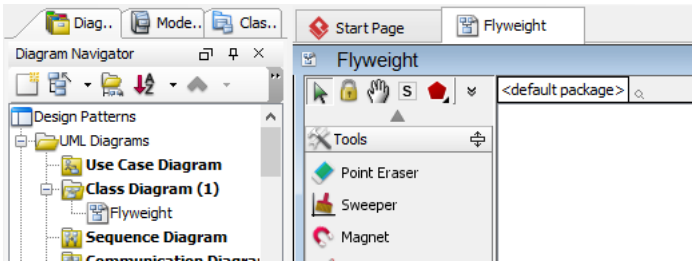
Flyweight Pattern Tutorial

Written Date : October 14, 2009

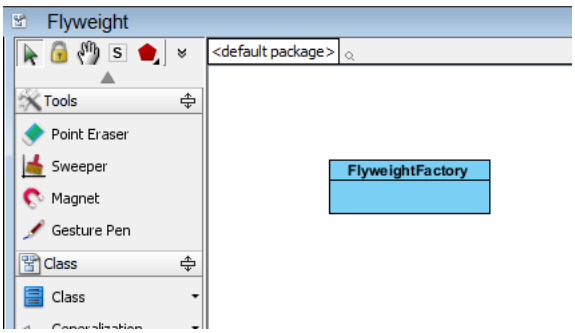
Modeling a Design Pattern with a Class Diagram

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

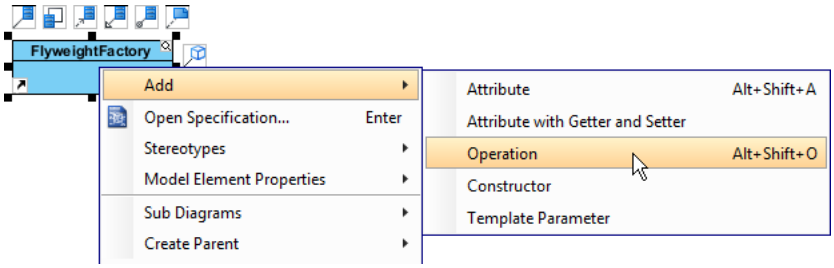
2. Create a class diagram named *Flyweight*.



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

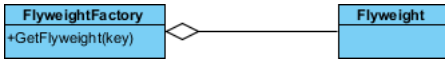


4. Right-click on the *FlyweightFactory* class and select **Add > Operation** from the popup menu.



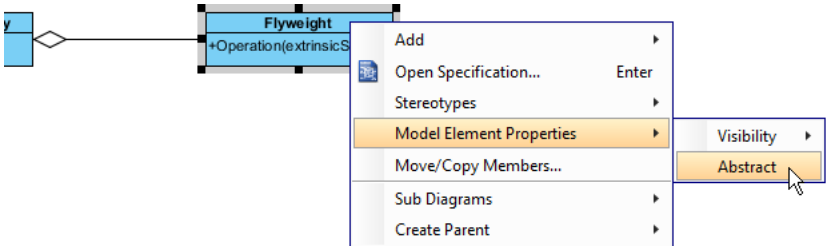
5. Name the operation *GetFlyweight(key)*.

6. Move the mouse cursor over the *FlyweightFactory* class and drag out **Aggregation > Class** to create an aggregated class *Flyweight*.

