

Analyzing System's Temporal Behaviors

Analyzing Objects Behavior

- A state transition diagram (STD) can be used to show the state of a single process, object, component, subsystem, or system,.
- Normally states are shown as a rectangle or a rounded corner rectangle, and transitions are shown by a one-directional line (with an arrow head), and labeled with an event or condition.
- States are normally labeled as a:
 - Verb ending with an 'ing' such as: Ordering, Paying, Reading;
 - Or, as a past participle of a verb such as: returned, damaged, sold, etc.
 - Or, sometimes as a combination of noun and prepositions to express the geographic state of an object. For example: in-the-box, on-the-shelf
- The events or messages cause a transition from one state to another and the action that results from a state change.
- A state transition diagram encompasses all the messages that an entity (system, subsystem, component, process) can send and receive.

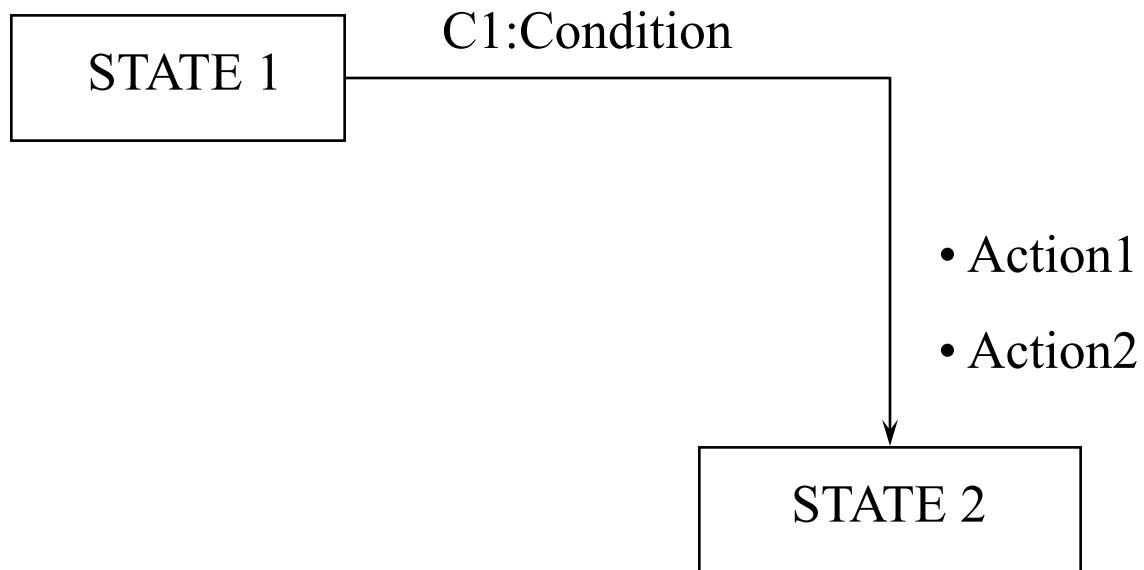
State Transition Diagrams

- Highlights time-dependent behavior.
- Used when you need to specify what happens when.
- Used when an ordered sequence of events must be specified.
- May be used to express the details of a process, function, object, component, subsystem or entire system in a Software Requirements Specification document.

