

ASSIGNMENT - 07

OOP

WRITE - UP

Title → Template

Aim → Implement a generic program using any collection class to count no. of elements in collection that have specific property such as even no's, odd no's, prime no's, palindromes.

Objectives → To learn concept of templates and generic programming.

Theory →

1) Java generic methods →

- Generic means parameterized types.

Idea to allow type to be a parameter to methods, classes, interfaces using generics. It is possible to create classes that work with data types.

2) Syntax to declare template class →

A generic class declaration looks like a normal class declaration except that class name followed by type parameter section.

```
class class-name <parameter> { ... }
```

→ Example →

```
class Test <T>
{
```

```
    T obj;
```

```
    Test (T obj) { this.obj = obj; }
```

```
    public T getobj() { return this.obj; }
```

```
class Main
```

```
{
```

```
    public static void main (String[] args)
```

```
{
```

```
    Test <Integer> obj 1 = new Test <Integer> (1);
```

```
    System.out.println(obj 1.getobj());
```

```
    Test <String> obj 2 = new Test <String> ("hi");
```

```
    System.out.println(obj 2.getobj());
```

```
}
```

```
}
```

### 3.) Generic methods in Java →

- These methods introduce their own parameter

This is similar to generic class but parameter scope is related to method.

- Static and non-static as well as Constructors can be generic.



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- Example →

```

public class generic-method {
    public static <E> void print-a(E[] arr)
    {
        for (E element arr) {
            System.out.print(element);
        }
    }
}

```

```

public static void main (String[] args)
{

```

```

    Integer [] iarr = {1, 2, 3};

```

```

    Double [] darr = {1.1, 2.1, 3.1};

```

```

    Character [] carr = {'A', 'B', 'C'};

```

```

    print-a(iarr);

```

```

    print-a(darr);

```

```

    print-a(carr);

```

```

}

```

```

}

```

## 2.) Generic classes with multiple type parameters →

- It has facility to declare more than one type of parameters.
- To specify two or more type parameters by using a comma-separated list.

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3) Example →

```
class Box <T, S> {
```

```
    private T t;
```

```
    private S s;
```

```
    public void add (T t, S s)
```

```
{
```

```
    this.t = t;
```

```
    this.s = s; }
```

```
    public T getfirst() { return t; }
```

```
    public S getsecond() { return s; }
```

```
}
```

```
public class Generic-Test {
```

```
    public static void main (String[] args)
```

```
{
```

```
        Box <Integer, String> box =
```

```
            new Box <Integer, String>();
```

```
        box.add (10, "Hi");
```

```
        System.out.println (box.getfirst());
```

```
        System.out.println (box.getsecond());
```

```
        Box <String, String> box1 =
```

```
            new Box <String, String>();
```

```
        box1.add ("Hello", "World");
```

```
        System.out.println (box1.getfirst());
```

```
        System.out.println (box1.getsecond());
```

```
}
```



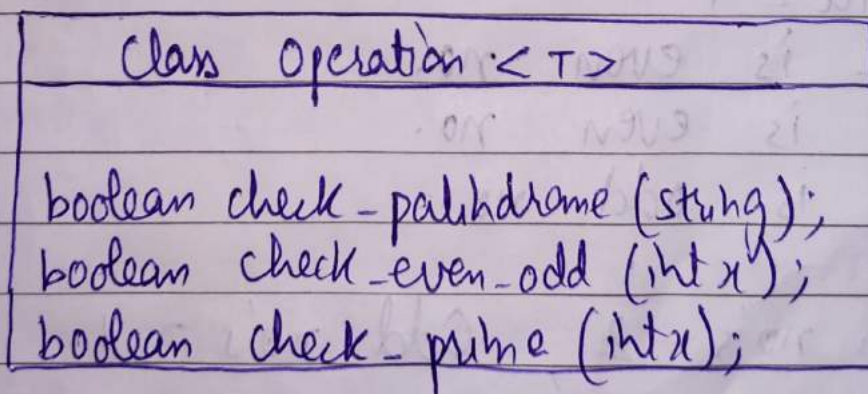
### 3) Advantages of Generics →

- Generics move runtime errors to compile-time errors.
- There is no need to typecast Object when we use generics.
- By using generics, programmers can implement generic algorithms that work on collections of different types.

### 4) Disadvantages of Generics →

- Generics does not work with primitive types.
- Creation of generic arrays is not possible.
- Static fields of type parameters cannot be declared.

### Class diagram →



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Input →

Integers and strings are given as input.

Output →

Enter your choice

- 1) Integer
- 2) String

Choice = 1

Enter no. of integers to be added: 3

2 2

3 2

3 1

Enter your choice

1. To check even or odd
2. To check prime or not

choice = 1

2 2 is even no.

3 2 is even no.

3 1 is odd no.

Even no's = 2, Odd no's = 1



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Choice = 2

2 2 is not prime

32 is not prime

31 is prime

Prime no's = 1, non Prime no's = 2

Choice = 2

Enter no. of strings to be added : 4  
level

table

SMS

gate

Level is palindrome

table is not palindrome

SMS is palindrome

gate is not palindrome

No. of palindromes = 2

no. of non-palindromes = 2

Test cases →

They include diff. values of integers & strings. They are implemented & attached in Soft Copy.

08

classmate

Date

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Conclusion → We came to learn about generic programming & concept of templates.