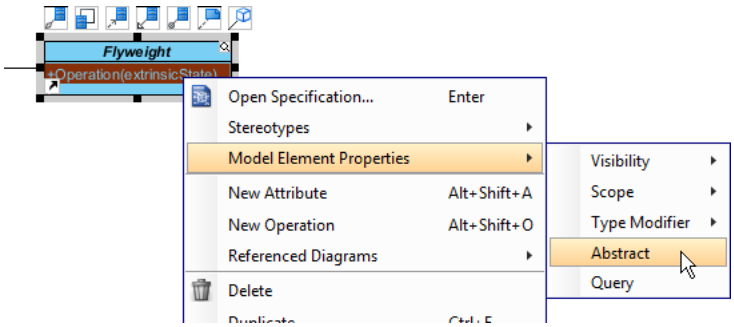


7. Create an operation in *Flyweight*, name it *Operation*, and it takes an argument *extrinsicState*.

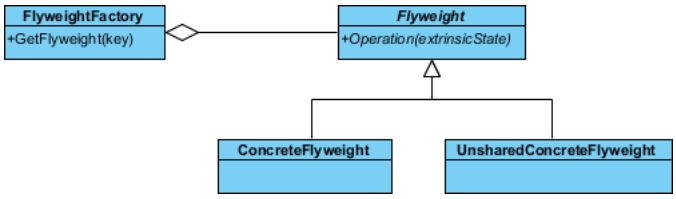
8. Right-click on *Flyweight* and select **Model Element Properties > Abstract** to set it as abstract.



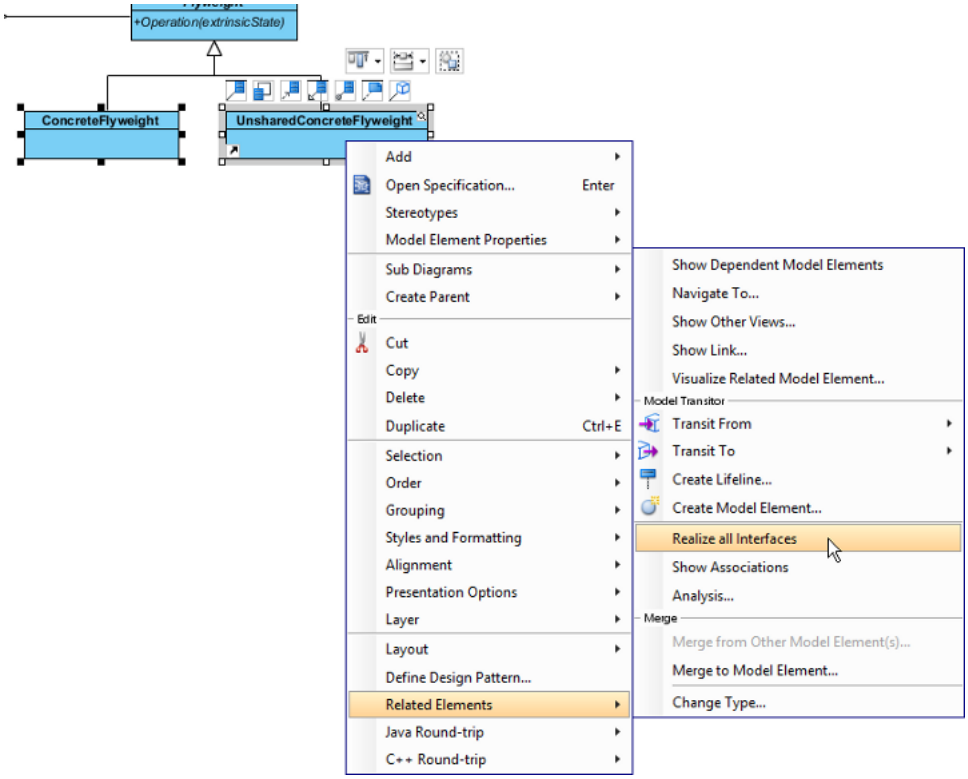
9. Right-click on *Operation* in *Flyweight* and select **Model Element Properties > Abstract** to set it as abstract.



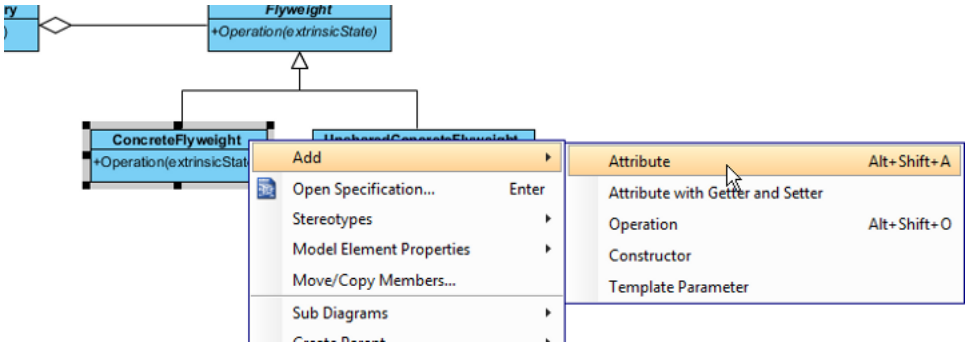
10. Move the mouse cursor over the *Flyweight* class and drag out **Generalization > Class** to create subclasses *ConcreteFlyweight* and *UnsharedConcreteFlyweight*.



