Core Java 8 and Development Tools

Lesson 03 : Language Fundamentals

Lesson Objectives

- After completing this lesson, participants will be able to:
  - Understand Basic Java Language constructs like:
    - Keywords
    - Primitive Data Types
    - Operators
    - Variables
    - Literals
  - Write Java programs using control structures
  - Best Practices

Keywords in Java

abstract	continue	for	new	switch
assert***	default	goto*	package	synchronized
boolean	do	if	private	this
break	double	implements	protected	throw
byte	else	import	public	throws
case	enum****	instanceof	return	transient
catch	extends	int	short	try
char	final	interface	static	void
class	finally	long	strictfp**	volatile
const*	float	native	super	while

Java Data types

Type	Size/Format	Description
byte	8-bit	Byte-length integer
short	16-bit	Short Integer
int	32-bit	Integer
long	64-bit	Long Integer
float	32-bit IEEE 754	Single precision floating point
double	64-bit IEE 754	Double precision floating point
char	16-bit	A single character
boolean	1-bit	True or False

Operators in Java

- Operators can be divided into following groups:
  - Arithmetic
  - Bitwise
  - Relational
  - Logical
  - *instanceof* Operator

Arithmetic Operators

Operator	Result
+	Addition
-	Subtraction (or unary) operator
*	Multiplication
/	Division
%	Modulus
++	Increment
+=	Addition assignment
-=	Subtraction assignment
*=	Multiplication assignment
/=	Division assignment
%=	Modulus assignment
--	Decrement

Bitwise Operators

- Apply upon *int, long, short, char* and *byte* data types:

Operator	Result
~	Bitwise unary NOT
&	Bitwise AND
|	Bitwise OR
^	Bitwise exclusive OR
>>	Shift right
>>>	Shift right zero fill
<<	Shift left
&=	Bitwise AND assignment
|=	Bitwise OR assignment

Relational Operators

- Determine the relationship that one operand has to another.
  - Ordering and equality.

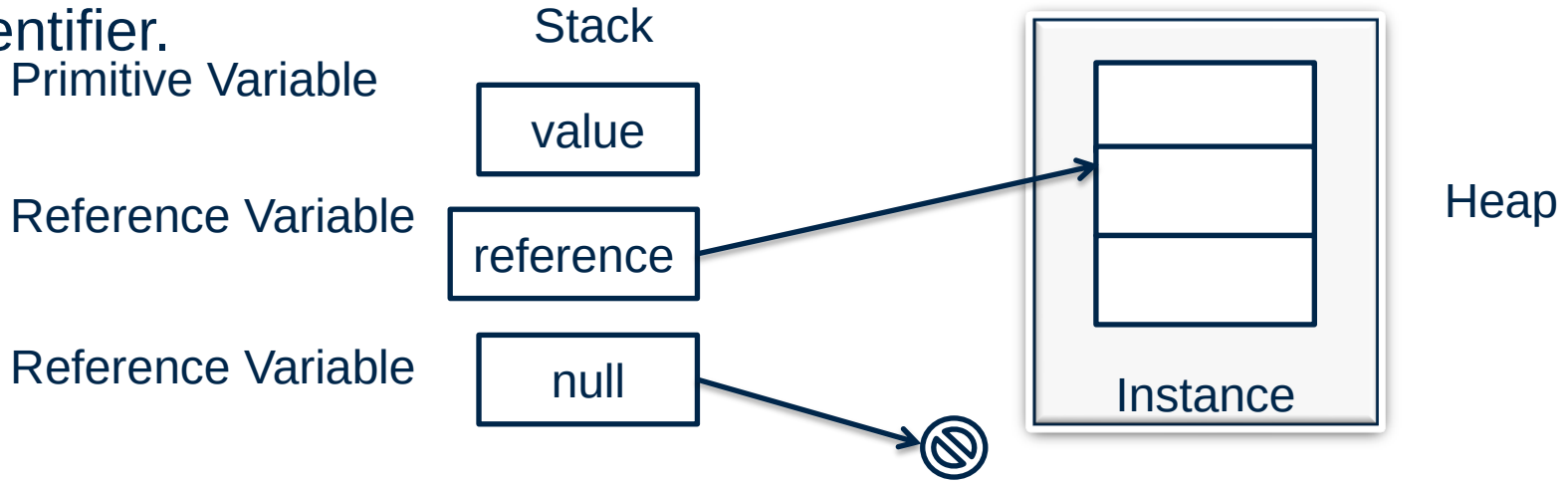
Operator	Result
==	Equal to
!=	Not equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to

Logical Operators

Operator	Result
&&	Logical AND
||	Logical OR
^	Logical XOR
!	Logical NOT
==	Equal to
?:	Ternary if-then-else

Variables

- Variables are data placeholders.
- Java is a strongly typed language, therefore every variable must have a declared type.
- The variables can be of two types:
  - reference types: A variable of reference type provides a reference to an object.
  - primitive types: A variable of primitive type holds a primitive.
- In addition to the data type, a Java variable also has a name or an identifier.

