



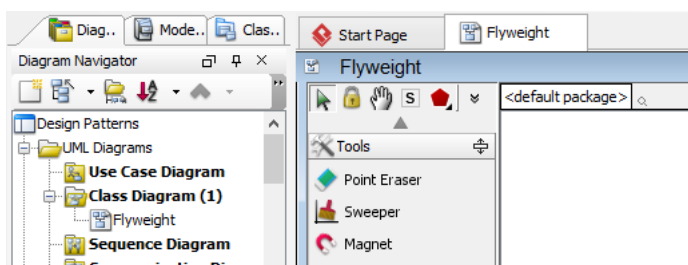
Flyweight Pattern Tutorial

Written Date : October 14, 2009

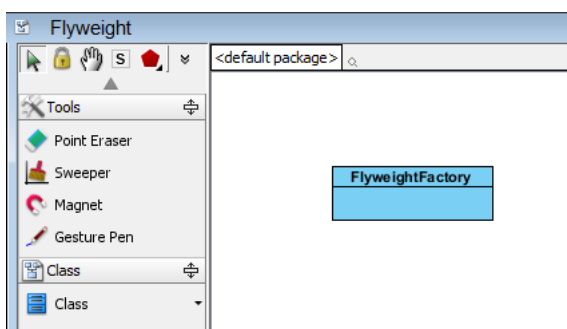
This tutorial is aimed to guide the definition and application of [Gang of Four \(GoF\)](#) flyweight [design pattern](#). By reading this tutorial, you will know how to develop a model for the flyweight pattern, and how to apply it in practice.

Modeling Design Pattern with Class Diagram

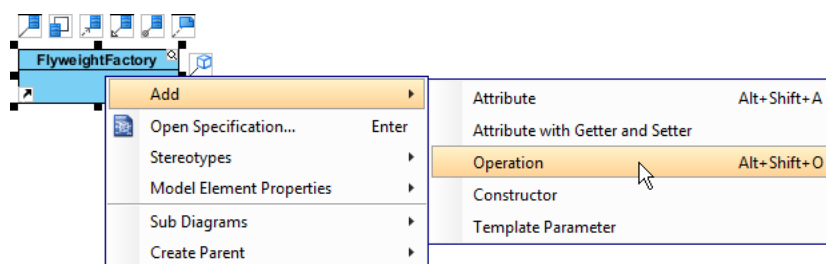
1. Create a new project *Design Patterns*.
2. Create a class diagram *Flyweight*.



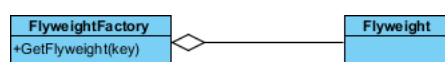
3. Select **Class** from diagram toolbar. Click on diagram to create a class. Name it as *FlyweightFactory*.



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



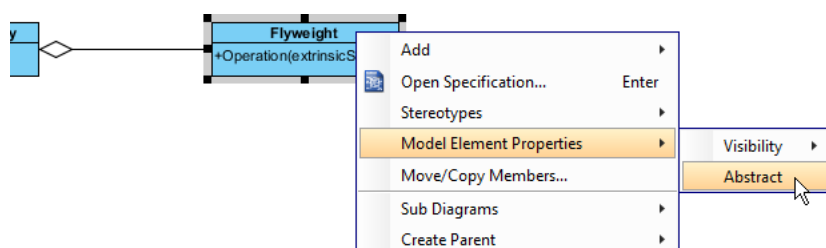
- Name the operation *GetFlyweight(key)*.
- Move the mouse cursor over the *FlyweightFactory* class, and drag out **Aggregation > Class** to create an aggregated class *Flyweight*.



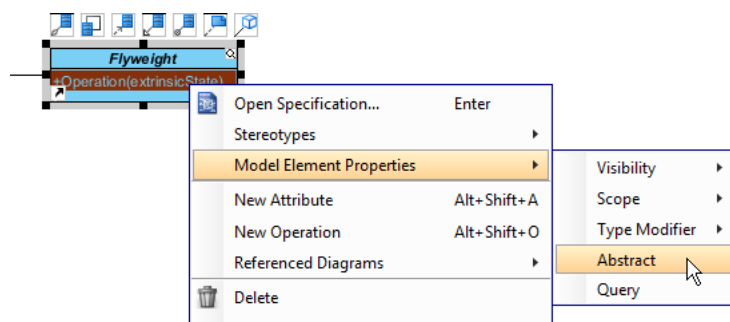
- Create an operation in *Flyweight*, name it as *Operation* and takes an argument *extrinsicState*.



