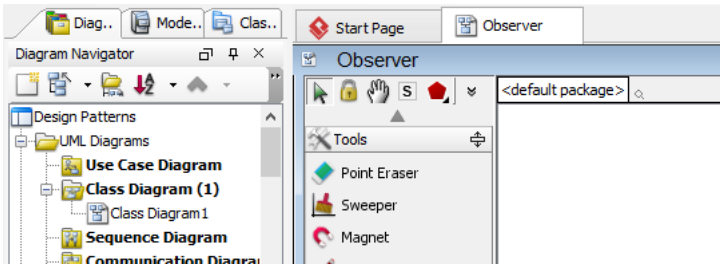
Observer Pattern Tutorial

Written Date : October 21, 2009

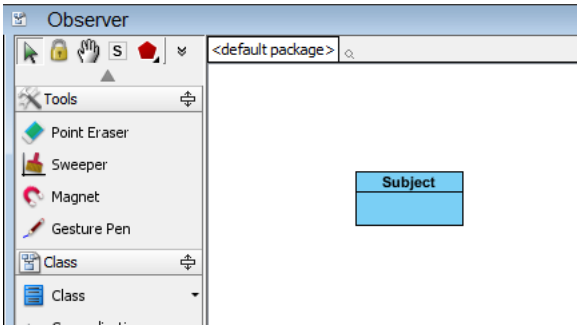
Modeling a Design Pattern with a Class Diagram

1. Create a new project named *Design Patterns*.

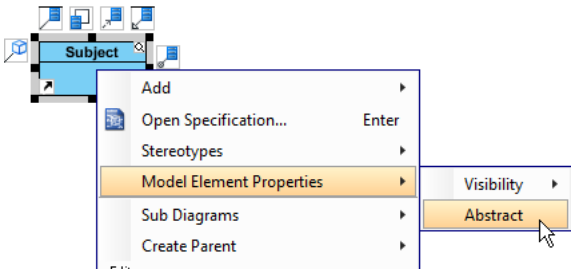
2. Create a class diagram named *Observer*.



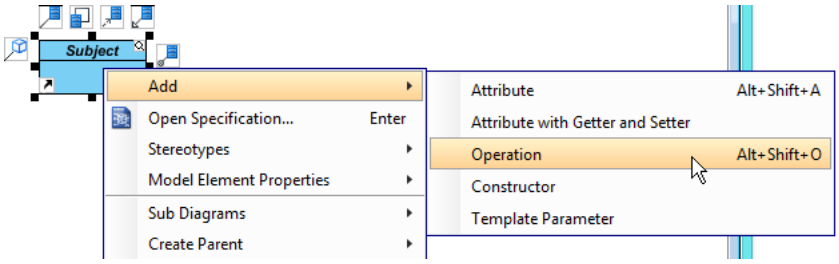
3. Select **Class** from the diagram toolbar. Click on the diagram to create a class. Name it *Subject*.



4. Right-click on *Subject* and select **Model Element Properties** > **Abstract** to set it as abstract.

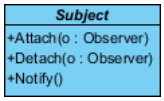


5. Right-click on the *Subject* class and select **Add** > **Operation** from the popup menu.

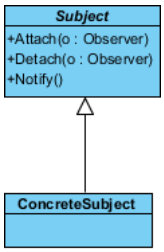


6. Name the operation *Attach(o : Observer)*.

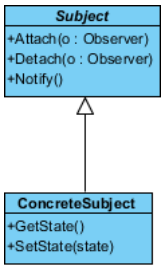
7. Repeat steps 5 and 6 to create the remaining two operations: *Detach (o : Observer)*, *Notify()*.



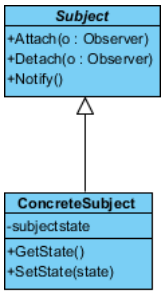
8. Move the mouse cursor over the *Subject* class and drag out **Generalization** > **Class** to create a subclass *ConcreteSubject*.



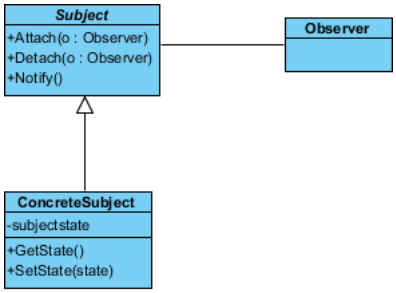
9. Repeat steps 5 and 6 to create the following operations in *ConcreteSubject: GetState()*, *SetState(state)*.



