A/L ICT

Activity Diagrams

Analytical Tools

Lecturer - Teran Subasinghe
AURORA COMPUTER STUDIES

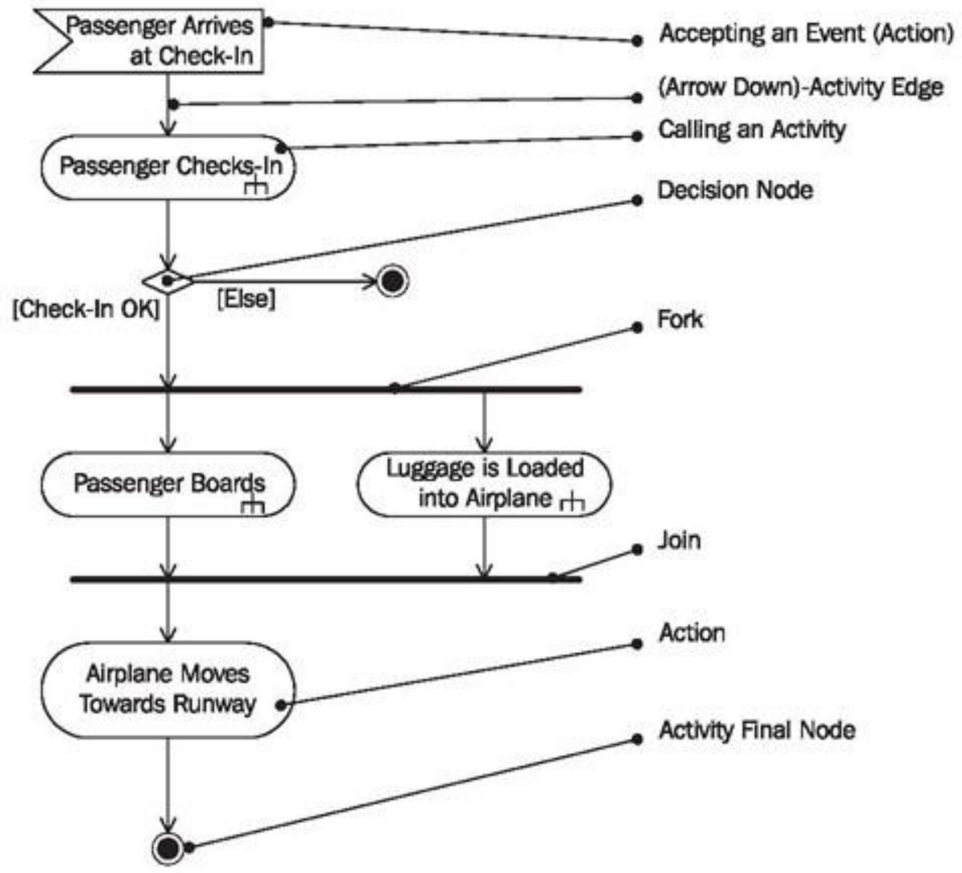
ACTIVITY DIAGRAMS

Activity diagrams, which are related to program flow plans (flowcharts), are used to illustrate activities. In the external view, we use activity diagrams for the description of those business processes that describe the functionality of the business system.

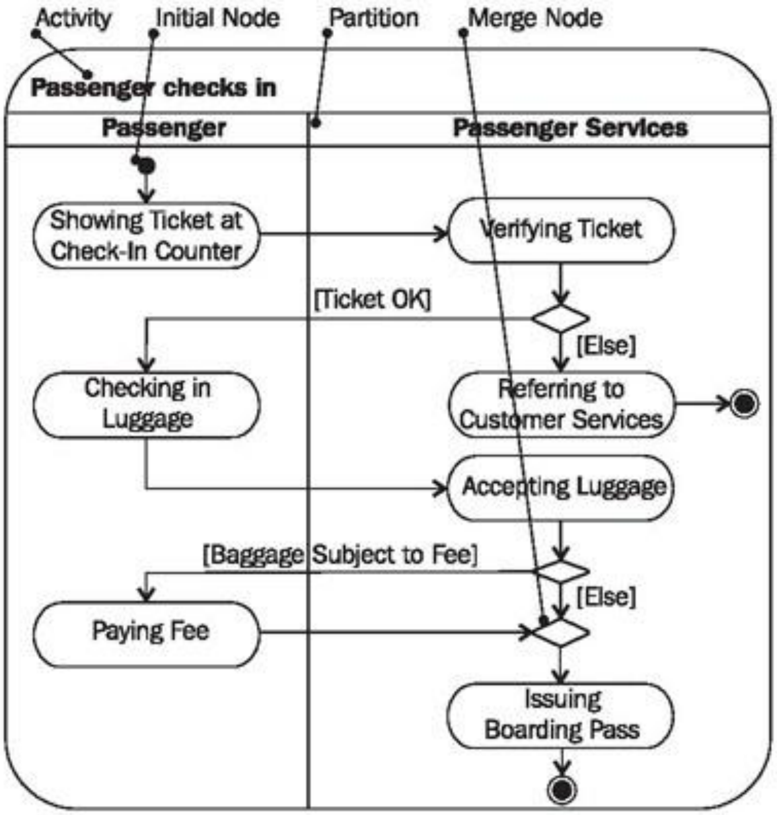
Contrary to use case diagrams, in activity diagrams it is obvious whether actors can perform business use cases together or independently from one another.

The following illustrates a basic activity diagram:

Activity diagram “Passenger Services” with a low level of detail (“High Level”)

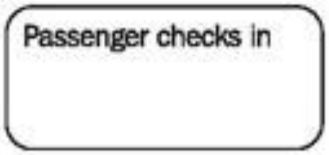

Passenger Arrives at Check-In
Accepting an Event (Action)
(Arrow Down)-Activity Edge
Calling an Activity
Passenger Checks-In
Decision Node
[Check-In OK]
[Else]
Fork
Passenger Boards
Luggage is Loaded into Airplane
Join
Action
Airplane Moves Towards Runway
Activity Final Node

Activity diagram of the activity “Passenger checks in”



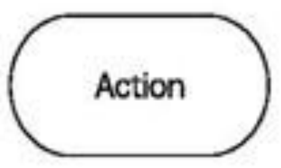
Activity

An activity diagram illustrates one individual activity. In our context, an activity represents a business process. Fundamental elements of the activity are actions and control elements (decision, division, merge, initiation, end, etc.):



ACTION

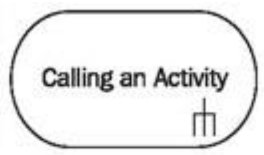
An action is an individual step within an activity, for example, a calculation step that is not deconstructed any further. That does not necessarily mean that the action cannot be subdivided in the real world, but in this diagram will not be refined any further:



The action can possess input and output information. The output of one action can be the input of a subsequent action within an activity. Specific actions are calling other actions, receiving an event, and sending signals.

CALLING AN ACTIVITY (ACTION)

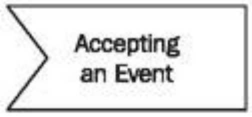
With this symbol an activity can be called from within another activity. Calling, in itself, is an action; the outcome of the call is another activity:



In this way, activities can be nested within each other and can be represented with different levels of detail.

ACCEPTING AN EVENT (ACTION)

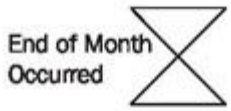
This action waits for an event to occur. After the event is accepted, the flow that comes from this action (and is defined in the activity diagram) is executed. Accepting events is an important element for business processes in activity diagrams:



Many business processes are initiated by events, for example, processing an order by the receipt of an order, or delivery by the receipt of a payment.

Accepting a Time Event (Action)

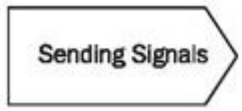
At a definite point in time, this action starts a flow in the activity diagram. An hourglass symbol can be used to represent the acceptance of a time event:



A typical example of a time event is triggering reminders after the deadline for payment has passed.

Sending Signals (Action)

Sending a signal means that a signal is being sent to an accepting activity:



The accepting activity accepts the signal with the action “accepting an event” and can react accordingly, meaning according to the flow that originates from this node in the activity diagram.

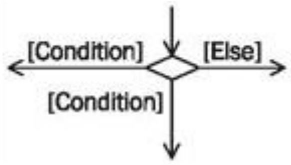
Edge (Control Flow)

Edges, represented by arrows, connect the individual components of activity diagrams and illustrate the control flow of the activity:

Within the control flow an incoming arrow starts a single step of an activity; after the step is completed the flow continues along the outgoing arrow. A name can be attached to an edge (close to the arrow).

Decision Node

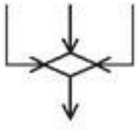
The diamond below represents a conditional branch point or decision node. A decision node has one input and two or more outputs:



Each output has a condition attached to it, which is written in brackets. If a condition is met, the flow proceeds along the appropriate output. An 'else' output can be defined along which the flow can proceed if no other condition is met.

Merge Node

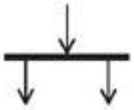
The diamond below has several inputs and only one output:



Its purpose is the merging of flows. The inputs are not synchronized; if a flow reaches such a node it proceeds at the output without waiting for the arrival of other flows.

Fork

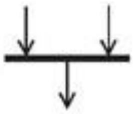
For the branching of flows in two or more parallel flows we use a synchronization bar, which is depicted as a thick horizontal or vertical line:



Branching allows parallel flows within activities. A fork has one input and two or more outputs.

Join

For the consolidation of two or more parallel flows we also use a synchronization bar, which is depicted as a thick horizontal or vertical line:



During consolidation synchronization takes place, meaning the flow proceeds only after all incoming flows have reached the consolidation point. Join has two or more inputs and one output.

Initial Node

The initial node is the starting point of an activity. An activity can have more than one initial node; in this case several flows start at the beginning of an activity:

It is also possible that an activity has no initial node, but is initiated by an event (action: accepting an event).

Activity Final Node

The activity final node indicates that an activity is completed. An activity diagram can have more than one exit in the form of activity final nodes:

If several parallel flows are present within an activity, all flows are stopped at the time the activity final node is reached.

Flow Final Node

A flow final node terminates a flow. Unlike the activity final node, which ends an entire activity, reaching a flow final node has no effect on other parallel flows that are being processed within the activity at the same point in time:

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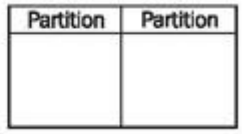
In this way, parallel flows can be terminated individually and selectively.

Activity Partition

The individual elements of an activity diagram can be divided into individual areas or ‘partitions’. Various criteria can lead to the creation of these partitions: organization entities, cost centers, locations, etc:



Individual steps of an activity will be assigned to these partitions. Each partition is set apart from its neighboring partition by a horizontal or vertical continuous line; from this stems the term *swim lanes*. Each partition receives a name. Partitions can be arranged in a two-dimensional manner; in this case the activity diagram is divided into individual cells like a grid.