State Chart

INTRODUCTION

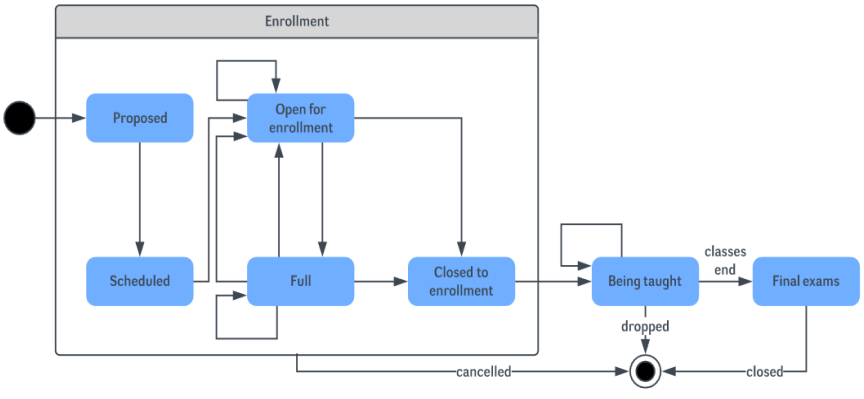
- A state machine is any device that stores the status of an object at a given time and can change status or cause other actions based on the input it receives.
- States refer to the different combinations of information that an object can hold, not how the object behaves.
- In order to understand the different states of an object, you might want to visualize all of the possible states and show how an object gets to each state, and you can do so with a UML state diagram.
- Each state diagram typically begins with a dark circle that indicates the initial state and ends with a bordered circle that denotes the final state.

INTRODUCTION

- State diagrams mainly depict states and transitions.
- States are represented with rectangles with rounded corners that are labeled with the name of the state.
- Transitions are marked with arrows that flow from one state to another, showing how the states change.
- The main applications are as follows:
  - Depicting event-driven objects in a reactive system.
  - Illustrating use case scenarios in a business context.
  - Describing how an object moves through various states within its lifetime
  - Showing the overall behavior of a state machine or the behavior of a related set of state machines.

STATE DIAGRAM SYMBOLS AND COMPONENTS

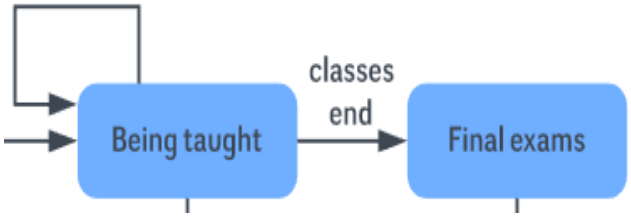
- **Composite state :** A state that has substates nested into it. See the university state diagram example below. “Enrollment” is the composite state in this example because it encompasses various substates in the enrollment process.



STATE DIAGRAM SYMBOLS AND COMPONENTS

- **Choice pseudostate :** A diamond symbol that indicates a dynamic condition with branched potential results.

- **Event :** An instance that triggers a transition, labeled above the applicable transition arrow. In this case, “classes end” is the event that triggers the end of the “Being taught” state and the beginning of the “Final exams” state.



STATE DIAGRAM SYMBOLS AND COMPONENTS

- **Exit point :** The point at which an object escapes the composite state or state machine, denoted by a circle with an X through it. The exit point is typically used if the process is not completed but has to be escaped for some error or other issue.

- **First state :** A marker for the first state in the process, shown by a dark circle with a transition arrow.

- **Guard :**A Boolean condition that allows or stops a transition, written above the transition arrow.

STATE DIAGRAM SYMBOLS AND COMPONENTS

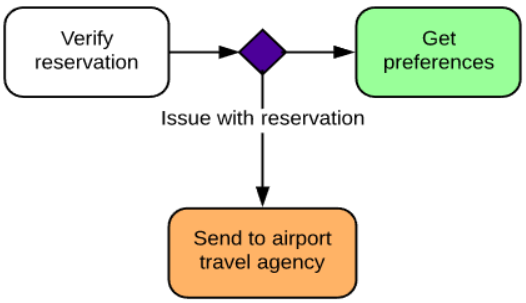
- **State :** A rectangle with rounded corners that indicates the current nature of an object.