10. Right-click on the *ConcreteSubject* class and select **Add** > **Attribute** from the popup menu. Name the attribute *subjectstate*.

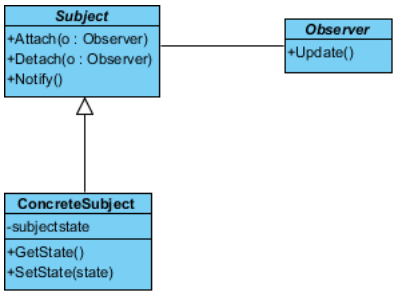


11. Move the mouse cursor over the *Subject* class and drag out **Association** > **Class** to create an associated class *Observer*.

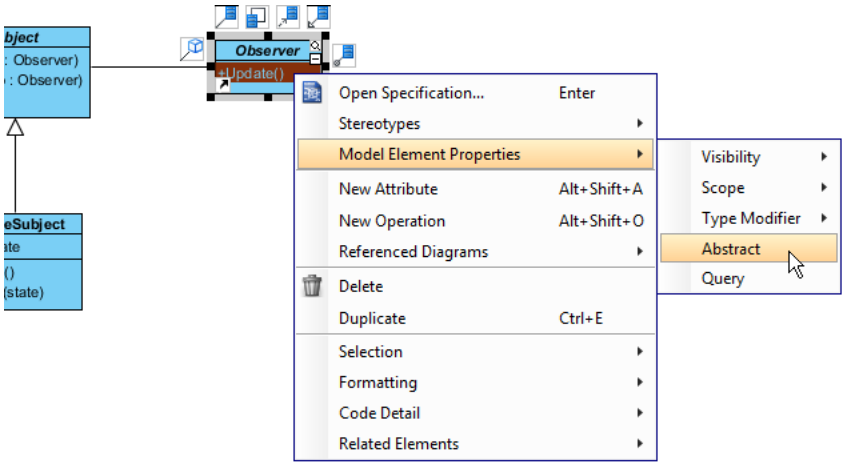


12. Right-click an *Observer* and select **Model Element Properties** > **Abstract** to set it as abstract.

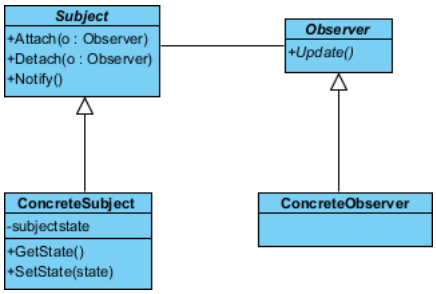
13. Repeat steps 5 and 6 to create the following operation in *Observer: Update()*.



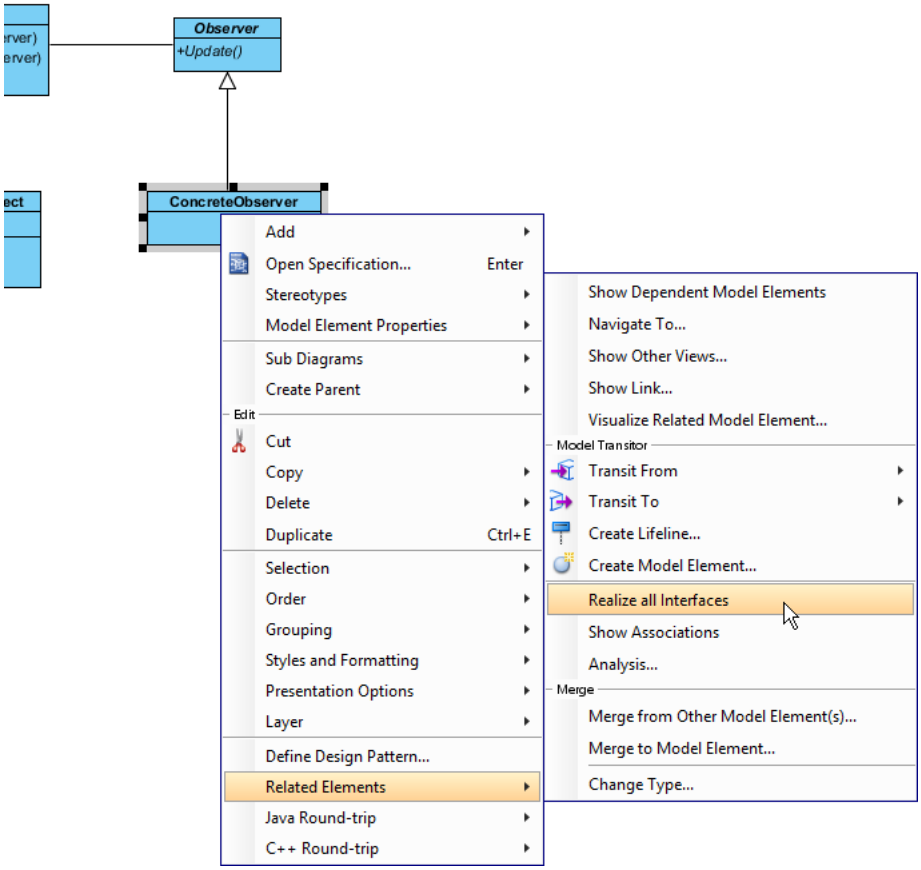
14. Right-click on *Update()* and select **Model Element Properties** > **Abstract** to set it as abstract.



