NATIONAL UNIVERSITY OF COMPUTER AND EMERGING SCIENCES

CS3005– Software Design & Architecture Lab

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Lab 08

Outline

Objective: To Understand Activity Diagram and Advanced Feature
Exercise

Introduction

- An activity diagram is a type of flow chart with additional support for parallel behavior.
- This diagram explains overall flow of control.
- Activity diagram is another important diagram in UML to describe dynamic aspects of the system.
- Activity diagram is basically a flow chart to represent the flow from one activity to another activity
- The activity can be described as an operation of the system.
- The control flow is drawn from one operation to another. This flow can be sequential, branched or concurrent.
- Activity diagrams deals with all type of flow control by using different elements like fork, join etc
- An activity diagram shows a process workflow as a series of activities in a flowchart-like structure.
- On the other hand, Use case diagrams show actors and the situations where they interact with a system
- Activity diagrams allow you to think functionally.

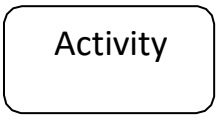
Purpose

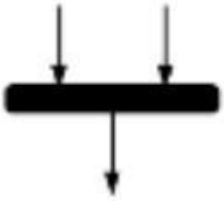
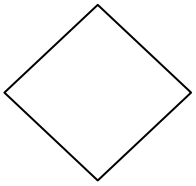
- An activity diagram shows a process workflow as a series of activities in a flowchart-like structure.

- On the other hand, Use case diagrams show actors and the situations where they interact with a system
- Activity diagrams allow you to think functionally.

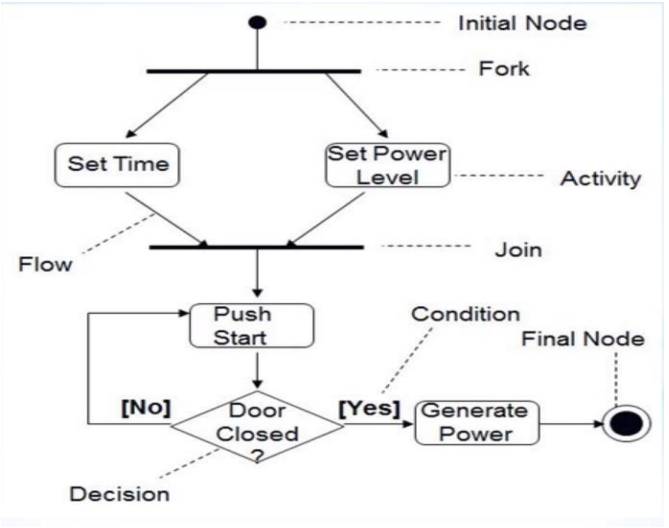
When to use: Activity Diagrams

- Activity diagrams are most useful when modeling the parallel behavior of a multithreaded system or when documenting the logic of a business process.
- Because it is possible to explicitly describe parallel events, the activity diagram is well suited for the illustration of business processes, since business processes rarely occur in a linear manner and often exhibit parallelisms.
- This diagram is useful to investigate business requirements at a later stage.
- An activity diagram is drawn from a very high level. So it gives high level view of a system. This high level view is mainly for business users or any other person who is not a technical person.
- This diagram is used to model the activities which are nothing but business requirements.
- So the diagram has more impact on business understanding rather implementation details.

Symbol	Name	Description
	Start symbol	Represents the beginning of a process or workflow in an activity diagram. It can be used by itself or with a note symbol that explains the starting point
	Activity symbol	Indicates the activities that make up a modeled process. These symbols, which include short descriptions within the shape, are the main building blocks of an activity diagram.
	Connector symbol	Shows the directional flow, or control flow, of the activity. An incoming arrow starts a step of an activity; once the step is

		completed, the flow continues with the outgoing arrow.
	Joint symbol/ Synchronization bar	Combines two concurrent activities and re-introduces them to a flow where only one activity occurs at a time. Represented with a thick vertical or horizontal line.
	Fork symbol	Splits a single activity flow into two concurrent activities. Symbolized with multiple arrowed lines from a join.
	Decision symbol	Represents a decision and always has at least two paths branching out with condition text to allow users to view options. This symbol represents the branching or merging of various flows with the symbol acting as a frame or container.
	Note symbol	Allows the diagram creators or collaborators to communicate additional messages that don't fit within the diagram itself. Leave notes for added clarity and specification.
	Send signal symbol	Indicates that a signal is being sent to a receiving activity.

