Interpreter Pattern Tutorial

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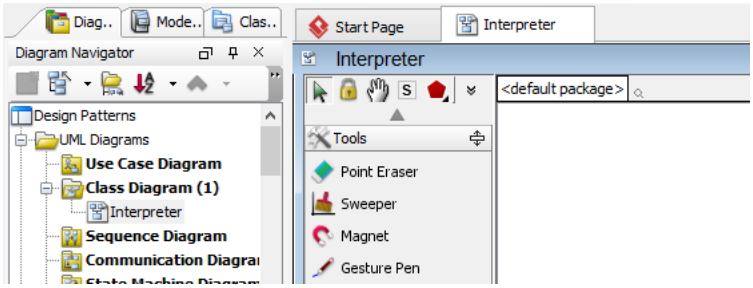
This tutorial is aimed to guide the definition and application of Gang of Four (GoF) interpreter design pattern. By reading this tutorial, you will know how to develop a model for the interpreter pattern, and how to apply it in practice.

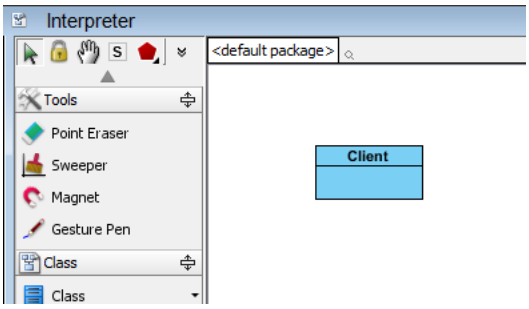
Modeling Design Pattern with Class Diagram

1. Create a new project *Design Patterns*.

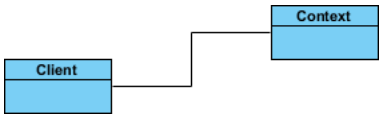
2. Create a class diagram *Interpreter*.



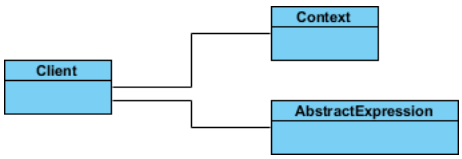
3. Select **Class** from diagram toolbar. Click on the diagram to create a class. Name it as *Client*.



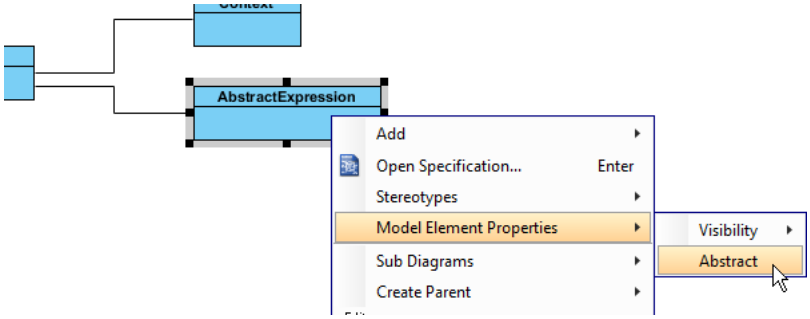
4. Move the mouse cursor over the *Client* class, and drag out **Association** > **Class** to create an associated class *Context*.



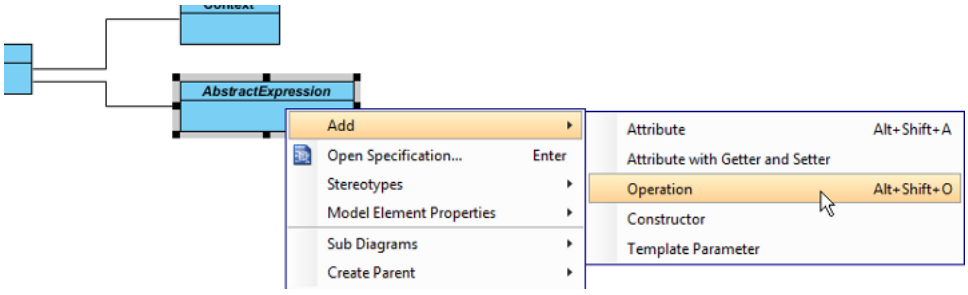
5. Move the mouse cursor over the *Client* class, and drag out **Association** > **Class** to create an associated class *AbstractExpression*.