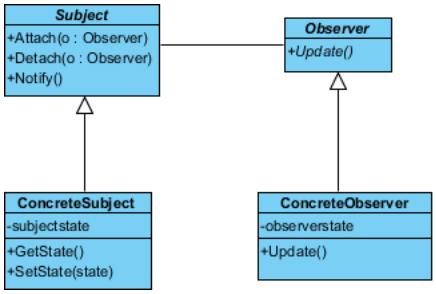
15. Move the mouse cursor over the *Observer* class and drag out **Generalization** > **Class** to create a subclass *ConcreteObserver*.



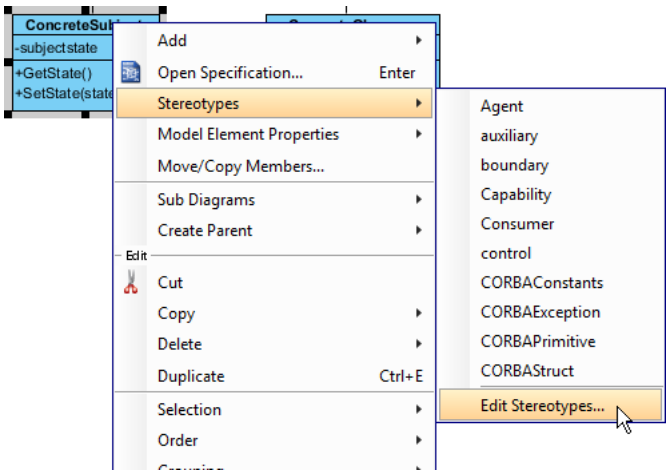
16. *ConcreteObserver* will inherit the operations from *Observer*. Right-click on *ConcreteObserver* and select **Related Elements** > **Realize all Interfaces** from the popup menu.



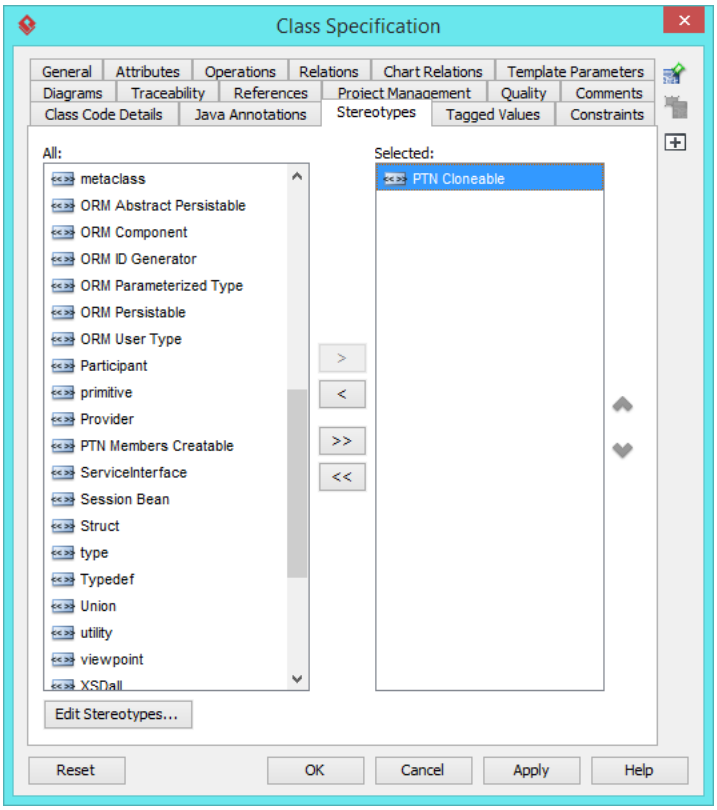
17. Right-click on the *ConcreteObserver* class and select **Add** > **Attribute** from the popup menu. Name the attribute *observerstate*. Up to now, the diagram should look like:



