

if then else

if statement identifies the statement/code block to run based on the expressions value(the specific condition)

Code block is {can contain 1 or more statements}
defined by curly braces

else comes after the if, executed when the condition is false

else if can test multiple conditions

Example

```
int score = 6000;
if (score >= 5000) {
    do something;
} else if (score <1000 && score
>= 500) {
    do something else;
} else [
    do this if all previous conditions are false
}
```

Method

Prevent code duplication

Same as 'function' in other languages

Set the name of the method, then the data type and name of parameters it will access from the main method

Java automatically creates variables with the appropriate data type for us

Defining a new method:

```
public static void method Name(b oolean boolParam, int intPar
am) {
}
```

void means to "return nothing"

Calling a Method

When the method is called, all the code in curly brackets in the method is executed

Execute by **calling** the method (in main) with the required arguments in the brackets

Arguments can be the variable name or the actual values we want to send, as long as it matches the parameters

```
method Name(v ari able1, variab le2);
```

In the example, two arguments expected

A variable can be assigned a method result

e.g.

```
int highScore = calcul ate Sco re( gam eOver, score, level, bo
nus);
```

When the variable highScore is printed, the result of the calculations is sent back from the calculateScore method and assigned to the variable

Return variable from method to main:

```
public static int method Name(b oolean boolParam, int intPar
am) {
}
return -1;
```

Changing void to int means we are returning an int datatype to the Main Method

The method must explicitly return the variable:

```
return newValue;
```

An int variable is expected, whether or not the statements in the method execute (i.e. when an if statement is either true or false, something must be returned)

Return variable from method to main: (cont)

Adding the parameter is expected

Required arguments in the brackets

```
public static void main(S tring[]
otherwise an
error.
```

```
boolean isThis Helpful = true;
int points = 15;
method Name(i sth isH elpful, po
datatype need
not be specified
}
```

```
public static int method Name(b
oolean isThis Hel pful, int poi
nts) {
```

```
if (isThis Helpful) {
    int finalScore = points + 5
    System.out.p rin tln ("Your f
inal score is: " + finalS core);
    return finalS core;
}
```

return -1; //indicate to the Main Method that the variable is not found

Method Overloading

Allows us to create multiple methods with the same name but different parameters

Changing the data type of the method will not change its signature. The number of paramaters make it unique

The methods can have the same name but different parameters

```
sum(int a, int b);
sum(int a, int b, int c);
sum(int a, int b, int c, int d);
```

```
public static int sum(int a, int b
return a + b;
}
```

```
public static int sum(int a, int b
return a + b + c;
}
```

```
public static int sum(int a, int b
return a + b + c + d;
}
```

println method is an example of method overloading methods of the same name

Method Overloading (cont)

It improves code readability and re-usability

Easier to remember one method name instead of many

Achieves naming consistency

Gives flexibility to call a similar method with different types of data, based on defined arguments/parameters

Switch

Similar to the if-then-else statement

Good for testing values of the same variable

The variable that will be changed goes inside the brackets the conditions tested will be the **case** numbers

break; are essential to close off your case comparison. Without it, results will be unpredictable.

The final switch statement is **default**, same as **else**

Switch statement

```
int value = 1;

switch (value) {

case 1:

System.out.println ("Value was 1");

break;

case 2:

System.out.println ("Value was 2");
```

Switch (cont)

break;

default:

```
System.out.println ("Was not 1 or 2");
```

break;

}

Case tests can also be on one line, e.g.:

Common Methods

variable.toLowerCase() Turns the string variable to all lower case

variable.toUpperCase() Turns the string variable to all UPPERCASE

Math.round(variable) Rounds decimal numbers to the nearest value
String.format("%2f", variable) Converts and outputs the variable number with just two decimal points

