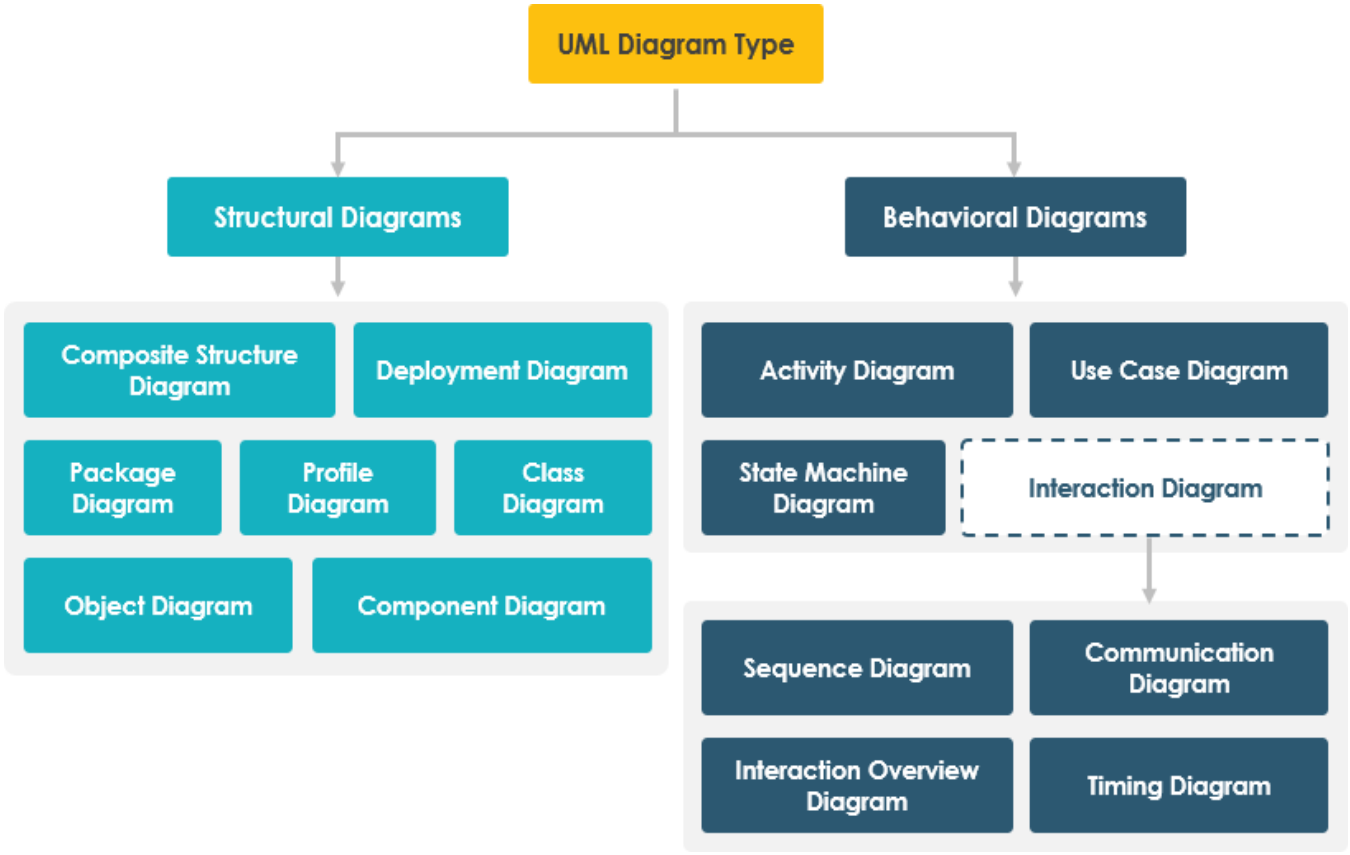
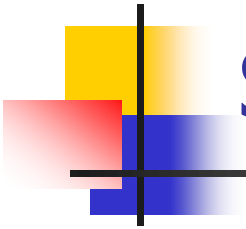
8. Dynamic Modeling using the Unified Modeling Language (UML) - **State diagram**

