MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
K.A.YASSAWI INTERNATIONAL KAZAKH-TURKISH UNIVERSITY
FACULTY OF NATURAL SCIENCE
DEPARTMENT OF ECOLOGY AND CHEMSTRY

The theme:

State diagram of single component system

Teacher of dicepline: Altynbekova M.O.
Prepared by: Asan Asel
Group : JHM-611F

Turkestan

Definitions: Components and Phases

Component - chemically recognizable species (Fe and C in carbon steel, H2O and NaCl in salted water). A binary alloy contains two components, a ternary alloy – three, etc.
Phase – a portion of a system that has uniform physical and chemical characteristics. Two distinct phases in a system have distinct physical or chemical characteristics (e.g. water and ice) and are separated from each other by definite phase boundaries. A phase may contain one or more components.
A single-phase system is called homogeneous, systems with two or more phases are mixtures or heterogeneous systems.
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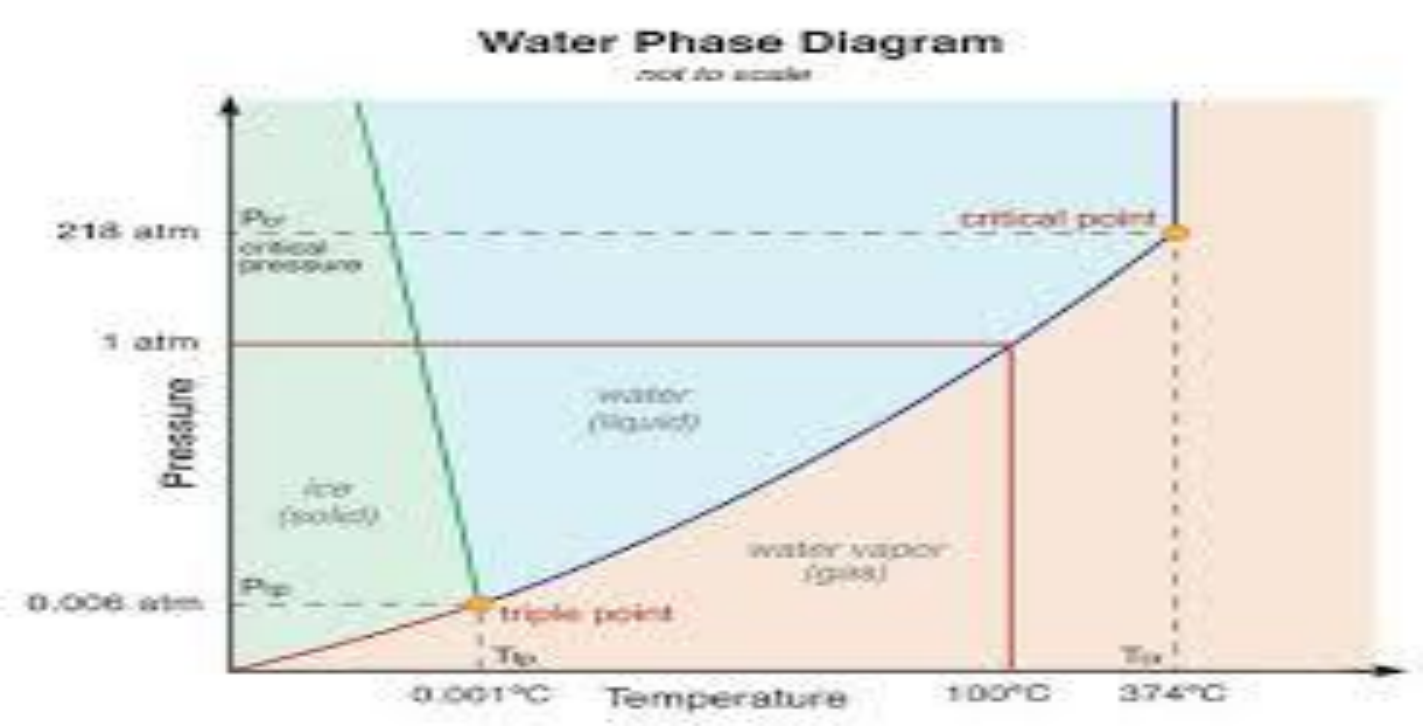
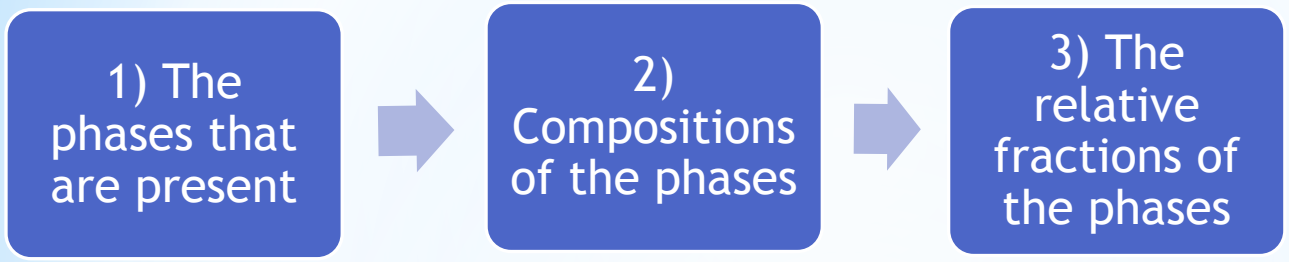
A phase diagram - graphical representation of the combinations of temperature, pressure, composition, or other variables for which specific phases exist at equilibrium.
For H2O, a typical diagram shows the temperature and pressure at which ice (solid),water (liquid) and steam (gas) Exis



