Basic Computer Programming and Networking

Introduction to C++

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C++

- C++ is a middle-level programming language
- Developed by Bjarne Stroustrup
- Starting in 1979 at Bell Labs
- C++ runs on a variety of platforms
  - Windows,
  - Mac OS,
  - various versions of UNIX

- General-purpose programming language
- Features
  - Object-oriented & generic programming features
  - Low-level memory manipulation
- Consists of
  - Key words
  - Syntax
  - Semantics

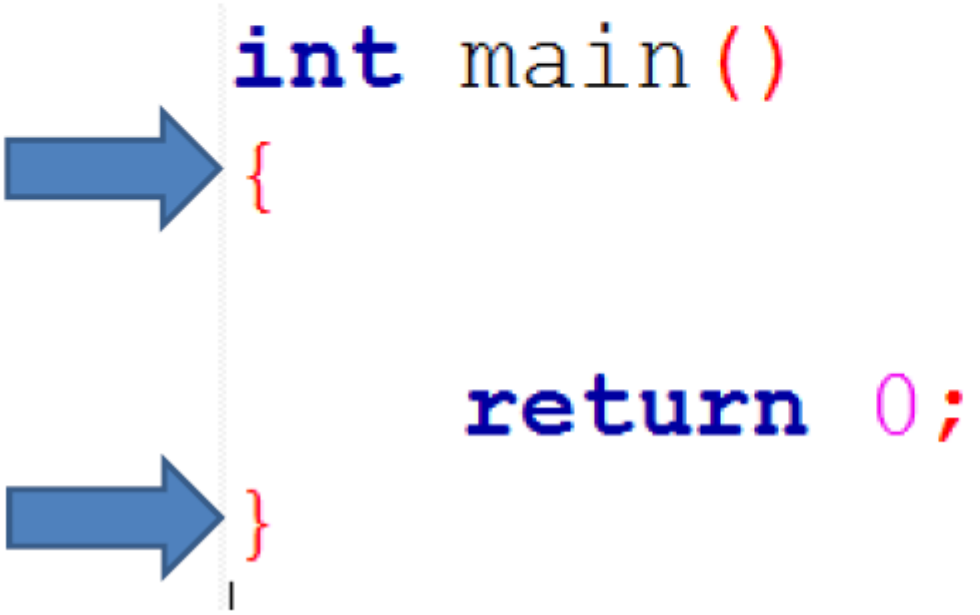
Minimum C++ Program

- Do nothing

```
int main()
{

    return 0;
}
```

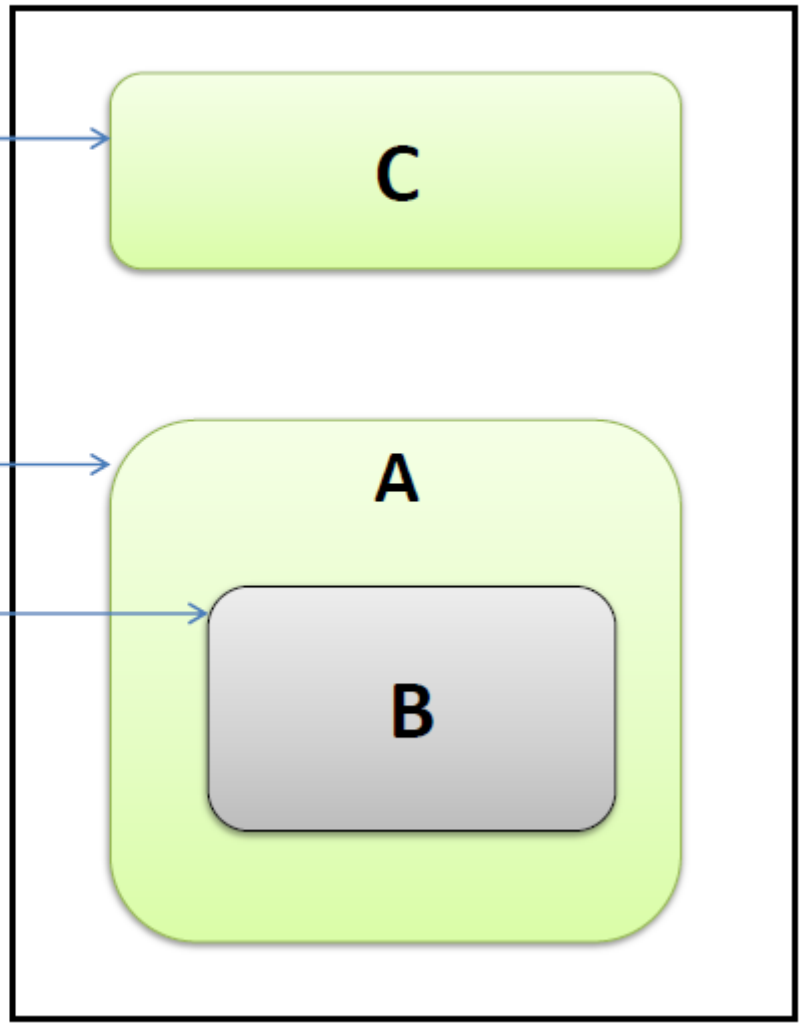
C++ Block

- **A block** is a set of logically connected statements that are surrounded by opening and closing braces.