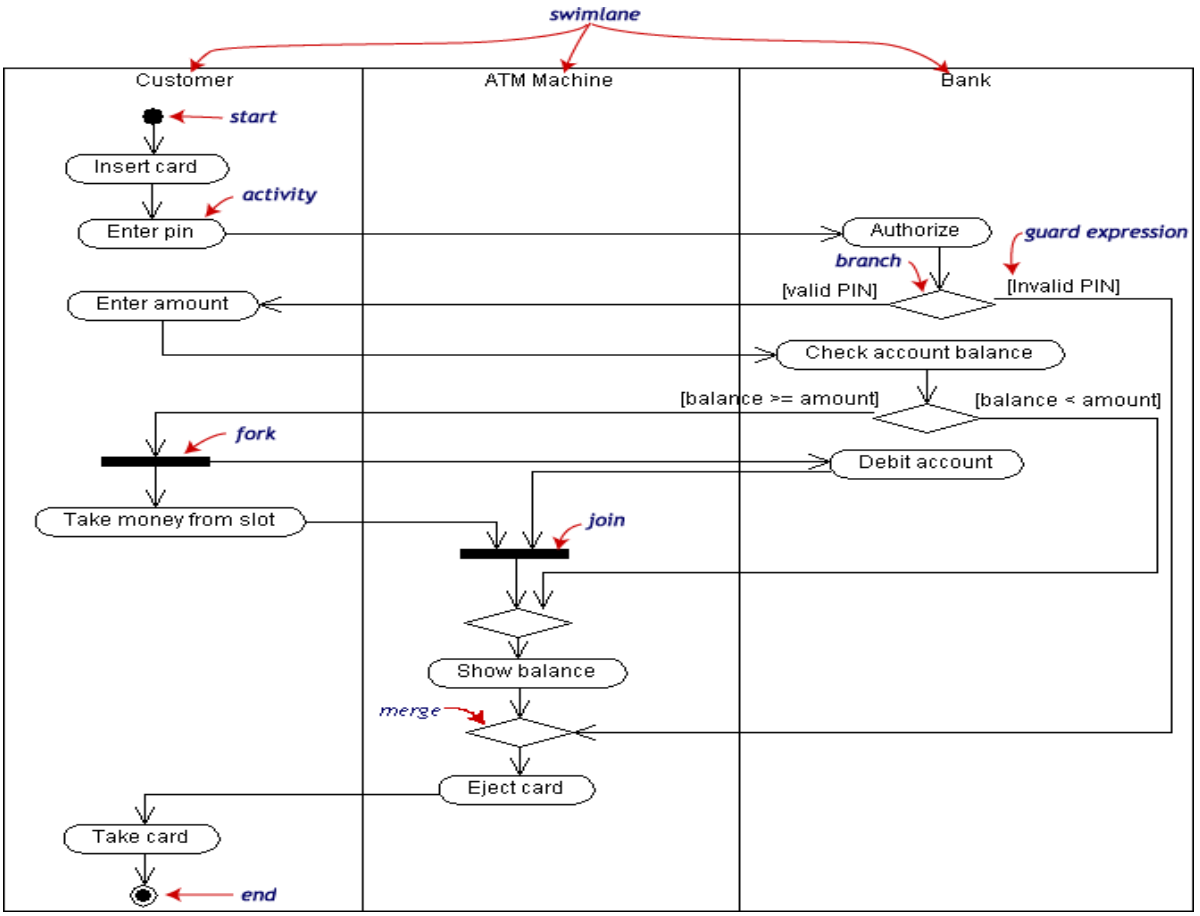
Activity Diagram Symbols



Example: 01

For example, we used the following process.

