UML - STATE DIAGRAM

2021-’22 Winter SWE B.Tech

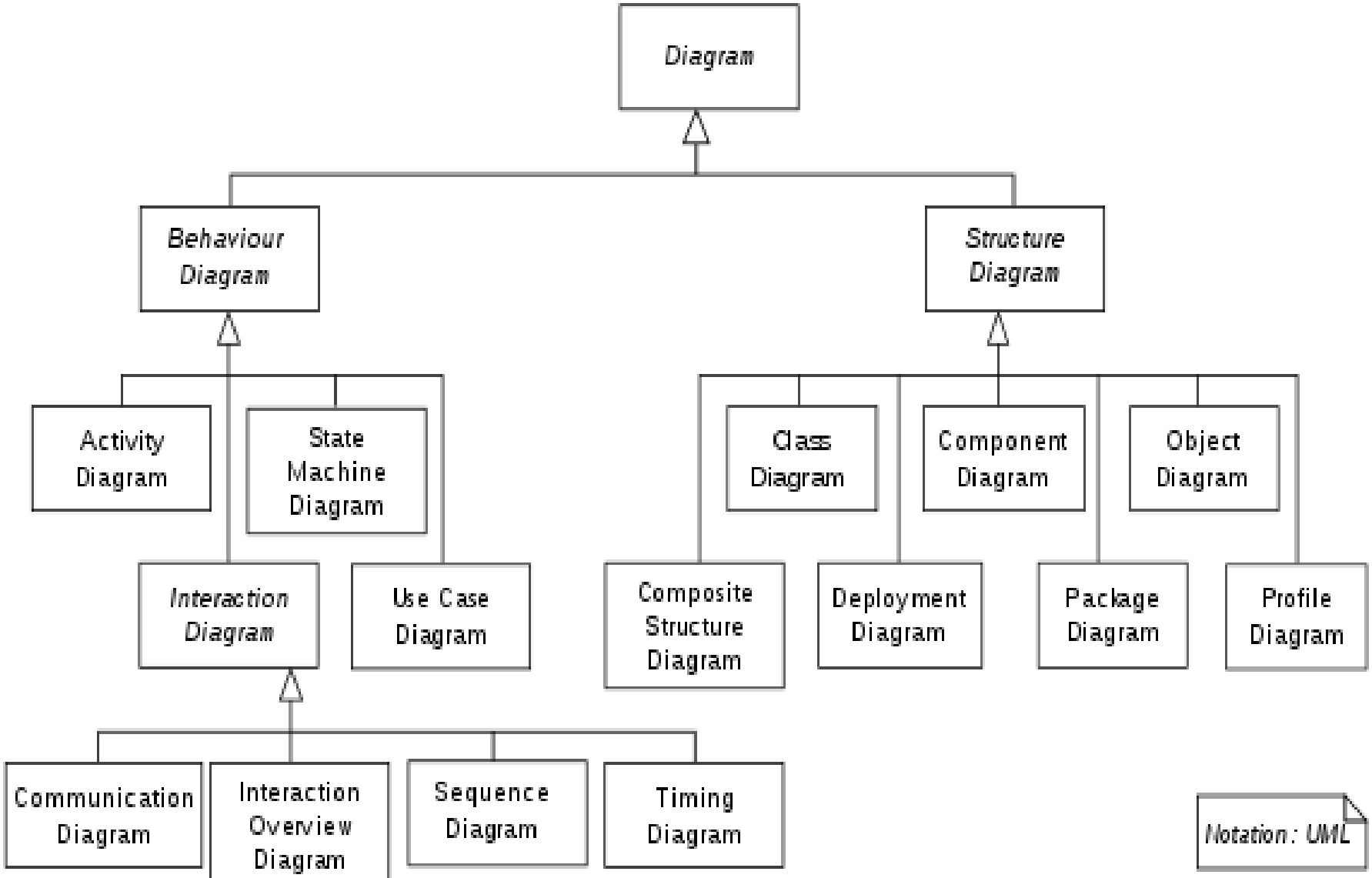


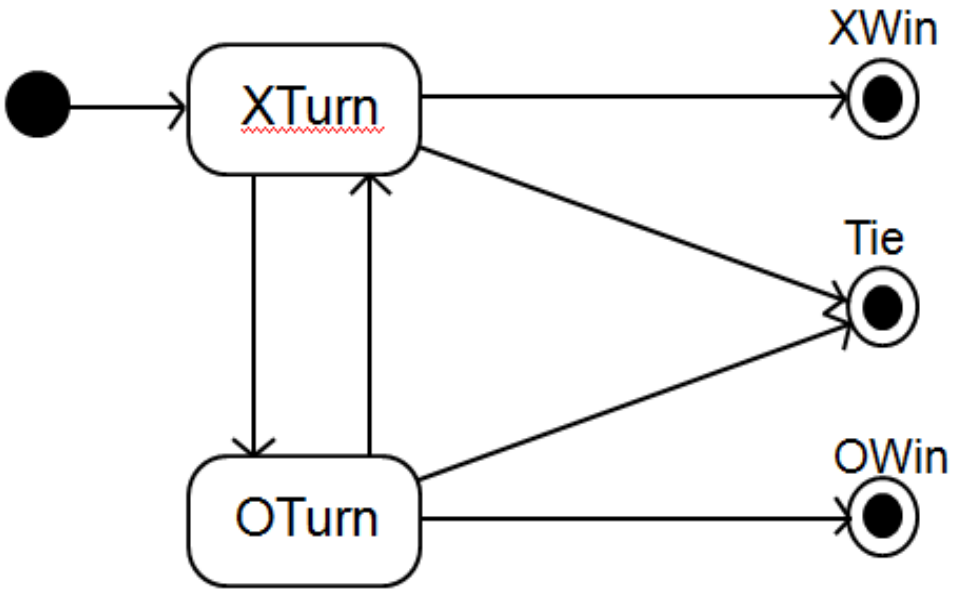
Diagram
Behaviour Diagram
Structure Diagram
Activity Diagram
State Machine Diagram
Interaction Diagram
Use Case Diagram
Class Diagram
Component Diagram
Object Diagram
Composite Structure Diagram
Deployment Diagram
Package Diagram
Profile Diagram
Communication Diagram
Interaction Overview Diagram
Sequence Diagram
Timing Diagram
Notation: UML

State Diagrams

- **Describes the externally visible behavior of a system or of an individual object.**
- **Like directed graph where the nodes are states and the arcs are transitions.**
  - At any given point in time, the system or object is in a certain ***state***.
