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Lab Experiment No.1

Develop UML Use case model for a problem

Objective :

To understand the users view of a project using Use case Diagram
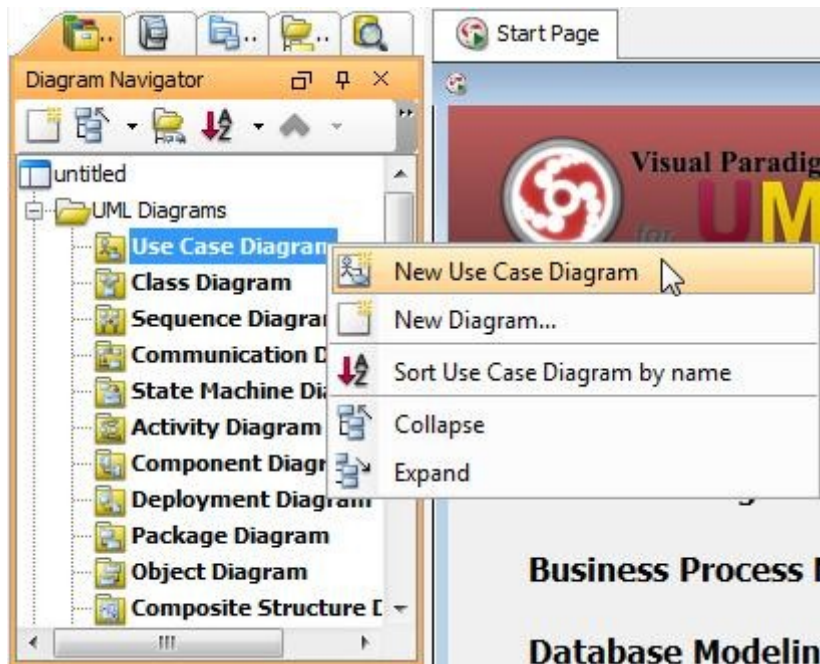
Software Required :-

Visual Paradigm for UML 8.2

Procedure:-

You can draw use case diagrams in VP-UML as well as to document the event flows of use cases using the flow-of-events editor of UML 8.2 .The steps are as follows.
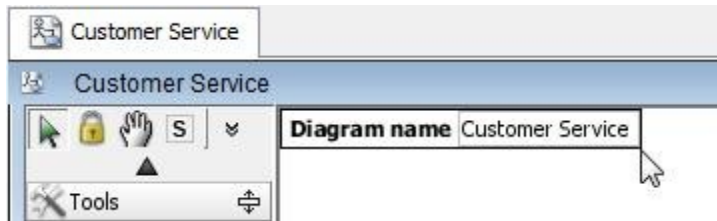
Step 1:

Right click **Use Case Diagram** on **Diagram Navigator** and select **New Use Case Diagram** from the pop-up menu.
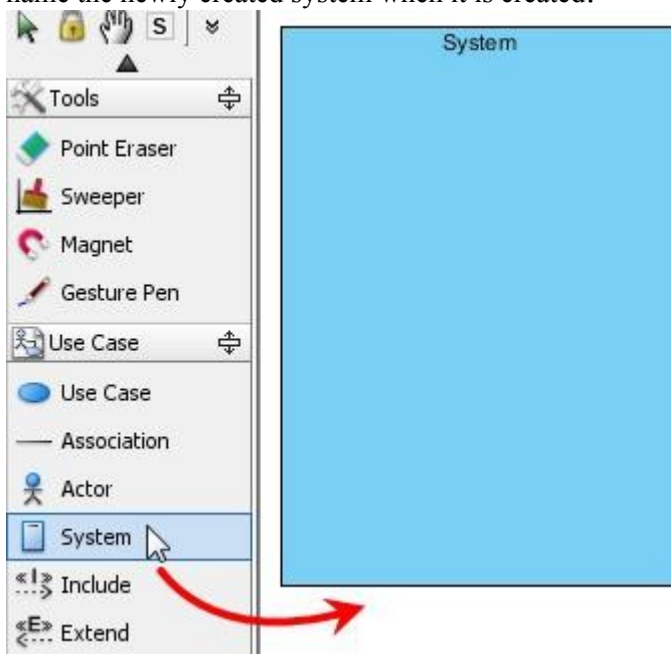
Step 2:-

Enter name for the newly created use case diagram in the text field of pop-up box on the top left corner.
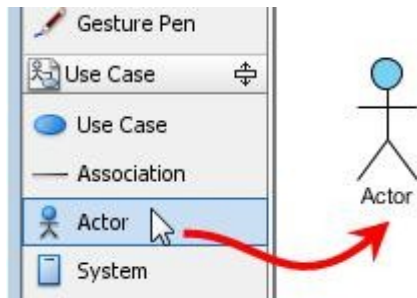
Step 3:

Drawing a system

To create a system, select **System** on the diagram toolbar and then click it on the diagram pane. Finally, name the newly created system when it is created.

Step 4:

Drawing an actor

To draw an actor, select **Actor** on the diagram toolbar and then click it on the diagram pane. Finally, name the newly created actor when it is created.

Step 5:-

Drawing a use case
Besides creating a use case through diagram toolbar, you can also create it through resource icon.

Move the mouse over a shape and press a resource icon that can create use case. Drag it and then release the mouse button until it reaches to your preferred place. The source shape and the newly created use case are connected. Finally, name the newly created use case.
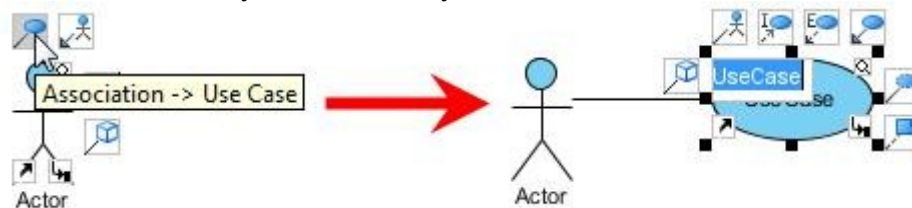
Step 6:-

Create a use case through resource icon
Line wrapping use case name
If a use case is too wide, for a better outlook, you may resize it by dragging the filled selectors. As a result, the name of use case will be line-wrapped automatically.
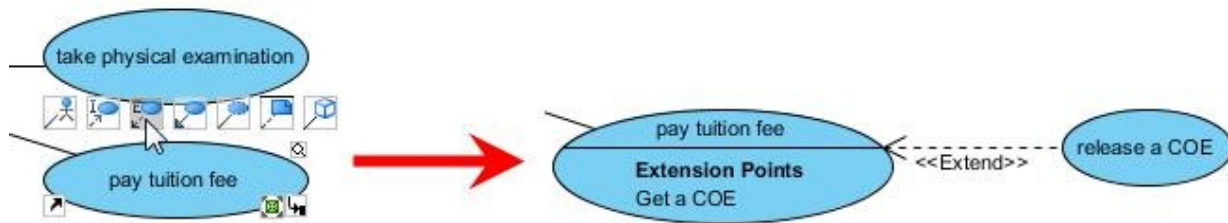

Step 7:

Resize a use case
To create an extend relationship, move the mouse over a use case and press its resource icon **Extend -> Use Case**. Drag it to your preferred place and then release the mouse button. The use case with extension points and a newly created use case are connected. After you name the newly created use case, a pop-

up dialog box will ask whether you want the extension point to follow the name of use case. Click **Yes** if you want it to do so; click **NO** if you want to enter another name for extension point.
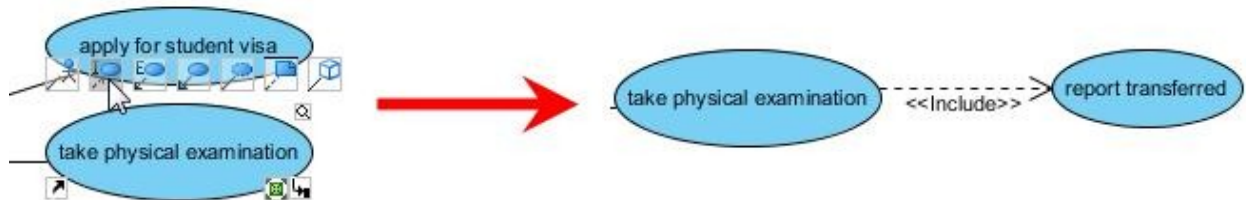
Step 8:

Create an extend relationship
Drawing <<Include>> relationship

To create an include relationship, mouse over a use case and press its resource icon **Include -> Use Case**. Drag it to your preferred place and then release the mouse button. A new use case together with an include relationship is created. Finally, name the newly created use case.
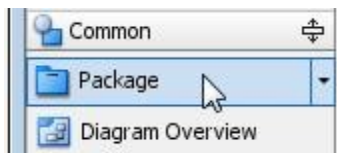
Step 9:

Include relationship is created
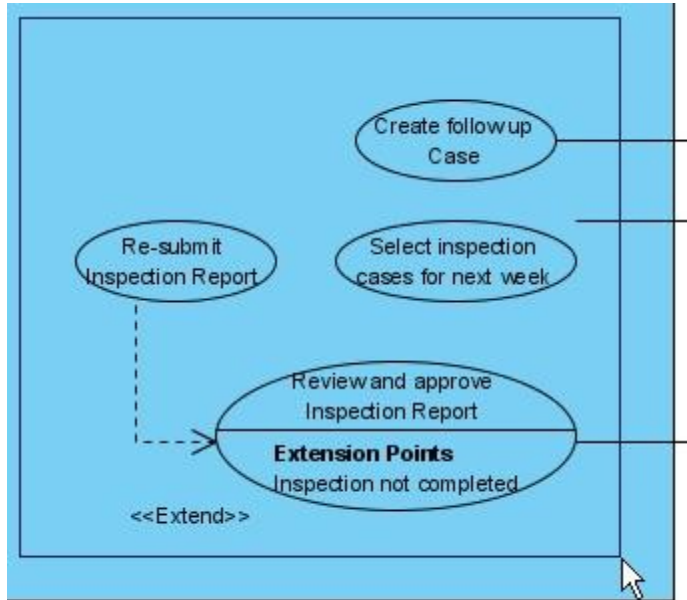Structuring use cases with package

You can organize use cases with package when there are many of them on the diagram.
Select **Package** on the diagram toolbar (under **Common** category).
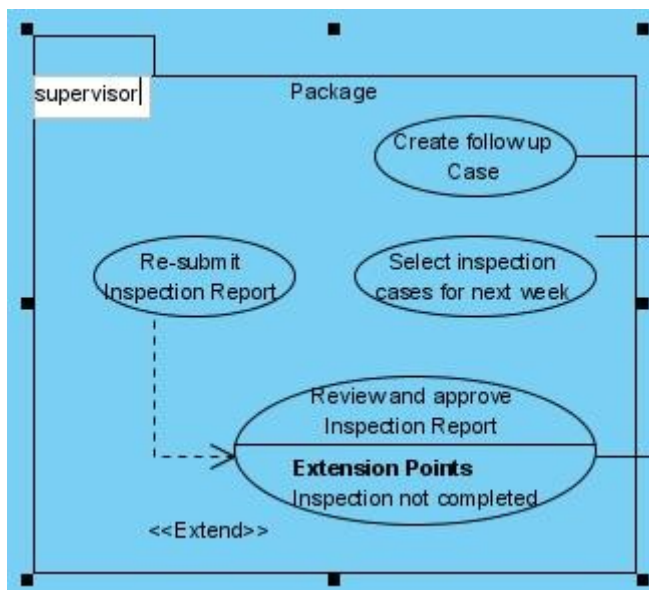
Step 10:

Create a package
Drag the mouse to create a package surrounding those use cases.

Step 11:

Surround use cases with package
Finally, name the package.

Step 12

Name the package

Assigning IDs to actors/Use cases

You may assign IDs to actors and use cases. By default, IDs are assigned with the order of object creation, starting from one onwards. However, you can define the format or even enter an ID manually.

