

# Interaction diagram

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- Models show that how groups of objects collaborate to realize some behaviour
- Typically each interaction diagram realizes behaviour of a single use case
- For complex use cases, some times more than one interaction diagrams may be necessary to capture the behaviour.

# Interaction diagram

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- Two kinds:
  - Sequence
  - Collaboration
- Two diagrams are equivalent but portrays different perspective
- These diagram play a very important role in the design process

# Sequence diagram

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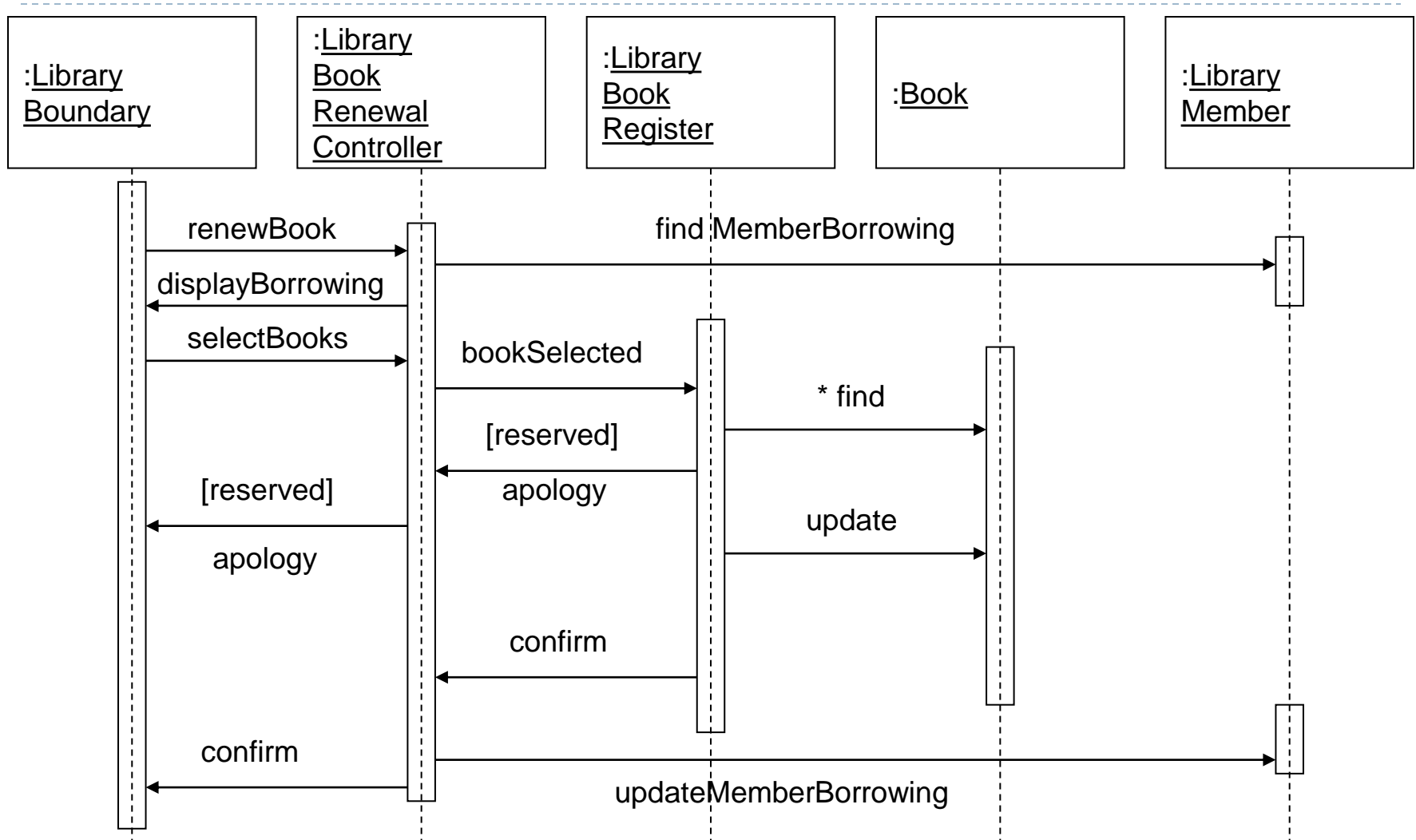
- Shows interaction among objects as two-dimensional chart
- Objects are shown as boxes at top
- If object created during execution then shown at appropriate place
- Objects existence are shown as **dashed lines (lifeline)**
- Objects activeness, shown as **rectangle on lifeline**