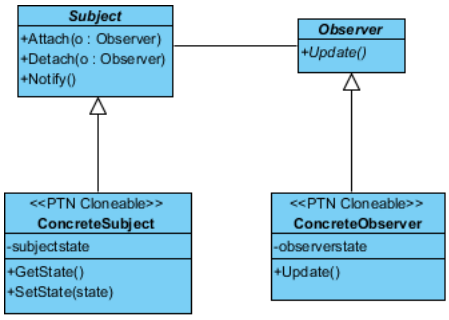
18. In practice, there may be multiple concrete subjects and observers. To represent this, stereotype the class *ConcreteSubject* and *ConcreteObserver* as **PTN Cloneable**. Right-click on *ConcreteSubject* and select **Stereotypes** > **Stereotypes...** from the popup menu.



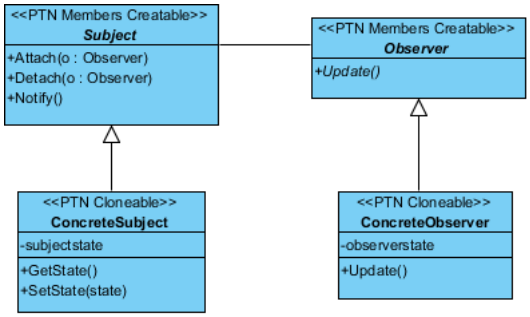
19. In the **Stereotypes** tab of the **Class Specification** dialog box, select **PTN Cloneable** and click **>** to assign it to the *ConcreteSubject* class. Click **OK** to confirm.



20. Repeat steps 18 and 19 on *ConcreteObserver*.

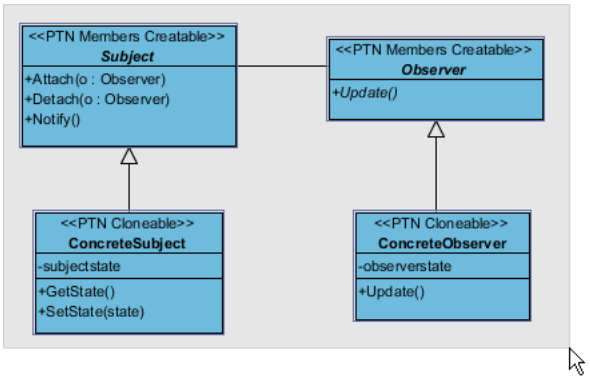


21. In practice, there are domain-specific operations in a subject and observer. To represent this, stereotype the classes *Subject* and *Observer* as **PTN Members Creatable**. Repeat steps 18 and 19 to stereotype *Subject* and *Observer* as **PTN Members Creatable**.

