


- **Systems Analysis and Design** **Object-Oriented Systems**
  - **Course Code: CSE 305** **Analysis and Design Using UML**  
**(Activity Diagram)**
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# Activity Diagrams







- Activity diagram is another important diagram in UML to describe the dynamic aspects of the system.
- Activity diagram is basically a flowchart 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 deal with all type of flow control by using different elements such as fork, join, etc.

# The purpose of an activity diagram






- Draw the **activity flow** of a system.
  - Describe the **sequence from one activity to another**.
  - Describe the **parallel**, branched and **concurrent flow** of the system.
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# Activity Diagram Symbols




UML has specified a set of symbols and rules for drawing activity diagrams.

Symbol	Name	Use
	Start/ Initial Node	Used to represent the starting point or the initial state of an activity
	Activity / Action State	Used to represent the activities of the process
	Action	Used to represent the executable sub-areas of an activity
	Control Flow / Edge	Used to represent the flow of control from one action to the other
	Object Flow / Control Edge	Used to represent the path of objects moving through the activity
	Activity Final Node	Used to mark the end of all control flows within the activity

# Activity Diagram Symbols

	Flow Final Node	Used to mark the end of a single control flow
	Decision Node	Used to represent a conditional branch point with one input and multiple outputs
	Merge Node	Used to represent the merging of flows. It has several inputs, but one output.
	Fork	Used to represent a flow that may branch into two or more parallel flows
	Merge	Used to represent two inputs that merge into one output

# Activity Diagram Symbols

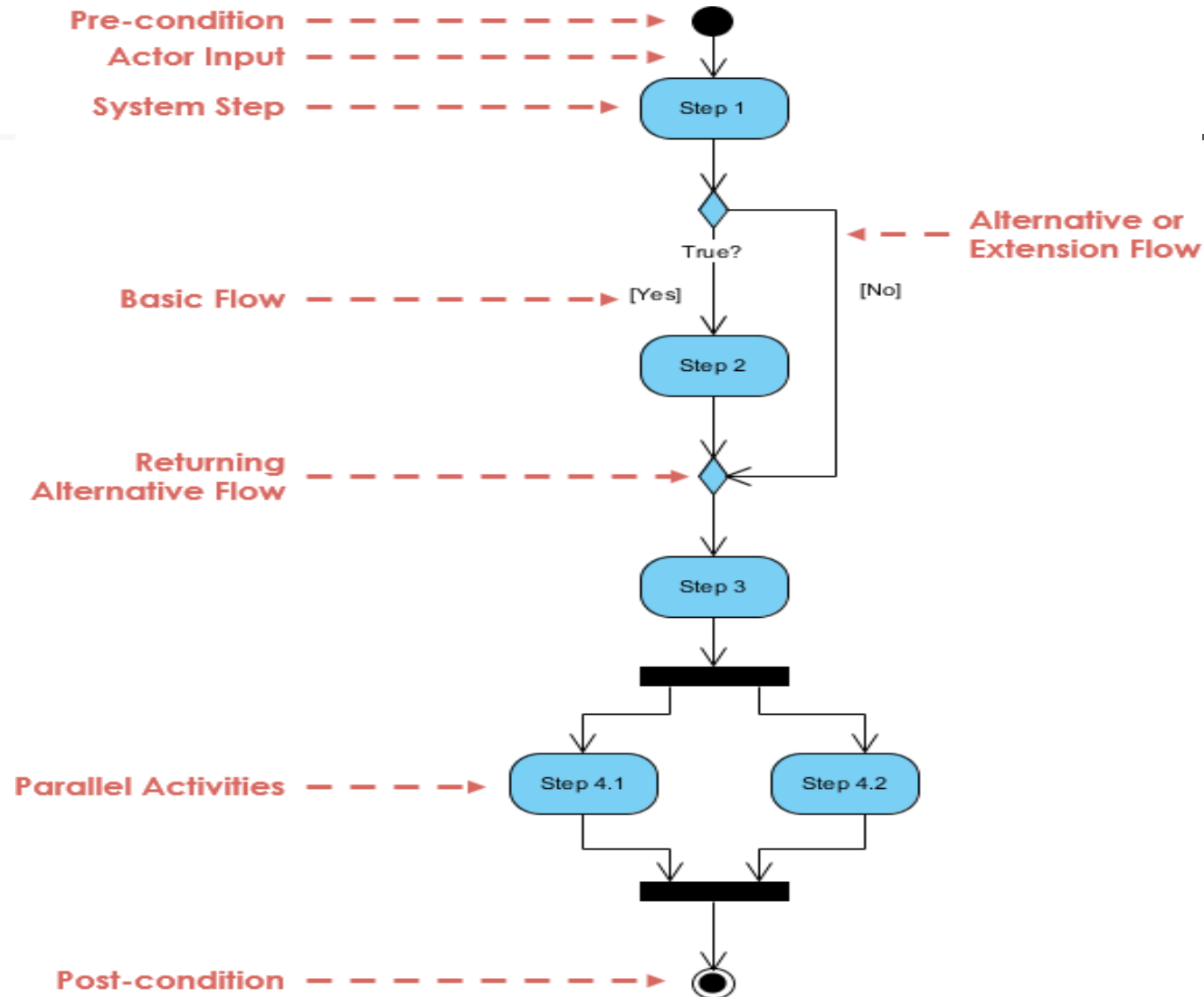
	Signal Sending	Used to represent the action of sending a signal to an accepting activity
	Signal Receipt	Used to represent that the signal is received
	Note/ Comment	Used to add relevant comments to elements

# How to Draw an Activity Diagram?

Activity diagrams can be used to model business requirements, create a high-level view of a system's functionalities, analyze use cases and for various other purposes.