  - Some ***events*** will cause the system to change state.

State diagrams – an example

- tic-tac-toe game



States

- At any given point in time, the system is in one state.
- It will remain in this state until an event occurs that causes it to change state.
- A state is represented by a **rounded rectangle** containing the name of the state.
- Special states:
  - A black circle represents the ***start state***
  - A circle with a ring around it represents an ***end state***

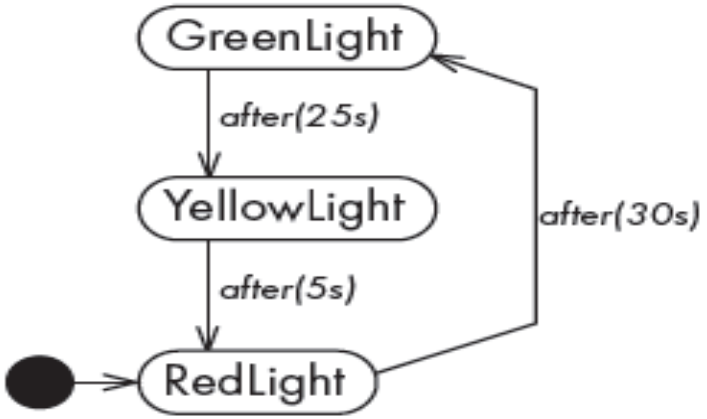
Transitions

- A transition represents a change of state in response to an event.
  - It is considered to occur instantaneously.

- The label on each transition is the event that causes the change of state.

