5B Behavioural Modeling in UML Part B

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Unit Objectives and Outline

After this unit, you should be able to :

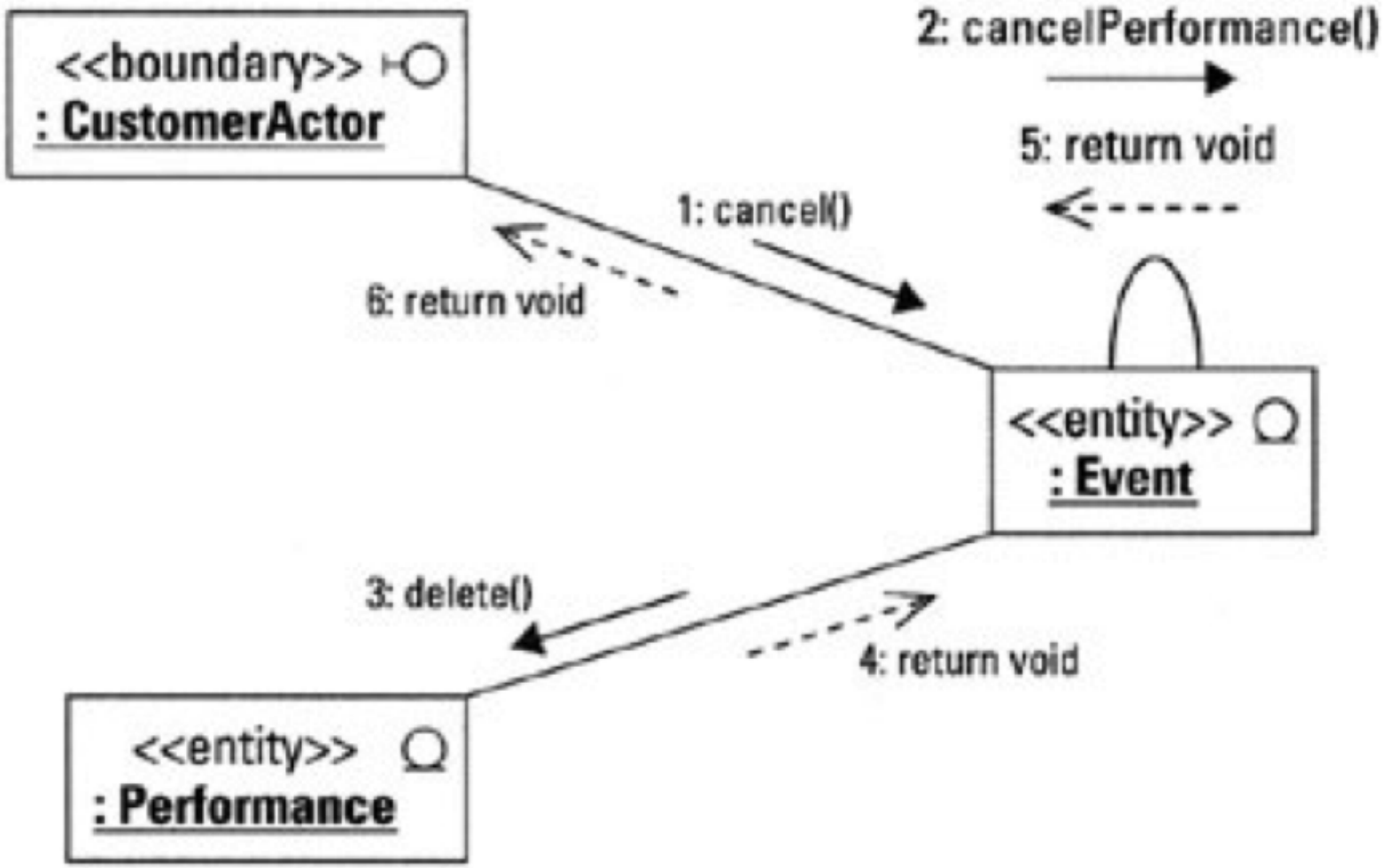
A create communication diagrams to describe interactions in use cases

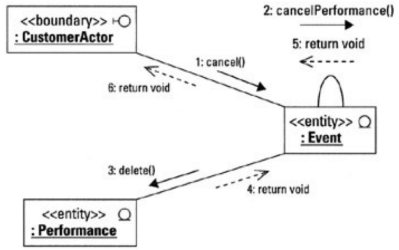
B create activity diagrams to describe business processes

