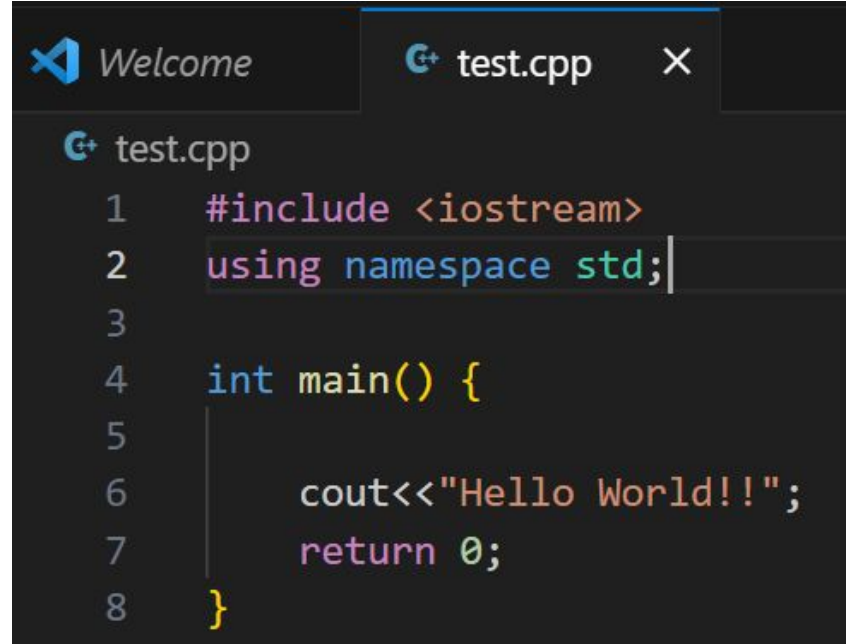


Introduction

Md. Tanvir Alam

Introduction to C++



The image shows a screenshot of a code editor with a dark theme. At the top, there are two tabs: 'Welcome' with a blue icon and 'test.cpp' with a C++ icon and a close button. The 'test.cpp' tab is active. Below the tabs, the code for 'test.cpp' is displayed with line numbers 1 through 8 on the left. The code is as follows:

```
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5      |
6      cout<<"Hello World!!";
7      return 0;
8  }
```

How to run?

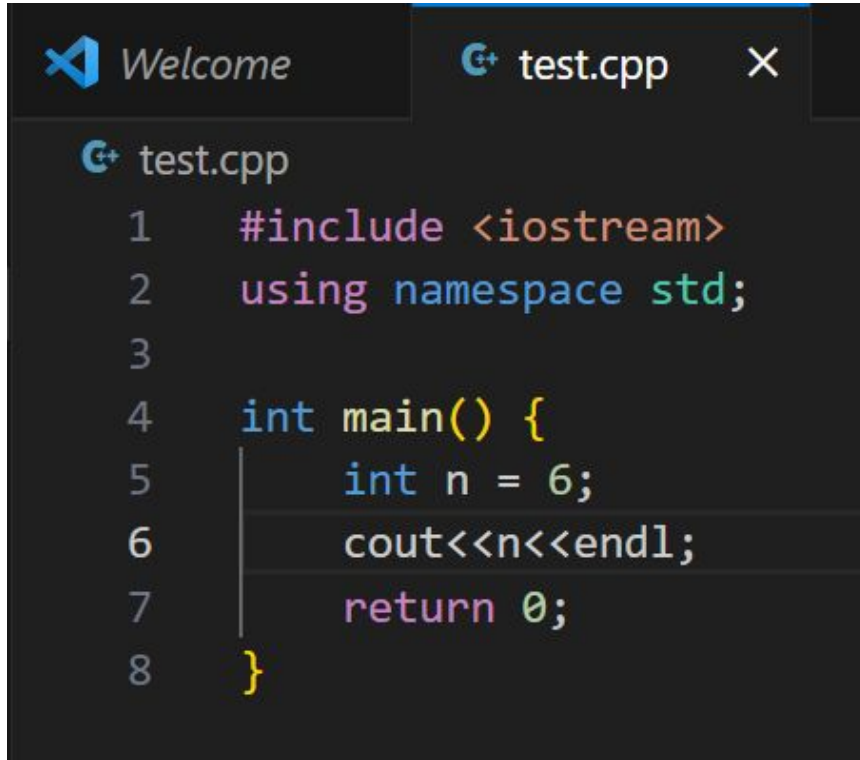
```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out  
Hello World!!  
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```

g++ version

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ --version
g++ (Ubuntu 11.4.0-1ubuntu1~22.04) 11.4.0
Copyright (C) 2021 Free Software Foundation, Inc.
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$
```

