

Software Engineering

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State diagrams

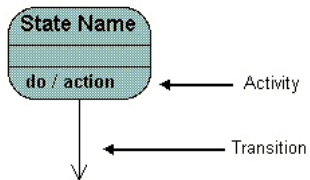
- ▶ describe the behavior of a system.
- ▶ State diagrams describe all of the possible states of an object as events occur.
- ▶ Each diagram usually represents objects of a single class and track the different states of its objects through the system.

Components

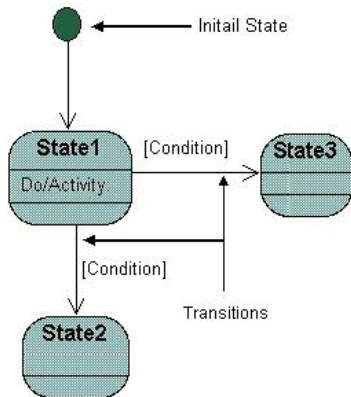
- ▶ state
- ▶ event

- ▶ a state of an object can be realized as values of its data members.
- ▶ special states: start or initial state, final or end state

States



States



- ▶ it changes state of an object.

Definition of states

state: <ID of state>

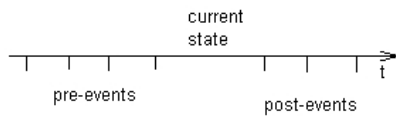
comment: <short description about the state>

pre-events: <the list of the current state's pre-events >

invariant: < description of the current state's invariant >

post-events: <list of the states related to the termination of the state>

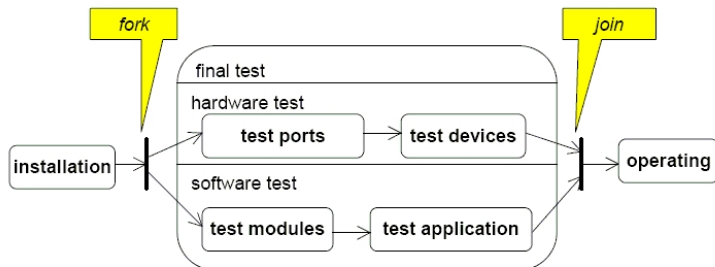
Event and state



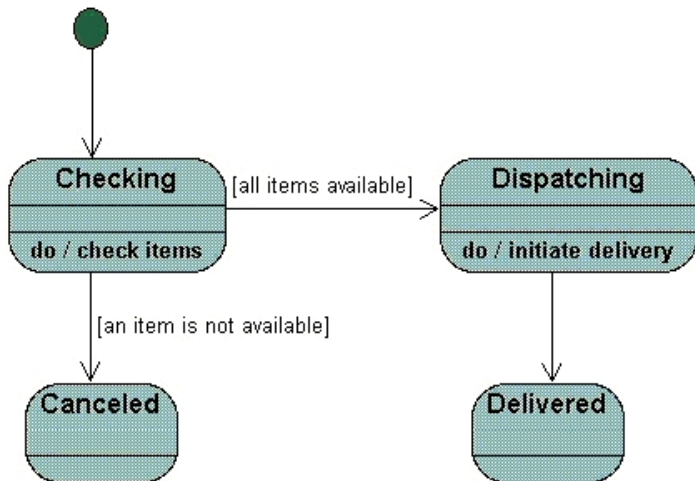
State diagrams

- ▶ State diagrams are graphs: the nodes are states, the edges are events

Concurrent Sub States: Alternative



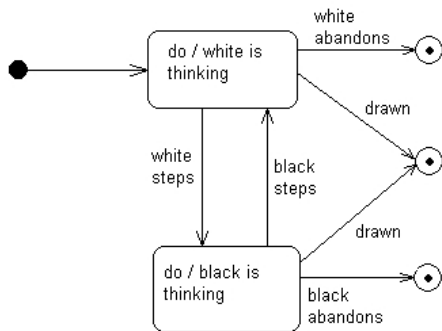
Example



Exercise

Chess is played by two players. They play by turns: first, white is thinking. After thinking he steps. This is black's turn. The black player is thinking, and he steps. Turns go on while one of the players doesn't abandon. They also can do deal with each other. In this case the result of the game is drawn.