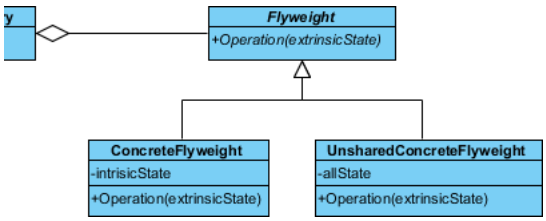
11. Make *ConcreteFlyweight* and *UnsharedConcreteFlyweight* inherit the abstract operations provided by *Flyweight* by right-clicking on them and selecting **Related Elements > Realize all Interfaces** from the popup menu.



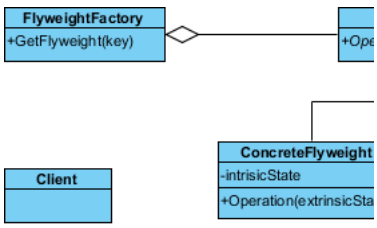
12. Add an attribute to *ConcreteFlyweight* by right-clicking on *ConcreteFlyweight* and selecting **Add > Attribute** from the popup menu. Name the attribute *intrinsicState*.



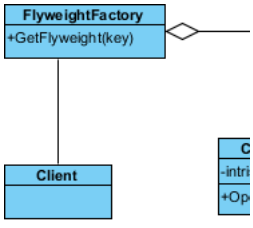
13. Repeat the previous step to add attribute *allState* to *UnsharedConcreteFlyweight*.



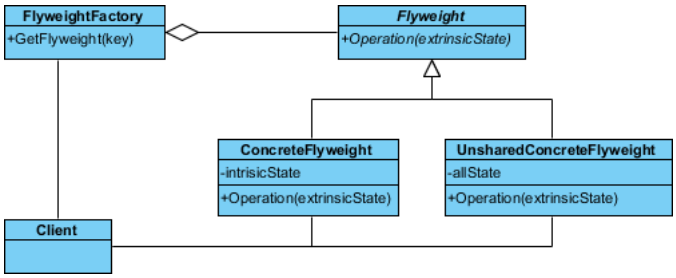
14. Create a class *Client* in the empty region of the diagram.



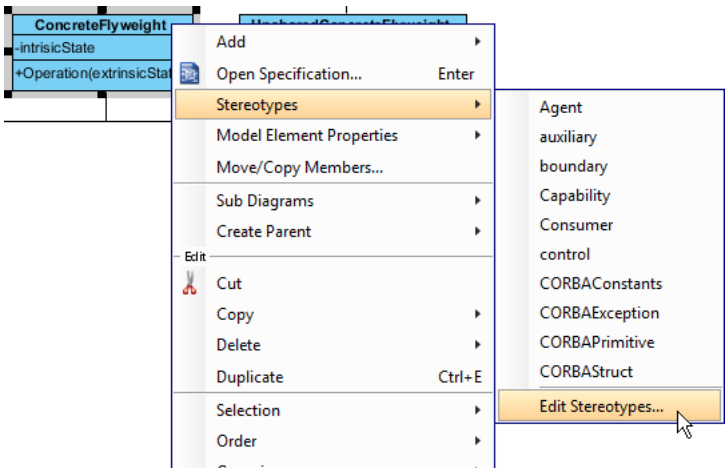
15. Use the resource-centric interface to associate *Client* and *FlyweightFactory*.



