SCS1310 - Object Oriented Modelling and Programming

State Transition Diagrams

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Introduction

What are State Transition Diagrams

- Sometimes also known as state machine diagrams
- Used to model the change of state of the objects of the system (object can be a class object or a conceptual object)
- Components of a state transition diagram,
  1. Simple State
  2. Initial State
  3. Final State
  4. Composite State
  5. Transition
  6. Fork
  7. Join

Simple State

- A instance of an object in its lifetime satisfying some conditions
- Can have multiple entry and exit points
- A simple state has no substructure

Figure: Simple State

Initial State

- Special state that marks the beginning of the transition
- There are no entry points, and only one exit point is available
- Lifetime of the object starts at this state

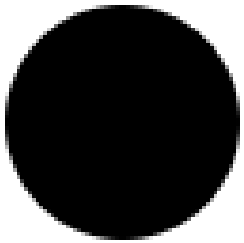

Figure: Initial State

Final State

- Special state that marks the end of the transition
- There are no exit points
- Can have multiple entry points
- After reaching this state the lifetime of the object is over

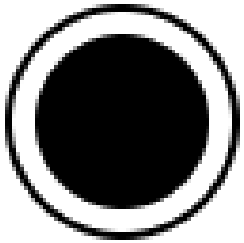

Figure: Final State

Composite State

- A state containing multiple sub-states
- Most of the time, only one state can be active at a given time

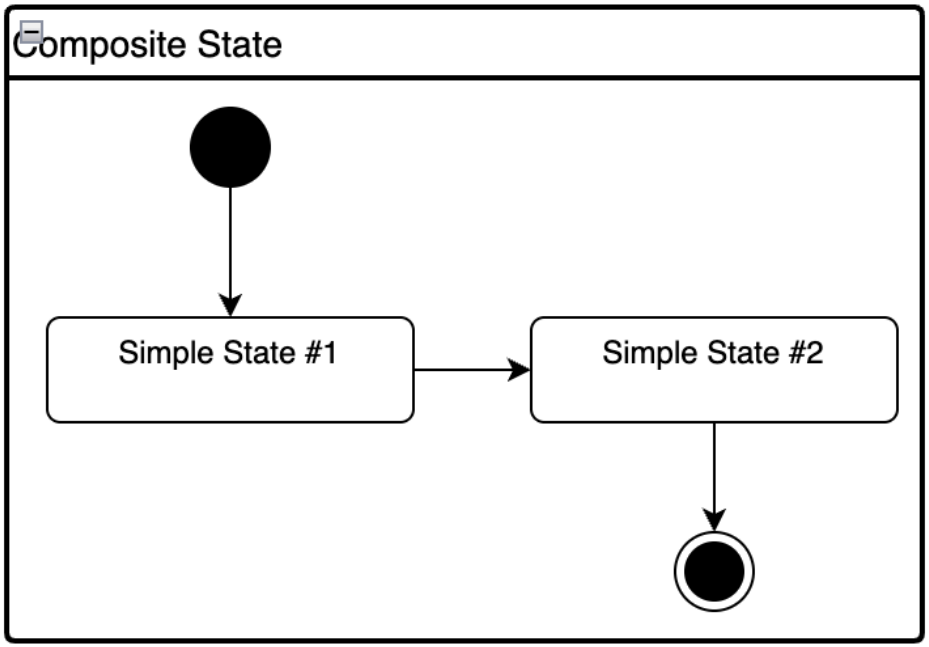

Figure: Composite State

Transition

- Used to represent changing from one state to another
- Result of an **event**
- Event transitions can be protected by **guard**, a boolean condition allowing the transition only if its true
- **Actions** can be associated with transitions
- Self-transitions are also possible

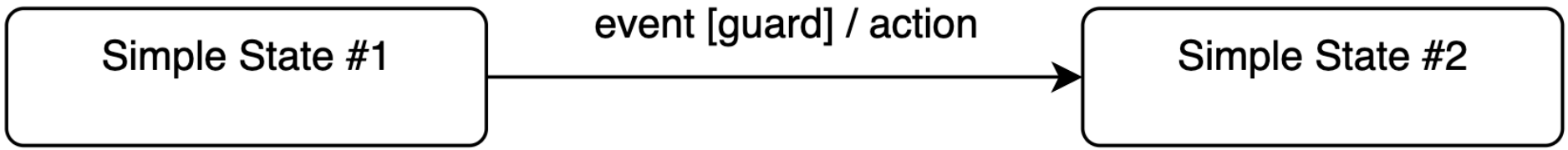

Figure: Transition

More About Actions

- Actions are not limited only to transitions
- They are also possible,
  - on entering a state
  - looping in a state
  - events that happen while in a state
  - on exiting a state