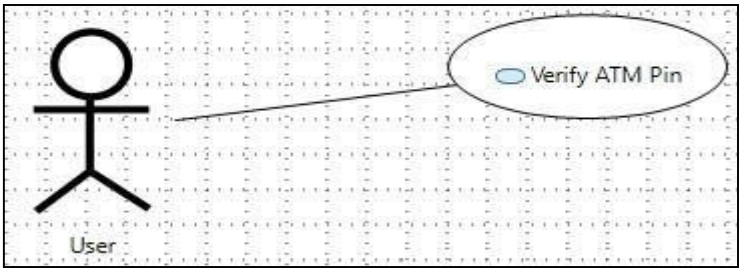
"Withdraw money from a bank account through an ATM."

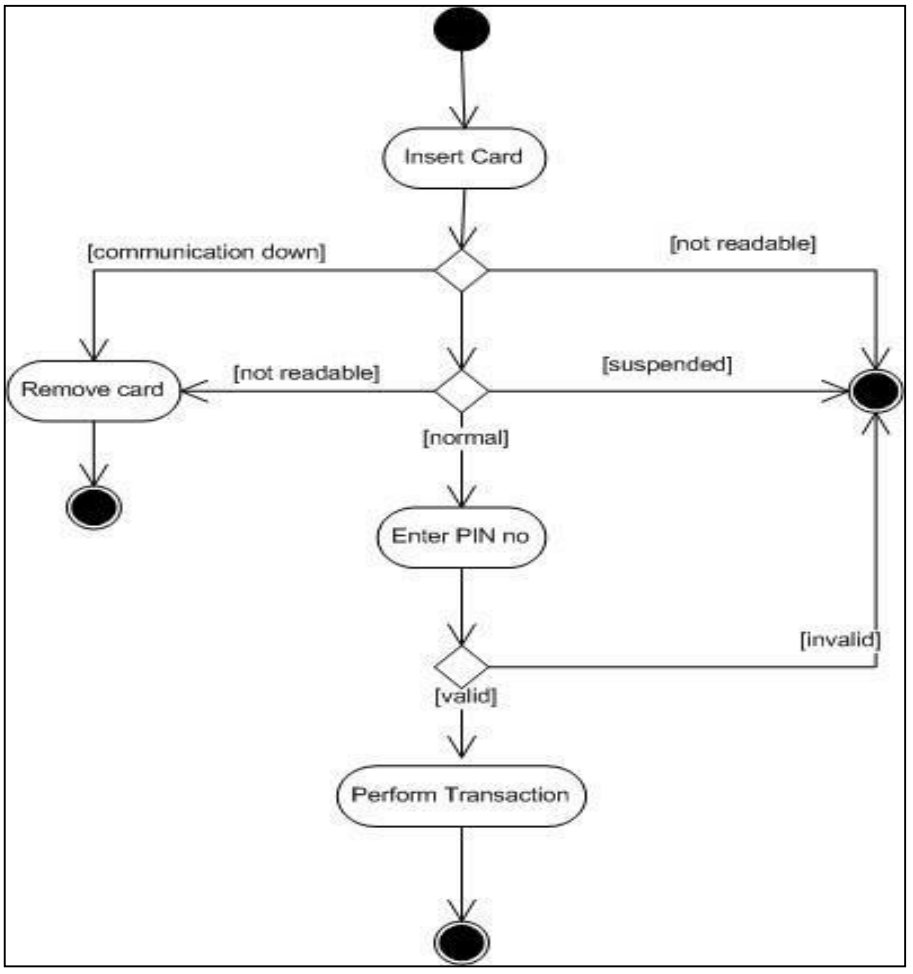


Example: 2

Activity diagram for ATM

Verify PIN number:

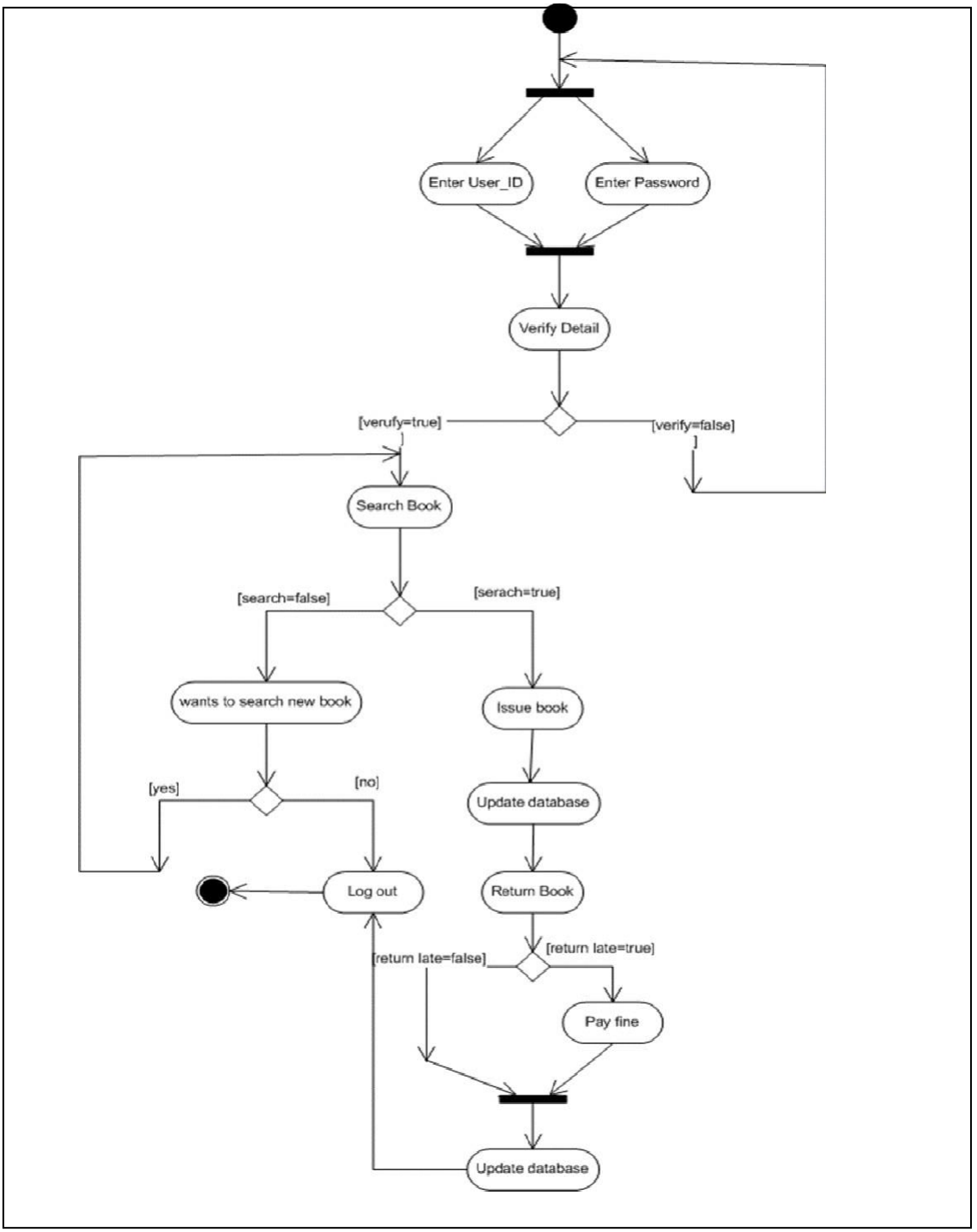




Example: 3