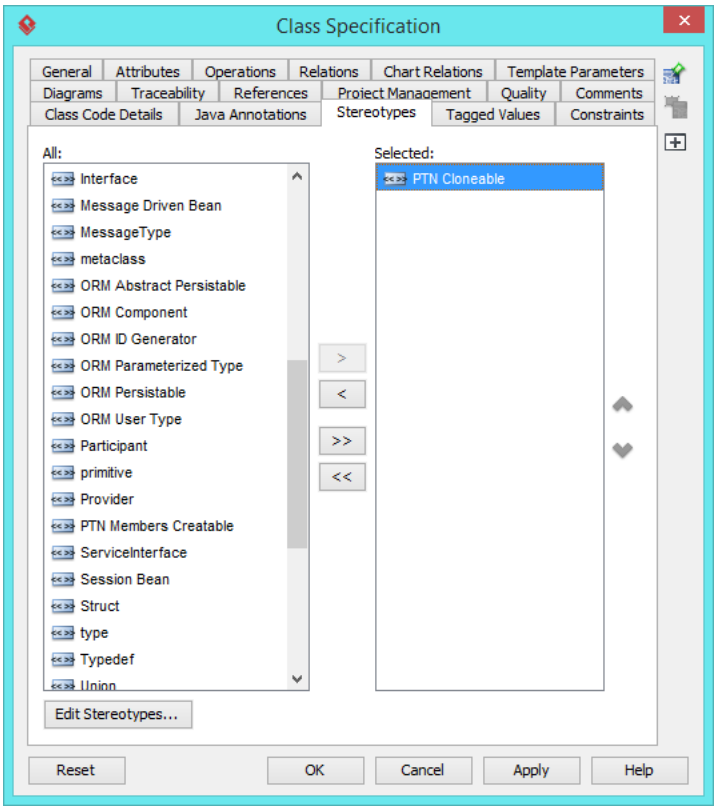
16. Associate *Client* with *ConcreteFlyweight* and *UnsharedConcreteFlyweight*.



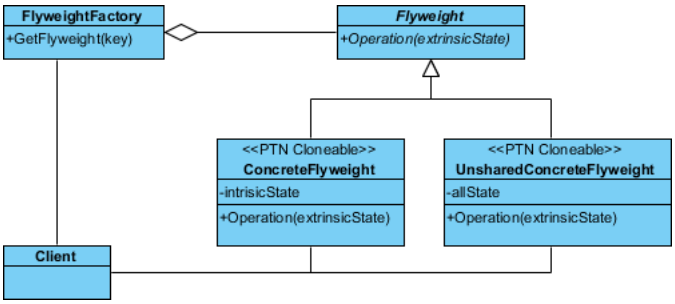
17. In practice, there may be multiple *ConcreteFlyweight* classes. To represent this, stereotype the *ConcreteFlyweight* class as **PTN Cloneable**. Right-click on the *ConcreteFlyweight* class and select **Stereotypes > Stereotypes...** from the popup menu.



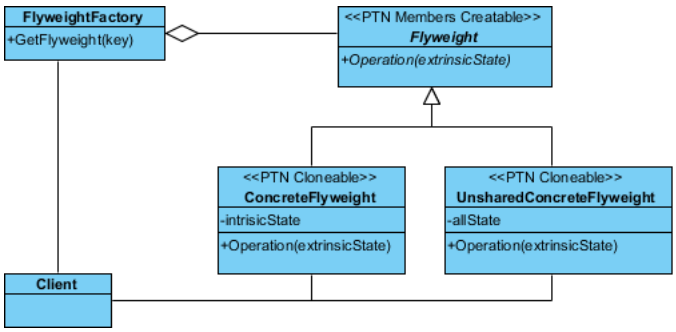
18. In the **Stereotypes** tab of the class specification, select **PTN Cloneable** and click > to assign it to the class. Click **OK** to confirm.



