

UML BEHAVIOURAL DIAGRAMS

http://www.tutorialspoint.com/object_oriented_analysis_design/ooad_uml_behavioural_diagrams.htm

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UML behavioral diagrams visualize, specify, construct, and document the dynamic aspects of a system. The behavioral diagrams are categorized as follows: use case diagrams, interaction diagrams, state-chart diagrams, and activity diagrams.

Use Case Model

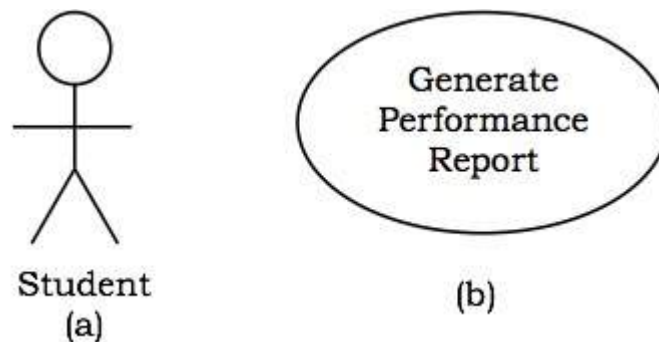
a Use case

A use case describes the sequence of actions a system performs yielding visible results. It shows the interaction of things outside the system with the system itself. Use cases may be applied to the whole system as well as a part of the system.

b Actor

An actor represents the roles that the users of the use cases play. An actor may be a person *e. g. student, customer*, a device *e. g. workstation*, or another system *e. g. bank, institution*.

The following figure shows the notations of an actor named Student and a use case called Generate Performance Report.



c Use case diagrams

Use case diagrams present an outside view of the manner the elements in a system behave and how they can be used in the context.

Use case diagrams comprise of:

- Use cases
- Actors
- Relationships like dependency, generalization, and association

Use case diagrams are used:

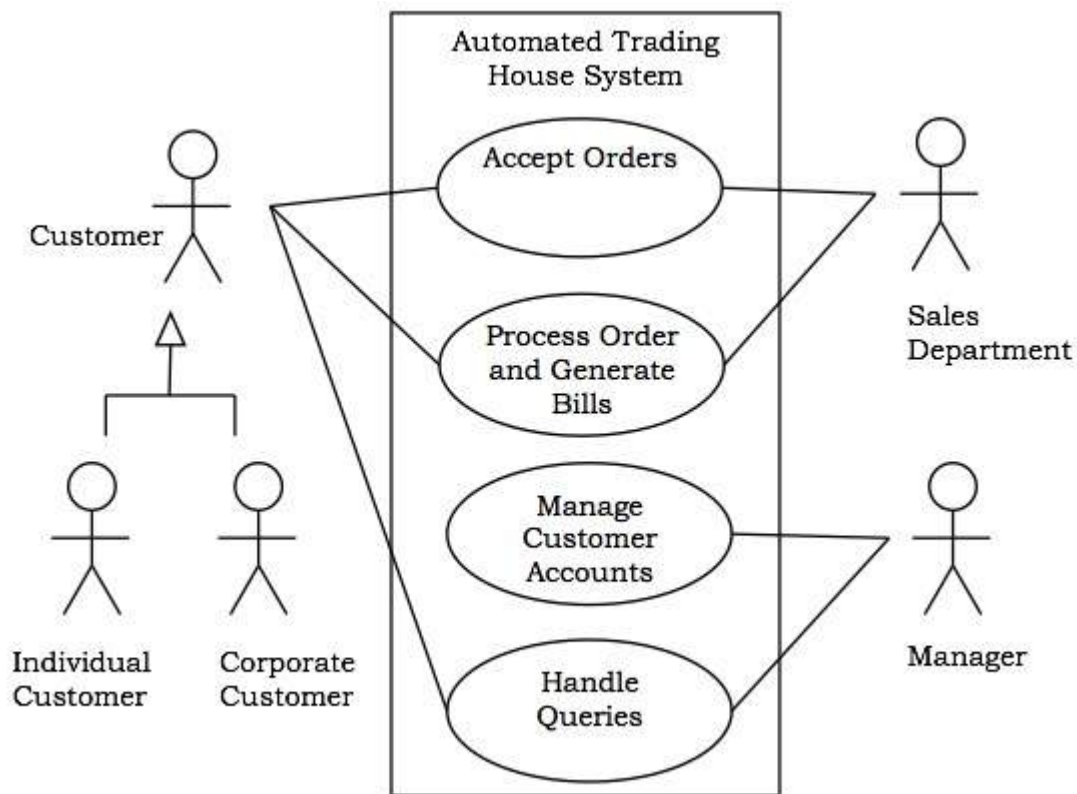
- To model the context of a system by enclosing all the activities of a system within a rectangle and focusing on the actors outside the system by interacting with it.
- To model the requirements of a system from the outside point of view.

