C++ Notes

Part 1-1

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C++ Online IDE

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GDB online Debugger
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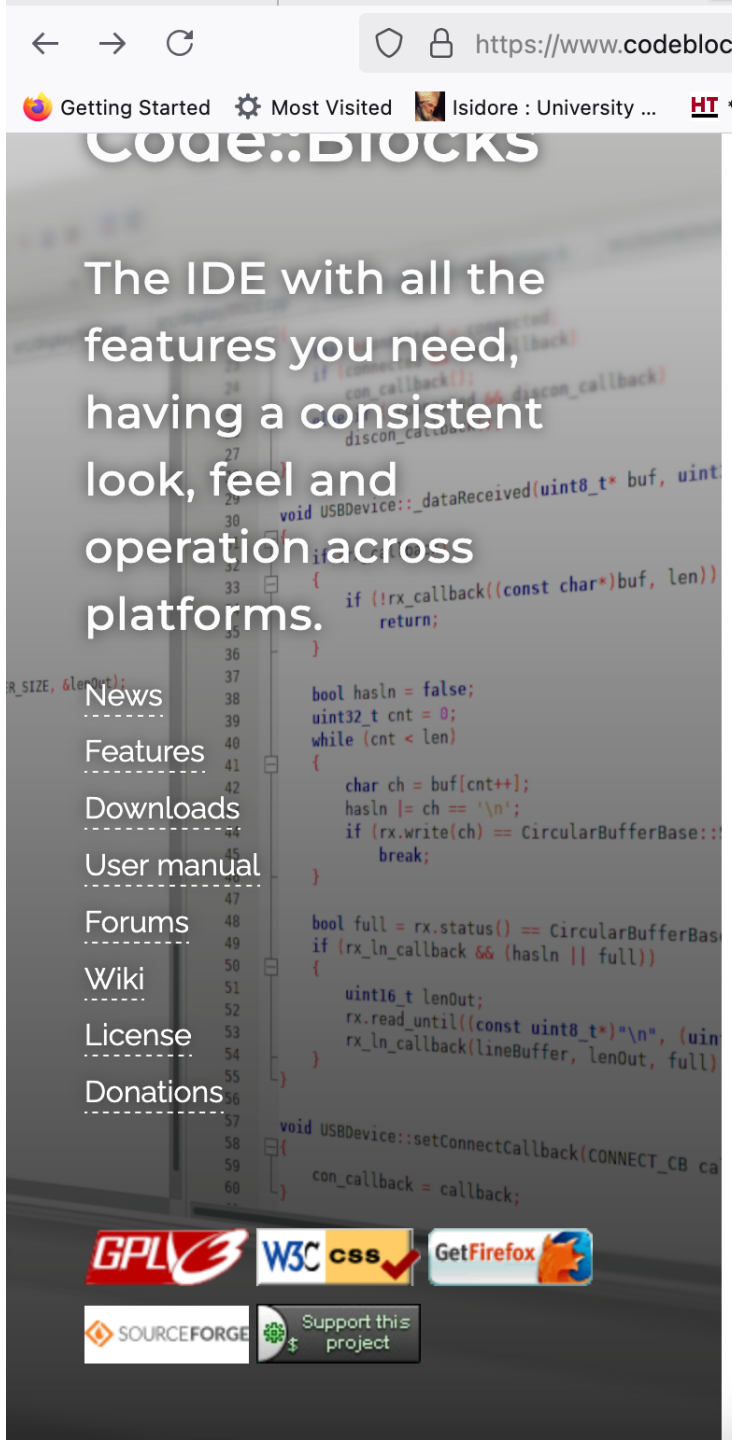
Online C++ Compiler - online editor

Online C++ Compiler. Code, Compile, Run and Debug C++ program online. Write your code in this editor and press "Run" button to compile and execute it.



Code::Blocks

The free C/C++ and Fortran IDE.

Code::Blocks is a free C/C++ and Fortran IDE built to meet the most demanding needs of its users. It is designed to be very extensible and fully configurable.

Built around a plugin framework, Code::Blocks can be extended with plugins. Any kind of functionality can be added by installing/coding a plugin. For instance, event compiling and debugging functionality is provided by plugins!

If you 're new here, you can read the **user manual** or visit the **Wiki** for documentation. And don't forget to visit and join our **forums** to find help or general discussion about Code::Blocks.

We hope you enjoy using Code::Blocks!

The Code::Blocks Team

Latest news

Code::Blocks 25.03 is here!

Finally, after quite some time, we are back with many improvements, new features, more stable, further

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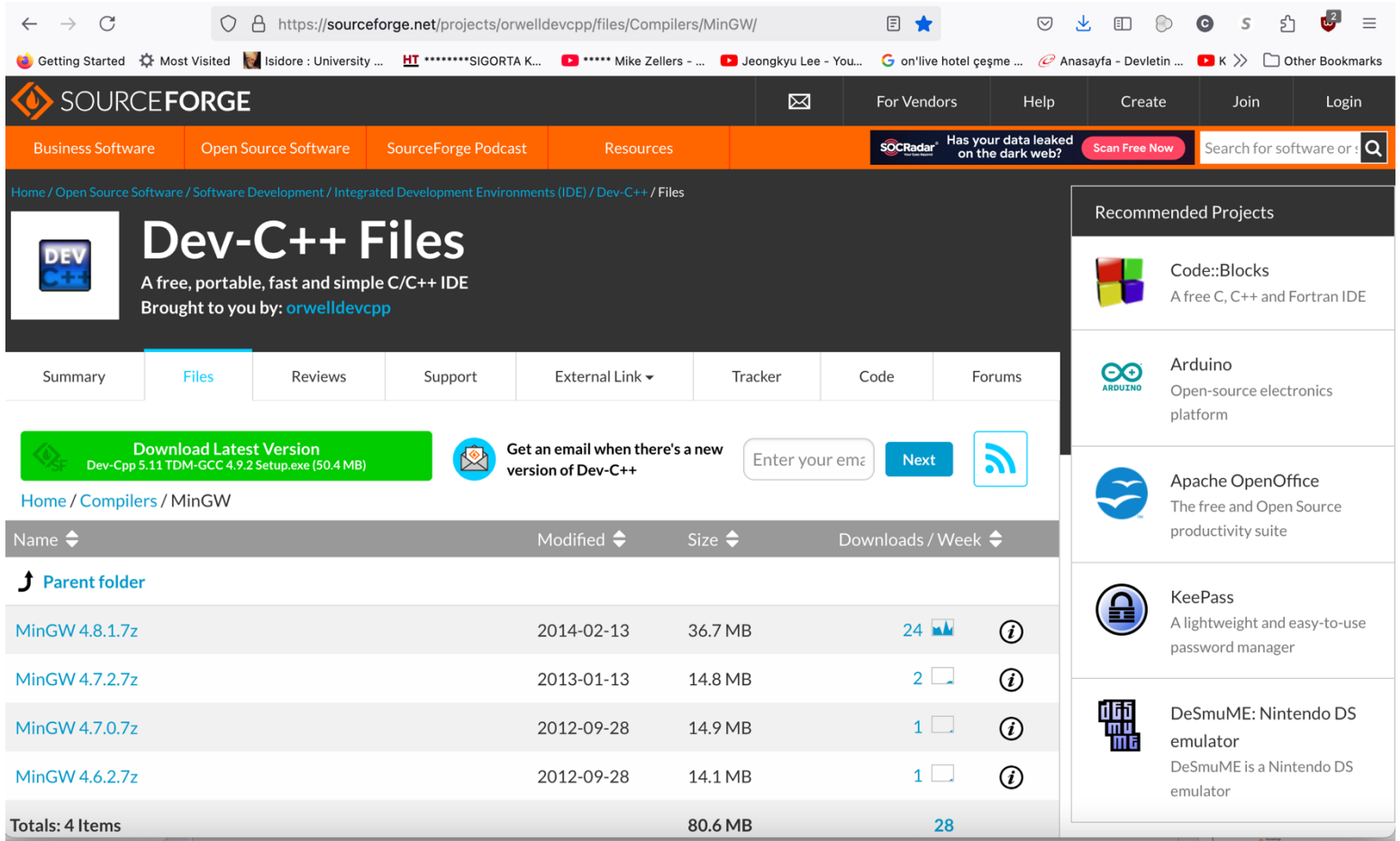
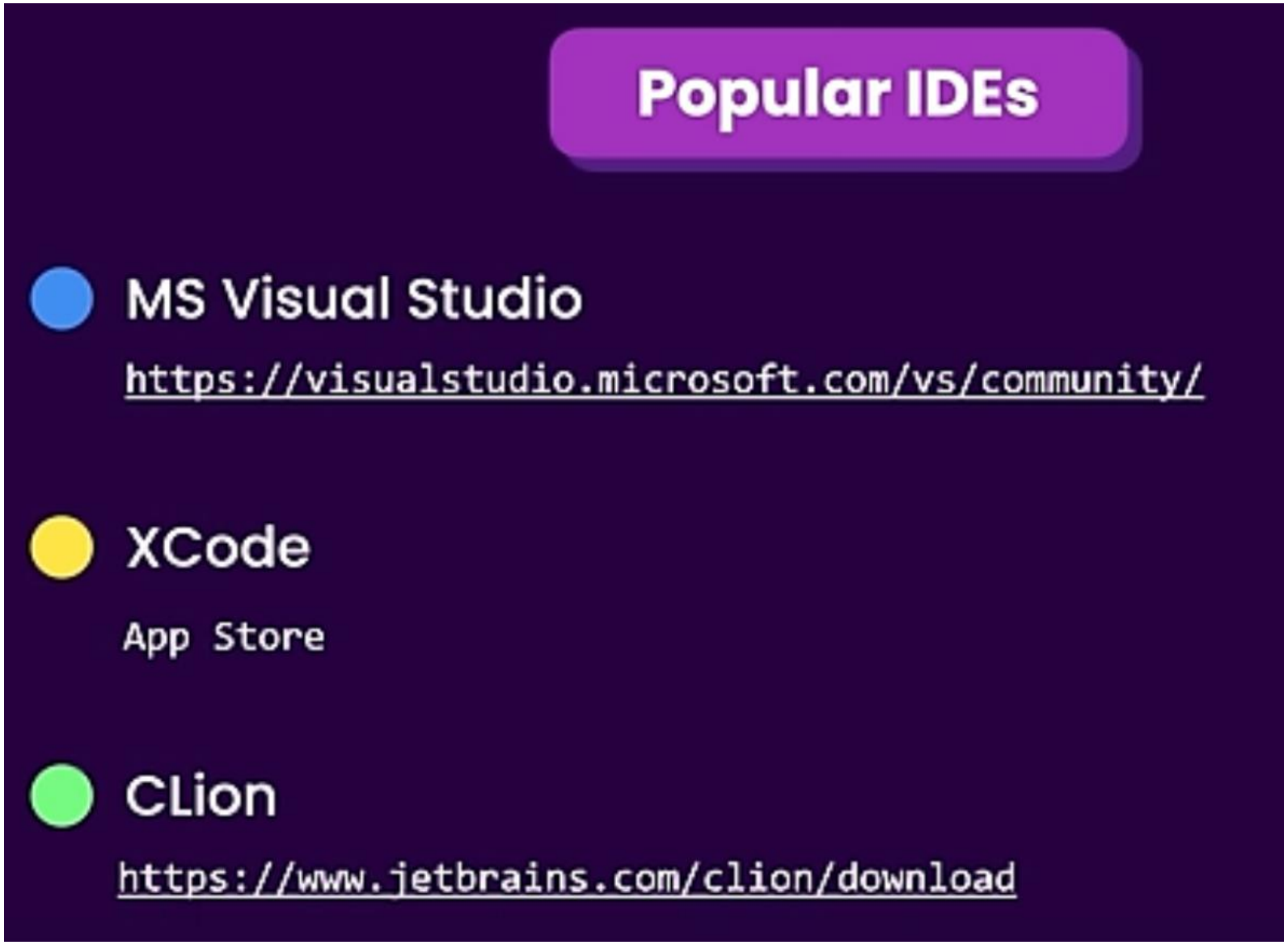


C++ IDEs


Popular IDEs
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JetBrains
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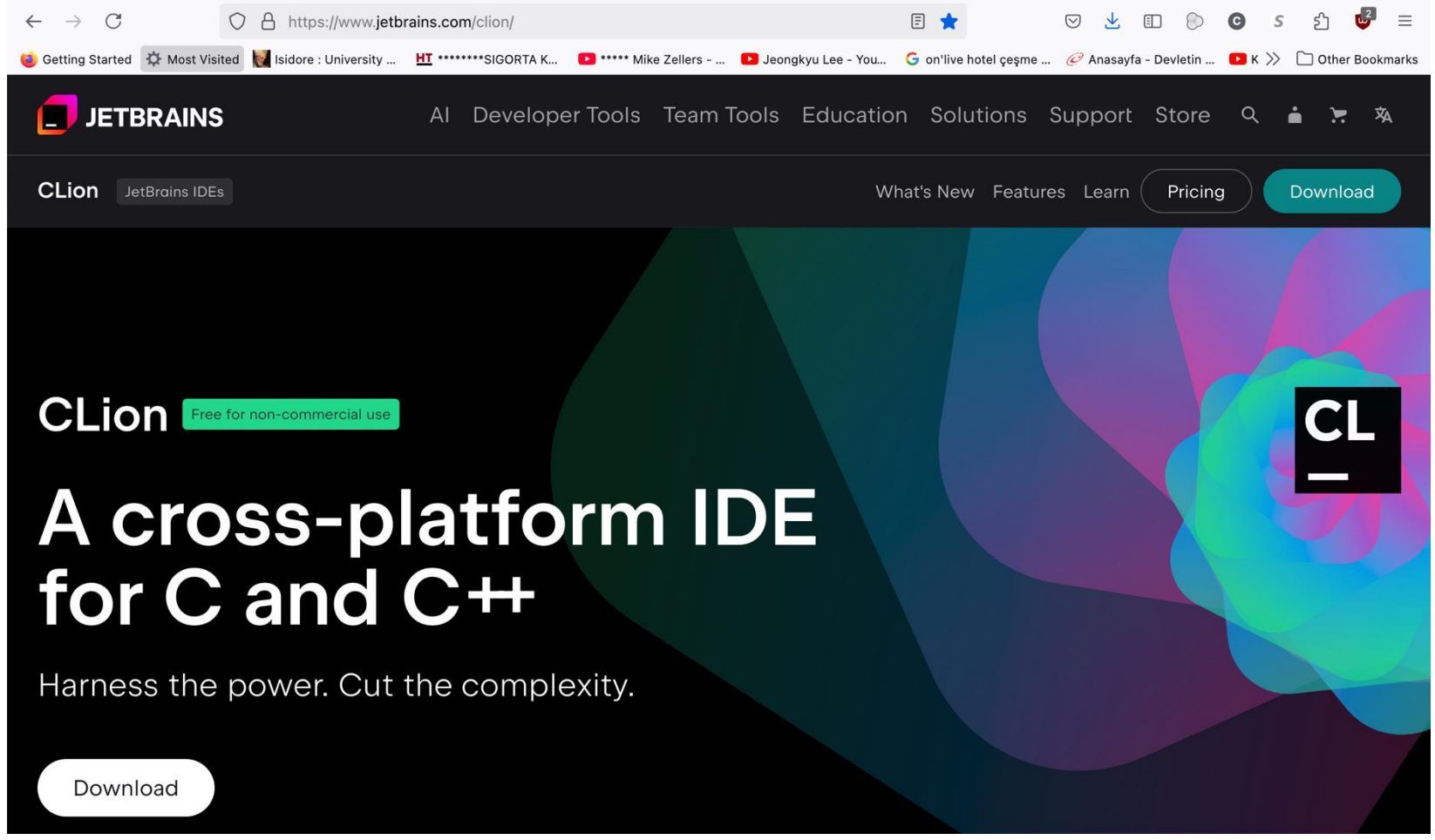
CLion: A Cross-Platform IDE for C and C++ by JetBrains

A single IDE for all your C and C++ needs. No matter how you use C and C++, **CLion** helps make your development experience smoother and more productive.



C++ Overview

❑ High Performance & Efficiency

C++ remains one of the oldest yet most popular programming languages thanks to its speed and resource efficiency.

❑ Widely Used in Critical Applications

Ideal for performance-intensive software such as:
- Video games (e.g., Unreal Engine)
- Server applications
- Operating systems

❑ Learning Path

To master C++, focus on:
- Syntax and grammar
- The C++ Standard Library (pre-written solutions for common problems)

C++ Overview

❑ Development Tools

Most C++ applications are built using IDEs such as:
- Microsoft Visual Studio
- XCode
- CLion

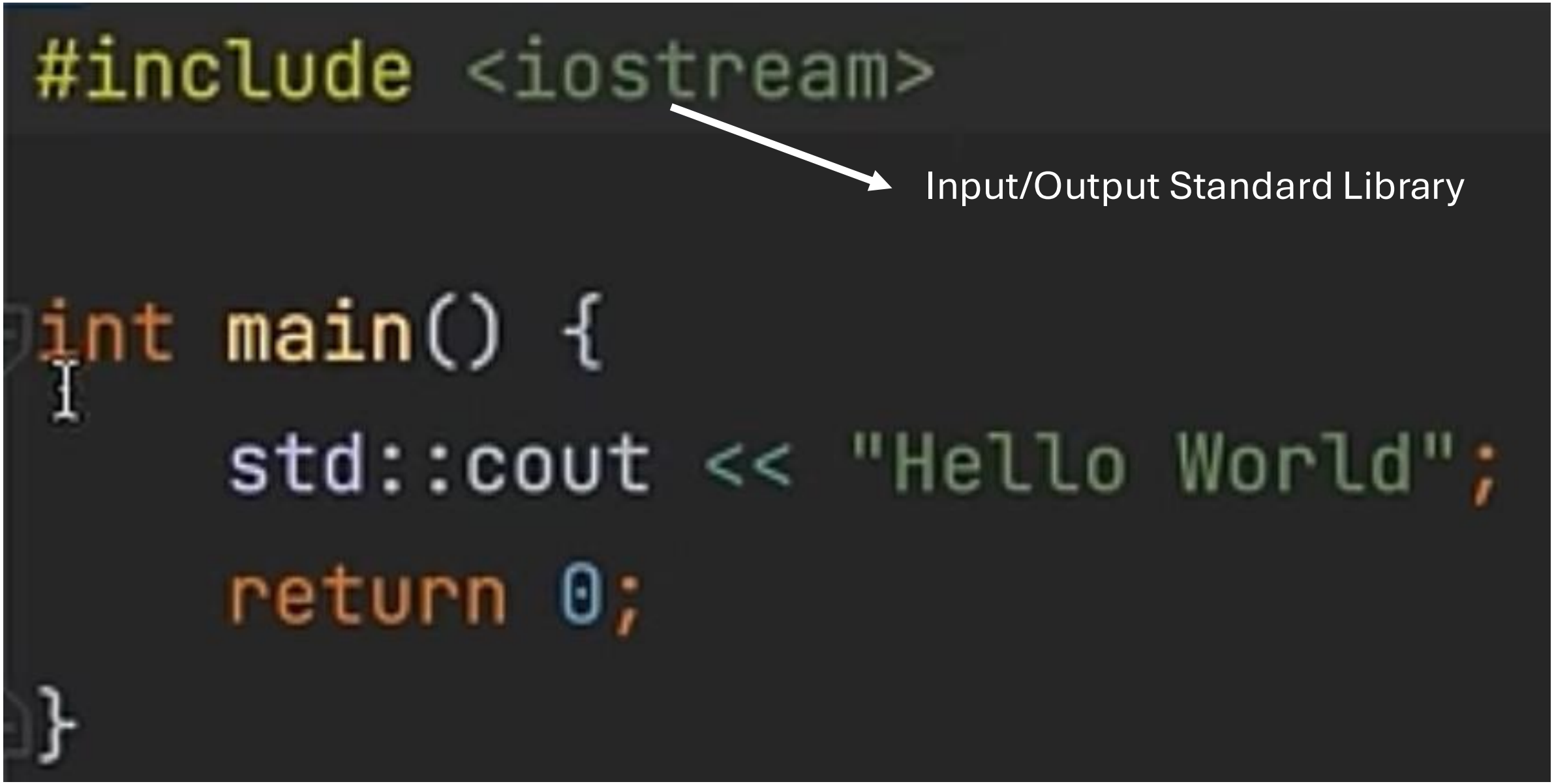
❑ Compilation Process

Before running a C++ program, the source code must be compiled into machine code.

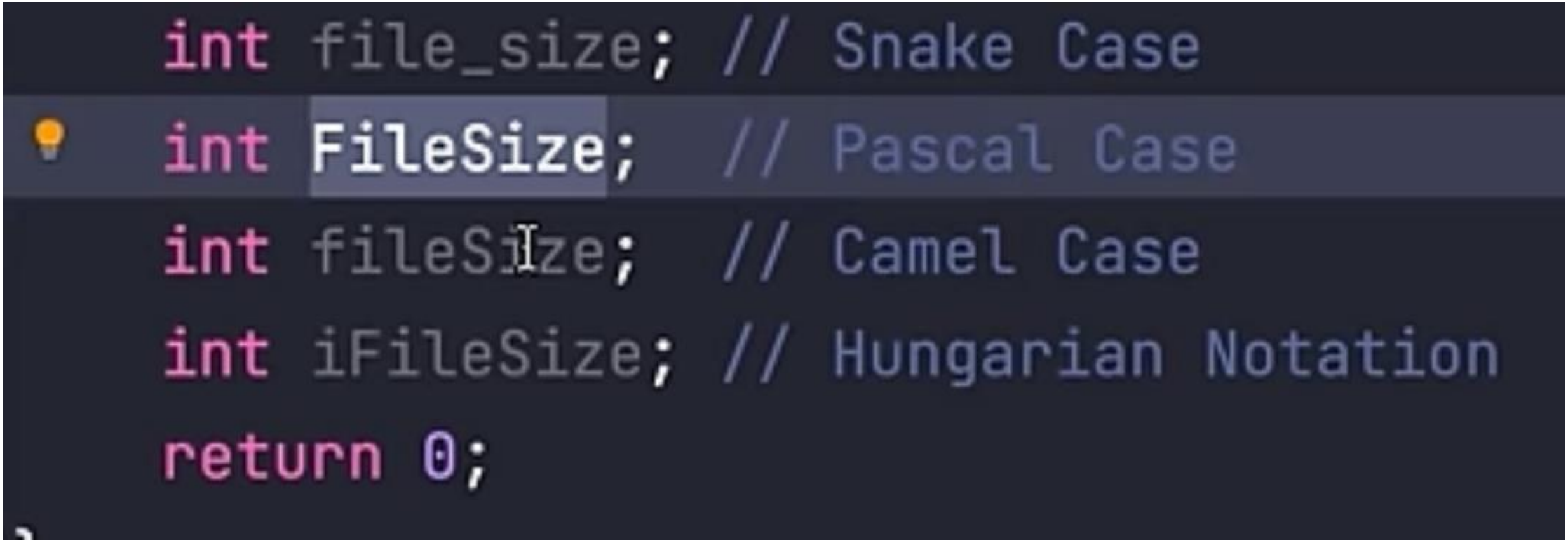
❑ Program Entry Point

Every C++ application starts with the main() function.

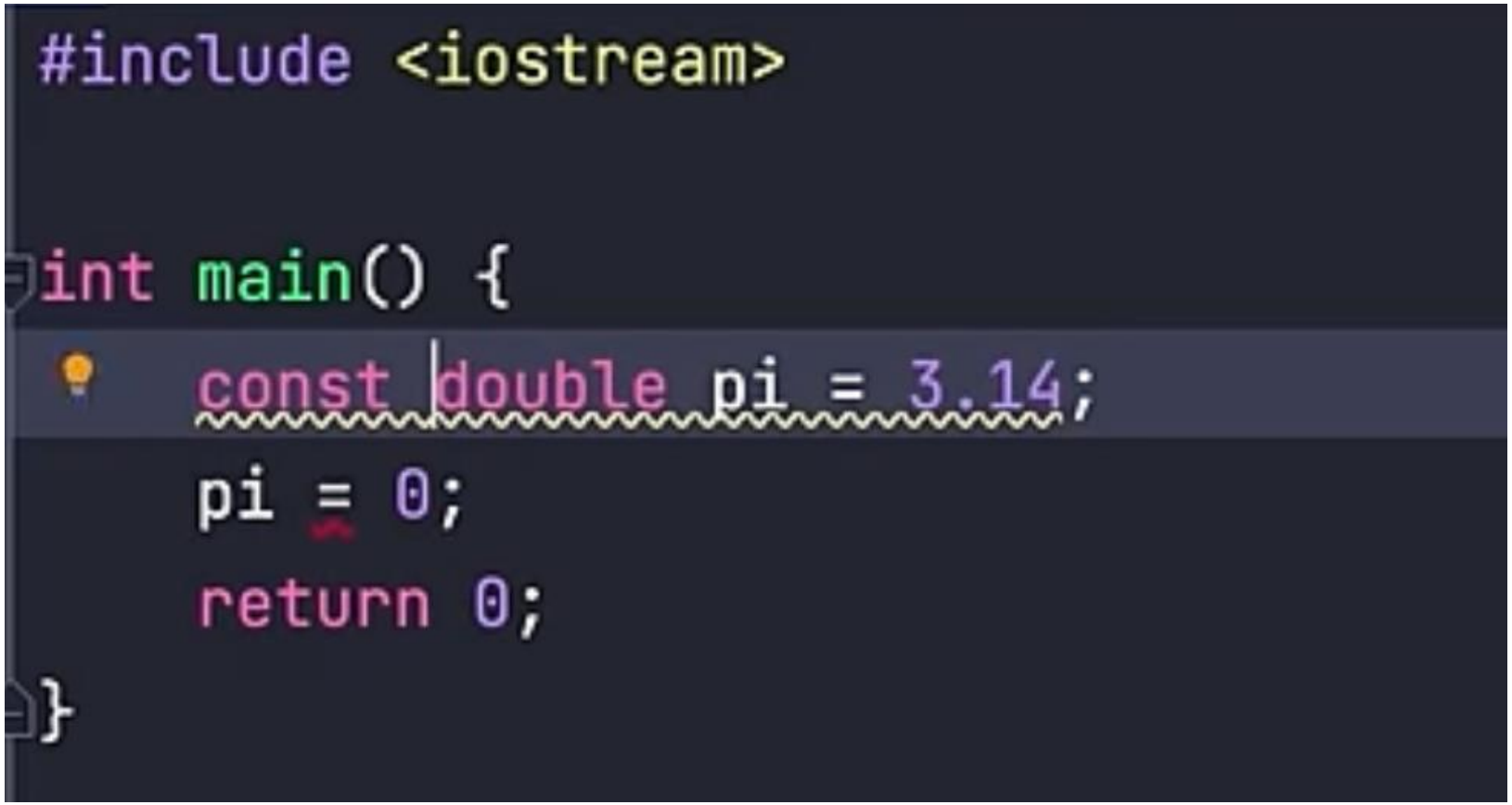
Main Function



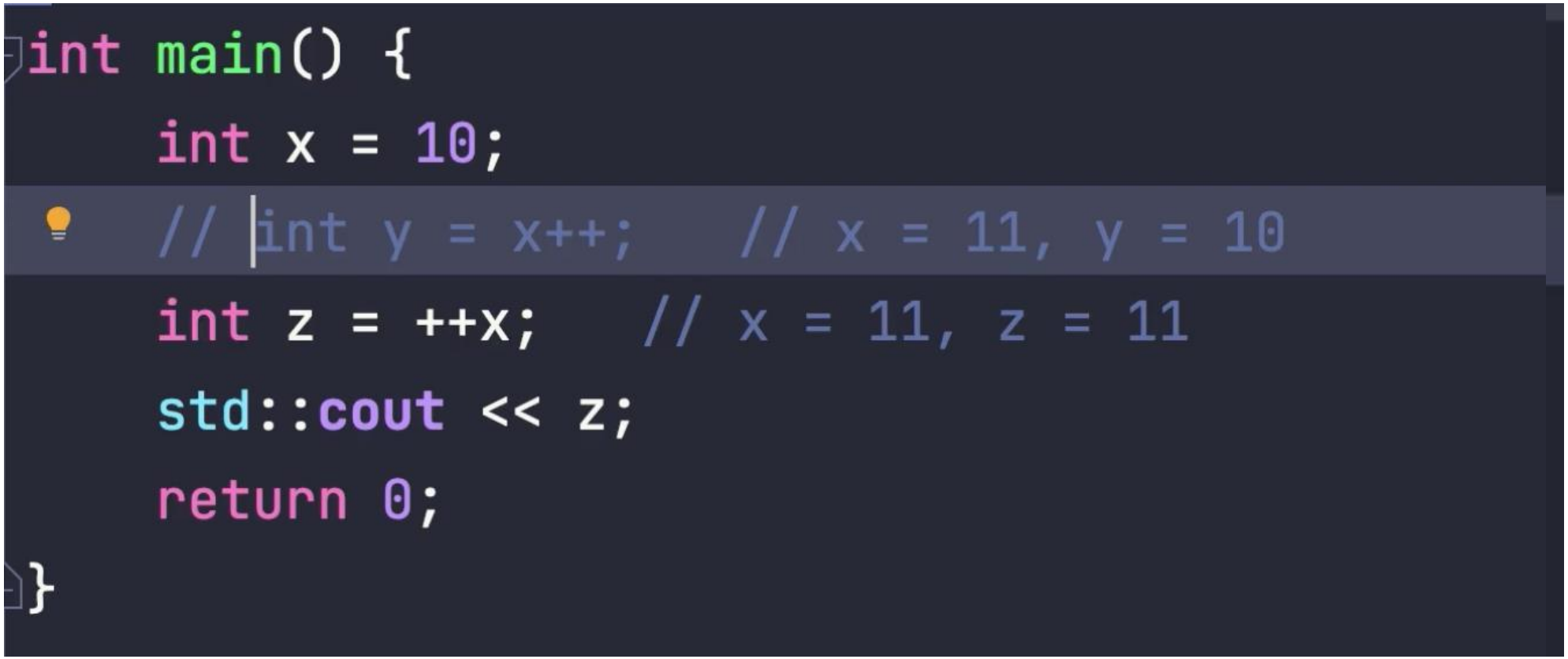
Naming Conventions



Variables and Constants

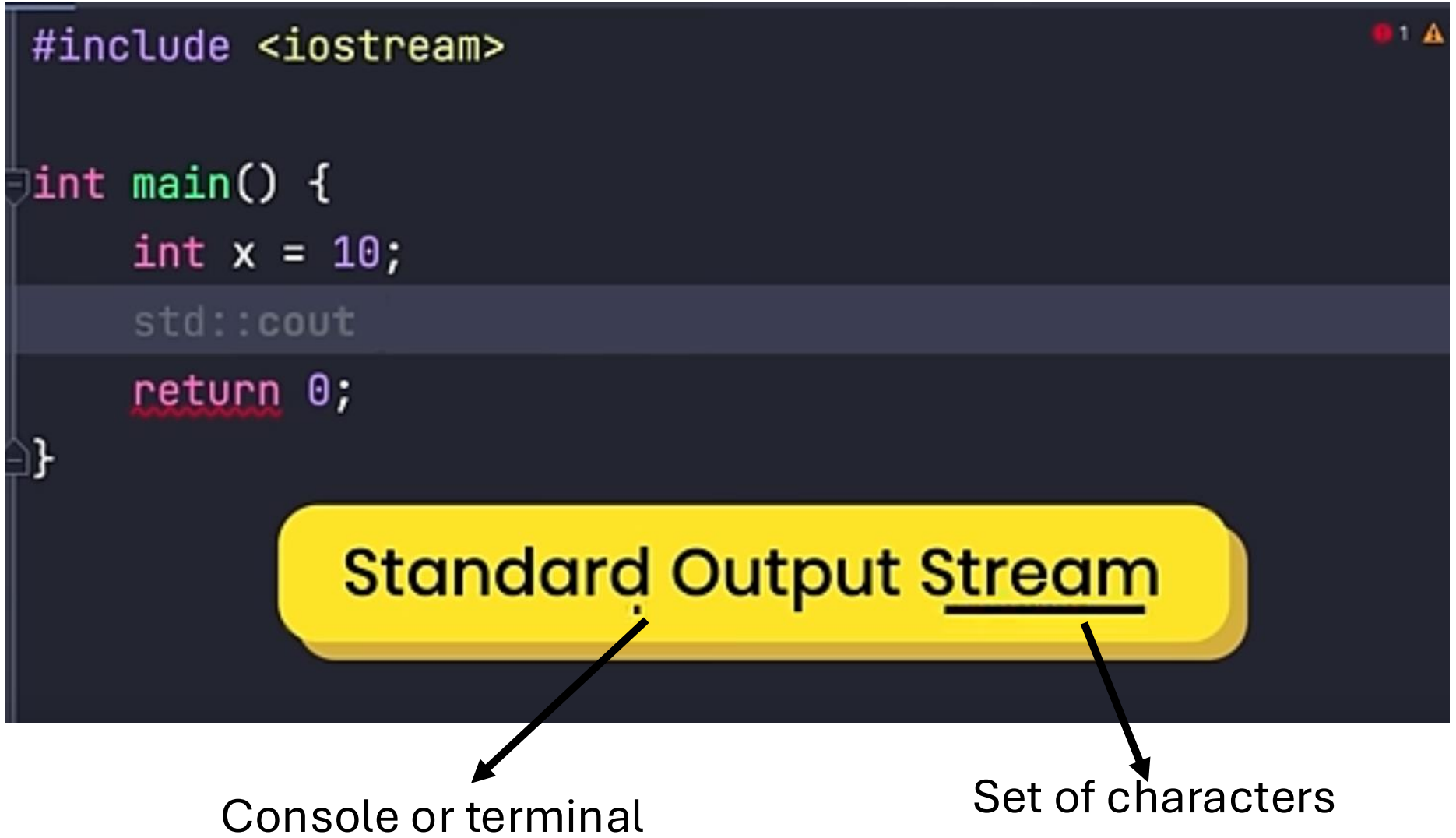


Arithmetic Operations

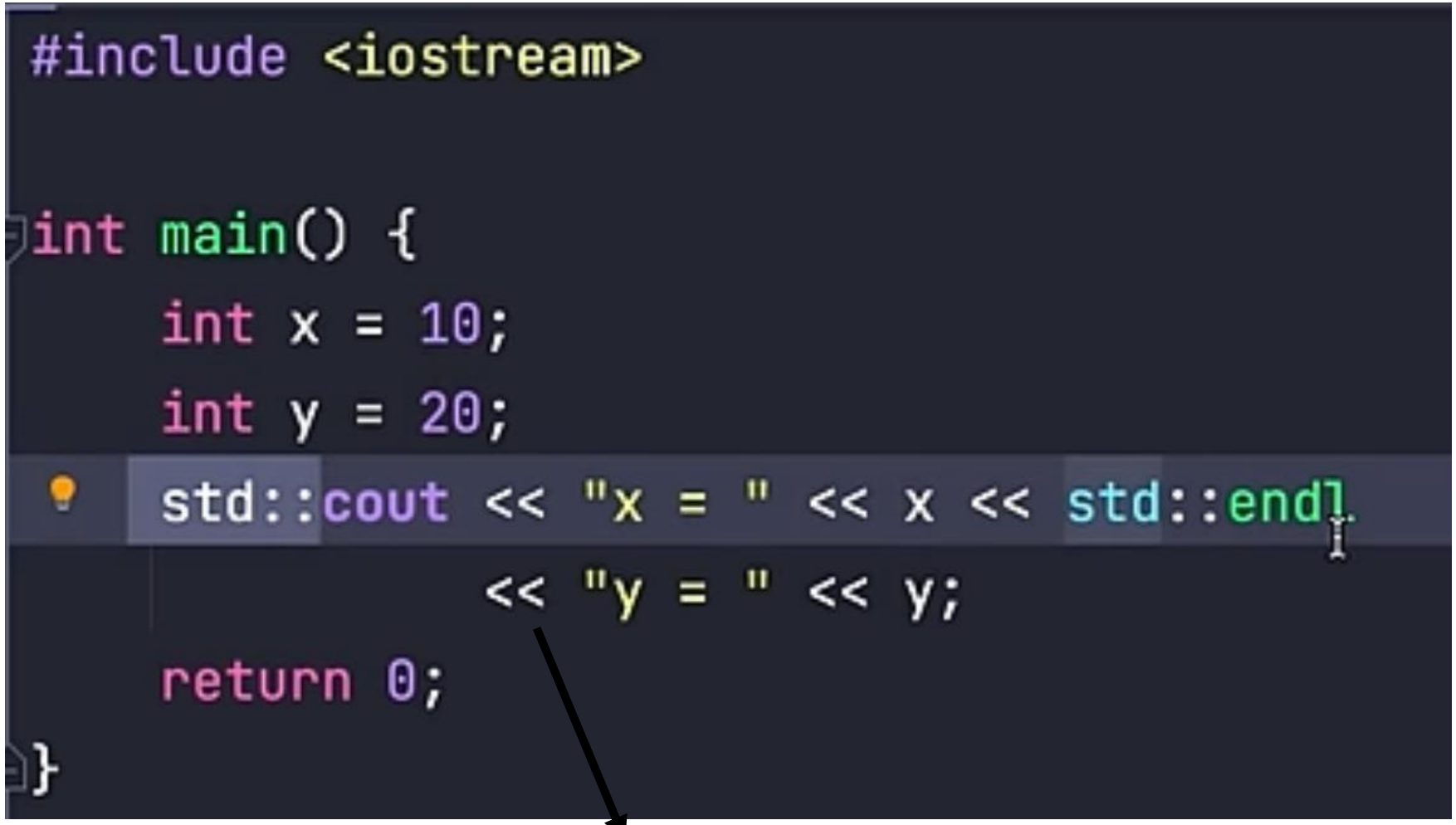


Arithmetic Operations

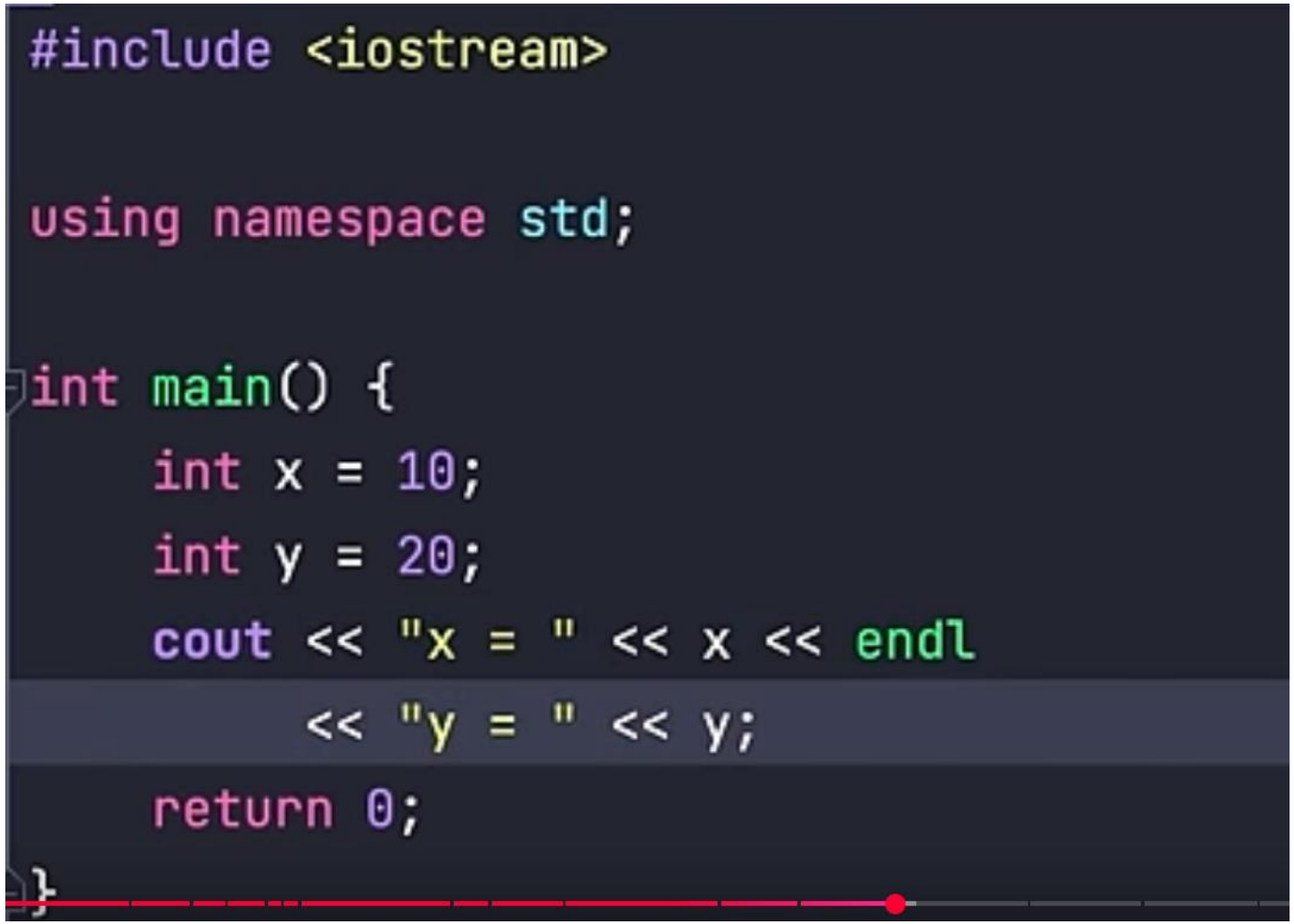
Output


#include <iostream>
int main() {
int x = 10;
std::cout
return 0;
}
Standard Output Stream
Console or terminal
Set of characters

Output


#include <iostream>
int main() {
int x = 10;
int y = 20;
std::cout << "x = " << x << std::endl
<< "y = " << y;
return 0;
}
Stream Insertion Operator

Output



```cpp
#include <iostream>

using namespace std;

int main() {
    int x = 10;
    int y = 20;
    cout << "x = " << x << endl
         << "y = " << y;
    return 0;
}
```

Namespace

In C++, `std` is an abbreviation for "standard" and refers to the standard namespace. This namespace encompasses the C++ Standard Library, which provides a wide range of functionalities, including:

- **Data Structures:** `std::vector`, `std::list`, `std::array`, `std::map`, etc.
- **Input/Output:** `std::cout`, `std::cin`.
- **Algorithms:** `std::sort`, `std::find`, `std::copy`.
- **Function Objects:** `std::function`.
- **Strings:** `std::string`.
- **Utilities:** such as exception handling, memory management, and more.

Namespace

The `std` namespace serves to organize these library components and prevent naming conflicts with user-defined code or other libraries. To access elements within the `std` namespace, one can either use the scope resolution operator (`::`) or the `using namespace std;` directive. For example:

```cpp
#include <iostream>

int main() {
  std::cout << "Hello, world!" << std::endl; // Using scope resolution op

  return 0;
}
```

OR

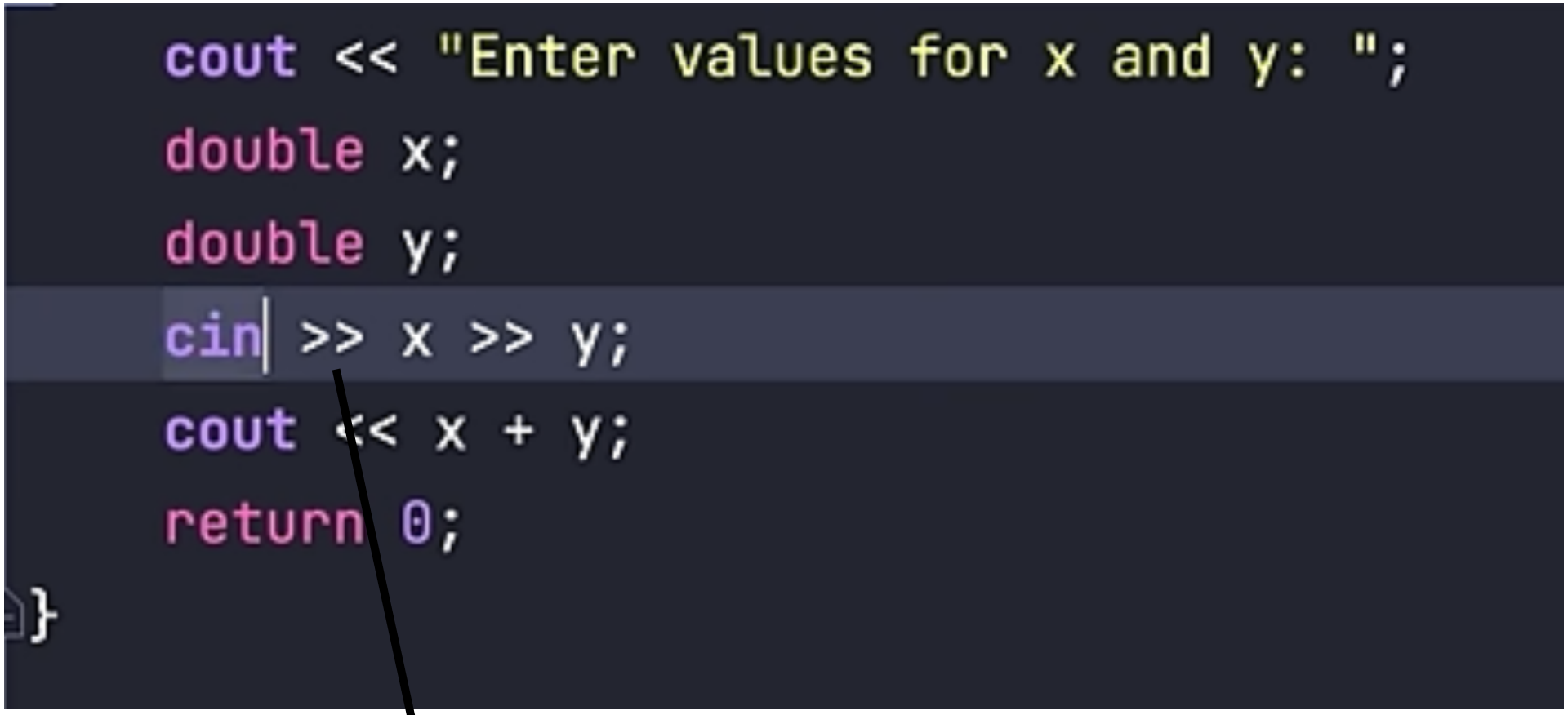
```cpp
#include <iostream>
using namespace std;

int main() {
  cout << "Hello, world!" << endl; // Using namespace directive
  return 0;
}
```

Variable Names

- The variable name should begin with an alphabet.
- Digits may be used in the variable name but only after the alphabet.
- No special symbols can be used in variable names except for the underscore('_').
- No keywords can be used for variable names.

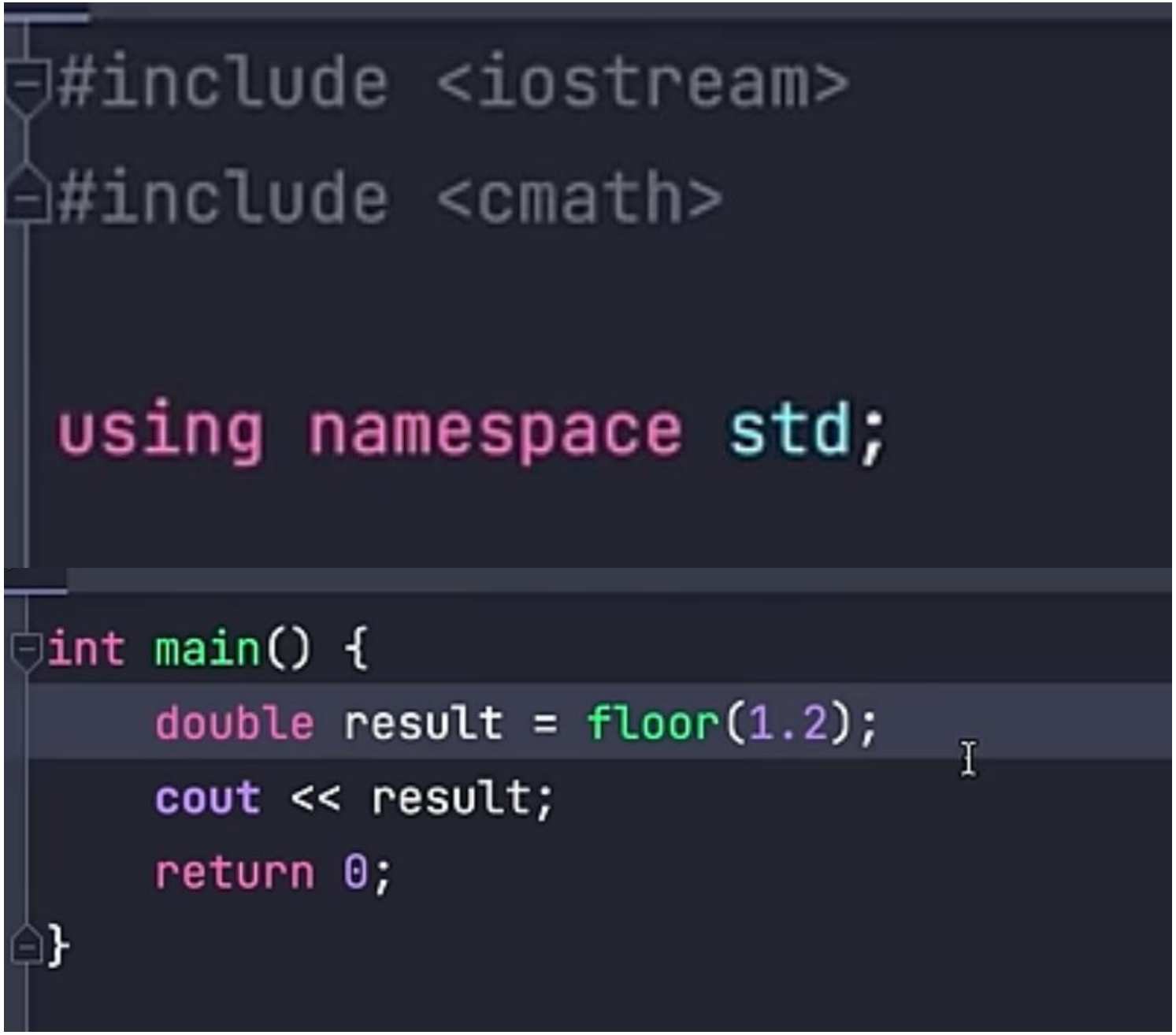
Input


cout << "Enter values for x and y: ";
double x;
double y;
cin >> x >> y;
cout << x + y;
return 0;
}
Stream Extraction Operator

Example

```cpp
int main() {
    cout << "Fahrenheit: ";
    int fahrenheit;
    cin >> fahrenheit;
    double celsius = (fahrenheit - 32) / 1.8;
    cout << celsius;
    return 0;
}
```

Example


#include <iostream>
#include <cmath>
using namespace std;
int main() {
double result = floor(1.2);
cout << result;
return 0;
}

Example


#include <iostream>
#include <cmath>
using namespace std;
int main() {
double result = pow(lcpp_x: 2, lcpp_y: 3);
cout << result;
return 0;
}

Example

```cpp
int main() {
    cout << "Enter radius: ";
    double radius;
    cin >> radius;
    const double pi = 3.14;
    double area = pi * pow( lcpp_x: radius,  lcpp_y: 2);
    cout << area;
    return 0;
}
```

Comments

```c
int main() {
    // Declare a variable and initialize to 0
    int x = 0;
    return 0;
}
```

Single line comment

```c
int main() {
    /*
     *
     *
     */
    int x = 0;
    return 0;
```

Multiple line comment

Fundamental Data Types

Type Casting

- **Type Casting:** It allows you to treat a variable of one type as another type for a specific operation. However, it does not change the original variable's type.

C++

```
int intValue = 10;
double doubleValue = (double)intValue; // Type casting int to double
```

- **Creating a new variable:** You can create a new variable of the desired type and assign the value of the original variable to it.

C++

```
int intValue = 10;
double doubleValue = intValue; // Implicit conversion to double
```

Fundamental Data Types

Whole Numbers

Type	Bytes	Range
short	2	-32,768 to 32,767
int	4	-2B to 2B
long	4	Same
long long	8	

Fundamental Data Types

Numbers with Decimal Places

Type	Bytes	Range
float	4	-3.4E38 to 3.4E38
double	8	-1.7E308 to 1.7E308
long double	8	-3.4E932 to 1.7E4832

Fundamental Data Types

Type	Bytes	Range
bool	1	true / false
char	1	

Example

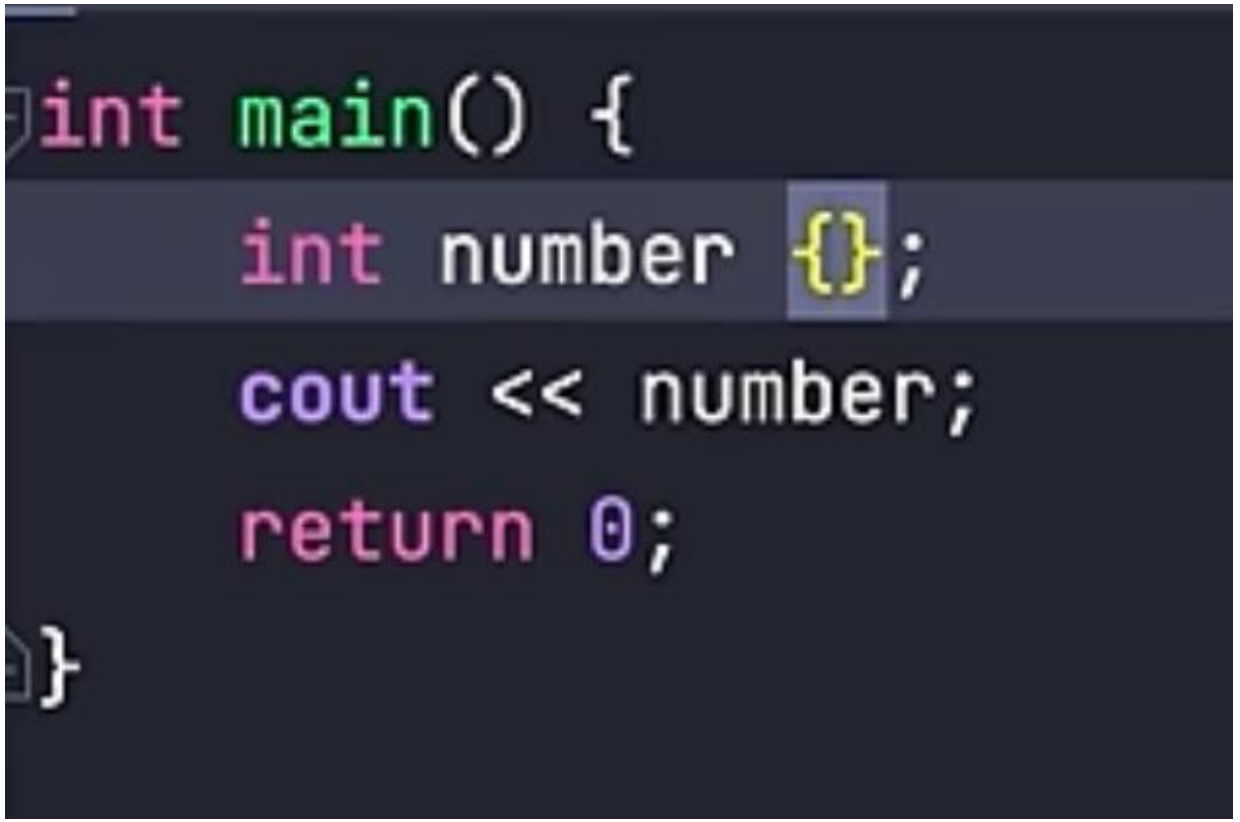
```cpp
#include <iostream>

using namespace std;

int main() {
    double price = 99.99;
    float interestRate = 3.67f;
    long fileSize = 90000L;
    char letter = 'a';
    bool isValid = false;
    return 0;
```

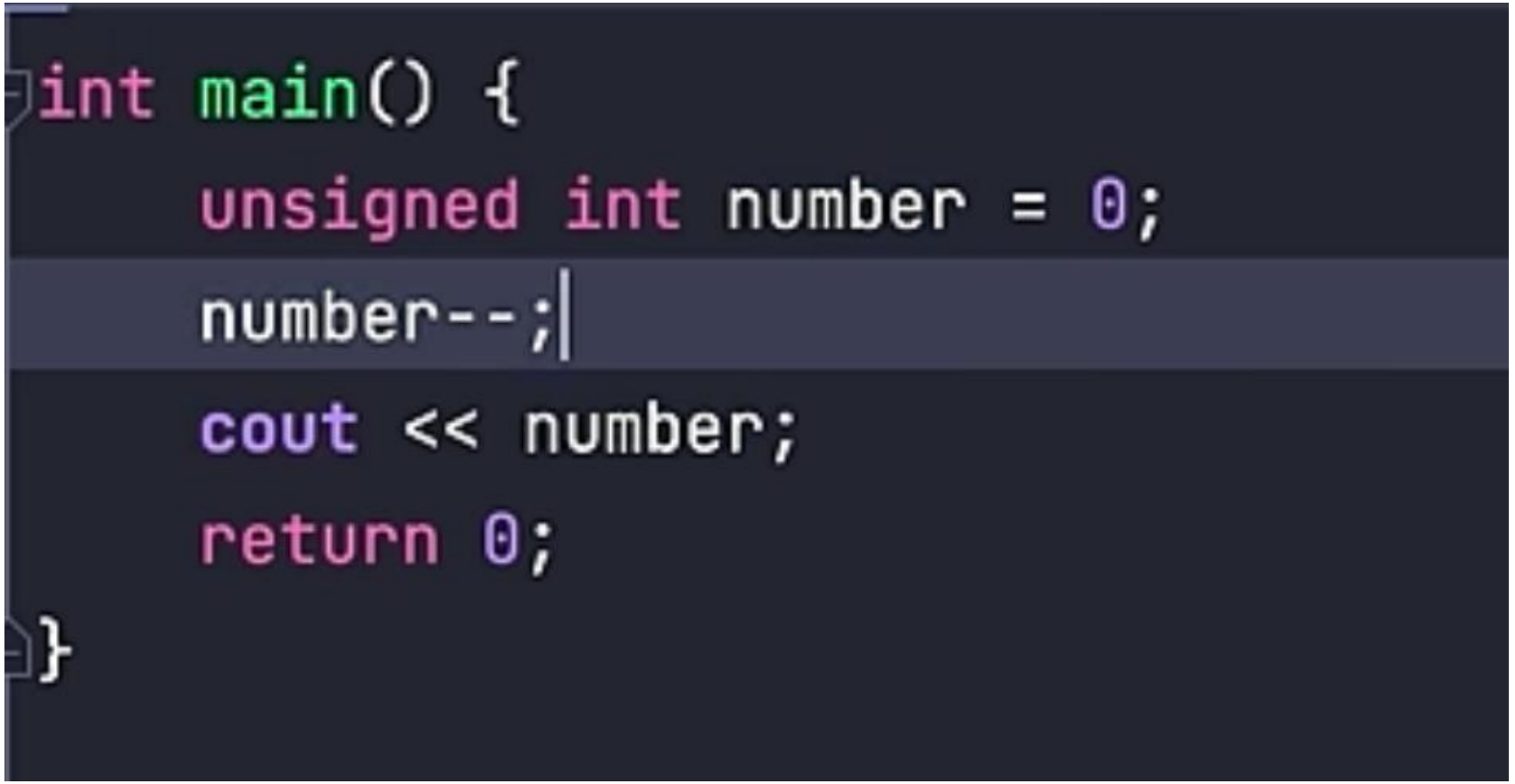
```cpp
int main() {
    auto price : double = 99.99;
    auto interestRate : double = 3.67;
    auto fileSize = 90000L;
    auto letter = 'a';
    auto isValid = false;
    return 0;
}
```

Brace Initialization



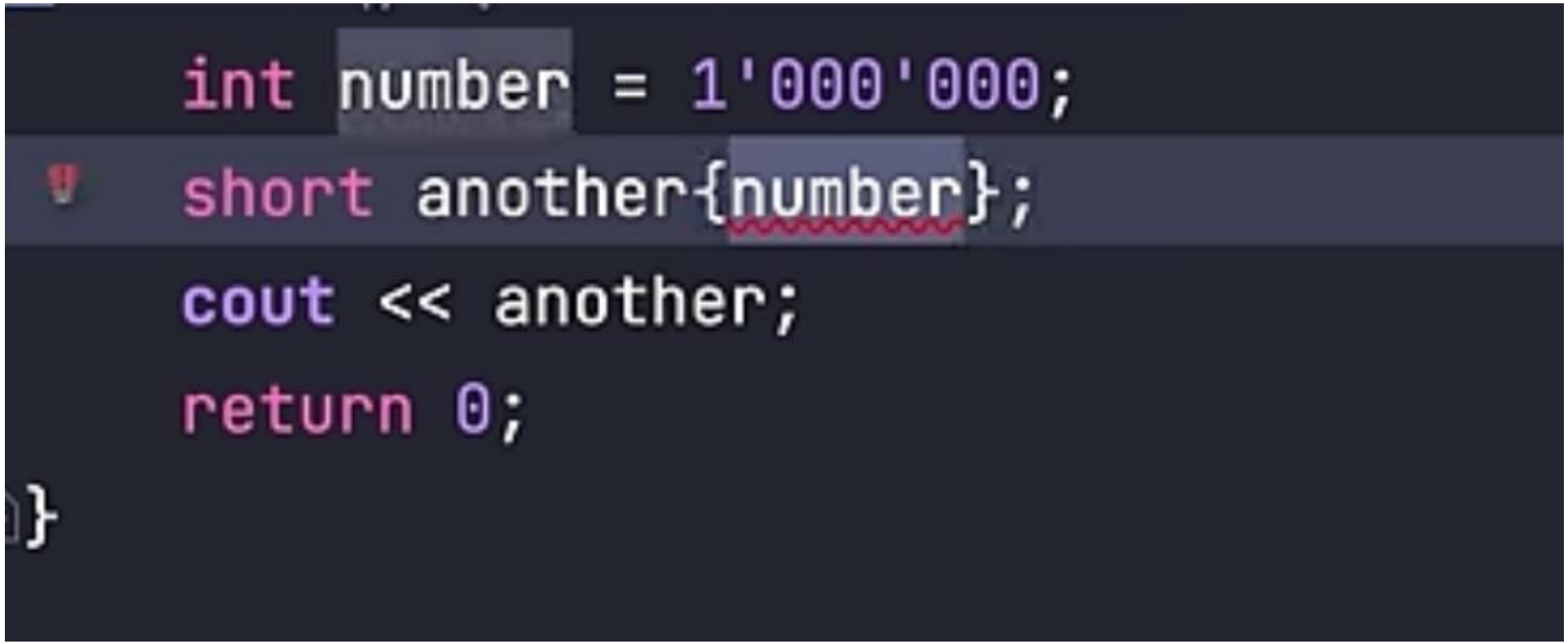
Number is initialized to zero. Otherwise, an unknown value.

Unsigned int – be careful!



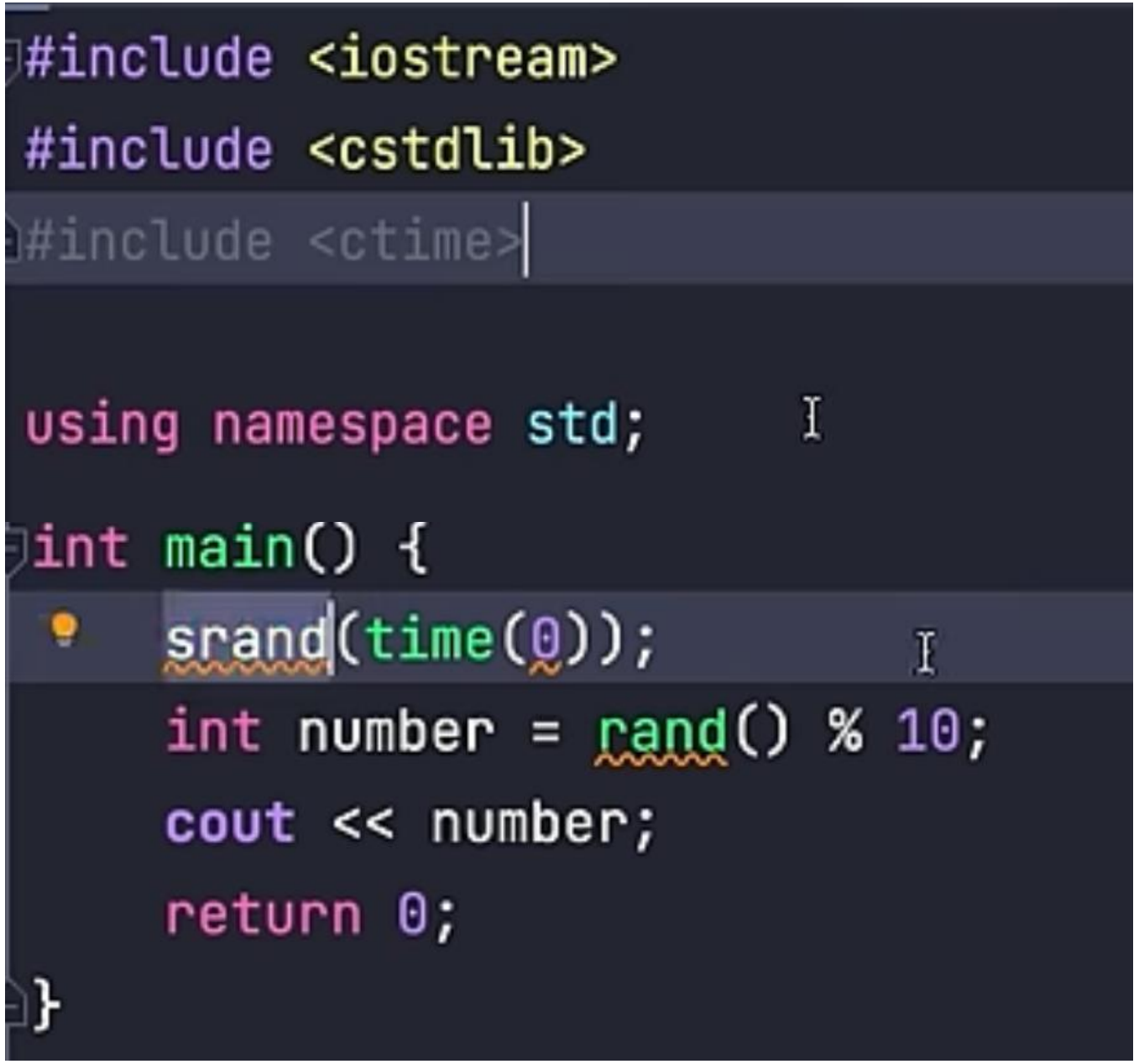
Narrowing Numbers

Narrowing Numbers



Use brace initializer { }

Rundom Number Generation



CMakeLists.txt | main.cpp

```cpp
#include <iostream>
#include <cstdlib>
#include <ctime>

using namespace std;

int main() {

    const short minValue = 0;
    const short maxValue = 6;

    srand(time(0));
    short first = ((rand() % (maxValue - minValue)) + 1) + minValue;
    short second = ((rand() % (maxValue - minValue)) + 1) + minValue;

    cout << first << " , " << second << endl;

    return 0;
}
```

To Run code, press ^ R or click the ▷ icon in the gutter.

Example: Rolling Dice