Subject Name: Java Programming
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Computer Science & Technology
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Shift: Second

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What is Java?

Java is a popular programming language, created in 1995.
It is owned by Oracle, and more than 3 billion devices run Java.
It is used for:

- Mobile applications (specially Android apps)
- Desktop applications
- Web applications
- Web servers and application servers
- Games
- Database connection
- And much, much more!

Why Use Java?

- Java works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc.)
- It is one of the most popular programming language in the world
- It has a large demand in the current job market
- It is easy to learn and simple to use
- It is open-source and free
- It is secure, fast and powerful
- It has a huge community support (tens of millions of developers)
- Java is an object oriented language which gives a clear structure to programs and allows code to be reused, lowering development costs
- As Java is close to C++ and C#, it makes it easy for programmers to switch to Java or vice versa

Java Install

Some PCs might have Java already installed.
To check if you have Java installed on a Windows PC,
search in the start bar for Java or type the following in

Command Prompt (cmd.exe):
C:\Users\Your Name>java -version

If Java is installed, you will see something like this
(depending on version):
java version "11.0.1" 2018-10-16 LTS
Java(TM) SE Runtime Environment 18.9 (build 11.0.1+13-LTS)
Java HotSpot(TM) 64-Bit Server VM 18.9 (build 11.0.1+13-LTS, mixed mode)

Java Syntax

```
public class Main {
public static void main(String[] args) {
System.out.println("Hello World");
}
}
```

Every line of code that runs in Java must be inside a class. In our example, we named the class Main. A class should always start with an uppercase first letter.

Note: Java is case-sensitive: "MyClass" and "myclass" has different meaning.

Java Output

Java Output / Print

```
System.out.println("Hello World!");
System.out.println("I am learning Java.");
System.out.println("It is awesome!");
```

Print Numbers

```
System.out.println(3);
System.out.println(358);
System.out.println(50000);
```

Java Comments

Java Comments
Comments can be used to explain Java code, and to make it more readable. It can also be used to prevent execution when testing alternative code.

Single-line Comments
Single-line comments start with two forward slashes (//).
Example
// This is a comment

Java Multi-line Comments
/* The code below will print the words Hello World to the screen, and it is amazing */

Java Variables

Variables are containers for storing data values.
In Java, there are different types of variables, for example:
- String – stores text, such as "Hello". String values are surrounded by double quotes
- int – stores integers (whole numbers), without decimals, such as 123 or –123
- float – stores floating point numbers, with decimals, such as 19.99 or –19.99
- char – stores single characters, such as 'a' or 'B'. Char values are surrounded by single quotes
- boolean – stores values with two states: true or false

Declaring (Creating) Variables

To create a variable, you must specify the
type and assign it a value:
Syntax
type variableName = value;

Example
Create a variable called name of type String and assign it the value "John":

```
String name = "John";
System.out.println(name);
int myNum;
myNum = 15;
System.out.println(myNum);
String name = "John";
System.out.println("Hello " + name);
```

Primitive Data Types

Data Type	Size	Description
byte	1 byte	Stores whole numbers from -128 to 127
short	2 bytes	Stores whole numbers from -32,768 to 32,767
int	4 bytes	Stores whole numbers from -2,147,483,648 to 2,147,483,647
long	8 bytes	Stores whole numbers from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
float	4 bytes	Stores fractional numbers. Sufficient for storing 6 to 7 decimal digits
double	8 bytes	Stores fractional numbers. Sufficient for storing 15 decimal digits
boolean	1 bit	Stores true or false values
char	2 bytes	Stores a single character/letter or ASCII values

Data Types

1. Integer types stores whole numbers, positive or negative (such
2. as 123 or –456), without decimals. Valid types
3. are byte, short, int and long. Which type you should use,
4. depends on the numeric value.
5. Floating point types represents numbers with a fractional part,
6. containing one or more decimals. There are two
7. types: float and double.

```
byte myNum = 100; System.out.println(myNum);
short myNum = 5000; System.out.println(myNum);
int myNum = 100000; System.out.println(myNum);
long myNum = 15000000000L;
System.out.println(myNum);
float myNum = 5.75f; System.out.println(myNum);
double myNum = 19.99d; System.out.println(myNum);
```

Java Operators

Operators are used to perform operations on variables and values. In the example below, we use the + operator to add together two Values.

```
int sum1 = 100 + 50; // 150 (100 + 50)
int sum2 = sum1 + 250; // 400 (150 + 250)
int sum3 = sum2 + sum2; // 800 (400 + 400)
```

Java divides the operators into the following groups:

1. - Arithmetic operators
2. - Assignment operators
3. - Comparison operators
4. - Logical operators
5. - Bitwise operators

Arithmetic Operators

Arithmetic operators are used to perform common mathematical operations.

