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Course : Object Oriented Programming

Introduction to Java Algorithm

Session 01

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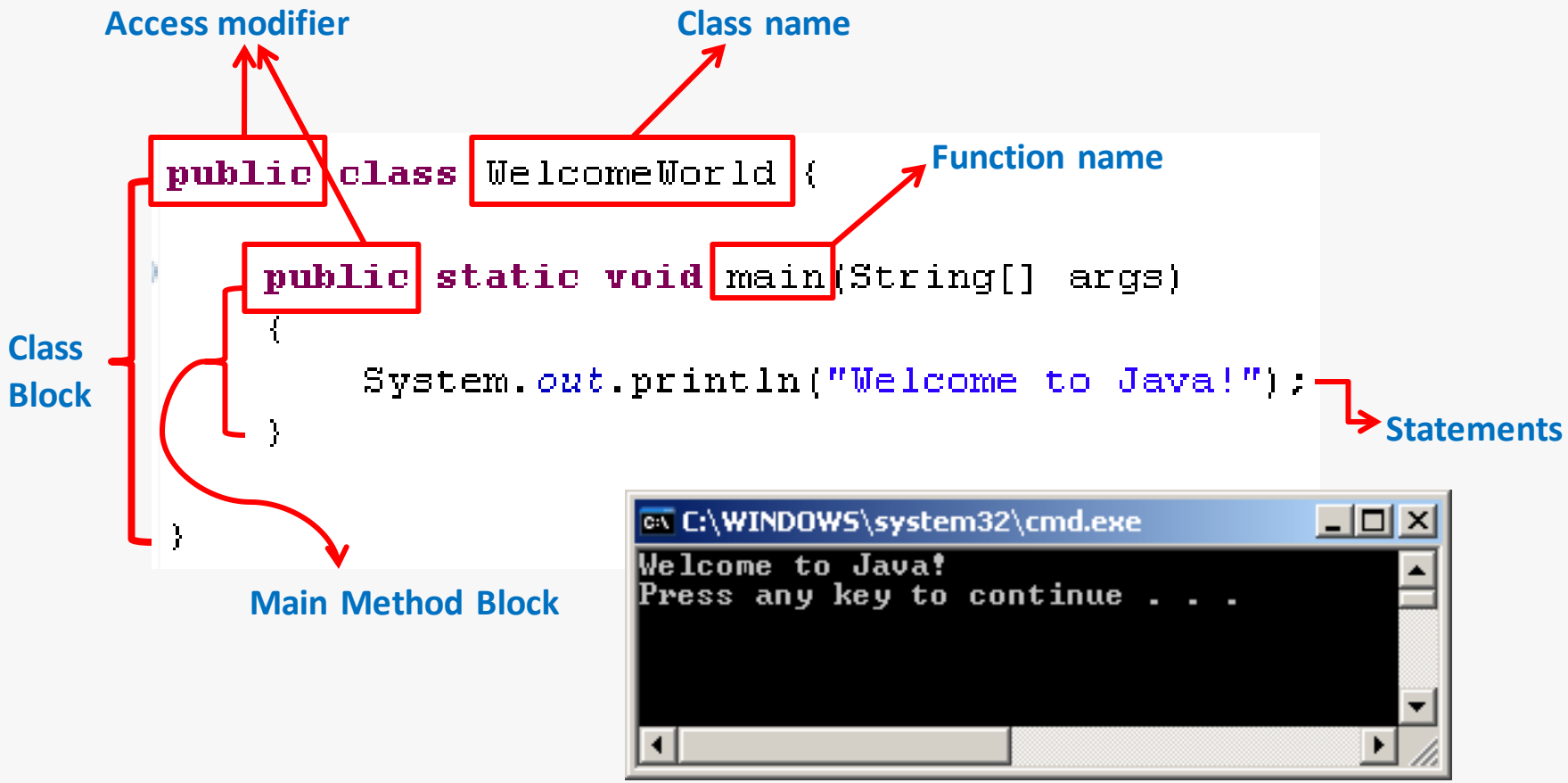
Java Edition and JRE

- Java Edition:
  - Java Standard Edition (Java SE)
    To develop client-side applications.
  - Java Enterprise Edition (Java EE)
    To develop server-side applications.
  - Java Micro Edition (Java ME)
    To develop applications for mobile devices.

- Java Runtime Environment (JRE)
  - A Software that execute Java based application
  - Java Virtual Machine (JVM) is a collection of programs to execute java bytecode on any computer platform.

Simple Java Program



Note: access modifier will be taught in details in the next subject. At First, you just need to apply the `public` access modifier.

Identifier (1)

- What's called identifier?
  - Name of things that appear in the program

```
import java.util.Scanner;
public class ComputeTotal {
    public static void main(String[]args)
    {
        Scanner input =  new Scanner(System.in);

        String name = "";
        name = input.nextLine();

        System.out.println("Name = " + name);
    }
}
```

- Identifier

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Identifier (2)

Did you know the identifier's rules?

By Convention,

- Consist of letters, digits, underscores, dollar sign
- Can not start with digit
- Can not use a reserved word, such as if, while, static, etc.
- Can be of any length

Note:

descriptive identifier make the code easy to read.

