Command Pattern Tutorial

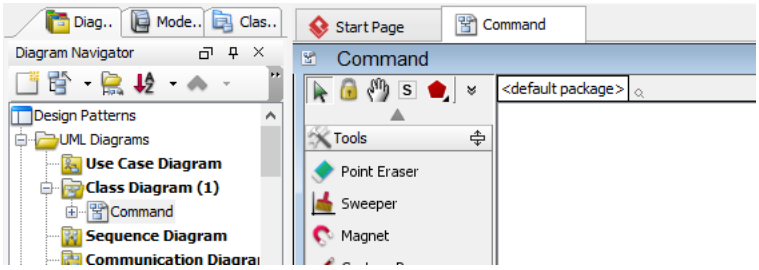
Written Date : October 14, 2009

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

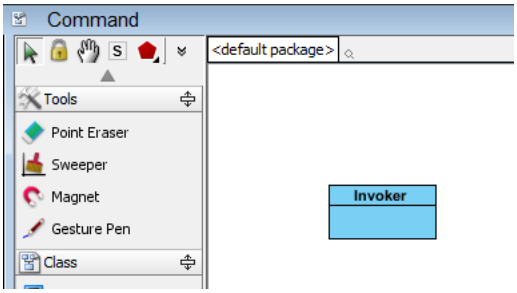
Modeling Design Pattern with Class Diagram

1. Create a new project *Design Patterns*.

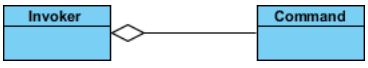
2. Create a class diagram *Command*.



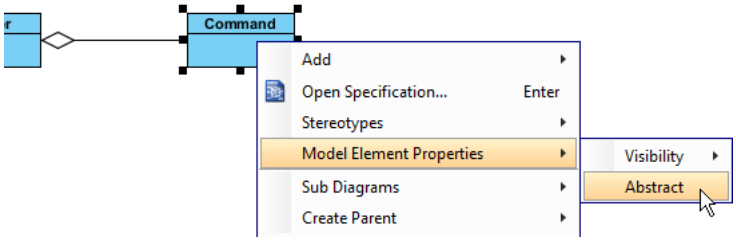
3. Select **Class** from diagram toolbar. Click on the diagram to create a class. Name it as *Invoker*.



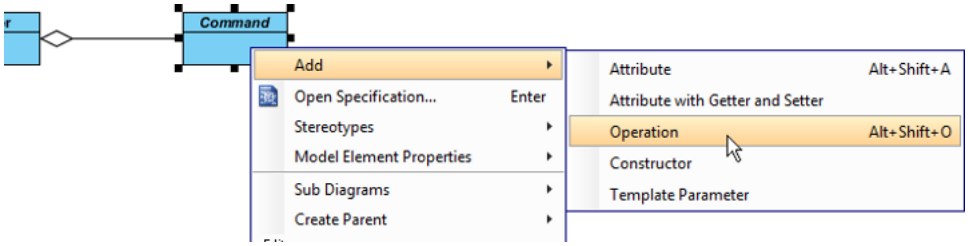
4. Move the mouse cursor over the *Invoker* class, and drag out **Aggregation** > **Class** to create an associated class *Command*.



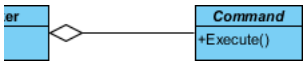
5. Right click on *Command*, and select **Model Element Properties** > **Abstract** to set it as abstract.



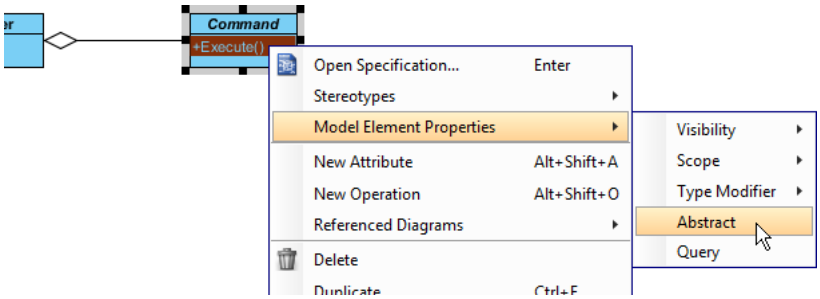
6. Right click on *Command* class, and select **Add** > **Operation** from the popup menu.