Operator	Name	Description	Example
+	Addition	Adds together two values	x + y
-	Subtraction	Subtracts one value from another	x - y
*	Multiplication	Multiplies two values	x * y
/	Division	Divides one value by another	x / y
%	Modulus	Returns the division remainder	x % y
++	Increment	Increases the value of a variable by 1	++x
--	Decrement	Decreases the value of a variable by 1	--x

Assignment Operators

Assignment operators are used to assign values to variables.
assignment operator (=) to assign the value 10 to a variable called x:

```
int x = 10;
```

Operator	Example	Same As
=	x = 5	x = 5
+=	x += 3	x = x + 3
-=	x -= 3	x = x - 3
*=	x *= 3	x = x * 3
/=	x /= 3	x = x / 3
%=	x %= 3	x = x % 3
&=	x &= 3	x = x & 3
|=	x |= 3	x = x | 3
^=	x ^= 3	x = x ^ 3
>>=	x >>= 3	x = x >> 3
<<=	x <<= 3	x = x << 3

Comparison Operators

```
int x = 5; int y = 3;
System.out.println(x > y); // returns true, because 5 is higher than 3
```

Operator	Name	Example
==	Equal to	x == y
!=	Not equal	x != y
>	Greater than	x > y
<	Less than	x < y
>=	Greater than or equal to	x >= y
<=	Less than or equal to	x <= y

Logical Operators

Operator	Name	Description	Example
&&	Logical and	Returns true if both statements are true	x < 5 && x < 10
||	Logical or	Returns true if one of the statements is true	x < 5 || x < 4
!	Logical not	Reverse the result, returns false if the result is true	!(x < 5 && x < 10)

Strings

```
String greeting = "Hello";
String txt = "ABCDEFGHIJKLMNOPQRSTUVWXYZ";
System.out.println("The length of the txt string is: " + txt.length());
```

Conditions and If Statements

Less than: a < b

Less than or equal to: a <= b

Greater than: a > b

Greater than or equal to: a >= b

Equal to a == b

Not Equal to: a != b

```
if (condition) {
// block of code to be executed if the condition is true
}
if (20 > 18) {
System.out.println("20 is greater than 18");
}
```

else Statement

Syntax:

if (*condition*) { *// block of code to be executed if the condition is true* }
else { *// block of code to be executed if the condition is false* }

Example:

```
int time = 20;
if (time < 18) {
System.out.println("Good day."); }
else {
System.out.println("Good evening."); } // Outputs "Good evening."
```

else if Statement

Use the else if statement to specify a new condition if the first condition is false.

```
Example:
int time = 22;
if (time < 10) {
System.out.println("Good morning."); }
else if (time < 18) {
System.out.println("Good day."); }
else {
System.out.println("Good evening."); } // Outputs "Good
evening."
```

Switch Statements

Instead of writing many if...else statements, you can use the switch statement.

```
Example:
int day = 4;
switch (day) {
case 1: System.out.println("Monday");
break;
case 2: System.out.println("Tuesday");
break;
case 3: System.out.println("Wednesday");
break;
case 4: System.out.println("Thursday");
break;
case 5: System.out.println("Friday");
break;
case 6: System.out.println("Saturday");
break;
case 7: System.out.println("Sunday");
break;
} // Outputs "Thursday" (day 4)
```

Loops

Loops can execute a block of code as long as a specified condition is reached. Loops are handy because they save time, reduce errors, and they make code more readable.

While Loop

The while loop loops through a block of code as long as a specified condition is true:

```
Example:
int i = 0;
while (i < 5) {
System.out.println(i);
i++;
}
```

For Loop

When you know exactly how many times you want to loop through a block of code, use the for loop instead of a while loop:

Example:

```
for (int i = 0; i < 5; i++)
{
System.out.println(i);
}
```

Nested Loops

It is also possible to place a loop inside another loop. This is called a nested loop. The "inner loop" will be executed one time for each iteration of the "outer loop":

Example:

```
// Outer loop
for (int i = 1; i <= 2; i++)
{
System.out.println("Outer: " + i); // Executes 2 times
// Inner loop
for (int j = 1; j <= 3; j++)
{
System.out.println(" Inner: " + j); // Executes 6 times (2 * 3)
}
}
```

For-Each Loop

There is also a "for-each" loop, which is used exclusively to loop through elements in an array:

Example:

```
String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
for (String i : cars)
{
System.out.println(i);
}
```

Arrays

Arrays are used to store multiple values in a single variable, instead of declaring separate variables for each value.
To declare an array, define the variable type with square brackets:

Example:

```
String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};

int[] myNum = {10, 20, 30, 40};

String[] cars = {"Volvo", "BMW", "Ford", "Mazda"};
System.out.println(cars[0]);
// Outputs Volvo
```

Methods

A method is a block of code which only runs when it is called.
You can pass data, known as parameters, into a method.
Methods are used to perform certain actions, and they are also known as functions.