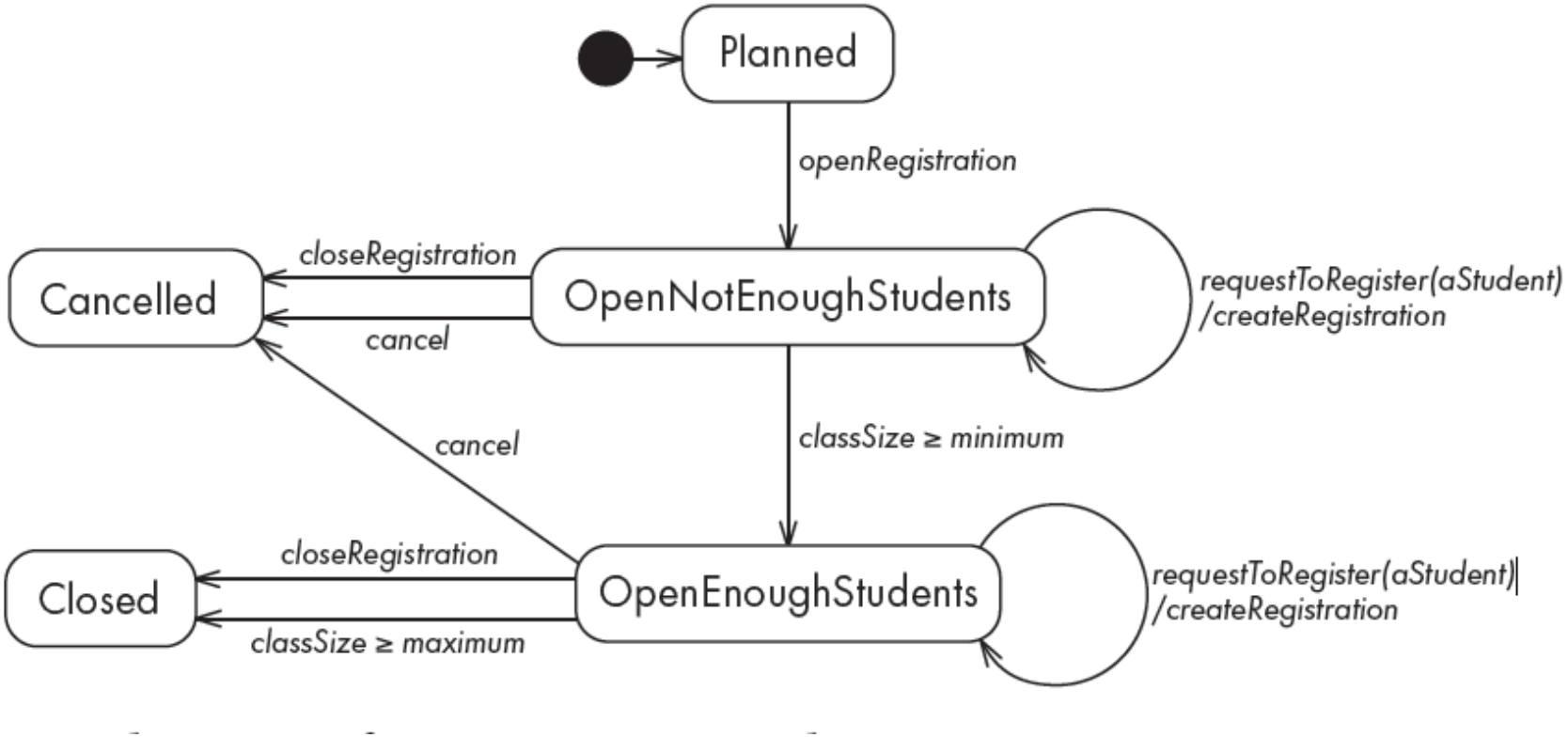
- A transition is rendered as a **solid directed line**.