- **Substate :** A state contained within a composite state's region. In the university state machine diagram, "Open for enrollment" is a substate in the larger "Enrollment" composite state.
- **Terminator :** A circle with a dot in it that indicates that a process is terminated.

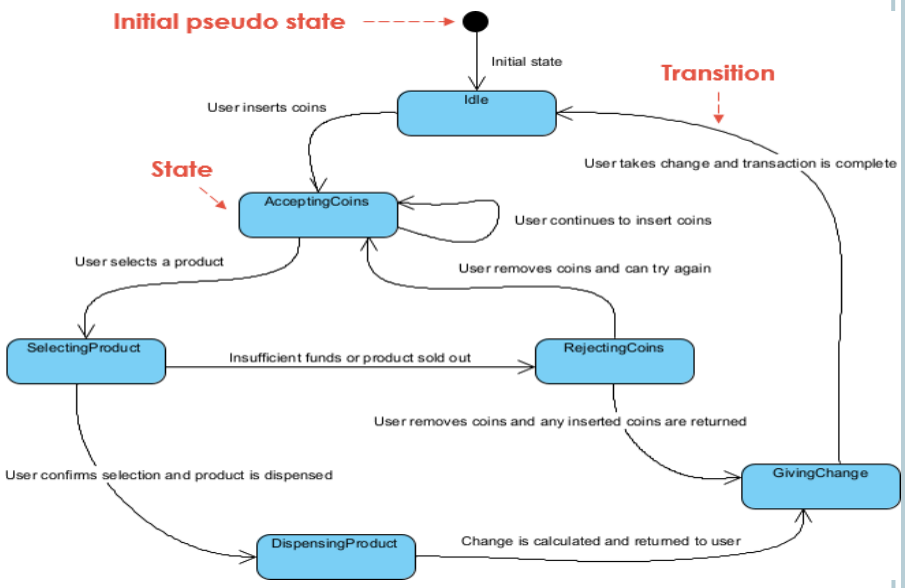
- **Transition:** An arrow running from one state to another that indicates a changing state.

STATE DIAGRAM SYMBOLS AND COMPONENTS

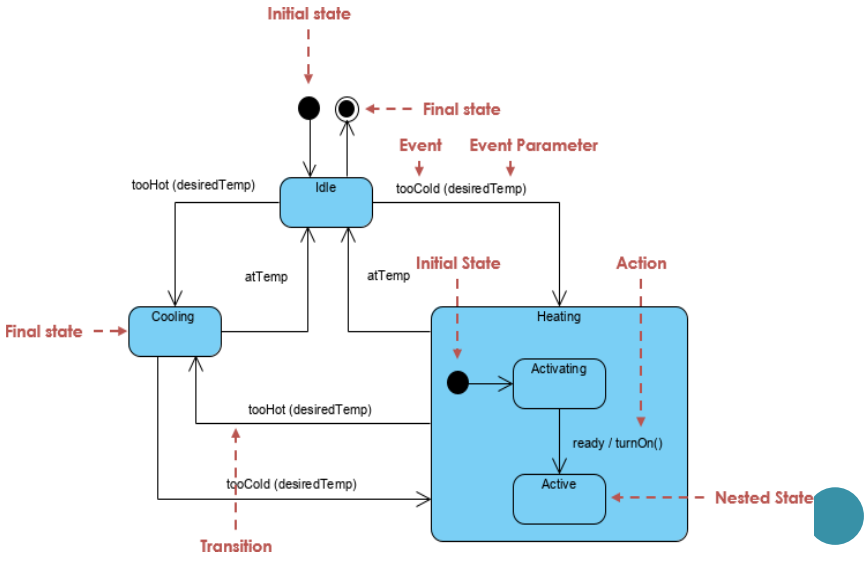
- **Transitional behavior :** A behavior that results when a state transitions, written above the transition arrow.
- **Trigger :** A type of message that actively moves an object from state to state, written above the transition arrow. In this example, "Issue with reservation" is the trigger that would send the person to the airport travel agency instead of the next step in the process.



