Boolean

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Learning Object

- Boolean Data Type
- Comparison Operators and Logical Operators
- Truth Table

Boolean Data Type

- A Boolean variable can hold only one of two values – true or false. For Example:

```
boolean isItPayDay = false;
```

- Compare two variables using **Comparison** operators and **logical** operators to get **true** or **false**
  - **In Math: a<b**
  - **In real world: front and back of coin for game**
- Boolean variable is normally used with **control statement**
  - Boolean mostly is used to control the program flow

Comparison Operators

Operator	Meaning
a == b	Is a equal to b?
a != b	Is a not equal to b?
a > b	Is a greater than b?
a < b	Is a less than b?
a >= b	Is a greater than or equal to b?
a <= b	Is a less than or equal to b?

Example:
Let a = 10, b = 10
(a == b) is true
(a != b) is false

```
System.out.println(a > b); //false
System.out.println(a < b) //?
System.out.println(a >= b) //?
System.out.println(a <= b) //?
```

Logical Operators

Operator	Name	Description
!	not	Negates true to false, and false to true.
&&	and	The result is true if and only if both operands is true.
||	or	The result is true if at least one of the operands is true.
^	exclusive or	The result is true if and only if the two operands have different Boolean values.

Let a = 10, b = 10

!(a == b) is false

((a==b) && (a!=b)) is false

((a==b || a!=b)) is ?

((a==b)^ (a!=b)) is ?

Truth Table

p	q	p && q	p || q	p ^ q	!p
False	False	False	False	False	True
True	False	False	True	True	False
False	True	False	True	True	True
True	True	True	True	False	False

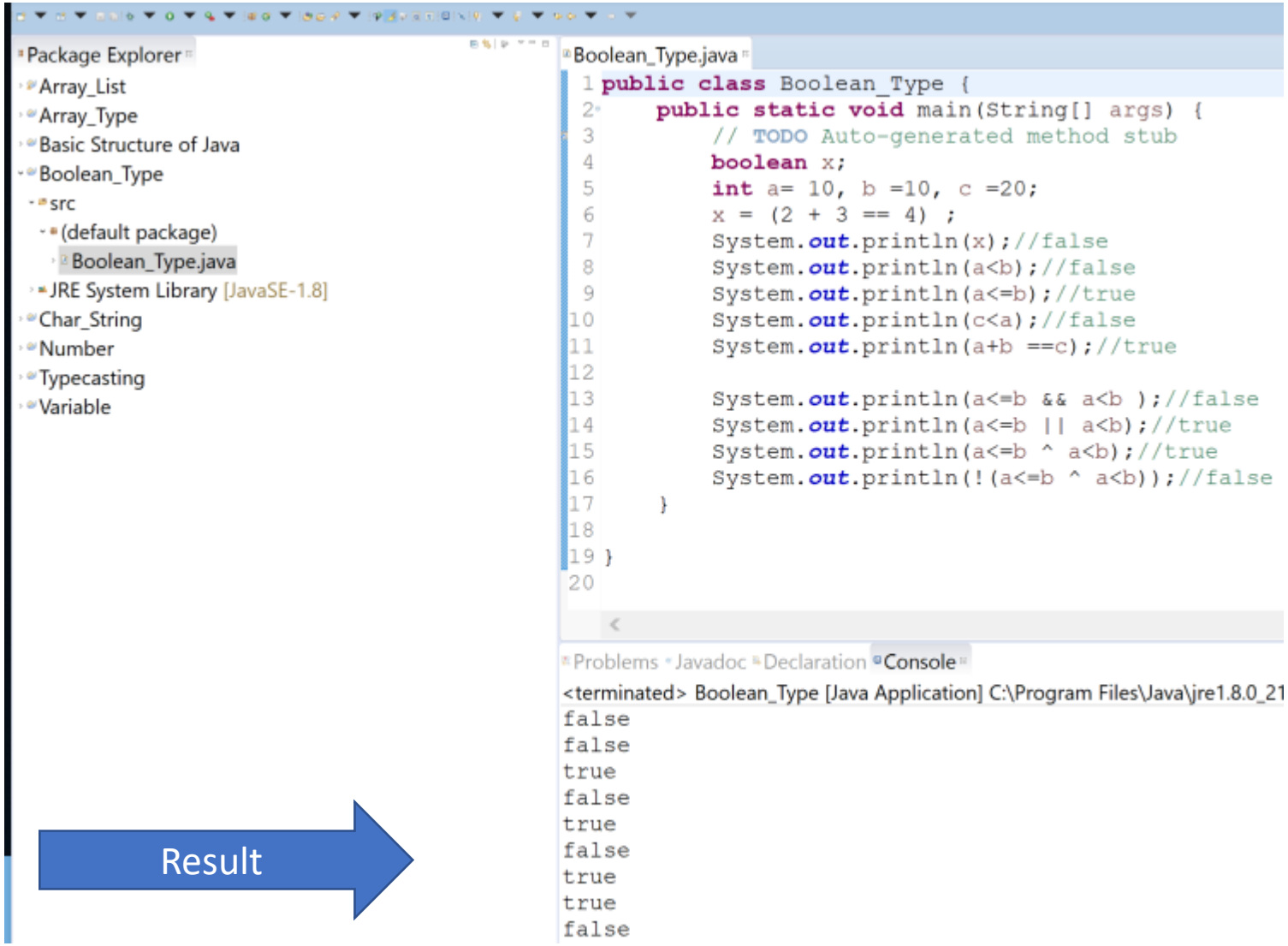
Practice

1. Make a new project (Reference: Create Project and Class File)
   - ❑Project name: Boolean_Type
2. Create a new Class File
   - ❑Class name: Boolean_Type
3. Coding:

```
public class Boolean_Type {
    public static void main(String[] args) {
        boolean x;
        int a= 10, b =10, c =20;
        x = (2 + 3 == 4) ;
        System.out.println(x);//false
        System.out.println(a<b);//false
        System.out.println(a<=b);//true
        System.out.println(c<a);//false
        System.out.println(a+b ==c);//true

        System.out.println(a<=b && a<b );//false
        System.out.println(a<=b || a<b);//true
        System.out.println(a<=b ^ a<b);//true
        System.out.println(!(a<=b ^ a<b));//false } }
```

Practice – Code and Result



Summary

- A Boolean variable can hold only one of two values
  - true or false
- **Comparison** operators and **logical** operators to get **true** or **false**

p	q	p && q	p || q	p ^ q	! p
False	False	False	False	False	True
True	False	False	True	True	False
False	True	False	True	True	True
True	True	True	True	False	False

Boolean_Type.java

```
1 public class Boolean_Type {
2     public static void main(String[] args) {
3         // TODO Auto-generated method stub
4         boolean x;
5         int a= 10, b =10, c =20;
6         x = (2 + 3 == 4) ;
7         System.out.println(x);//false
8         System.out.println(a<b);//false
9         System.out.println(a<=b);//true
0         System.out.println(c<a);//false
1         System.out.println(a+b ==c);//true
2
3         System.out.println(a<=b && a<b );//false
4         System.out.println(a<=b || a<b);//true
5         System.out.println(a<=b ^ a<b);//true
6         System.out.println(!(a<=b ^ a<b));//false
7     }
8
9 }
```