UML - USE CASE DIAGRAMS

Overview:

To model a system the most important aspect is to capture the dynamic behaviour. To clarify a bit in details, *dynamic behaviour* means the behaviour of the system when it is running /operating.

So only static behaviour is not sufficient to model a system rather dynamic behaviour is more important than static behaviour. In UML there are five diagrams available to model dynamic nature and use case diagram is one of them. Now as we have to discuss that the use case diagram is dynamic in nature there should be some internal or external factors for making the interaction.

These internal and external agents are known as actors. So use case diagrams are consists of actors, use cases and their relationships. The diagram is used to model the system/subsystem of an application. A single use case diagram captures a particular functionality of a system.

So to model the entire system numbers of use case diagrams are used.

Purpose:

The purpose of use case diagram is to capture the dynamic aspect of a system. But this definition is too generic to describe the purpose.

Because other four diagrams $activity, sequence, collaborationandStatechart$ are also having the same purpose. So we will look into some specific purpose which will distinguish it from other four diagrams.

Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. So when a system is analyzed to gather its functionalities use cases are prepared and actors are identified.

Now when the initial task is complete use case diagrams are modelled to present the outside view.

So in brief, the purposes of use case diagrams can be as follows:

- Used to gather requirements of a system.
- Used to get an outside view of a system.
- Identify external and internal factors influencing the system.
- Show the interacting among the requirements are actors.

How to draw Use Case Diagram?

Use case diagrams are considered for high level requirement analysis of a system. So when the requirements of a system are analyzed the functionalities are captured in use cases.

So we can say that uses cases are nothing but the system functionalities written in an organized manner. Now the second things which are relevant to the use cases are the actors. Actors can be defined as something that interacts with the system.

The actors can be human user, some internal applications or may be some external applications. So in a brief when we are planning to draw an use case diagram we should have the following items identified.

- Functionalities to be represented as an use case
- Actors
- Relationships among the use cases and actors.

Use case diagrams are drawn to capture the functional requirements of a system. So after identifying the above items we have to follow the following guidelines to draw an efficient use case diagram.

- The name of a use case is very important. So the name should be chosen in such a way so that it can identify the functionalities performed.
- Give a suitable name for actors.
- Show relationships and dependencies clearly in the diagram.
- Do not try to include all types of relationships. Because the main purpose of the diagram is to identify requirements.
- Use note when ever required to clarify some important points.

The following is a sample use case diagram representing the order management system. So if we look into the diagram then we will find three use cases *Order, SpecialOrderandNormalOrder* and one actor which is customer.

The *SpecialOrder* and *NormalOrder* use cases are extended from *Order* use case. So they have extends relationship. Another important point is to identify the system boundary which is shown in the picture. The actor *Customer* lies outside the system as it is an external user of the system.

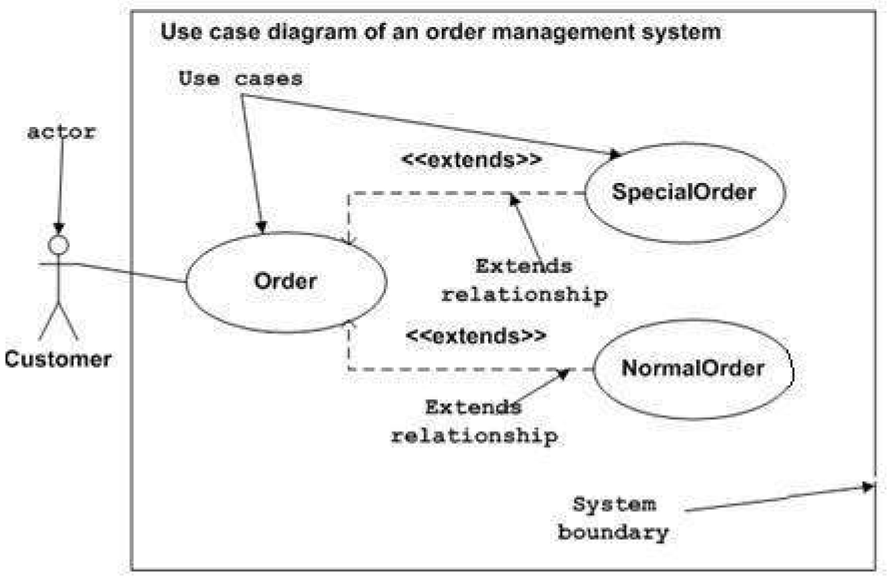

Figure: Sample Use Case diagram

Where to Use Case Diagrams?

As we have already discussed there are five diagrams in UML to model dynamic view of a system. Now each and every model has some specific purpose to use. Actually these specific purposes are different angles of a running system.

So to understand the dynamics of a system we need to use different types of diagrams. Use case diagram is one of them and its specific purpose is to gather system requirements and actors.

Use case diagrams specify the events of a system and their flows. But use case diagram never describes how they are implemented. Use case diagram can be imagined as a black box where only the input, output and the function of the black box is known.

These diagrams are used at a very high level of design. Then this high level design is refined again and again to get a complete and practical picture of the system. A well structured use case also describes the pre condition, post condition, exceptions. And these extra elements are used to make test cases when performing the testing.

Although the use cases are not a good candidate for forward and reverse engineering but still they are used in a slight different way to make forward and reverse engineering. And the same is true for reverse engineering. Still use case diagram is used differently to make it a candidate for reverse engineering.

In forward engineering use case diagrams are used to make test cases and in reverse engineering use cases are used to prepare the requirement details from the existing application.

So the following are the places where use case diagrams are used:

- Requirement analysis and high level design.
- Model the context of a system.
- Reverse engineering.
- Forward engineering