Interpretation of Phase Diagrams

For a given temperature and composition we can use phase diagram to determine:



Finding the composition in a two phase region:

1. Locate composition and temperature in diagram
2. In two phase region draw the tie line or isotherm
3. Note intersection with phase boundaries. Read compositions at the intersections.

The liquid and solid phases have these compositions.

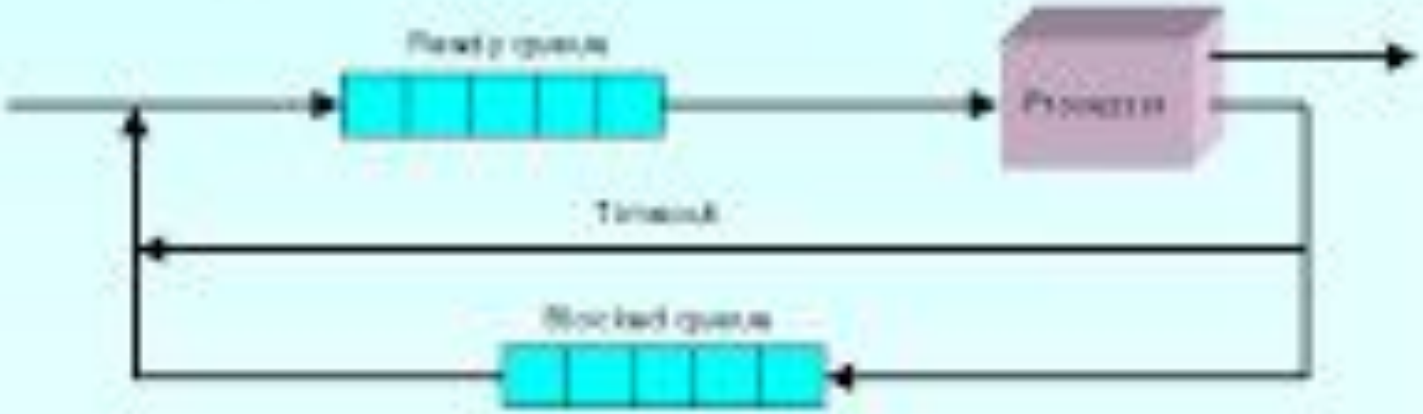
32.1 State Transition Diagram

- A state transition diagram shows the states of a single object, the events or the messages that cause a transition from one state to another and the action that result from a state change.
- A state transition diagram will not be created for every class in the system.

Components of State Transition Diagram:

- Start State
- Stop state
- State Transition

Process State Transition Diagram



32.2 Semantics of every components

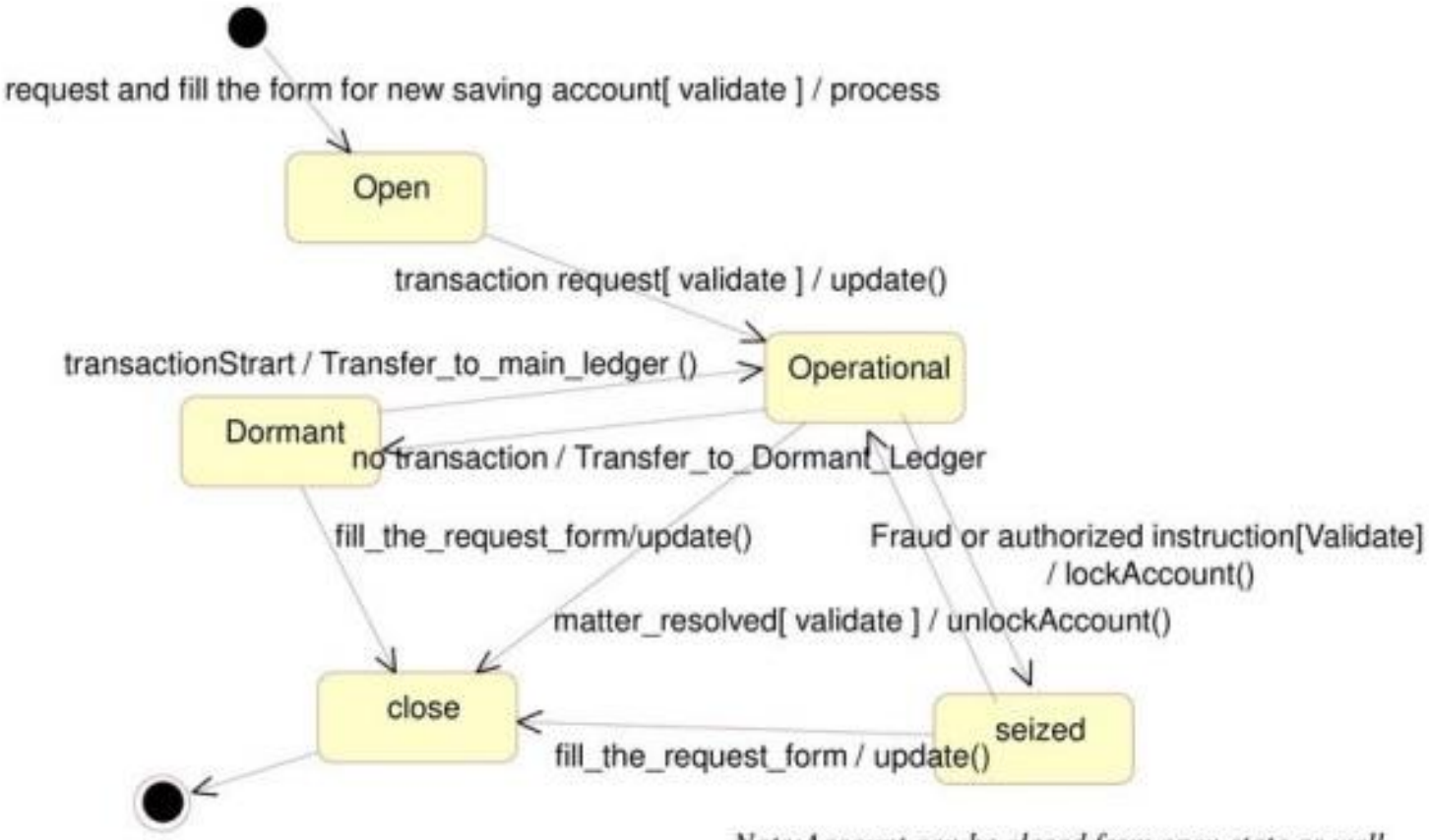
State: A state is a condition during the life of an object when it satisfies some condition, performs some action, or waits for an event. The UML notation for a state is a rectangle with rounded corners.

Special states: There are two special states.

Start state: Each state diagram must have one and only one start state. Notation for start state is "filled solid circle".

Stop State: An object can have multiple stop states. Notation for stop state is bull's eye.