C create state machine diagrams to describe lives of objects

Outline

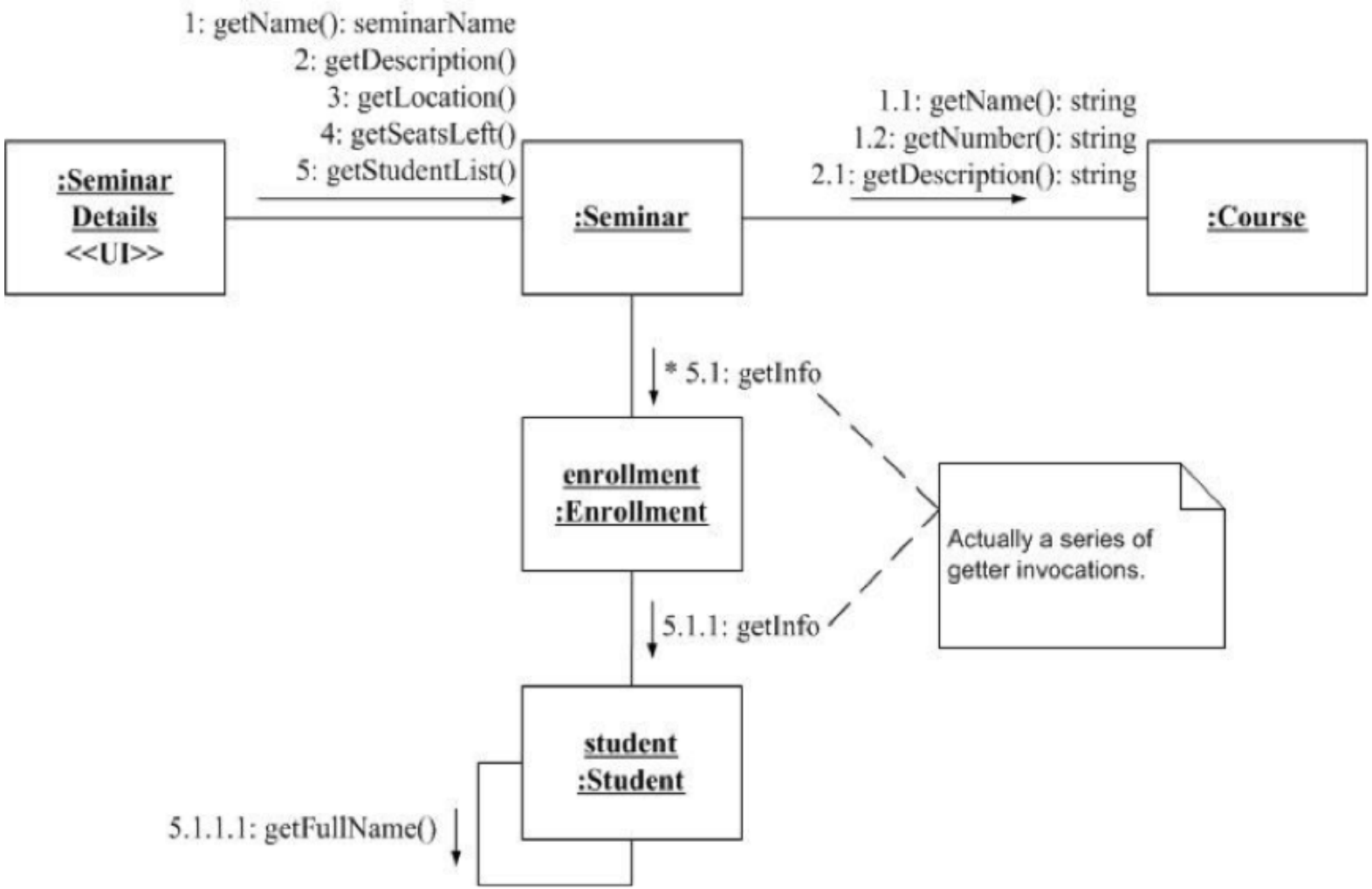
Communication Diagrams to Describe Interactions

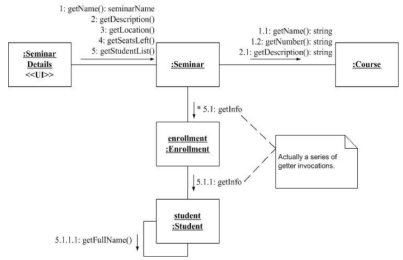




- Communication diagrams look like object and class diagrams to be taught in next chapter.
- But associations between classes are labelled with numbered messages to convey similar information expressed on sequence diagrams.
- Sequence diagrams are more popular than communication diagrams.