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

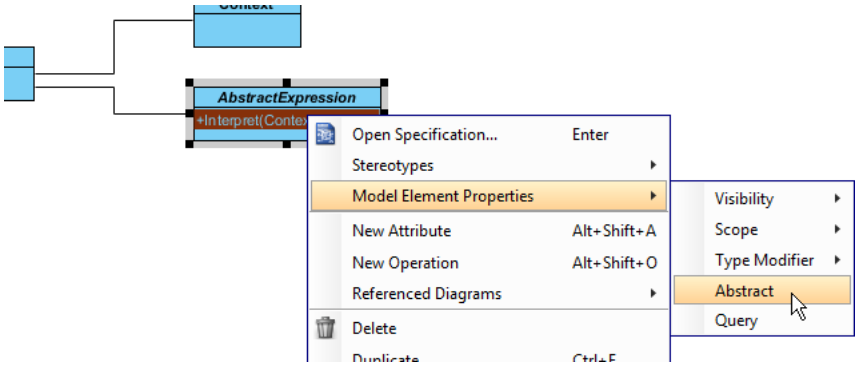


7. Right-click on *AbstractExpression* class, and select **Add** > **Operation** from the popup menu.

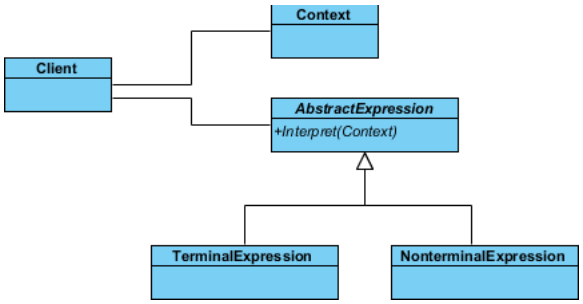


8. Name the operation *Interpret(Context)*.

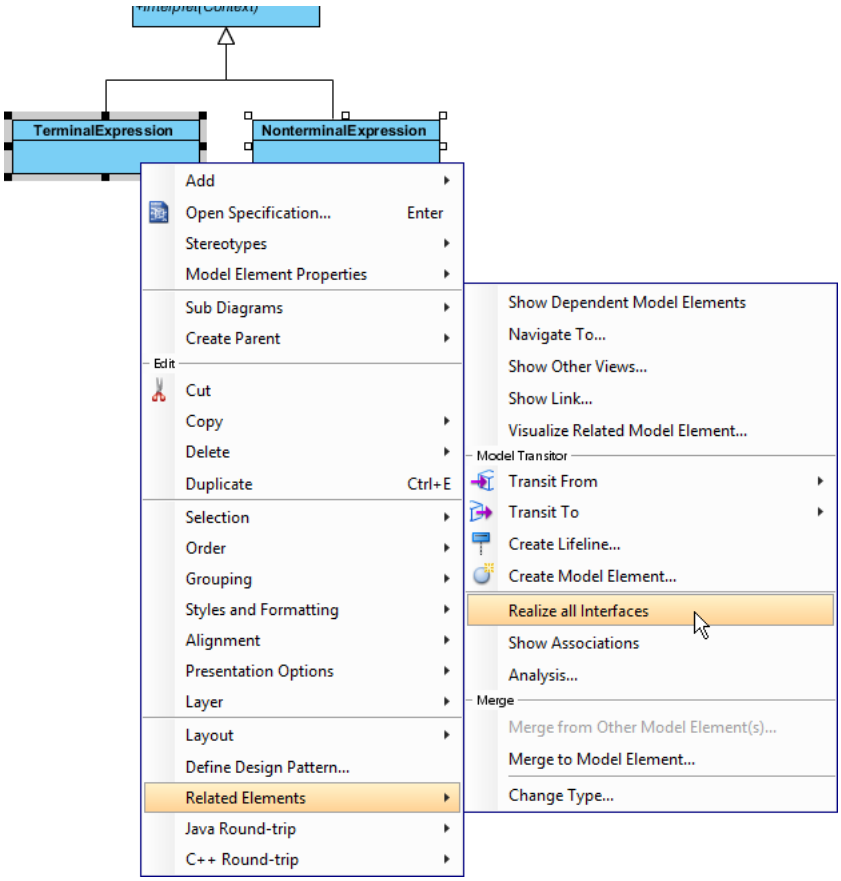
9. Right-click on *Interpret(Context)*, and select **Model Element Properties** > **Abstract** to set it as abstract.