32.5 State Transition Diagram for Account class



Note:Account can be closed from open state as well

32.6 More about State Diagram:

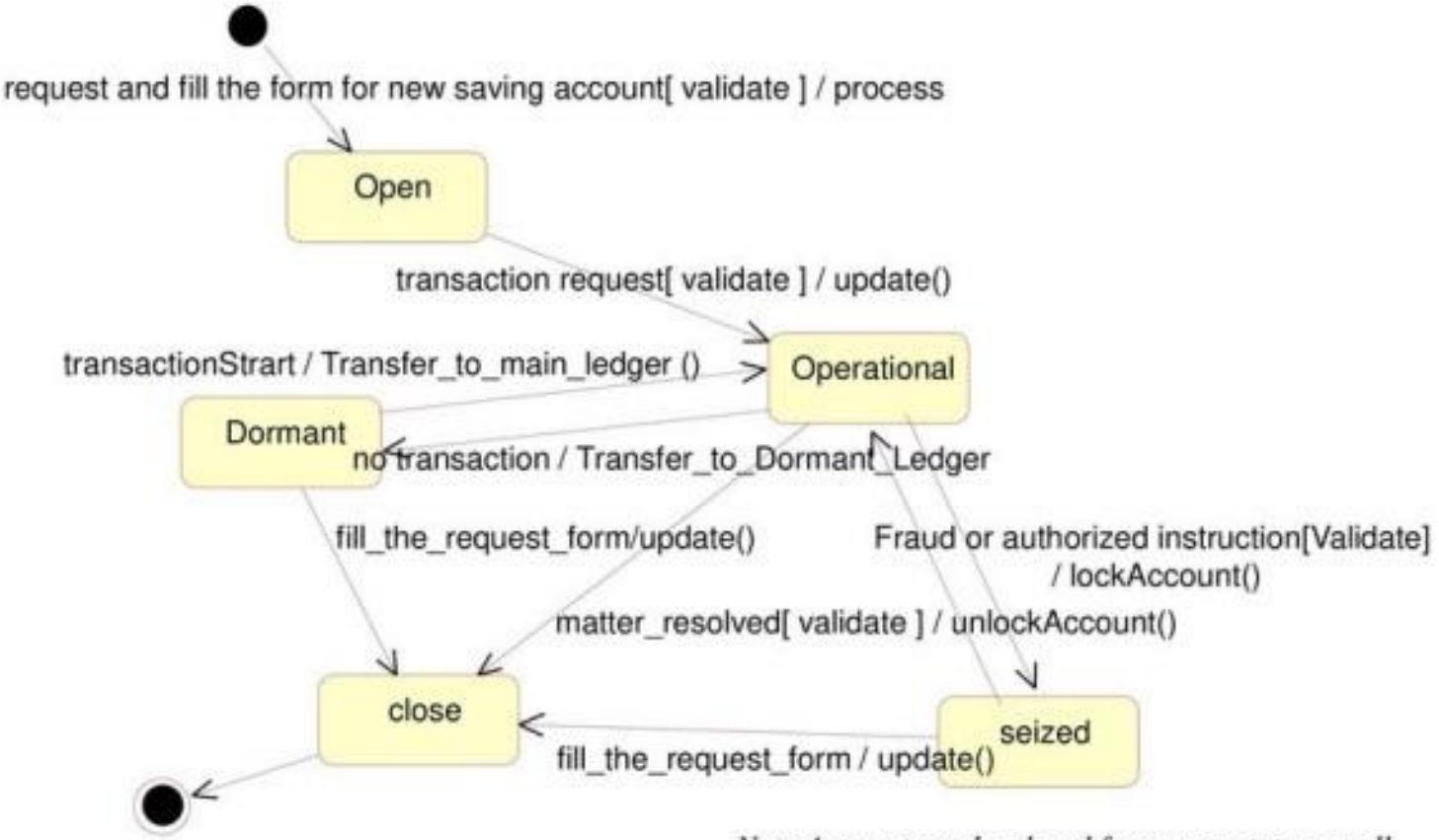
- A state diagram will not be created for every class.
- state diagrams are used only for those classes that exhibit interesting behavior.
- State diagrams are also useful to investigate the behavior of user interface and control classes.
- State diagram are used to show dynamics of a individual class

32.7 Activity Diagram

It is a special kind of state diagram and is worked out at use case level.

- These are mainly targeted towards representing internal behavior of a use case.
- Flowcharts are normally limited to sequential process; activity diagrams can handle parallel process.
- Activity diagrams are recommended in the following situations:
  - Analyzing use case
  - Dealing with multithreaded application
  - Understanding workflow across many use cases.