Defining the format of ID

To define the format of ID, select **Tools > Options** from the main menu to unfold the **Options** dialog box. Select **Diagramming** from the list on the left hand side and select the **Use Case Diagram** tab on the right hand side. You can adjust the format of IDs under **Use Case Diagram** tab. The format of ID consists of prefix, number of digits and suffix.
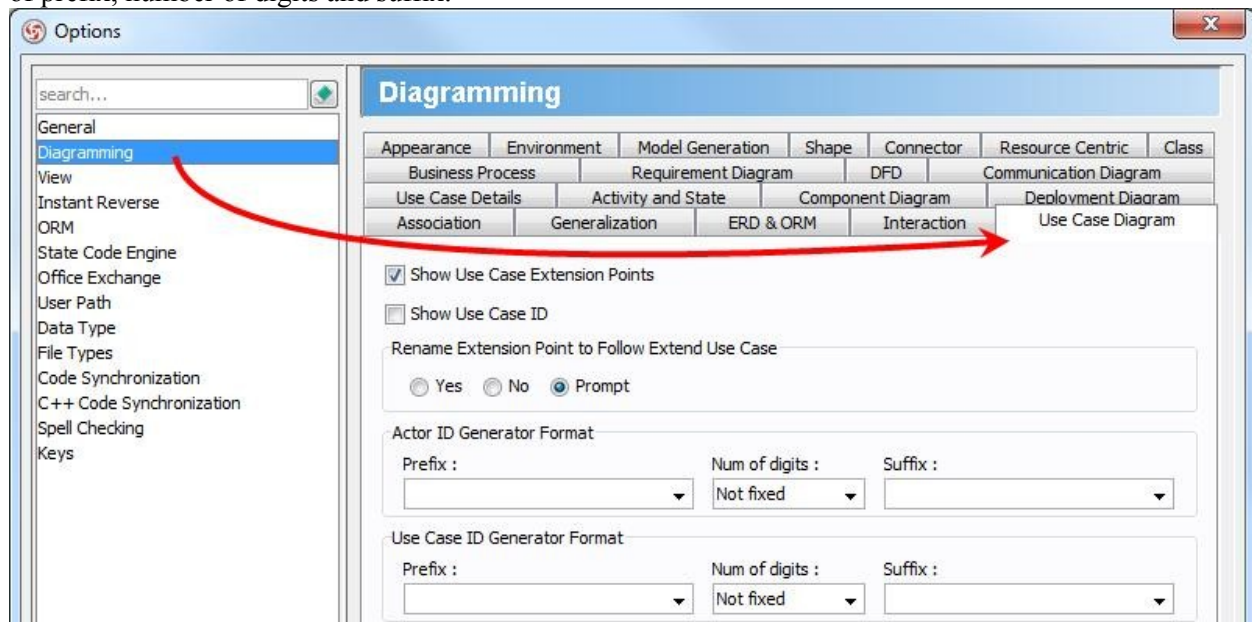
Step 13:

Use Case Diagram tab

The description of options for ID generator format is shown below.

| Option	Description
Prefix	The prefix you enter in **Prefix** text field will be inserted before the number.
Num of digits	The number of digits for the number. For example, when digit is 3, ID "1" will become "001".

Suffix   The suffix you enter in **Suffix** text field will be inserted behind the number.

Options for formatting ID

Showing ID on diagram

By default, ID is just a text property. It usually doesn't appear on diagram. However, you can make it shown within a use case.

Right click on the diagram background, select **Presentation Options** and the specific model element display option from the pop-up menu.
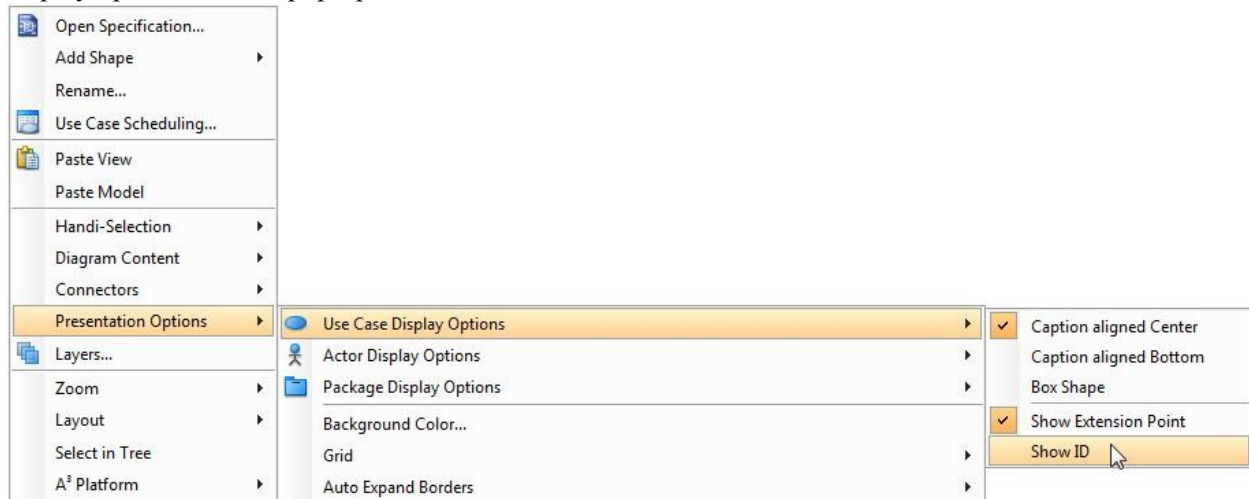
Step 14 :

Show ID on diagram

As a result, the use case is displayed with ID.

A use case with ID displayed

NOTE: The feature of showing ID does only support for use case, but not for actor.

ID assignment

There are several ways that you can assign an ID to a model element, including:

- Through the specification dialog box (Right click on the selected model element and select **Open Specification...** from the pop-up menu)
- Through the **Property Pane**

  Drawing business use case

1. Right click on a use case and select **Model Element Properties > Business Model** from the pop-up menu.
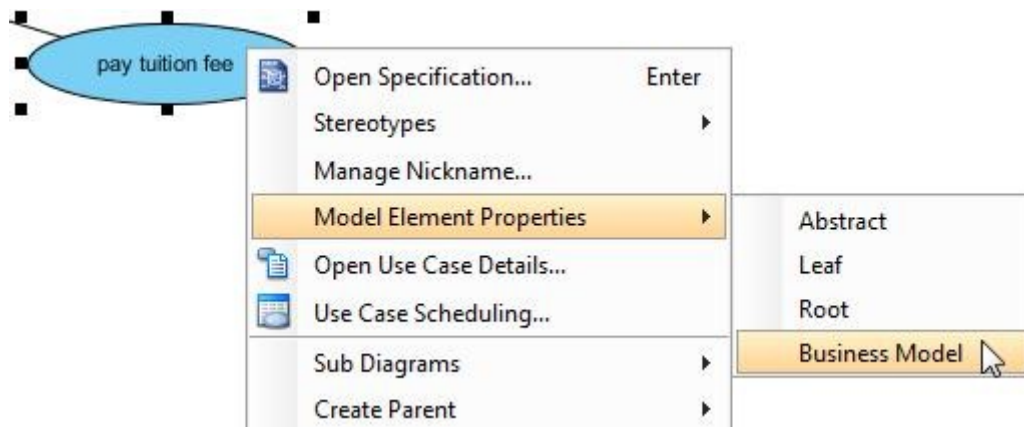
Step 15:

1. Click **Business Model**

2. After selected, an extra slash will be shown on the left edge of the use case.

Business model

And Finally The Use case Diagram is ready.

Conclusion :-

Lab Experiment No.2

Develop sequence diagram

<u>Objective :</u>

To understand the interactions between objects that are represented as lifelines in a sequential order of a project using Sequence Diagram.
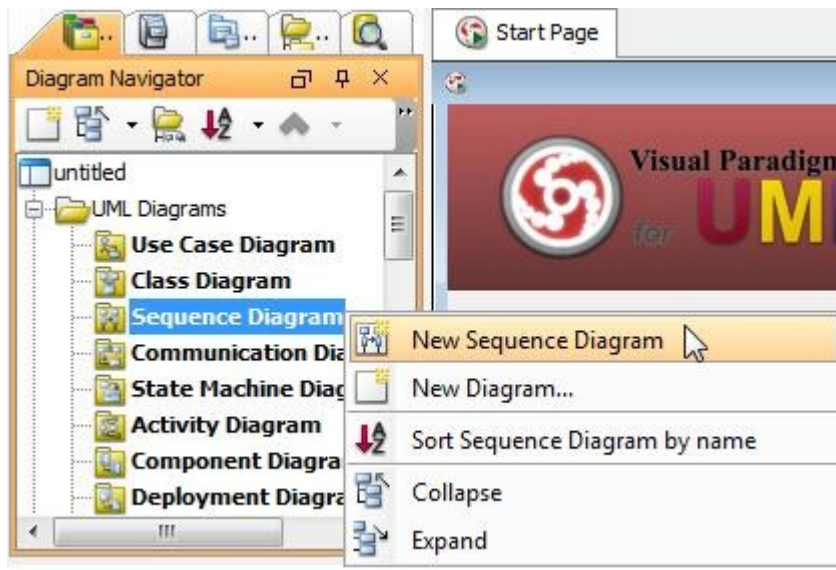
<u>Software Required :-</u>

Visual Paradigm for UML 8.2

<u>Procedure :-</u>

A sequence diagram is used primarily to show the interactions between objects that are represented as lifelines in a sequential order.

Step 1:-

Right click **Sequence diagram** on **Diagram Navigator** and select **New Sequence Diagram** from the pop-up menu to create a sequence diagram.

Step 2:-

Enter name for the newly created sequence diagram in the text field of pop-up box on the top left corner.
Creating actor
To create actor, click **Actor** on the diagram toolbar and then click on the diagram.
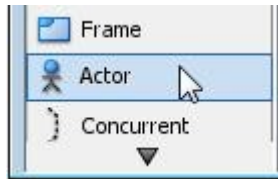
Creating lifeline

To create lifeline, you can click **LifeLine** on the diagram toolbar and then click on the diagram. Alternatively, a much quicker and more efficient way is to use the resource-centric interface. Click on the **Message** -> **LifeLine** resource beside an actor/lifeline and drag.
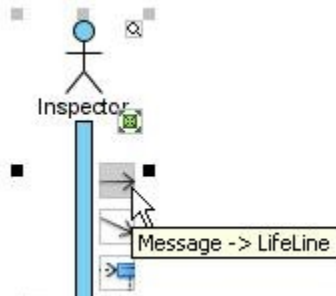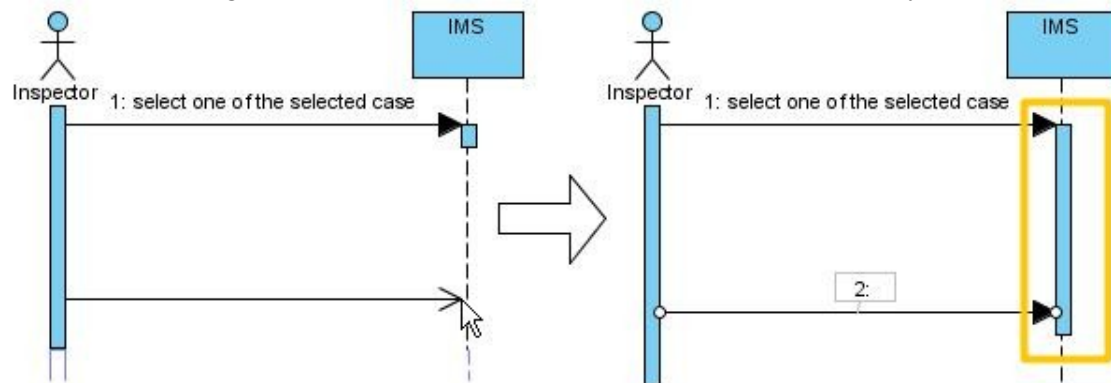