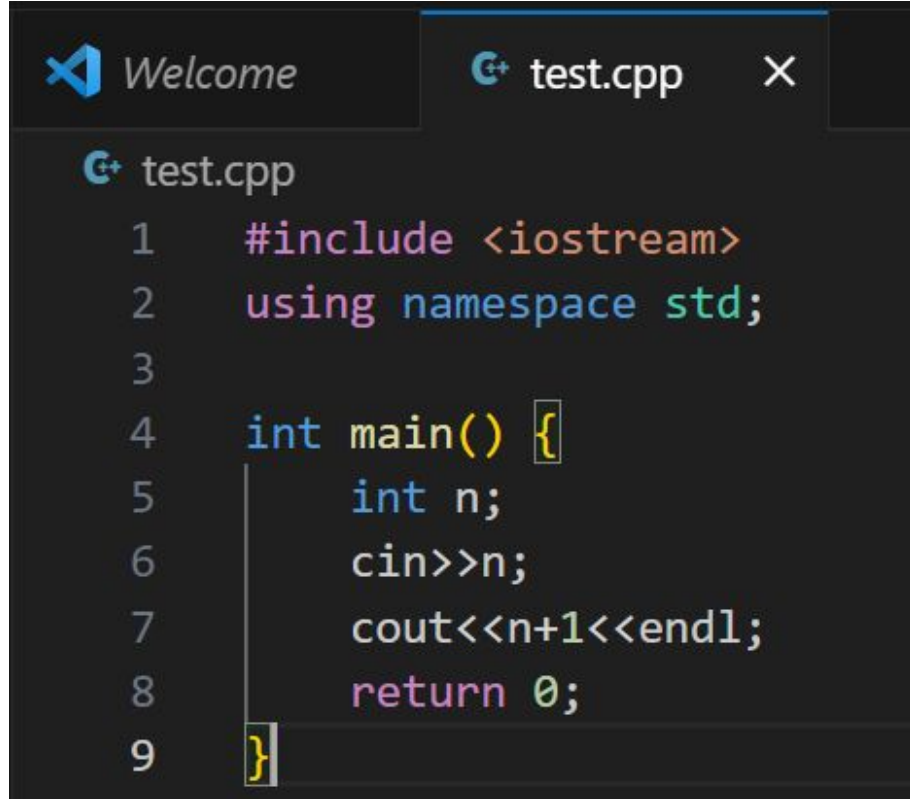
More Examples



```
test.cpp
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5      int n = 6;
6      cout<<n<<endl;
7      return 0;
8  }
```

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

More Examples



A screenshot of a code editor with a dark theme. The editor has two tabs: 'Welcome' and 'test.cpp'. The 'test.cpp' tab is active, showing the following C++ code:

```
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5      int n;
6      cin>>n;
7      cout<<n+1<<endl;
8      return 0;
9  }
```

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

More Examples

```
Welcome test.cpp
test.cpp
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5      int n, m;
6      cin>>n>>m;
7      cout<<n+1<<" "<<m+2<<endl;
8      return 0;
9  }
```