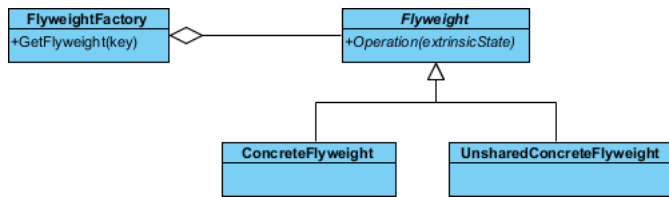
- Right click on *Flyweight*, and select **Model Element Properties > Abstract** to set it as abstract.



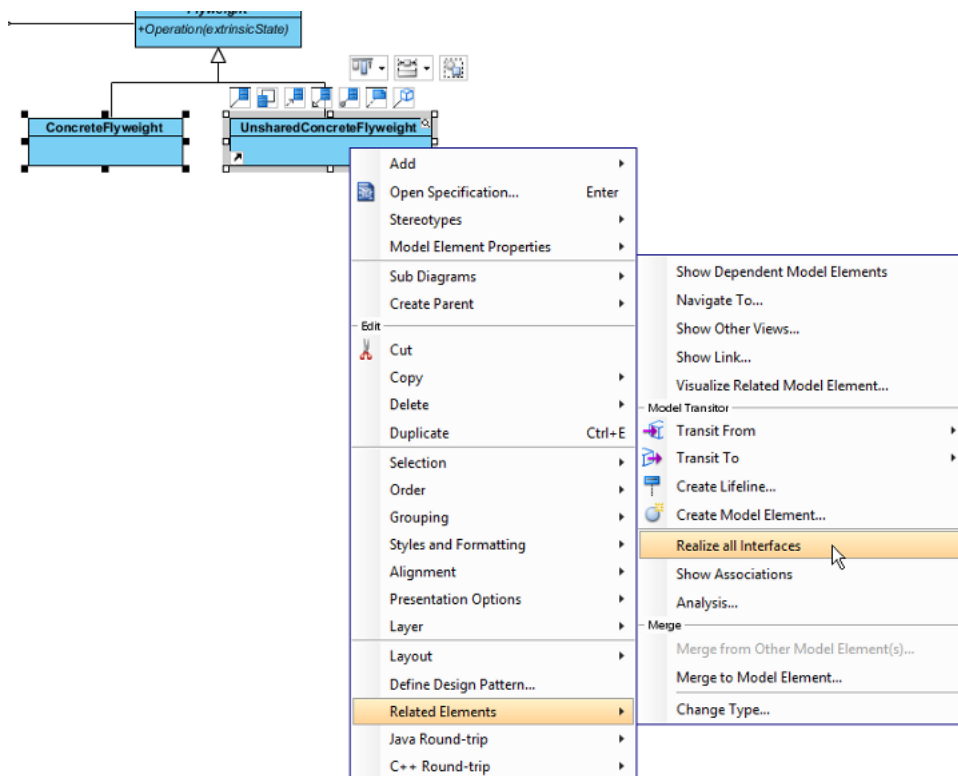
- Right click on *Operation* in *Flyweight*, and select **Model Element Properties > Abstract** to set it as abstract.