Step 3:-

Move the mouse to empty space of the diagram and then release the mouse button. A new lifeline will be created and connected to the actor/lifeline with a message.
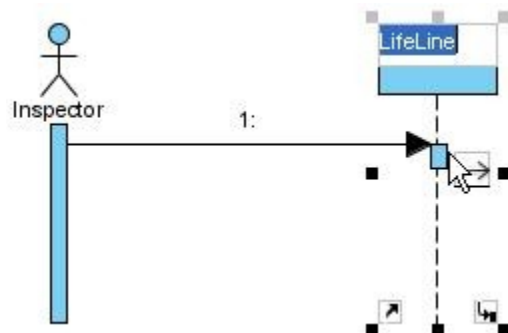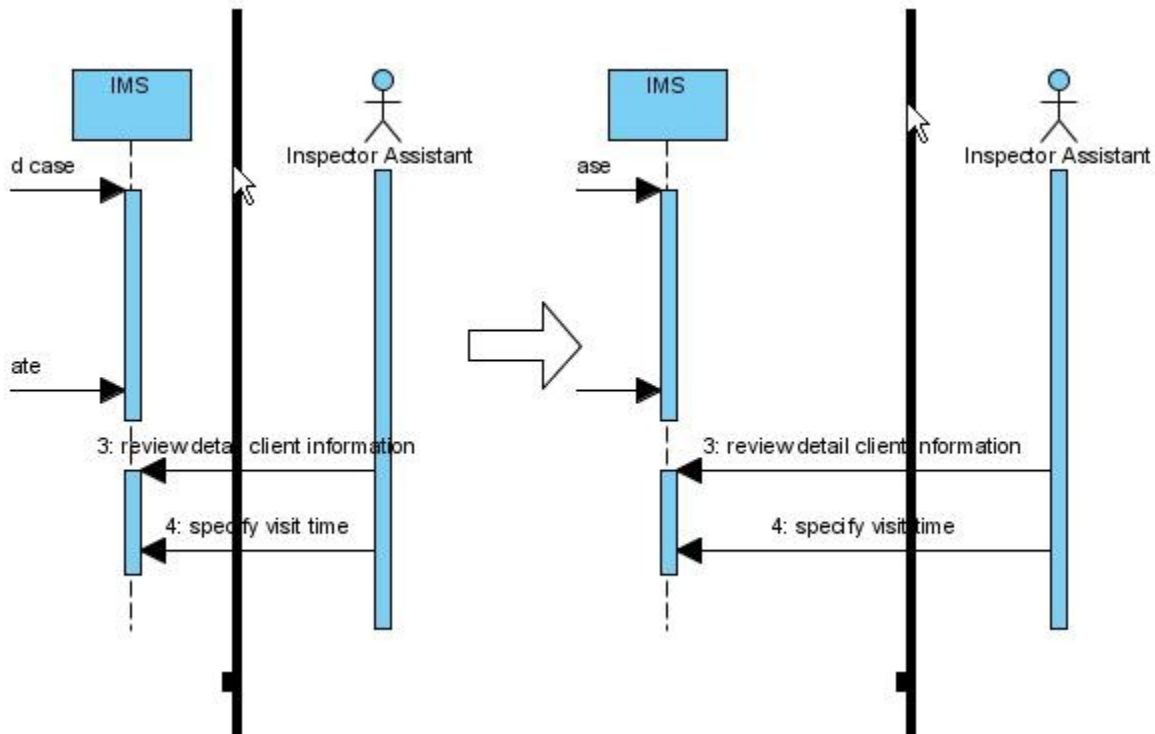

Auto extending activation

When create message between lifelines/actors, activation will be automatically extended.

Step 4:-

Using sweeper and magnet to manage sequence diagram
Sweeper helps you to move shapes aside to make room for new shapes or connectors. To use sweeper, click **Sweeper** on the diagram toolbar (under the **Tools** category).
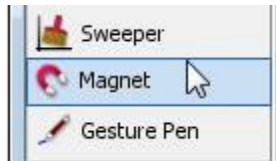
The picture below shows the message *specify visit time* is being swept downwards, thus new room is made for new messages.
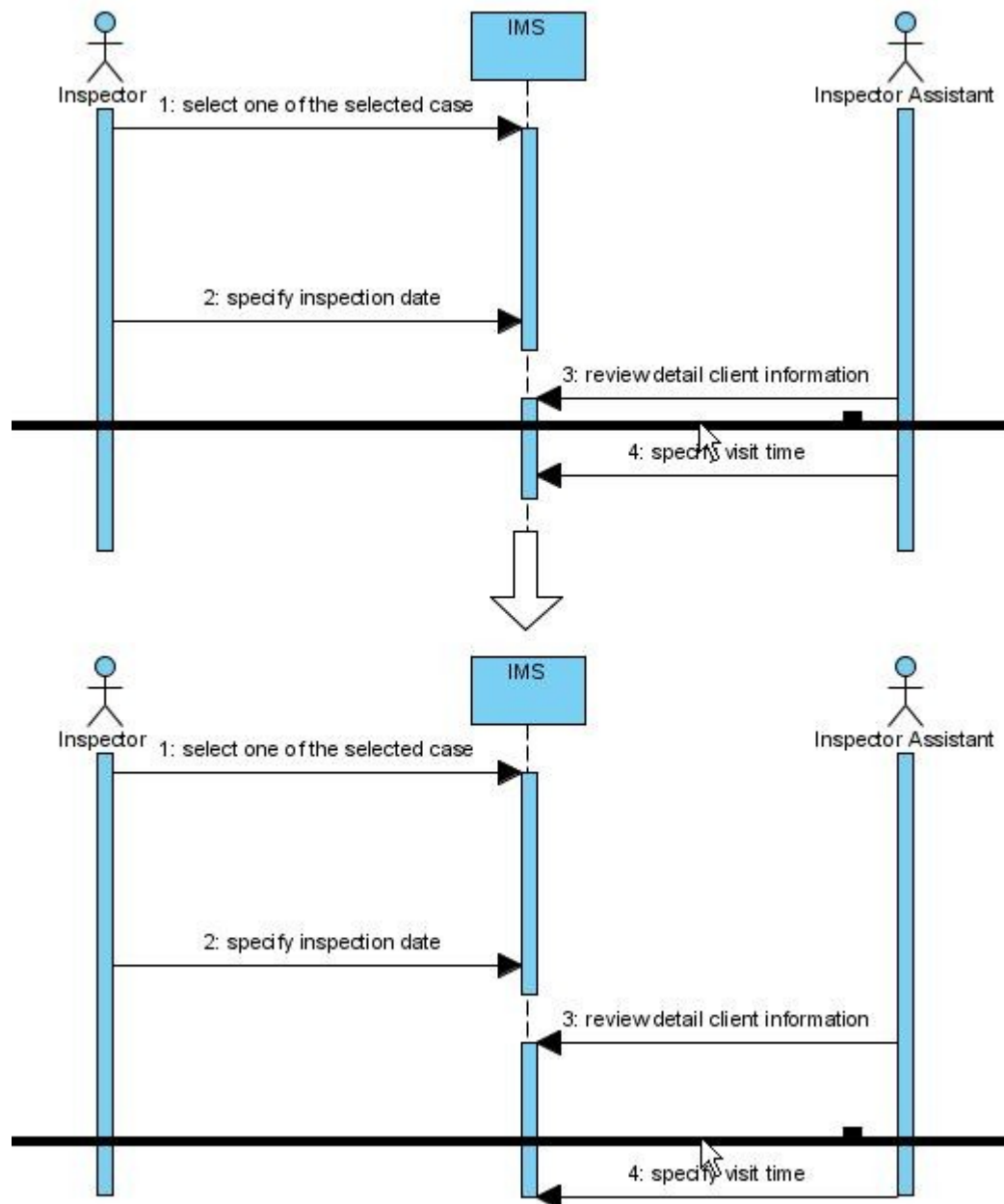

Step 5:-

You can also use magnet to pull shapes together. To use magnet, click **Magnet** on the diagram toolbar (under the **Tools** category).

Magnet

Click on empty space of the diagram and drag towards top, right, bottom or left. Shapes affected will be pulled to the direction you dragged.
The picture below shows when drag the magnet upwards, shapes below dragged position are pulled upwards.
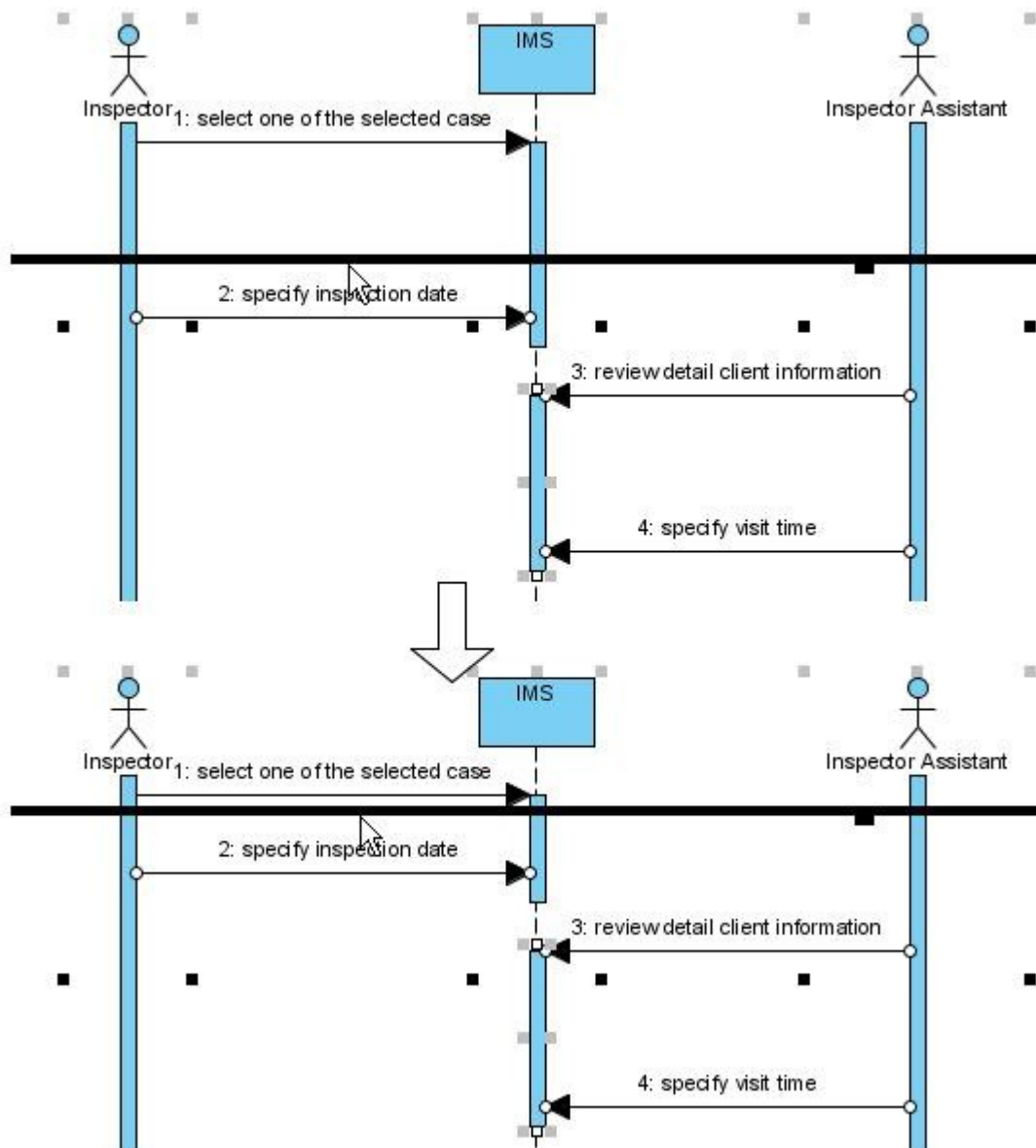
Step 6:-