# Sequence diagram

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- Messages are shown as arrows
- Message labelled with message name
- Message can be labelled with control information
- Two types of control information: condition ([]) & an iteration (\*)

# Example of Sequence diagram



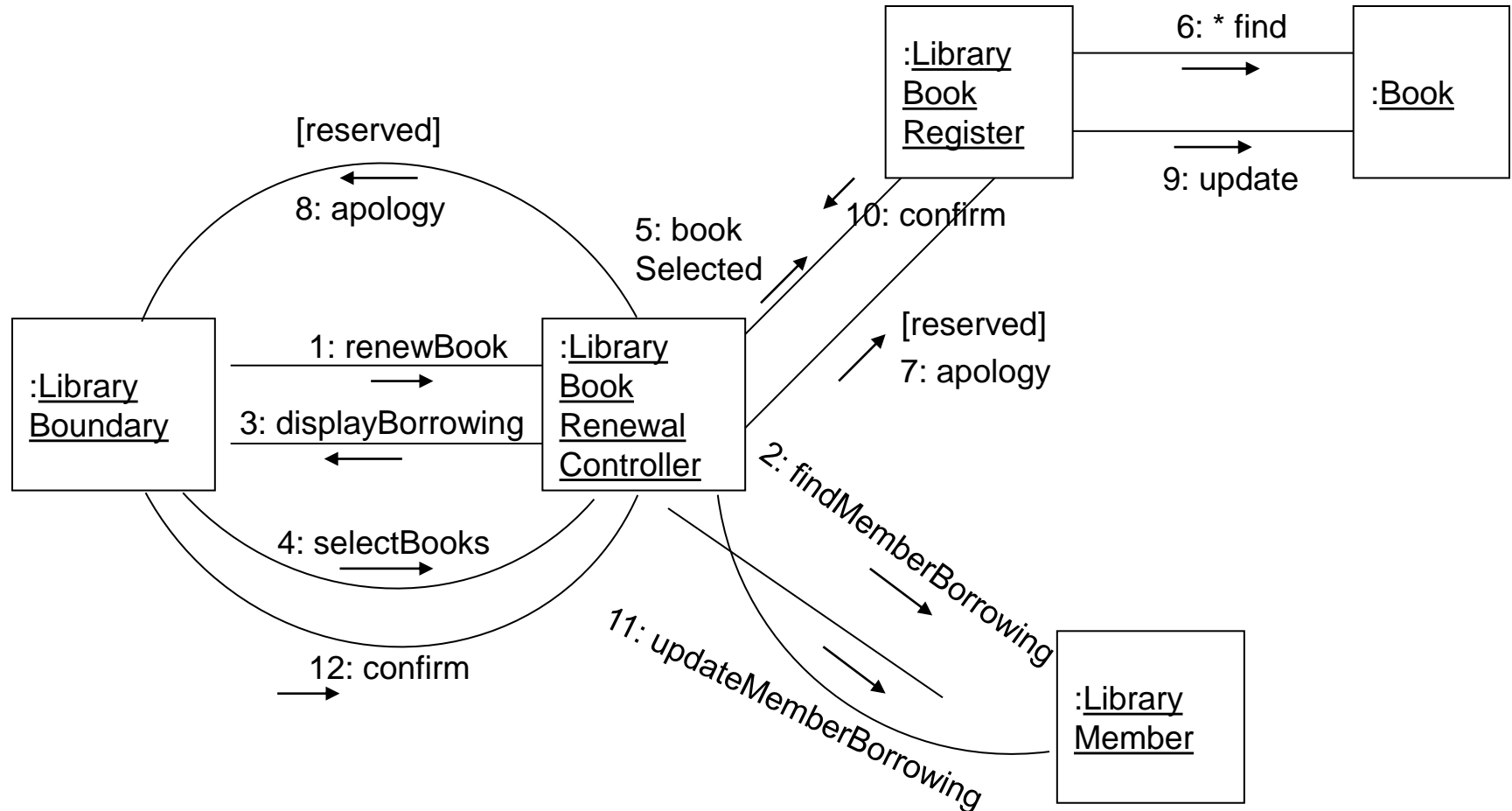
Sequence Diagram for the renew book use case

# Collaboration diagram

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- Shows both structural and behavioural aspects
- Objects are collaborator, shown as boxes
- Messages between objects shown as a solid line
- Message is shown as a labelled arrow placed near the link
- Messages are prefixed with sequence numbers to show relative sequencing

# Example of Collaboration diagram



**Collaboration Diagram for the renew book use case**

# Activity diagram

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- No such diagrams were present in Booch, Jacobson, or Rumbaugh.
- New concept, possibly based on event diagram of Odell [1992]
- Represent processing activities and their sequence of activation, may not correspond to methods