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Data Type and Input/Output

Numeric data types

Name	Range	Storage size
byte	-2^7 (-128) to 2^7-1 (127)	8-bit signed
short	-2^{15} (-32768) to 2^{15}-1 (32767)	16-bit signed
int	-2^{31} (-2147483648) to 2^{31}-1 (2147483647)	32-bit signed
long	-2^{63} to 2^{63}-1	64-bit signed
float	Negative range: -3.4028235E + 38 to -1.4E-45 Positive range: 1.4E-45 to 3.4028235E+38	32-bit IEEE 754
double	Negative range: -1.7769313486231 57E + 308 to -4.9E-324 Positive range: 4.9E-324 to 1.7976931348623157E+308	64-bit IEEE 754

List of six numeric data types, their ranges, and their storage sizes (Daniel Y. Liang, Vol 8, 2011, P56)

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Example of Character Data Type

- Both statements assign character **A** to **char** variable **letter** and **letters**

```
char letter = 'A';
char letters = '\u0041';
```

- The increment and decrement operators can also be used on char variables to get the next or preceding Unicode character.

Output: **B**

```
char letter = 'A';
System.out.println(++letter);
```

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String Types and Boolean Variables

- **String** is used to represent a string of characters

```
String word = "Hello World!";
word = word + " Welcome" + " to " + "Java Tutorial" + 1;
System.out.println(word);
```

Output → `Hello World! Welcome to Java Tutorial1`

  - Note: String will be explained more in the next session

- **Boolean Variables:** A variable that holds a Boolean value
- Values: true or false

```
boolean lightsOn = true;
```

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Input in Java Programming

- Basic input: From keyboard, How?
  - Use Scanner class (included in java.util.Scanner)
- Steps:
  1. Import the class
  2. Create the object of Scanner class
  3. Utilize the functions provided in the class to get the input from user
- Example:

```
import java.util.Scanner;                                   1

public class WelcomeWorld {
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);                2
        int number = sc.nextInt();                          3
        System.out.println(number);
    }
}
```

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Common used Scanner's methods

Method	Description
next();	Input String (word)
nextLine();	Input String (sentence)
nextByte();	Input number (byte)
nextShort();	Input number (short)
nextInt();	Input number (int)
nextLong();	Input number (long)
nextFloat();	Input number (float)
nextDouble();	Input number (double)

Output

- **`System.out.print`**
  - print into console without linefeed (newline).
- **`System.out.println`**
  - print into console with linefeed (newline)
- **`System.out.printf`**
  - same as **`System.out.print`**, supports format output:

Specifier	Description	Example 1	Output 1	Example 2	Output 2
%b	boolean	%6b	␣false	%-6b	false␣
			␣␣true		true␣␣
%c	character	%5c	␣␣␣␣a	%-5c	a␣␣␣␣
%d	integer	%5d	␣␣␣69	%-5d	69␣␣␣
			1234567		1E+06
%f	Floating-point	%5.2f	␣␣3.14	%-5.2f	3.14␣␣
			␣20.60		20.60␣
%e	scientific	%10.2e	␣␣3.14e+02	%-10.2e	3.14e+02␣␣
%s	string	%10s	␣␣␣␣␣hello	%-10s	hello␣␣␣␣␣

Note : ␣ → **`space`**

Simple Input/Output Code

```
import java.util.Scanner;

public class InputTestScanner{
    public static void main(String args[]){
        int intVal;
        double doubleVal;
        String stringVal;
        Scanner input =  new Scanner(System.in);

        System.out.println("Input an integer value : ");
        intVal = input.nextInt();
        System.out.println("Integer value = " + intVal);

        System.out.println("Input a double value : ");
        doubleVal = input.nextDouble();
        System.out.println("Double value = " + doubleVal);

        System.out.println("Input a String value without space : ");
        stringVal = input.next();
        System.out.println("Double value = " + stringVal);
    }
}
```

```
Input an integer value : 5
Integer value = 5
Input a double value : 6.5
Double value = 6.5
Input a String value without space : Java
Double value = Java
```

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Selection Statement

- Choose actions with two or more alternative courses.
- Use conditions, which are Boolean expressions.
- Java provides several types of selection statements:
  1. One-way `if` statements (**`if`** without **`else`**)
  2. Two-way `if` statements (**`if`** with **`else`**)
  3. Nested `if` statements (**`if`** inside **`if`**)
  4. `switch` statements
  5. Conditional expressions
- The Statement inside Selection Statements is executed when the condition is fulfilled.

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Iteration Statement

- Controls how many times an operation or a sequence of operations is performed in succession.
- Three types of iteration statements:
  - The while loop (known as *counter-controlled loop)*
  - The do-while loop
  - The for loop
- Iteration can be implemented inside iteration (nested)

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while VS do-while Loop

while

- Condition is checked in the beginning of loop (pre-test loop).

```
int i=-1;

while(i>0)
{
    System.out.
    println("Welcome to Java!");
    i--;
}
```

do-while

- Condition is checked in the last of loop (post-test loop).

```
int i=-1;

do
{
    System.out.
    println("Welcome to Java!");
    i--;
} while(i>0);
```

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Jump Operations

- Additional control for Looping.
- 3 jump operations:
  - **`break`**: Stop (and quit) from inner looping,
  - **`continue`**: Stop (not quit) from looping, generally using with if
  - **`label`**: Controlling exit for break and continue
- **`break`** had been used at **`switch-case`** too.

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