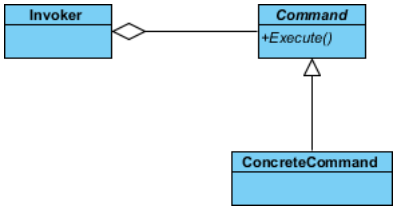
7. Name the operation *Execute()*.



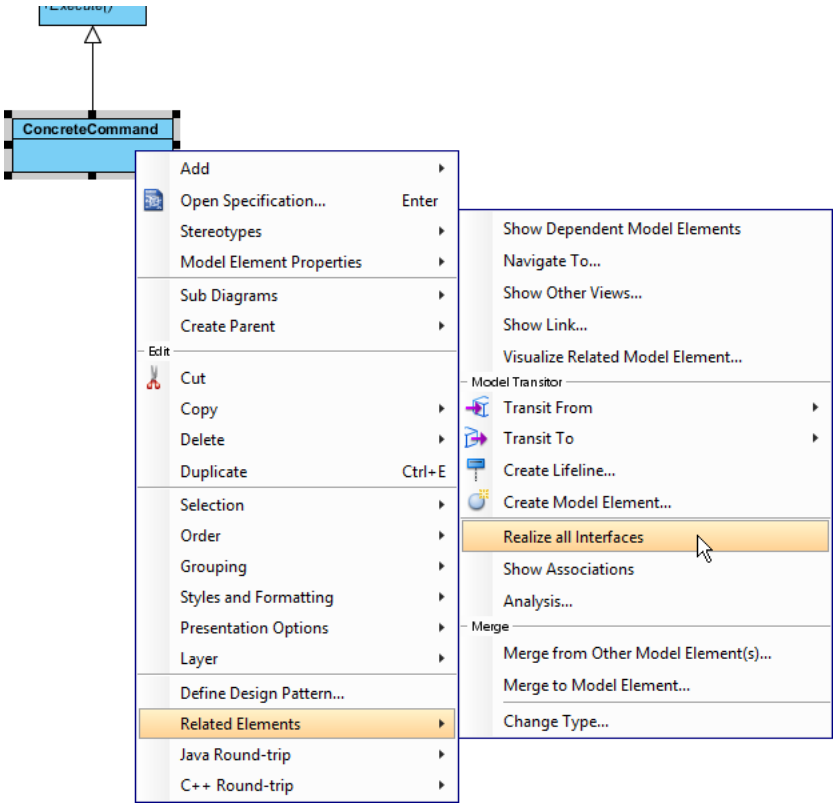
8. Right click on *Execute*, and select **Model Element Properties** > **Abstract** to set it as abstract.



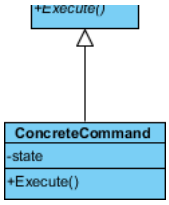
9. Move the mouse cursor over the *Command* class, and drag out **Generalization** > **Class** to create subclasses *ConcreteCommand*.



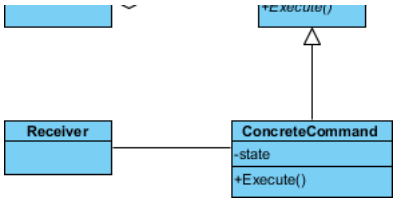
10. We need make the concrete commands inherit operations from the command class. Right click on *ConcreteCommand* and select **Related Elements** > **Realize all Interfaces** from the popup menu.



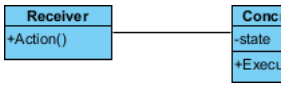
11. Right click on the *ConcreteCommand* class, and select **Add** > **Attribute** from the popup menu. Enter *state* as attribute name.



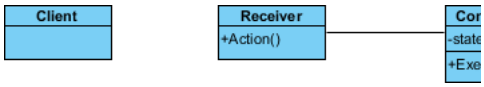
12. Move the mouse cursor over the *ConcreteCommand* class, and drag out **Association** > **Class** to create an associated class *Receiver*.