Example

Let us consider an Automated Trading House System. We assume the following features of the system:

- The trading house has transactions with two types of customers, individual customers and corporate customers.

- Once the customer places an order, it is processed by the sales department and the customer is given the bill.
- The system allows the manager to manage customer accounts and answer any queries posted by the customer.



Interaction Diagrams

Interaction diagrams depict interactions of objects and their relationships. They also include the messages passed between them. There are two types of interaction diagrams:

- Sequence Diagrams
- Collaboration Diagrams

Interaction diagrams are used for modeling:

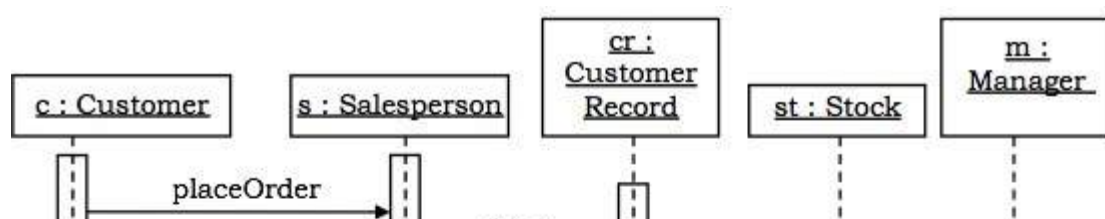
- the control flow by time ordering using sequence diagrams.
- the control flow of organization using collaboration diagrams.

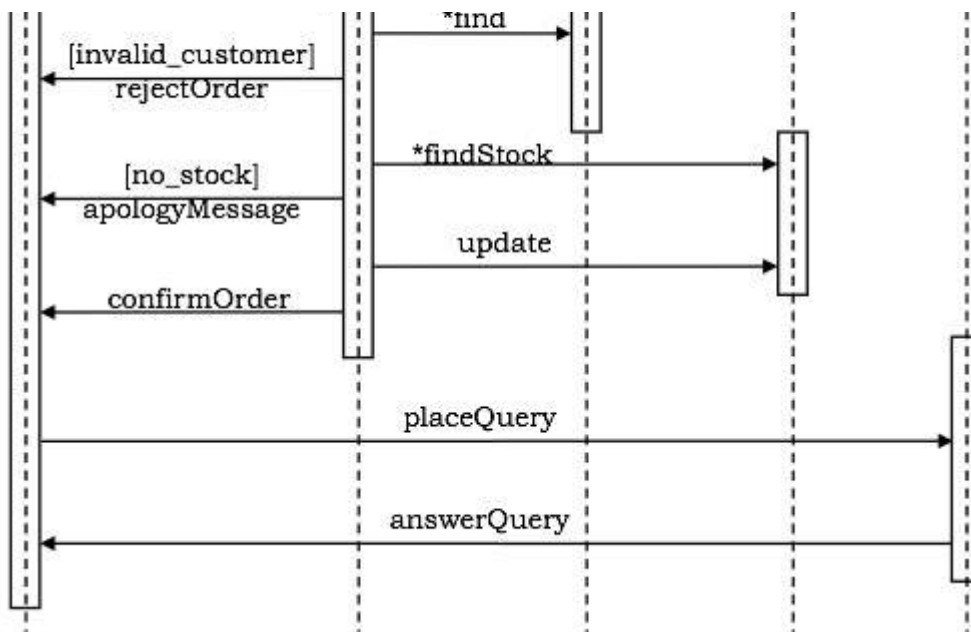
Sequence Diagrams

Sequence diagrams are interaction diagrams that illustrate the ordering of messages according to time.

Notations : These diagrams are in the form of two-dimensional charts. The objects that initiate the interaction are placed on the x-axis. The messages that these objects send and receive are placed along the y-axis, in the order of increasing time from top to bottom.

Example : A sequence diagram for the Automated Trading House System is shown in the following figure.



