Al-Mustaqbal University
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المرحلة الاولى- اساسيات البرمجة

كليـــة العلـــوم
قسم الأمن السيبراني

Subject: Programming Fundamentals

First Stage

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Lecture (5)

Selection Statements

Lecture Outline

2024-2025

1. **Introduction to Selection Statements**
2. **Types of Selection Statements**
   - Single `if` Statement
   - Single `if` Block Statement
   - Single `if-else` Statement
   - `else if` Statement
   - Nested `if` Statements
3. **Examples and Explanations**

1. Introduction to Selection Statements

Definition: Selection statements allow a program to make decisions and execute specific blocks of code based on conditions.

Importance:

- Enables conditional logic in programs.
- Allows decision-making to adapt to input or runtime data.
- Provides flexibility and control over program execution.

2. Types of Selection Statements

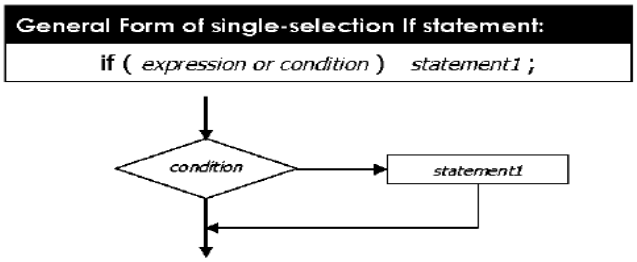
A. Single `if` Statement Structure

Syntax:

```
if (condition) {
    // Code to execute if the condition is true
}
```

Explanation:

- The condition is evaluated. If it is true (non-zero), the code inside the `if` block executes.
- If false (zero), the block is skipped.



Example 1:

```
int x = 10;
if (x > 5)
    cout << "x is greater than 5";
```

Explanation:

- The condition `x > 5` evaluates to true, so the message is printed.

Example 2:

```
int temperature = -5;
if (temperature < 0)
    cout << "It's freezing!";
```

Explanation:

- The condition `temperature < 0` evaluates to true, so the message is printed.

B. Single `if` Block Statement Structure

General Form of single block selection If statement:

if (*expression or condition*)
{
statement1 ;
statement2 ;
statement3 ;
}

Example 1:

```
int score = 85;
if (score >= 50) {
    cout << "You passed!\n";
    cout << "Congratulations!";
}
```

Explanation:

- Both lines inside the block execute because `score >= 50` is true.

Example 2:

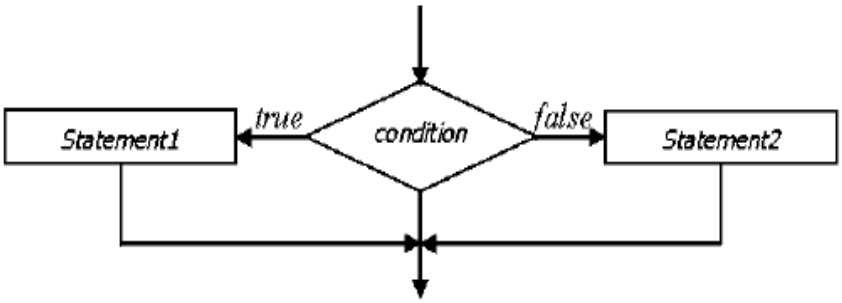
```
int age = 18;
if (age >= 18) {
    cout << "You are an adult.\n";
    cout << "You can vote.";
}
```

Explanation:

- The condition `age >= 18` evaluates to true, so both messages are displayed.

C. Single `if-else` Statement Structure

Syntax:



General Form of If/else statement:	
if (*expression*) *statement1* ; else *statement2* ;	if (*expression*) {*statements* } else {*statements*}

Example 1:

```
int number = 10;
if (number % 2 == 0) {
    cout << "Even number";
} else {
    cout << "Odd number";}
```

Explanation:

- If `number` is divisible by 2, it prints "Even number"; otherwise, "Odd number".

Example 2:

```
int marks = 45;
if (marks >= 50) {
    cout << "You passed!";
} else {
    cout << "You failed.";
}
```

Explanation:

- The `marks >= 50` condition determines which message is displayed.

D. `else if` Statement Structure

Syntax:

General Form of else if statement:

```
if ( expression or condition 1 )  statement1 ;
else if ( expression or condition 2 )  statement2 ;
else if ( expression or condition 3 )  statement3 ;
:
else if ( expression or condition n )  statement-n ;
else statement-e ;
```

Example 1:

```
int grade = 85;
if (grade >= 90) {
    cout << "Excellent";
} else if (grade >= 75) {
    cout << "Good";
} else {
    cout << "Needs Improvement";
}
```

Explanation:

- The program checks each condition in sequence and executes the block for the first true condition.

Example 2:

```
int temperature = 15;
if (temperature > 30) {
    cout << "Hot";
} else if (temperature > 20) {
    cout << "Warm";
} else {
    cout << "Cold";
}
```

Explanation:

- Based on `temperature`, the appropriate message is displayed.

E. Nested `if` Statement Structure

Some of the samples of *NESTED if-else* constructions are shown below:

Syntax:

If (exp.) { Statements }
Else { Statements}
	If (exp.) {
	If (exp.) {Statements}
	Else { Statements} }
	Else {Statements}
		If (exp.) {
		If (exp.) {Statements}
		Else { Statements} }
		Else {If (exp)
		{Statements}
		Else {Statement}
		}

Example 1:

```
int x = 10, y = 20;
if (x > 5) {
    if (y > 15) {
        cout << "x is greater than 5 and y is greater than 15";
    }
}
```

Explanation:

- The outer `if` checks `x > 5`, and the inner `if` checks `y > 15`.

Example 2:

```
int age = 25;
string gender = "female";
if (age > 18) {
    if (gender == "female") {
        cout << "You are an adult female.";
    }
}
```

Explanation:

- The nested `if` checks both `age > 18` and `gender == "female"` before printing the message.