Creating combined fragment for messages

To create combined fragment to cover messages, select the messages, right-click on the selection and select **Create Combined Fragment**, and then select a combined fragment type (e.g. loop) from the popup

menu.
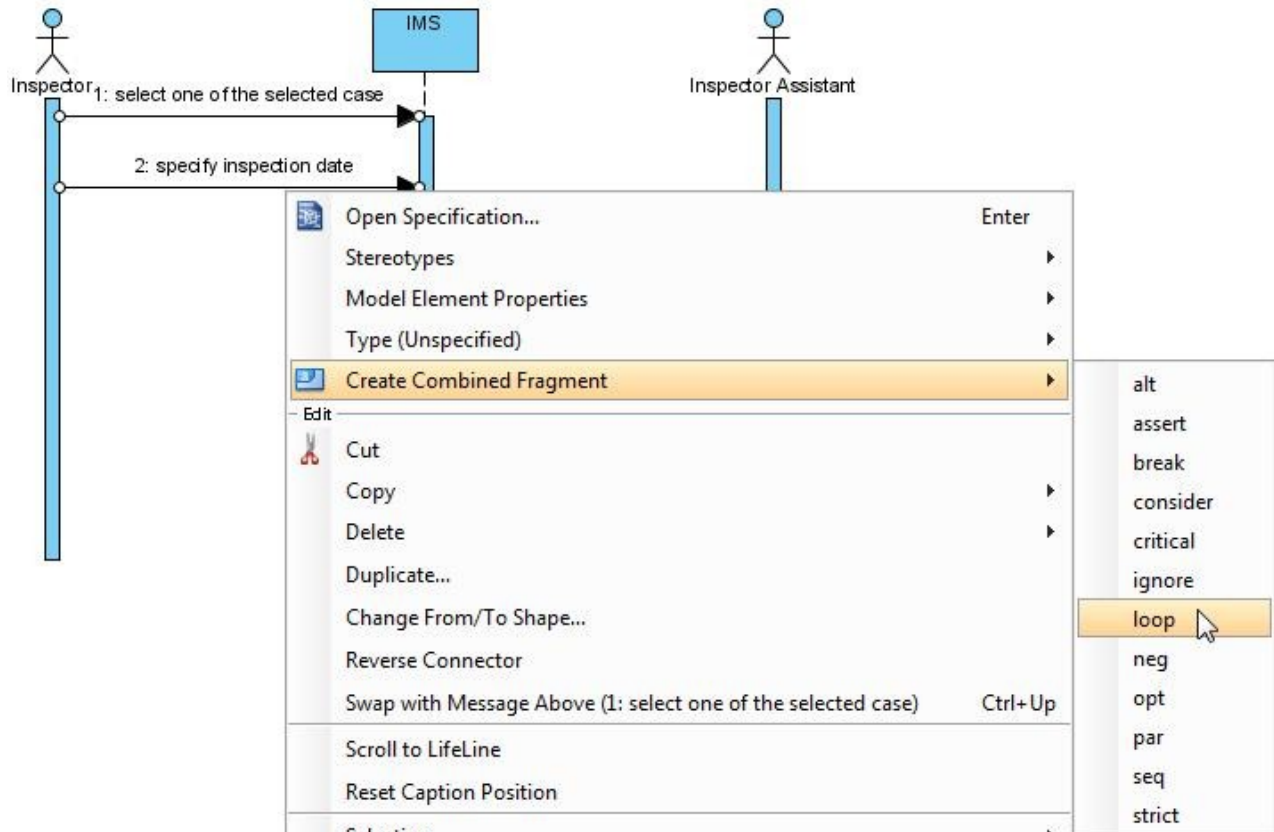
Step 7:-

A combined fragment of selected type will be created to cover the messages.
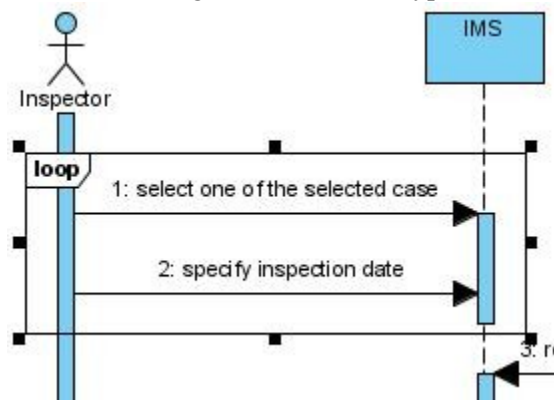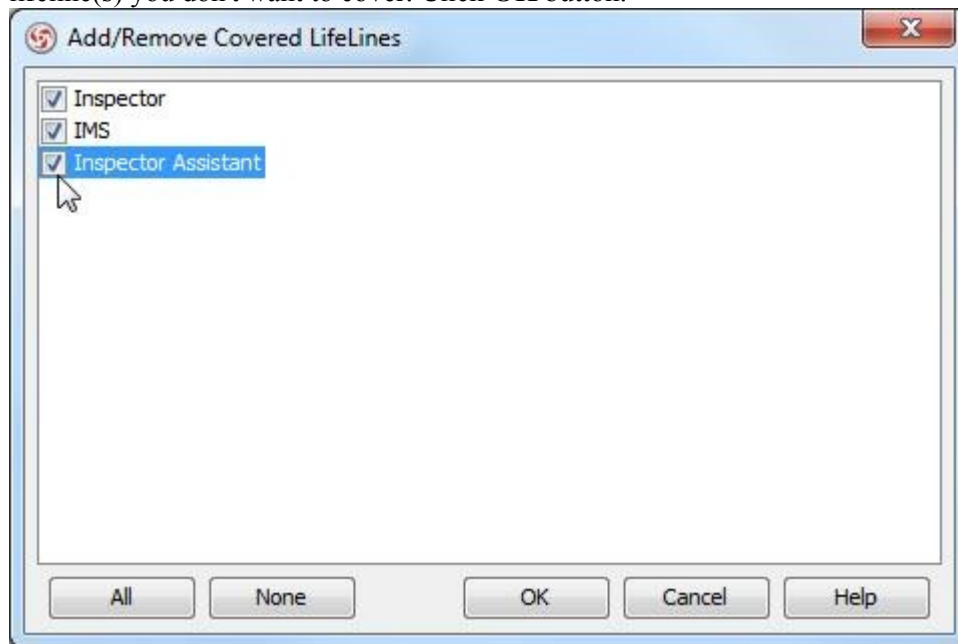
Step 8:-

Adding/removing covered lifelines

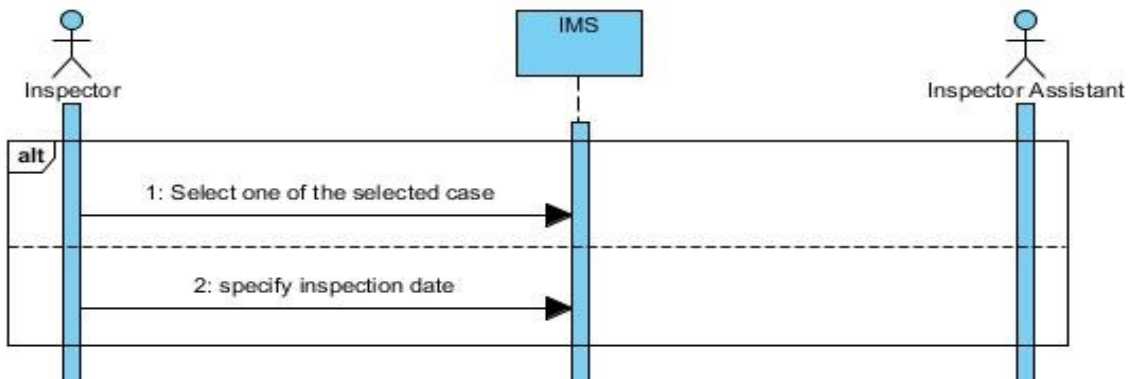After you've created a combined fragment on the messages, you can add or remove the covered lifelines.

1. Move the mouse over the combined fragment and select **Add/Remove Covered Lifeline...** from the pop-up menu.
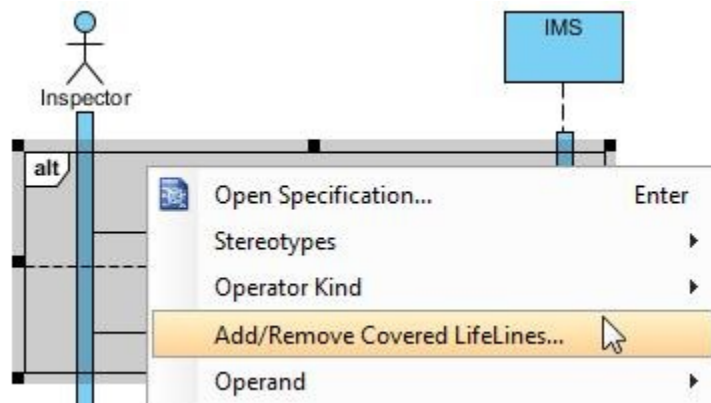
2. In the **Add/Remove Covered Lifelines** dialog box, check the lifeline(s) you want to cover or uncheck the lifeline(s) you don't want to cover. Click **OK** button.
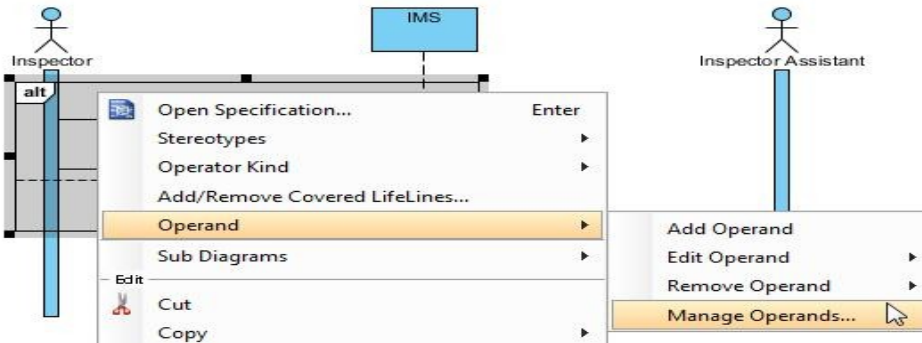
3. As a result, the area of covered lifelines is extended or narrowed down according to your selection.
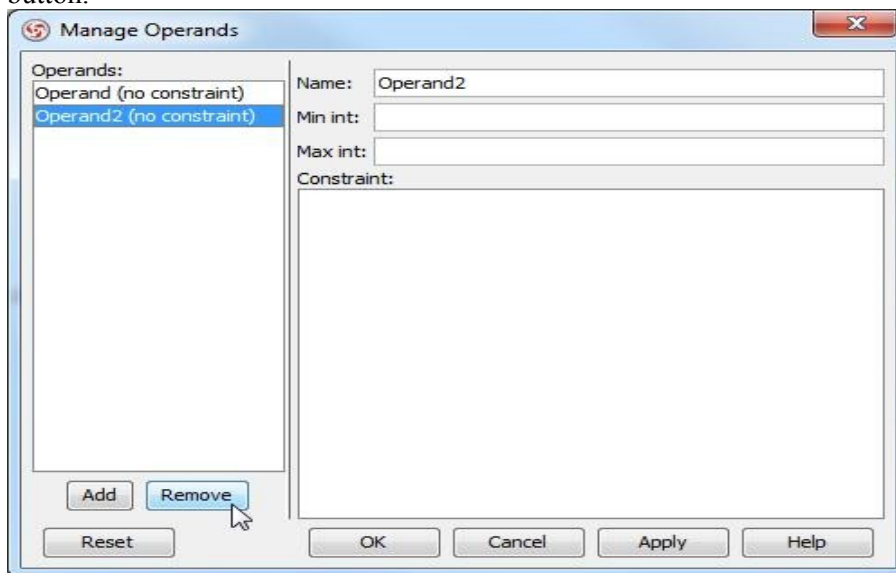

Managing Operands

After you've created a combined fragment on the messages, you can also add or remove operand(s).

