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Assignment-12

Title : Template design pattern and exception handling in JAVA.

Problem: Write a program on template and exception handling in Java. In this assignment multiple templates are to be designed as a pattern and these patterns to be used to take decisions.

Objective : 1) To understand the use of template design pattern.
2) To understand concept and importance of exception handling in java.
3) To learn to use multiple templates as pattern to take decisions.

Outcome : 1) To be able to implement multiple templates in java.
2) To be able to implement exception handling in java.

Theory:

Template Method Design Pattern:

Design Patterns are the best practices used by experienced object oriented software developers. These design patterns are solutions to general problems that software developers faced during software development. There are total 23 design patterns.

Template method pattern is a behavioral design pattern which provides base method for algorithm called template method which defers some of its steps to subclasses. So algorithm structure is same but some of its steps can be redefined by subclasses according to content.

Template means present format like HTML templates which has fixed preset format. Similarly in template method pattern, a preset structure method called template method which consists of steps. These steps can be abstract method which will be implemented by its subclasses. Thus template method defines algorithm but exact steps can be defined in subclasses.

Components:

Abstract class: It defines template method defining the structure of algorithm and it also defines abstract operations that will be implemented by subclasses to define steps of algorithm.

Concrete class: It implements abstract operation of super class to carry out subclass specific steps of the algorithm and also overrides operation if default behavior is not required

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Exception Handling :

An exception is an error conditions that changes the normal flow of control in a program. Exception is an object which is thrown at runtime. The exception handling in java is one of the powerful mechanism to handle the runtime errors so that normal flow of the application can be maintained. The core advantage is to maintain the normal flow of the application.

An exception can occur for many different reasons.

1) A user has entered invalid data.
2) A file that needs to be opened cannot be found
3) A network connection has been lost in the middle of communication or the JVM has run out of memory.

There are mainly three types of exceptions:

i) Checked :

The classes that extend Throwable class except Runtime Exception and Error are known as checked exceptions eg: IO Exceptions, SQL Exception etc. Checked Exceptions are checked at compile-time

ii) Unchecked Exception : The classes that extend Runtime Exception are known as unchecked exceptions eg. Arithmetic Exception, Null Pointer Exception, Array Index Out of Bounds Exception etc. Unchecked exceptions

are not checked at compile-time rather - they are checked at runtime.

iii) Error

Error is irrecoverable eg: OutofMemoryError, VirtualMachineError, AssertionError etc.

There 5 keyword used in java exception handling
i) try
ii) catch
iii) finally
iv) throw
v) throws.

Algorithm:
Template method Design-pattern.
1) Define abstract class with template method consists of abstract methods and common methods.
2) Common implementations of individual steps are defined in the base class.
3) Override or implement specific steps to sub class.
4) Template method in super class should not be overridden so make it final.

Syntax of exception handling:-

```
try
{
    // statements that can cause error/exceptions
}
catch (Exception e)
{
    // statement To be displayed after catching the
    // exception.
}
```

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Conclusion:

We successfully implemented the assignment and understood the concept of template design pattern and exception handling in Java.