Math.sqrt(variable); Variable must be long. If not, add (long) before the expression

variable1.equals(variable2) Tests if one String variable is equal to another

For Loop/Statement

Processes a part of a code block until a condition is satisfied

Variable created in the for statement only exists in that code block

Structure:

for(init; termination; increment)

init: Code initialised once at the start of the loop

termination: Determines at what point it exits the for loop

Once it evaluates to false, it will exit the loop and proceed to the next line

increment An expression invoked after each iteration

Example:

```
for(int i = 0; i < 5; i++)
```

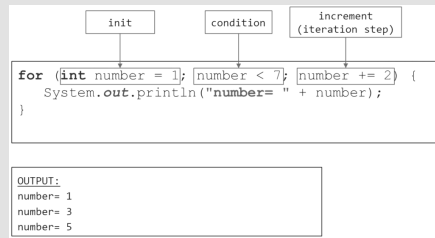
int i = 0 initialise i to zero,

i < 5 test if i is less than 5 and keeps processing until i is greater than 5

i++ add 1 to the value of i

Looping forwards or backwards depends on the conditions and ranges

For Statement



while/do-while

Similar to the for loop

instead of looping a certain number of times (as seen in `for`), `while()` allows you to loop until the expression is true or false

the count must be incremented, otherwise you will enter an infinite loop

for version

```

for (int i = 0; i != 5; i++) {
    //do something
}
    
```

while version

```

int i = 1
while (i != 6) {
    //do something
}
    
```

while

```

while (condition) {
    //statements
}

while (true) {
    if (i == 5) {
        break;
    }
    count++;
}
    
```

Do-While

It will always execute once or more depending on defined expressions

```

do {
    //statements
} while (condition);
    
```

Remember,
 semi-colon after
 while condition

```

count = 1;
do {
    count++;
} while (count != 6);
    
```

Object-Oriented Programming

Object A value of a class type

Has states and behaviours

State is stored in fields

e.g. a dog's name, breed, colour

Behaviour is shown via methods

e.g. a dog's behaviour: barking, wagging tail, running

Class Describes set of objects with the same behaviour

Can have any number of methods to access the value of different methods

Updating a variable using a method instead of directly

Why? If the variable's access modifier is set to `private` for security reasons, we don't want users to directly change the variable by making it 'public'

Use `this.` before the class to refer to a particular field

Object-Oriented Programming (cont)

`this.model = model;` this means to update the field `model` with the contents of the parameter `model` that was passed through.

Classes can have:

Local variables: Defined in methods, constructors or blocks

Instance variables: Variables within a class but outside any method. Initialised when the class is instantiated.

Class variables: Variables declared within a class, outside any method, with the `static` keyword

Static Variables

Declared using the keyword `static`

Also known as **static member variables**

Every class instance shares the same static variable. Change made to that variable will be seen in other instances.

Accessible by **static methods** directly

Reading user input with **Scanner**, `scanner` is declared as a static variable

e.g. `private static String name;` not a good idea

Instance variables

They **don't** use the `static` keyword

Known as fields or member variables

Belong to an **instance** of a class

Represents the state of an instance

Instance variables (cont)

Every instance: -Has it's own copy of an instance variable
-Can have a different value(-state)

Static Method

Declared using a static modifier

Can't access instance methods and instance variables directly

Cannot use the `this` keyword
Usually used for operations that don't require data from an instance of the class (from `this`)

When a method **does not use instance variables**, that method should be **declared as a static method**

e.g. `main` is a static method and is called by JVM when it starts an application

Example

```
public static void printSum(int a, int b) {
    System.out.println("sum = " + (a + b));
}
```

Instance Methods

Belongs to an instance of a class

To use, we must instantiate the class first by using the `new` keyword

Can access instance methods and variables directly

Can access static methods and static variables directly

Example:

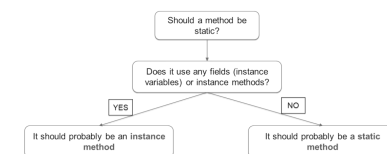
```
class Dog {
    public void bark() {
        System.out.println("woof");
    }
}
```

Instance Methods (cont)

```
public class Main {
    public static void main(String[] args)
    {
        Dog rex = new Dog(); //create instance
        rex.bark(); //call instance method
    }
}
```

Static or Instance Method?

Static or Instance Method?



question that you would ask yourself

Should a method be static?

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Does it use any fields(instance variables) or Instance methods?

YES? It should probably be an instance method

NO? It should probably be a static method