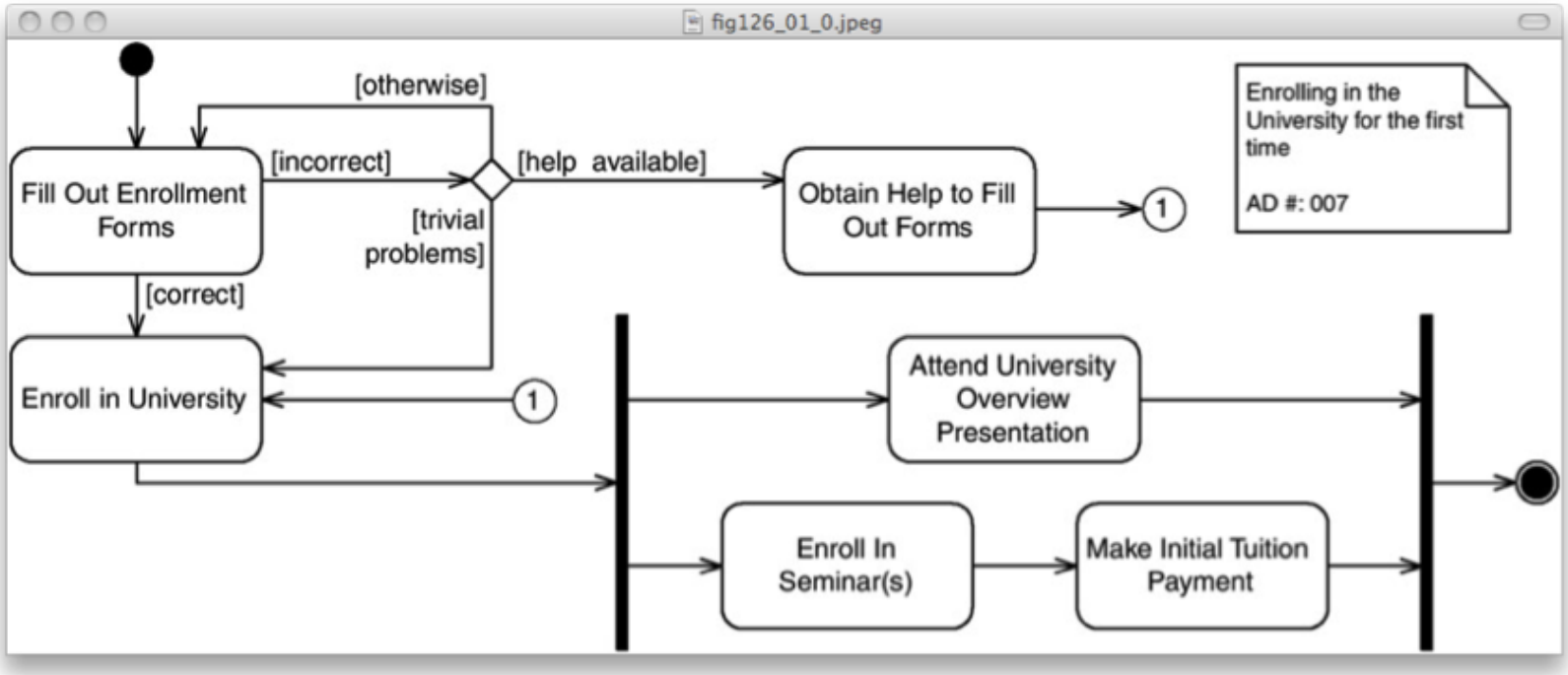
Communication DiagramsVs Sequence Diagrams





