ICT-232-3 Information Systems and Data Modeling
Lecture 4 – Process Models

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Outline

- Overview of process modelling
- Activity diagram
- Sequence diagram

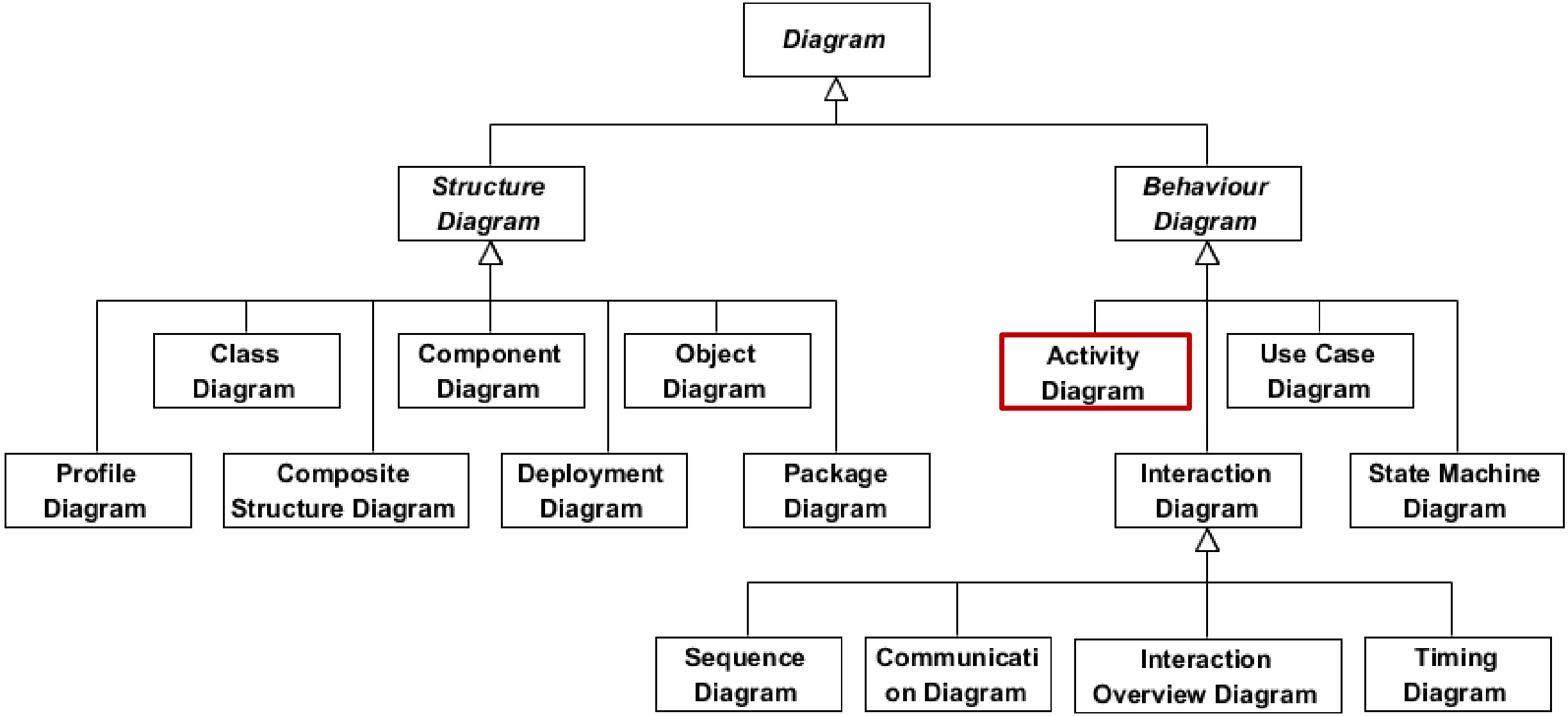


Diagram
Structure Diagram
Behaviour Diagram
Class Diagram
Component Diagram
Object Diagram
Activity Diagram
Use Case Diagram
Profile Diagram
Composite Structure Diagram
Deployment Diagram
Package Diagram
Interaction Diagram
State Machine Diagram
Sequence Diagram
Communicati on Diagram
Interaction Overview Diagram
Timing Diagram

Overview of process modelling

- Process modeling is the graphical representation of business processes or workflows.
- Business professionals have adapted UML as a powerful business process modeling technique.

- Activity diagrams are intuitive to read, easy to understand and presents a detailed view of the process and permitting activities in parallel.

Activity Diagram

- Activity Diagram shows how a system accomplish its goals.
- Activity Diagram is drawn for a particular process in a system
  - Visibility on certain aspects of control flow
- Useful for modelling
  - Business processes
  - Workflows
  - Data flows
  - Algorithms

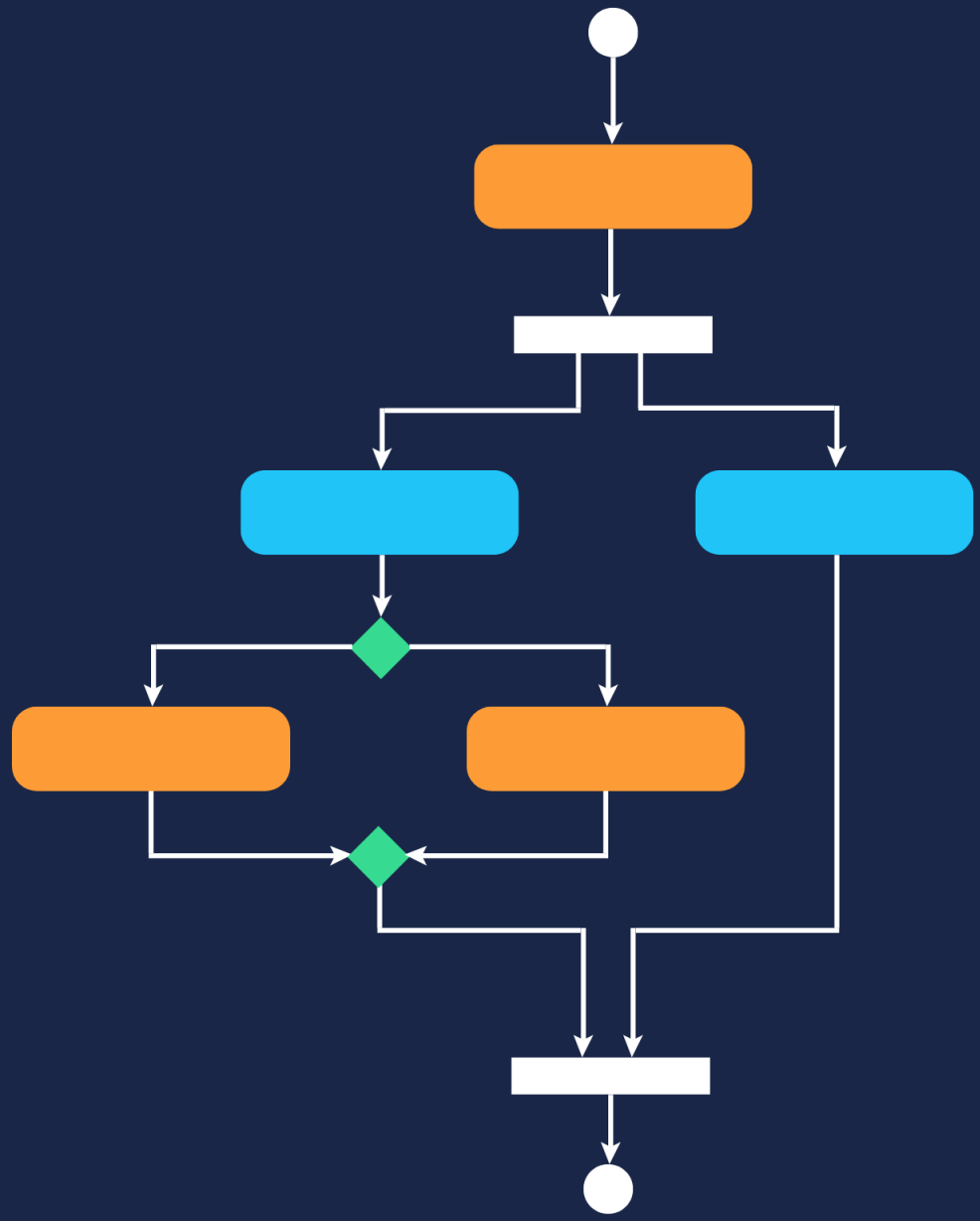
Activity Diagram

When to Use

- **Analyzing a use case** – What actions are needed to complete a particular use case and to explore internal behavior of a use case.
- **Understanding workflow** – Flow of a business process can be modeled with an activity diagram which can be explained to a non-technical person as well.
- **Explaining an algorithm** – Complex algorithms can be represented using activity diagrams and an algorithm is decomposed in to multiple steps and decisions points.

How to Create an

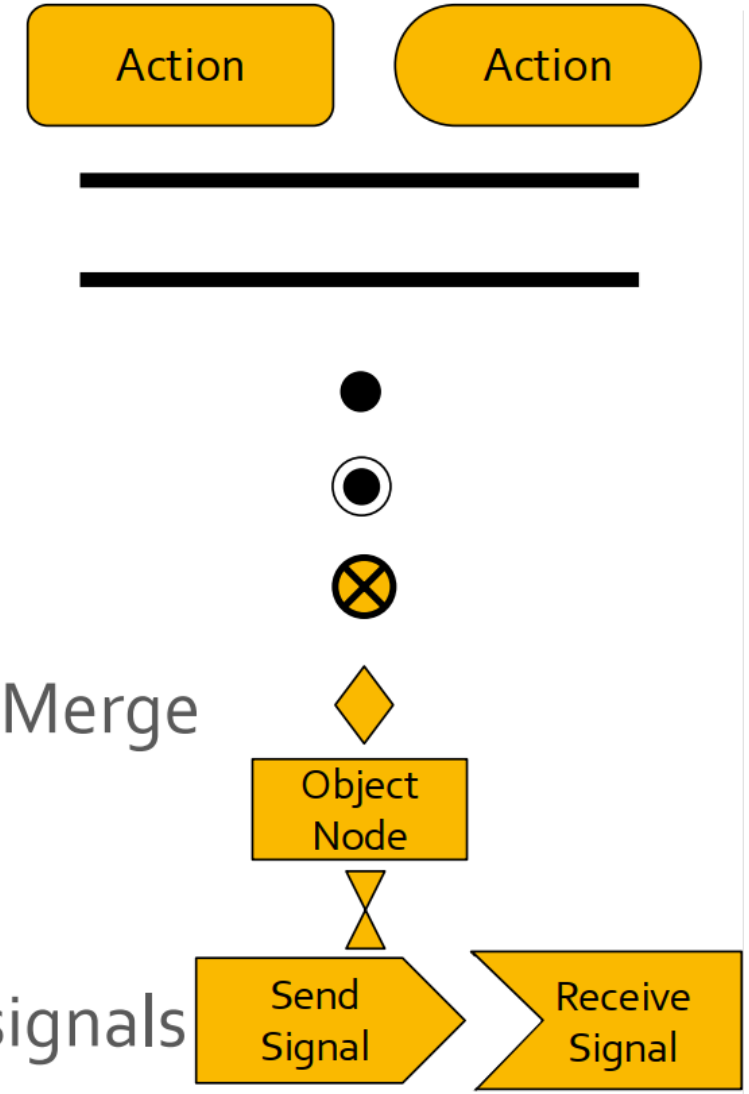
Activity Diagram



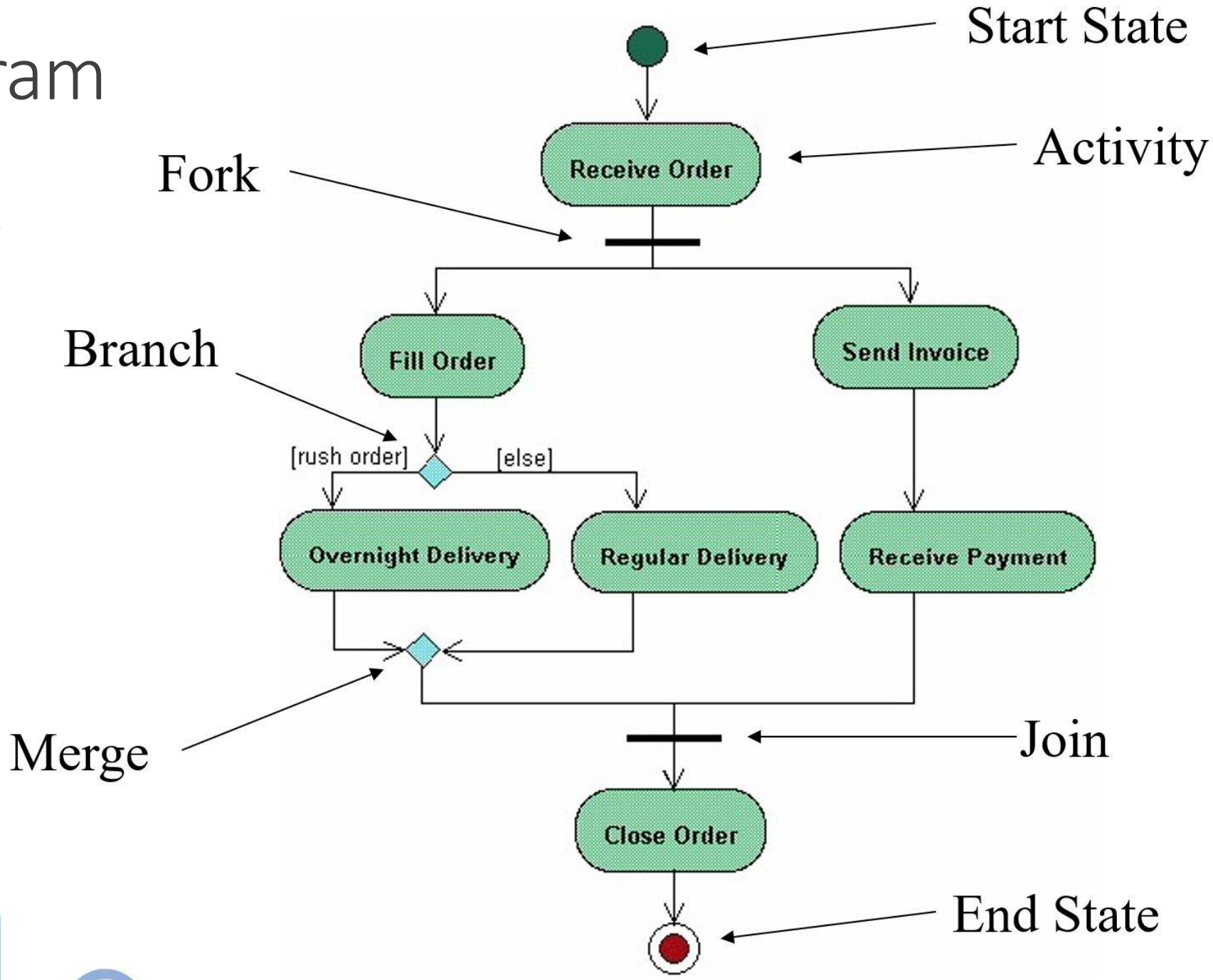
Activity Diagram

- Activity diagrams contain:
  - Activities
  - Transactions between activities
  - Decision points
  - Synchronization bars
  - Swimlanes

- Action
- Fork
- Join
- Initial node
- Final node
- End of a flow
- Decision node / Merge
- Object node
- Time Event
- Send / Receive signals



Activity Diagram Example



Activity Diagram

Activity:

- Represented in UML by a rounded rectangle.
- *Activity* represents the performance of some behavior in the workflow.

Activity Diagram

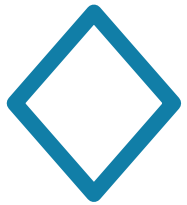
Transactions:

- Transitions are used to show the passing of the flow of control from activity to activity.
- They are typically triggered by the completion of the behavior in the originating activity.

Activity Diagram

Decision Points:

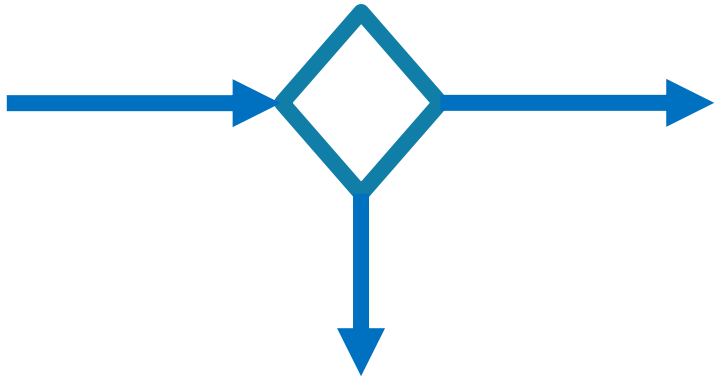
- When modeling the workflow of a system, it is often necessary to show where the flow of control branches based on a decision point.
- The transition from a decision point contain a guard condition.



Activity Diagram

Decision Points:

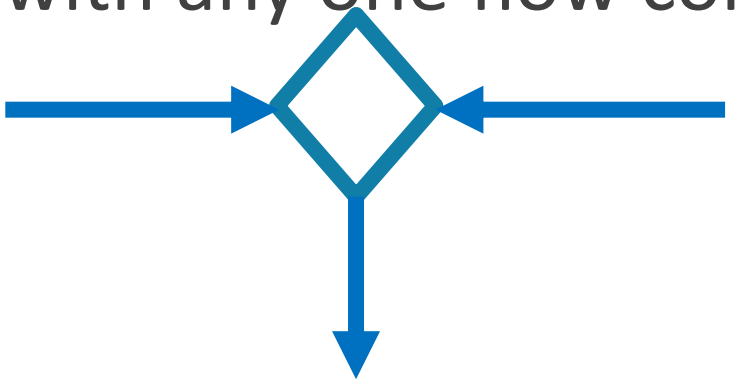
- The guard condition is used to determine which path from the decision point is taken.
- Decisions along with their guard conditions allow you to show alternative paths through a workflow.



Activity Diagram

Merge Points:

- Two or more flows come in and one flow goes out.
- This combines flows that were previously separated by decisions.
- Processing continues with any one flow coming into the merge.



Activity Diagram

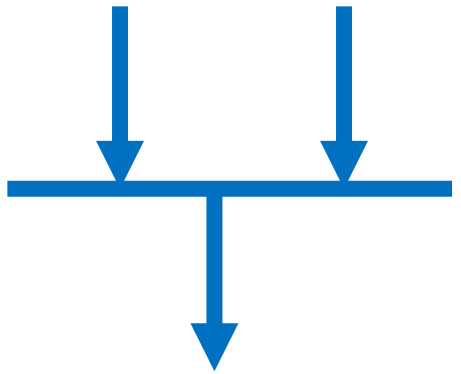
Synchronization Bars:

- In a workflow there are typically some activities that may be done in parallel.
- A synchronization bar allows you to specify what activities may be done concurrently.

Activity Diagram

Join:

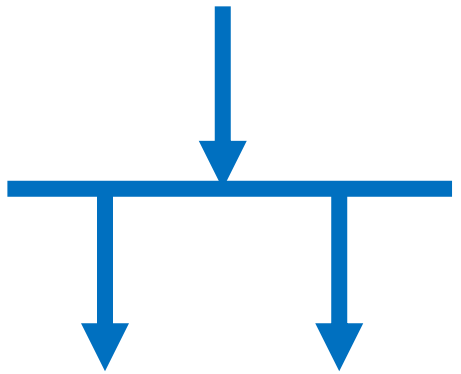
- Synchronization bars used to show joins in the workflow.
- ie. What activities must complete before processing may continue.
- All actions coming into the join must be completed before processing continues.



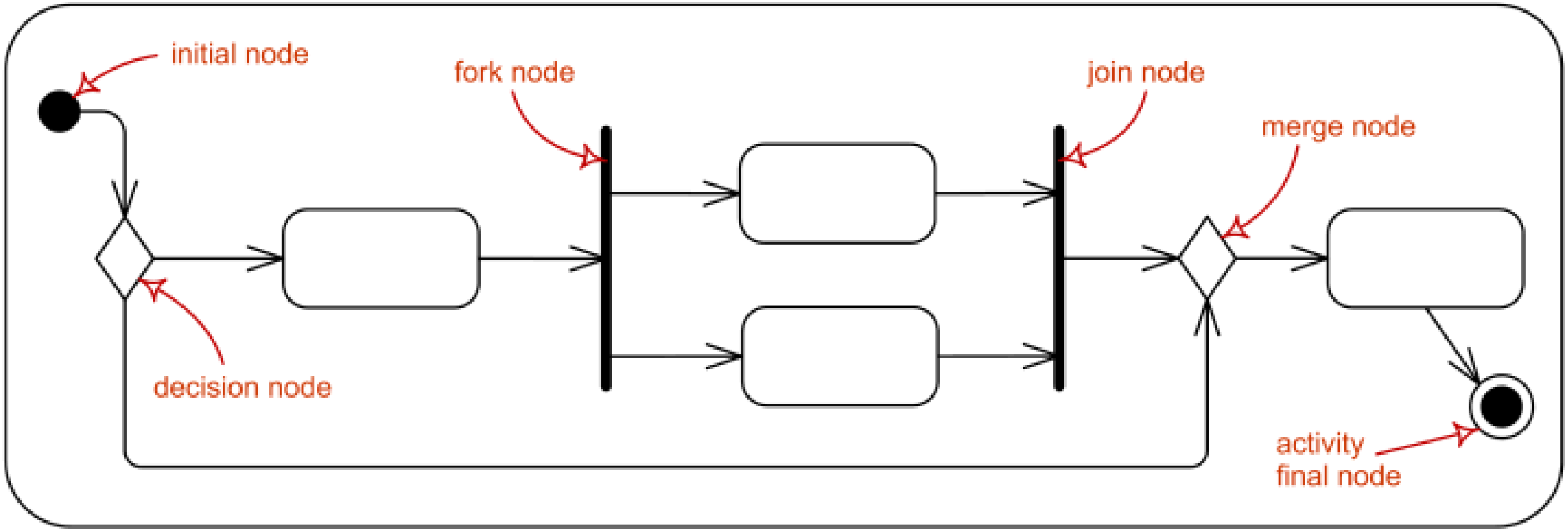
Activity Diagram

Fork:

- Synchronization bars can also be used to show forks in the workflow.
- Actions on parallel flows beneath the folk can occur in any order or concurrently.



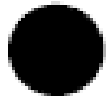
Activity control nodes overview



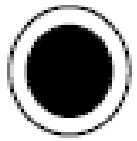
Activity Diagram

Initial and Final Activities:

- There are special symbols that are used to show the starting and final activities in a workflow.
- Starting activities are shown using a solid filled circle.



- The final activities are shown using a bull's eye.



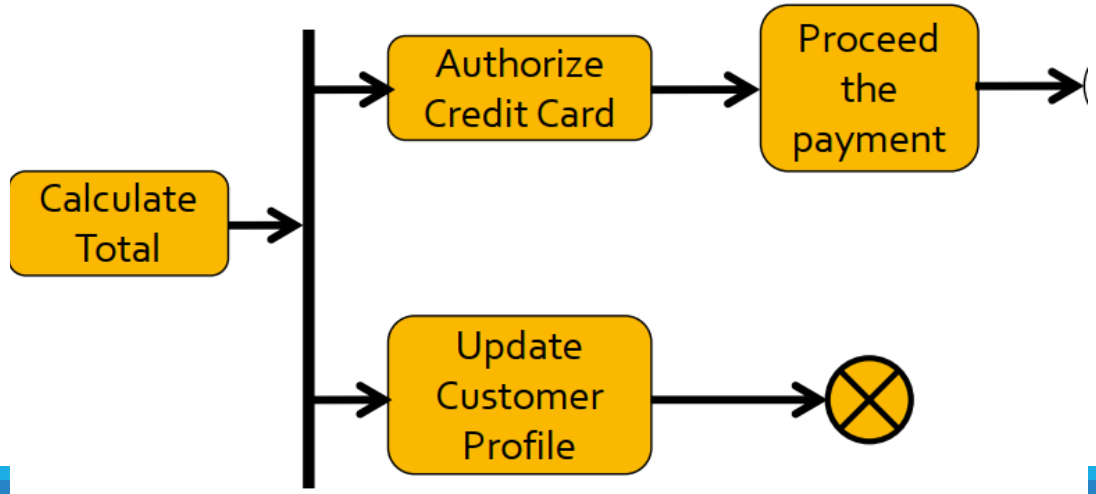
Activity Diagram

- Typically, there is one starting activity for the workflow and
- There may be more than one ending activity (one for each alternate flow in the workflow)

Activity Diagram

End of a Flow: 

- When it is required to show a particular path of a flow ends without ending the whole activity.
  - A ‘flow final node’ terminates its own path, not the whole activity



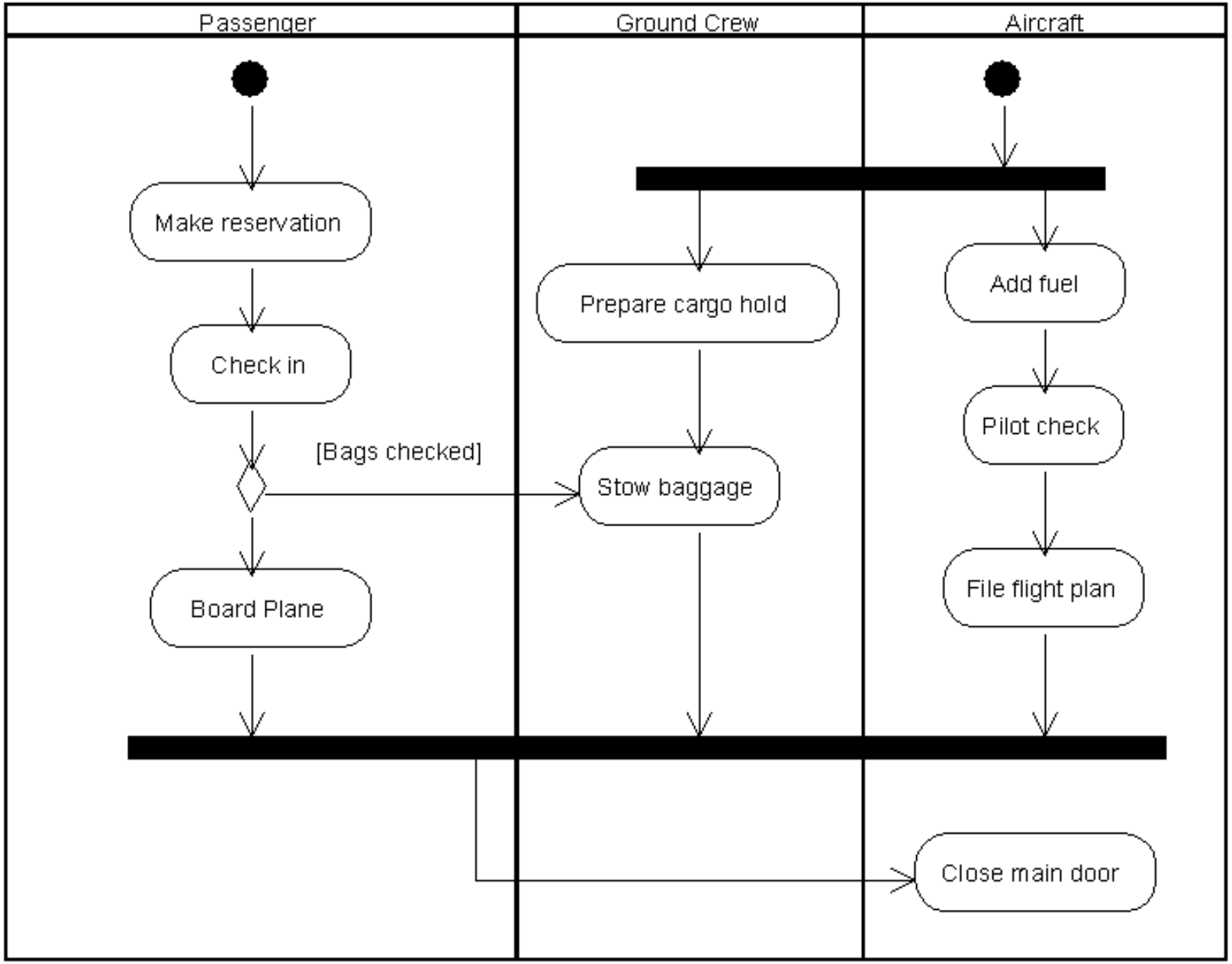
Activity Diagram

Swimlane:

- Swimlane may be used to partition an activity diagram.
- This facility allows activity diagrams to expand and show who has the responsibility for each activity in a process.

Activity Diagram

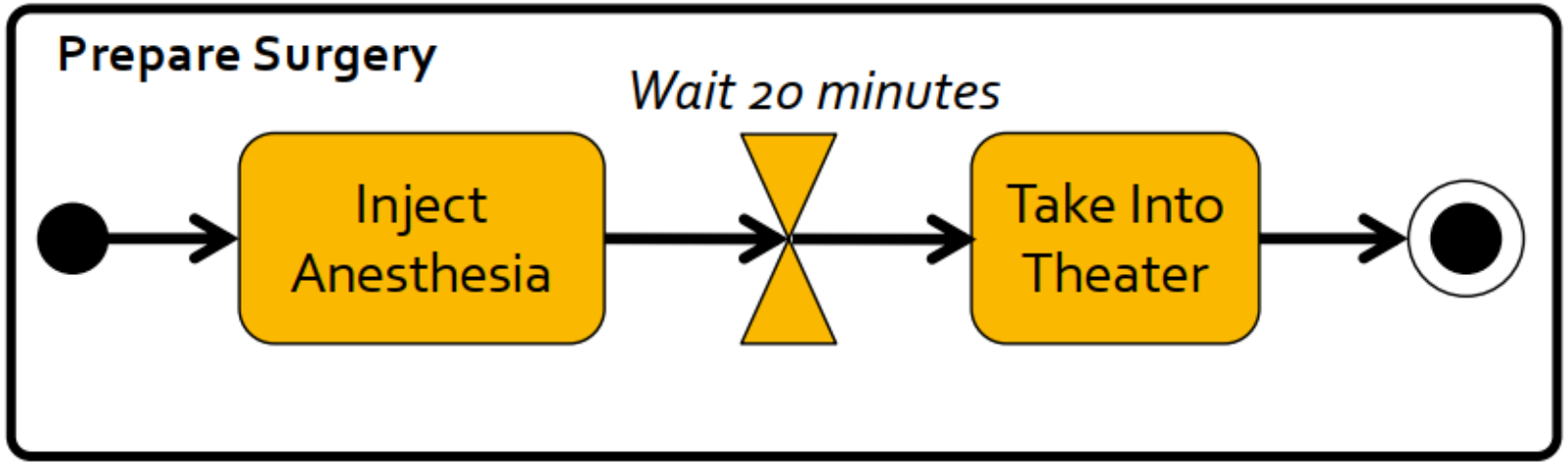
Swimlane: Example



New in UML 2.0

Passage of time:

- Time events can be used when a process needs to follow a time period dependent actions.
  - Wait time period
  - Periodical activation

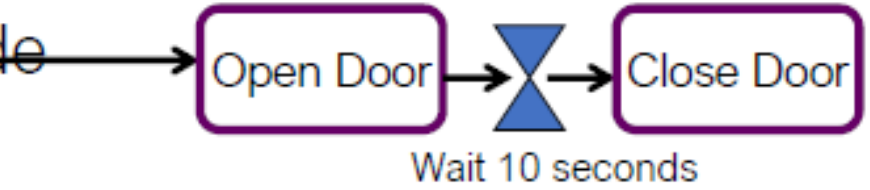


New in UML 2.0

Passage of time: Eg. Accept time event

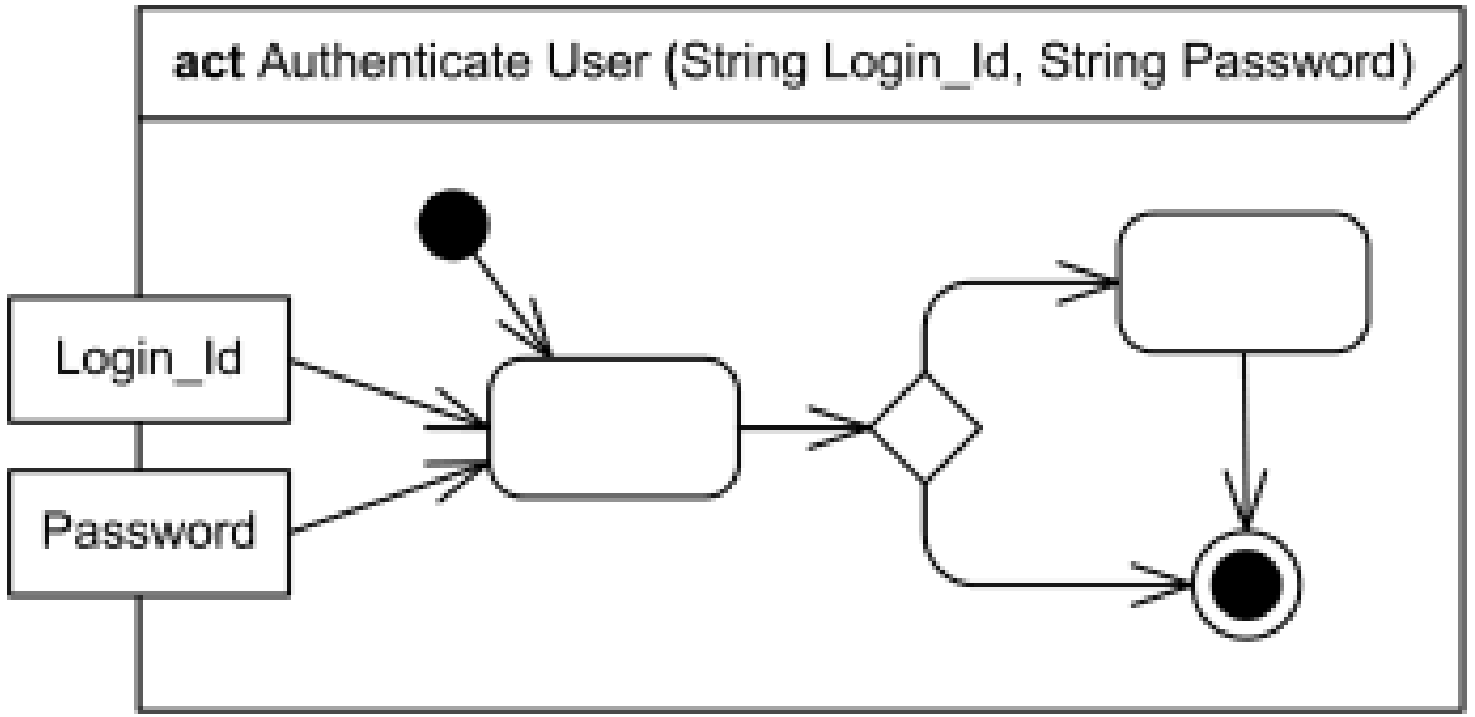
3-6 Min

Eg. Action Node



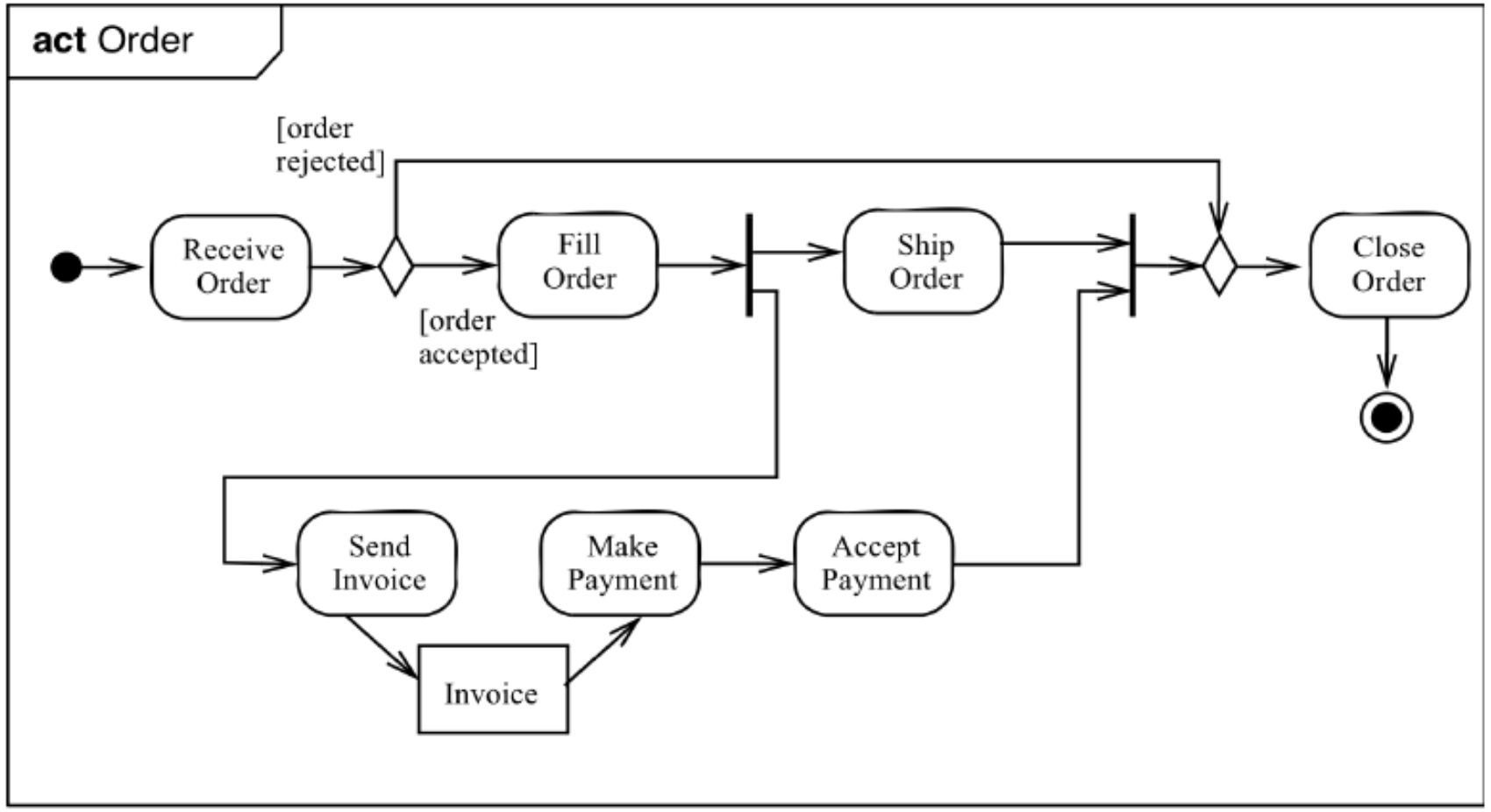
End of business year occurred

New in UML 2.4

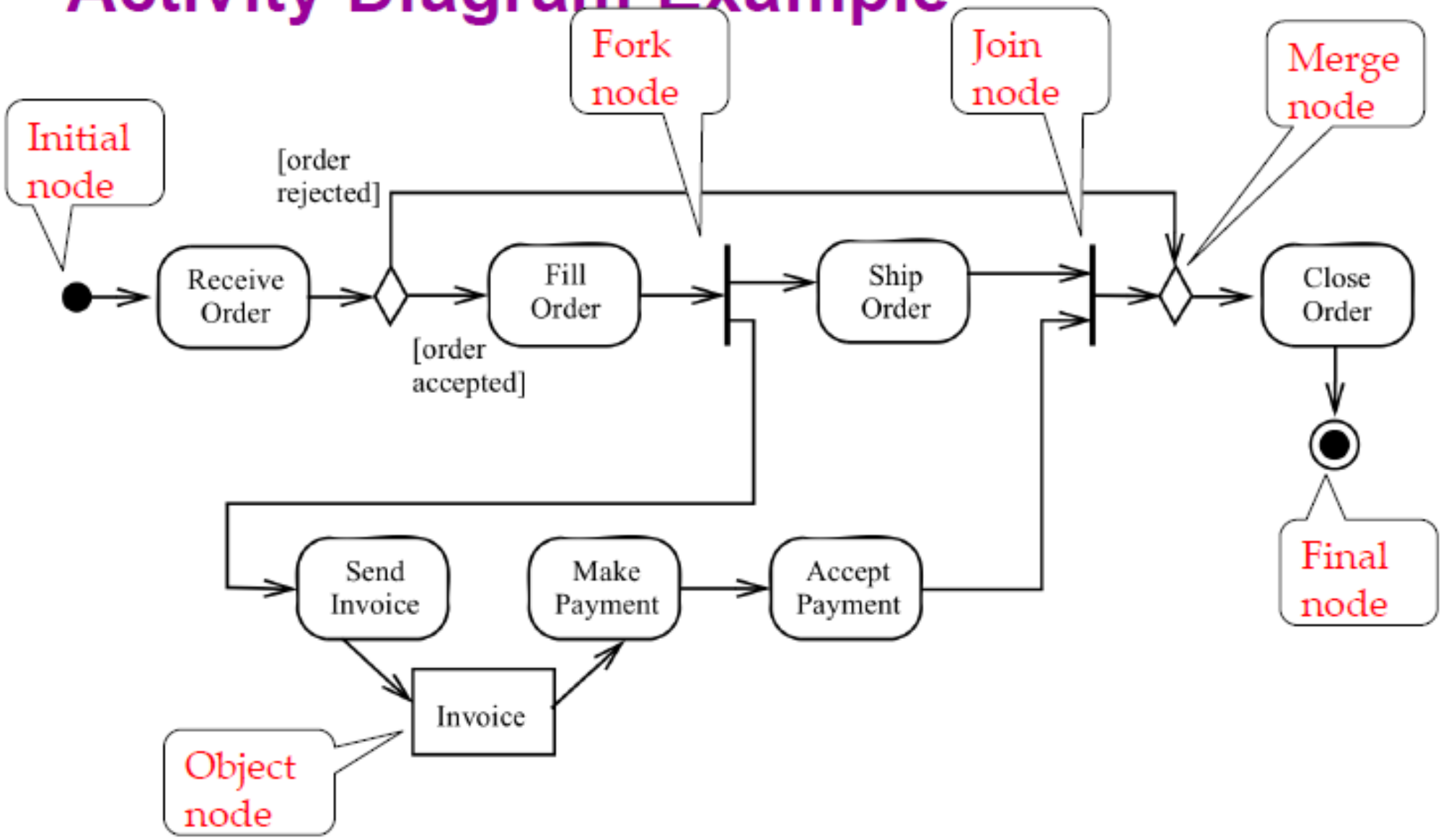


Authenticate User activity frame with two parameters -Login Id and Password.

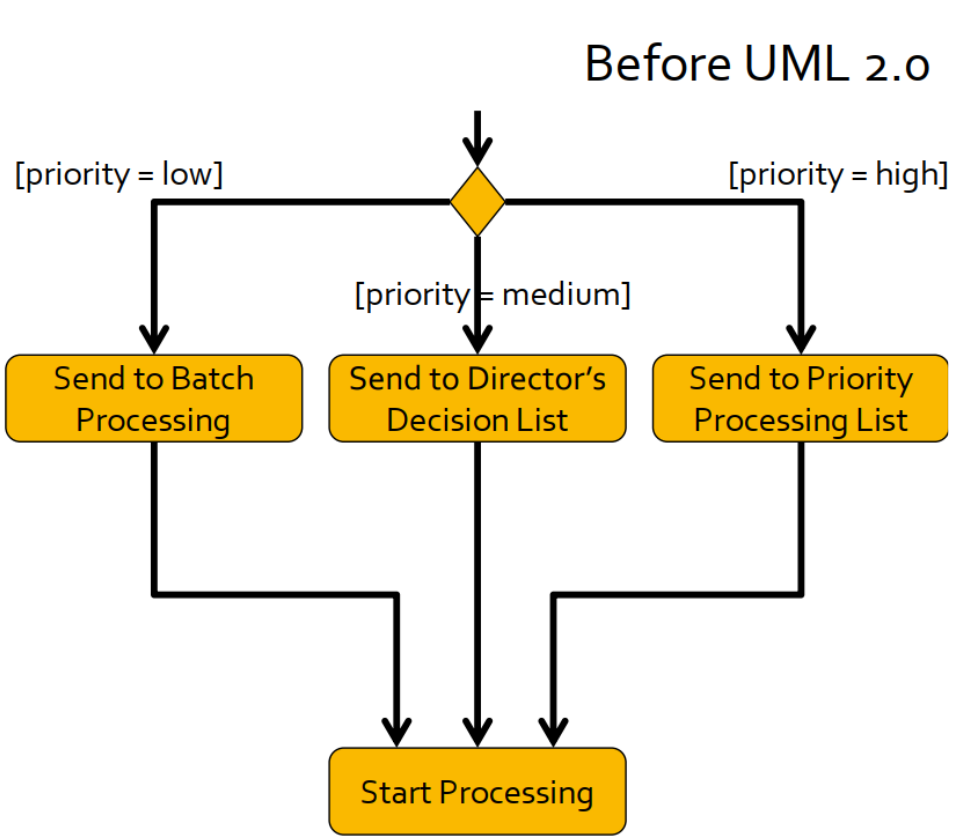
Example of an Activity Diagram with a frame

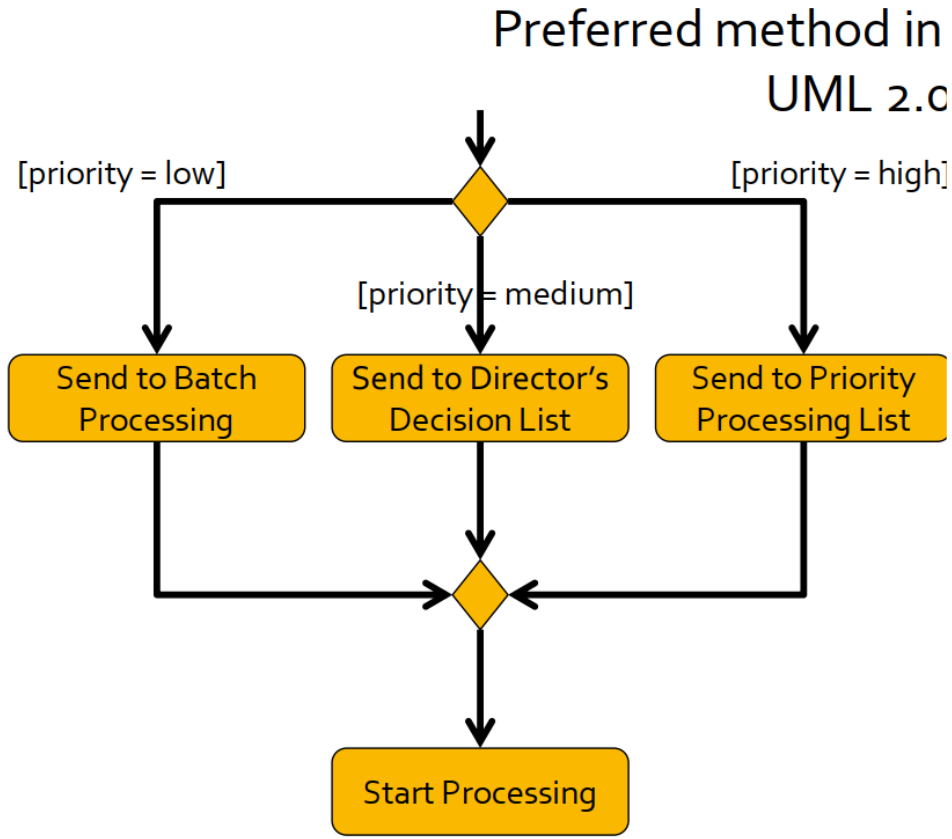


Activity Diagram Example



Decision and Merge





Exercise 1

A computer assembly workflow that involves the following steps

1. Prepare the case
2. Prepare the motherboard
3. Install the motherboard
4. Install the drives
5. Install a special VGA card if the computer is for the modeling lab

Exercise 2

The purchasing department handles purchase requests from other departments in the company.

People in the company who initiate the original purchase request are the "customers" of the purchasing department.

A case worker within the purchasing department receives that request and monitors it until it is ordered and received.

Case workers process the requests for purchasing products under $1,500, write a purchase order, and then send it to the approved vendor.

Purchase requests over $1,500 must first be sent out for a bid from the vendor that supplies the product.

When the bids return, the case worker selects one bid.

Then, the case worker writes a purchase order and sends it to the approved vendor.

Exercise 3

- An applicant wants to enroll in the university.
- The applicant hands a filled-out University Application Form to the registrar.
- The registrar inspects the forms.
- The registrar determines that the forms have been filled out properly.
- 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 the initial

Exercise 4: Purchase Ticket use case for a Ticket vending machine.

Summary : Activity is started by Commuter actor who needs to buy a ticket. Ticket vending machine will request trip information from Commuter. Based on the info machine will calculate payment due and request payment options. After payment is complete, ticket is dispensed to the Commuter.

Exercise 5: Business flow activity to process purchase order.

Summary : Requested order is input parameter of the activity. After order is accepted and all required information is filled in, payment is accepted, and order is shipped. Note, that this business flow allows order shipment before invoice is sent or payment is confirmed.

Thank You