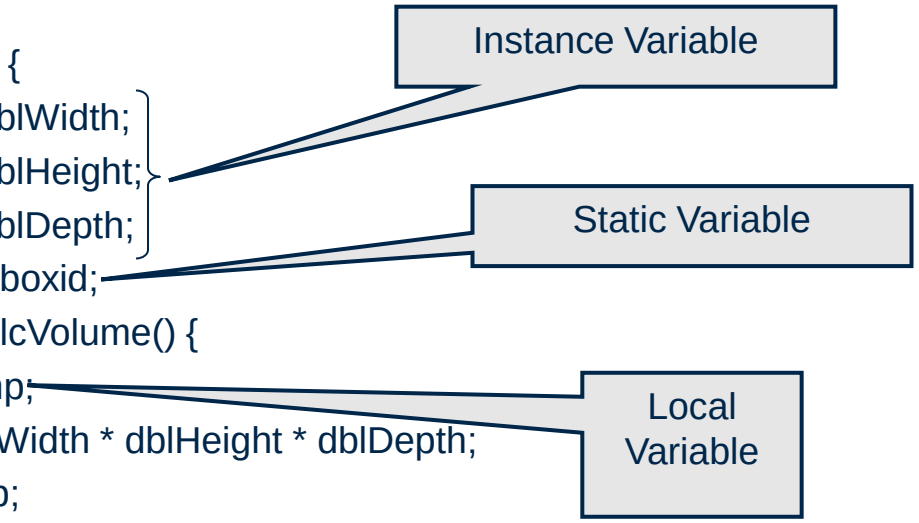


Types of Variables

- Variable is basic storage in a Java program
- Three types of variables:
  - Instance variables
    - Instantiated for every object of the class
  - Static variables
    - Class Variables
    - Not instantiated for every object of the class
  - Local variables
    - Declared in methods and blocks

Types of Variables

```
public class Box {
private double dblWidth;
private double dblHeight;
private double dblDepth;
private static int boxid;
public double calcVolume() {
   double dblTemp;
   dblTemp = dblWidth * dblHeight * dblDepth;
   return dblTemp;
  }
}
```



Literals

- Literals represents value to be assigned for variable.
- Java has three types of literals:
  - Primitive type literals
  - String literals
  - null literal
- Primitive literals are further divided into four subtypes:
  - Integer
  - Floating point
  - Character
  - Boolean
- For better readability of large sized values, Java 7 allows to include '_' in integer literals.

Control Statements

- Use control flow statements to:
  - Conditionally execute statements
  - Repeatedly execute a block of statements
  - Change the normal, sequential flow of control
- Categorized into two types:
  - Selection Statements
  - Iteration Statements

Selection Statements

- Allows programs to choose between alternate actions on execution.
- "if" used for conditional branch:

```
if (condition) statement1;
else statement2;
```

- "switch" used as an alternative to multiple "if's":

```
switch(expression){
    case value1:    //statement sequence
                    break;
    case value2:    //statement sequence
                    break; …
    default:        //default statement sequence
}
```

Expression can be of String type!

switch case : an example

```
class SampleSwitch {
    public static void main(String args[]) {
        for(int i=0; i<=4; i++)
            switch(i) {
         case 0:
                System.out.println("i is zero."); break;
         case 1:
                System.out.println("i is one."); break;
         case 2:
                System.out.println("i is two."); break;
         case 3:
                System.out.println("i is three."); break;
         default:
                System.out.println("i is greater than 3.");
            }
       }}
```

Output:

```
i is zero.
i is one.
i is two.
i is three.
i is greater than 3.
```

Iteration Statements

- Allow a block of statements to execute repeatedly
  - While Loop: Enters the loop if the condition is true

```
while (condition)
{  //body of loop
 }
```

  - Do – While Loop: Loop executes at least once even if the condition is false

```
do
{ //body of the loop
}  while (condition)
```

Iteration Statements

- For Loop:

```
for( initialization ; condition ; iteration)
{ //body of the loop }
```

- Example

```
// Demonstrate the for loop.
class SampleFor {
    public static void main(String args[]) {
        int number;
        for(number =5; number >0; n--)
            System.out.print(number +"\t");
    }
}
```

Output: 5 4 3 2 1

Demo

- Data types in Java
- Switch Statement using String as expression

Best practices: Iteration Statements

- Always use an int data type as the loop index variable whenever possible
- Use for-each liberally
- Switch case statement
- Terminating conditions should be against 0
- Loop invariant code motion

E.g If you call length() in a tight loop, there can be a performance hit.

Summary

- In this lesson you have learnt:
  - Keywords
  - Primitive Data Types
  - Operators and Assignments
  - Variables and Literals
  - Flow Control: Java's Control Statements
  - Best Practices

Review Question

- Question 1: Java considers variable number and NuMbEr to be identical.
  - True/False
- Question 2: The *do...while* statement tests the loop-continuation condition _____ it executes executing the loop's body; hence, the body executes at least once.
  - **Option1:** before
  - **Option2:** after