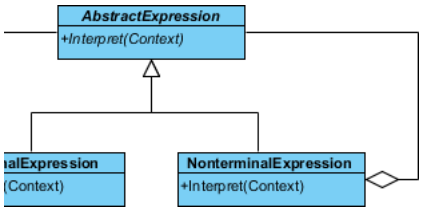
10. Move the mouse cursor over the *AbstractExpression* class, and drag out **Generalization** > **Class** to create a subclass *TerminalExpression*. Repeat this step to create another subclass *NonterminalExpression*, from *AbstractExpression*.



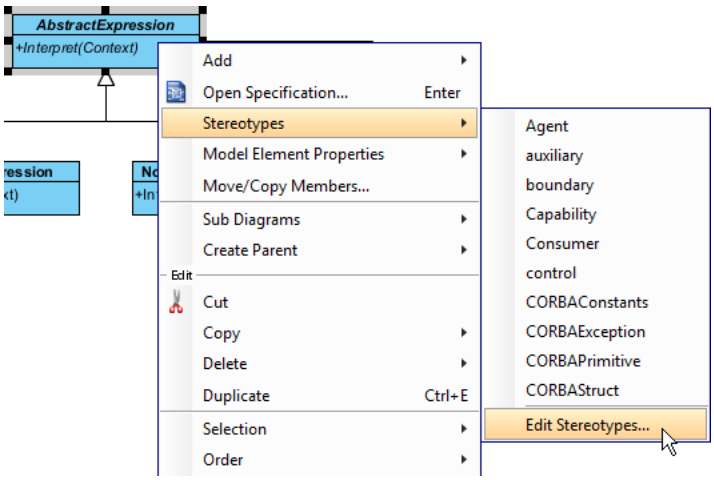
11. *TerminalExpression* and *NonterminalExpression* will inherit the operations from *AbstractExpression*. Select *TerminalExpression* and *NonterminalExpression*, right-click on them and select **Related Elements** > **Realize all Interfaces** from the popup menu.



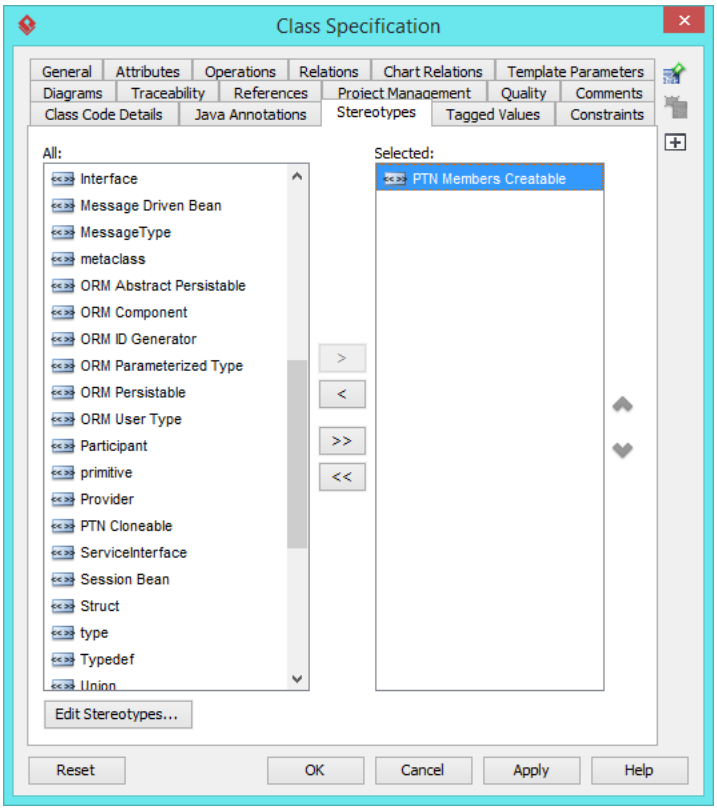
12. Move the mouse cursor over the *NonterminalExpression* class, and drag out **Aggregation** > **Class** to *AbstractExpression*.