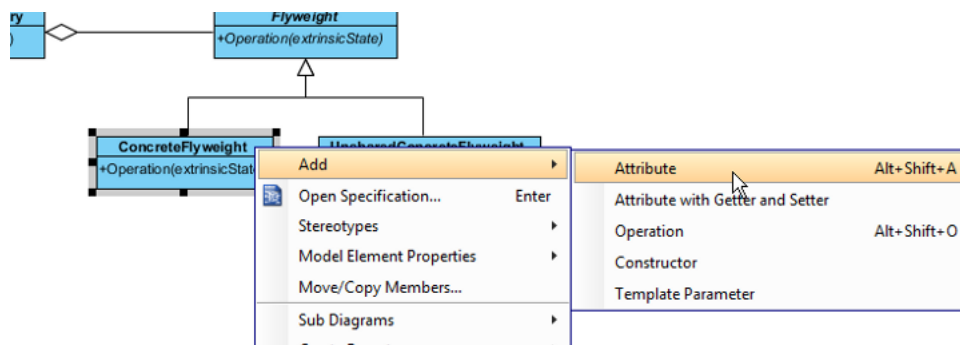
10. Move the mouse cursor over the *Subject* class, and drag out **Generalization** > **Class** to create subclasses *ConcreteFlyweight* and *UnsharedConcreteFlyweight*.



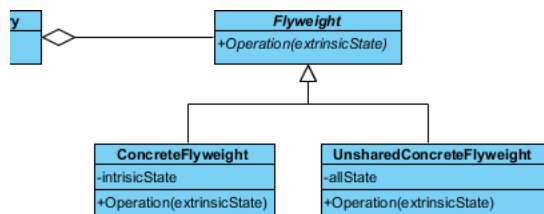
11. Make *ConcreteFlyweight* and *UnsharedConcreteFlyweight* inherit the abstract operations provided from *Flyweight* by right clicking on them, and selecting **Related Elements** > **Realize all Interfaces** from the popup menu.



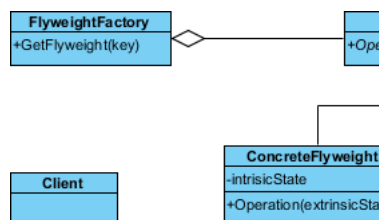
12. Add an operation to *ConcreteFlyweight* by right clicking on *ConcreteFlyweight*, and selecting **Add > Attribute** from the popup menu. Name the attribute *intrinsicState*.



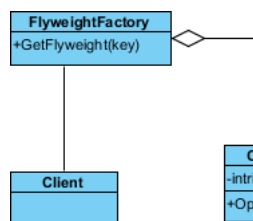
13. Repeat the previous step to add attribute *allState* to *UnsharedConcreteFlyweight*.



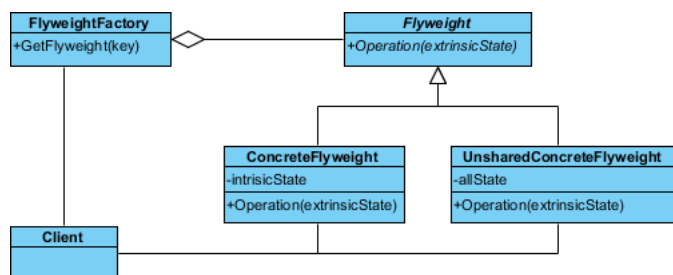
14. Create a class *Client* at the empty region of the diagram.



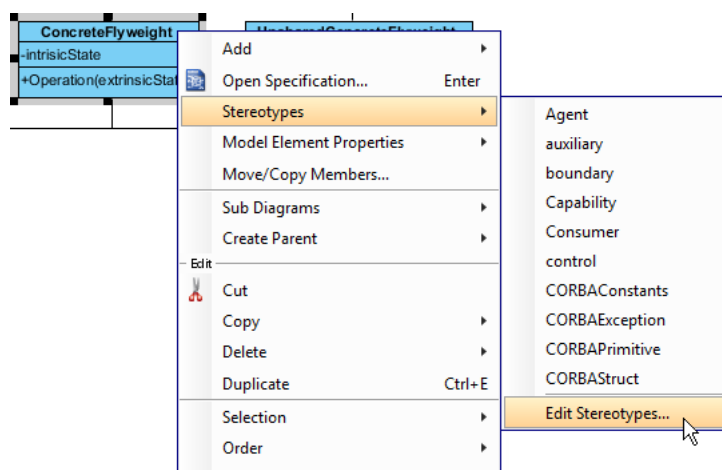
15. Make use of resource centric interface to associate *Client* and *FlyweightFactory*.