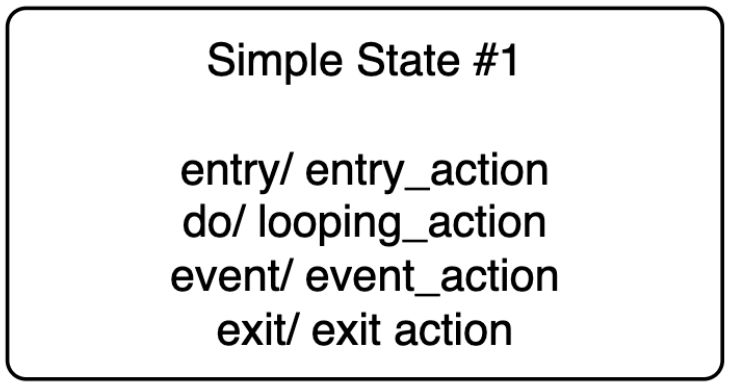

Figure: Events Related to States

Forks

- Used to represent a splitting of the states into 2 or more concurrent states

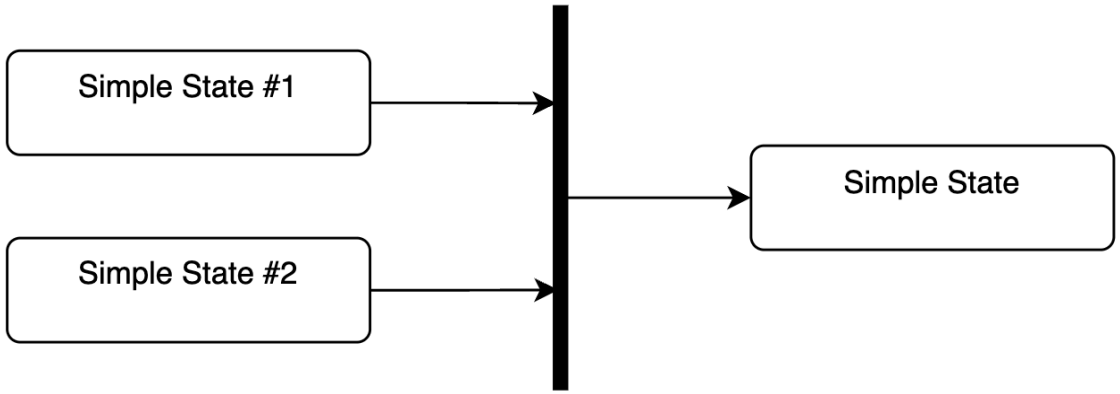

Figure: Fork

Joins

- Converge 2 or more concurrent states into one state

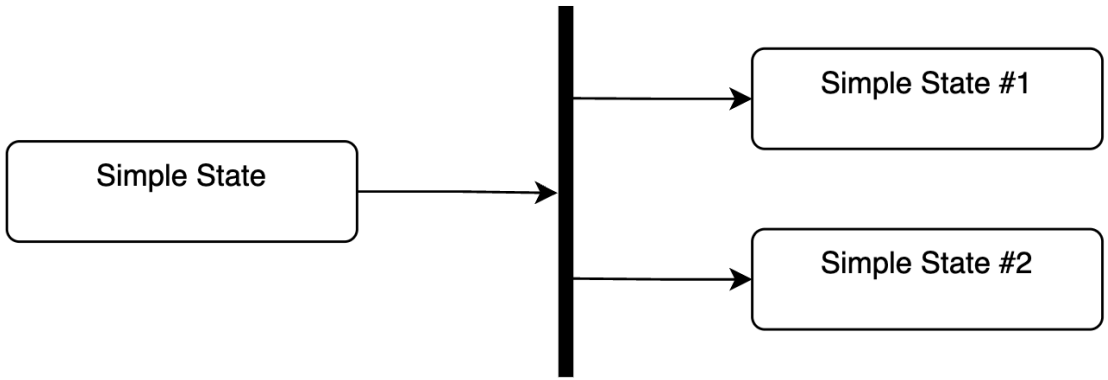

Figure: Join

Summary

- State transitions diagrams are used to model the transition between objects during their lifetime
- Transitions are triggered by events
- Transitions can be protected by guards
- Actions are associated with both transitions and states forks can model item Splitting into concurrent states and emerging concurrent states and joins