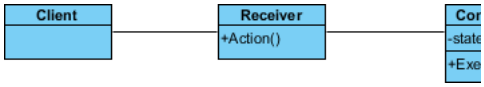
13. Right click on the *Receiver* class, and select **Add** > **Operation** from the popup menu. Enter *Action* as operation name.



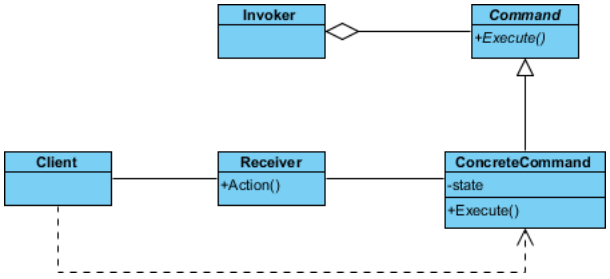
14. Create a *Client* class near the *Receiver* class.



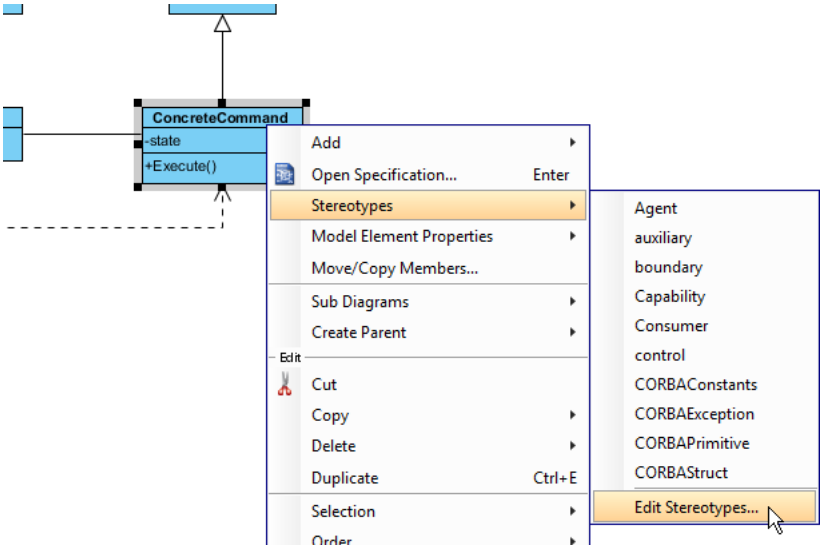
15. Move the mouse cursor over the *Client* class, and drag out **Association** > **Class** to create an associated class *Receiver*.



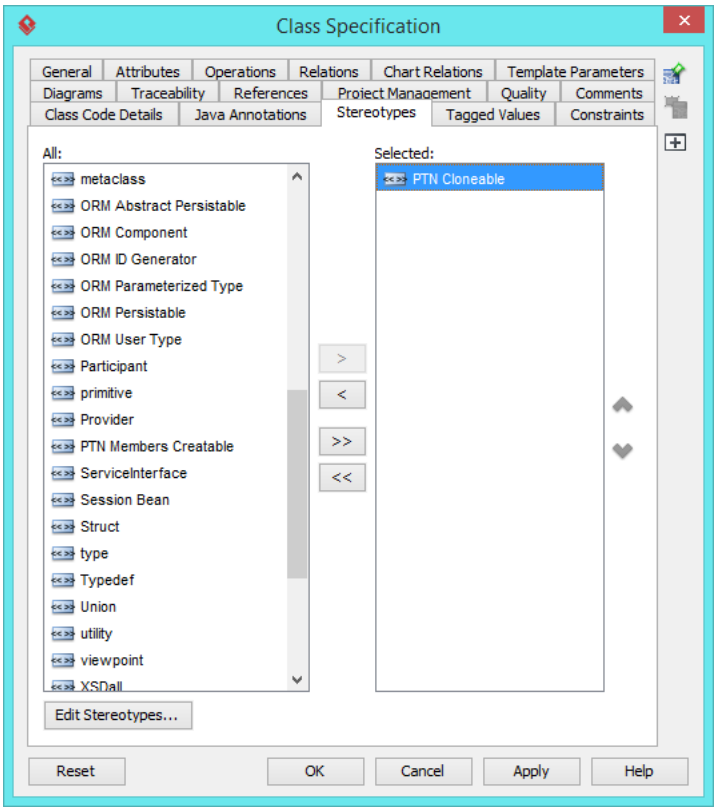
16. Move the mouse cursor over the *Client* class, and drag out **Dependency** > **Class** to create an associated class *ConcreteCommand*. Up to now, the diagram becomes:



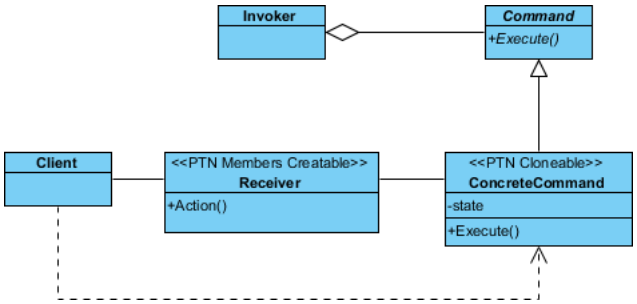
17. In practice, there may be multiple concrete handlers. To represent this, stereotypes the class *ConcreteCommand* as **PTN Cloneable**. Right click on *ConcreteCommand* and select **Stereotypes** > **Stereotypes...** from the popup menu.



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

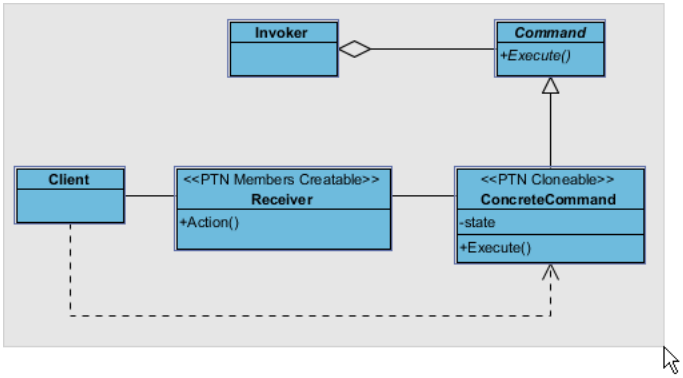


19. There may be multiple actions that the receiver can perform. To represent this, stereotype the class *Receiver* as **PTN Members Creatable**. Up to now, the diagram becomes:

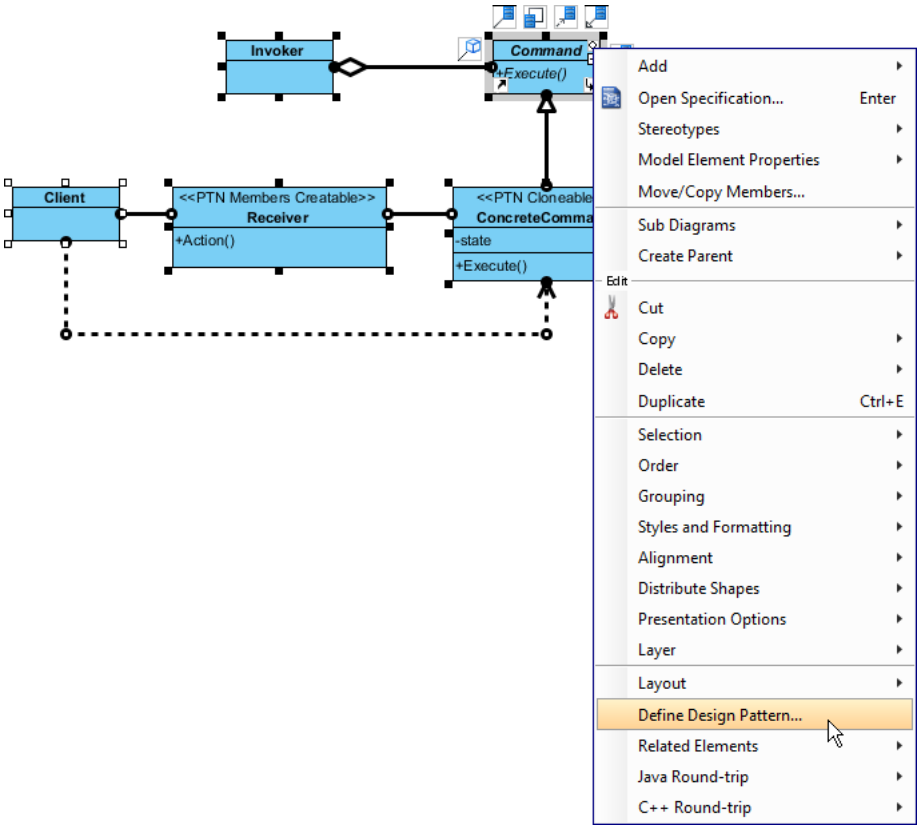


Defining Pattern

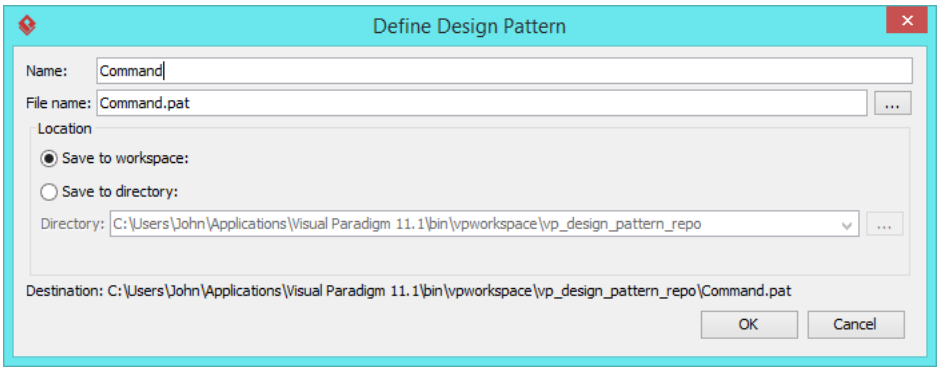
1. Select all classes on the class diagram.



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



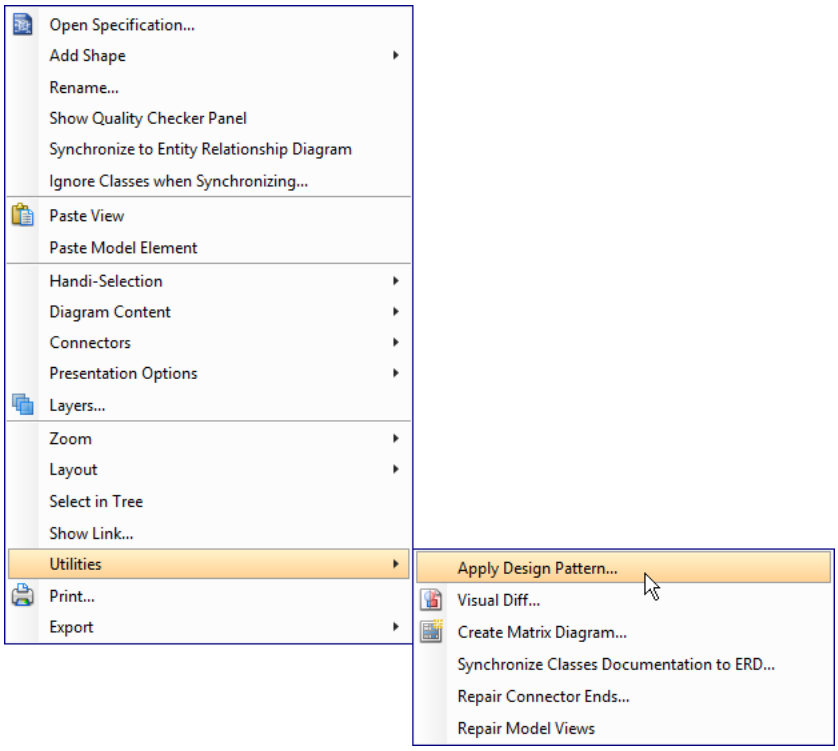
Applying Design Pattern on Class Diagram

In this section, we are going to apply the command pattern in modeling a document editor.