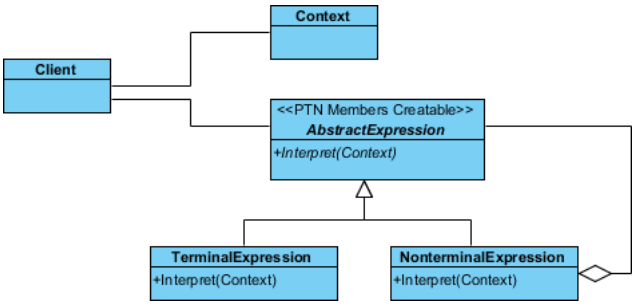
13. In practice, there may be multiple operations in *AbstractExpression*. To represent this, stereotype the class *AbstractExpression* as **PTN Members Creatable**. Right-click on *AbstractExpression* and select **Stereotypes** > **Stereotypes...** from the popup menu.



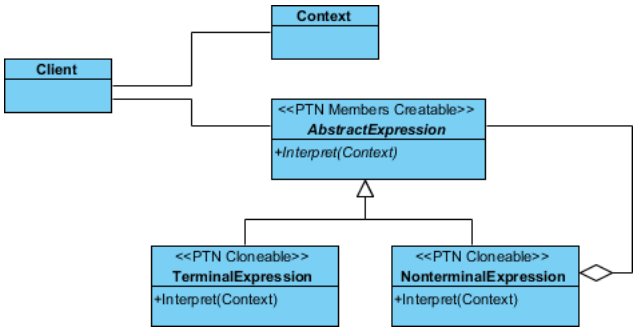
14. In the **Stereotypes** tab of the **Class Specification** dialog box, select **PTN Members Creatable** and click > to assign it to *AbstractExpression* class. Click **OK** to confirm.



Up to now, the diagram should look like this:

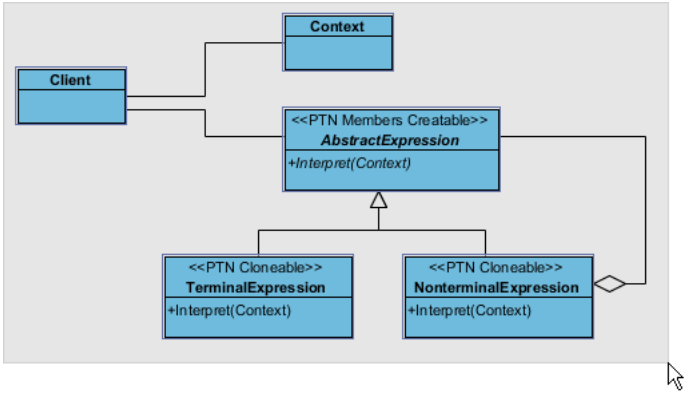


15. In practice, there may be multiple *TerminalExpression* and/or *NonterminalExpression*. To represent this, assign them with **PTN Cloneable**, by following steps 13 and 14.

