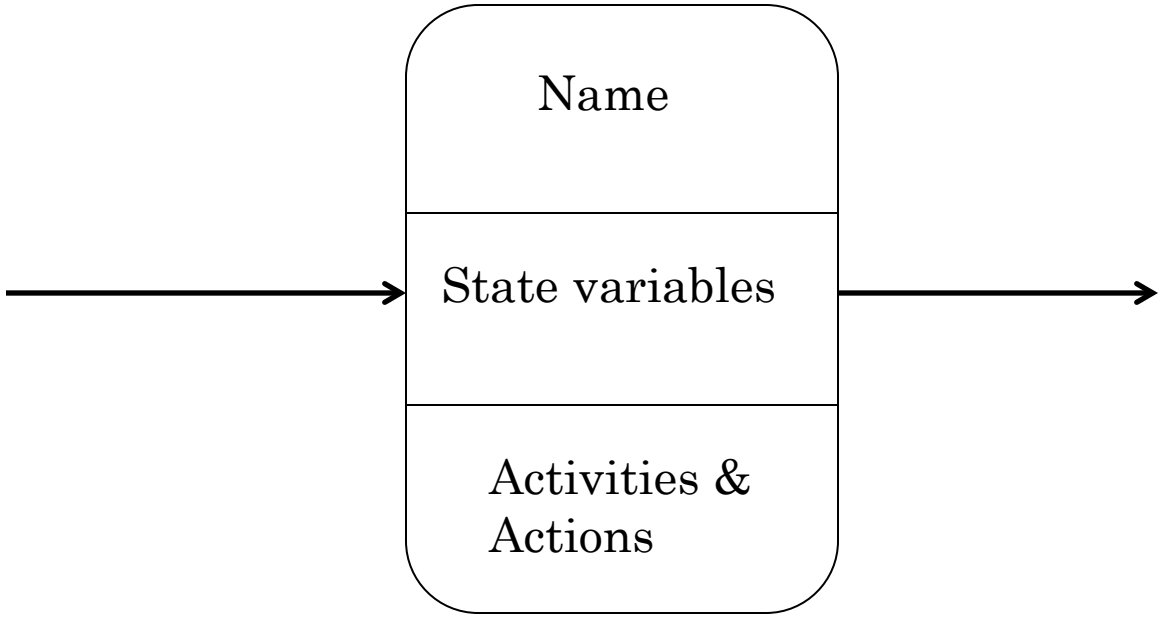
State Diagram

Prof. Sudip Misra
Department of Computer Science & Engineering
Indian Institute of Technology, Kharagpur
http://cse.iitkgp.ac.in/~smisra/

What is State Diagram?

- Diagram for dynamic behavior
- A type of a finite state machine.
- Best for modeling one class whose behavior depends on its state.
- Used for representing, how a state of an object moves to another

States



State Variables

- The composite values of all attributes and links held by an object represent the object's identity.
- Ignore attributes that do not affect the objects behavior.
- No two distinct states of a single object can have identical responses to all events.
- Lump together sets of values that have the same response to events.
- Temporary attributes (that trigger events) may also be represented.

Activities & Actions

- Activity
  - Takes time
  - Associated only with states.
  - May be interrupted by some event.
  - Can often be modeled as a nested state diagram.
  - Example:
    - Downloading a file.

Activities & Actions (cont.)

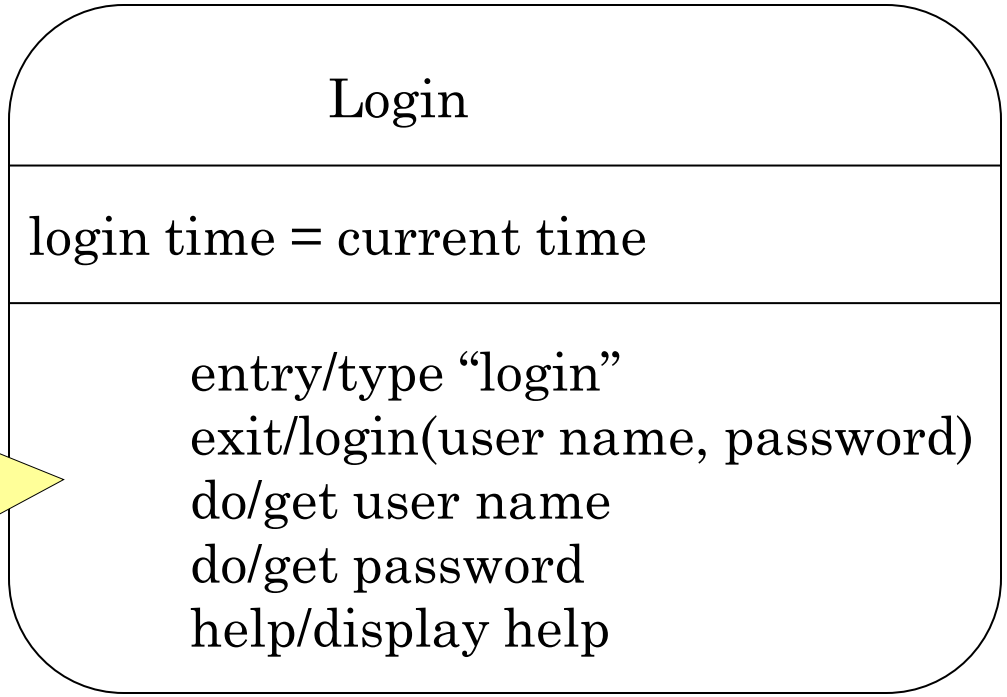
- Action
  - Have short duration
  - Associated with states and transitions
  - Atomic
  - Examples:
    - Beep
    - Display a menu
    - set a flag
    - Sending a message (firing an event)

Activities & Actions (cont.)