- Step 1: Figure out the **action** steps from the use case: Here you need to identify the various activities and actions your business process or system is made up of.
- Step 2: Identify the **actors** who are involved: If you already have figured out who the actors are, then it's easier to discern each action they are responsible for.
- Step 3: **Find a flow among the activities**: Figure out in which order the actions are processed. Mark down the conditions that have to be met in order to carry out certain processes, which actions occur at the same time and whether you need to add any branches in the diagram. And do you have to complete some actions before you can proceed to others?
- Step 4: **Add swimlanes**: You have already figured out who is responsible for each action. Now it's time to assign them a swimlane and group each action they are responsible for under them.

# A basic activity diagram - flowchart like





# Activity Diagram - Modeling a Word Processor

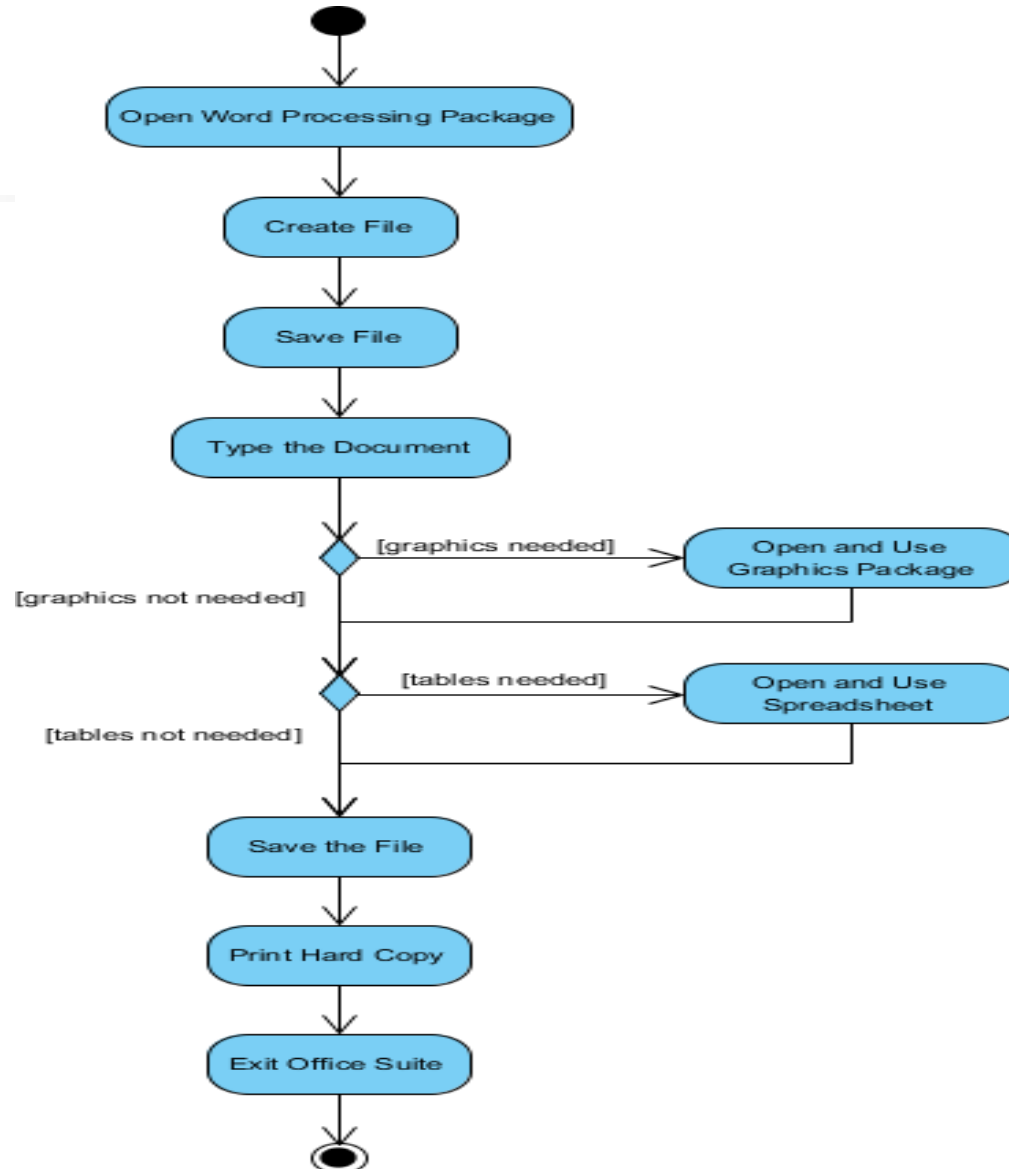
The activity diagram example below describes the workflow for a word process to create a document through the following steps:

- ☐ Open the word processing package.