Events and Actions

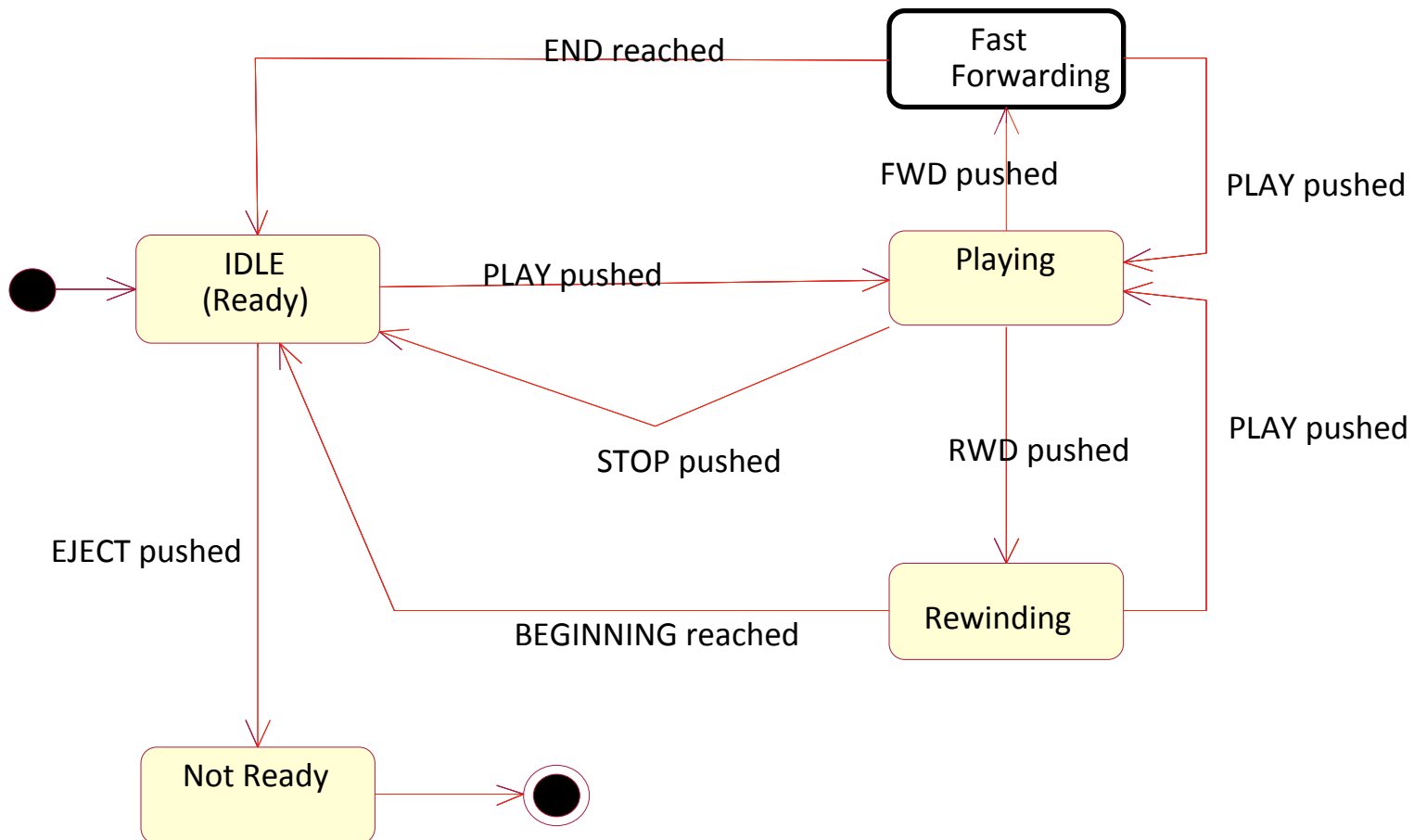
- Conditions (Events)
 - Events in the external environment that the system is capable of detecting.
 - Events that cause a change of state.
- Actions
 - Something the system does when a state changes.
 - Responses sent back to the external environment.
 - Calculations remembered by the system.

Conditions/Actions/States



VCR - Example

- Initial and final states can be shown using filled or half-filled circles.
- If a diagram is too cluttered, states can be nested (leveled) to show super-states and sub-states.



Guidelines

- Building the STD
 - Method 1:
 - Identify all possible states.
 - Identify all transitions.
 - Identify all conditions and actions.
 - Method 2:
 - Identify the initial state.
 - Trace through each successive state.
 - Identify conditions and actions.

Guidelines (continued)

- Check for consistency:
 - Are all states defined?
 - Can all states be reached?
 - Do all states except the final state have a successor?
 - Are actions defined for all possible conditions for each state.
 - Is an initial state shown with a leading arrow?

Example

- Possible States:
 - Managing Customer Orders
 - Preparing Food
 - Managing Reports
 - Handling Fire even
 - Managing Supplies