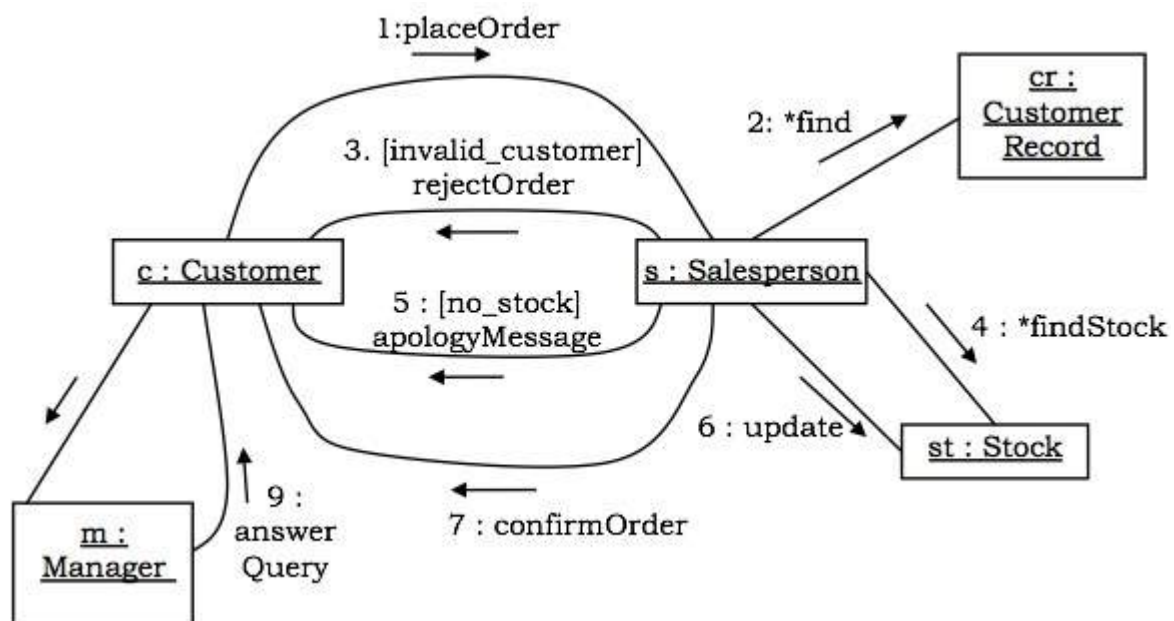


Collaboration Diagrams

Collaboration diagrams are interaction diagrams that illustrate the structure of the objects that send and receive messages.

Notations : In these diagrams, the objects that participate in the interaction are shown using vertices. The links that connect the objects are used to send and receive messages. The message is shown as a labeled arrow.

Example : Collaboration diagram for the Automated Trading House System is illustrated in the figure below.



State-Chart Diagrams

A state-chart diagram shows a state machine that depicts the control flow of an object from one state to another. A state machine portrays the sequences of states which an object undergoes due to events and their responses to events.

State-Chart Diagrams comprise of:

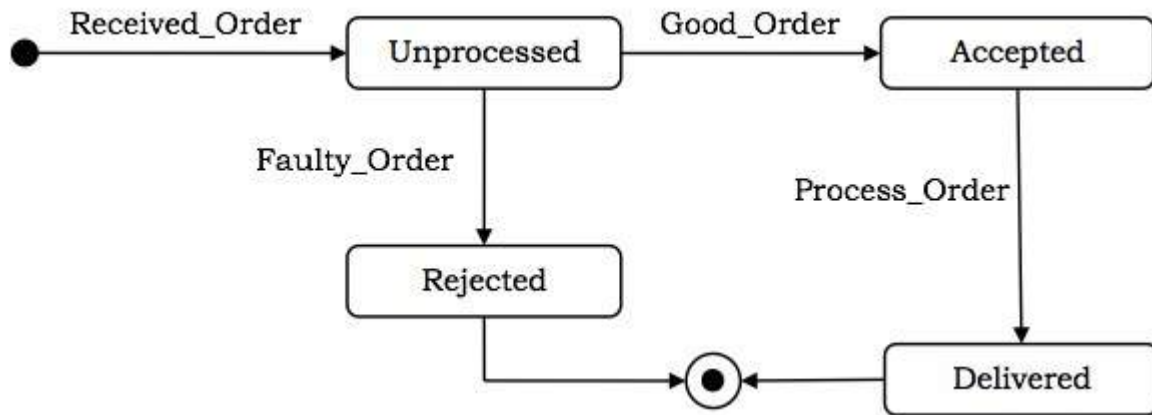
- States: Simple or Composite
- Transitions between states
- Events causing transitions

- Actions due to the events

State-chart diagrams are used for modeling objects which are reactive in nature.

Example

In the Automated Trading House System, let us model Order as an object and trace its sequence. The following figure shows the corresponding state-chart diagram.