- Actions can be spawned on *entry* and *exit* to states.
  - entry/ entry-action(s)
  - exit/ exit-action(s)
- Activities may be indicated
  - do/ activity(ies)
- Internal events may be indicated (instead of self directed transitions)
  - internal-event/ action(s)

Activities & Actions (cont.)

- Example:



Actions/Activities should be specified as operation signatures whenever possible

TRANSITIONS

- A transition is a relationship between a source state and a target state indicating that an object having the source state will change its state to the target state, when a specified set of events occur and/or a set of conditions are satisfied.
- A self transition is a transition whose source and target states are the same.
- Actions may be attached to transitions.
- Transitions from the same state must be mutually exclusive. Otherwise, object's state is undefined.

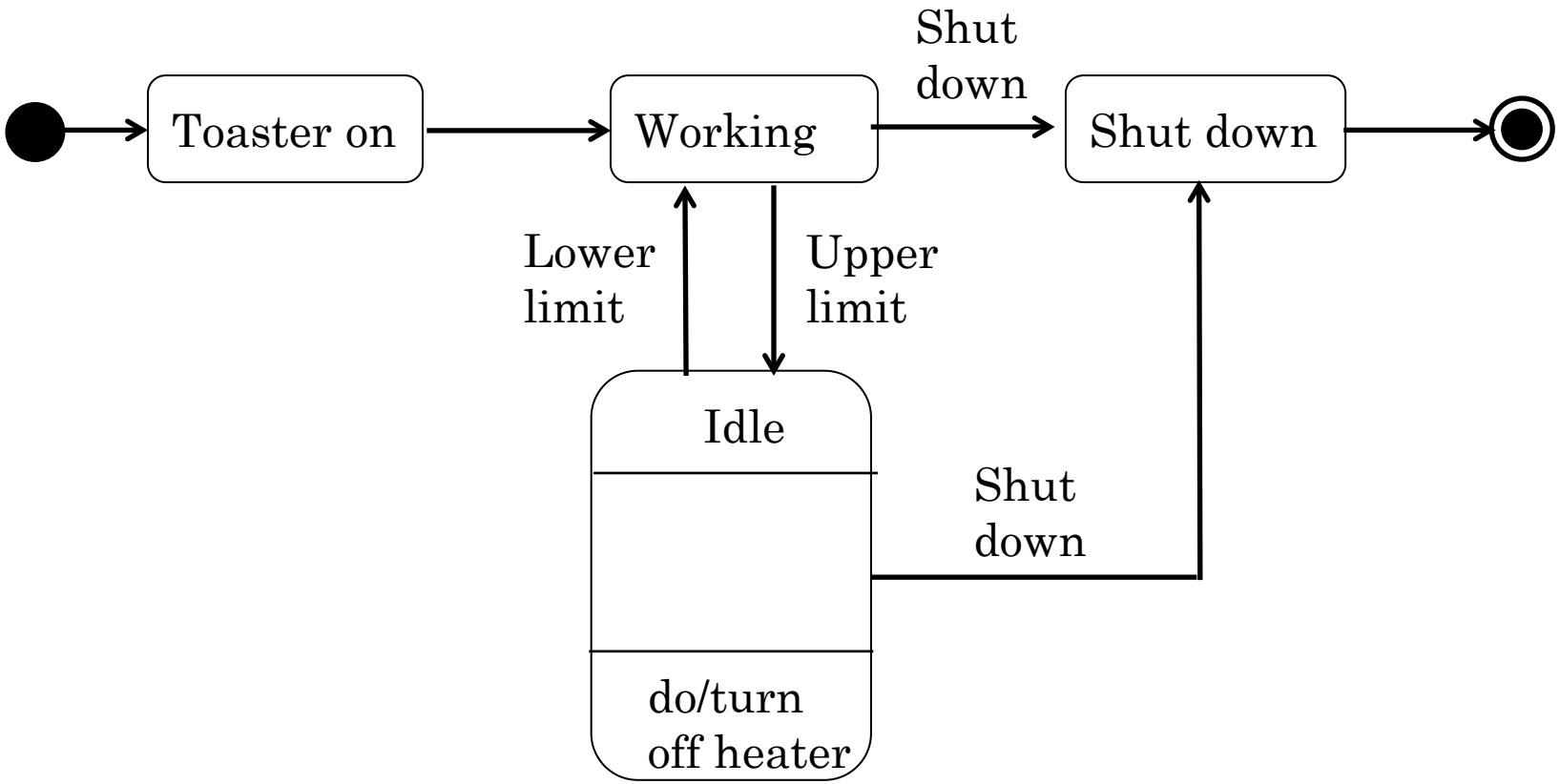
TRANSITIONS (CONT.)