UML Diagram

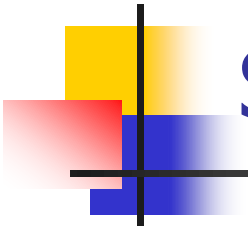

UML Diagram Type
Structural Diagrams
Behavioral Diagrams
Composite Structure Diagram
Deployment Diagram
Package Diagram
Profile Diagram
Class Diagram
Object Diagram
Component Diagram
Activity Diagram
Use Case Diagram
State Machine Diagram
Interaction Diagram
Sequence Diagram
Communication Diagram
Interaction Overview Diagram
Timing Diagram



State Diagram

"The state machine view describes the dynamic behavior of objects over time by modeling the lifecycles of objects of each class. Each object is treated as an isolated entity that communicates with the rest of the world by detecting events and responding to them. Events represent the kinds of changes that objects can detect... Anything that can affect an object can be characterized as an event."

- *The UML Reference Manual, [Rumbaugh,99]*

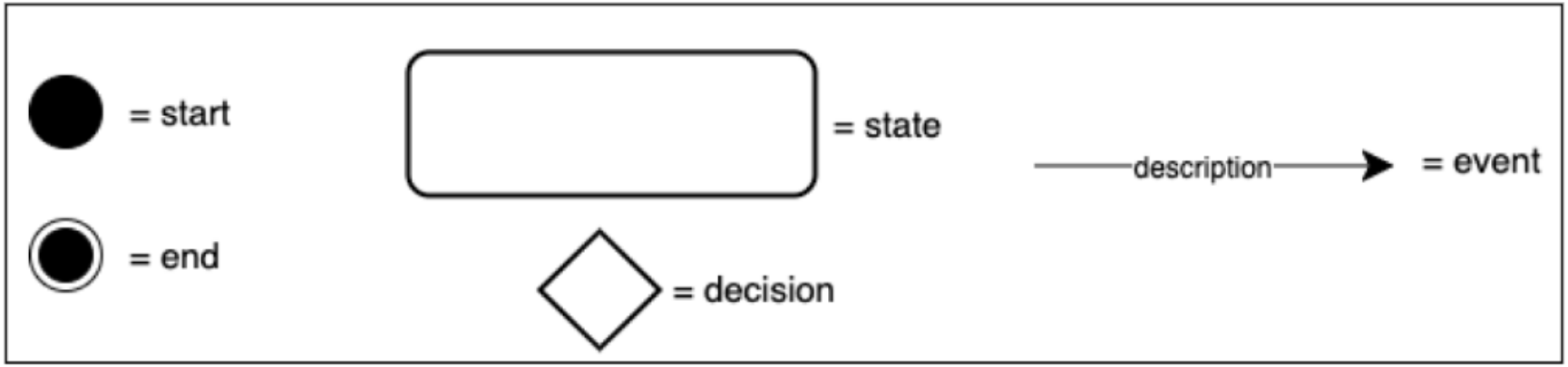


State Diagram

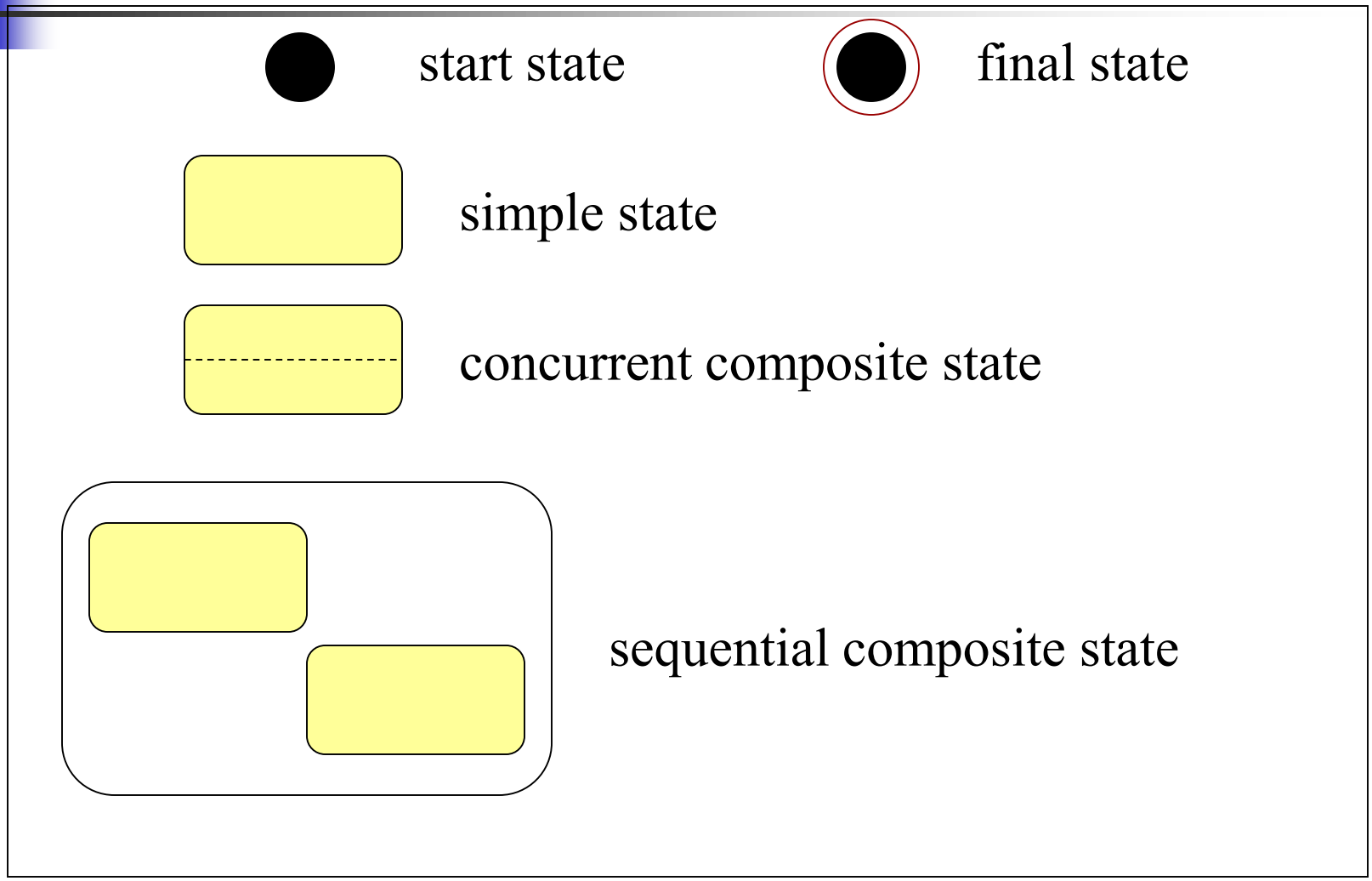
An object must be in some specific state at any given time during its lifecycle. An object transitions from one state to another as the result of some event that affects it.

There can be only one start state in a state diagram, but there may be many intermediate and final states.