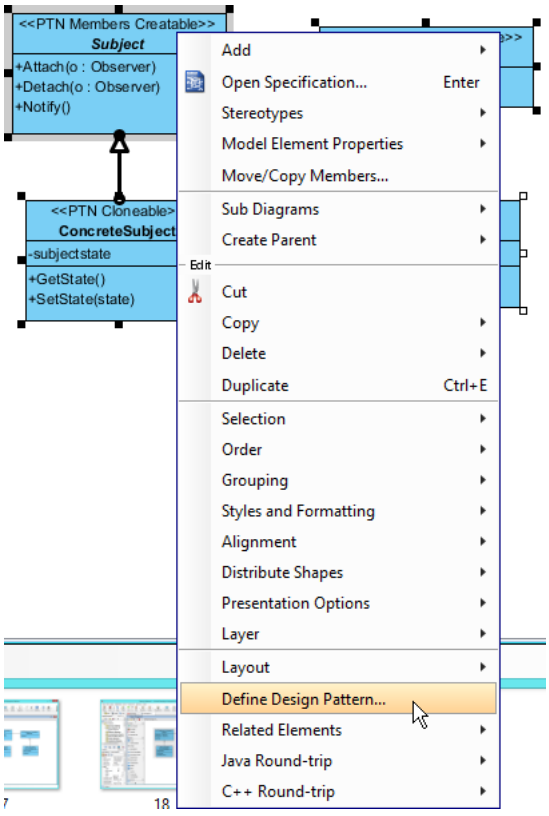


Defining a Pattern

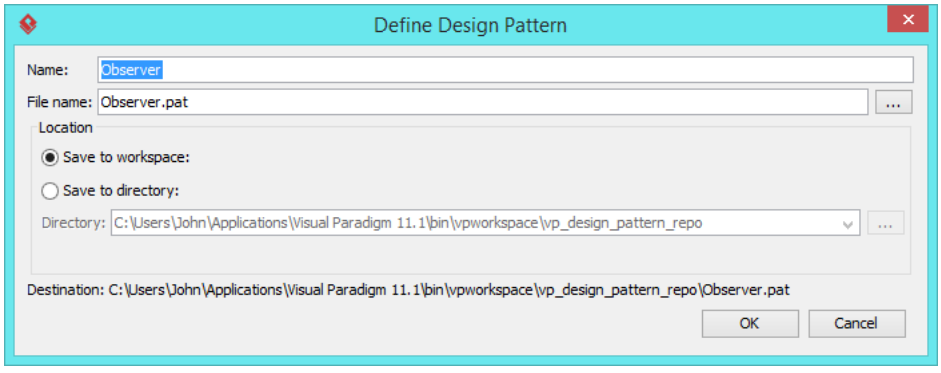
1. Select all classes on the class diagram.



2. Right-click on the selection and select **Define Design Pattern...** from the popup menu.



3. In the **Define Design Pattern** dialog box, specify the pattern name *Observer*. Keep the file name as is. Click **OK** to proceed.