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- ☐ Create a file.
- ☐ Save the file under a unique name within its directory.
- ☐ Type the document.
- ☐ If graphics are necessary, open the graphics package, create the graphics, and paste the graphics into the document.
- ☐ If a spreadsheet is necessary, open the spreadsheet package, create the spreadsheet, and paste the spreadsheet into the document.
- ☐ Save the file.
- ☐ Print a hard copy of the document.
- ☐ Exit the word processing package

# Activity Diagram - Modeling a Word Processor

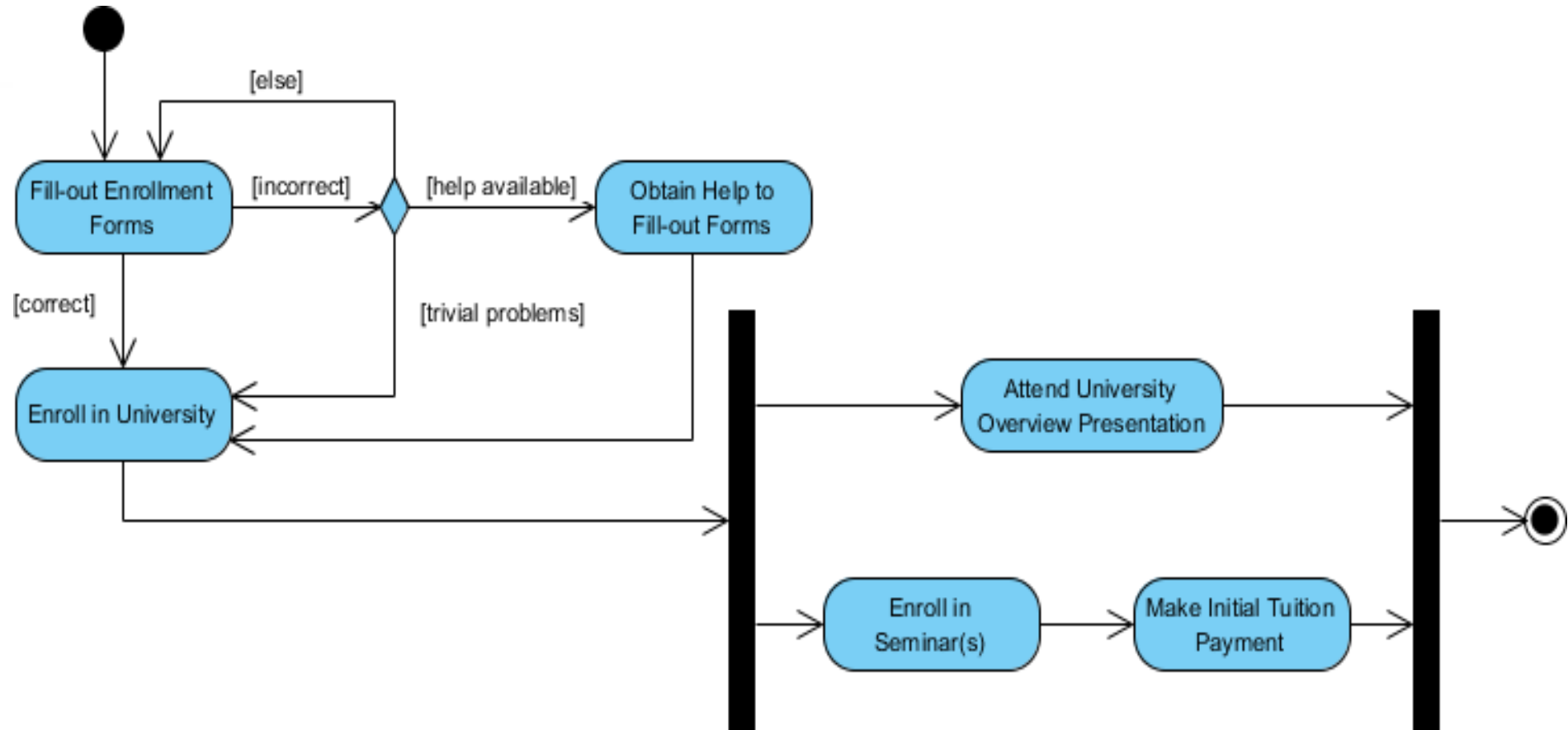


## Activity Diagram Example - Student Enrollment

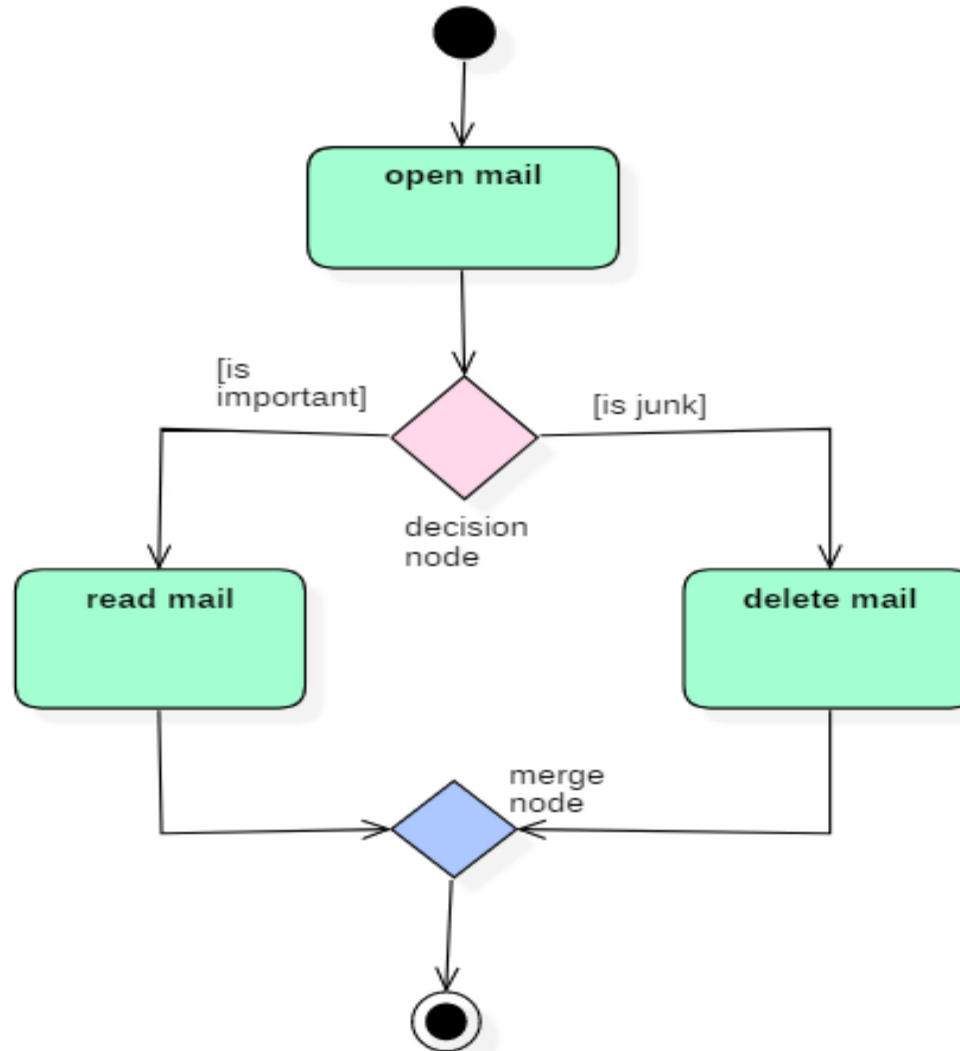