19. Repeat step 17 and 18 for *UnsharedConcreteFlyweight*.

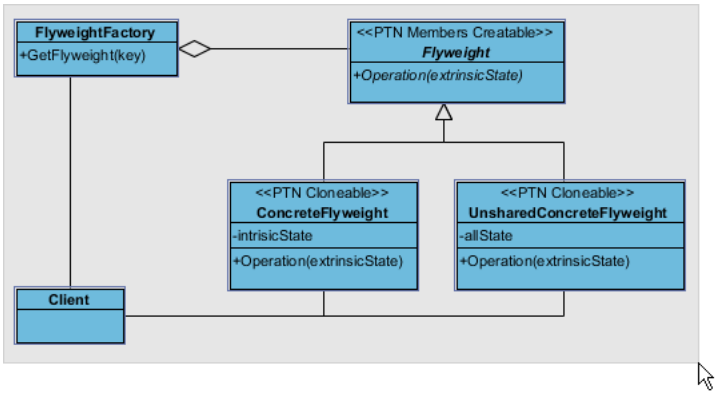


20. There may be multiple operations in *Flyweight*. To represent this, stereotype the *Flyweight* class as **PTN Members Creatable**. Repeat steps 17 and 18 to stereotype *Flyweight* as **PTN Members Creatable**. Up to now, the pattern should look like this:

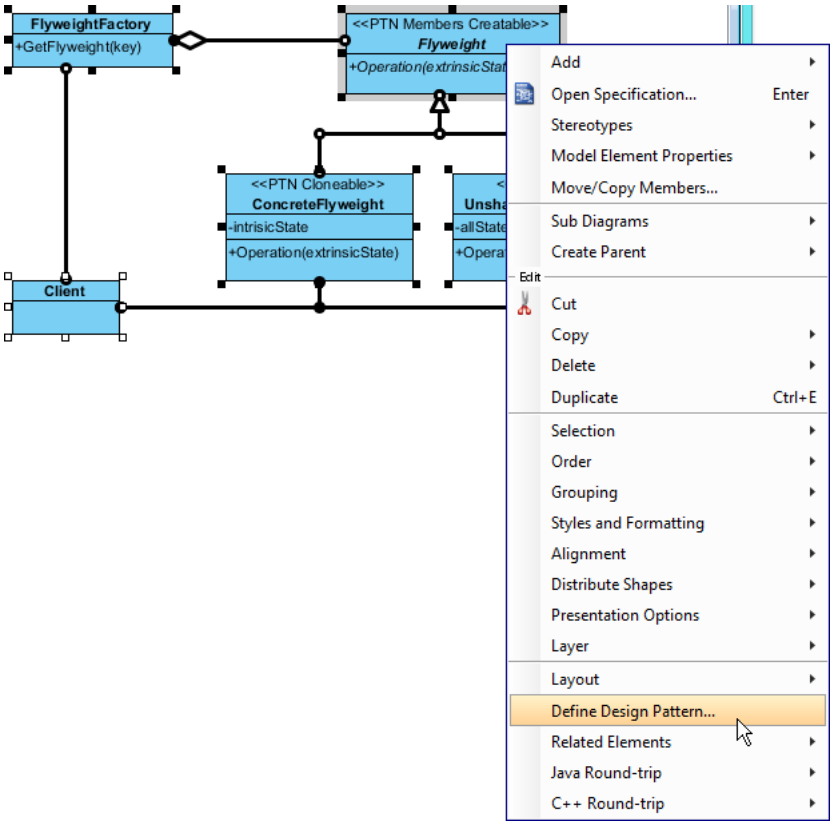


Defining a Pattern

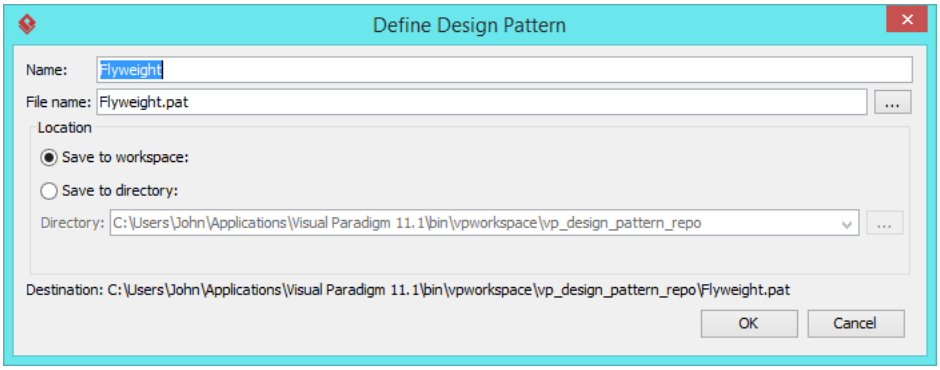
1. Select all classes on the class diagram.