Example:

```
public class Main {
static void myMethod()
{
// code to be executed
}
}
```

Method Overloading

With method overloading, multiple methods can have the same name with different parameters:

Example:

```
static int plusMethodInt(int x, int y)
{
return x + y;
}
static double plusMethodDouble(double x, double y)
{
return x + y;
}
public static void main(String[] args){
int myNum1 = plusMethodInt(8, 5);
double myNum2 = plusMethodDouble(4.3, 6.26);
System.out.println("int: " + myNum1);
System.out.println("double: " + myNum2);
}
```

What is OOP?

OOP stands for Object-Oriented Programming.
Procedural programming is about writing procedures or methods that perform operations on the data, while object-oriented programming is about creating objects
that contain both data and methods.
Object-oriented programming has several advantages over procedural programming:

- OOP is faster and easier to execute
- OOP provides a clear structure for the programs
- OOP helps to keep the Java code DRY "Don't Repeat Yourself", and makes the code easier to maintain, modify and debug
- OOP makes it possible to create full reusable applications with less code and shorter development time

Classes/Objects

ava is an object-oriented programming language.
Everything in Java is associated with classes and objects, along with its attributes and
methods. For example: in real life, a car is an object. The car has attributes, such as
weight and color, and methods, such as drive and brake.
A Class is like an object constructor, or a "blueprint" for creating objects.

```
Example:
public class Main {
int x = 5;
public static void main(String[] args)
{
Main myObj = new Main();
System.out.println(myObj.x);
}
}
```

Inheritance

In general the meaning of inheritance is something that you got from your predecessor or parent, the same applies with java inheritance as well.

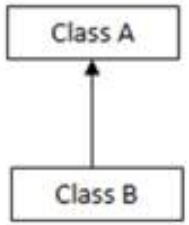
Inheritance in

java is a mechanism by which one class is allowed to inherit the features(fields and

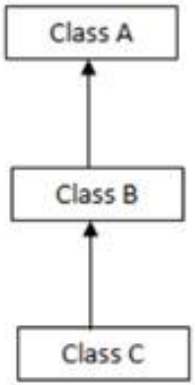
methods) of another class.

Different Types of Inheritance in Java

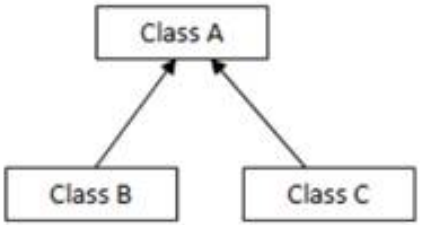
- Single inheritance
- Multilevel inheritance
- Hierarchical inheritance



Single



Multilevel



Hierarchical

Single inheritance

```
Example:
class student
{
int roll;
String name;
void getdata()
{
roll = 101;
name = "Karim";
}
}
class display extends student
{
void display()
{
System.out.println("Roll is :" + roll);
System.out.println("Name is :" + name);
}
}
class single_inheritance
{
public static void main(String[] args)
{
display d = new display();
d.getdata();
d.display();
}
}
```

Multilevel Inheritace

```
Example:
class student
{
int roll;
String name;
float mark;
}
class exam extends student
{
void getdata()
{
roll=101;
name="Karim";
}
}
class result extends exam
{
void getmark()
{
mark=50.55f;
}
void display()
{
System.out.println("Roll is "+roll);
System.out.println("Name is "+name);
System.out.println("Mark is "+mark);
}
}
class multilevel_inheritace
{
public static void main(String args[])
{
result r=new result();
r.getdata();
r.getmark();
r.display();
}
}
```

Interface

In java programming language an interface is a reference type, similar as class, that can contain only constants, method declaration

Syntax:

```
interface interfaceName {
// constant declarations
// Method signatures
}
```

Example :

```
interface MyInterface {
int id = 20; void print();
public int calculateArea();
}
```

Thank You