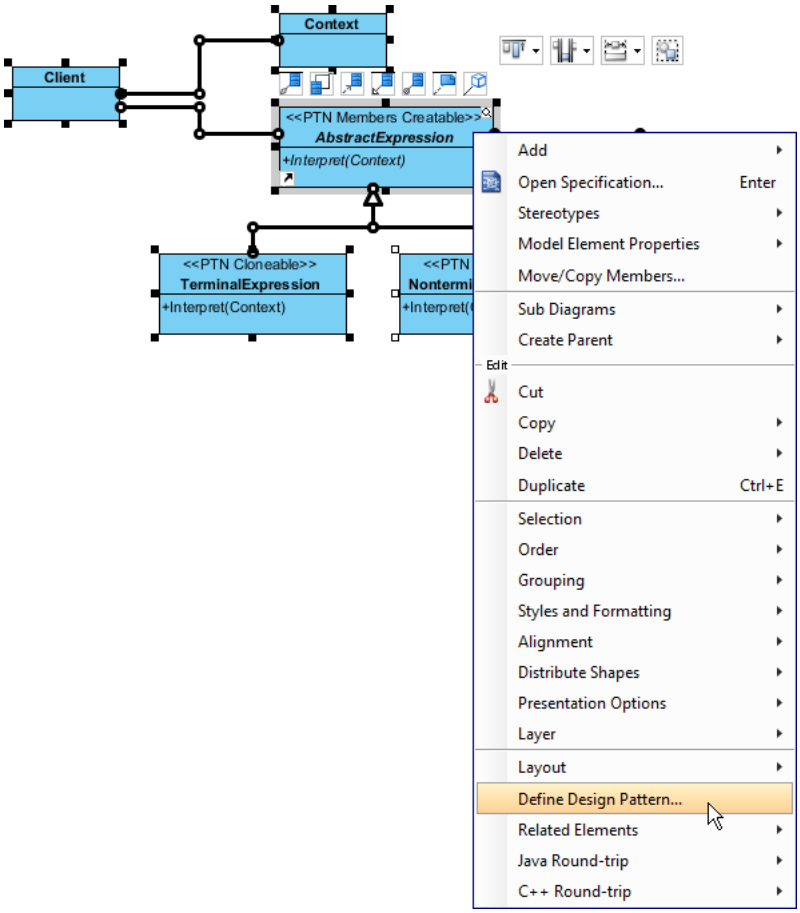


Defining Pattern

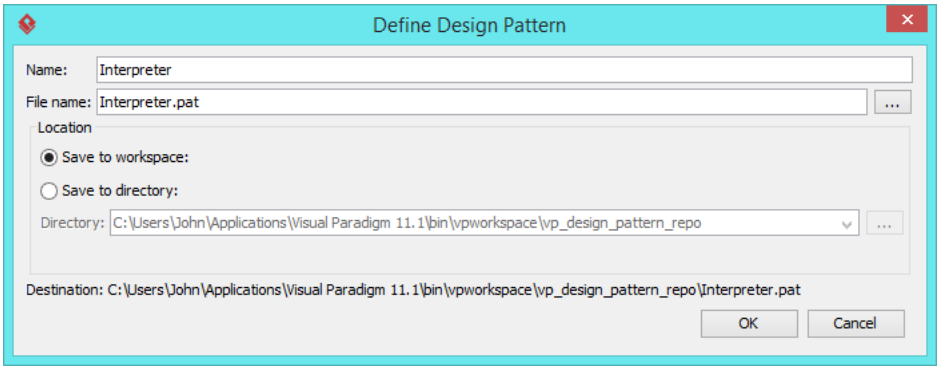
1. Select all classes on the class diagram.