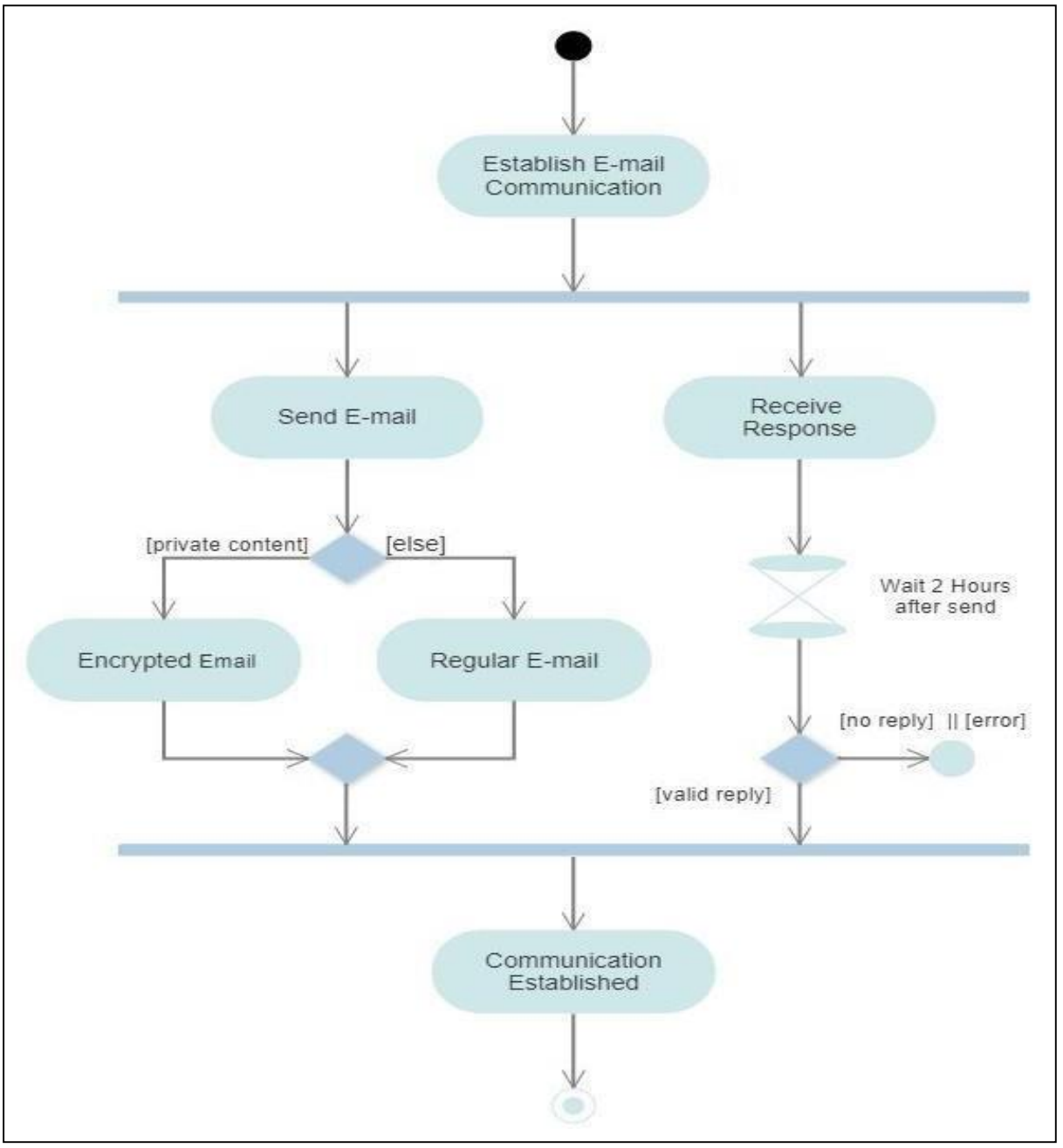
Activity Diagram for Library Management System

