Introduction

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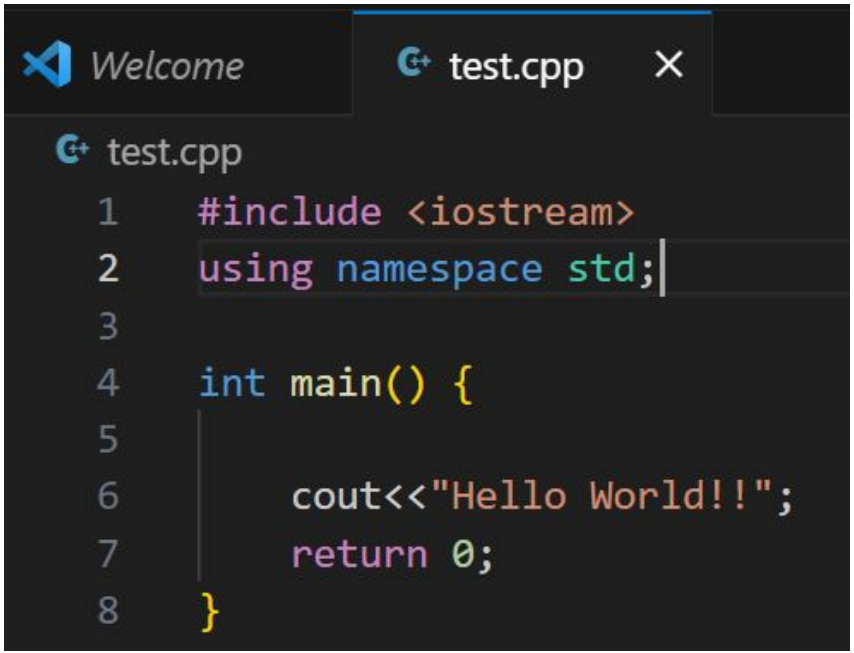
Introduction to C++



How to run?

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
Hello World!!
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

g++ version

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ --version
g++ (Ubuntu 11.4.0-1ubuntu1~22.04) 11.4.0
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This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

More Examples

Welcome | test.cpp

test.cpp

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

int main() {
    int n = 6;
    cout<<n<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
6
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

More Examples

Welcome | test.cpp

test.cpp

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

int main() {
    int n;
    cin>>n;
    cout<<n+1<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
3
4
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

More Examples

Welcome | test.cpp

test.cpp

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

int main() {
    int n, m;
    cin>>n>>m;
    cout<<n+1<<" "<<m+2<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
2
3
3 5
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

Problem

There are three points in a 3d space.

The position of a point is presented with its three coordinate values (x, y, z).

Take the positions as input.

Print the positions as output.

Naive Solution

Welcome | test.cpp

test.cpp

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

int main() {
    int p1x, p1y, p1z, p2x, p2y, p2z,p3x, p3y, p3z;
    cin>>p1x>>p1y>>p1z>>p2x>>p2y>>p2z>>p3x>>p3y>>p3z;
    cout<<p1x<<p1y<<p1z<<p2x<<p2y<<p2z<<p3x<<p3y<<p3z;
    return 0;
}
```

What if there are more attributes of a point? For example, color, size…

Struct

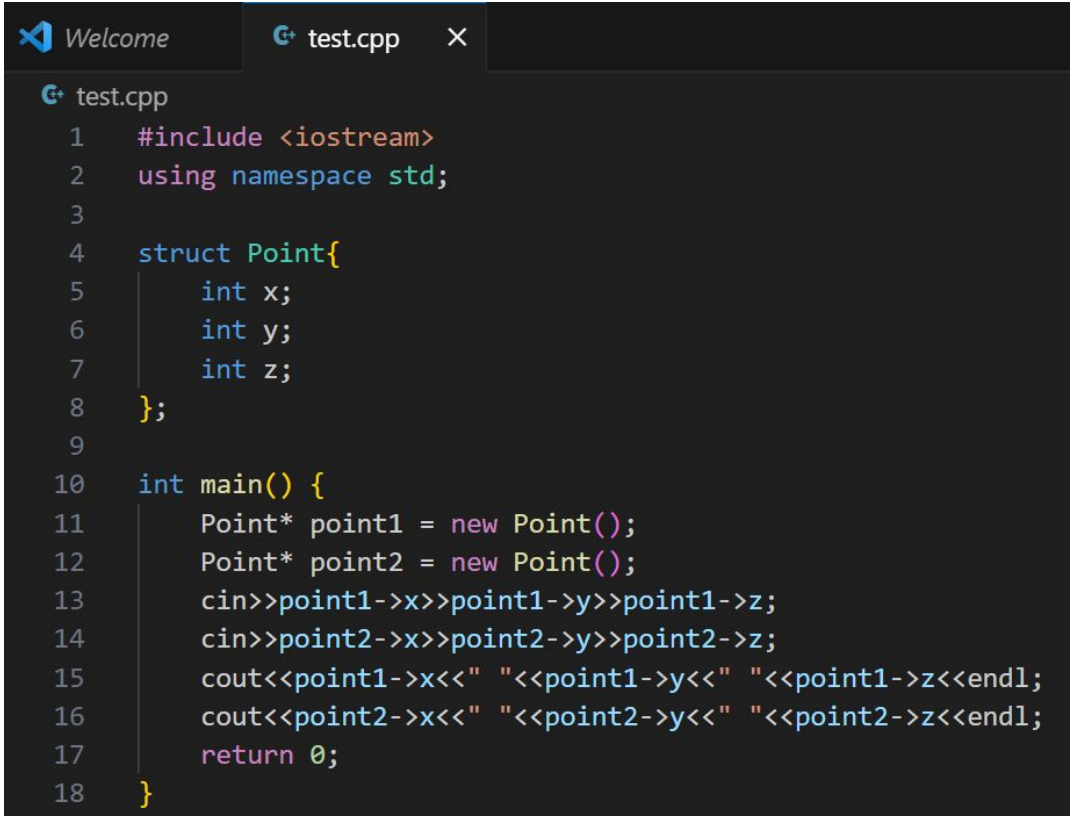
Welcome | test.cpp

test.cpp

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

struct Point{
    int x;
    int y;
    int z;
};

int main() {
    Point* p = new Point();
    p->x = 2;
    p->y = 3;
    p->z = 4;
    cout<<p->x<<endl;
    cout<<p->y<<endl;
    cout<<p->z<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
2
3
4
```