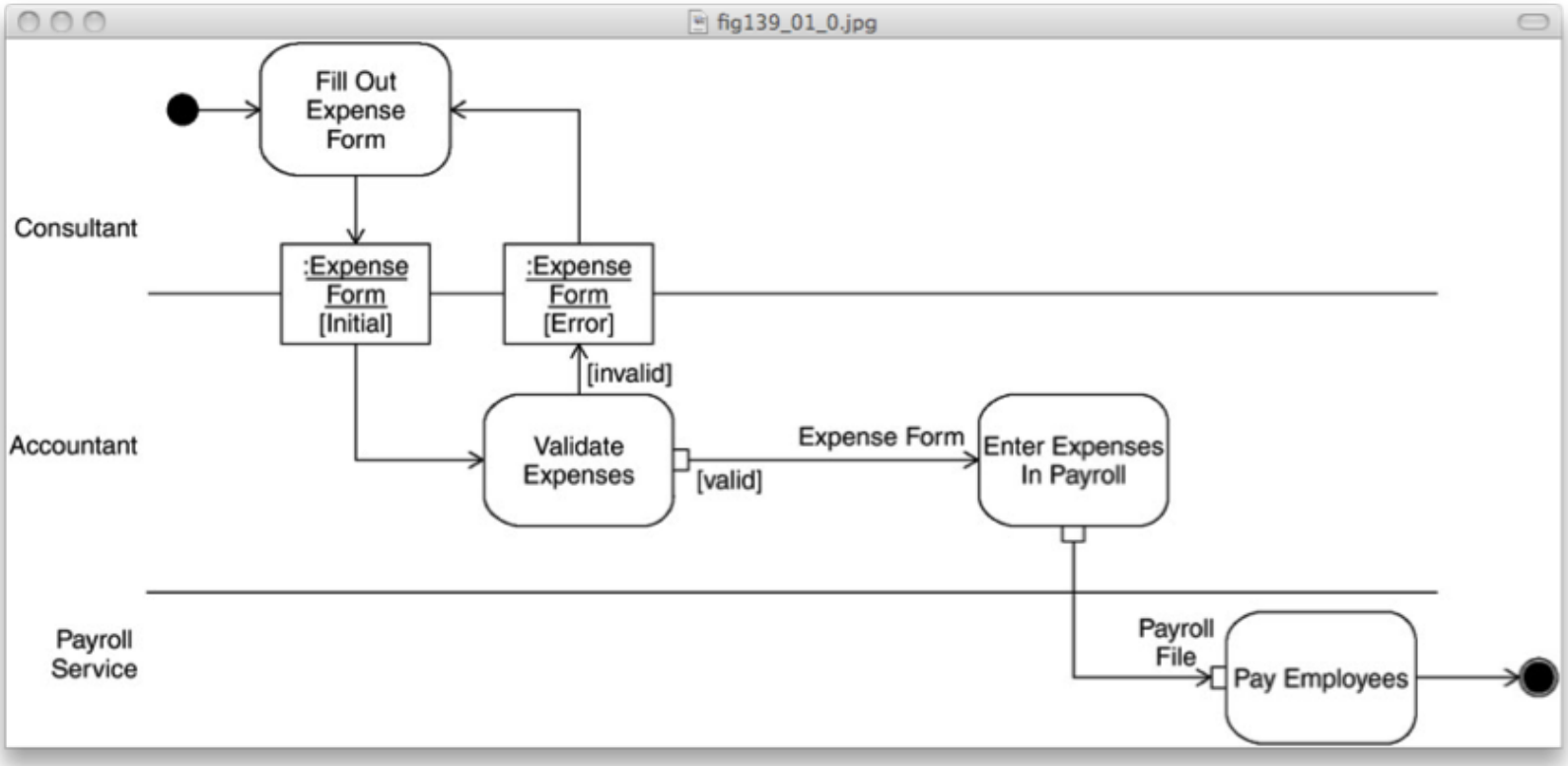
- This communication diagram with more messages than the previous communication diagram can illustrate their drawbacks.
    1. Even we can tell message order from message numbers, it is not as obvious as on sequence diagrams where order is indicated by the vertical positions of the messages.
    2. Different message types, asynchronous, synchronous and return messages, are difficult to show.
    3. Looping, Alt and Opt constructs on sequence diagrams are hard to express on communication diagrams.
- On the other hand, communication diagrams better illustrate object relationships.