1. Move the mouse over the combined fragment and select **Operand > Manage Operands...** from the pop-up menu.
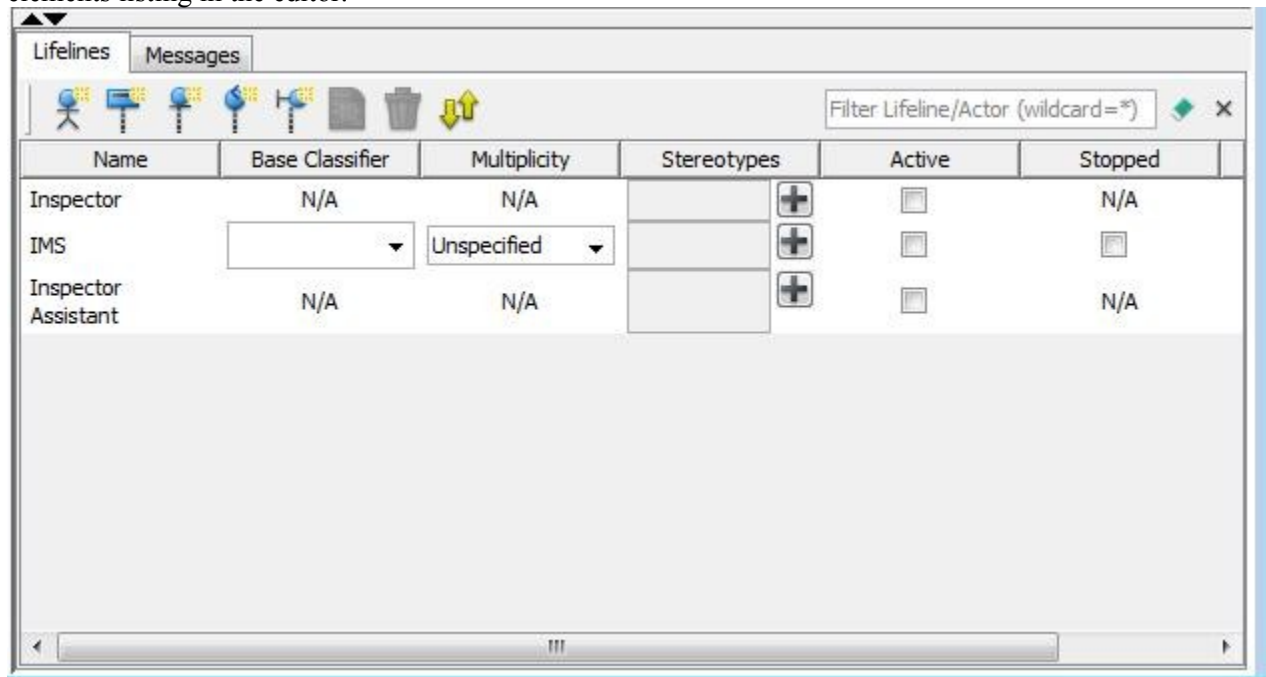

Step 9:-

1. To remove an operand, select the target operand from **Operands** and click **Remove** button. Click**OK** button.
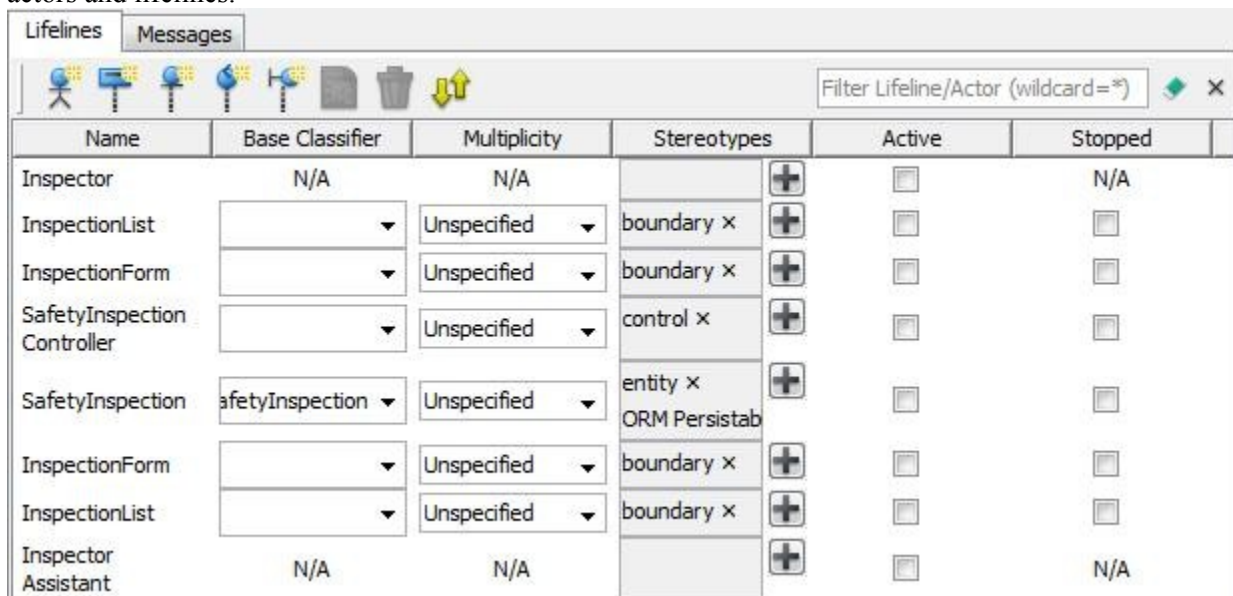
2.   Otherwise, click **Add** button to add a new operand and then name it. Click **OK** button.

Developing sequence diagram with quick editor or keyboard shortcuts

In sequence diagram, an editor appears at the bottom of diagram by default, which enables you to construct sequence diagram with the buttons there. The shortcut keys assigned to the buttons provide a way to construct diagram through keyboard. Besides constructing diagram, you can also access diagram elements listing in the editor.

Name	Base Classifier	Multiplicity	Stereotypes	Active	Stopped
Inspector	N/A	N/A		☐	N/A
IMS		Unspecified		☐	☐
Inspector Assistant	N/A	N/A		☐	N/A

There are two panes, **Lifelines** and **Messages**. The **Lifelines** pane enables you to create different kinds of actors and lifelines.

| Name	Base Classifier	Multiplicity	Stereotypes	Active	Stopped
Inspector	N/A	N/A		☐	N/A
InspectionList		Unspecified	boundary ×	☐	☐
InspectionForm		Unspecified	boundary ×	☐	☐
SafetyInspection Controller		Unspecified	control ×	☐	☐
SafetyInspection	afetyInspection	Unspecified	entity × ORM Persistab	☐	☐
InspectionForm		Unspecified	boundary ×	☐	☐
InspectionList		Unspecified	boundary ×	☐	☐
Inspector Assistant	N/A	N/A		☐	N/A

Button	Shortcut	Description
	Alt-Shift-A	To create an actor
	Alt-Shift-L	To create a general lifeline
	Alt-Shift-E	To create an <<entity>> lifeline
	Alt-Shift-C	To create a <<control>> lifeline
	Alt-Shift-B	To create a <<boundary>> lifeline
	Alt-Shift-O	To open the specification of the element chosen in quick editor
		To delete the element chosen in quick editor
	Ctrl-Del	To delete the element chosen in quick editor
	Ctrl-L	To link with the diagram, which cause the diagram element to be selected when selecting an element in editor, and vice versa

Step 10:-

Buttons in
Lifelines pane

Editing messages

The **Messages** pane enables you to connect lifelines with various kinds of messages.
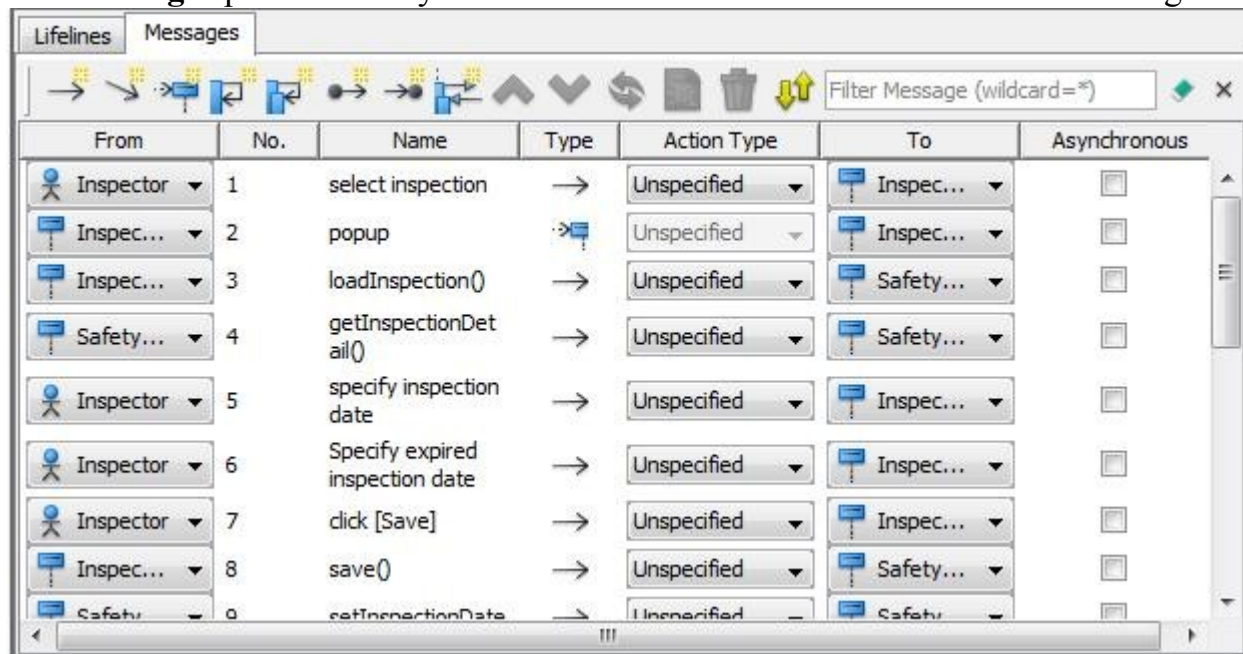
Messages pane in quick editor

ButtonShortcut		Description
	Alt-Shift-M	To create a message that connects actors/lifelines in diagram
	Alt-Shift-D	To create a duration message that connects actors/lifelines in diagram
	Alt-Shift-C	To create a create message that connects actors/lifelines in diagram
	Alt-Shift-S	To create a self message on an actor/lifeline in diagram
	Alt-Shift-R	To create a recursive message on an actor/lifeline in diagram
	Alt-Shift-F	To create a found message that connects to an actor/lifeline
	Alt-Shift-L	To create a lost message from an actor/lifeline
	Alt-Shift-E	To create a reentrant message that connects actors/lifelines in diagram
	Ctrl-Shift-Up	To swap the chosen message with the one above
	Ctrl-Shift-Down	To swap the chosen message with the one below
	Ctrl-R	To revert the direction of chosen message
	Alt-Shift-O	To open the specification of the message chosen in quick editor
	Ctrl-Del	To delete the message chosen in quick editor
	Ctrl-L	To link with the diagram, which cause the message to be selected when selecting a message in editor, and vice versa