Better Solution



Another Example

Welcome | test.cpp

test.cpp

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

struct Student{
    string name = "Bob";
    int marks = 20;
};

int main() {
    Student* st = new Student();
    cout<<st->name<<endl;
    cout<<st->marks<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
Bob
20
```

Function in struct

Welcome | test.cpp

test.cpp

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

struct Student{
    string name = "Bob";
    int marks = 20;

    void increaseMarks(int increment){
        marks += increment;
    }
};

int main() {
    Student* st = new Student();
    cout<<st->name<<endl;
    cout<<st->marks<<endl;
    st->increaseMarks(5);
    cout<<st->marks<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
Bob
20
25
```

Constructor in struct

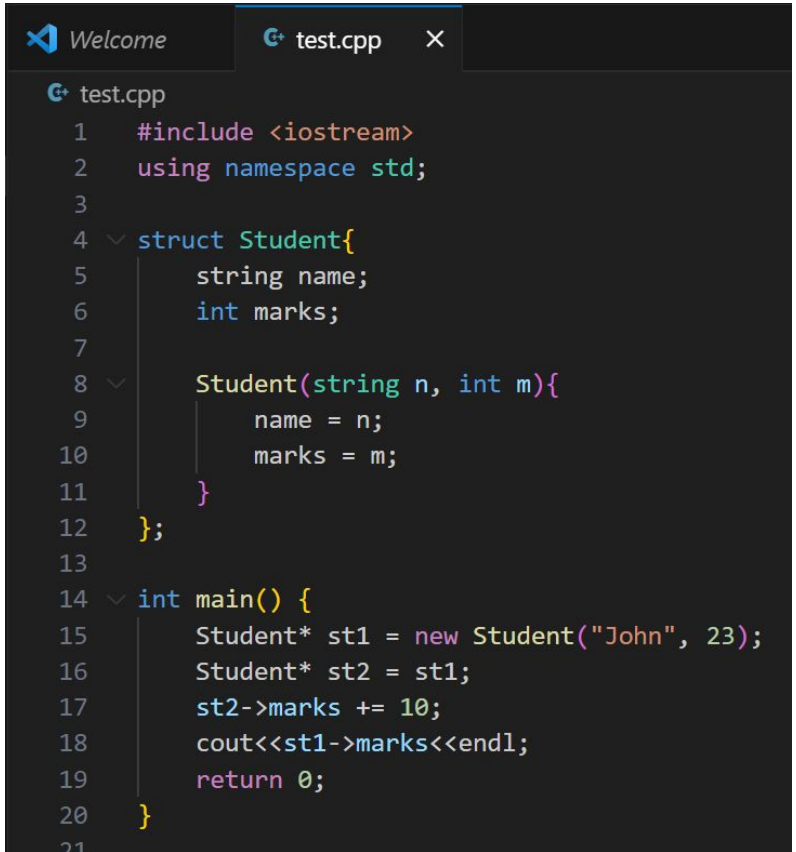
Welcome | test.cpp

test.cpp

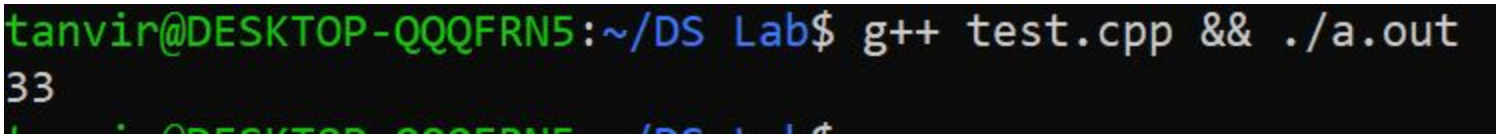
```cpp
#include <iostream>
using namespace std;

struct Student{
    string name;
    int marks;

    Student(string n, int m){
        name = n;
        marks = m;
    }
};

int main() {
    Student* st = new Student("John", 23);
    cout<<st->name<<endl;
    cout<<st->marks<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
John
23
```

Determine the output



Answer



Welcome | test.cpp

test.cpp

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

struct Student{
    string name;
    int marks;

    Student(string n, int m){
        name = n;
        marks = m;
    }
};

int main() {
    Student* st1 = new Student("John", 23);
    Student* st2 = st1;
    Student* st3 = new Student("Bob", 30);
    cout<<st1<<endl;
    cout<<st2<<endl;
    cout<<st3<<endl;
    return 0;
}
```

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out
0x5569c7cc5eb0
0x5569c7cc5eb0
0x5569c7cc5ee0
```

Thank you