DSA Study Notes Day 2

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How Does Code Run?

- **Our First Program:**

```
cout << "DSA Series By Munawar";
```

- **Semicolon (;)**: Acts as a statement terminator in C++.

Main Function Structure

- **Main Function**:

```
int main() {
  // Your code here
  return 0;
}
```

- **Preprocessor Directive**:

```
#include <iostream>
```

- **Using Namespace**:
  Optional but common in C++ to avoid prefixing `std` before `cout`.

```
using namespace std;
```

- **Output Statement**:

```
std::cout << "DSA Series";
```

- **Return Statement**:

```
return 0;
```

Compilation Process

- **Source Code** (`code.cpp`) → **Compiler** → **Executable File** (`code.exe`)
  - **For Windows**: The executable file is typically `.exe`.
  - **For Linux**: The output file is typically `.out`.
- **Compile and Run**:
  - **Windows**: `g++ code.cpp & ./code.exe`
  - **Linux**: `a.out` or `./a.out`
- **Clear Terminal**:

```
clear
```

Boilerplate Code

This is the basic structure of a C++ program:

```
#include<iostream>
using namespace std;

int main() {
  return 0;
}
```

Comments in C++

- **Single-line comment**:

```
// This is a comment
```

Variables

- **Definition**: Containers used to store data.
    - Example:

      ```
      int age = 24;
      char grade = 'A';
      ```

    - `age` and `grade` are **identifiers** that hold values.

Memory Representation

- **RAM Representation**:

```
------------------
|   24   |   A   |
|   age  | grade |
------------------
```

Data Types

- **Integer (int)**: 4 bytes
- **Character (char)**: 1 byte
- **Floating Point (float)**: 4 bytes
- **Boolean (bool)**: 1 byte
- **Double Precision (double)**: 8 bytes

Computer's Binary System

- **Binary System**: Based on 0s and 1s.
- **Bit and Byte**:
  - 1 bit = 0 or 1
  - 8 bits = 1 byte
  - Integer: 4 bytes → 32 bits (reserved space)

Character Representation

- **ASCII Values**:
  - Uppercase: `A` = 65, `B` = 66, … `Z`
  - Lowercase: `a` = 97, `b` = 98, … `z`

Boolean Data Type

- **Boolean**: Represents `true` or `false`.

Primitive Data Types

- **Types**: `int`, `char`, `float`, `bool`, `double`.

Type Casting

- **Type Conversion**: Changing one data type into another.
  - **Implicit**: Automatic conversion.
  - **Explicit**: Manual conversion (casting).

Input in C++

- **Syntax**:

```
cin >> data;
```

- **Explanation**: `cin` and `cout` are global objects used for input and output.

Operators in C++

- **Arithmetic Operators**: `+`, `-`, `*`, `%`
- **Relational Operators**: `>`, `<`, `>=`, `<=`, `==`
- **Logical Operators**: `&&`, `||`, `!`

Unary Operators

- **Increment**:
  - **Post-increment**: `variable++`
  - **Pre-increment**: `++variable`

- **Decrement**:
  - **Post-decrement**: `variable--`
  - **Pre-decrement**: `--variable`

Home Task

- **Calculator Implementation**: Create a simple calculator in C++ using the concepts learned.