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

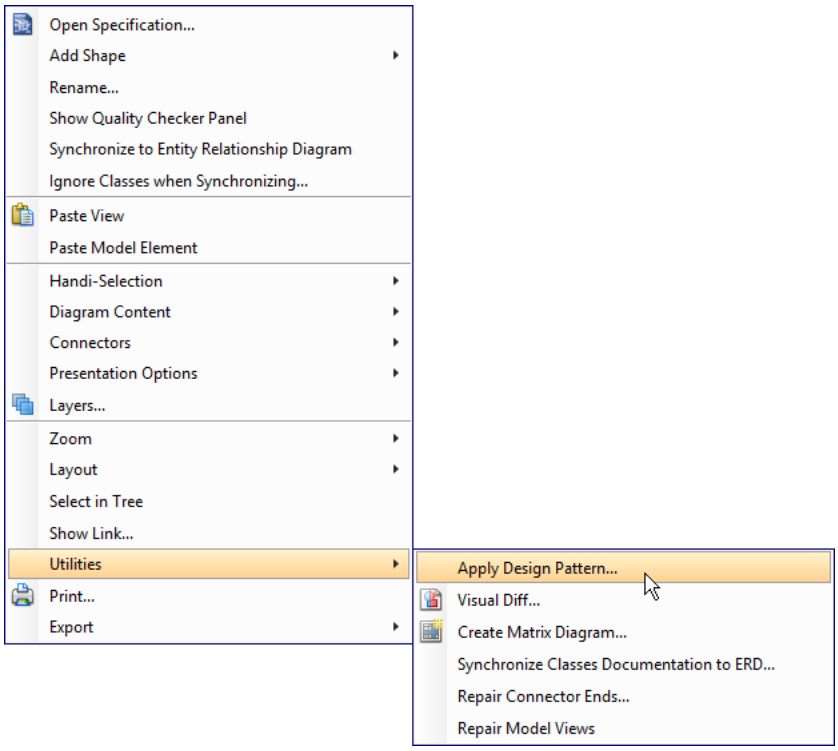


Applying Design Pattern on Class Diagram

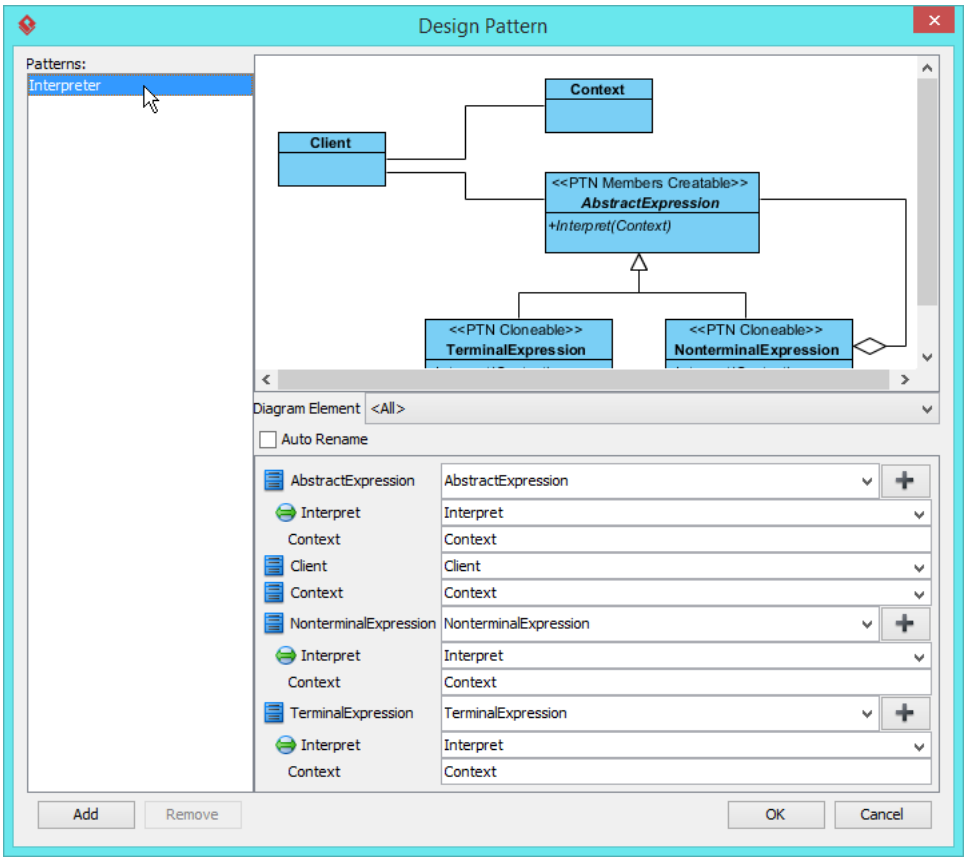
In this section, we are going to apply the interpreter pattern to model the interpretation of expression.

1. Create a new project *Expression*.
2. Create a class diagram *Expression*.

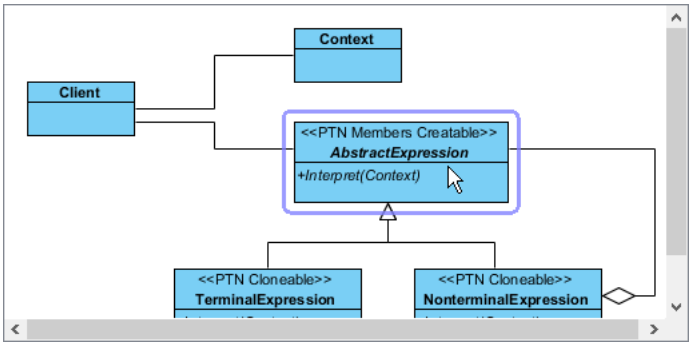
3. Right-click on the class diagram and sleect **Utilities** > **Apply Design Pattern...** from the popup menu.



