Activity Diagrams

Activity Diagram

- Activity diagrams describe the workflow behavior of a system.
  - Activity diagrams are used in process modeling and analysis of during requirements engineering.
  - A typical business process which synchronizes several external incoming events can be represented by activity diagrams.
- They are most useful for understanding work flow analysis of synchronous behaviors across a process.

Activity Diagram

- Activity diagrams are used for
  - documenting existing process
  - analyzing new Process Concepts
  - finding reengineering opportunities.

- The diagrams describe the state of activities by showing the sequence of activities performed.
  - they can show activities that are conditional or parallel.

Activity Diagram Concepts

- An activity is trigged by one or more events and activity may result in one or more events that may trigger other activity or processes.
- Events start from start symbol and end with finish marker having activities in between connected by events.
- The activity diagram represents the decisions, iterations and parallel/random behavior of the processing.
  - They capture actions performed.
  - They stress on work performed in operations (methods).

When to Use Activity Diagrams

- The main reason to use activity diagrams is to model the workflow behind the system being designed.
- Activity Diagrams are also useful for:
  - analyzing a use case by describing what actions need to take place and when they should occur
  - describing a complicated sequential algorithm
  - modeling applications with parallel processes
- Activity Diagrams should not take the place of interaction diagrams and state diagrams.
- Activity diagrams do not give detail about how objects behave or how objects collaborate.

Components

- An *activity* is an ongoing, though interruptible, execution of a step in a workflow (such as an operation or transaction)
  - Represented with a rounded rectangle.
  - Text in the activity box should represent an activity (verb phrase in present tense).

Components

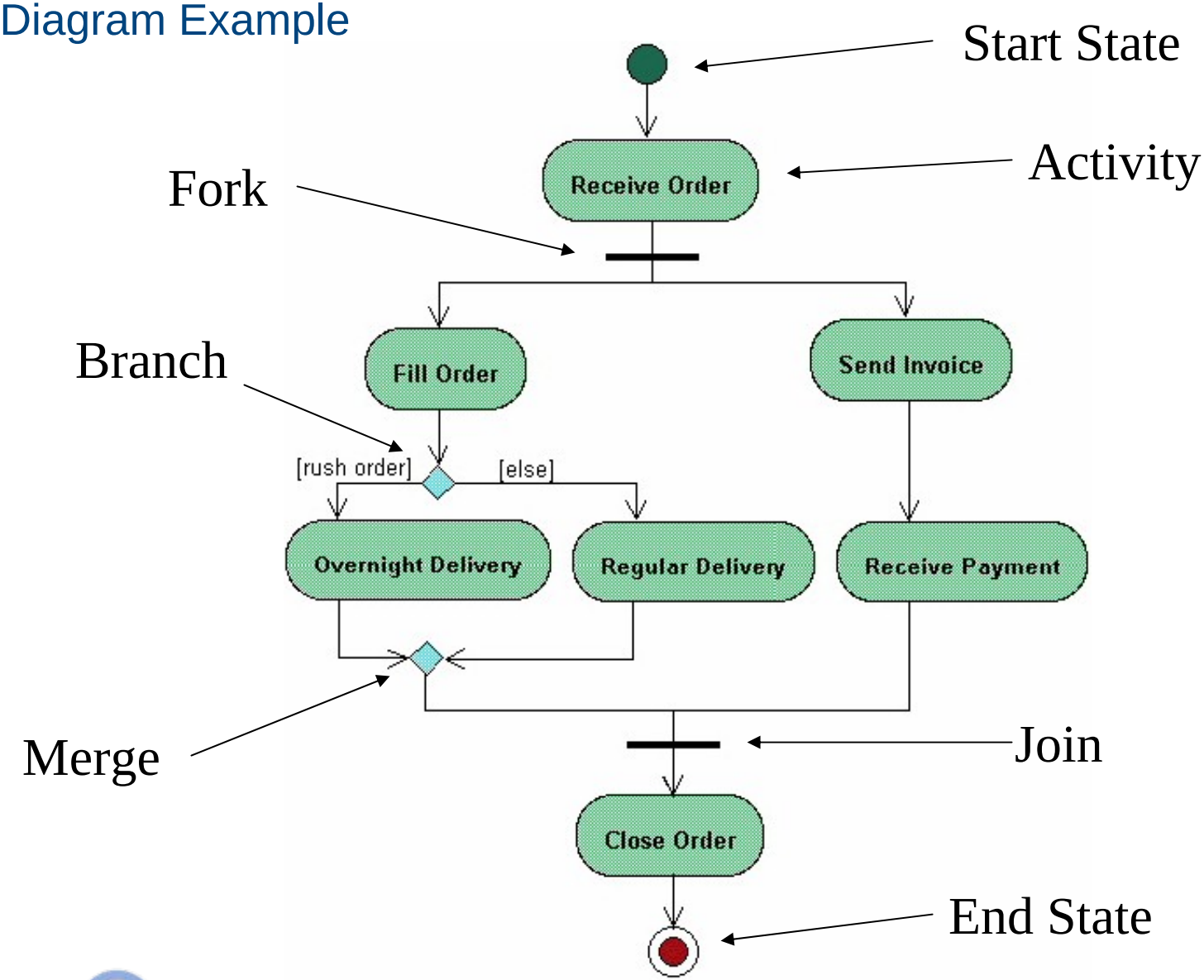
- An *event* is triggered by an activity. It specifies a significant occurrence that has a location in time and space.
  - An instance of an event (trigger) results in the flow from one activity to another.
  - These are represented by directed straight lines emerging from triggering activity and ending at activity to be triggered. Label text for events should represent event but not the data involved.