Activity Diagrams Show Business Processes Clearly



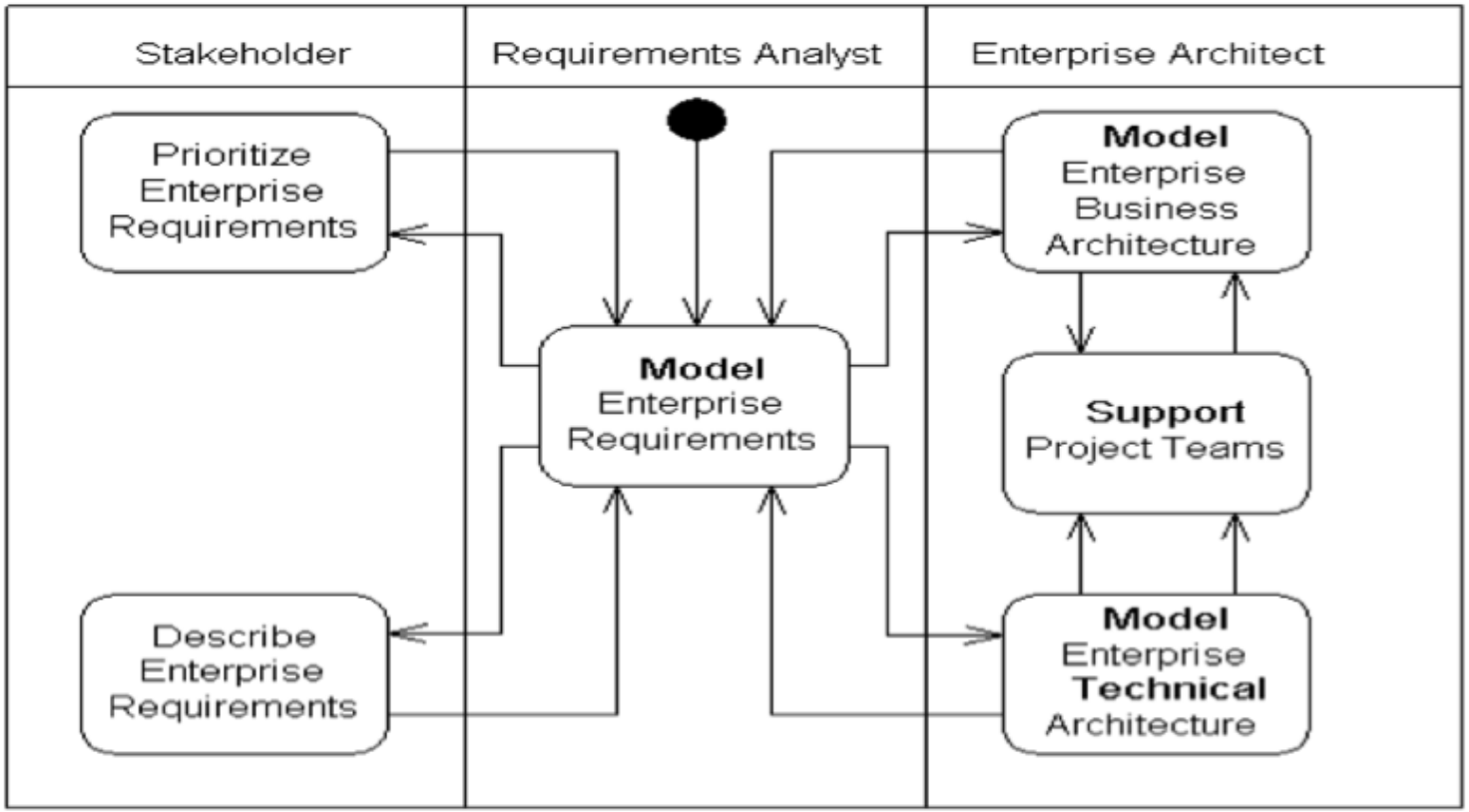
- Round-corner rectangles represent actions.
- Building blocks are start state, end state (solid circle with a hollow ring), action, flow, decision diamond, guard in square brackets, pin and synchronisation bars (fork & join)