Buttons in Messages pane

Expanding and collapsing the editor

To hide the editor, click on the down arrow button that appears at the bar on top of the quick editor. To expand, click on the up arrow button.
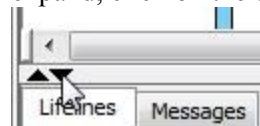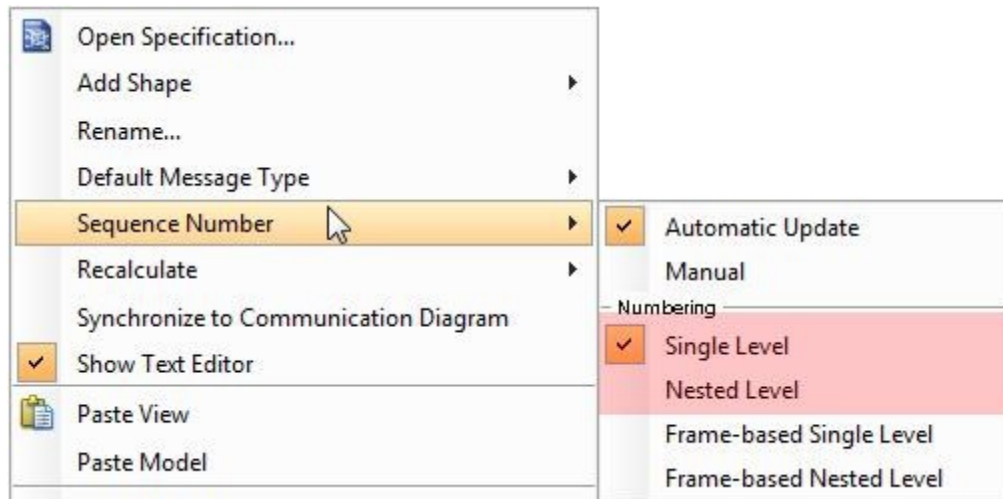

Collapse the quick editor

Setting different ways of numbering sequence messages
You are able to set the way of numbering sequence messages either on diagram base or frame base.
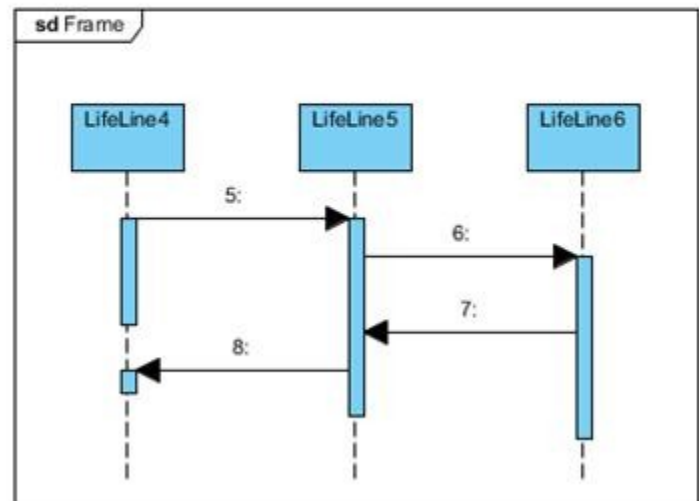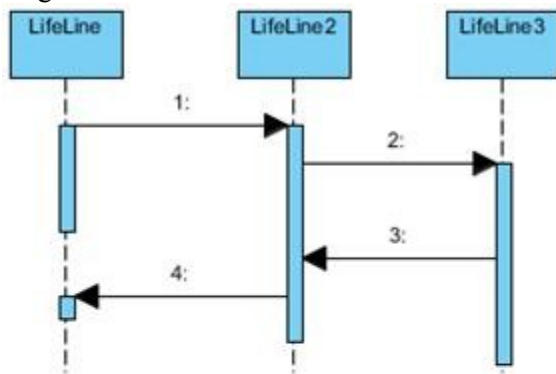
Diagram-based sequence message

Right click on the diagram's background, select **Sequence Number** and then either **Single Level**or **Nested Level** from the pop-up menu.

Step 11:-

If you choose **Single Level**, all sequence messages will be ordered with integers on diagram base. On the other hand, if you choose **Nested Level**, all sequence messages will be ordered with decimal place on diagram base.

Right click on the diagram's background, select **Sequence Number** and then either **Frame-based Single Level** or **Frame-based Nested Level** from the pop-up menu.
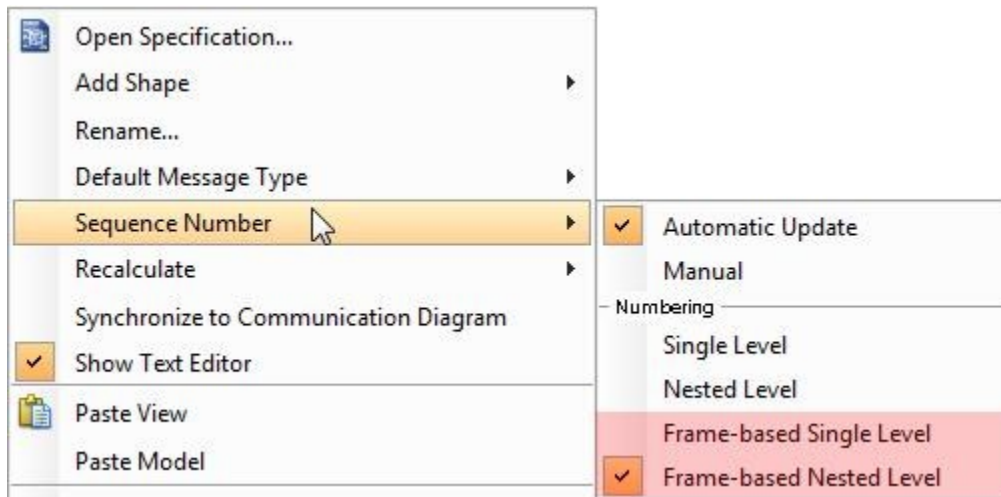
When you set the way of numbering sequence messages on frame base, the sequence messages in frame will restart numbering sequence message since they are independent and ignore the way of numbering sequence message outside the frame.
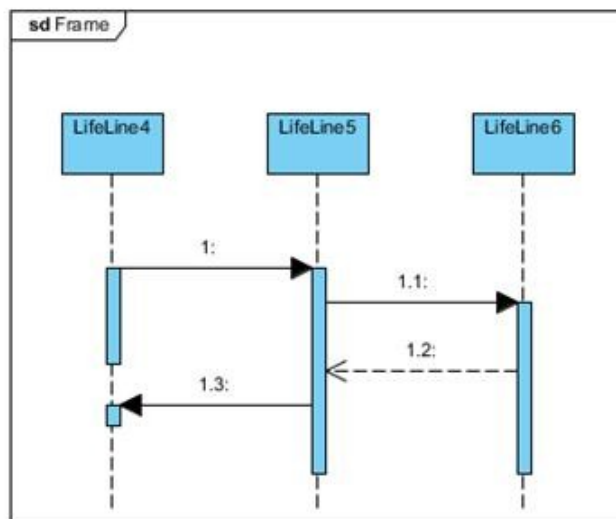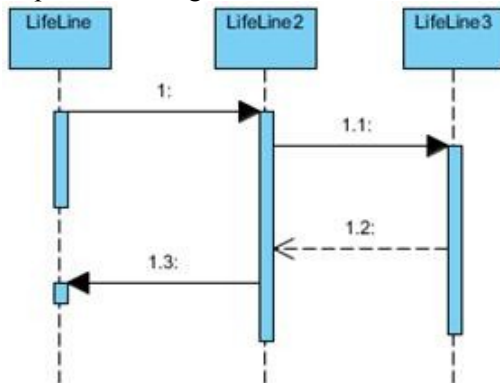
Conclusion :-

<h1 align="center">Experiment No. 3:-</h1>

Develop Class diagram

Objective:-

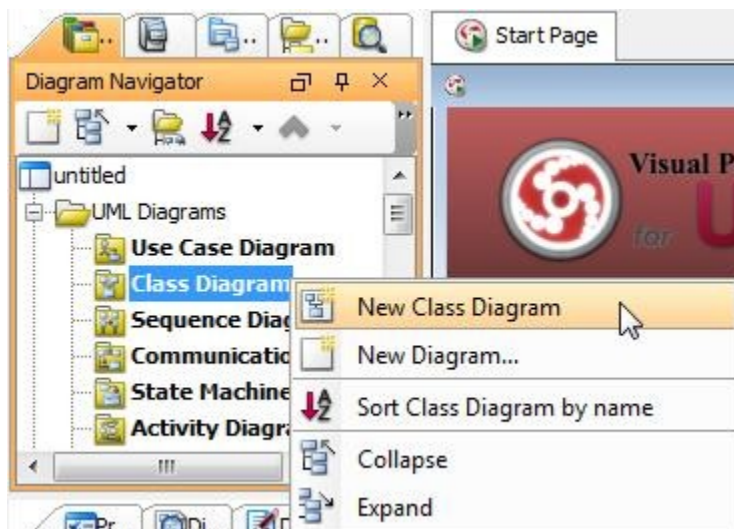To show diagrammatically the objects required and the relationships between them while developing a software product.

Software Required :-

Visual Paradigm for UML 8.2

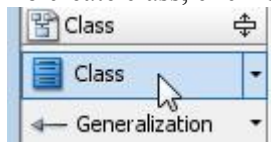## Procedure :-

Step 1:-

Right click **Class Diagram** on **Diagram Navigator** and select **New Class Diagram** from the pop-up menu to create a class diagram.
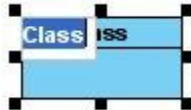

Step 2:-

Creating class
To create class, click **Class** on the diagram toolbar and then click on the diagram.
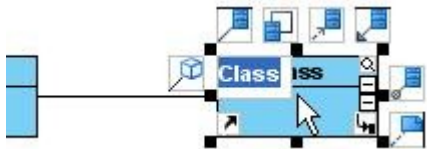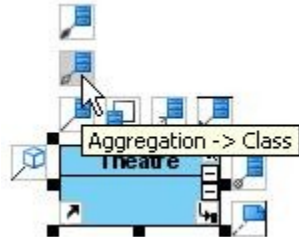

A class will be created.

Creating association

To create association from class, click the **Association** -> **Class** resource beside it and drag.

Drag to empty space of the diagram to create a new class, or drag to an existing class to connect to it. Release the mouse button to create the association.
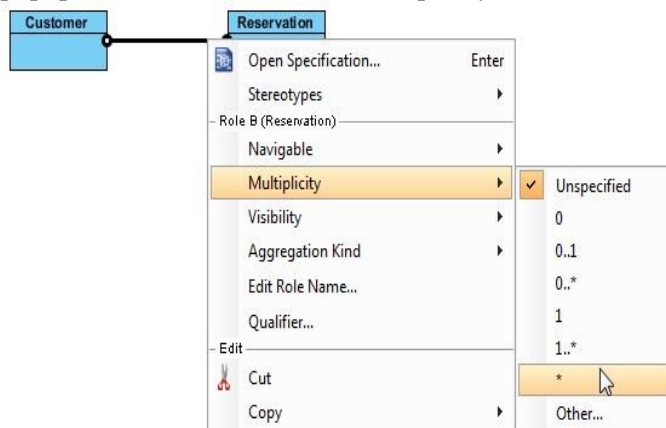