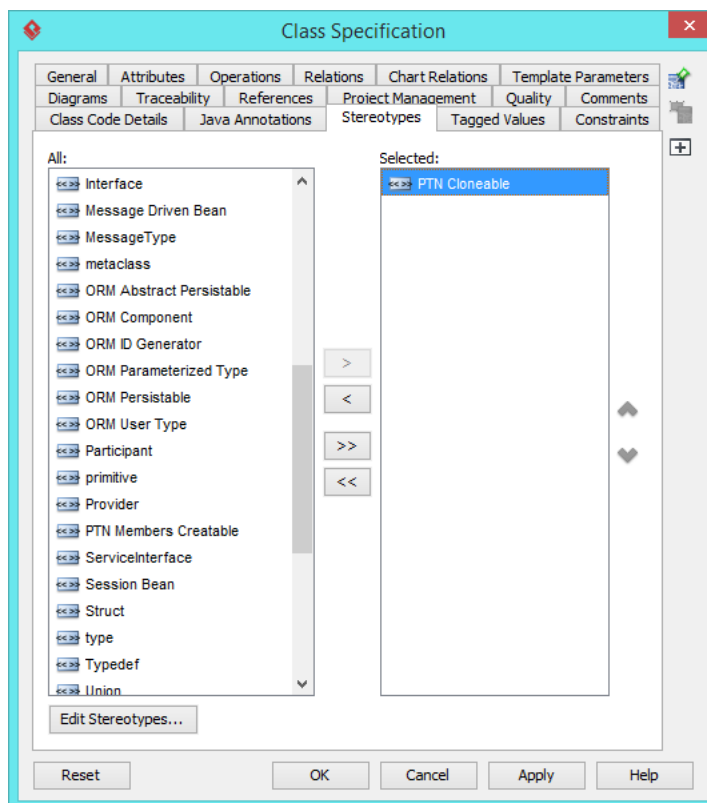
16. Associate *Client* with *ConcreteFlyweight* and *UnsharedConcreteFlyweight*.



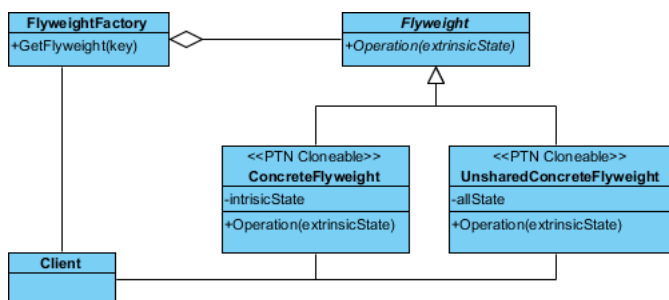
17. In practice, there may be multiple *ConcreteFlyweight* classes. To represent this, stereotype the *ConcreteFlyweight* class as **PTN Cloneable**. Right click on *ConcreteFlyweight* class and select **Stereotypes > Stereotypes...** from the popup menu.



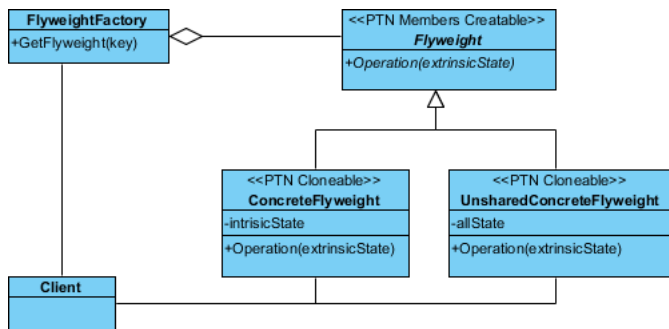
- In the **Stereotypes** tab of class specification, select **PTN Cloneable** and click > to assign it to the class. Click **OK** to confirm.



- Repeat step 17 and 18 on *UnsharedConcreteFlyweight*.

