Shift Operator in Java

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Operators in Java are used to performing operations on variables and values.

Examples of operators: +, -, *, /, >>, <<.

Types of operators:

- Arithmetic Operator,
- Shift Operator,
- Relational Operator,
- Bitwise Operator,
- Logical Operator,
- Ternary Operator and
- Assignment Operator.

In this article, we will mainly focus on the **Shift Operators in Java.**

By shifting the bits of its first operand right or left, a shift operator performs bit manipulation on data. The shift operators available in the Java programming language are listed below. The shift operator is a java operator that is used to shift bit patterns right or left.

Types of Shift Operator in Java:

Name of operator	Sign	Description
Signed Left Shift	<<	The left shift operator moves all bits by a given number of bits to the left.
Signed Right Shift	>>	The right shift operator moves all bits by a given number of bits to the right.
Unsigned Right Shift	>>>	It is the same as the signed right shift, But the vacant leftmost position is filled with 0 instead of the sign bit.

1. Signed Left Shift Operator in Java

This operator is represented by a symbol <<, read as double less than.

Syntax:

```
left_operand  <<  number
```

Description:

Calculate the value of number<<2 if number=2.

When the value of a number is shifted to the left two places, the leftmost two bits are lost. The number has a value of two. 0010 is the binary representation of the number 2. In the following example, the method for doing a left shift is explained:

In the example above, the binary number 0010 (in decimal 2) becomes 1000 after shifting the bits to the left (in decimal 8).

Example:

```java
// Java program to demonstrate
// the Signed left shift operator
import java.io.*;

class GFG {
    public static void main(String[] args)
    {
        int number = 2;

        // 2 bit left shift operation
        int Ans = number << 2;

        System.out.println(Ans);
    }
}
```

Output

```
8
```

2. Signed Right Shift Operator in Java

The Right Shift Operator moves the bits of a number a given number of places to the right. The >> sign represents the right shift operator, which is understood as double greater than. When you type x>>n, you tell the computer to move the bits x to the right n places.

When we shift a number to the right, the least significant bits (rightmost) are deleted, and the sign bit is filled in the most considerable place (leftmost).

Syntax:

```
left_operand  >>  number
```

Description:

Calculate the value of number>>2 if number=8.

When the value of a number is shifted to the right two places, the rightmost two bits are lost. The number has a value of eight. 1000 is the binary representation of the number 8. The following is an example of how to perform the right shift:

In the example above, the binary number 1000 (in decimal 8) becomes 0010 after shifting the bits to the right (in decimal 2).

Example:

```java
// Java program to demonstrate
// the Signed right shift operator
import java.io.*;

class GFG
    {
    public static void main (String[] args) {
    {
        int number = 8;

        // 2 bit signed right shift
        int Ans = number >> 2;

        System.out.println(Ans);
    }
}
```

Output

> 2

3. Unsigned Right Shift Operator in Java

Unsigned Right Shift Operator moves the bits of the integer a given number of places to the right. The sign bit was filled with 0s. The Bitwise Zero Fill Right Shift Operator is represented by the symbol >>>.

Syntax:

```
left_operand  >>>  number
```

```java
// Java program to demonstrate
// the Unsigned right shift operator
import java.io.*;

class GFG
    {
    public static void main (String[] args)
    {
        byte num1 = 8;
        byte num2 = -8;

        System.out.println(num1 >>> 2);
        System.out.println(num2 >>> 2);
    }
}
```

Output

> 2
> 1073741822

Note: *For negative bits, the signed and unsigned right shift operators provide different results.*

4. Unsigned Left Shift Operator in Java

Unlike unsigned Right Shift, there is no "<<<" operator in Java because the logical (<<) and arithmetic left-shift (<<<) operations are identical.