Swimlanes, Pins and Objects



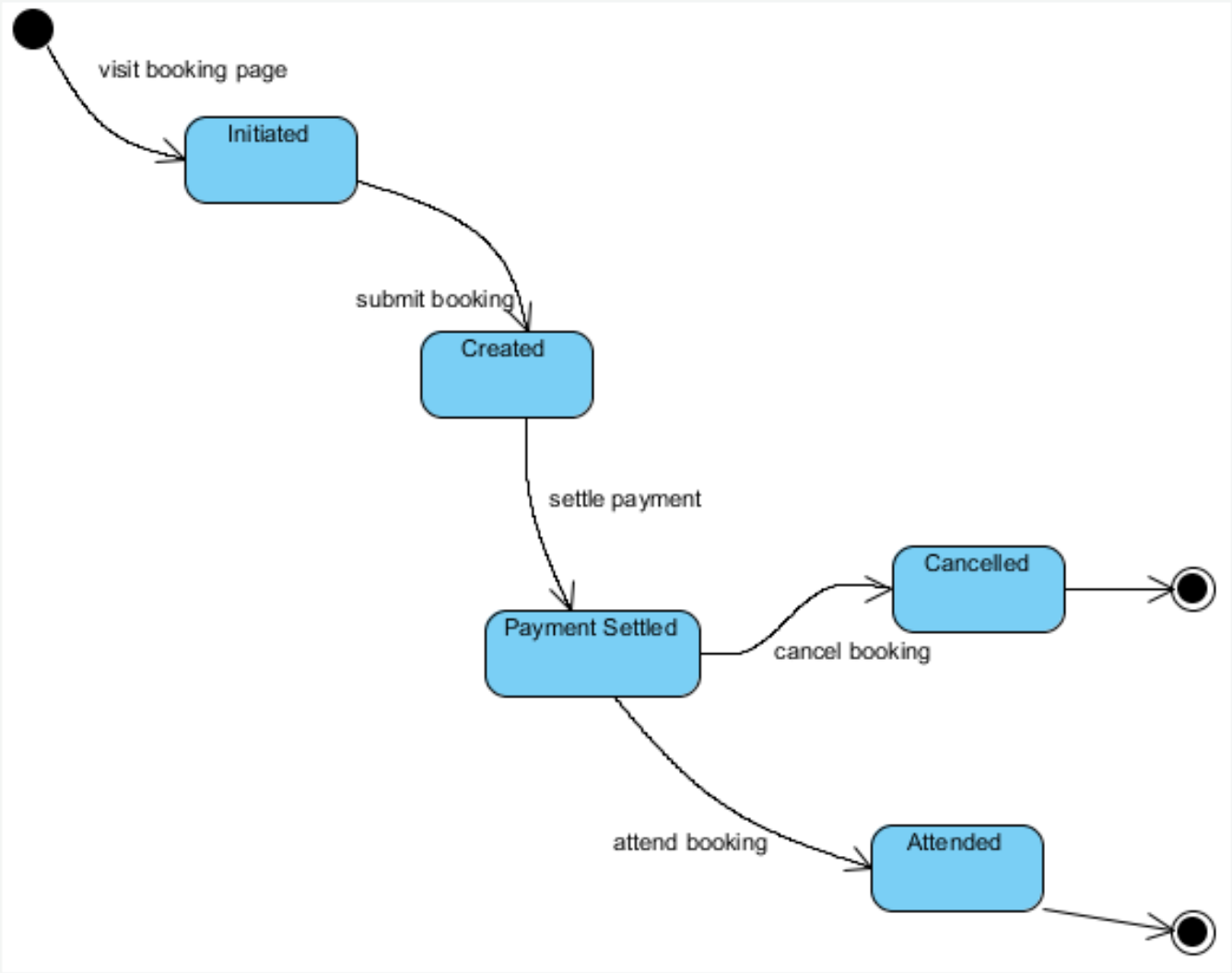
- Swimlanes represent differing roles
- Sharp-corner rectangles represent objects
- Tiny little squares attached to actions are input pins or output pins

Choosing Horizontal or Vertical Swimlanes



Some elements are optional. For example with the end state omitted, the process can run forever.