State diagrams of a simple traffic light, illustrating elapsed-time transitions



State diagrams – an example of transitions with time-outs

State diagrams – an example with conditional transitions



State diagram of a CourseSection class

Computations in State Diagram

- Activities
- Actions

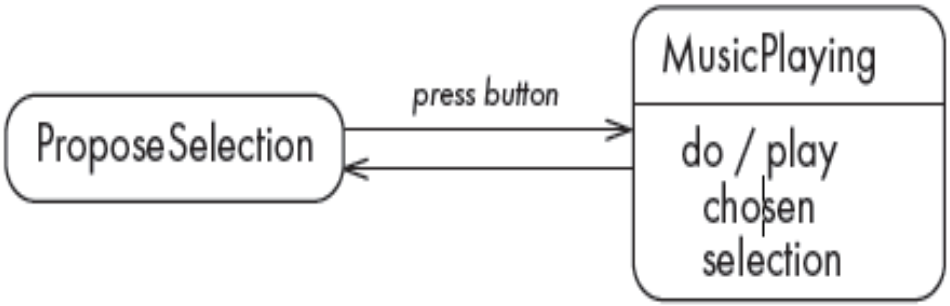
Activities in state diagrams

- An *activity* is something that takes place while the system is *in* a state.
  - It takes a period of time.
  - The system may take a transition out of the state in response to completion of the activity,
  - Some other outgoing transition may result in:
    - The interruption of the activity, and
    - An early exit from the state.

Activity representation

- An activity is shown textually within a state box by the word '**do**' followed by a '**/**' symbol, and a ***description*** of what is to be done.
- When you have details such as actions in a state, you draw a horizontal line above them to separate them from the state name.

State diagram – an example with activity



State diagram for a jukebox, illustrating an activity in a state

Actions in state diagrams

- An *action* is something that takes place effectively *instantaneously*
  - When a particular transition is taken,
  - Upon entry into a particular state, or
  - Upon exit from a particular state

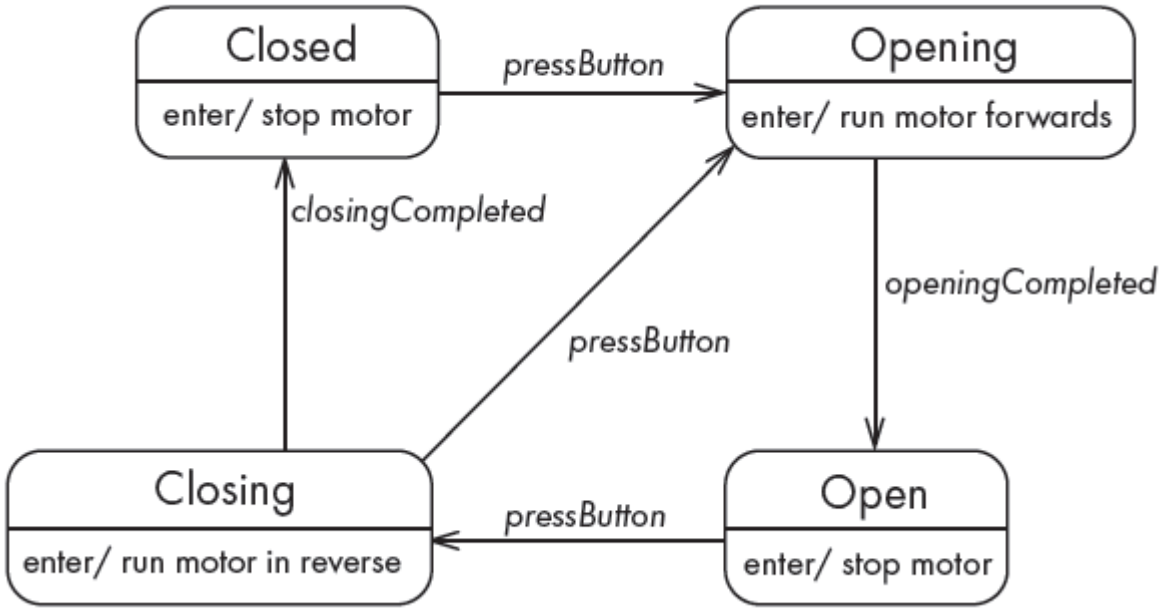
- ***An action should consume no noticeable amount of time***

Representation of action

- An action is always shown preceded by a slash (‘/’) symbol.
- If the action is to be performed during a transition, then the syntax is **event/action**.
- If the action is to be performed when entering or exiting a state, then it is written in the state box with the notation **enter/action** or **exit/action**.

State diagram – an example with actions

- **State diagram for a garage door opener,**



Nested substates

- A state diagram can be nested inside a state.
- The states of the inner diagram are called substates.

State diagram – an example with substates