

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.

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

3. Switch Statement

Alternative to multiple if-else statements.

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

```
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.

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

6. While Loops

Loop that continues until a condition is false.

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

7. Functions (Pass by Value & Reference)

• Pass by Value: Copies the argument.

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

```
}
```

• Pass by Reference: Passes the original argument.

```
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.

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

• **O(n)**: Linear time.

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

• **O(n^2)**: Quadratic time.

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

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

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```
#include<bits/stdc++.h>
using namespace std;

void patone(int n){
   for(int i=0;i<n;i++){
      for(int j=0;j<n;j++){
       cout<<"*";
      }
      cout<<endl;
   }
}</pre>
```

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```
void pat2(int n){
    for(int i=0;i<n;i++){
        for(int j=0;j<=i;j++){
            cout<<"*";
        }
        cout<<endl;
    }
}</pre>
```

```
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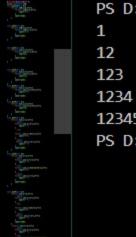
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```

```
void pat3(int n){
    for(int i=1;i<=n;i++){
        for(int j=1;j<=i;j++){
            cout<<j;
        }
        cout<<endl;
    }
}</pre>
```



```
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1

12

123

1234

12345

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```

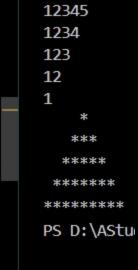
```
void pat4(int n){
    for(int i=1;i<=n;i++){
        for(int j=1;j<=i;j++){
            cout<<i;
        }
        cout<<endl;
    }
}</pre>
```



```
void pat5(int n){
    for(int i=1;i<=n;i++){
        for(int j=1;j<=n-i+1;j++){
            cout<<"*";
        }
        cout<<endl;
    }
}</pre>
```



```
void pat6(int n){
    for(int i=1;i<=n;i++){
        for(int j=1; j <= n-i+1; j++){
             cout<<j;
        cout<<endl;</pre>
void pat7(int n){
    for(int i=1;i<=n;i++){</pre>
           space
        for(int j=1;j<=n-i;j++){
             cout<<" ";
           star
        for(int j=1; j<=2*i-1; j++){}
             cout<<"*";
           space
          for(int j=1;j<=n-i;j++){</pre>
             cout<<" ";
        cout<<endl;</pre>
```



```
void pat8(int n){
    for(int i=1;i<=n;i++){
        //space
        for(int j=1;j<=i-1;j++){
            cout<<" ";
        }
        //star
        for(int j=1;j<=2*n-2*i+2-1;j++){
            cout<<"*";
        }
        //space
        for(int j=1;j<=i-1;j++){
            cout<<" ";
        }
        cout<<<" ";
    }
    cout<<<endl;
}</pre>
```

```
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```

```
void pat9(int n){
    for(int i=1;i <=n;i++){
          space
        for(int j=1;j<=n-i;j++){</pre>
             cout<<" ";
           star
        for(int j=1; j<=2*i-1; j++){}
             cout<<"*";
           space
         for(int j=1; j \leftarrow n-i; j++){
             cout<<" ";
        cout<<endl;
     for(int i=1;i <=n;i++){
           space
        for(int j=1;j<=i-1;j++){}
             cout<<" ";
           star
        for(int j=1; j <= 2*n-2*i+2-1; j++){}
             cout<<"*";
           space
        for(int j=1;j<=i-1;j++){
             cout<<" ";
        cout<<endl;
```

```
*

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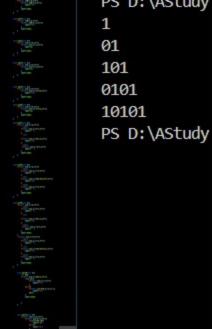
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```

```
void pat10(int n){
    int k=1;
    for(int i=1;i<=2*n-1;i++){
        if(i<=n){
            for(int j=1;j<=i;j++){
                cout<<"*";
            }
        }else{
            for(int j=i-2*k;j>=1;j--){
                 cout<<"*";
            }k++;
        }
        cout<<<endl;
}</pre>
```

```
void pat11(int n){
    for(int i=1;i<=n;i++){
        for(int j=1;j<=i;j++){
            if((i+j)%2!=0){
                 cout<<"0";
            }else{
                 cout<<"1";
            }
        }
        cout<<<endl;
}</pre>
```



```
void pat12(int n){
    for(int i=1;i<=n-1;i++){
        //print
        for(int j=1;j<=i;j++){
            cout<<j;
        }
        //space
        for(int j=1;j<=2*n-2*i-2;j++){
            cout<<" ";
        }
        //star
        for(int j=i;j>=1;j--){
            cout<<j;
        }
        cout<<endl;
    }
}</pre>
```

```
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1 1

12 21

123 321

12344321

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```