# Activity diagram

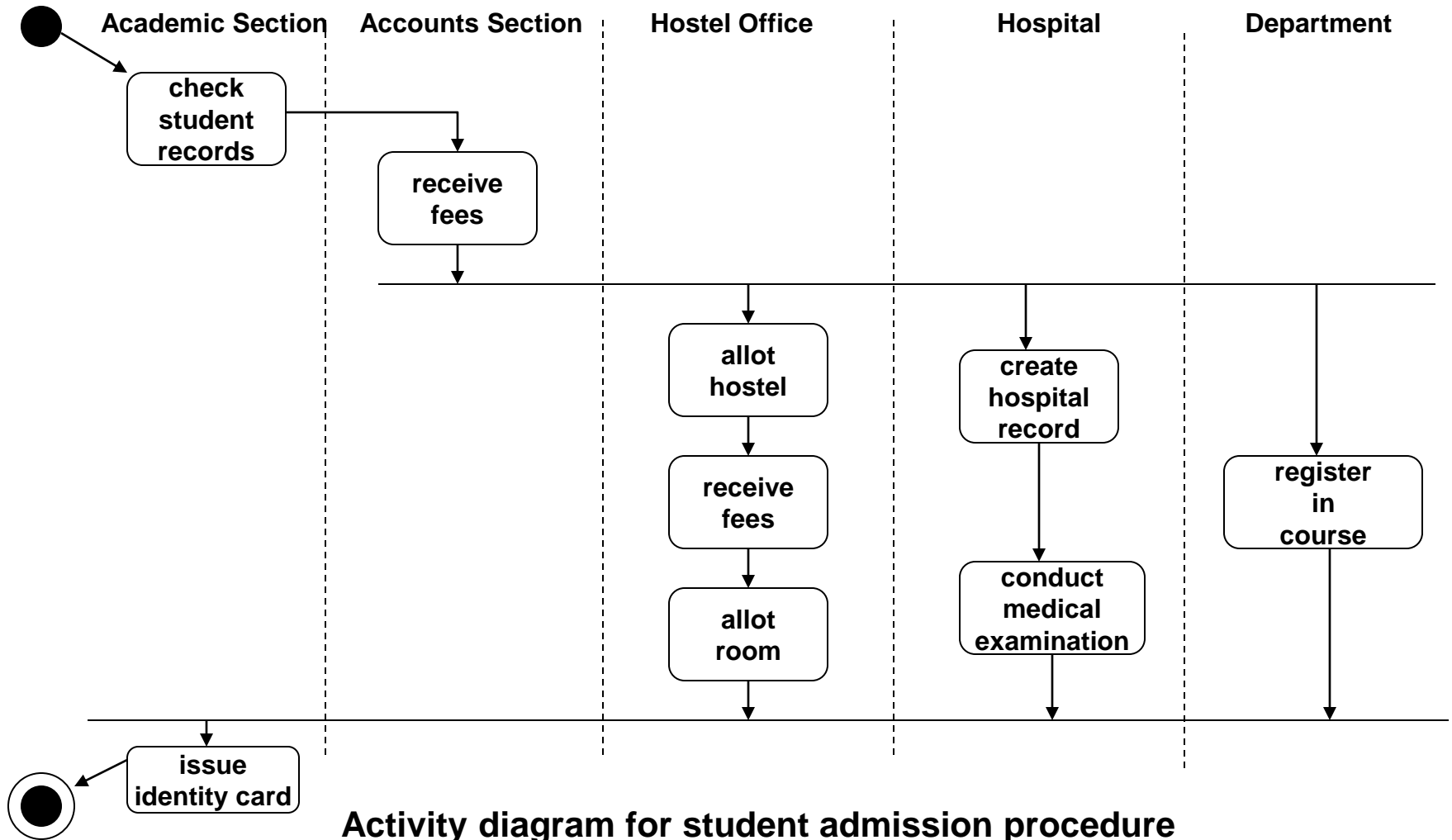
- Activity is **a state** with **an internal action** and one/many outgoing transition which automatically follow the termination of the internal activity.
- Can represent **parallel activity** and **synchronization** aspects involved in different activities unlike **procedural flow chart**.
- Parallel activities are represented by Swim lanes enable to group activities based on who is performing them
- Example: academic department vs. hostel

# Activity diagram

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- The activities in a swim lanes can be assigned to some model elements, e.g. **classes** or some component.
- Normally employed in **business process modelling**
- Carried out during initial stage of requirement analysis and specification
- Understand complex processing activities involving the roles played by many components.
- Can be used to develop interaction diagrams