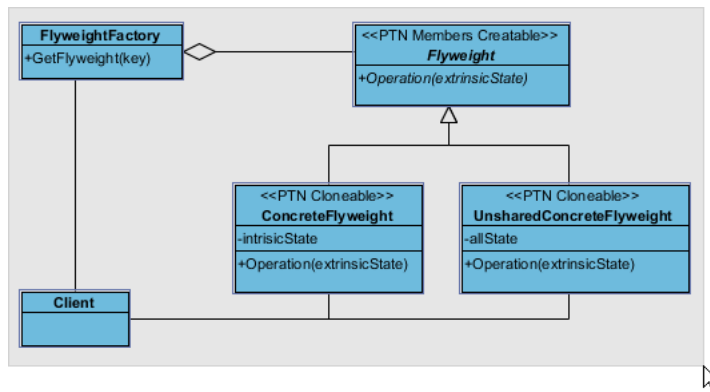


- There may be multiple operations in *Flyweight*. To represent this, stereotype the *Flyweight* class as **PTN Members Creatable**. Repeat steps 17 and 18 to stereotype *Flyweight* as **PTN Members Creatable**. Up to now, the pattern should look like this:

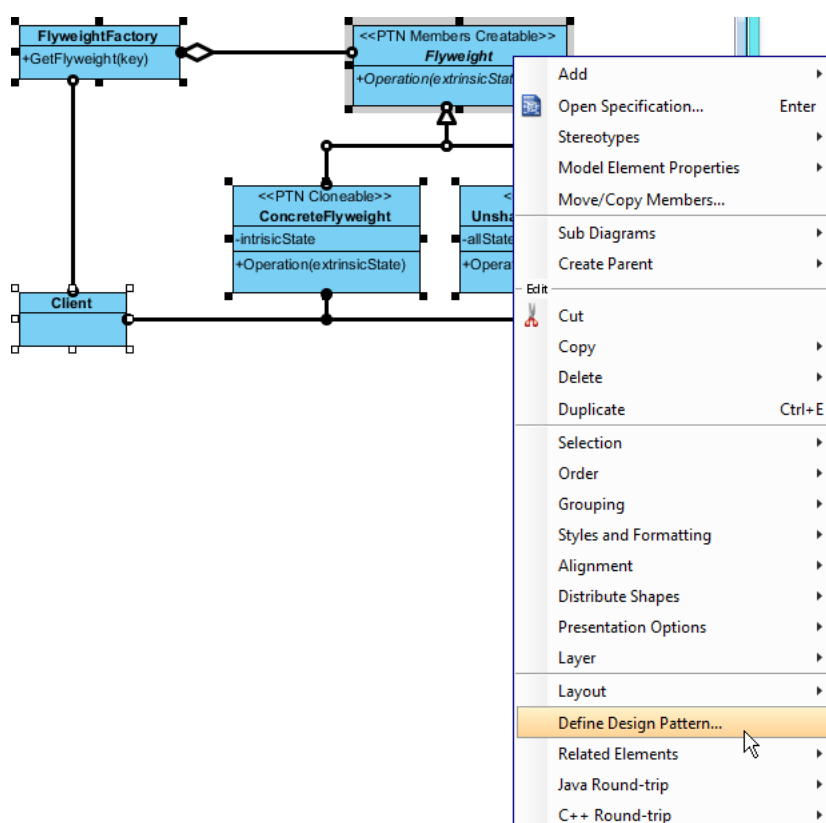


Defining Pattern

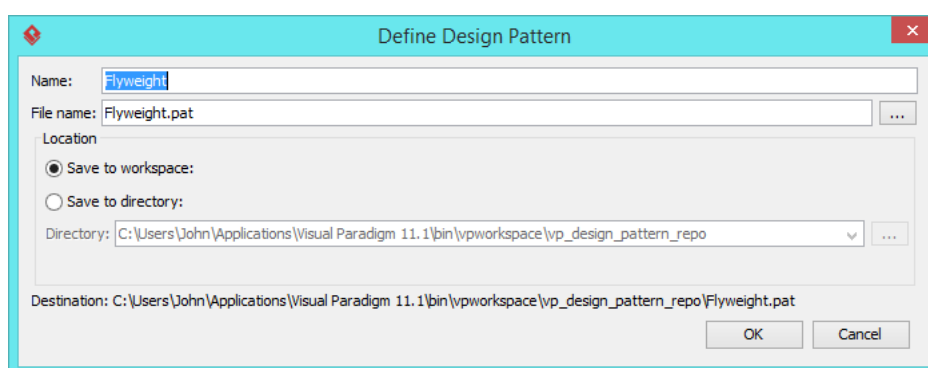
- Select all classes on the class diagram.