Issue and return book



Example: 05

Activity Diagram for Email Connection

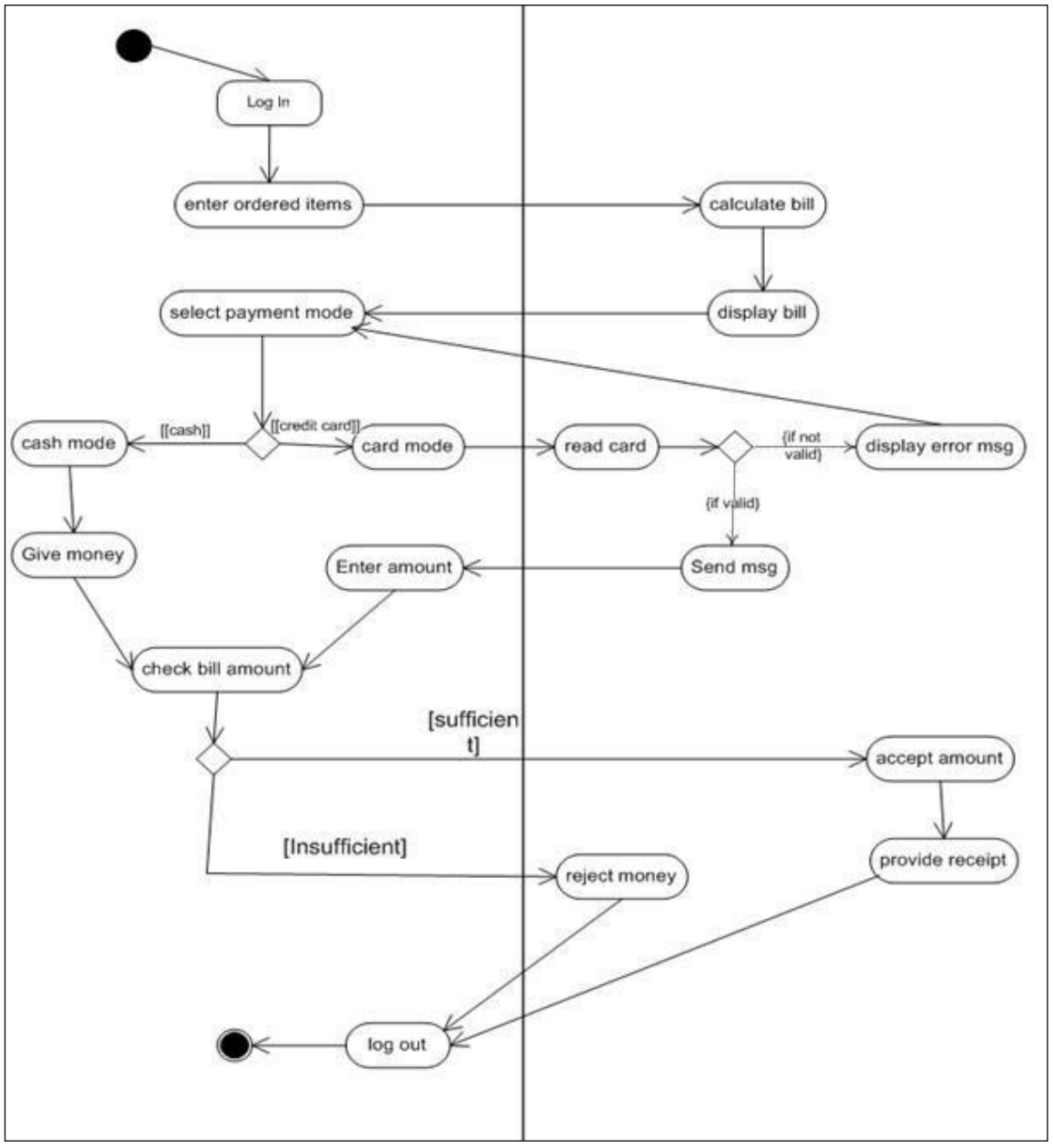


Swimlane:

- **Swimlanes group related activities into same column or row**

Example: 06

Activity Diagram for payment method using Swimlane



Advanced Features of Activity diagram

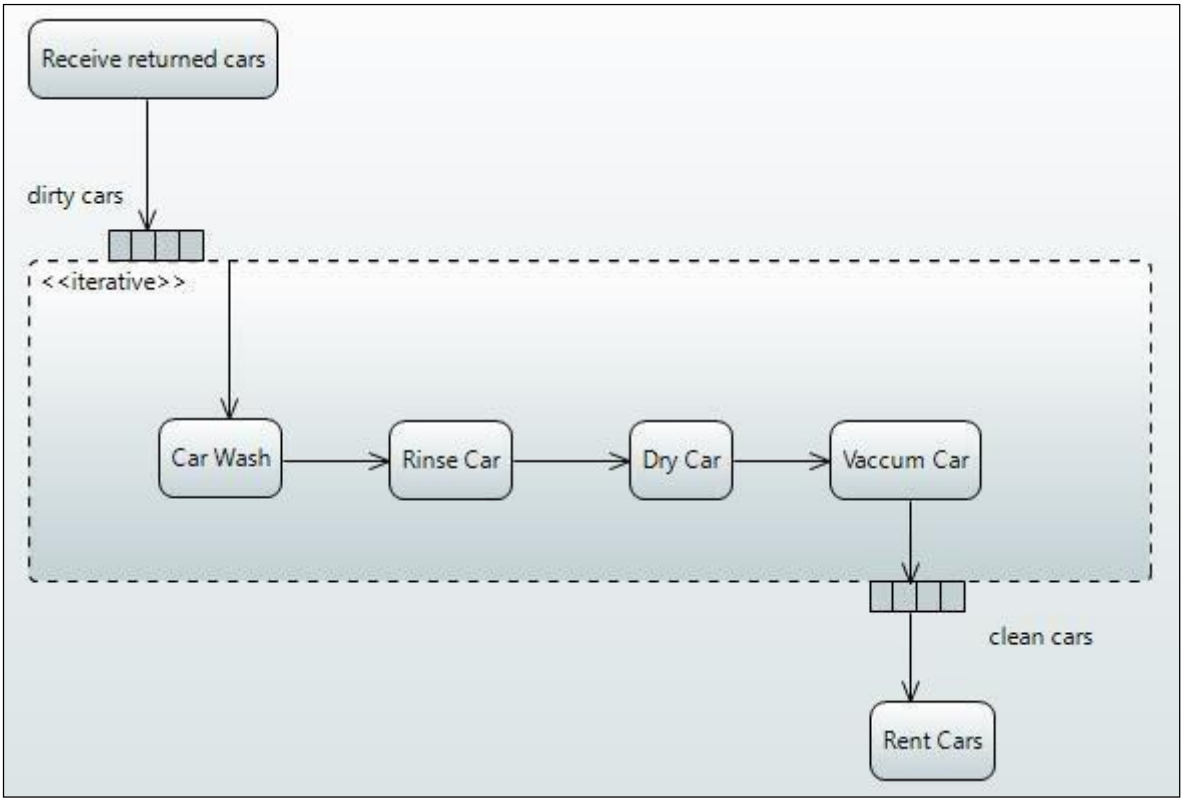
Expansion Region:

On an Activity diagram, sometimes the output of an action can trigger multiple invocations of another action when this happens it's helpful to use an expansion region in your activity diagram.

