshot is designed to show how the system will function, giving stakeholders a clear understanding of the user experience.



## **Preparation for Group Assignment:**

### **Case Study 4 - Tool-Share Co-op**

## **7. Conclusion**

The proposed information system for Tool-Share Co-op addresses the inefficiencies identified in the current manual processes by automating tool borrowing and return, enhancing inventory management, and improving member management. The system's architecture is well-structured, ensuring reliability, scalability, and security. The prototype demonstrates the key functionalities, providing a solid foundation for the final system. This report has provided a comprehensive analysis, detailed process and data models, and a clear design for the system, aligning with best practices in systems analysis and design.

## **8. References**

(Include at least 5-7 references from reputable journals and sources, formatted according to Holmes Institute Adapted Harvard Referencing.)

Happy A Learning Day!

Lecturer/Tutor: Dr. Farshid Keivanian