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



- In the **Define Design Pattern** dialog box, specify the pattern name *Flyweight*. Keep the file name as it. Click **OK** to proceed.

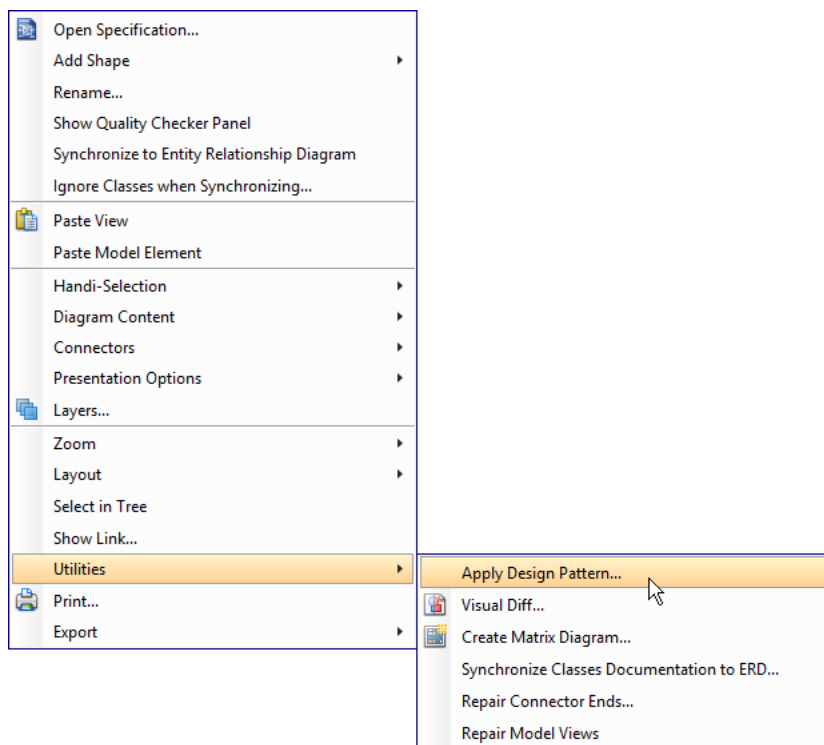


Applying Design Pattern on Class Diagram

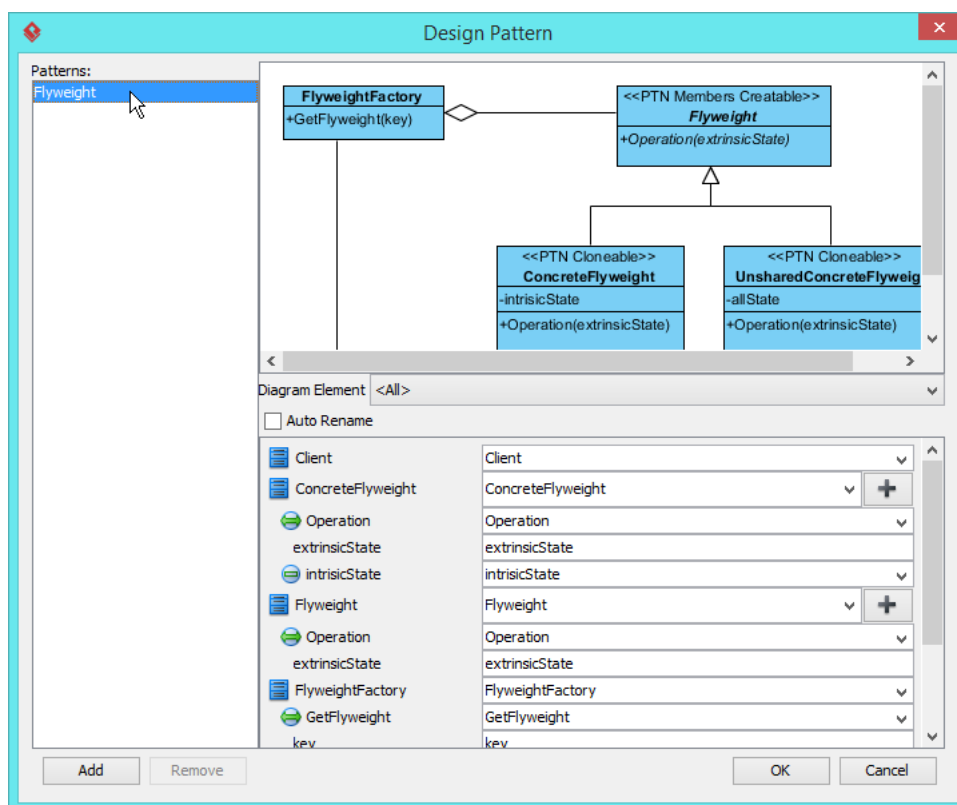
In this section, we will try to make use of the flyweight pattern to model a part of a diagram editor.