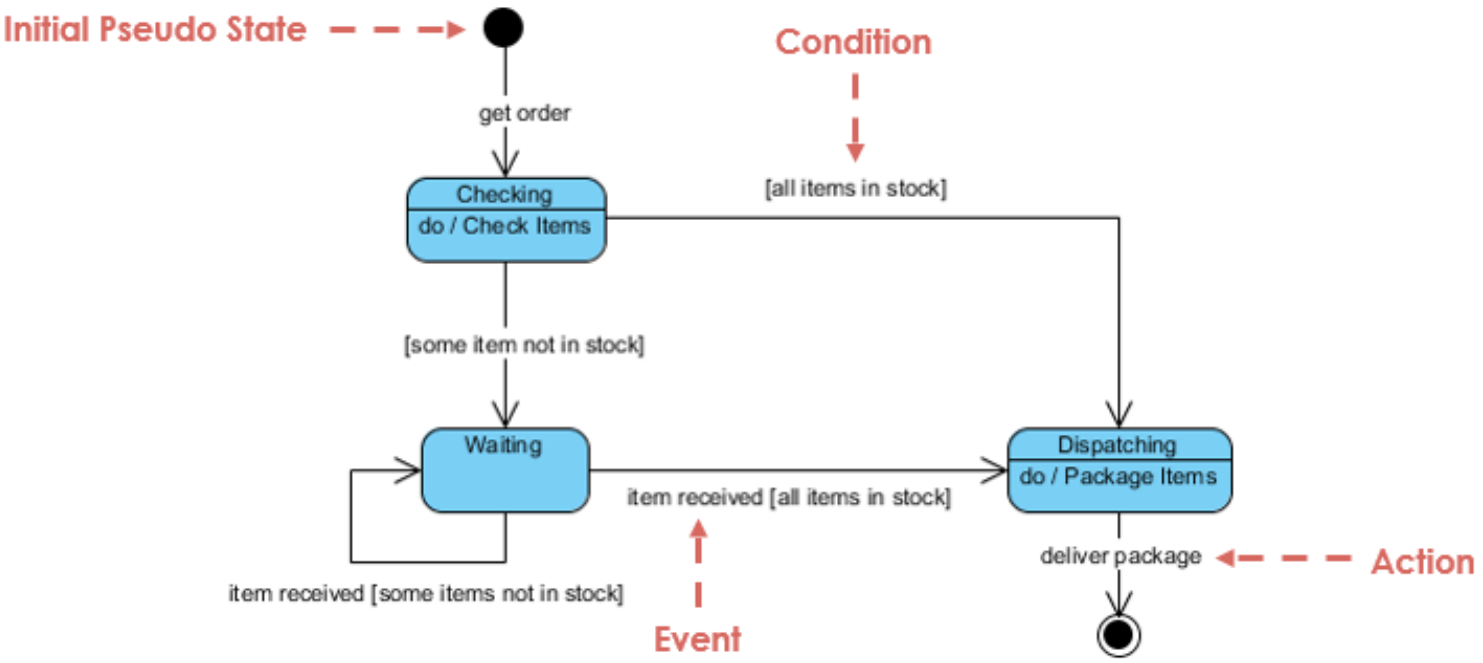
State Diagrams



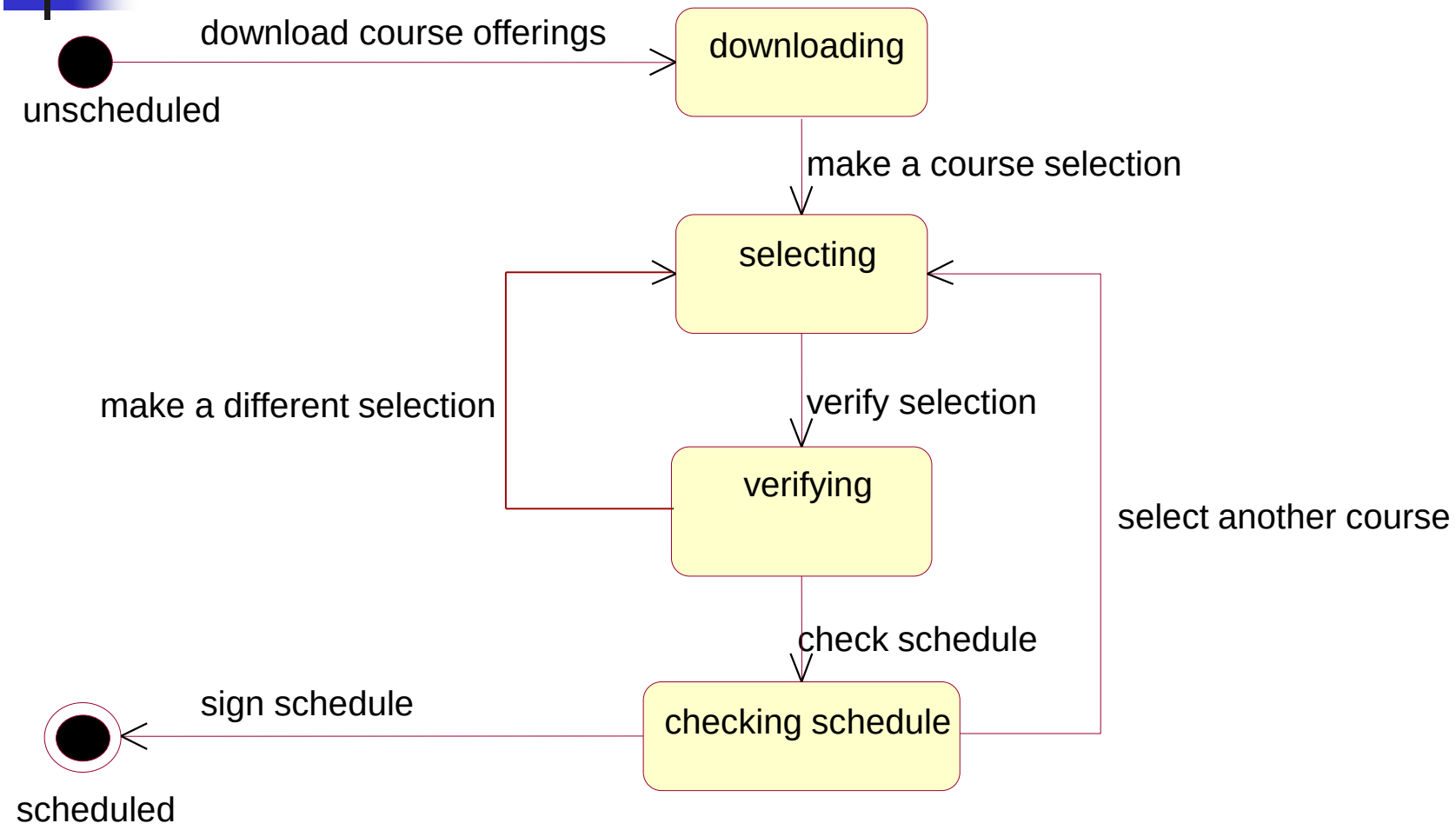
State Diagrams



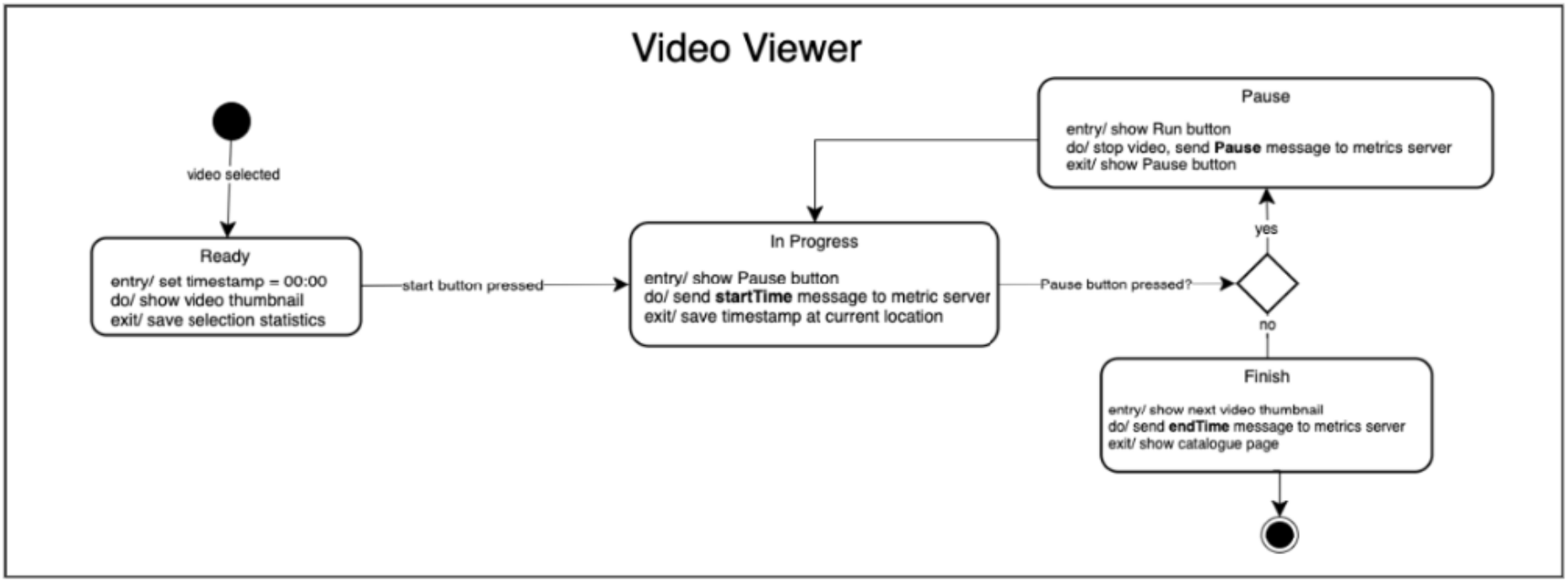
State Diagrams

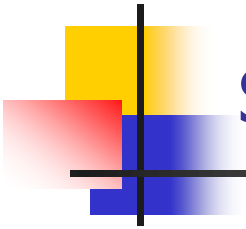


State Diagrams



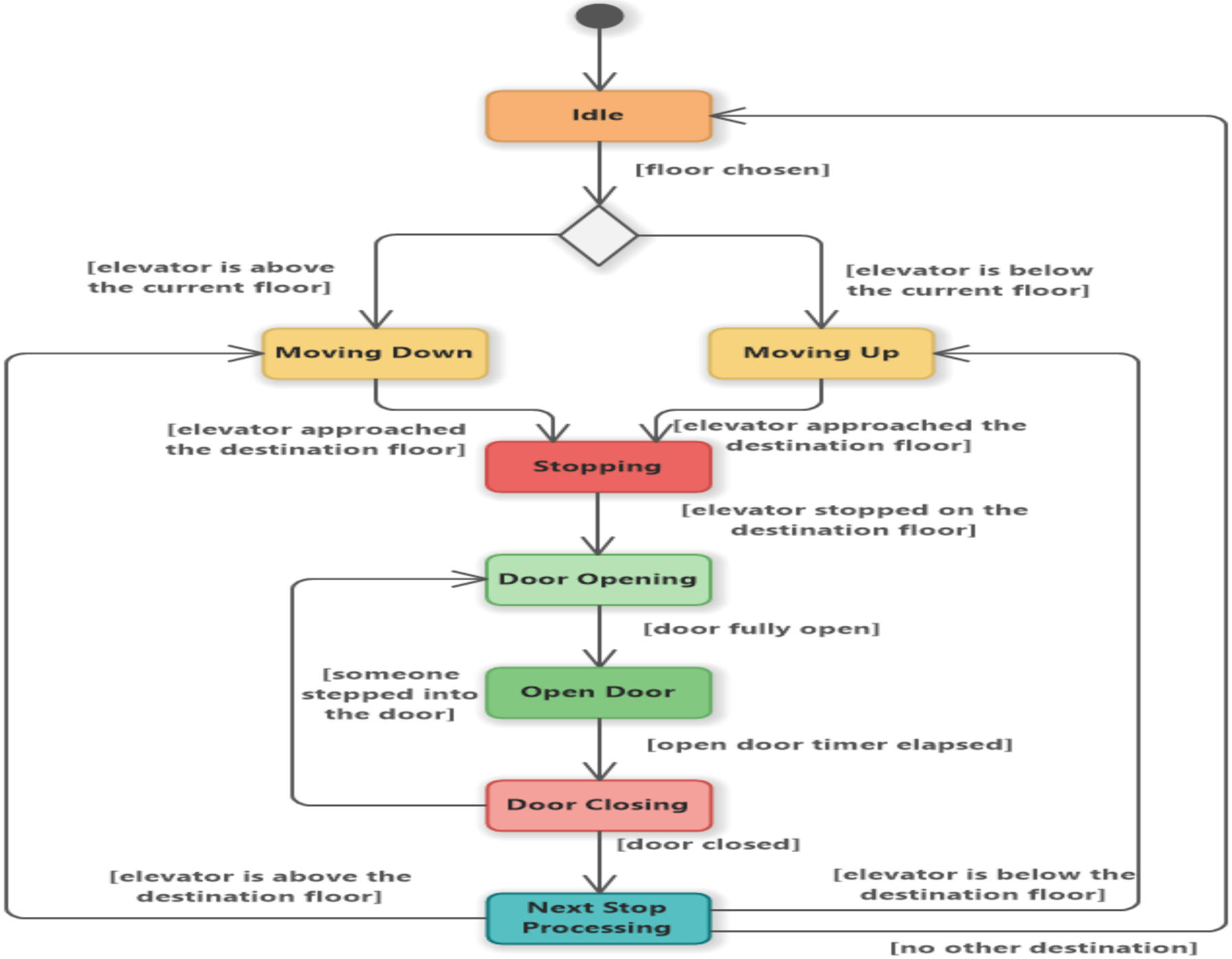
State Diagrams





State Diagrams – Exercise #1 (Elevator System)

- The **state machine diagram** depicts the following states of an **elevator**:
  - Idle
  - Moving Down
  - Moving Up
  - Stopping
  - Door Opening
  - Door Closing
  - Next Stop Processing
  - Open Door


Idle
[floor chosen]
[elevator is above the current floor]
[elevator is below the current floor]
Moving Down
Moving Up
[elevator approached the destination floor]
[elevator approached the destination floor]
Stopping
[elevator stopped on the destination floor]
Door Opening
[door fully open]
[someone stepped into the door]
Open Door
[open door timer elapsed]
Door Closing
[door closed]
[elevator is above the destination floor]
[elevator is below the destination floor]
Next Stop Processing
[no other destination]