STATE DIAGRAM EXAMPLE

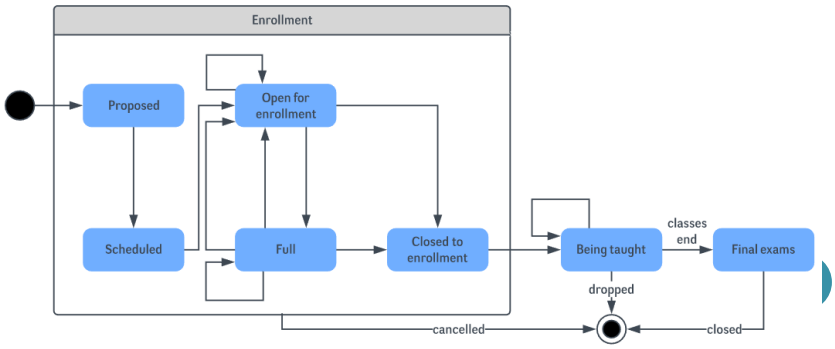


STATE DIAGRAM EXAMPLE

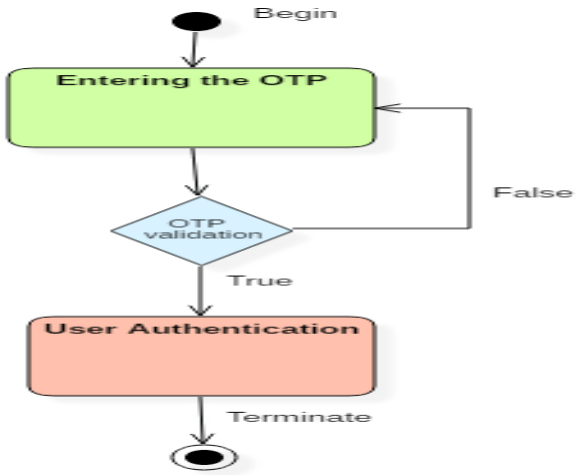


UNIVERSITY STATE DIAGRAM EXAMPLE

- This state diagram shows the process of enrollment and classes at a university. The composite state “Enrollment” is made up of various substates that will lead students through the enrollment process. Once the student has enrolled, they will proceed to “Being taught” and finally to “Final exams.”



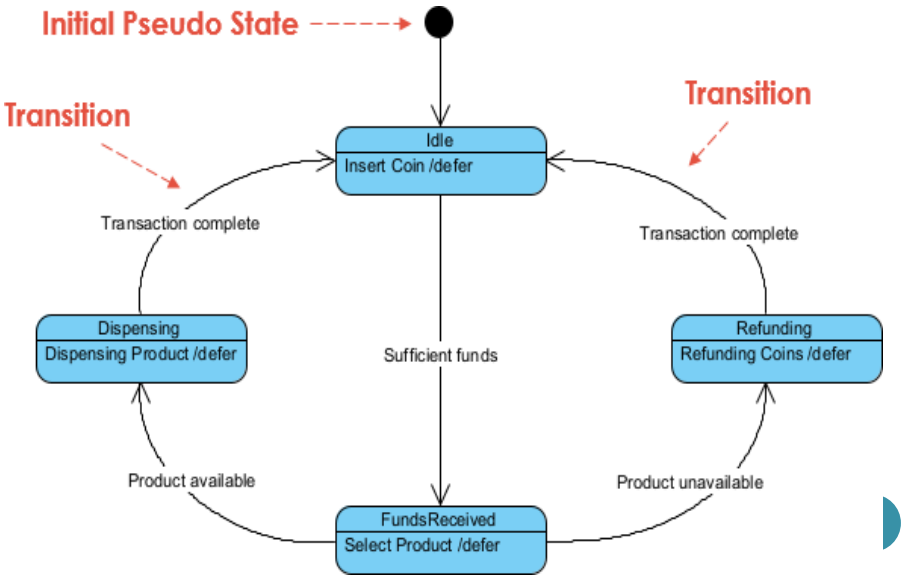
USER AUTHENTICATION PROCESS EXAMPLE



Similarities And Differences Between State Chart And Activity Diagrams

	State Chart Diagram	Activity Diagram
Purpose	Model reactive systems	Model non-reactive systems
Focus	Internal state of an object or system	Sequence of activities involved in a process or workflow
Elements	States, transitions, events	Activities, actions, transitions
Complexity	More complex	Less complex
Use cases	Embedded systems, control systems, real-time systems	Business processes, workflows, software processes

Modeling a Vending Machine by a State Chart



Modeling a Vending Machine by a Activity Diagram