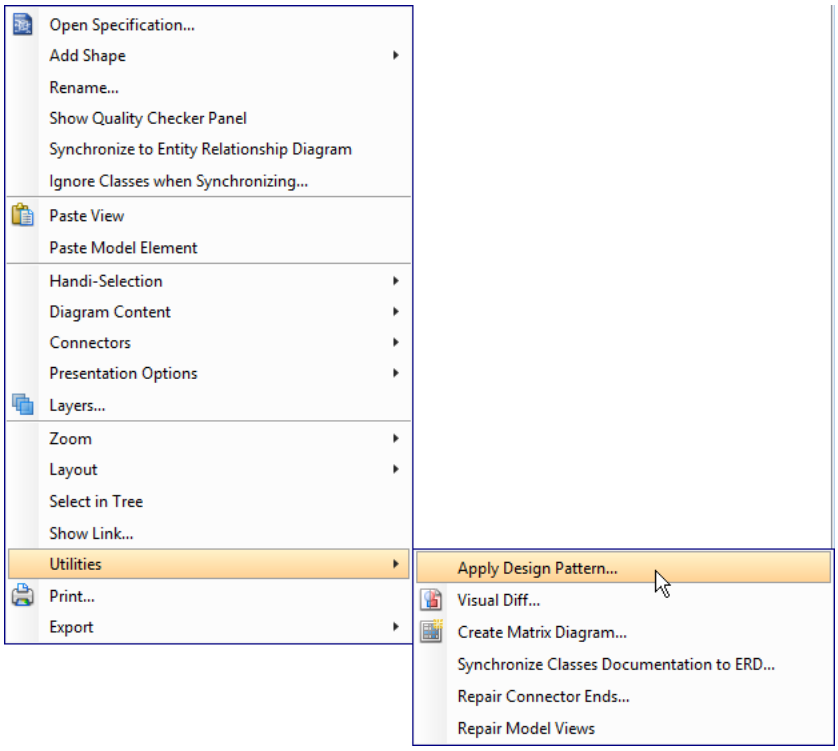


Applying a Design Pattern on a Class Diagram

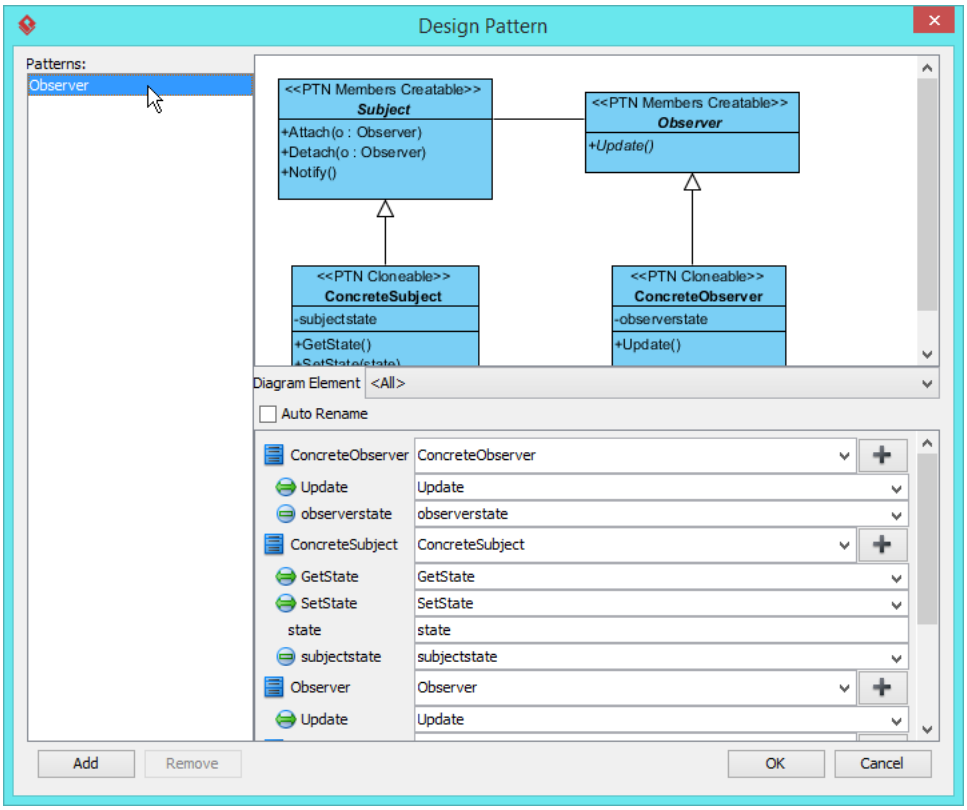
In this section, we are going to apply the observer pattern to model a diagram editor for observing changes of a model and calling various panes like the property and overview panes to update their content.