- Create a new project *My Diagram Tool*.
- Create a class diagram *Domain Model*.

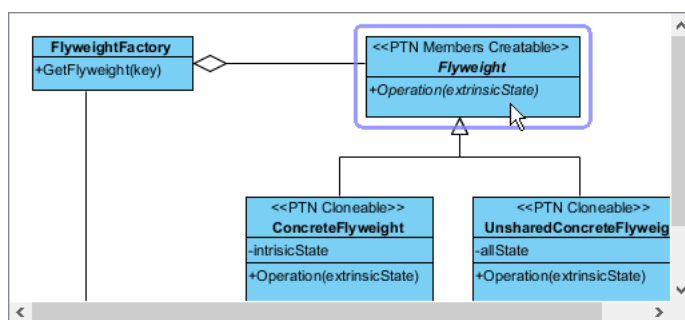
3. Right click on the class diagram and select **Utilities > Apply Design Pattern...** from the popup menu.



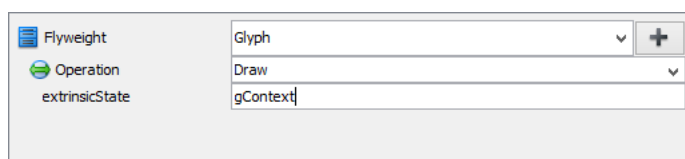
- In the **Design Pattern** dialog box, select *Flyweight* from the list of patterns.



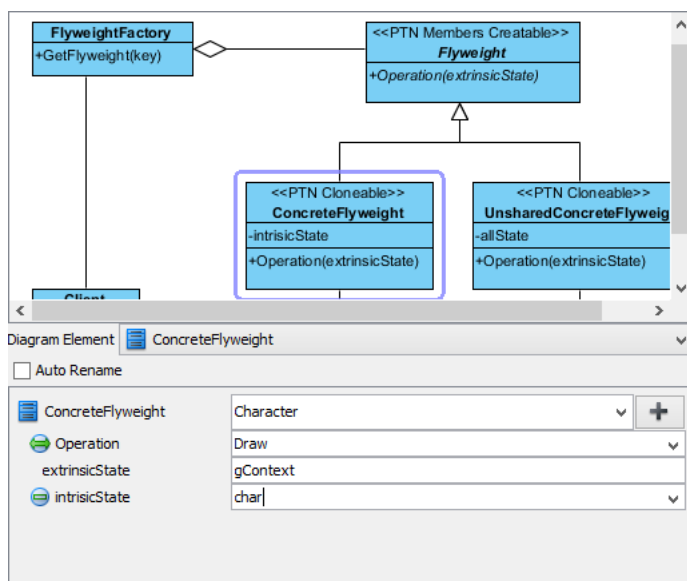
- Click on *Flyweight* in the overview.