Blocks

```
void message()
{
    //C
}
int main()
{
    // A
    {
    //   B
    }
     return 0;
}
```



C++ semicolon

- The **semicolon** is a statement terminator. That is, each individual statement must be ended with a semicolon.

```
int main()
{

    return 0;
}
```

Example

- Create a C++ program to print message on console window

```
//My first C++ program
#include <iostream>

using namespace std;

int main()
{
    cout << "Hello world!";
    return 0;
}
```

Example

```
//My first C++ program
```

- This is a **comment** line.
- All lines beginning with two slash signs (//) or (/*) are considered comments and do not have any effect on the behavior of the program.
- // Single line comment
- /* */ block comment
- Block comments cannot be nested

Example

```
#include <iostream>
```

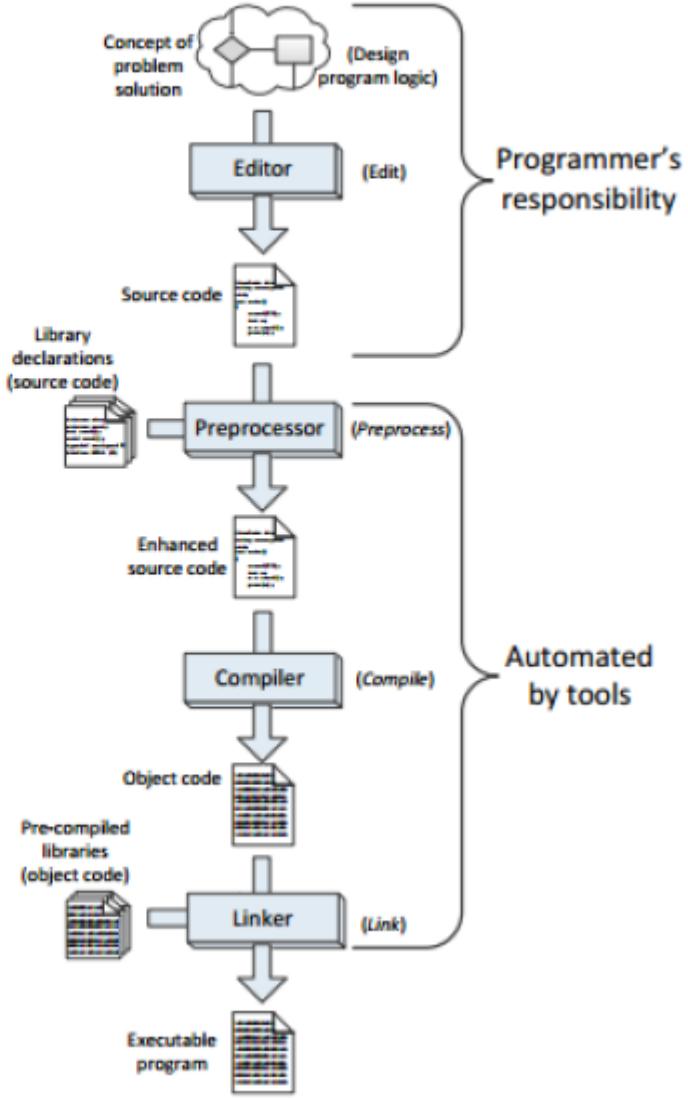
- Lines beginning with a hash sign (#) are directives for the preprocessor.
- They are not regular code lines with expressions but indications for the compiler's preprocessor.
- In this case the directive **#include <iostream>** tells the preprocessor to include the iostream standard file.
- This specific file (**iostream**) includes the declarations of the basic standard input-output library in C++, and it is included because its functionality is going to be used later in the program.

What is preprocessor.

- Is a program that processes its input data to produce output that is used as input to another program.
- The preprocessor provides the ability for the **inclusion of header files**.
- Is a separate program invoked by the compiler as the first part of translation
- **Example:**

```
#include <stdio.h>

int main(void)
{
```

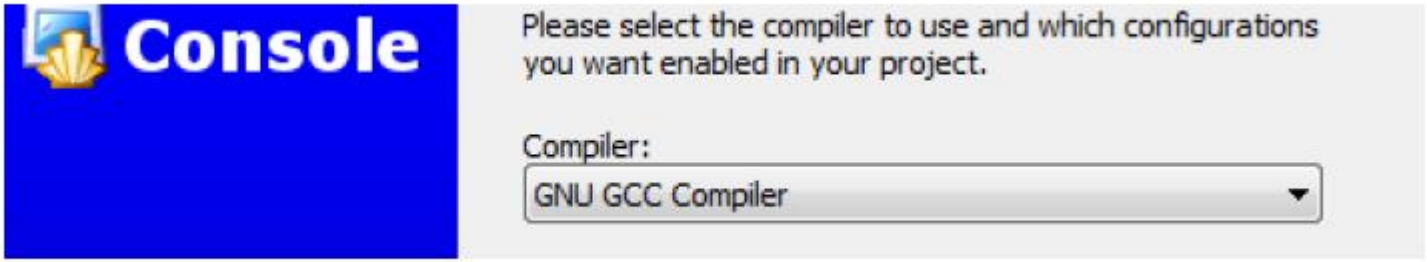
Preprocessor in a Program



Example

```
using namespace std;
```

- All the elements of the standard C++ library are declared within what is called a **namespace**, the namespace with the name **std**



Example

```
int main()
{
```

- Beginning of the definition of the main function.
- The main function is the point by where all C++ programs start their execution, independently of its location within the source code.
- **All C++ programs have a main function**

Example

```
cout << "Hello world!";
```

- Is a C++ statement.
- This statement performs the only action that generates a visible effect in our first program.
- **Command**

```
cout <<
```

Example

```
    return 0;
```

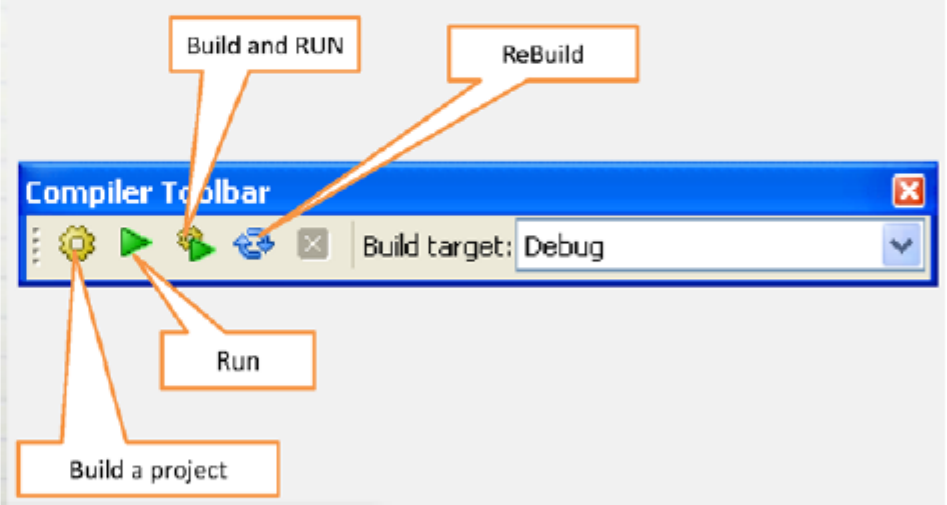
- The return statement causes the main function to finish.

```
int main()
{
    cout << "Hello world!";
    return 0;
}
```

Cording, Editing, compiling and run a program

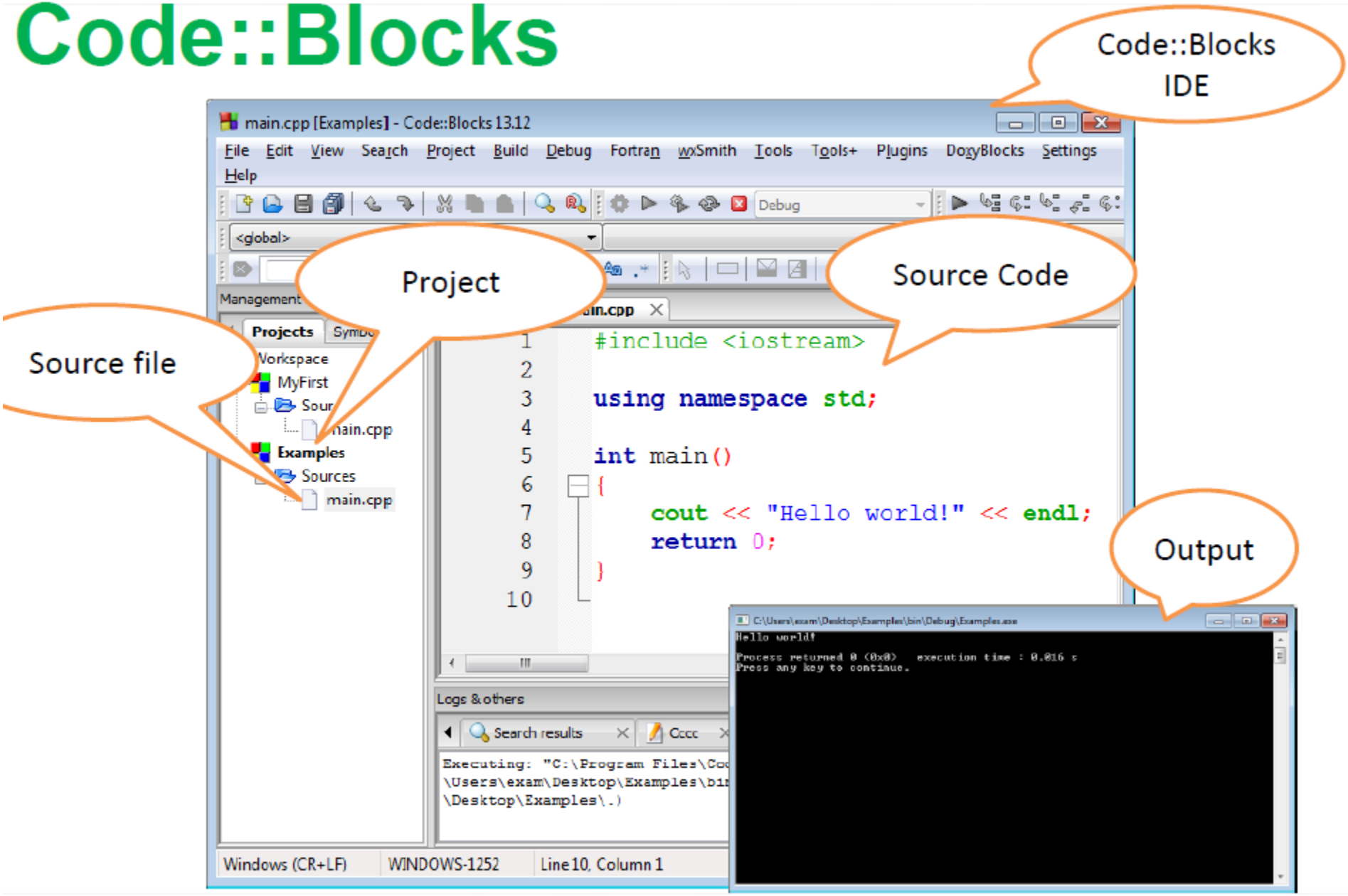
- Create new Code:blocks project
- Add following code

```
//My first C++ program
#include <iostream>

using namespace std;

int main()
{
    cout << "Hello world!";
    return 0;
}
```



- Compile and run

Code::Blocks


Code::Blocks IDE
main.cpp [Examples] - Code::Blocks 13.12
File Edit View Search Project Build Debug Fortran wxSmith Tools Tools+ Plugins DoxyBlocks Settings Help
Debug
<global>
Management
Projects
Workspace
MyFirst
Examples
Sources
main.cpp
Project
Source file
Source Code
#include <iostream>
using namespace std;
int main()
{
cout << "Hello world!" << endl;
return 0;
}
Logs & others
Search results
Executing: "C:\Program Files\Co
\Users\exam\Desktop\Examples\bi
\Desktop\Examples\.)
Windows (CR+LF)
WINDOWS-1252
Line 10, Column 1
Output
Hello world!
Process returned 0 (0x0) execution time : 0.016 s
Press any key to continue.

Example 2

- Create a C++ program to display your name and address

```
int main()
{
        cout << "Saman Kumara";
        cout << "No 27, Panadaura";

        return 0;
}
```

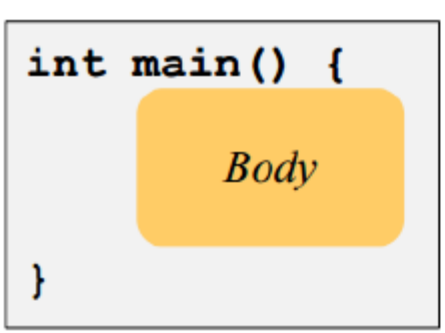
Example 2

- Create a C++ program to display your name and address

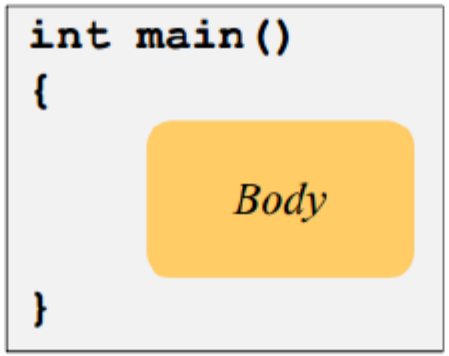
```
int main()
{
        cout << "Saman Kumara";
        cout << "No 27, Panadaura";

        return 0;
}
```

```
Saman KumaraNo 27, Panadaura
```

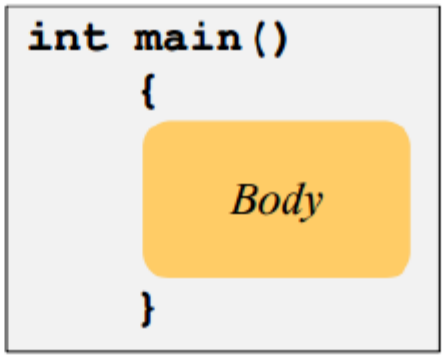
Coding Styles



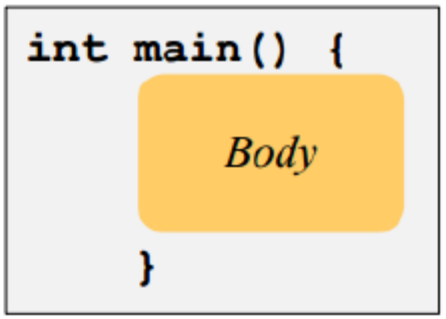
K & R Style



ANSI Style



Whitesmith Style



Banner Style

New Line

endl;

```
int main()
{
    cout << "Saman Kumara" << endl;
    cout << "No 27, Panadura" << endl;

    return 0;
}
```

```
Saman Kumara
No 27, Panadura
```

Example 2

- What is output of the following program

```
int main()
{
    cout << "C:\WINDOWS is Windows's root directory";
    return 0;
}
```

Example 2

- Create a C++ program to display your name and address

```
int main()
{
        cout << "Saman Kumara";
        cout << "No 27, Panadaura";

        return 0;
}
```

```
Saman KumaraNo 27, Panadaura
```

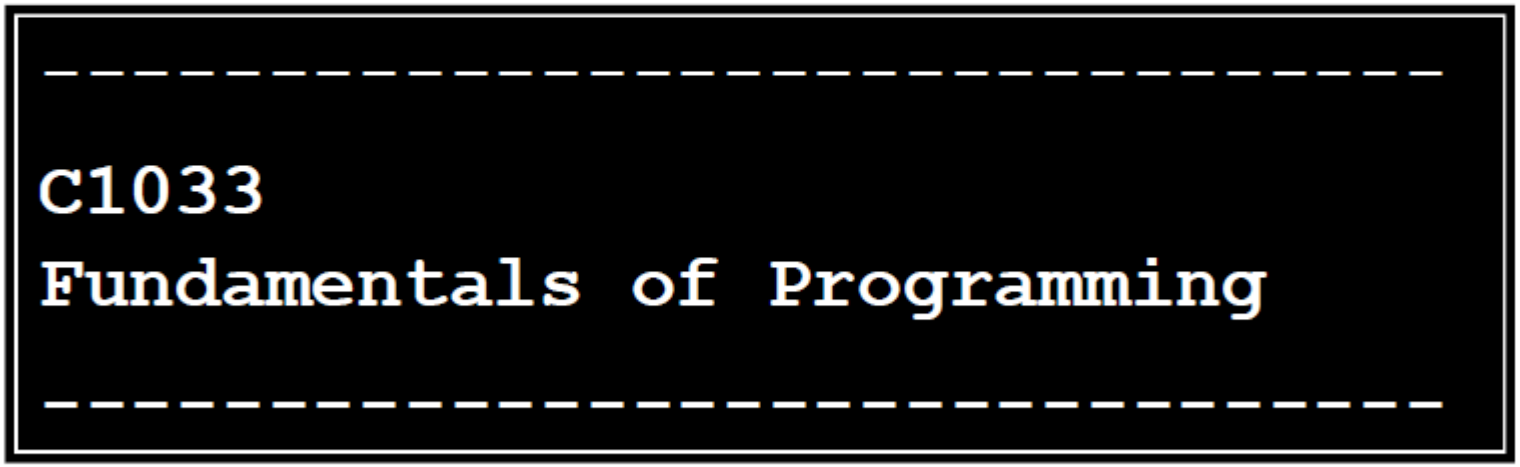
Escape sequences

- **Escape sequences** are used to represent certain special characters within string literals (“ ”)

Escape sequence	Description
\'	single quote
\"	double quote
\?	question mark
\\	backslash
\a	audible bell
\b	backspace
\f	form feed - new page
\n	line feed - new line
\r	carriage return
\t	horizontal tab

Exercise

1. Write a C++ Program to Display the Following output



Different ways to create a C++ program

```
#include <iostream>

using namespace std;

int main() {
    cout << "This is a simple C++ program!" << endl;
}
```

```
#include <iostream>

int main() {
    std::cout << "This is a simple C++ program!" << std::endl;
}
```

Different ways to create a C++program

```
#include <iostream>

using std::cout;
using std::endl;

int main() {
    cout << "This is a simple C++ program!" << endl;
}
```

Different ways to create a C++program

```
#include <iostream>

using namespace std;

int main() {
    cout << "    *    " << endl;
    cout << "   ***   " << endl;
    cout << "  *****  " << endl;
    cout << "    *    " << endl;
    cout << "    *    " << endl;
    cout << "    *    " << endl;
}
```

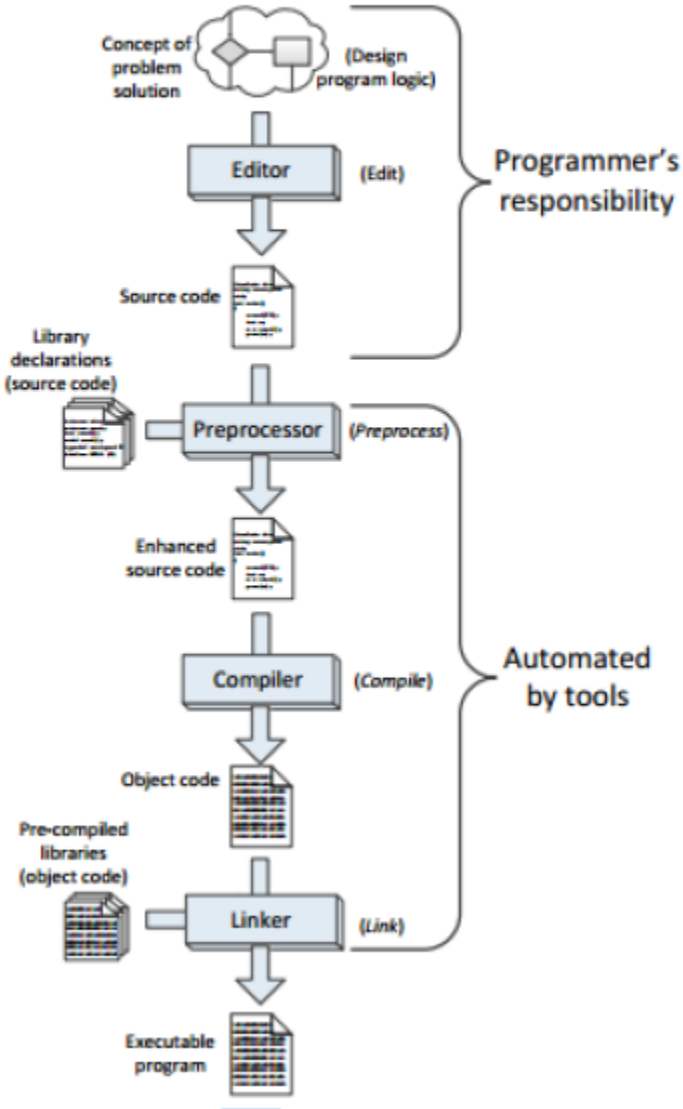
Different ways to create a C++program

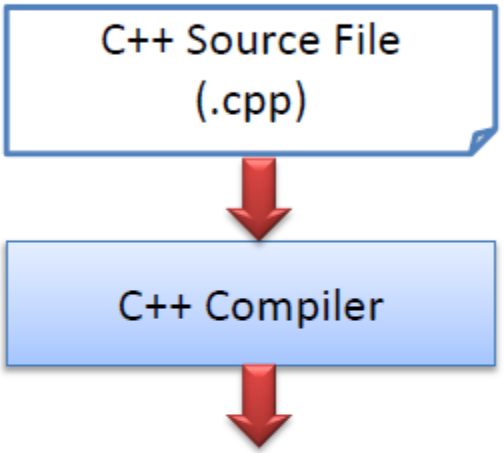
```
#include <iostream>

using namespace std;

int main() {
    cout << "    *    " << endl
         << "   ***   " << endl
         << "  *****  " << endl
         << "    *    " << endl
         << "    *    " << endl
         << "    *    " << endl;
}
```

Template for a C++ Program

```
#include <iostream>

using namespace std;

int main() {

        program statements

}
```

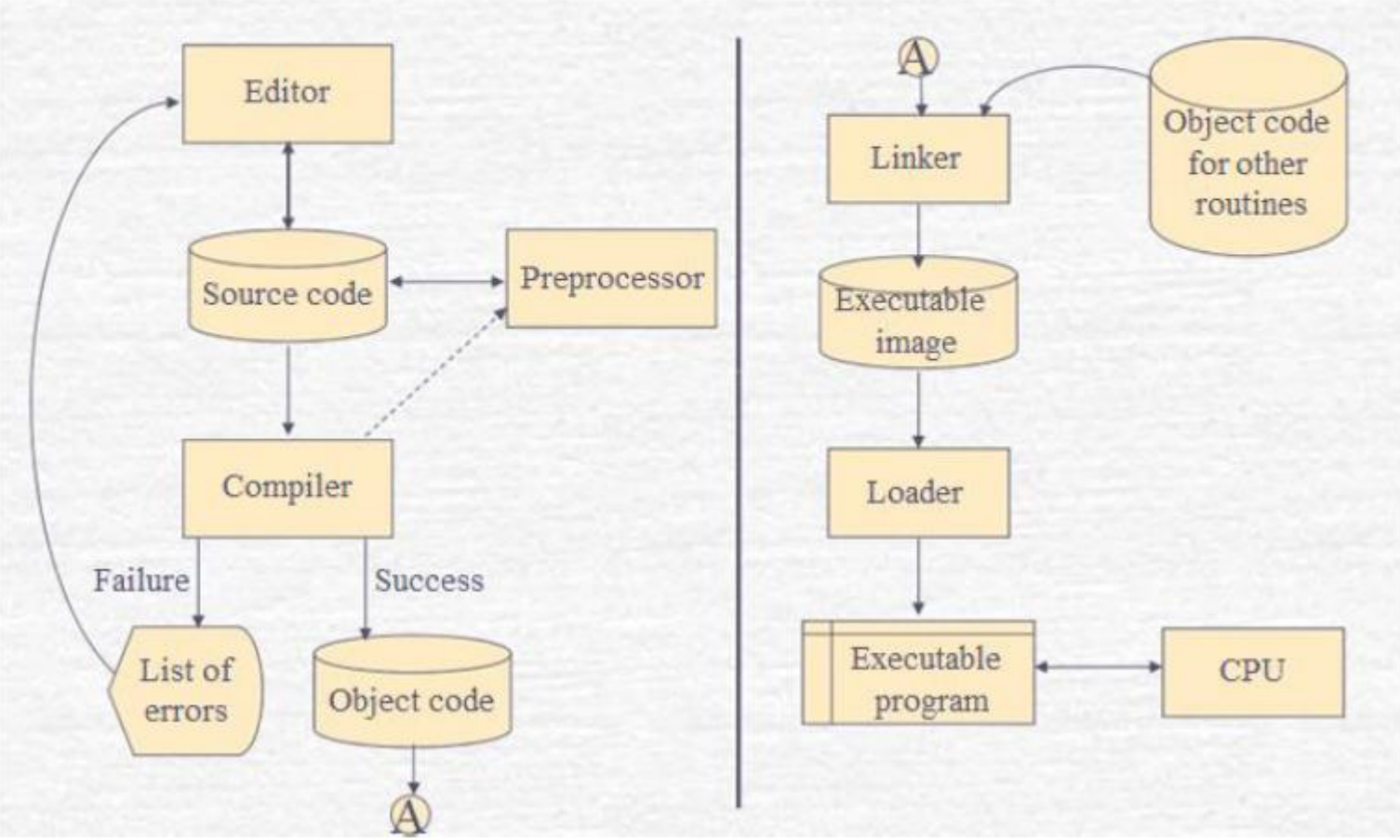
C++ Programming



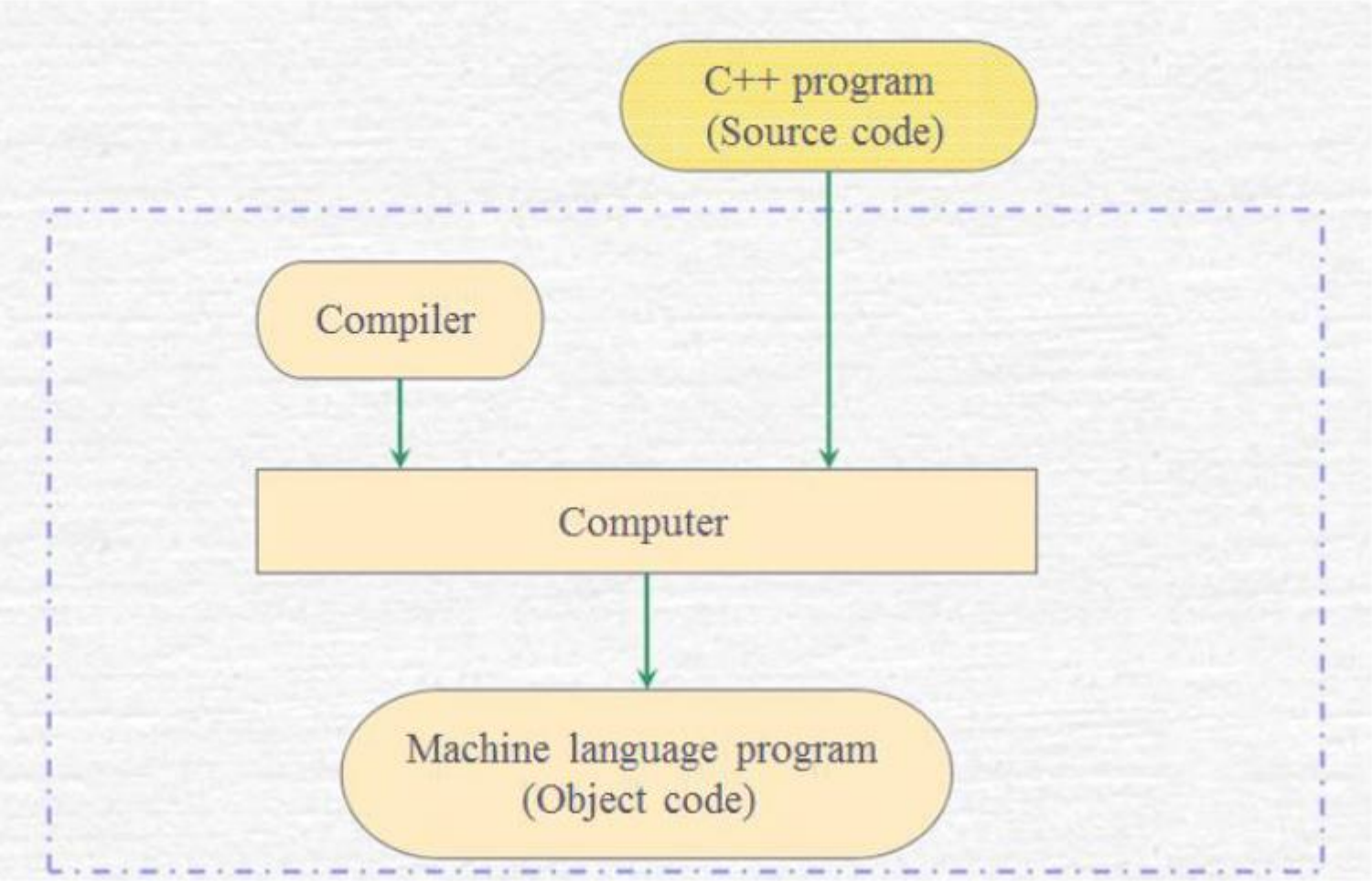


Operating system can directly execute

Preparing a C++ program for running



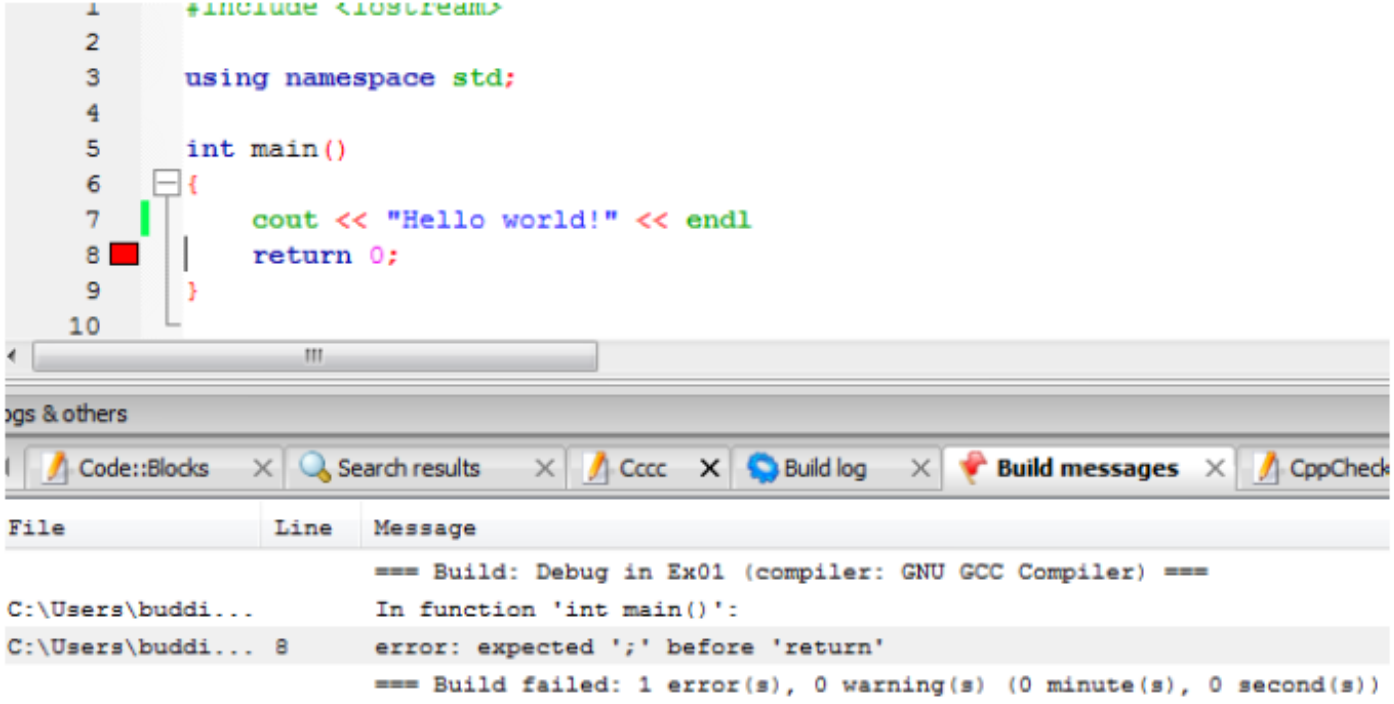
Compiling


C++ program
(Source code)
Compiler
Computer
Machine language program
(Object code)

Compile errors

Compilation Errors

- Compiler **fails to compile** a piece of computer program source code.
- Error message is given



Common C++ compilation errors

- Undeclared identifier
- Common function undeclared
- = expected
- Internal compiler error
- Unexpected closing brace

```
error: expected ';' before 'int'
In function 'int main()':
error: 'cout' was not declared in this scope
error: expected ';' before 'cout'
error: return-statement with no value, in function returning 'int' [-fpermissive]
```

Example

- Write the following C++ program and identify Compilation errors

```
#include <istream>

using namespace std

int main()
{
    cout << "Department of Computer Science" << endl
    cout << KDU;

    return ;
}
```

Example

- Correct errors and rewrite the program

Clear the console screen

```
#include <iostream>
#include <stdlib.h>
using namespace std;

int main()
{
    cout << "Hello world!" << endl;
    //Clear the screen
    system("cls");
    cout << "New screen";

    return 0;
}
```

Change console Text and background color

- Sets the default console foreground and background colours.
- Syntax
  - COLOR [background][foreground]
  - system("Color FA");
  - system("Color F0");

Color Code

- 0 = Black
- 1 = Blue
- 2 = Green
- 3 = Aqua
- 4 = Red
- 5 = Purple
- 6 = Yellow
- 7 = White
- 8 = Gray
- 9 = Light Blue
- A = Light Green
- B = Light Aqua
- C = Light Red
- D = Light Purple
- E = Light Yellow
- F = Bright White

Example

- Write a C++ program to display following screen

```
USER INFORMATION
--------------------------------
NAME    : B. HETTIGE
ADDRESS: No23, Panadura
AGE     : 19
SALARY  : 23500
GENDER  : M
--------------------------------
```

Summary

- C++ Programming Language?
- C++ Vs Natural Languages
- C++ Syntax
- Create a C++ program using code:blocks
- Cording styles
- ASCII Art
- Handle compile errors
- Customize Console screen