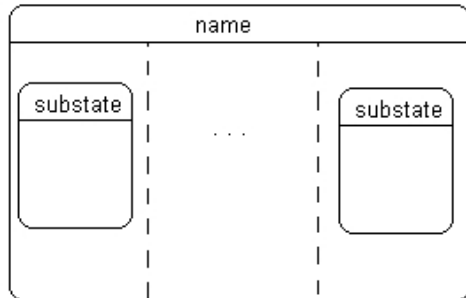
Solution



Problem

- ▶ The complexity of the diagrams is too large...
- ▶ If we have n states $\Rightarrow n * (n - 1)$ transitions
- ▶ generalization of states
- ▶ aggregation of states

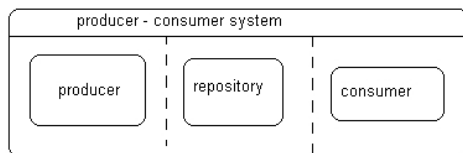
Aggregation of states



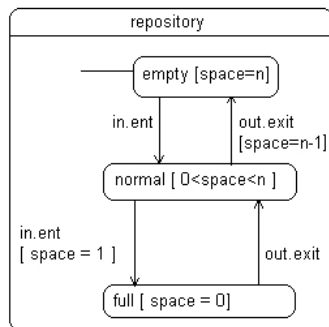
Exercise

The producer-consumer system consists of a producer, a consumer and a repository. The producer can carry his product if there is free space in the repository. There is n free spaces in the repository. The consumer is allowed to carry product from the repository if at least one product can be found in the repository.

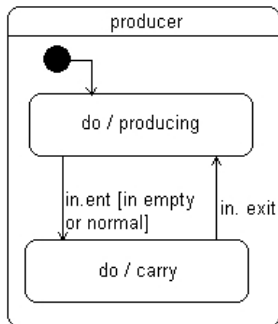
Solution



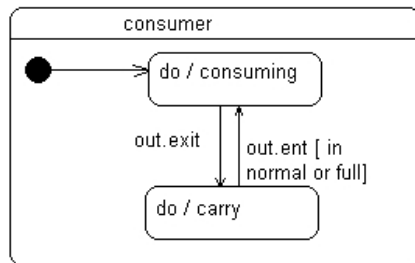
Solution



Solution



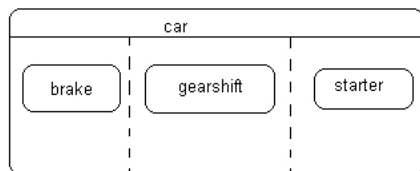
Solution



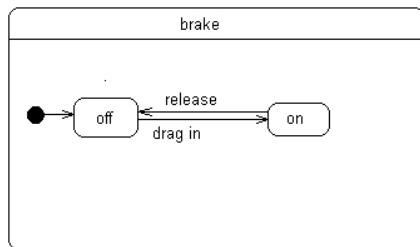
Exercise

The car has brake, starter, and gearshift. The brake can be on or off. The starter can be in stopped, start or working state. The motor can be ignited if the gearshift is in neutral. We can change between the reverse and forward gears if the brake is in off state.

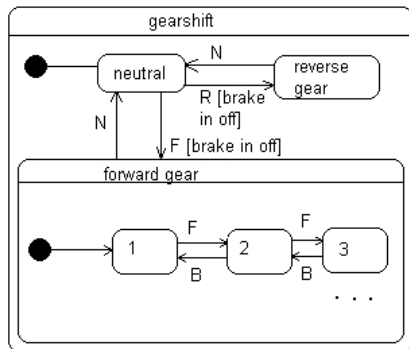
Solution



Solution



Solution



Solution