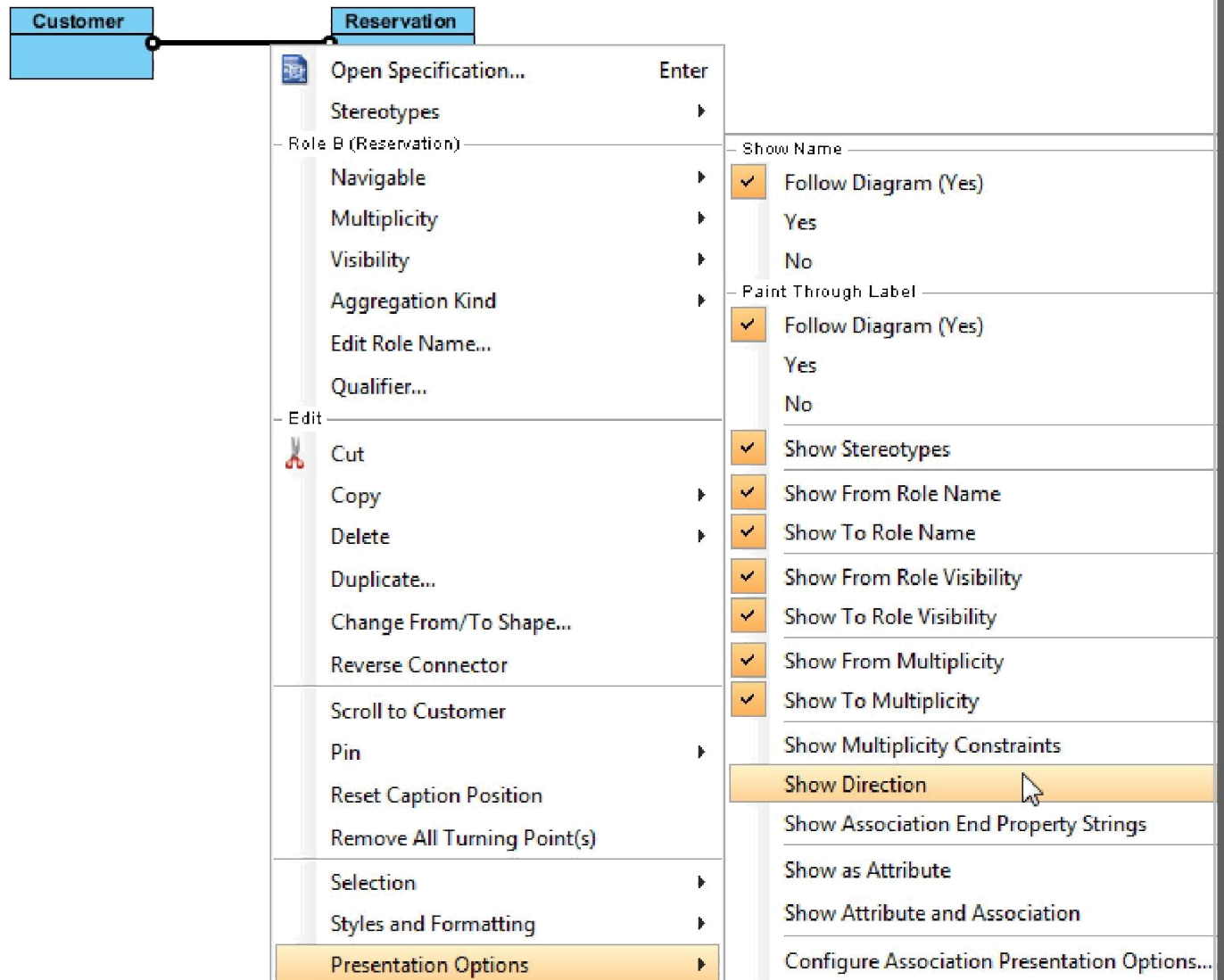To create aggregation, use the **Aggregation** -> **Class** resource instead.

Step 3:-

To edit multiplicity of an association end, right-click near the association end, select **Multiplicity** from the popup menu and then select a multiplicity.


To show the direction of an association, right click on it and select **Presentation Options** > **Show Direction** from the pop-up menu.

Customer		Reservation				

	Open Specification...	Enter		Show Name	
	Stereotypes	▶		✔	Follow Diagram (Yes)
Role B (Reservation)					Yes
	Navigable	▶			No
	Multiplicity	▶		Paint Through Label	
	Visibility	▶		✔	Follow Diagram (Yes)
	Aggregation Kind	▶			Yes
	Edit Role Name...				No
	Qualifier...			✔	Show Stereotypes
Edit				✔	Show From Role Name
✂	Cut			✔	Show To Role Name
	Copy	▶		✔	Show From Role Visibility
	Delete	▶		✔	Show To Role Visibility
	Duplicate...			✔	Show From Multiplicity
	Change From/To Shape...			✔	Show To Multiplicity
	Reverse Connector				Show Multiplicity Constraints
	Scroll to Customer				Show Direction
	Pin	▶			Show Association End Property Strings
	Reset Caption Position				Show as Attribute
	Remove All Turning Point(s)				Show Attribute and Association
	Selection	▶			Configure Association Presentation Options...
	Styles and Formatting	▶			
	Presentation Options	▶			

Step 4:-

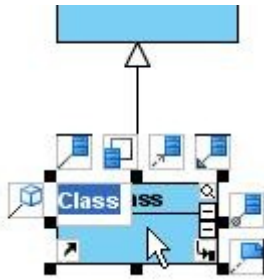The direction arrow is shown beside the association.
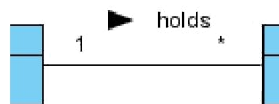
Creating generalization
To create generalization from class, click the **Generalization** -> **Class** resource beside it and drag.
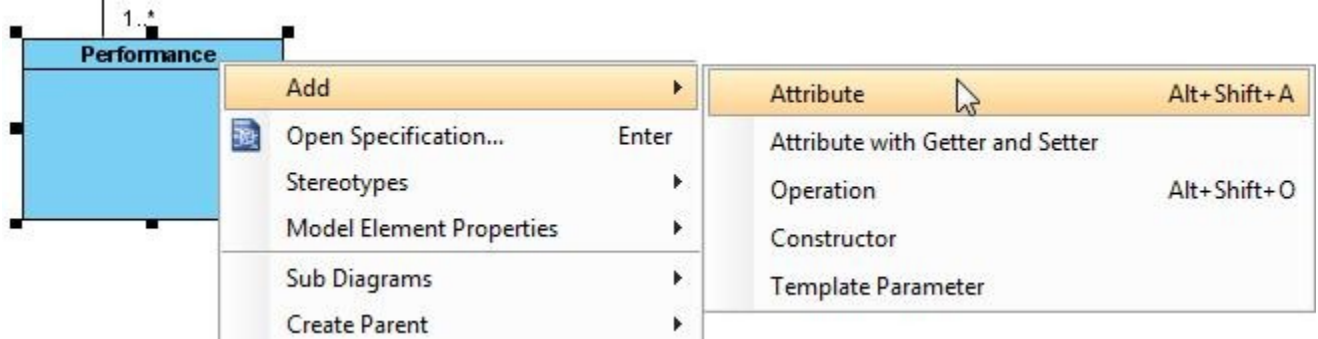
Drag to empty space of the diagram to create a new class, or drag to an existing class to connect to it.
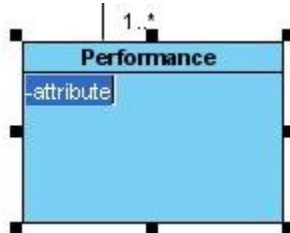Release the mouse button to create the generalization.

Creating attribute

To create attribute, right click the class and select **Add** > **Attribute** from the pop-up menu.
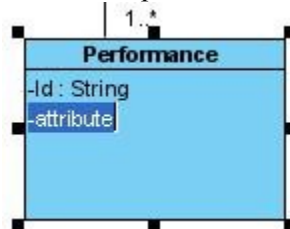
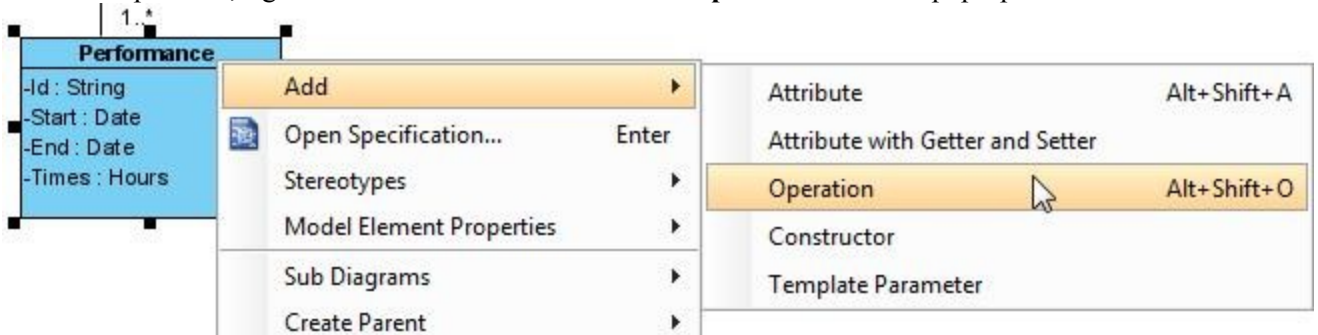

An attribute is created.

Creating attribute with enter key

After creating an attribute, press the Enter key, another attribute will be created. This method lets you create multiple attributes quickly and easily.
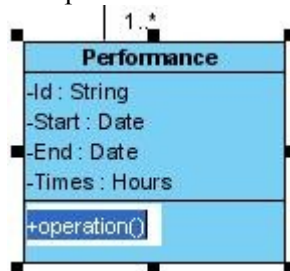

Creating operation

To create operation, right click the class and select **Add** > **Operation** from the pop-up menu.

An operation is created.

Similar to creating attribute, you can press the Enter key to create multiple operations continuously.
Drag-and-Drop reordering, copying and moving of class members

To reorder a class member, select it and drag within the compartment, you will see a thick black line appears indicating where the class member will be placed.
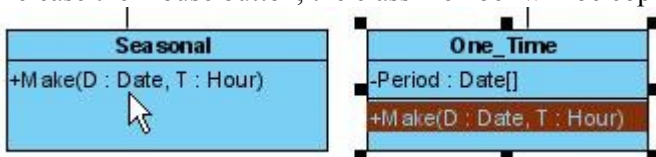

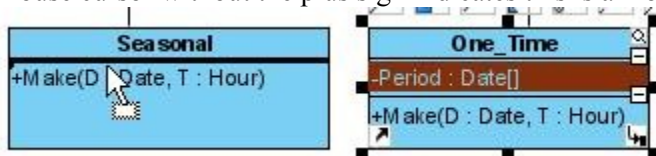Release the mouse button, the class member will be reordered.

To copy a class member, select it and drag to the target class while keep pressing the Ctrl key, you will see a thick black line appears indicating where the class member will be placed. A plus sign is shown beside the mouse cursor indicating this is a copy action.
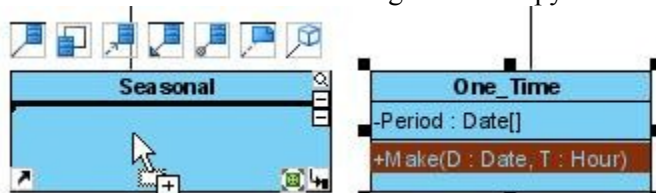

Release the mouse button, the class member will be copied.

To move a class member, select it and drag to the target class, you will see a thick black line appears indicating where the class member will be placed. Unlike copy, do not press the Ctrl key when drag, the mouse cursor without the plus sign indicates this is a move action.
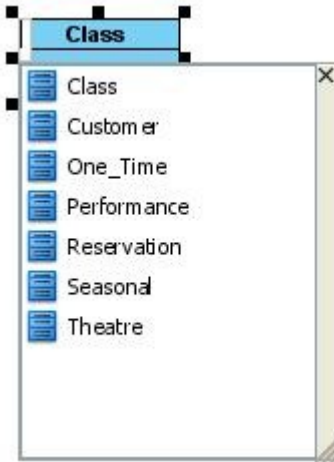

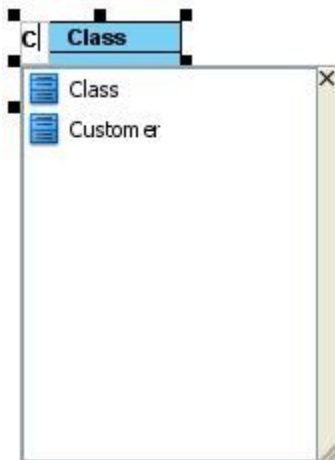Release the mouse button, the class member will be moved.
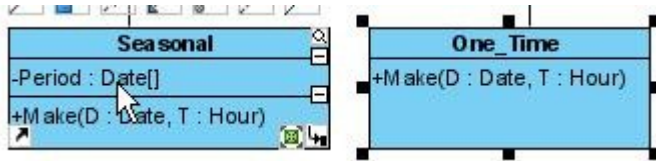
Model name completion for class

The model name completion feature enables quick creation of multiple views for the same class model. When create or rename class, the list of classes is shown.