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 as *Flyweight*. Keep the file name as is. Click **OK** to proceed.

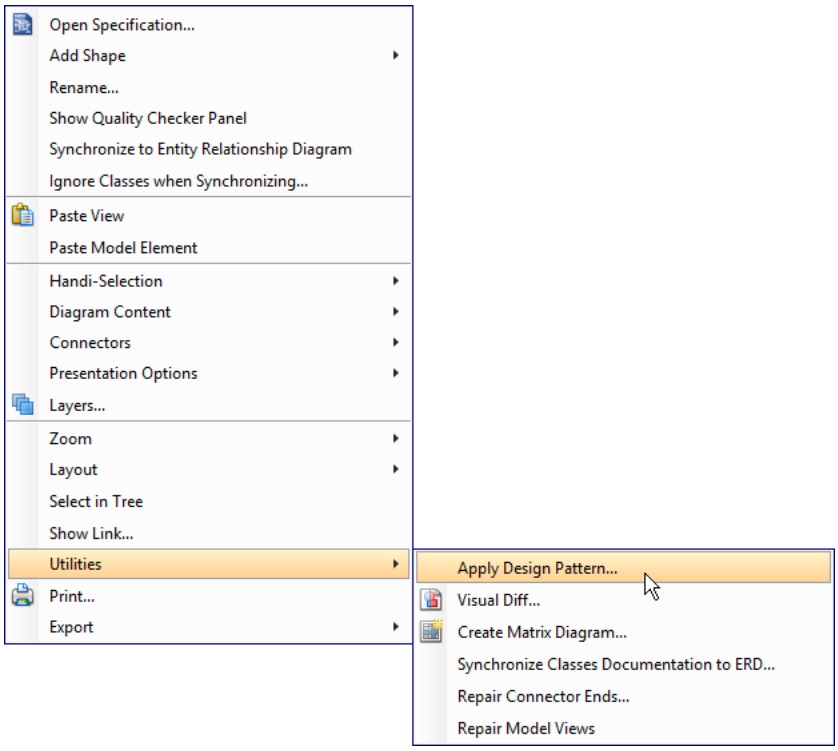


Applying a Design Pattern to a Class Diagram

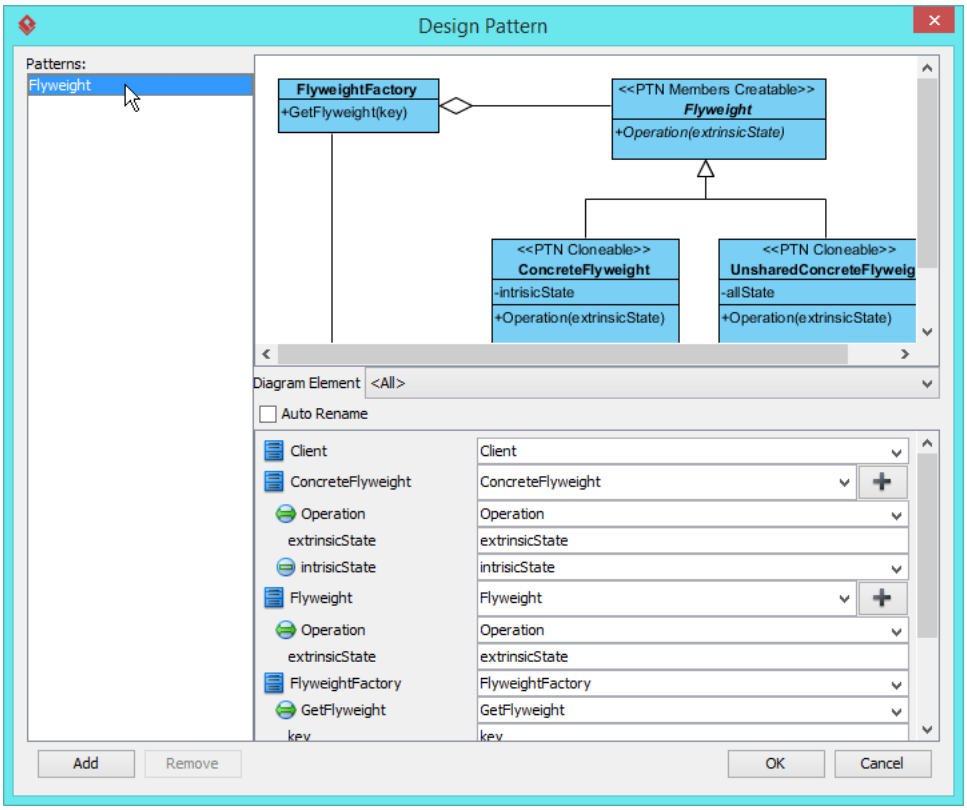
In this section, we will try to use the flyweight pattern to model a part of a diagram editor.