Activity Diagrams

An activity diagram depicts the flow of activities which are ongoing non-atomic operations in a state machine. Activities result in actions which are atomic operations.

Activity diagrams comprise of:

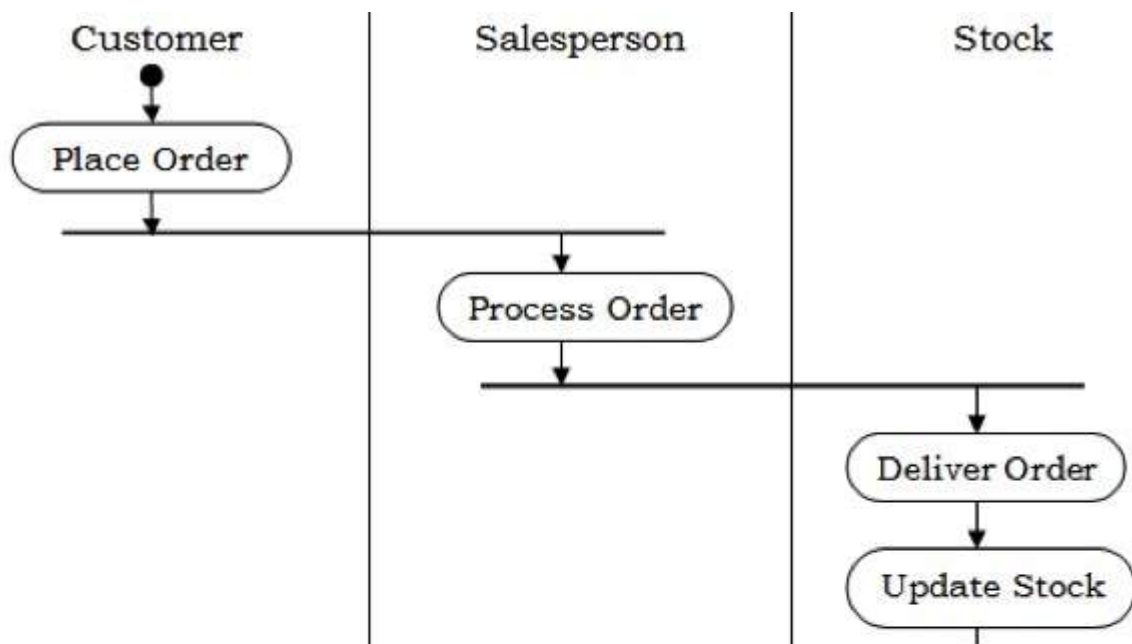
- Activity states and action states
- Transitions
- Objects

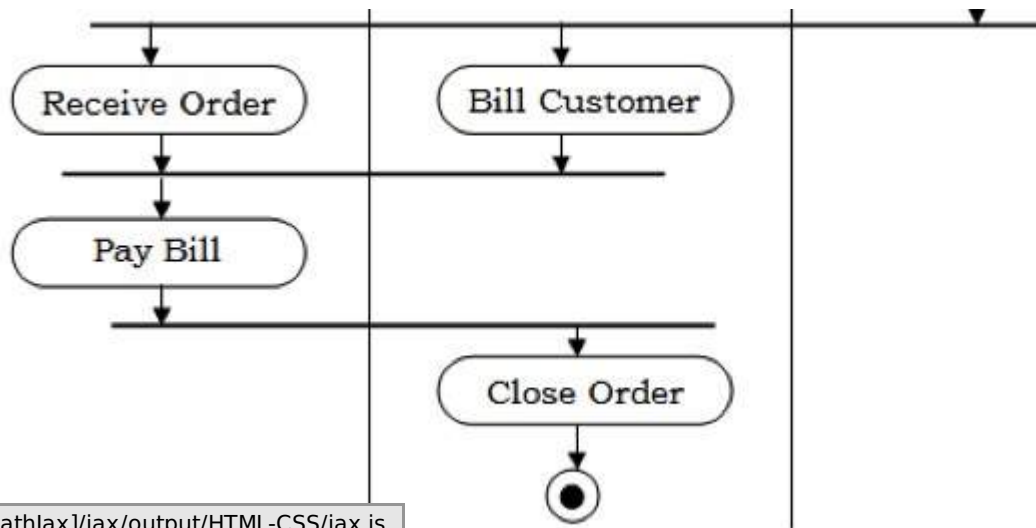
Activity diagrams are used for modeling:

- workflows as viewed by actors, interacting with the system.
- details of operations or computations using flowcharts.

Example

The following figure shows an activity diagram of a portion of the Automated Trading House System.





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