



C++ Basics Overview

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Here's a brief overview of the basics in C++, including code snippets:

1. Data Types

C++ offers several built-in data types:

- **int**: Integer (e.g., `int x = 5;`)
- **float**: Floating-point number (e.g., `float y = 5.5;`)
- **char**: Character (e.g., `char z = 'A';`)
- **bool**: Boolean (e.g., `bool isTrue = true;`)
- **double**: Double-precision floating-point number (e.g., `double w = 5.55;`)

2. If-Else Statements

Used for conditional logic.

cpp

```
int x = 10;
if (x > 0) {
    cout << "Positive";
} else {
    cout << "Non-positive";
}
```

3. Switch Statement

Alternative to multiple if-else statements.

cpp

```
int day = 3;
switch (day) {
    case 1: cout << "Monday"; break;
    case 2: cout << "Tuesday"; break;
    case 3: cout << "Wednesday"; break;
}
```

```
    default: cout << "Invalid";
}
```

4. Arrays & Strings

- **Array:** Collection of elements of the same type.

cpp

```
int arr[3] = {1, 2, 3};
```

- **String:** Sequence of characters.

cpp

```
string str = "Hello";
```

5. For Loops

Iterate over a range of values.

cpp

```
for (int i = 0; i < 5; i++) {
    cout << i << " ";
}
```

6. While Loops

Loop that continues until a condition is false.

cpp

```
int i = 0;
while (i < 5) {
    cout << i << " ";
    i++;
}
```

7. Functions (Pass by Value & Reference)

- **Pass by Value:** Copies the argument.

cpp

```
void byValue(int a) {
    a = 10;
```

```
}
```

- **Pass by Reference:** Passes the original argument.

```
cpp
```

```
void byReference(int &a) {
    a = 10;
}
```

8. Time Complexity (Basics)

Time complexity is used to analyze the efficiency of an algorithm. Here's a basic example:

- **$O(1)$:** Constant time.

```
cpp
```

```
int x = 5;    // Always takes the same time.
```

- **$O(n)$:** Linear time.

```
cpp
```

```
for (int i = 0; i < n; i++) {
    cout << i << " ";
}
```

- **$O(n^2)$:** Quadratic time.

```
cpp
```

```
for (int i = 0; i < n; i++) {
    for (int j = 0; j < n; j++) {
        cout << i << " " << j << " ";
    }
}
```

This provides a foundational understanding of basic C++ concepts and how to measure their efficiency using time complexity.

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