1. Create a new project named *My Diagram Tool*.
2. Create a class diagram named *Domain Model*.

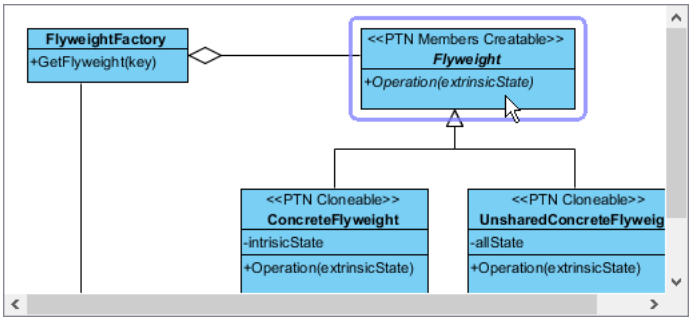
3. Right-click on the class diagram and select **Utilities > Apply Design Pattern...** from the popup menu.



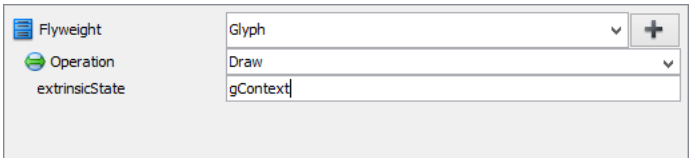
4. In the **Design Pattern** dialog box, select *Flyweight* from the list of patterns.



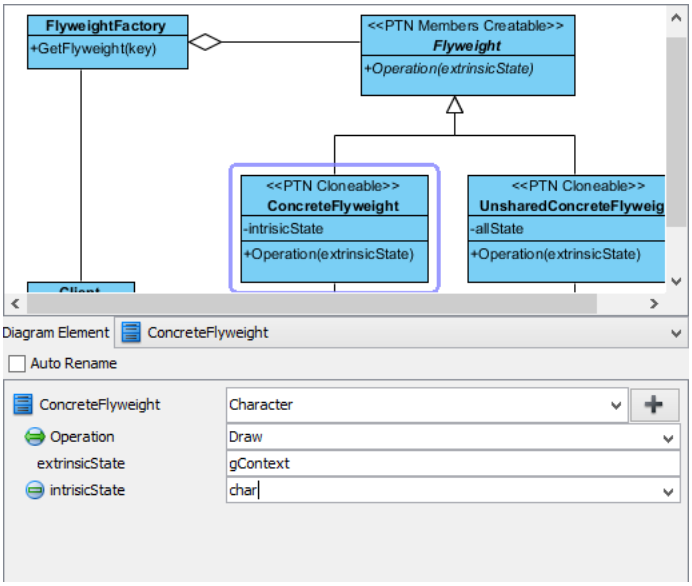
5. Click on *Flyweight* in the overview.



