Java Relational Operators

Java relational operators are a set of binary operators used to compare two operands and determine the relationship between them. These comparisons include checking equality, inequality, or relative size (greater than, less than, etc.). Relational operators are frequently employed in control flow statements like if-else conditions, while, and for loops, as well as during other logical decisions in a program.

Syntax:

variable1 relational_operator variable2

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1. Equal to Operator (==)

This operator checks whether two operands are equal. If the left-hand operand is equal to the right-hand operand, the result is true; otherwise, it is false.

Syntax:

var1 == var2

Example:

```
int var1 = 5, var2 = 5, var3 = 10;
System.out.println(var1 == var2); // true
System.out.println(var1 == var3); // false
```

2. Not Equal to Operator (!=)

This operator checks if two operands are not equal. If the left-hand operand is not equal to the right-hand operand, the result is true; otherwise, it is false.

Syntax:

var1 != var2

Example:

```
int var1 = 5, var2 = 10;
System.out.println(var1 != var2); // true
```

3. Greater Than Operator (>)

This operator checks whether the left-hand operand is greater than the right-hand operand. If var1 is greater than var2, the result is true; otherwise, it is false.

Syntax:

var1 > var2

Example:

```
int var1 = 15, var2 = 10;
System.out.println(var1 > var2); // true
```

4. Less Than Operator (<)

This operator checks whether the left-hand operand is less than the right-hand operand. If var1 is less than var2, the result is true; otherwise, it is false.

Syntax:

var1 < var2

Example:

```
int var1 = 5, var2 = 10;
System.out.println(var1 < var2); // true
```

5. Greater Than or Equal to Operator (>=)

This operator checks whether the left-hand operand is greater than or equal to the right-hand operand. If var1 is greater than or equal to var2, the result is true; otherwise, it is false.

Syntax:

var1 >= var2

Example:

```
int var1 = 10, var2 = 10;
System.out.println(var1 >= var2); // true
```

6. Less Than or Equal to Operator (<=)

This operator checks whether the left-hand operand is less than or equal to the right-hand operand. If var1 is less than or equal to var2, the result is true; otherwise, it is false.

Syntax:

var1 <= var2

Example:

```
int var1 = 5, var2 = 10;
System.out.println(var1 <= var2); // true
```

Example Program: Implementing All Relational Operators for User Input

```
import java.util.Scanner;

public class RelationalOperators {
  public static void main(String[] args) {
    Scanner scan = new Scanner(System.in);

    System.out.println("Enter the first number: ");
    int num1 = scan.nextInt();

    System.out.println("Enter the second number: ");
    int num2 = scan.nextInt();

    System.out.println("num1 > num2 is " + (num1 > num2));
    System.out.println("num1 < num2 is " + (num1 < num2));
    System.out.println("num1 >= num2 is " + (num1 >= num2));
    System.out.println("num1 <= num2 is " + (num1 <= num2));
    System.out.println("num1 == num2 is " + (num1 == num2));
    System.out.println("num1 != num2 is " + (num1 != num2));

    scan.close();
  }
}
```

Real-Time Examples of Relational Operators in Java

1. Checking User Age for Voting Eligibility

```
public class VotingEligibility {
    public static void main(String[] args) {
        int age = 18;
        if (age >= 18) {
            System.out.println("Eligible to vote");
        } else {
            System.out.println("Not eligible to vote");
        }
    }
}
```

2. Comparing Salaries for Bonus Allocation

```
public class SalaryComparison {
   public static void main(String[] args) {
      double salaryJohn = 55000, salaryJane = 65000;
      if (salaryJane > salaryJohn) {
         System.out.println("Jane earns more than John.");
      } else if (salaryJohn > salaryJane) {
         System.out.println("John earns more than Jane.");
      } else {
         System.out.println("John and Jane have the same salary.");
      }
   }
}
```

3. Temperature Control System

```
public class TemperatureControl {
   public static void main(String[] args) {
      double roomTemp = 22.5, desiredTemp = 20.0;
      if (roomTemp > desiredTemp) {
         System.out.println("Cooling the room.");
      } else {
         System.out.println("Heating the room.");
      }
   }
}
```