- Represented as a directed edge between two states.
- Transition (general) syntax:
  - event (attributes) [condition(s)] / action(s) ^ send-clause
  - All components are optional.
- Transition semantics:
  - IF the event occurs AND all specified conditions are true THEN spawn the specified actions and change object state to the target state.
  - If the triggering event is not specified, the transition will be attempted when all the state activities complete.

TRANSITIONS (CONT.)

- Represented as a directed edge between two states.
- Transition (general) syntax:
  - event (attributes) [condition(s)] / action(s) ^ send-clause
  - All components are optional.
- Transition semantics:
  - IF the event occurs AND all specified conditions are true THEN spawn the specified actions and change object state to the target state.
  - If the triggering event is not specified, the transition will be attempted when all the state activities complete.

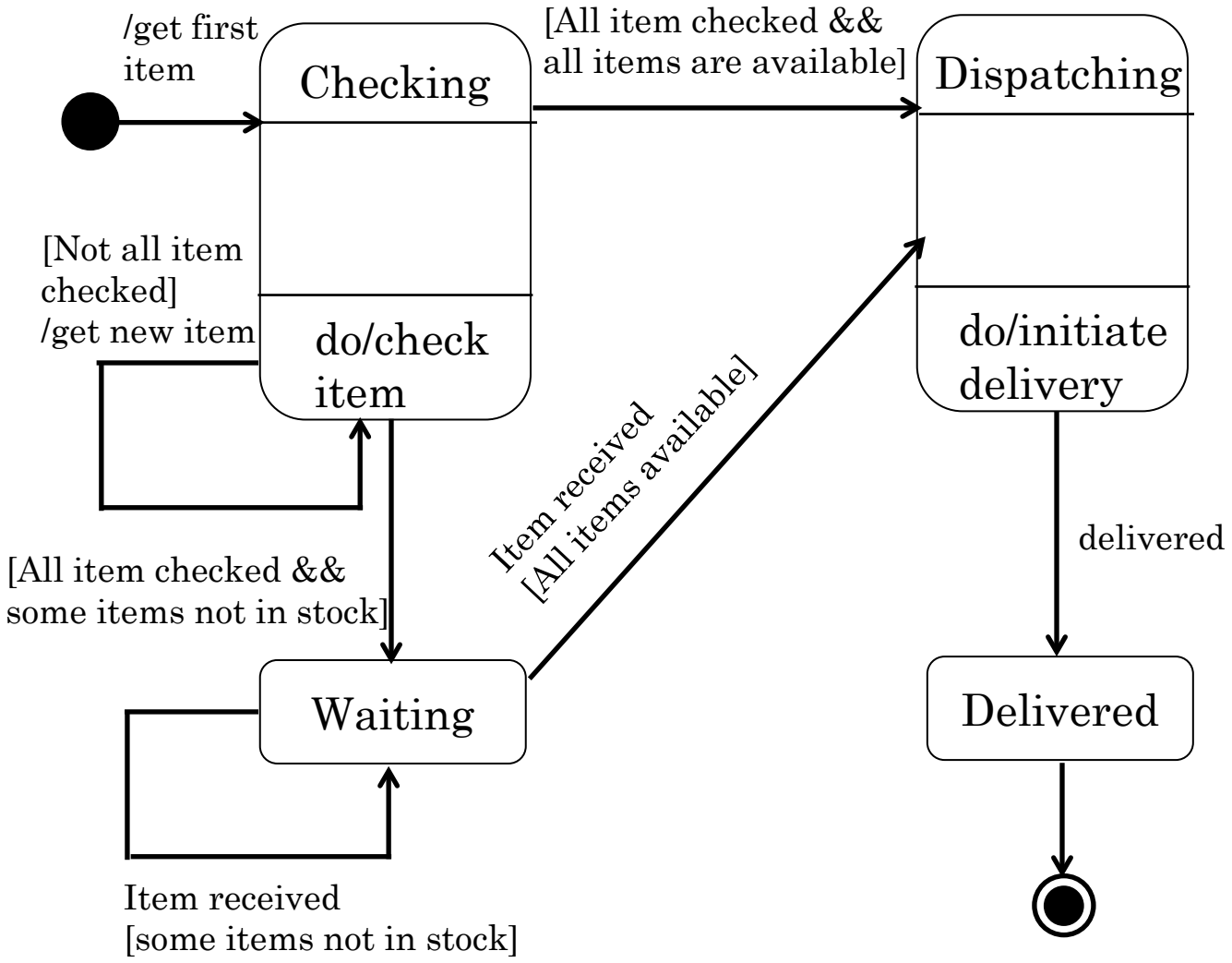
EXAMPLE: TOASTER MACHINE



Assignment: Online Shopping Delivery Item

- Draw a state diagram for the items delivery of a online shopping
- Consider whether the items are available or not

Solution: Online Shopping Delivery Item



THANK YOU