# Example of Activity diagram



Activity diagram for student admission procedure

# State Chart diagram

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- Based on the work of David Harel [1990]
- Model how the state of an object changes in its lifetime
- Based on finite state machine (FSM) formalism

# State Chart diagram

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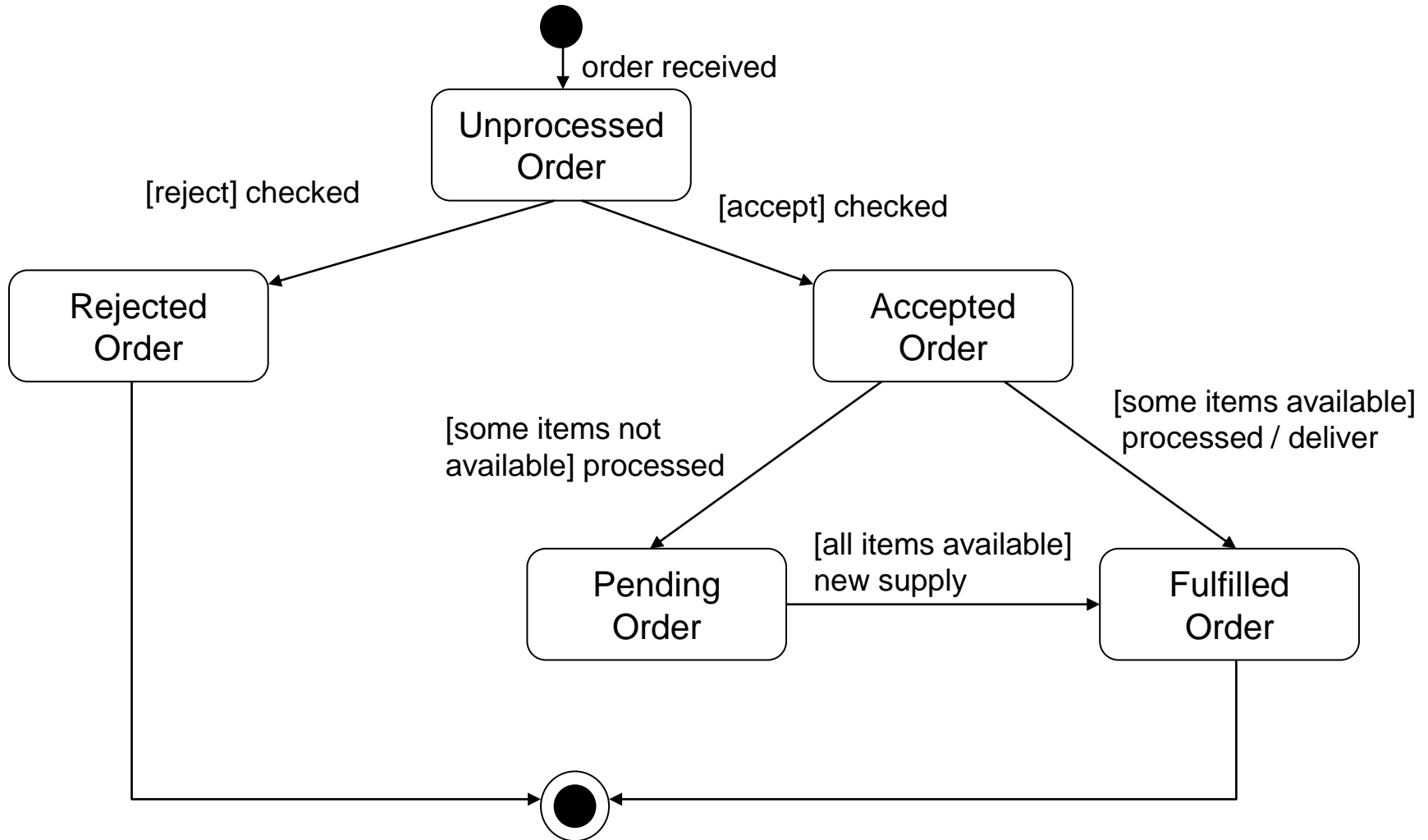
- State chart avoids problem of state explosion as in FSM
- Hierarchical model of a system, represents composite state (nested)

# State Chart diagram

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- Elements of state chart diagram
- Initial State: Filled circle
- Final State: Filled circle inside larger circle
- State: Rectangle with rounded corners
- Transitions: Arrow between states, also boolean logic condition (guard)

# Example of State Chart diagram



**Example: State chart diagram for an order object**