A State Machine Diagram for a Booking

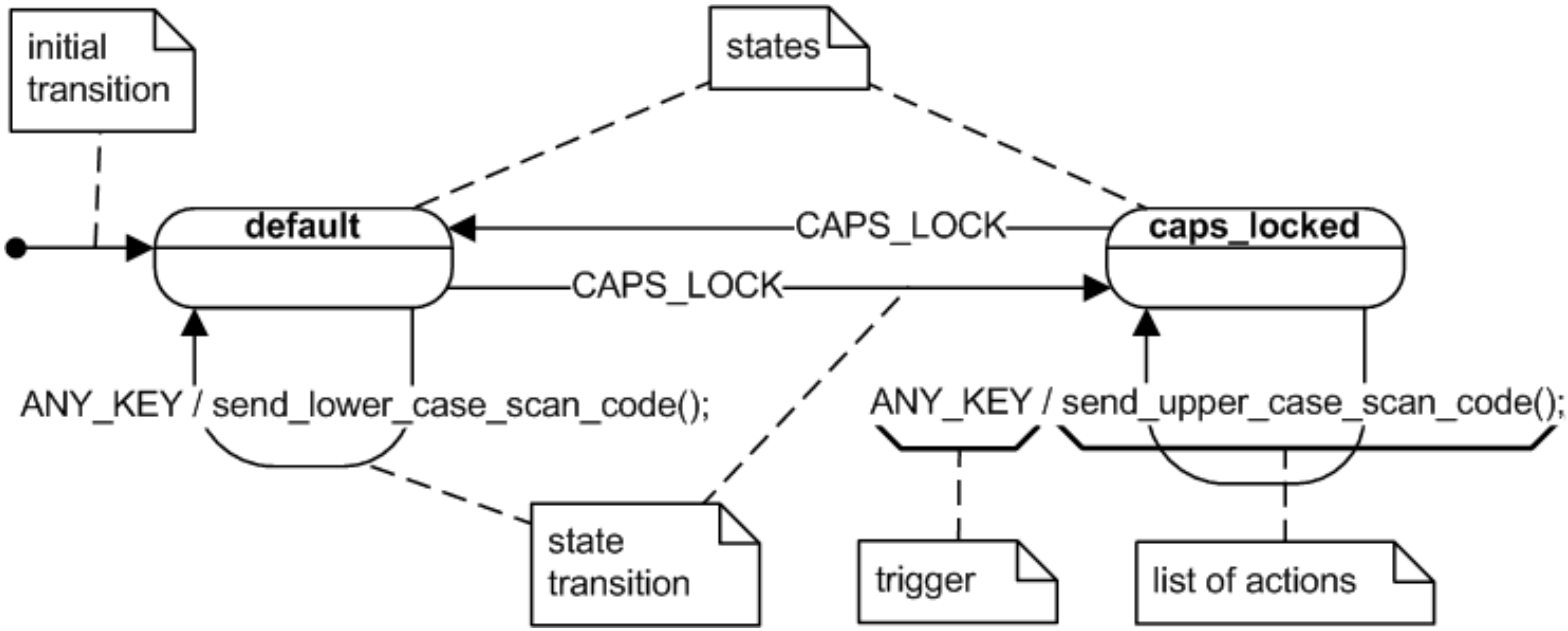


State Machine Diagrams Vs Activity Diagrams

Constructs	State Machine Diagrams	Activity Diagrams
Rounded rectangles	States	Actions
Arrows	State transitions	Control or data flow

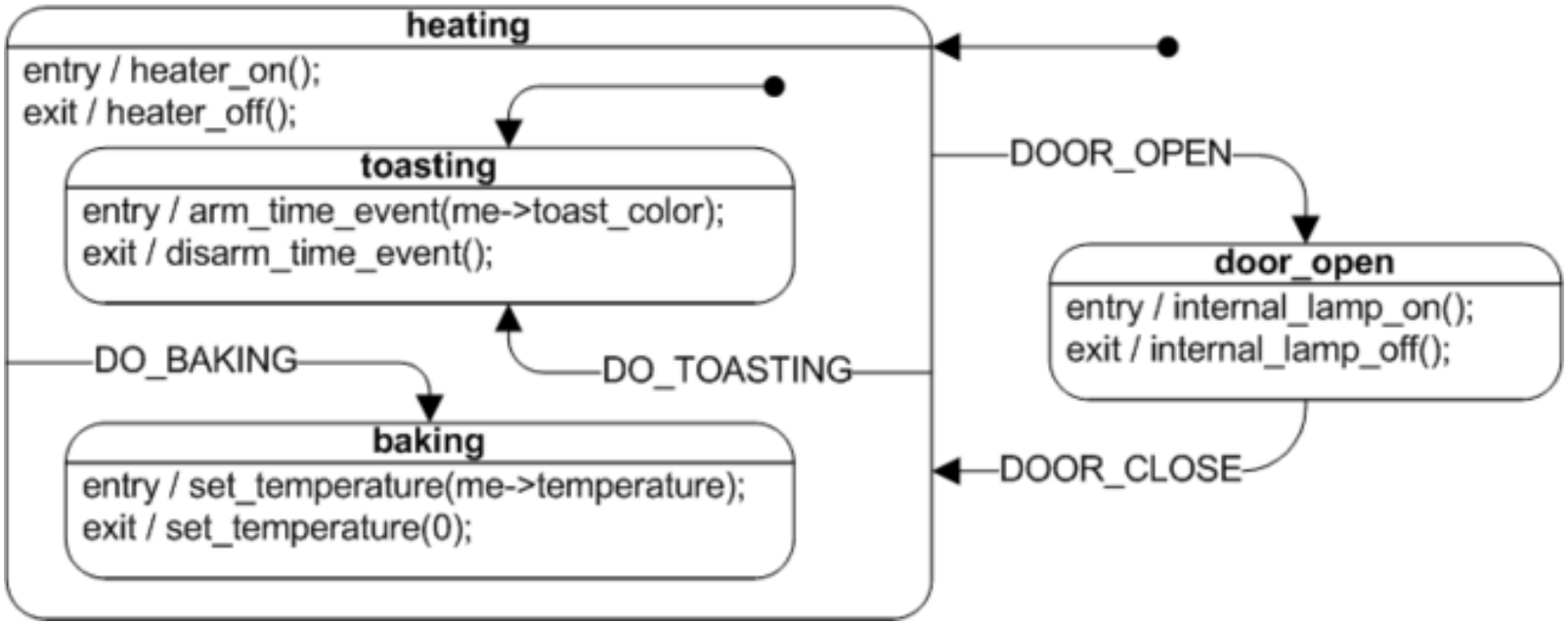
- A state machine diagram models the life of a single object potentially across multiple processes.
- An activity diagram describes a process involving multiple objects.