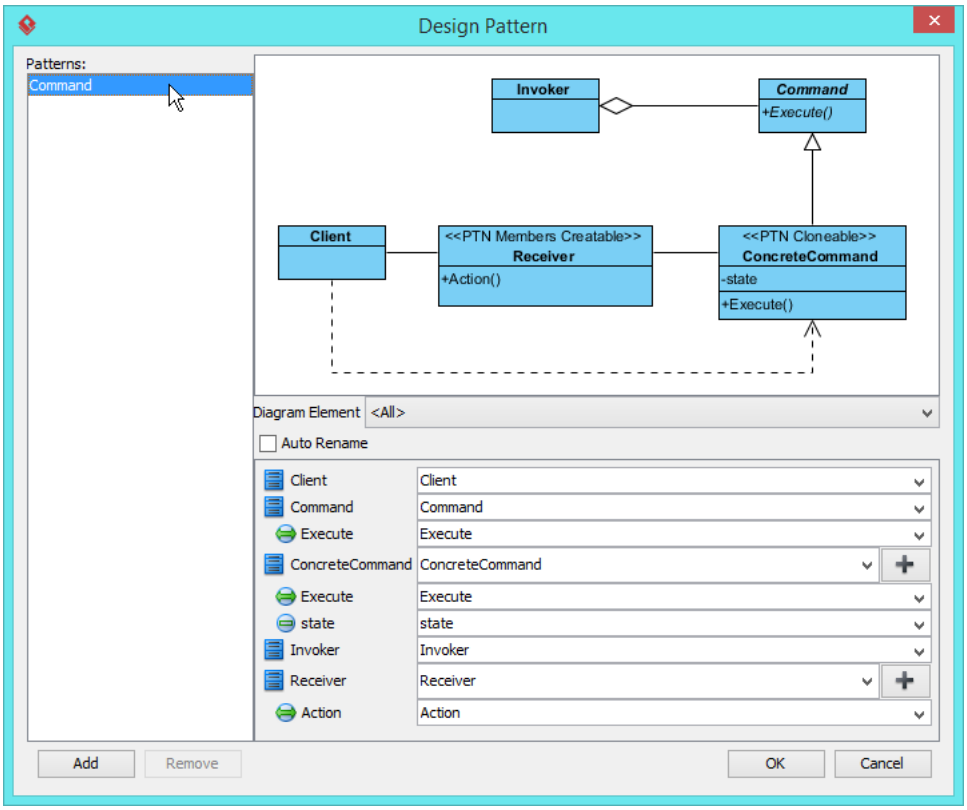
1. Create a new project *Document Editor*.

2. Create a class diagram *Domain Model*.

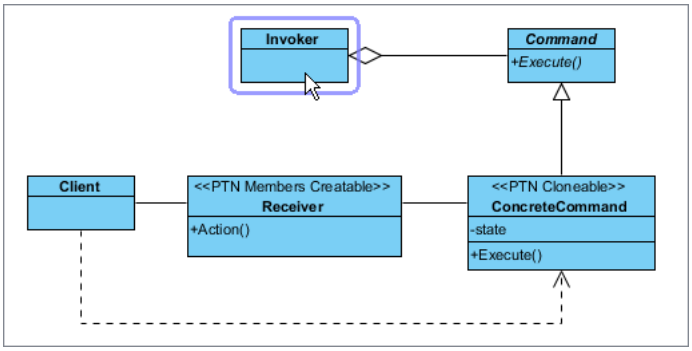
3. Right click on the class diagram and select **Utilities** > **Apply Design Pattern...** from the popup menu.



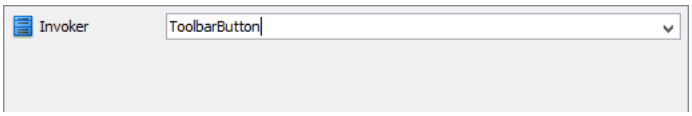
4. In the **Design Pattern** dialog box, select *Command* from the list of patterns.