1. Create a new project *Diagram Editor*.
2. Create a class diagram *Domain Model*.

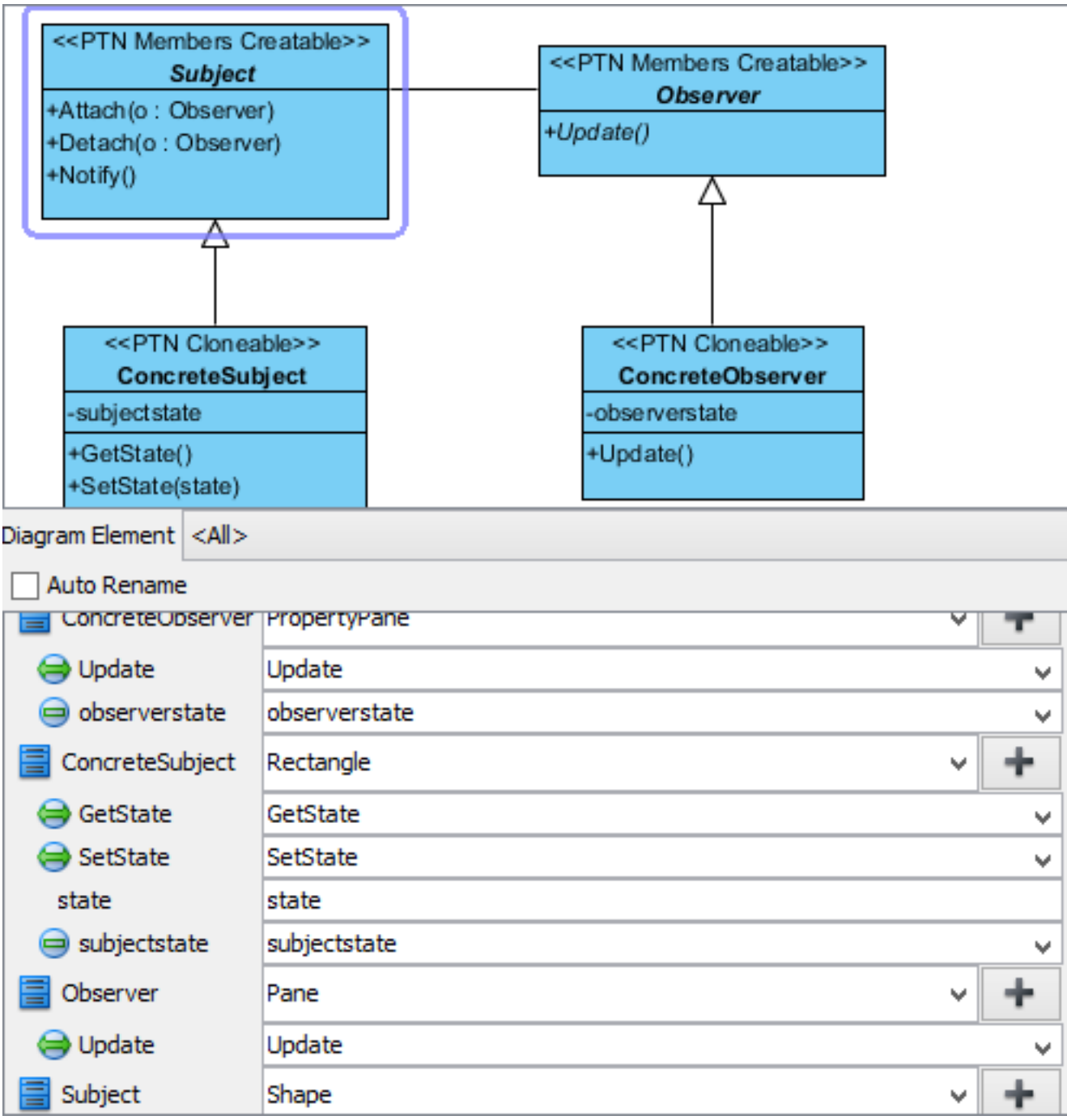
3. Right-click on the class diagram and select **Utilities** > **Apply Design Pattern...** from the popup menu.



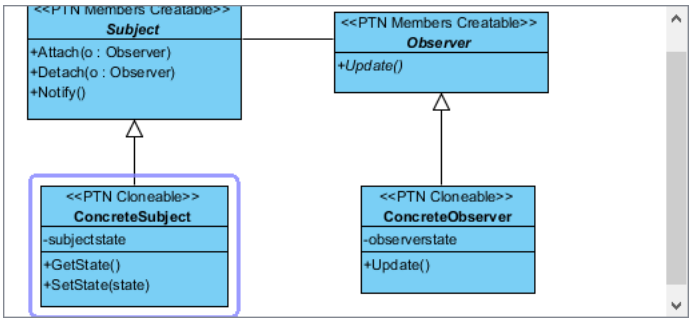
4. In the **Design Pattern** dialog box, select *Observer* from the list of patterns.



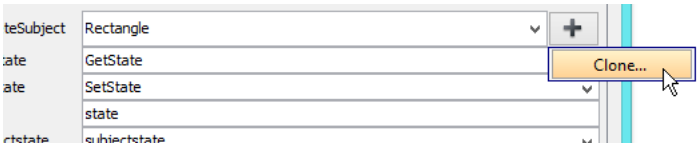
5. At the bottom pane, rename classes *Subject*, *Observer*, *ConcreteSubject*, and *ConcreteObserver* to *Shape*, *Pane*, *Rectangle*, and *PropertyPane*, respectively.