```
1
void pat13(int n){
                                                        23
    int cnt=1;
                                                        456
    for(int i=1;i<=n;i++){</pre>
                                                        78910
        for(int j=1; j <= i; j++){
                                                        1112131415
             cout<<cnt;
                                                        A
             cnt++;
                                                        AB
                                                        ABC
        cout<<endl;
                                                        ABCD
                                                        ABCDE
                                                        FEDCBA
                                                        EDCBA
void pat14(int n){
                                                        DCBA
    for(int i=0;i<n;i++){
                                                        CBA
        for(char j='A';j<='A'+i;j++){</pre>
                                                        BA
             cout<<j;
                                                        PS D:\AStudy\APlac
        cout<<endl;
  void pat15(int n){
    for(int i=0;i<n;i++){</pre>
        for(char j='A'+n-i;j>='A';j--){
             cout<<j;
        cout<<endl;</pre>
```

```
void pat15point1(int n){
    for(int i=0;i<n;i++){</pre>
         for(char j='A';j<='A'+n-i-1;j++){
             cout<<j;
         cout<<endl;
  void pat16(int n){
    for(int i=0;i<n;i++){</pre>
        for(char j='A';j<='A'+i;j++){
             cout<<char(i+'A');</pre>
         cout<<endl;
void pat17(int n){
  for(int i=0;i<n;i++){
      for(int j=0; j < n-i-1; j++){
           cout << " ";
      char ch = 'A';
      int breakpoint = (2*i+1)/2;
      for(int j=1; j <= 2*i+1; j++){
           cout<<ch;
           if(j <= breakpoint) ch++;</pre>
           else ch--;
      for(int j=0; j < n-i-1; j++){
           cout<<" ";
      cout<<endl;
```

ABCDE ABCD ABC AB Α Α BB CCC DDDD EEEEE Α ABA **ABCBA** ABCDCBA ABCDEDCBA PS D:\AStudy\

```
void pat18(int n){
    for(int i=0;i<n;i++){
        for(char ch =('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-1)-i;ch<=('A'+n-
```

```
void pat19(int n){
    for(int i=1;i <=n;i++){
          print
        for(int j=1;j<=n-i+1;j++){}
             cout<<"*";
           space
        for(int j=1; j<=2*i-2; j++){}
             cout<<" ";
         for(int j=1; j <= n-i+1; j++){
             cout<<"*";
        cout<<endl;
      inverted
     for(int i=1;i <=n;i++){
           print
        for(int j=1;j<=i;j++){
             cout<<"*";
           space
        for(int j=1; j <= 2*n-2*i; j++){}
             cout<<" ";
         for(int j=1;j<=i;j++){</pre>
             cout<<"*";
        cout<<endl;
```

```
void pat20(int n){
    for(int i=1;i<=n;i++){
         for(int j=1;j<=i;j++){</pre>
             cout<<"*";
           space
          for(int j=1; j <= 2*n-2*i; j++){
             cout<<" ";
           print
           for(int j=1; j <= i; j++){
             cout<<"*";
         cout<<endl;
      inbvertd
    for(int i=1;i<=n;i++){
         for(int j=1; j <= n-i; j++){
             cout<<"*";
           space
          for(int j=1; j<=2*i; j++){}
             cout<<" ";
           print
           for(int j=1; j \leftarrow n-i; j++){
             cout<<"*";
         cout<<endl;
```

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```
void pat21(int n){
    for(int i=1;i <=n;i++){
        for(int j=1;j<=n;j++){</pre>
            if(i=1||j=1||i=n||j=n){
                 cout<<"*";
            }else{
                 cout<<" ";
        cout<<endl;
void pat22(int n){
    for(int i=0; i < n*2-1; i++){
        for(int j=0;j<2*n-1;j++){
             int top = i;
         int bottom = j;
         int right = (2*n - 2) - j;
         int left = (2*n - 2) - i;
        cout << (n- min(min(top, bottom), mi
        cout<<endl;
```

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```
#include<iostream>
using namespace std;
int main()
{
    int n,i,j;
    cin>>n;
    for(i=1;i<=n;i++)
    {
        cout<<" ";
    }
    for(j=1;j<=n;j++){
        cout<<"*";
    }
    cout<<endl;
}</pre>
```

```
i.cpp
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```

```
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zag patter.cpp'
PS D:\Study2\study\pr
* *
* * *
* *
PS D:\Study2\study\pr
```