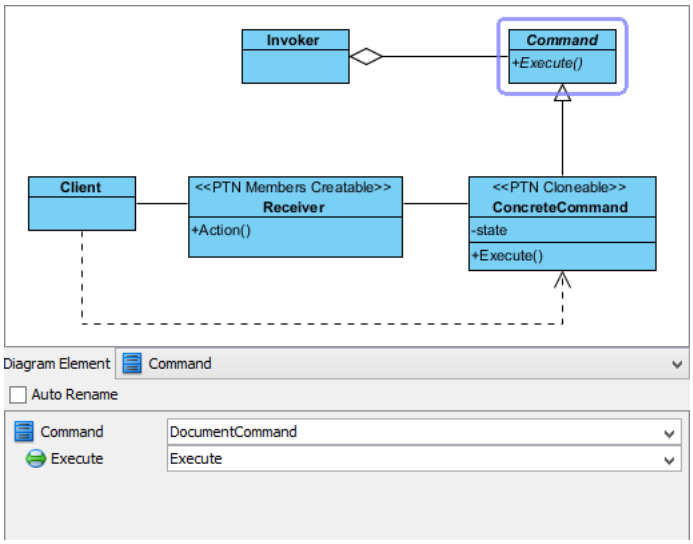
5. Select *Invoker* in overview.



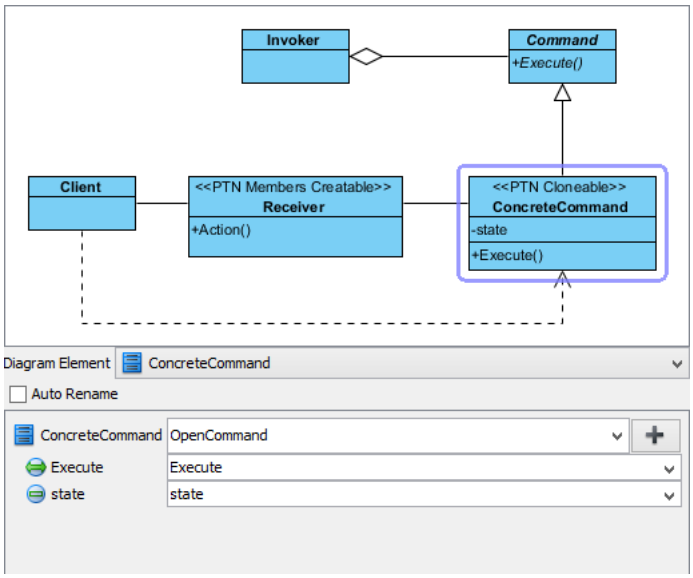
6. At the bottom pane, rename *Invoker* to *ToolbarButton*.



7. Select *Command* in overview. At the bottom pane, rename *Command* to *DocumentCommand*.

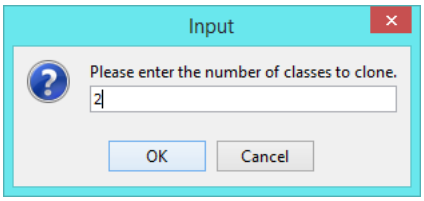


8. Select *ConcreteCommand* in overview. At the bottom pane, rename *ConcreteCommand* to *OpenCommand*.

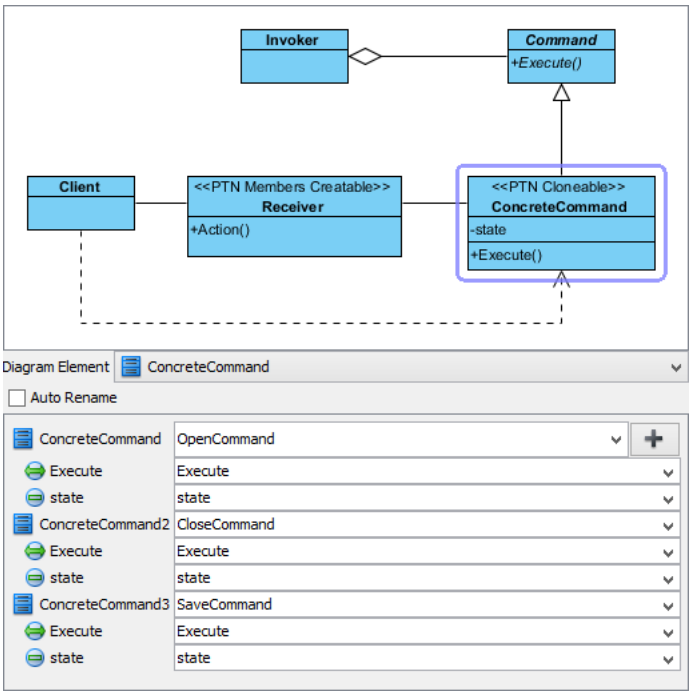


9. We need 2 more concrete commands for closing and saving a document. Press on the + button and select **Clone...** from the popup menu.