- A *decision* may be shown by labeling multiple output transitions of an activity with different guard conditions.
  - For convenience a stereotype is provided for a decision: the traditional diamond shape, with one or more incoming arrows and with two or more outgoing arrows, each labeled by a distinct guard condition with no event trigger.

How to Draw an Activity Diagram

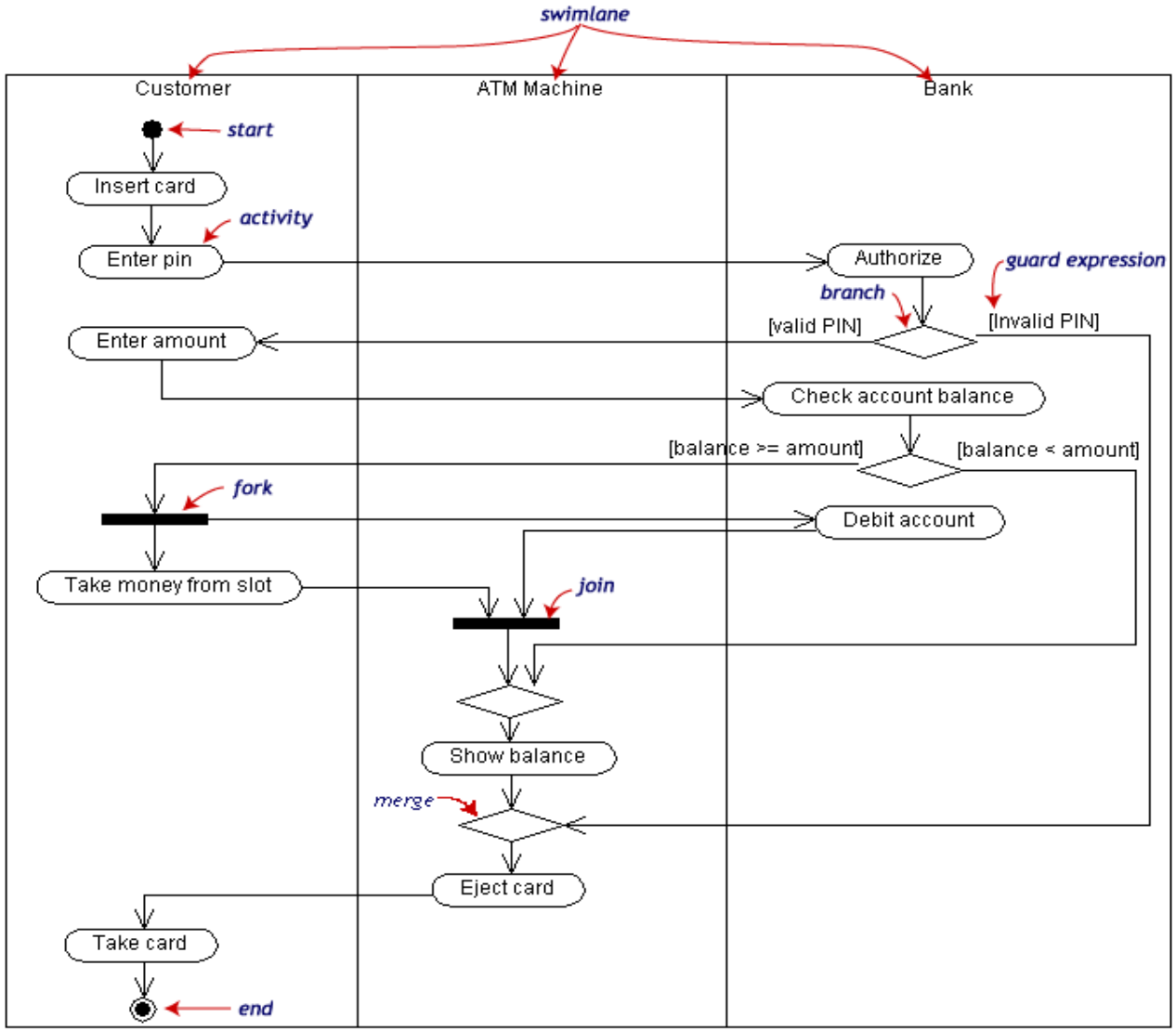
- Diagrams are read from top to bottom and have branches and forks to describe conditions and parallel activities.
  - A fork is used when multiple activities are occurring at the same time.
  - A branch describes what activities will take place based on a set of conditions.
  - All branches at some point are followed by a merge to indicate the end of the conditional behavior started by that branch.
  - After the merge all of the parallel activities must be combined by a join before transitioning into the final activity state.

Activity Diagram Example



Use Case

- Withdraw money from a bank account through an ATM


swimlane
Customer
ATM Machine
Bank
start
Insert card
activity
Enter pin
Authorize
guard expression
branch
[valid PIN]
[Invalid PIN]
Enter amount
Check account balance
[balance >= amount]
[balance < amount]
fork
Debit account
Take money from slot
join
Show balance
merge
Eject card
Take card
end

Disadvantages

- A disadvantage of activity diagrams is that they do not explicitly present which objects execute which activities, and the way that the messaging works between them.
  - Labeling of each activity with the responsible object can be done.
  - It is useful to draw an activity diagram early in the modeling of a process, to help understand the overall process.

- Then interaction diagrams can be used to help you allocate activities to classes.

References

- Activity Diagrams
- http://pigseye.kennesaw.edu/~dbraun/csis4650/A&D/UML_tutorial/activity.htm
- http://isds.bus.lsu.edu/cvoc/learn/bpr/cprojects/spring1998/modeling/activity.html
- http://www-106.ibm.com/developerworks/rational/library/2802.html
- Fast Track UML 2 (from Books 24x7)