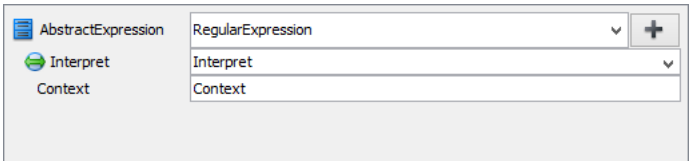
4. In the **Design Pattern** dialog box, select *Interpreter* from the list of patterns.



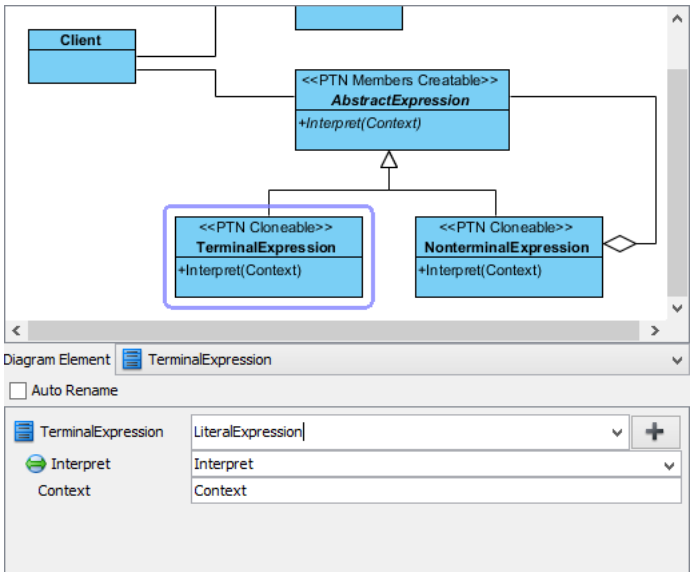
5. Click on *AbstractExpression* in the overview.



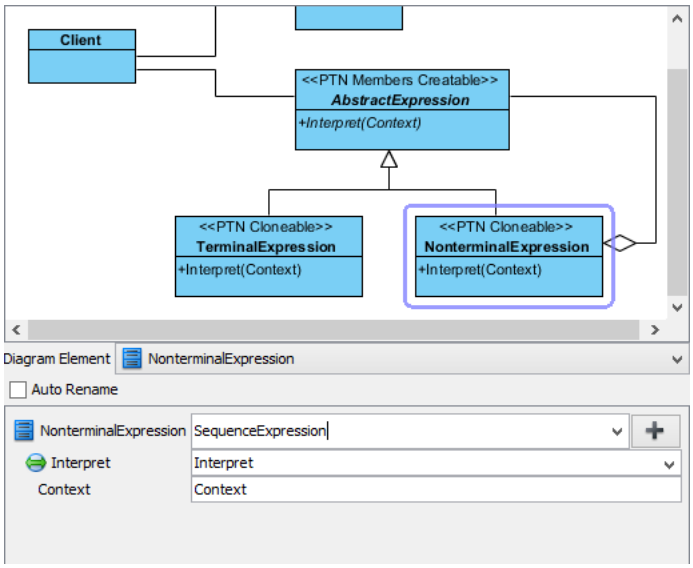
6. Rename *AbstractExpression* to *RegularExpression*.



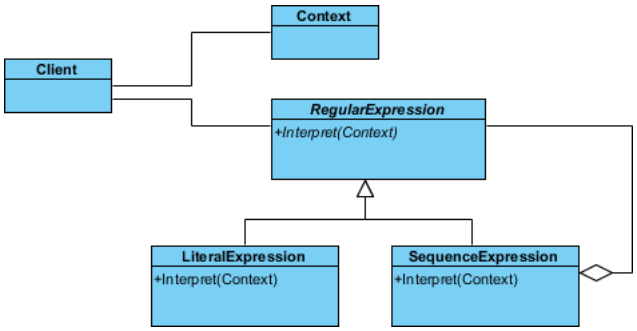
7. Select *TerminalExpression* in overview, and rename it to *LiteralExpression* at the bottom pane.



8. Select *NonterminalExpression* in overview, and rename it as *SequenceExpression* at the bottom pane. Click **OK** to apply the pattern to diagram.



This is the result:



Resources

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