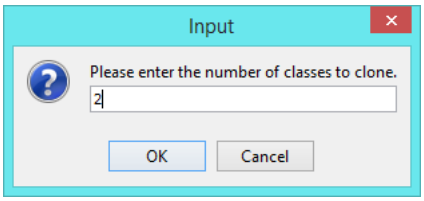
6. Besides a rectangle, there are more types of shapes, like a circle and a triangle. Select *ConcreteSubject* from the overview pane.



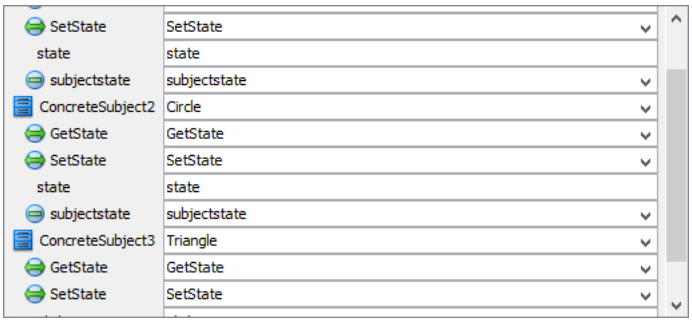
7. Click on the + button next to the class name and select **Clone...** from the popup menu.



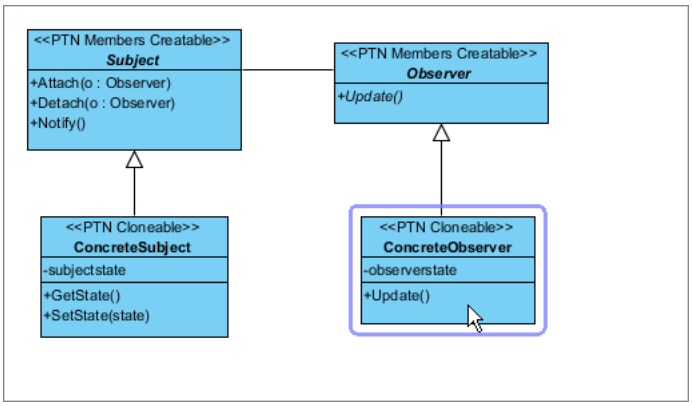
8. Enter 2, which is the number of classes to clone, and click **OK** to confirm.



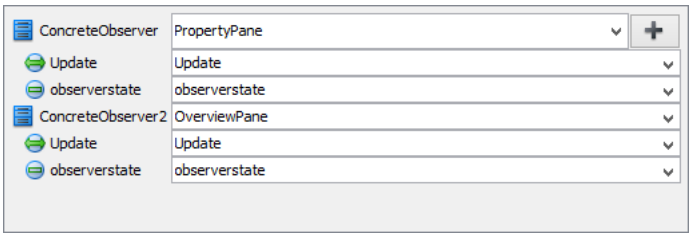
9. At the bottom pane, rename *ConcreteSubject2* and *ConcreteSubject3* to *Circle* and *Triangle*.



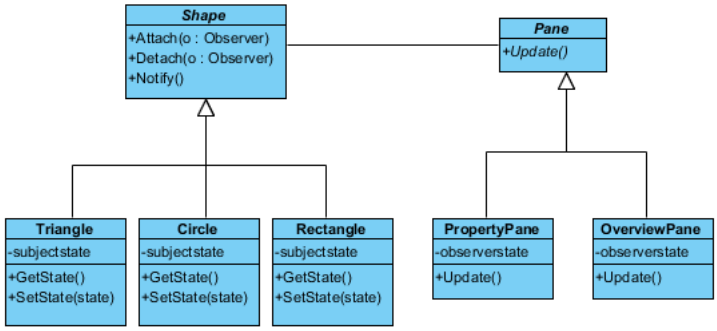
10. For observers, there are also panes like the overview pane. Select *ConcreteObserver* from the overview pane.



11. Click on the + button next to the class name and select **Clone...** from the popup menu.
12. Enter 1, which is the number of classes to clone, and click **OK** to confirm.
13. At the bottom pane, rename *ConcreteObserver2* to *OverviewPane*.



14. Click **OK** to confirm. Here is the diagram formed:



Resources

1. Design Patterns.vpp
2. Observer.pat

Related Links

- Full set of UML tools and UML diagrams

Visual Paradigm home page
(https://www.visual-paradigm.com/)

Visual Paradigm tutorials
(https://www.visual-paradigm.com/tutorials/)