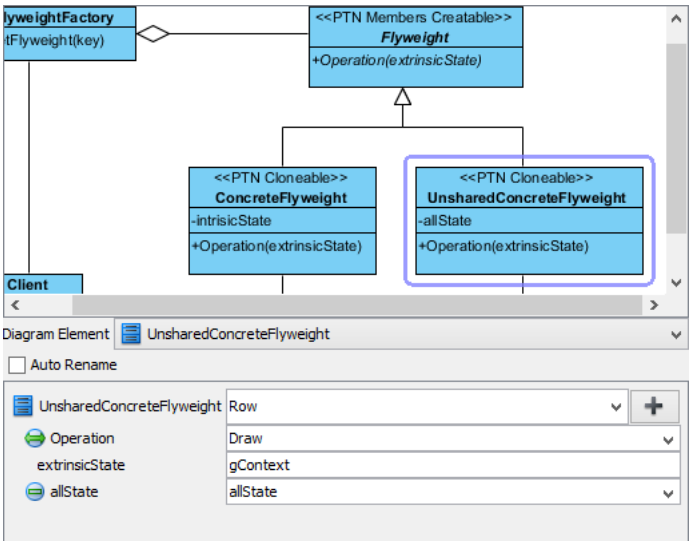
6. Rename it to *Glyph* in the bottom pane. Rename operation *Operation* to *Draw*, and parameter *extrinsicState* to *gContext*.



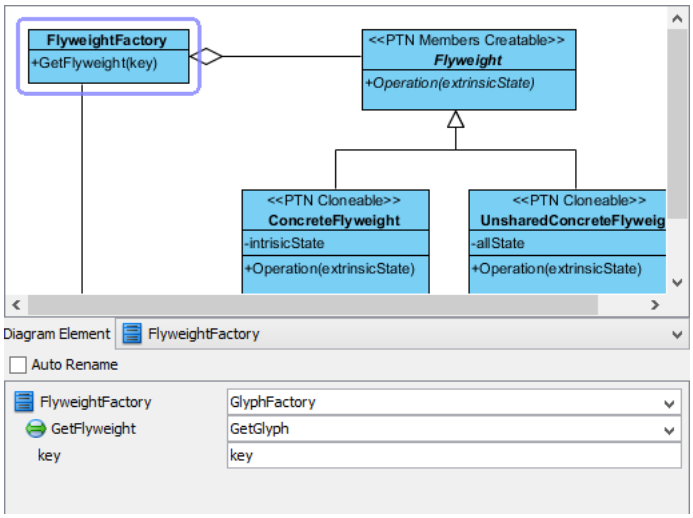
7. Select *ConcreteFlyweight* in the overview. In the bottom pane, rename it to *Character*. Rename operation *Operation* to *Draw*, parameter *extrinsicState* to *gContext* and attribute *intrinsicState* to *char*.



8. Select *UnsharedConcreteFlyweight* in the overview. In the bottom pane, rename it to *Row*. Rename operation *Operation* to *Draw*, parameter *extrinsicState* to *gContext*.

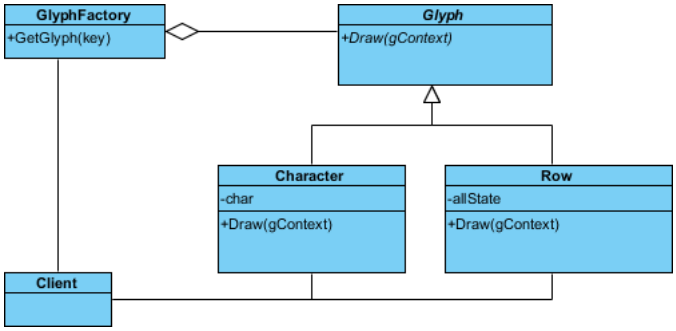


9. Select *FlyweightFactory* in the overview. In the bottom pane, rename it to *GlyphFactory* and operation *GetFlyweight* to *GetGlyph*.



10. Click **OK** to confirm editing and apply the pattern to the diagram.

11. Tidy up the diagram. It should look like this:



Resources

1. Design Patterns.vpp
2. Flyweight.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/)