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

Problem

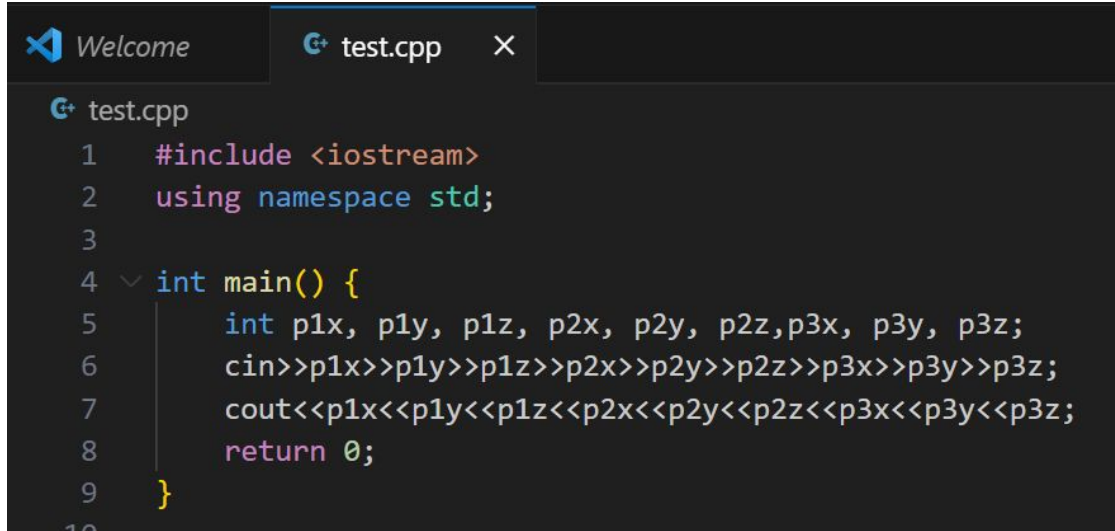
There are three points in a 3d space.

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



```
1  #include <iostream>
2  using namespace std;
3
4  int main() {
5      int p1x, p1y, p1z, p2x, p2y, p2z, p3x, p3y, p3z;
6      cin >> p1x >> p1y >> p1z >> p2x >> p2y >> p2z >> p3x >> p3y >> p3z;
7      cout << p1x << p1y << p1z << p2x << p2y << p2z << p3x << p3y << p3z;
8      return 0;
9  }
```

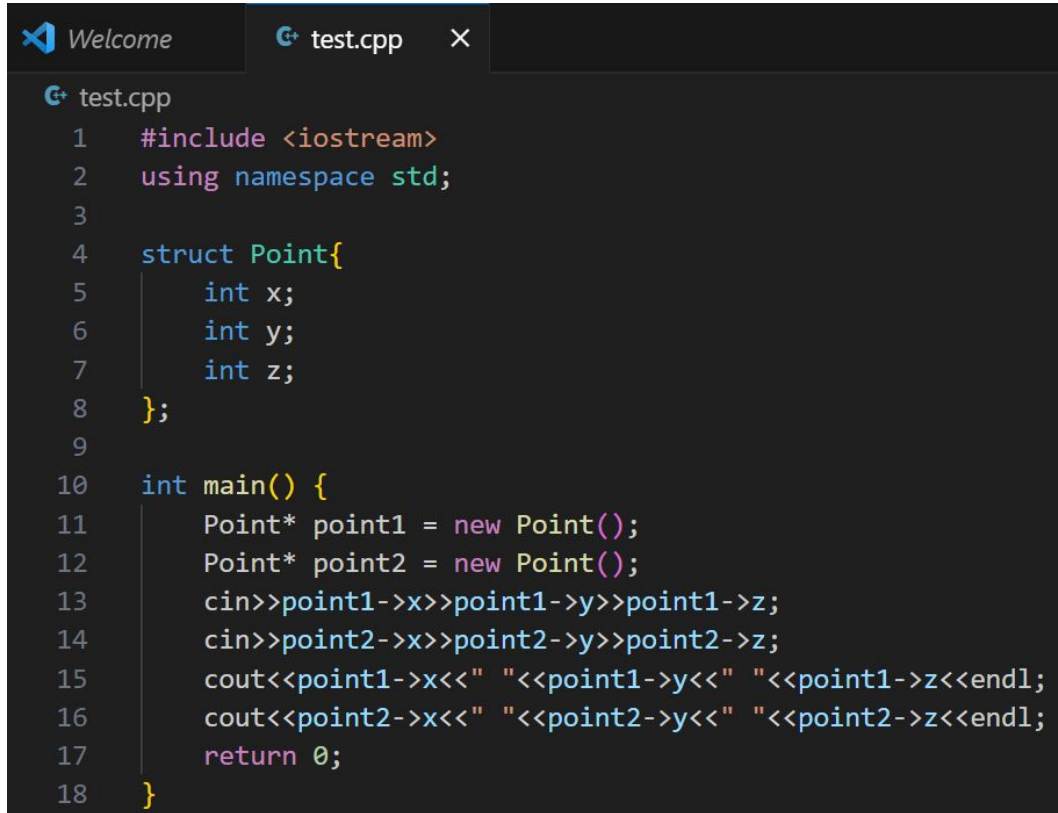
What if there are more attributes of a point? For example, color, size...