This UML activity diagram example describes a process for student enrollment in a university as follows:

- ❖ An applicant wants to enroll in the university.
- ❖ The applicant hands a filled out copy of Enrollment Form.
- ❖ The registrar inspects the forms.
- ❖ The registrar determines that the forms have been filled out properly and the student can enroll in university
- ❖ The registrar informs student to attend in university overview presentation.
- ❖ The registrar helps the student to enroll in seminars
- ❖ The registrar asks the student to pay for the initial tuition.

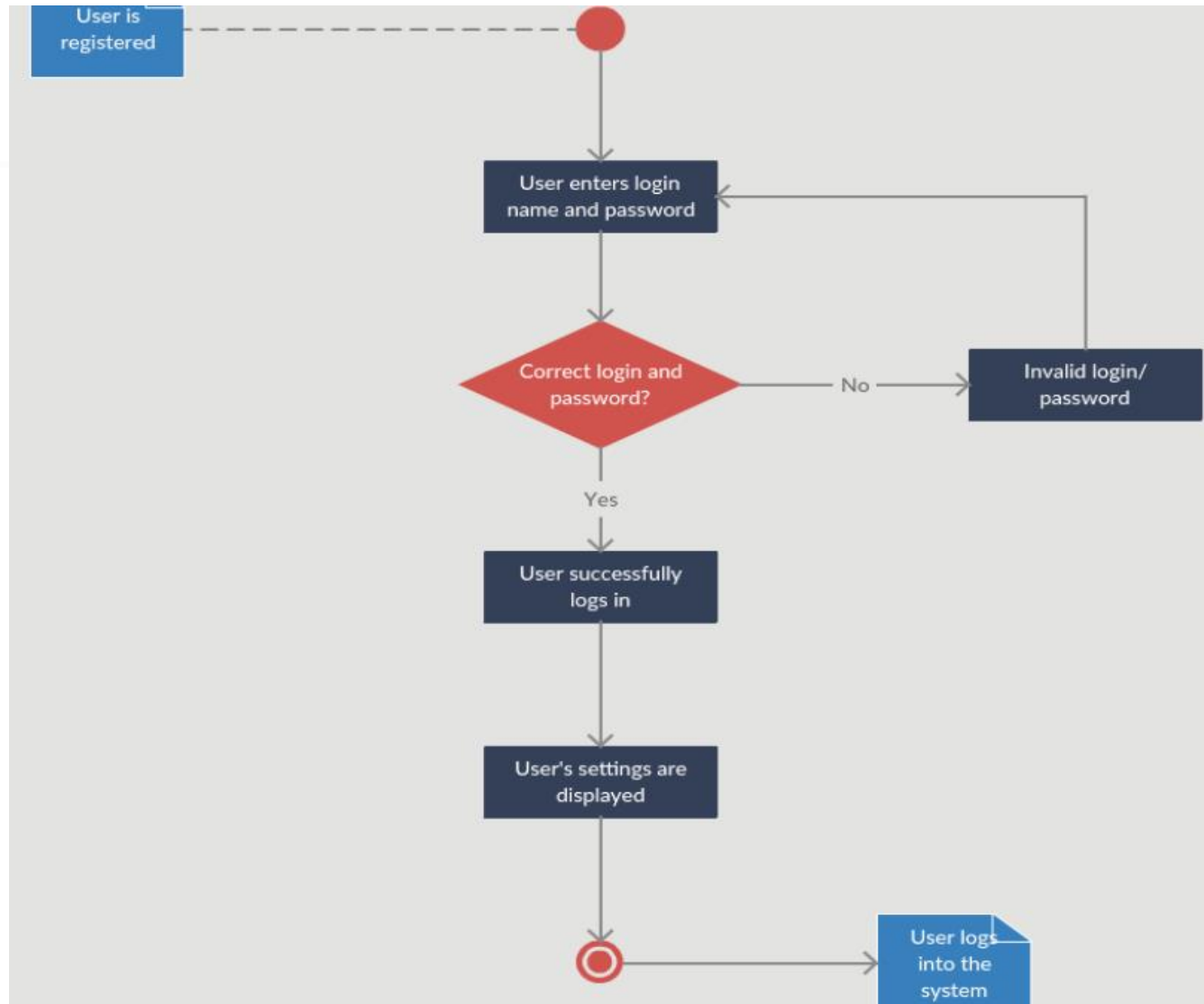
# Activity Diagram Example - Student Enrollment