32.5 State Transition Diagram for Account class



Note:Account can be closed from open state as well

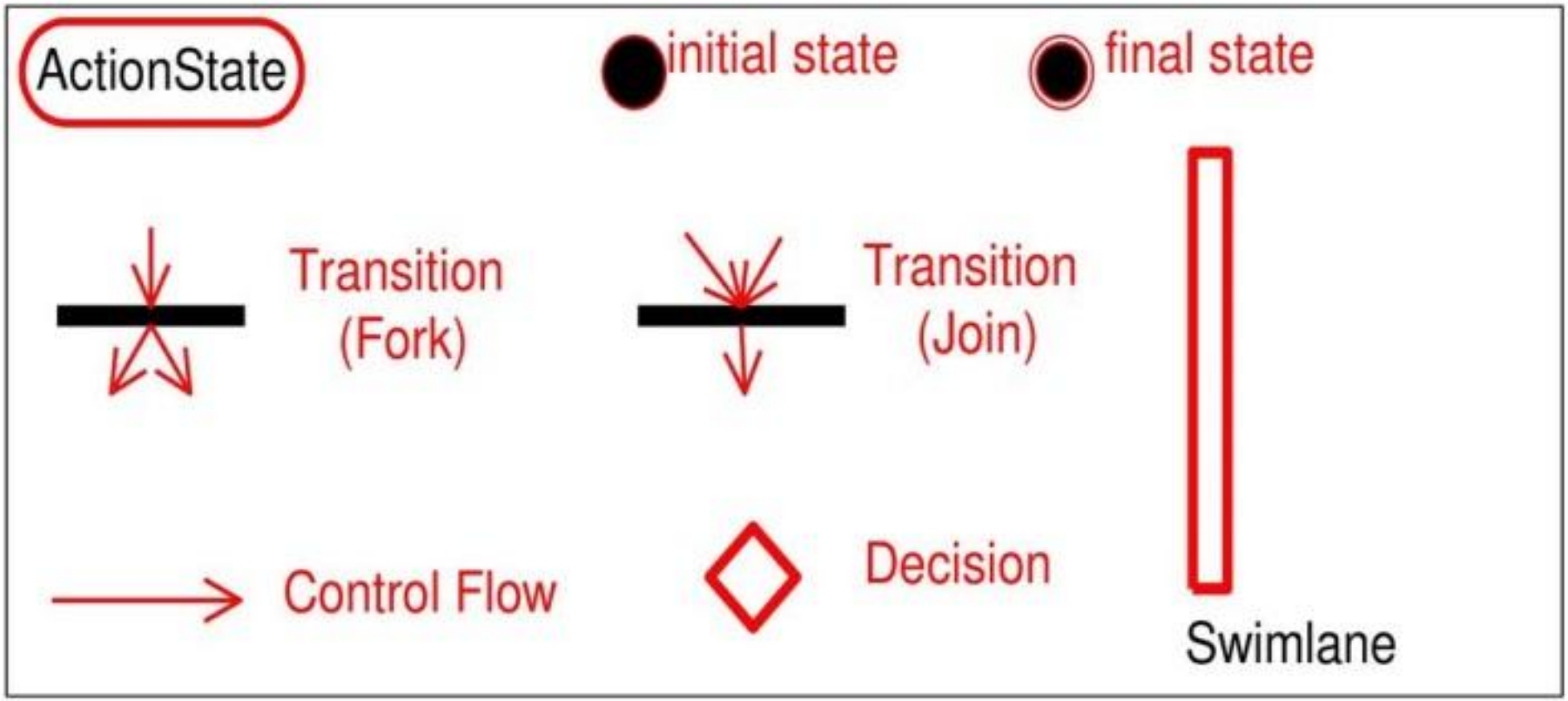
32.8 Activity Diagram Contd..

- Activity diagrams show the flow of control between activities
  - They can model the sequential and concurrent steps in a computational process
  - They can also model the flow of an object as it moves from state to state at different points in the activity

32.9 When we use an activity diagram ?

- we can choose the order in which to do things.
- It expresses the essential sequencing rules to follow.
- It is different from a flow chart in that it shows parallel processes, not just sequential processes.
- Shows a set of activities, the flow from activity to activity.
- Represents the dynamic view of a system.
- Models the function of a system

32.10 Activity Diagram Symbols



32.11 Modelling an Operation

- Collect the abstractions that are involved in this operation. This includes the operation‘s parameters, the attributes of eh enclosing class, and certain neighbouring classes.
- Identify the preconditions at the operation‘s initial state and the post conditions at the operation‘s final state.

32.12 Modelling an Operation contd..

- Begin at the operation‘s initial state, specify the activities and actions that take place over time and render them in the activity diagram as their activity states and action states.
- Use branching as necessary to specify conditional paths and iteration.
- If this operation is owned by an active class, use forking and joining as necessary to specify parallel flows of control.

32.13 Activity Diagram for date to date : Log in of a subscriber