

C++ Programming

Let's code

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Simple Calculator

- **Program** is a set of instructions
 - Read number 1
 - Read operations
 - Read number 2
 - Click Equal
 - E.g. $3 + 5 = 8$
- **Programming Language**
 - is used to write these instructions (**source code**)

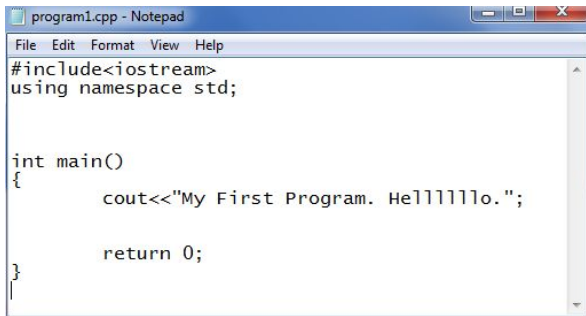


Writing a program

- A comput program is a
 - **Sequence of instructions** given to the computer
 - Read number
 - Write $2 * \text{number} + 1$
 - A programming language is used to write these instructions
 - They must be written in a specific format (respecting **syntax rules**)
- **C++ Compiler**
 - Do you follow syntax rules? If no: compiler errors & warnings
 - If everything is ok, compiler generates **object code** files (machine language)
 - A **linker** combines these object code files into an **executable**.
 - Computer's CPU knows how to **run** this executable

C++ Program Life Cycle

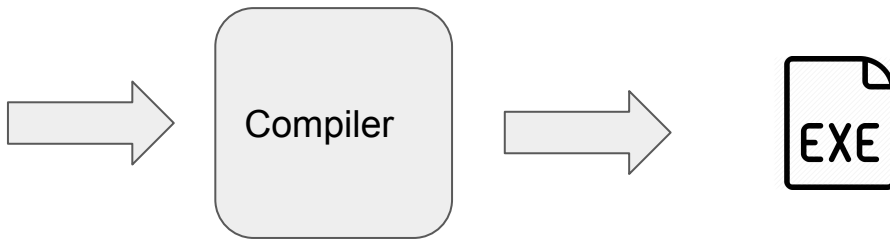
- 1) **Write** the Code (computer program)
- 2) **Compile** it (lots of *internal* steps)
 - 3) Generates a program (e.g. code.**exe** file on windows)
- 4) **Run** the executable



```
File Edit Format View Help
#include<iostream>
using namespace std;

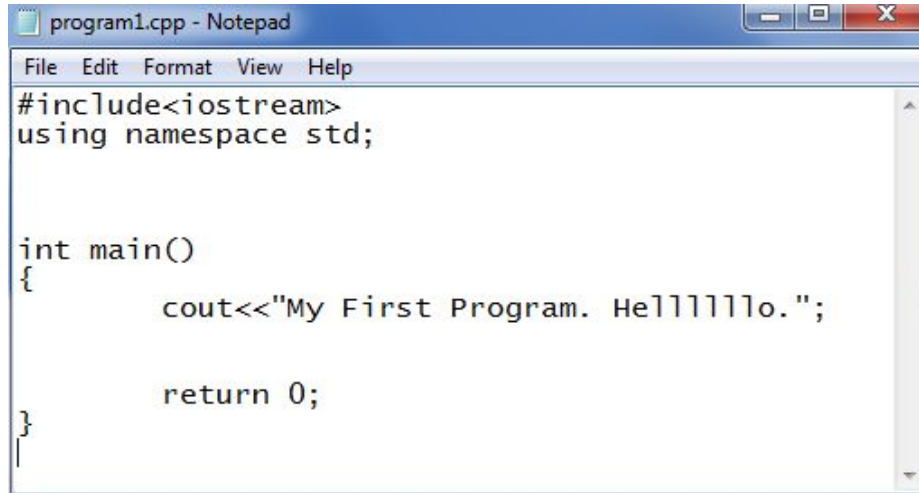
int main()
{
    cout<<"My First Program. Helllllllo.";

    return 0;
}
```



Your first program

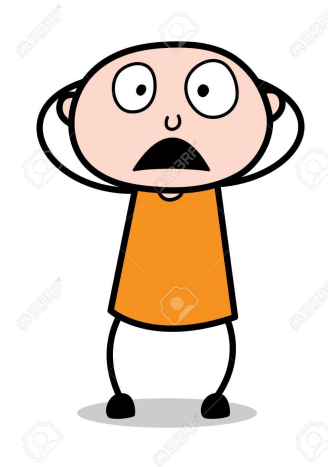
- Write a program to **print on the screen** the following statement
 - **My First Program. Helllllllo.**

A screenshot of a Notepad window titled "program1.cpp - Notepad". The window contains the following C++ code:

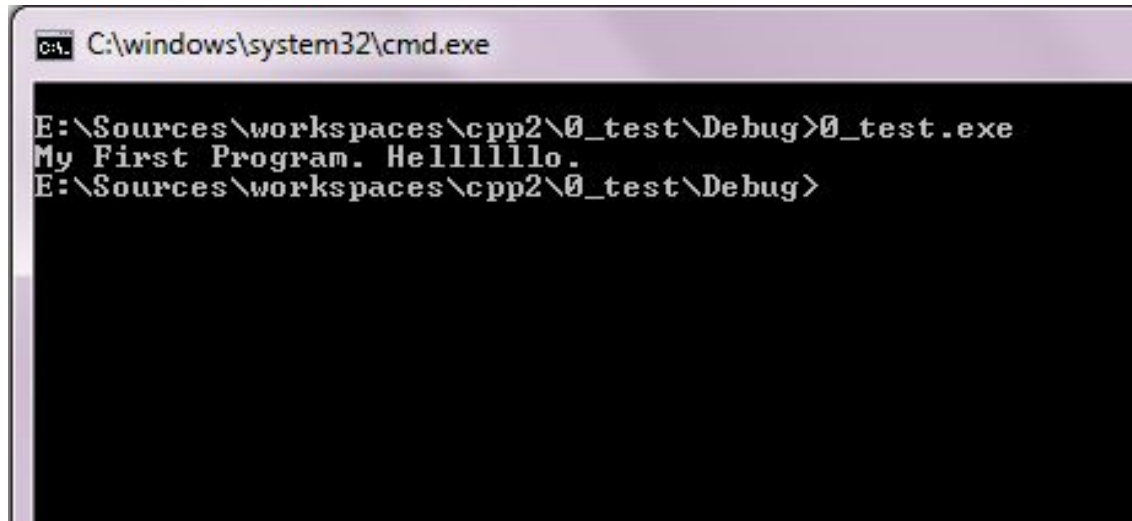
```
File Edit Format View Help
#include<iostream>
using namespace std;

int main()
{
    cout<<"My First Program. Helllllllo.";

    return 0;
}
```



Compile and Run Exe (Console Screen)

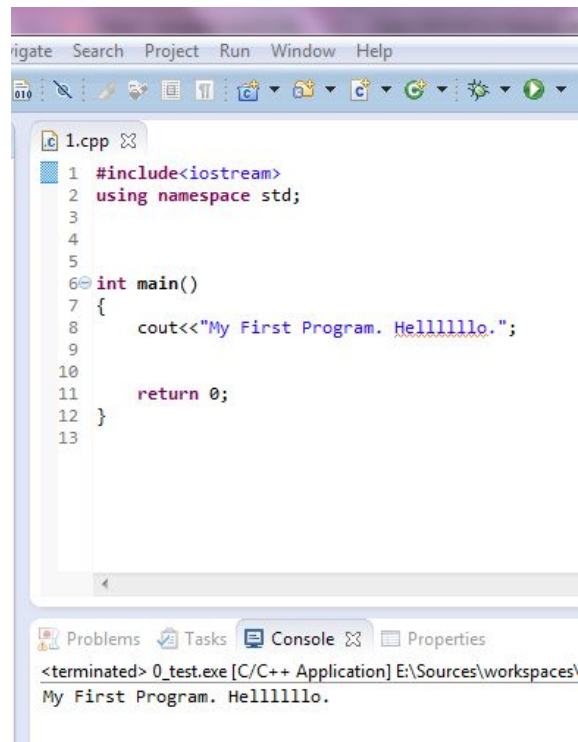


```
C:\windows\system32\cmd.exe  
E:\Sources\workspaces\cpp2\0_test\Debug>0_test.exe  
My First Program. Helllllo.  
E:\Sources\workspaces\cpp2\0_test\Debug>
```

The image shows a Windows command prompt window with a light purple title bar. The title bar text is "C:\windows\system32\cmd.exe". The command prompt shows the current directory as "E:\Sources\workspaces\cpp2\0_test\Debug". The user has entered the command "0_test.exe", which has been executed, resulting in the output "My First Program. Helllllo.". The prompt is now waiting for the next command.

Back to the code

- Line 8: It says
 - `Cout<<`
 - This is a **command** to print (cout = Console output)
 - `<<` (later)
 - “My First Program. Helllllllo.”
 - This is what to print. Notice the double quotes “ ”
 - ;
 - This is an end of line, like full stop for humans
 - Notice it in lines also 2 and 11
- Line 1: `iostream header`. Io for input/output
 - It helps in reading and writing
- Other lines: **Just write** in every program



The screenshot shows a C++ IDE with a file named `1.cpp` open. The code in the editor is as follows:

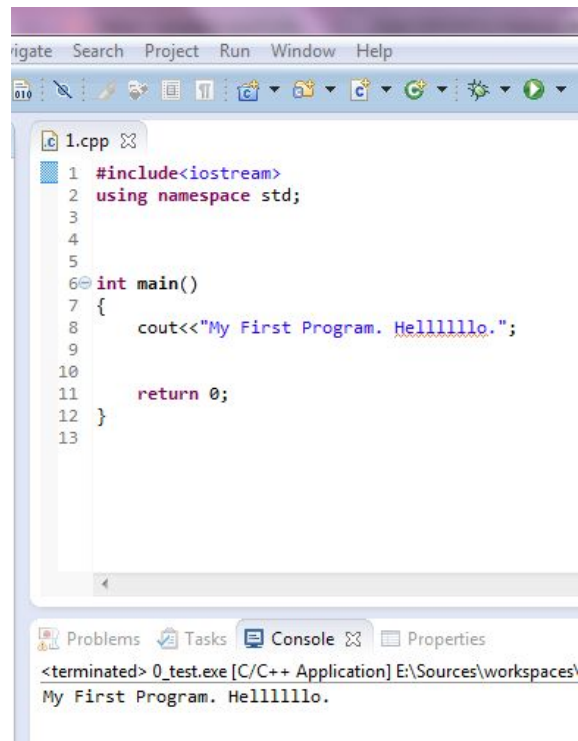
```
1 #include<iostream>
2 using namespace std;
3
4
5
6 int main()
7 {
8     cout<<"My First Program. Helllllllo.";
9
10
11     return 0;
12 }
13
```

At the bottom of the IDE, the Console window is visible, showing the output of the program:

```
<terminated> 0_test.exe [C/C++ Application] E:\Sources\workspaces\
My First Program. Helllllllo.
```

Back to the code: **Optional**

- **#include**
 - We have several things ready for you to use!
 - Let's say you want to calculate $\sqrt{25}$, which is 5
 - `#include<cmath>` \Rightarrow `sqrt(25)`
 - Ok, I want to read and write from the disk?
 - `#include<iostream>` handles that for you (e.g. `cout`)
- **Using namespace std;**
 - It contains all standard names used in C++
 - More later



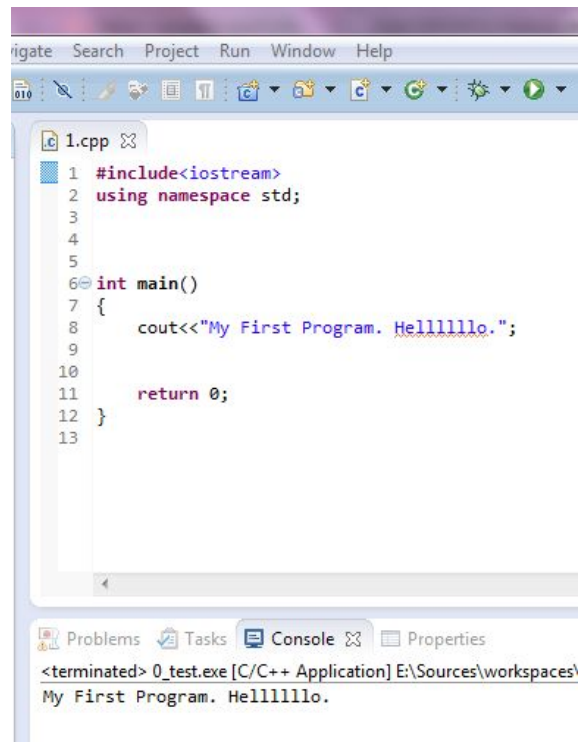
The screenshot shows a C++ IDE with a menu bar (File, Edit, View, Project, Run, Window, Help) and a toolbar. The main editor window displays a C++ file named '1.cpp' with the following code:

```
1 #include<iostream>
2 using namespace std;
3
4
5
6 int main()
7 {
8     cout<<"My First Program. Helllllllo.";
9
10
11     return 0;
12 }
13
```

The bottom of the IDE shows a 'Console' tab with the output: '<terminated> 0_test.exe [C/C++ Application] E:\Sources\workspaces\ My First Program. Helllllllo.'

Back to the code: **Optional**

- **Int main()**
 - This is called the main **function**
 - A c++ program must have it (**case sensitive**)
 - **Return 0**
 - Function is done successfully
 - Return means: finish and make the caller resumes
 - **()**
 - Called (round) brackets (aka **parentheses**)
 - You can put numbers: e.g. sqrt(25)
- **Braces** in lines 7 and 12: { }
 - We write code body between them. More later



The screenshot shows a C++ IDE with a single file named 1.cpp. The code is as follows:

```
1 #include<iostream>
2 using namespace std;
3
4
5
6 int main()
7 {
8     cout<<"My First Program. Hellllllo.";
9
10
11     return 0;
12 }
13
```

The IDE's console window at the bottom shows the output of the program: "My First Program. Hellllllo."

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”