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The theme:

State diagram of single component system

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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



Yair Amer

Fall 997 Lecture 2

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



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.