Effects of the Caplock Key



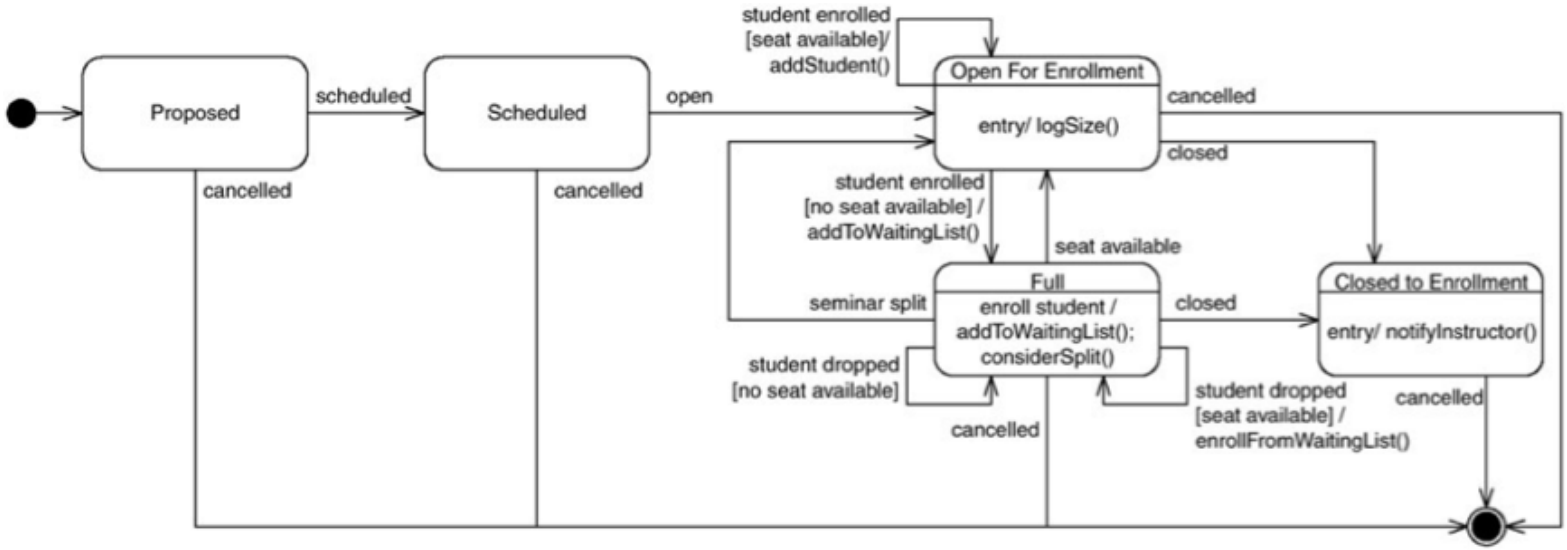
- Labels on transitions have the general format of *event*[*condition*]/*action*.

Superstates



- *heating* is a superstate because it contains substates of *toasting* and *baking*.

Life of a Seminar Course



- While in a state, an event can trigger actions without changing state. Such an arrow will point to itself. See examples regarding the *Full* state.

Summarising Behavioural UML DIagrams

- Modelling selectively describes aspects of a system.
- Many elements in UML diagrams are optional.
- UML may not be perfectly precise but many people prefer to read them over lengthy texts.
- Learning the meaning of the symbols helps you to understand UML diagrams.
- Drawing alternative design in UML diagrams can facilitate comparison.

Check `http://ouhk.seprofession.com` to see if the quizzes are ready.