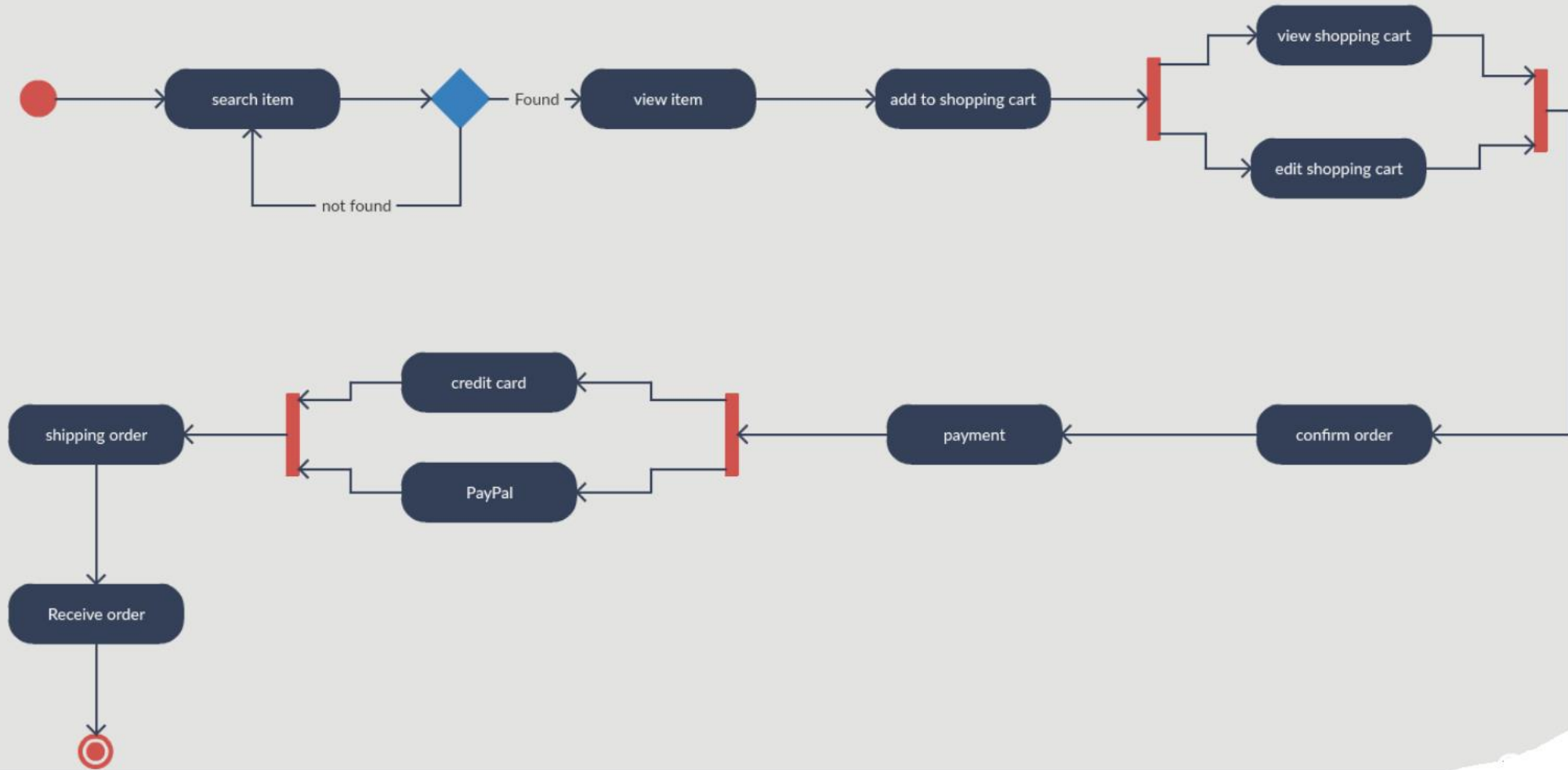
Following diagram represents activity for processing e-mails.



