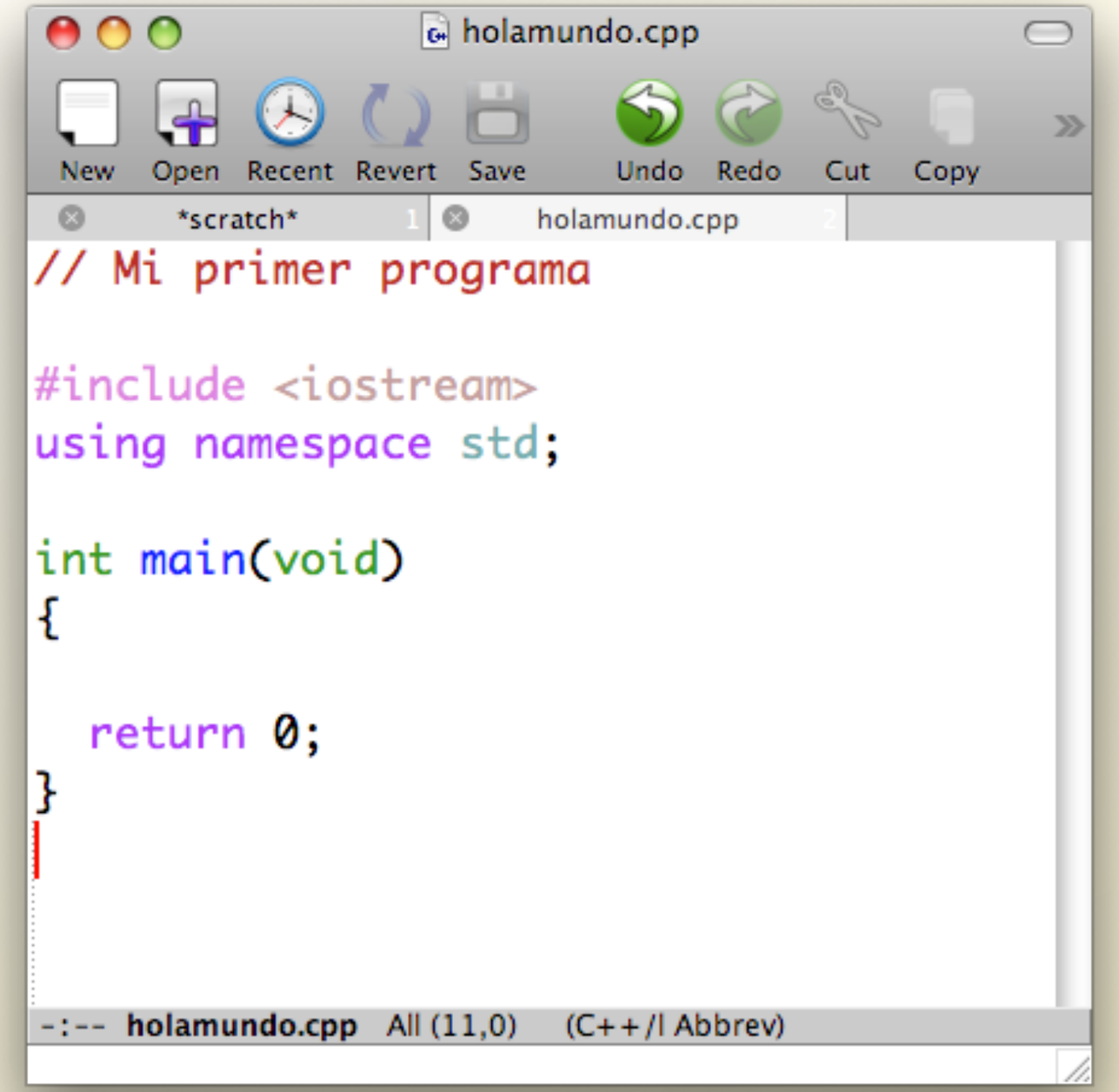
Program Structure and Compilation

William Oquendo, woquendo@gmail.com

Credits: Computational Physics - Landau and Paez, Wikipedia, www.cplusplus.com/doc/tutorial , Schaum series-Programming in C++