An expansion region shows a set of actions that occur once for each item in a collection so an expansion region contains some process that acts multiple times on the incoming data once for each element in the input collection it may be helpful to think of an expansion region as behaving like a for loop over the input collection for

Example:

Imagine a car rental agency and when cars are returned to this agency they collect a batch of cars and then they send those cars through their one lane car wash one at a time so our action that would trigger this multiple invocation of the carwash would be receive returned cars and once they've received batch of cars they're going to send them one at a time through the carwash and so that will be our expansion region

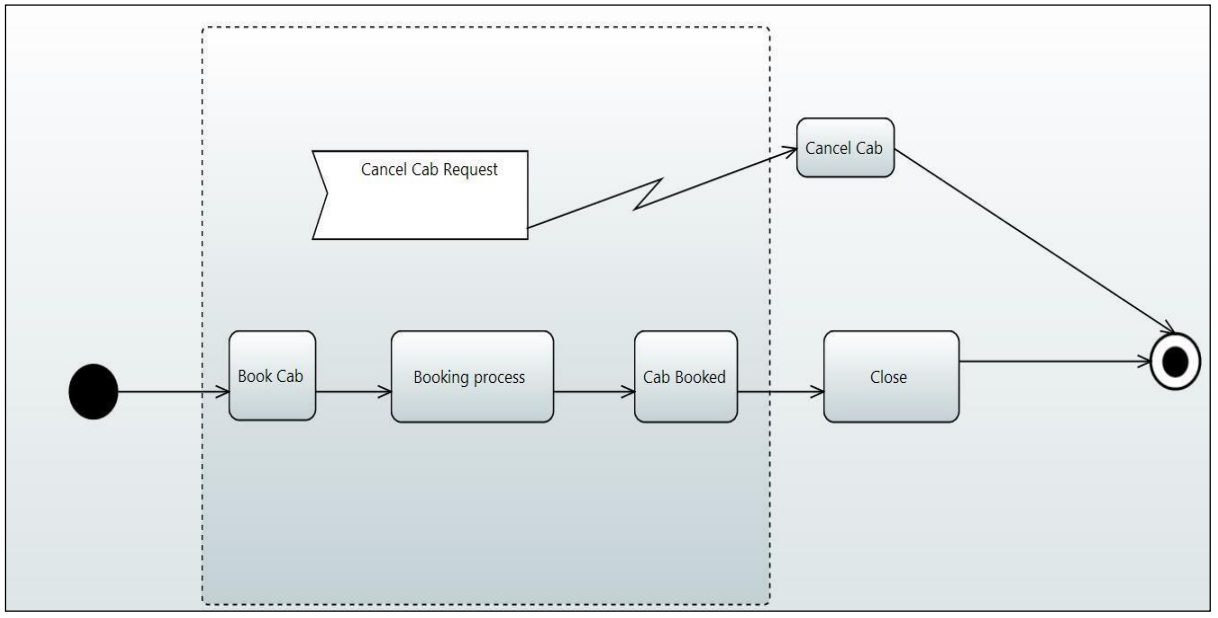


Interruptible Region:

As you diagram a processor activity you may find that an action or a group of actions can be interrupted by some event to show this use an interrupted activity region an interruptible activity region is represented by an activity box with a dashed line border.

Example:

Booking of cab process is shown below this process will execute until completion, when cab is booked, search for nearest captain starts (Booking process), when search is complete cab is booked and process is finished but what happens if you cancel a request to cancel the cab, a cancellation request should interrupt these various actions that are going on bringing them to a halt. It can be represented by Interruptible region. The actions that could be interrupted are put inside this interruptible and the event that can cause the interruption and in the case of our diagram here that would be an input signal and that input signal would be a Cancel Cab Request



Exception Handler:

Activity diagram in Unified Modeling Language (UML) represents the flow from one activity to another within the system. The exceptions in the activity diagrams are the events or actions that occur during the execution of a program that interrupts the normal execution. Exception handlers in activity diagrams can be modeled as shown in the figure below. Exception handler in activity diagram: