

# C0452

# Programming Concepts

Lecture 3

Selection and Enumerate types

# Selection

Selection allows us to choose between blocks of code based on whether a comparison evaluates to **true or false**

- ❖ if, else if, else blocks
- ❖ switch

if

# if statement

The code within the braces of an **if** statement will execute **if** the comparison evaluates to **true** (in this case, **if mark is less than zero**)

```
if(mark < 0)
{
    System.out.println("Mark must be greater than 0");
}
```

# More comparisons

```
if(mark < 0)
{
    System.out.println("Mark must be greater than 0");
}
if(mark > 100)
{
    System.out.println("Mark must be less than 100");
}
```

# Operators

# Comparison Operators

==	Equality
!=	Inequality
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal

# Java String Equality

Whilst the equality operator (==) can be applied to primitive data (`int`, `char`, `boolean`), Strings are classes, so **the equality operator would compare memory addresses of String objects** rather than the values stored in each object

Use the method **equals** to compare the values stored at String variables rather than comparing memory addresses

```
if(name.equals("Nick"))
```



# Logical Operators

&&

AND operator (**ALL comparisons** must be true)

||

OR operator (**only one comparison** must be true)

!

NOT operator (reverses the evaluation of comparison)

# Example of the OR operator

The OR operator `||` requires **at least one** comparison to be true

```
if(mark < 0 || mark > 100)
{
    System.out.println("Mark must between 0 and 100");
}
```

# Example of the AND operator

The AND operator **&&** requires **all** comparisons to be **true**

```
if(mark >= 0 && mark <= 100)
{
    System.out.println("This is a valid mark");
}
```

else and else if

# else statement

The **else** block executes **if** the evaluation is **false**

```
if(mark >= 0 && mark < 100)
{
    System.out.println("This is a valid mark");
}
else
{
    System.out.println("This is an invalid mark");
}
```

# else if statements

```
if(mark >= 0 && mark < 39)
    System.out.println("This is a failed attempt");
else if (mark < 49)
    System.out.println("This is a pass");
else if (mark < 59)
    System.out.println("This is a 2:2");
else if (mark < 69)
    System.out.println("This is a 2:1");
else if (mark <= 100)
    System.out.println("This is a 1st");
else
    System.out.println("This is an invalid mark");
```

# Declaring constants

```
public final int GRADE_NS = 0;  
public final int GRADE_F = 39;  
public final int GRADE_D = 49;  
public final int GRADE_C = 59;  
public final int GRADE_B = 69;  
public final int GRADE_A = 100;
```

# Applying constants

```
if(mark >= GRADE_NS && mark < GRADE_F)
    System.out.println("This is a failed attempt");
else if (mark < GRADE_D)
    System.out.println("This is a pass");
else if (mark < GRADE_C)
    System.out.println("This is a 2:2");
else if (mark < GRADE_B)
    System.out.println("This is a 2:1");
else if (mark <= GRADE_A)
    System.out.println("This is a 1st");
else
    System.out.println("This is an invalid mark");
```



switch

# How does the switch statement work?

The **switch** statement can compare the values of a variable against **cases**. Cases of the switch statement are tested individually in sequence and code executes when the case matches the value of the variable. The **default** is the equivalent of the **else** statement.

However, when a case executes, the remainder of the cases within the switch block also execute! The **break** statement can guard against this 'fall-through mechanism'.

# Switch example

```
char grade;
```

```
switch(grade)
{
    case 'F' : System.out.println("This is a failed attempt"); break;
    case 'D' : System.out.println("This is a pass"); break;
    case 'C' : System.out.println("This is a 2:2"); break;
    case 'B' : System.out.println("This is a 2:1"); break;
    case 'A' : System.out.println("This is a 1st"); break;
    default : System.out.println("This is an invalid mark");
}
```

# Enumerate type

# What is an enumerate type?

Enumerate types are user defined types which have a limited number of values

This makes for easier validation, when utilising selection structures, given that the valid (acceptable) values are limited/finite

**Letter grades:** A, B, C, D, E, F

**Directions:** North, South, East, West

**Music genres:** Rock, Pop, Blues, Classical, R&B, Country

# Basic enumerate type for Grades

```
public enum Grades  
{  
    NS, F, D, C, B, A;  
}
```

These would be assigned integer values by default:  
NS = 0, F = 1, D = 2, C = 3, B = 4, A = 5

```
public enum Grades
{
    NS (0), F (39), D (49), C (59), B (69), A (100);

    private final int value;

    private Grades(int value)
    {
        this.value = value;
    }

    public int getValue()
    {
        return value;
    }
}
```

# Applying enum for Grade

```
if(mark >= Grades.NS.getValue() && mark < Grades.F.getValue())  
    System.out.println("This is a failed attempt");  
else if (mark < Grades.D.getValue())  
    System.out.println("This is a pass");  
else if (mark < Grades.C.getValue())  
    System.out.println("This is a 2:2");  
else if (mark < Grades.B.getValue())  
    System.out.println("This is a 2:1");  
else if (mark <= Grades.A.getValue())  
    System.out.println("This is a 1st");  
else  
    System.out.println("This is an invalid mark");
```