

IV. State Diagrams

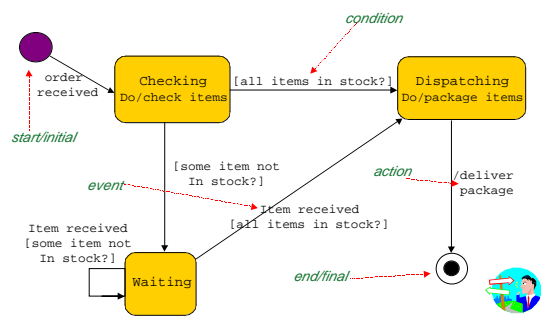
State Diagrams
Events and States
Superstates



State Diagrams (Statecharts)

- State diagrams model processes (business processes, machine processes, or anything in-between.)
- States
- Transitions
- Events, conditions and actions (all optional)
Event[Condition]/Action
- Initial and final states

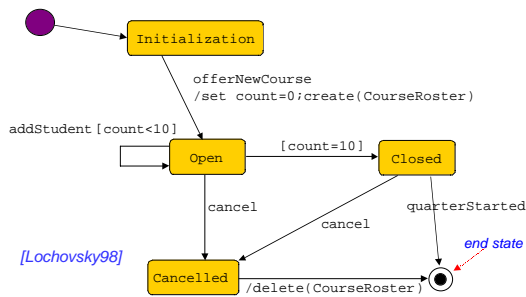
State Diagram for Purchase Order



Events

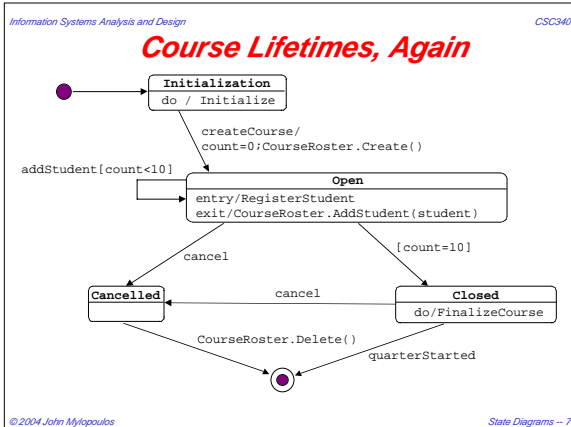
- An **event** is a happening that the system needs to know about.
- In UML, there are four types of events:
 - ✓ **Change events** occur when a condition becomes true, e.g., when (balance < 0);
 - ✓ **Signal events** designate the receipt of an explicit (real-time) signal from outside;
 - ✓ **Call events** indicate the receipt of a call for execution from outside;
 - ✓ **Time events** mark the passage of a designated period of time from the moment a state was entered/exited, e.g., after (10 seconds)

Course Lifetimes



States

- A state represents a time period during which
 - ✓ A predicate is true, e.g., budget - expenses > 0,
 - ✓ An action is being performed, or
 - ✓ Someone waits for an event to happen.
- A state can be "on" or "off".
- States can have associated activities. Special activity constructs include:
 - ✓ **do/stateDiagramName(parameterList)** -- "calls" another state diagram;
 - ✓ **entry/action** -- carry out the action when entering the activity;
 - ✓ **exit/action** -- carry out the action when exiting;

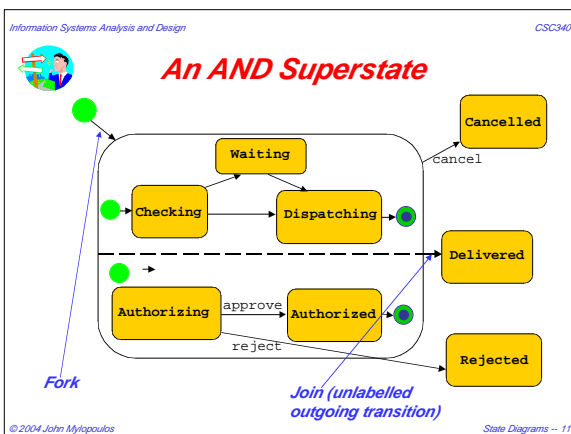
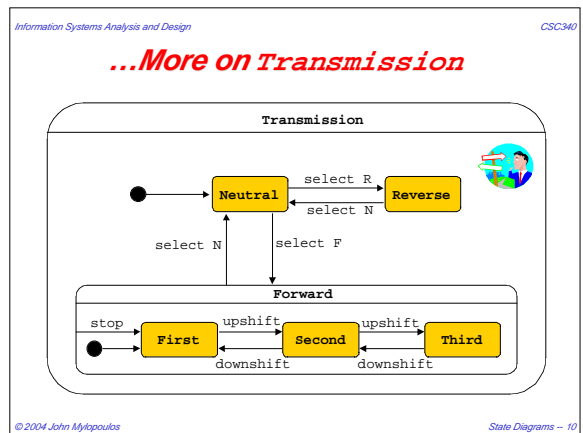
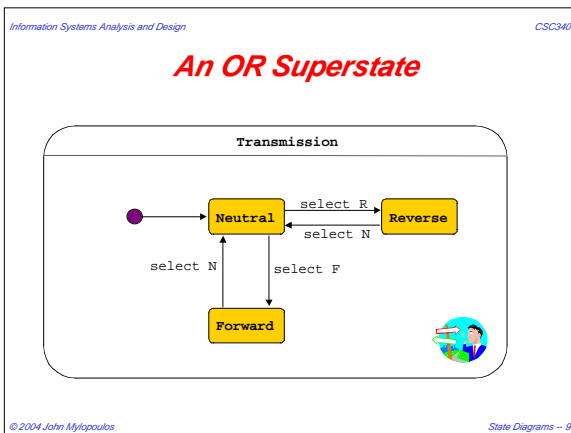


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Superstates

- A superstate consists of two or more substates.
- There are AND and OR superstates.
- When an **AND superstate** is “on”, all its states are also “on”.
- When an **OR superstate** is “on”, one of its states is “on”.

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Additional Readings

- [Booch99] Booch, G. et al., *The Unified Modeling Language User Guide*, Chapters 19, 20, 21, 24. Addison-Wesley.
- [Fowler00] Fowler, M., *UML Distilled: A Brief Guide to the Standard Object Modelling Language*, Chapters 8, 9. Addison-Wesley.

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