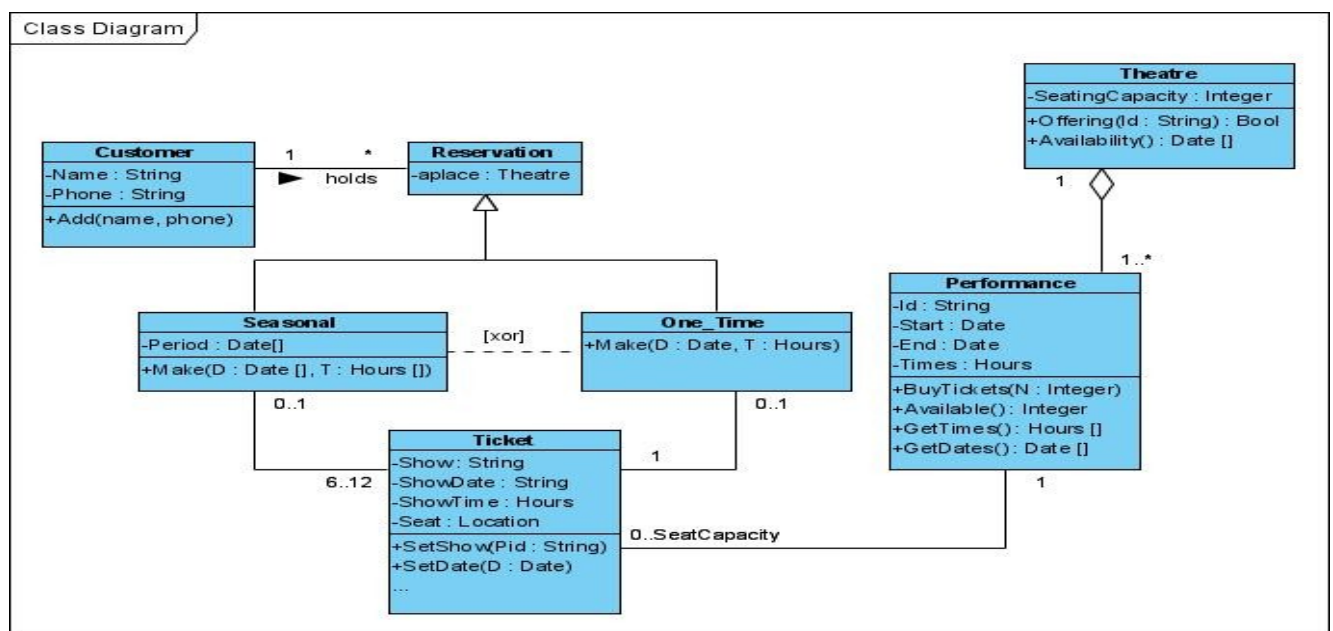Type text to filter classes in the list.

Press up or down key to select class in the list, press Enter to confirm. Upon selecting an existing class, all class members and relationships are shown immediately.
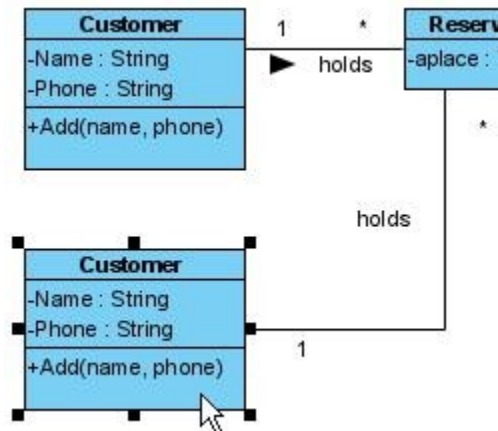
## Step 5:-

Continue to complete the diagram.

Generalization set

A generalization set defines a particular set of generalization relationships that describe the way in which a general classifier (or superclass) may be divided using specific subtypes. To define a generalization set, select the generalizations to include, right click and select Generalization set > Create Generalization Set... from the popup menu.
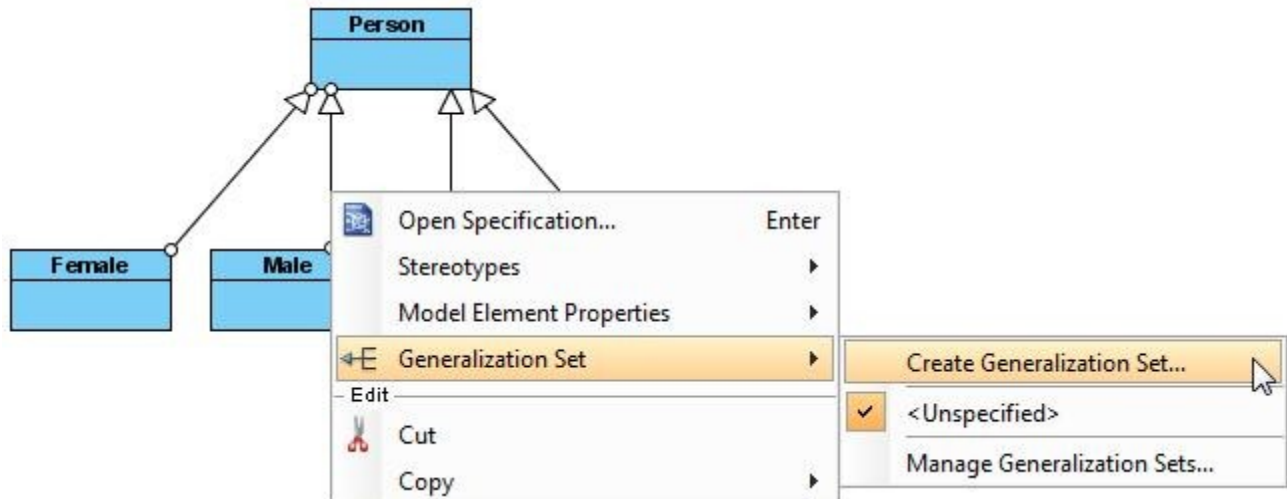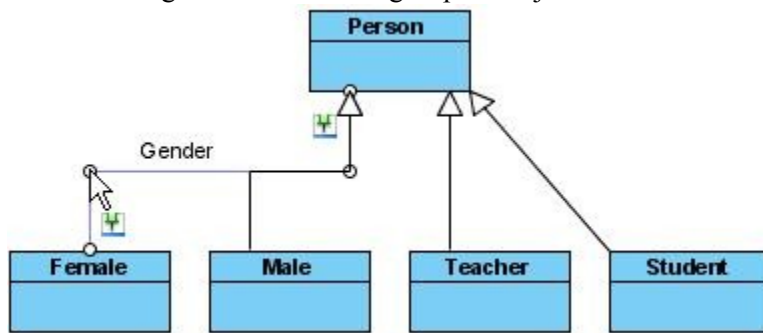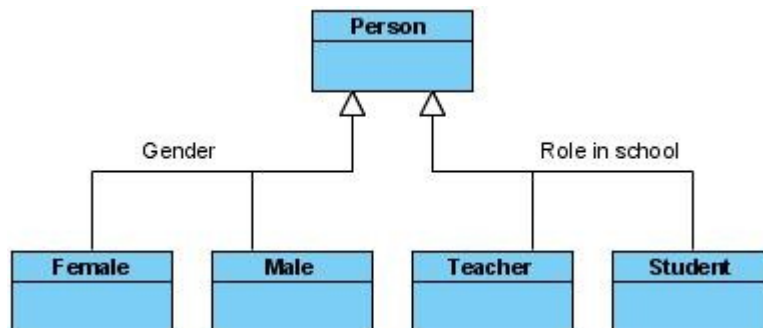
Step 6:-

Name the set in the Manage Generalization Sets dialog box, and confirm by pressing OK.
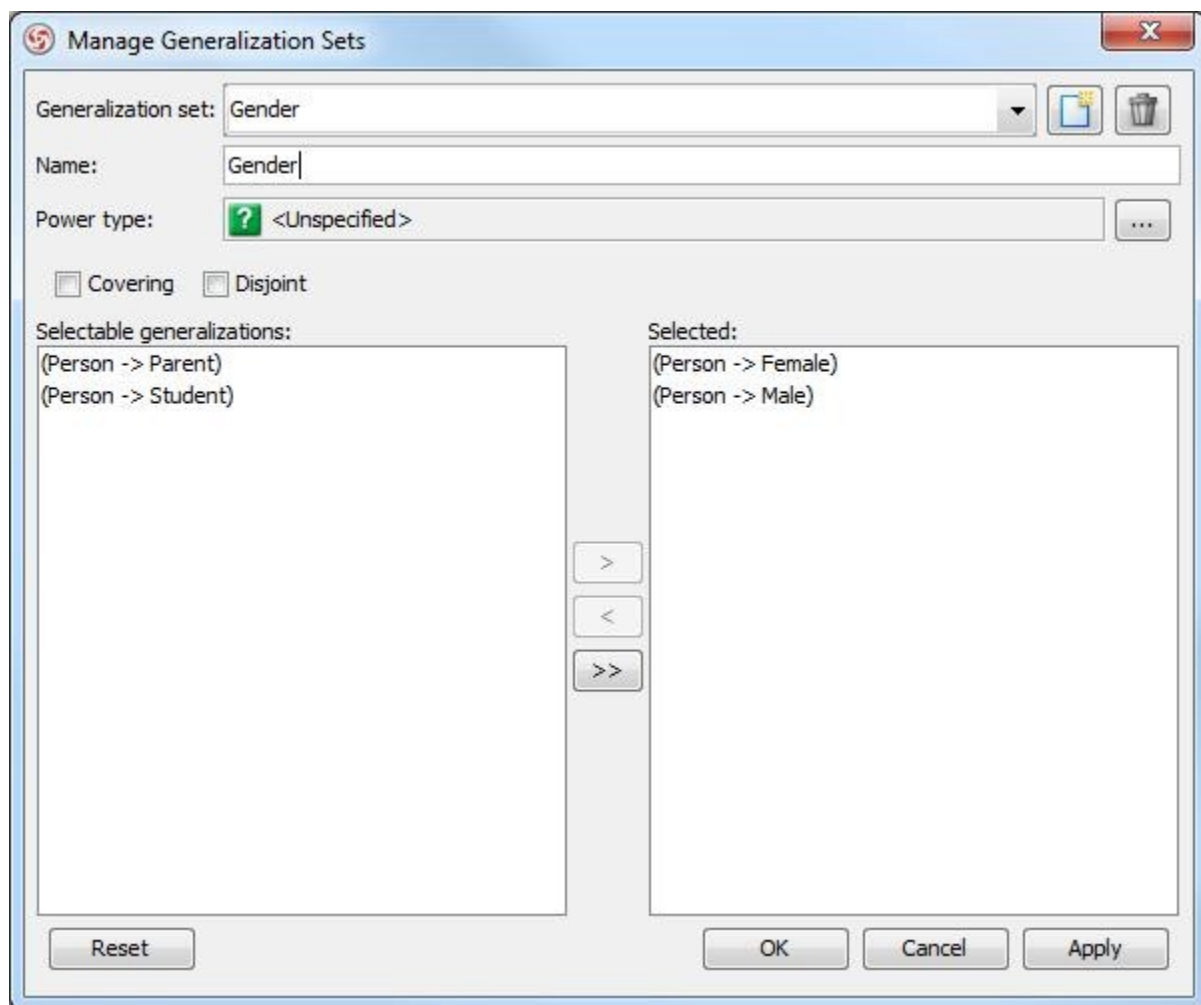
The selected generalizations are grouped. Adjust the connector to make the diagram tidy.

Repeat the steps for other generalizations.

Conclusion :-