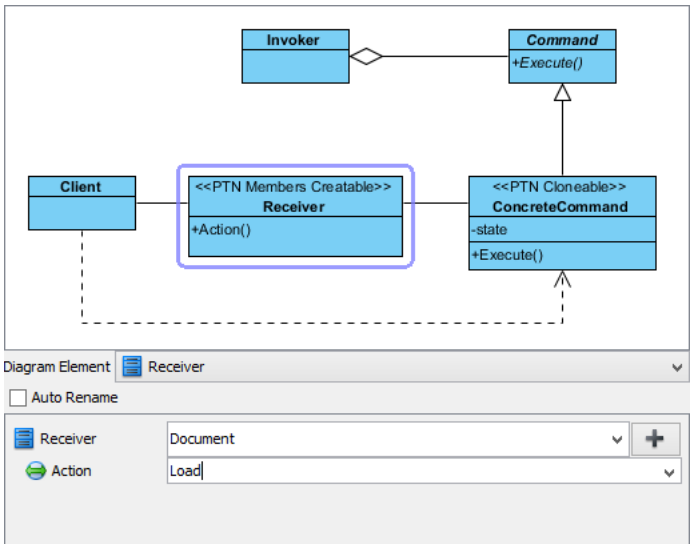
10. Enter 2 to be the number of classes to clone.



11. Rename *ConcreteCommand2* to *CloseCommand*, *ConcreteCommand3* to *SaveCommand*.

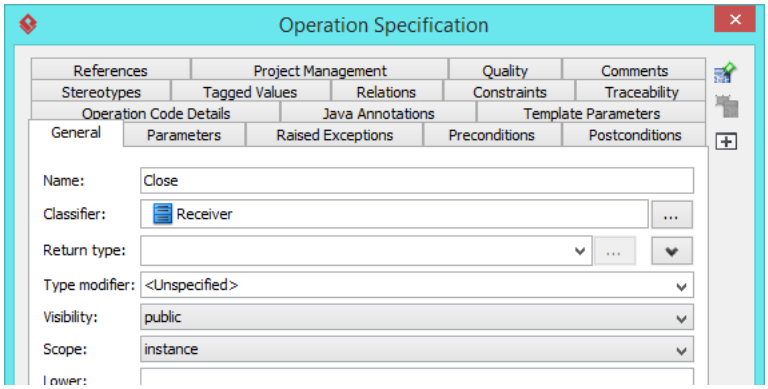


12. Select *Receiver* in overview. At the bottom pane, rename *Receiver* to *Document*, and operation *Action* to *Load*.



13. Create more operations for closing and saving documents. Click on the + button and select **New Operation...** from the popup menu.

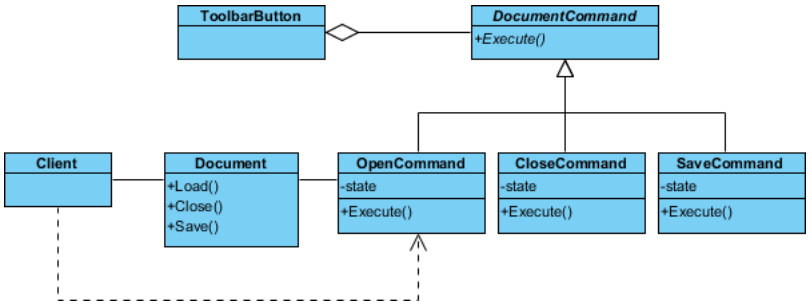
14. In the **Operation Specification**, enter *Close* as name. Click **OK** to confirm.



15. Repeat steps 13 and 14 to create operation *Save*.

16. Click **OK** to apply the pattern to diagram.

17. Tidy up the diagram. Here is the result:



Resources

1. Command.pat
2. Design Patterns.vpp

Related Links

- Full set of UML tools and UML diagrams

Visual Paradigm

Visual Paradigm home page
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