Struct

```
Welcome test.cpp X
test.cpp
1  #include <iostream>
2  using namespace std;
3
4  struct Point{
5      int x;
6      int y;
7      int z;
8  };
9
10 int main() {
11     Point* p = new Point();
12     p->x = 2;
13     p->y = 3;
14     p->z = 4;
15     cout<<p->x<<endl;
16     cout<<p->y<<endl;
17     cout<<p->z<<endl;
18     return 0;
19 }
```

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

Better Solution



The image shows a code editor window with a dark theme. The title bar at the top has a 'Welcome' tab and an active tab for 'test.cpp'. The code is written in C++ and defines a 'Point' struct with three integer members: x, y, and z. The main function creates two Point objects, point1 and point2, and reads their x, y, and z values from standard input. It then prints the values for each point on a new line, separated by spaces. The code is as follows:

```
1  #include <iostream>
2  using namespace std;
3
4  struct Point{
5      int x;
6      int y;
7      int z;
8  };
9
10 int main() {
11     Point* point1 = new Point();
12     Point* point2 = new Point();
13     cin>>point1->x>>point1->y>>point1->z;
14     cin>>point2->x>>point2->y>>point2->z;
15     cout<<point1->x<<" "<<point1->y<<" "<<point1->z<<endl;
16     cout<<point2->x<<" "<<point2->y<<" "<<point2->z<<endl;
17     return 0;
18 }
```

Another Example

```
Welcome × test.cpp ×  
test.cpp  
1  #include <iostream>  
2  using namespace std;  
3  
4  struct Student{  
5      string name = "Bob";  
6      int marks = 20;  
7  };  
8  
9  int main() {  
10     Student* st = new Student();  
11     cout<<st->name<<endl;  
12     cout<<st->marks<<endl;  
13     return 0;  
14 }
```

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

Function in struct

```
Welcome
test.cpp x
test.cpp
1  #include <iostream>
2  using namespace std;
3
4  struct Student{
5      string name = "Bob";
6      int marks = 20;
7
8      void increaseMarks(int increment){
9          marks += increment;
10     }
11 };
12
13 int main() {
14     Student* st = new Student();
15     cout<<st->name<<endl;
16     cout<<st->marks<<endl;
17     st->increaseMarks(5);
18     cout<<st->marks<<endl;
19     return 0;
20 }
```

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

Constructor in struct

```
Welcome  test.cpp x
G+ test.cpp
1  #include <iostream>
2  using namespace std;
3
4  struct Student{
5      string name;
6      int marks;
7
8      Student(string n, int m){
9          name = n;
10         marks = m;
11     }
12 };
13
14 int main() {
15     Student* st = new Student("John", 23);
16     cout<<st->name<<endl;
17     cout<<st->marks<<endl;
18     return 0;
19 }
```

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

Determine the output

```
Welcome  test.cpp x
test.cpp
1  #include <iostream>
2  using namespace std;
3
4  struct Student{
5      string name;
6      int marks;
7
8      Student(string n, int m){
9          name = n;
10         marks = m;
11     }
12 };
13
14 int main() {
15     Student* st1 = new Student("John", 23);
16     Student* st2 = st1;
17     st2->marks += 10;
18     cout<<st1->marks<<endl;
19     return 0;
20 }
21
```

Answer

```
tanvir@DESKTOP-QQQFRN5:~/DS Lab$ g++ test.cpp && ./a.out  
33  
tanvir@DESKTOP-QQQFRN5:~/DS Lab$
```


test.cpp

```
1  #include <iostream>
2  using namespace std;
3
4  struct Student{
5      string name;
6      int marks;
7
8      Student(string n, int m){
9          name = n;
10         marks = m;
11     }
12 };
13
14 int main() {
15     Student* st1 = new Student("John", 23);
16     Student* st2 = st1;
17     Student* st3 = new Student("Bob", 30);
18     cout<<st1<<endl;
19     cout<<st2<<endl;
20     cout<<st3<<endl;
21     return 0;
22 }
```

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

Thank you