**C++ 101 – Session 1**

**1. Syntax of a C++ Program**

**📌 Structure Overview:**

#include <iostream> // Allows input/output

using namespace std; // Avoids typing std:: repeatedly

int main() {

cout << "Hello, World!" << endl; // Output to screen

return 0; // Indicates that the program ended successfully

}

**💡 Explanation:**

* Every C++ program must have a main() function.
* cout is used to display output.
* endl moves the cursor to a new line and flushes the output buffer.

**2. Data Types in C++**

Data types tell the compiler what kind of data a variable will store.

|  |  |  |
| --- | --- | --- |
| **Type** | **Purpose** | **Example** |
| int | Stores whole numbers | int age = 20; |
| float | Stores decimal numbers (less precise) | float pi = 3.14; |
| double | More precise decimals | double weight = 45.12; |
| char | Stores single characters | char grade = 'A'; |
| bool | Stores true/false values | bool passed = true; |
| string | Stores a sequence of characters | string name = "Ngambo"; |

📝 Note: string requires including the #include <string> header if not already included.

**3. Variable Declaration**

To use a variable in C++, you must first declare it:

int age;

float temperature;

char grade;

📌 This tells the compiler:

* What type of data the variable will hold.
* The name you'll use to refer to it.

**4. Variable Assignment**

Once declared, you can assign a value to a variable:

age = 25;

temperature = 36.5;

grade = 'B';

📝 You can also **declare and assign** in one line:

int age = 25;

**5. Comments in C++**

Comments are notes you write in your code to explain what it does. They are **ignored by the compiler**.

// This is a single-line comment

/\* This is a

multi-line comment \*/

💡 Use comments to make your code easier to understand for yourself and others.

**6. Expressions**

Expressions perform operations on variables and values.

**🔹 6.1. Arithmetic Expressions**

Used for mathematical operations:

|  |  |  |
| --- | --- | --- |
| **Operator** | **Description** | **Example** |
| + | Addition | a + b |
| - | Subtraction | x - y |
| \* | Multiplication | p \* q |
| / | Division | a / b |
| % | Modulus (remainder) | x % y |

**🔹 6.2. Comparison (Relational) Expressions**

Used to compare values. They return true or false.

|  |  |  |
| --- | --- | --- |
| **Operator** | **Meaning** | **Example** |
| == | Equal to | x == y |
| != | Not equal to | x != y |
| > | Greater than | a > b |
| < | Less than | a < b |
| >= | Greater or equal | x >= 5 |
| <= | Less or equal | x <= 10 |

📌 These are often used inside if or while statements.

**🔹 3. Logical Expressions**

Combine or modify boolean values.

|  |  |  |  |
| --- | --- | --- | --- |
| **Operator** | **Name** | **Example** | **Result** |
| && | AND | x > 0 && y > 0 | true if both are true |
| || | OR | Age > 18 || name = ‘John’ | OR |
| ! | NOT | !isCorrect | true if isCorrect is false |

🧠 Used in conditions to add more logic.

**7. Conditional Statements**

Used to make **decisions** in your program based on conditions.

**🔹 if Statement**

Executes code **only if** the condition is true.

if (age >= 18) {

cout << "You are an adult." << endl;

}

**🔹 if-else Statement**

Chooses **between two paths**: one if true, another if false.

if (score >= 50) {

cout << "Passed!" << endl;

} else {

cout << "Failed." << endl;

}

**🔹 if-else if-else (Nested Conditions)**

Used to test **multiple conditions** in sequence.

if (marks >= 80) {

cout << "Grade: A" << endl;

} else if (marks >= 60) {

cout << "Grade: B" << endl;

} else if (marks >= 40) {

cout << "Grade: C" << endl;

} else {

cout << "Fail" << endl;

}

🧠 The program checks from top to bottom and runs the first condition that is true.

### ­­Compiling and Running a C++ Program

If you're using a terminal or command prompt and have a C++ compiler like g++ installed, follow these steps:

1. **Save your C++ file** with a .cpp extension.  
   Example: main.cpp
2. **Open terminal or command prompt** in the directory where the file is saved.
3. **Compile the file** using g++:

g++ main.cpp -o main

1. **Run the executable**:

./program