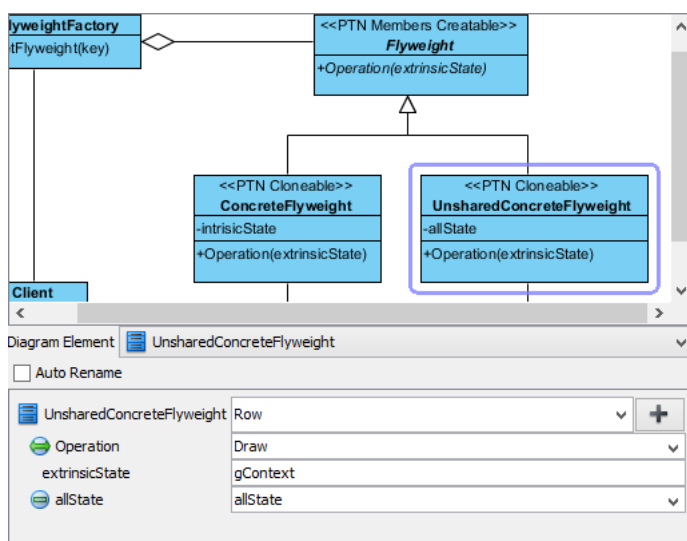
- Rename it to *Glyph* at the bottom pane. Rename operation *Operation* to *Draw*, and parameter *extrinsicState* to *gContext*.



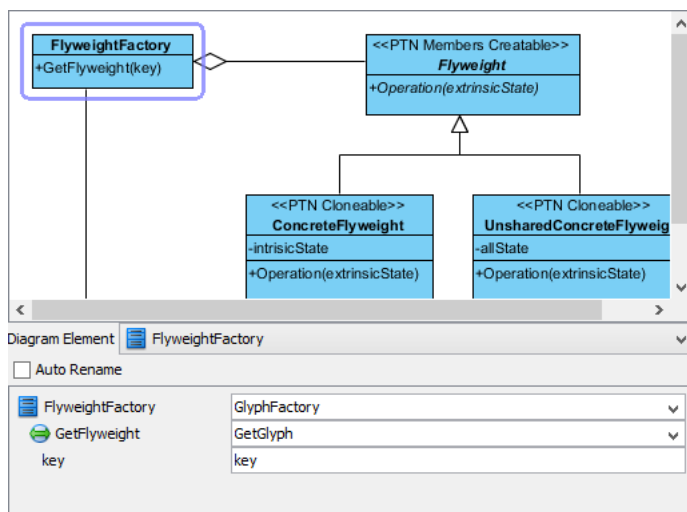
7. Select *ConcreteFlyweight* in overview. At the bottom pane, rename it to *Character*. Rename operation *Operation* to *Draw*, parameter *extrinsicState* to *gContext* and attribute *intrinsicState* to *char*.



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

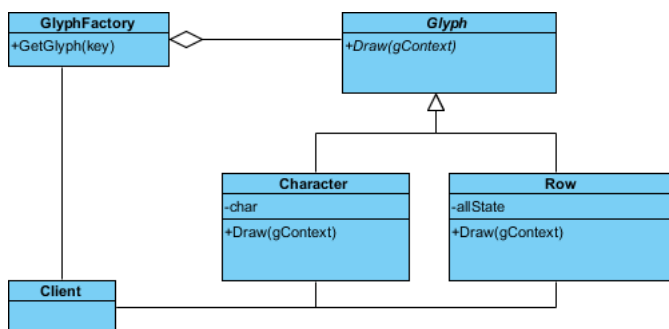


- Select *FlyweightFactory* in overview. At the bottom pane, rename it to *GlyphFactory* and operation *GetFlyweight* to *GetGlyph*.



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

- Tidy up the diagram. It should become:



Resources

- [Design Patterns.vpp](#)
- [Flyweight.pat](#)

Related Links

- [Full set of UML tools and UML diagrams](#)



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

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