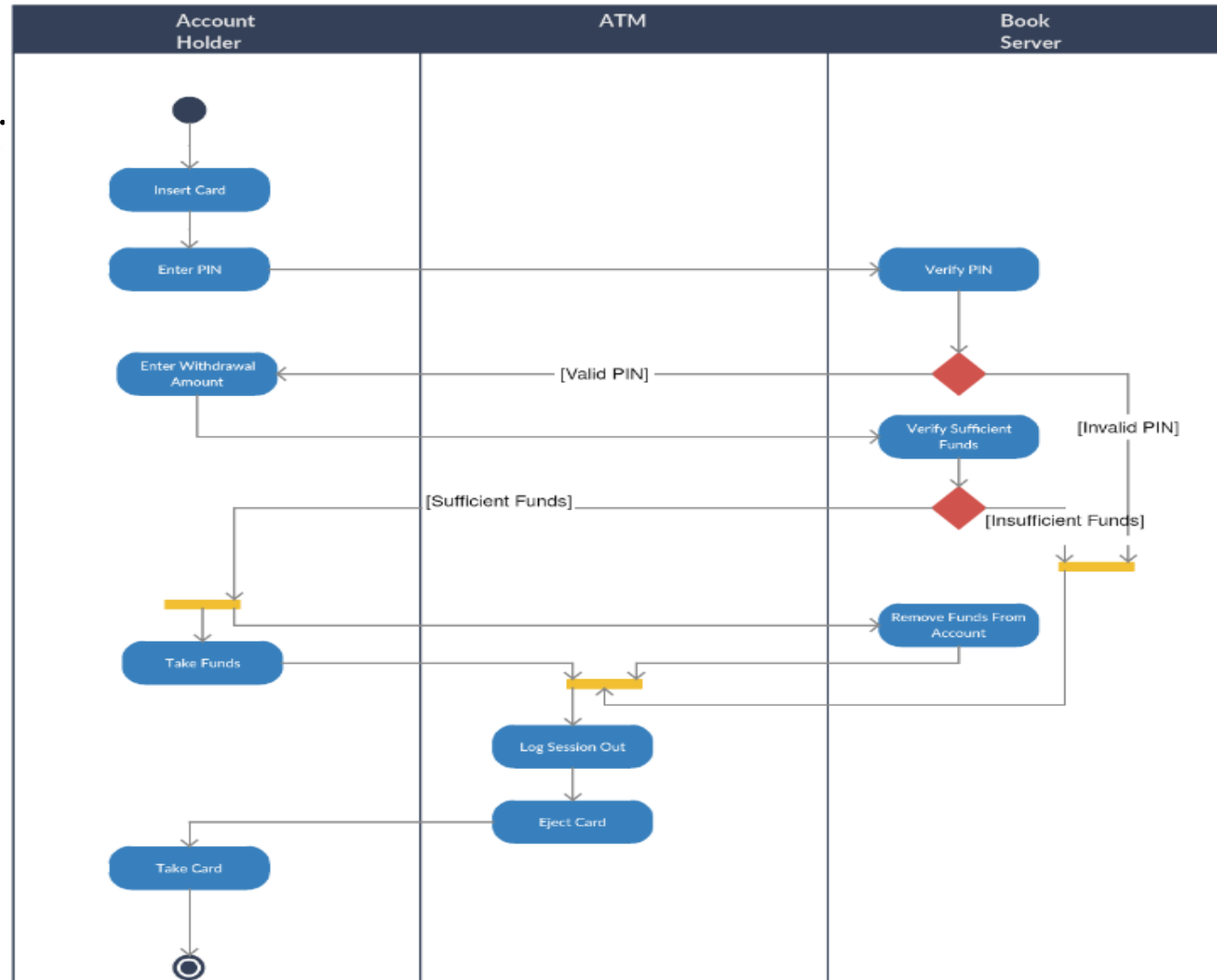
# Activity Diagram for Login



# Activity Diagram for Online Shopping System



# Activity Diagram for ATM





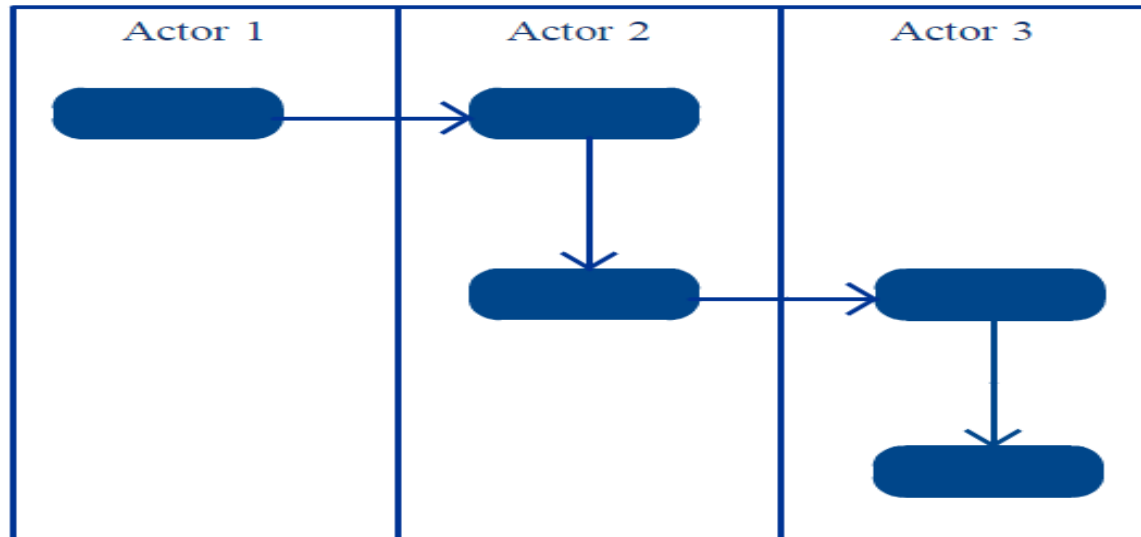
## Activity Diagram – Swimlane

In activity diagrams swimlanes – also known as partitions – are used to represent or group actions carried out by different actors in a single thread.

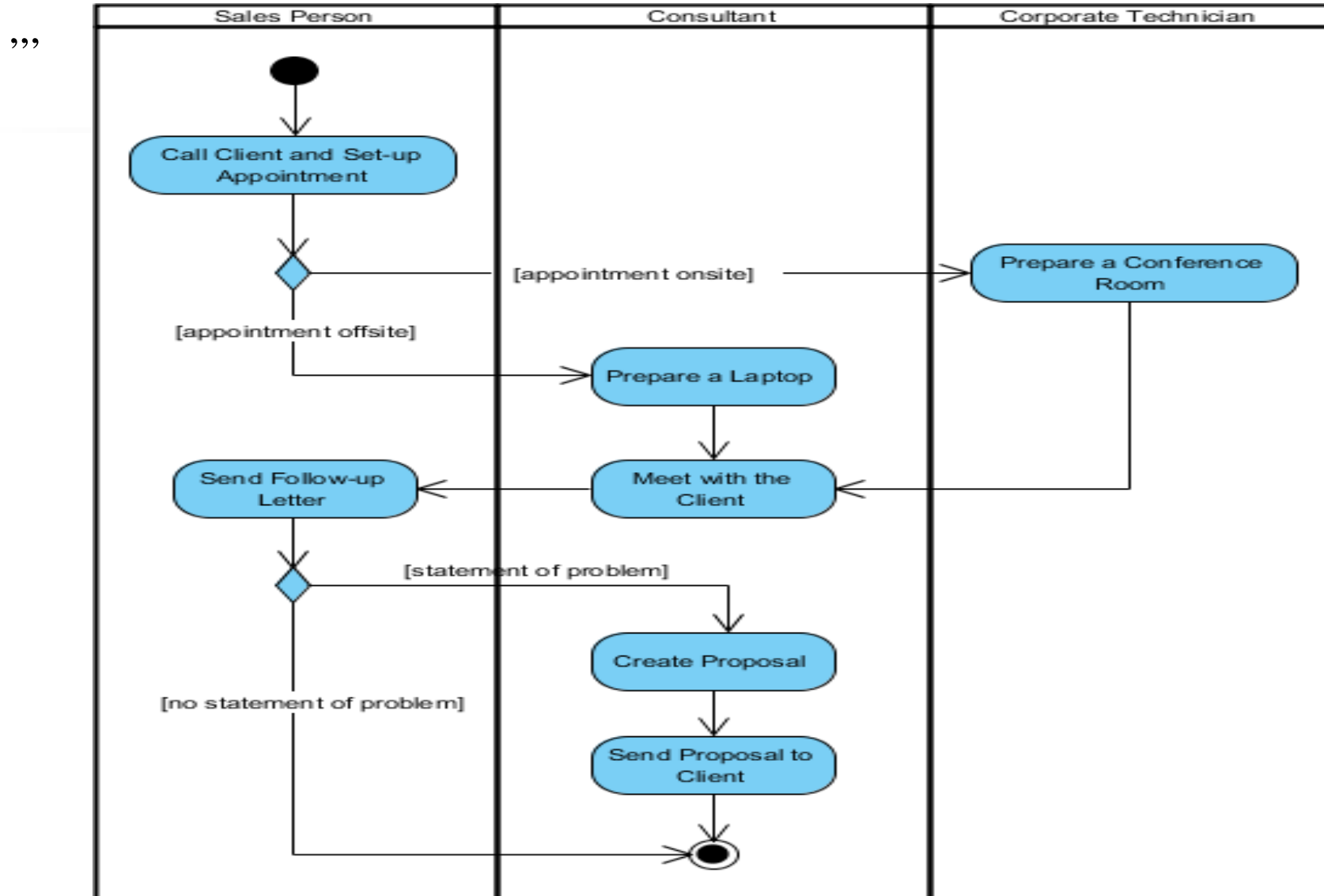
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**Here are a few tips you can follow when using swimlanes.**

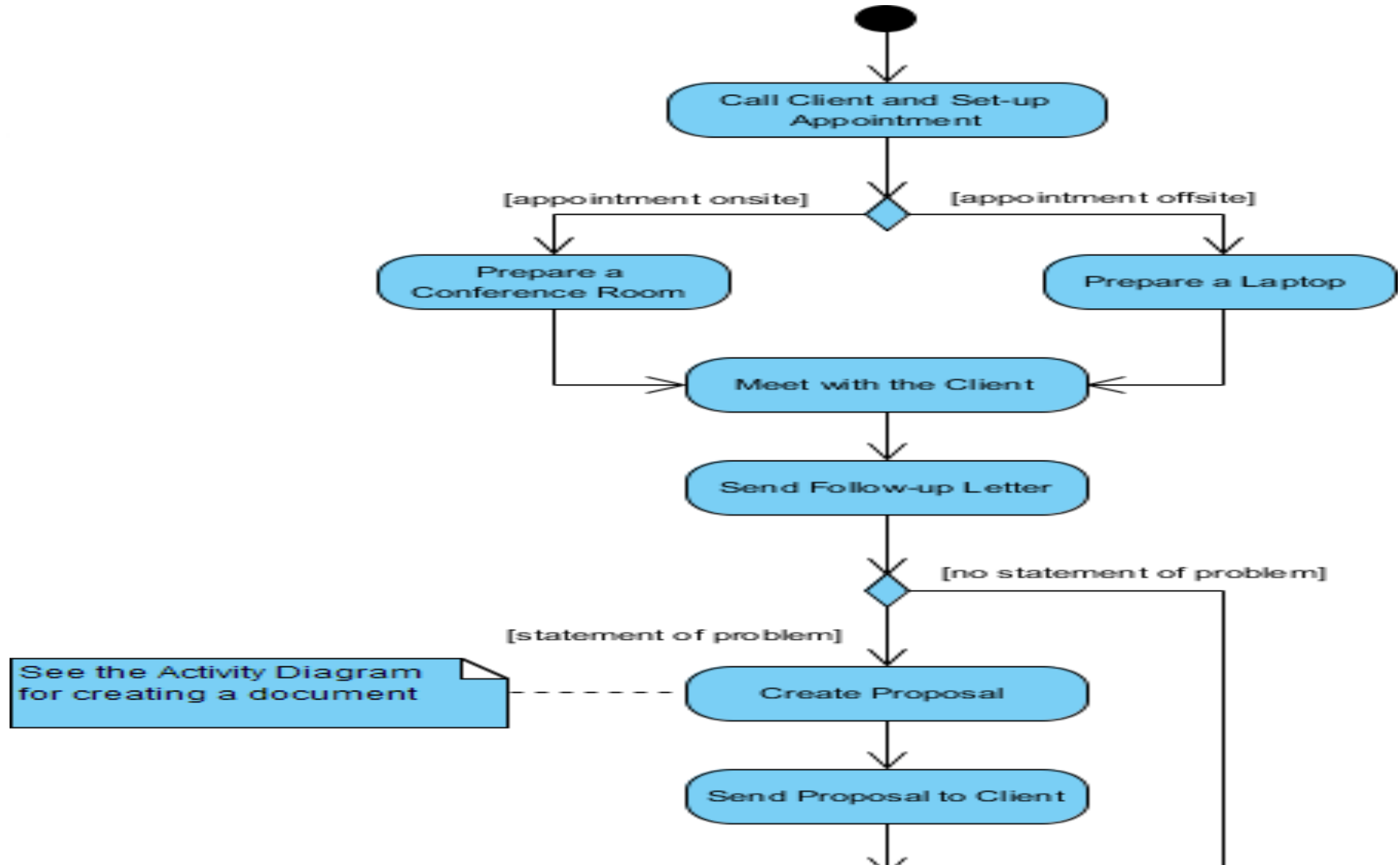
- ✓ Add swimlanes to linear processes. It makes it easy to read.
- ✓ Don't add more than 5 swimlanes.
- ✓ Arrange swimlanes in a logical manner.



This figure below describes the business process for meeting a new client using an activity Diagram with swimlane.



The activity diagram example below describes the business process for meeting a new client using an activity Diagram without swimlane.



# Summary

- Activity diagram is also called as **object-oriented flowcharts**.
- Activity diagrams consist of activities that are made up of smaller actions.
- Activity is a behavior that is divided into one or more actions.
- It uses action nodes, control nodes and object nodes.
- An activity partition or a swimlane is a high-level grouping of a set of related actions.
- Fork and merge/join nodes are used to generate concurrent flows within an activity.
- Activity diagram is used to model business processes and workflows.