UML Activity Diagrams

Activity

- Process Sale
  - PurchasedItem : Item

  - BILL Customer
  - Ship Item
Activity with PseudoCode

```
Process Sale
PurchasedItem : Item

Foreach Item
Subtotal = subtotal + item cost
Subtotal += subtotal * taxRate
End foreach
finalInvoice = subtotal.
```

Activity diagram with initial and final nodes
Activity with pre and post conditions

Activity: with object flow

can also label transitions with transformational flow
Activity: with transformation flow

Process Course Registration

Course Registration

«transformation»
CourseRegistration.student

Verify Account Status
Student

The transformation behavior extracts the student information from the course registration, since Verify Account Status requires a student account as input.

Activity: with connectors

perform automobile checkup

Record Odometer Reading

Check Oil Level

Check Air Pressure

The name of a connector has no notational meaning; the names are only to link the first half with the second half.
Token weight

The inputs and outputs of an action are represented as tokens. Each edge may have a weight associated with it that indicates how many tokens must be available before the tokens are presented to the target action. You show a weight by placing the keyword `weight` in curly brackets `{}` equal to the desired number of tokens.

Activity diagram with incoming and outgoing parameters
Object nodes in an activity diagram

The name of the node is typically the type of data the node represents.

Above is an activity diagram showing a factory producing parts for shipping.

Actions with input and output pins

UML defines a special notation for object nodes, called pins, to provide a shorthand notation for input to or output from an action. For example, because the action the previous slide requires a Part, you can define an input pin on Ship Parts labeled Part. You show a pin using the same rectangle as for object nodes, except the rectangle is small and attached to the side of its action.
Activity diagram with an exception pin

If the output from an action is related to an exception (error condition), you indicate that the pin is an exception pin by inserting a small arrow near the pin.

Action with input and output pins

If you don't have edges leading into or out of an action, you can show whether a pin is an input pin or an output pin by placing small arrows inside the pin rectangle. The arrow should point toward the action if you are showing an input pin and away from the action if you are showing an output pin.
Action with a value pin

If an action takes a constant value as input, you can model the input data using a value pin. A value pin is shown as a normal input pin, except the value of the object is written near the rectangle.

Activity diagram with a decision node
You show decision input behavior in a note labeled with the keyword «decisionInput». Above shows an activity diagram that checks to see if a newly authenticated user is the 100th user and should therefore be prompted to take a survey.

A merge node is effectively the opposite of a decision node; it brings together alternate flows into a single output flow. It doesn't synchronize multiple concurrent flows.
Example activity diagram with a fork node

A fork node splits the current flow through an activity into multiple concurrent flows. It has one incoming edge and several outgoing edges. When data arrives at a fork node, it is duplicated for each outgoing edge. All these actions execute concurrently and terminate independently.

Example activity diagram with a join node

Each branch of the activity diagram executes concurrently until they hit the join node. The activity waits until all branches have hit the join node, and then the “Serve Meal” action will execute.
Join node with a join specification

Activity Partitions
Activity diagram divided into partitions

This is frequently used when performing business modeling using activity diagrams.

Activity diagram with partitions representing classes and instances

To indicate that a partition represents a class, you use the keyword «class» before the type name. Though the UML doesn't explicitly state it, it is customary to show that a partition represents an instance by underlining the type name.
Activity diagram with an exception handler

You show an exception handler as a regular node with a small square on its boundary. Draw a lightning-bolt-style edge from the protected node to the small square. Finally, label the edge with the type of the exception caught by this handler.

Activity diagram with an expansion region

The use of four input pins simply represents a collection of input data; it doesn't specify how much data is actually presented to the expansion region. The region executes for each piece of data in the collection and, assuming there are no errors, offers one piece of output data from each execution.

You can use the keywords «parallel», «iterative», or «stream» to indicate if the executions of the expansion region can occur concurrently (parallel), sequentially (iterative), or continuously (stream).
Activity dialog with a streaming region

Shows a video encoder that streams the frames through the various stages of encoding as soon as they are available.

Loop Nodes

A loop node has three subregions: setup, body, and test. The test subregion may be evaluated before or after the body subregion. The setup subregion executes only once, when first entering the loop; the test and body sections execute each time through the loop until the test subregion evaluates to false.
Using activity partitions, you can express this as a single node.

An action is said to be streaming if it can produce output while it is processing input. For example, an action representing a compression algorithm can take audio input data from a streamed input and send compressed audio along a streamed output.

You indicate that an action is streaming its input and output by placing the keyword stream in braces (\{\}) near the edges coming in and out of an action.
UML provides a shorthand notation for streaming edges, and input and output pins: use a solid arrowhead or rectangle.