Plantilla


holamundo.cpp
New
Open
Recent
Revert
Save
Undo
Redo
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scratch
holamundo.cpp
// Mi primer programa
#include <iostream>
using namespace std;
int main(void)
{
return 0;
}
-:-- holamundo.cpp All (11,0) (C++/l Abbrev)

Template

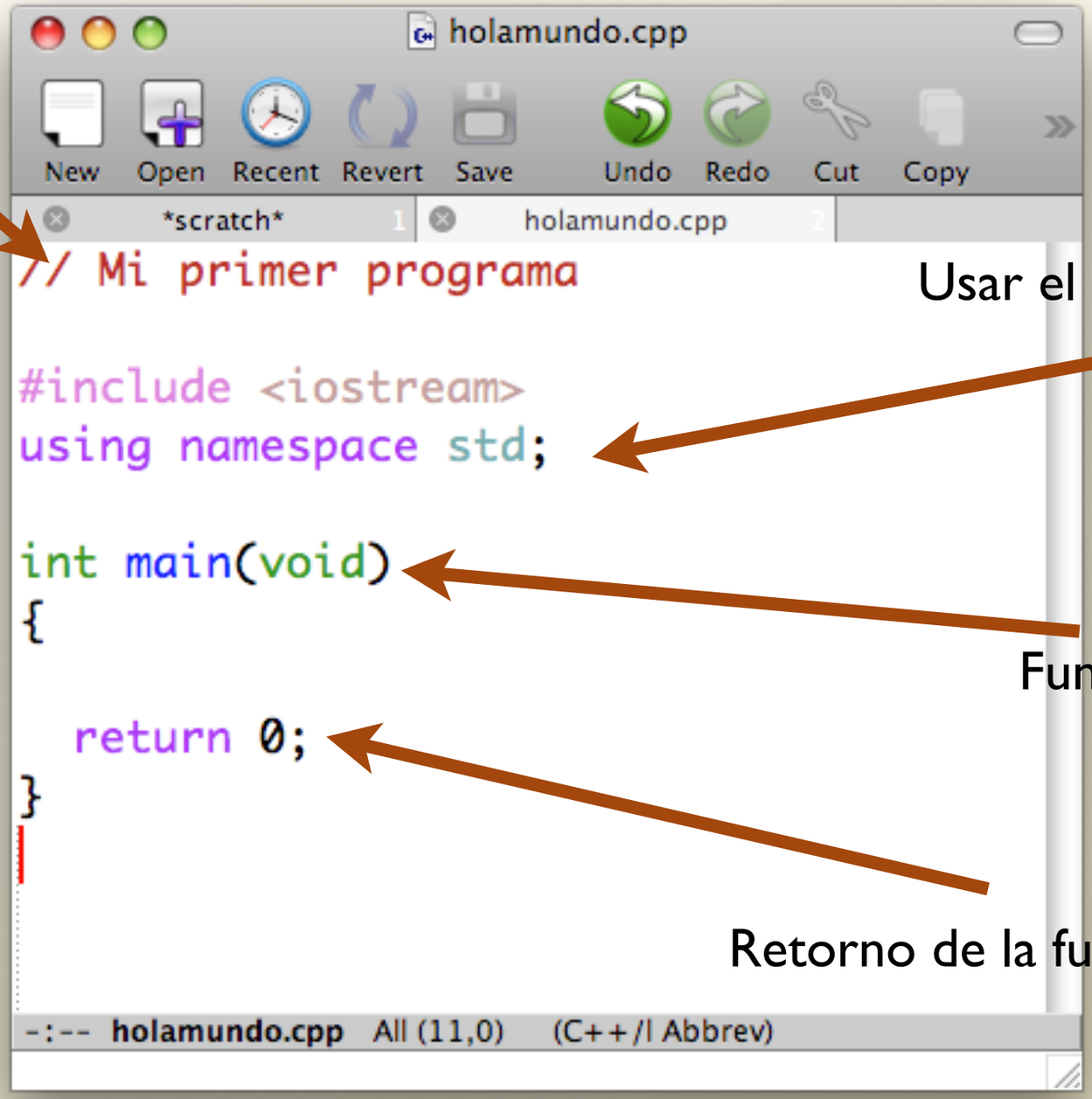
Comentario de una linea

Directiva de preprocesador

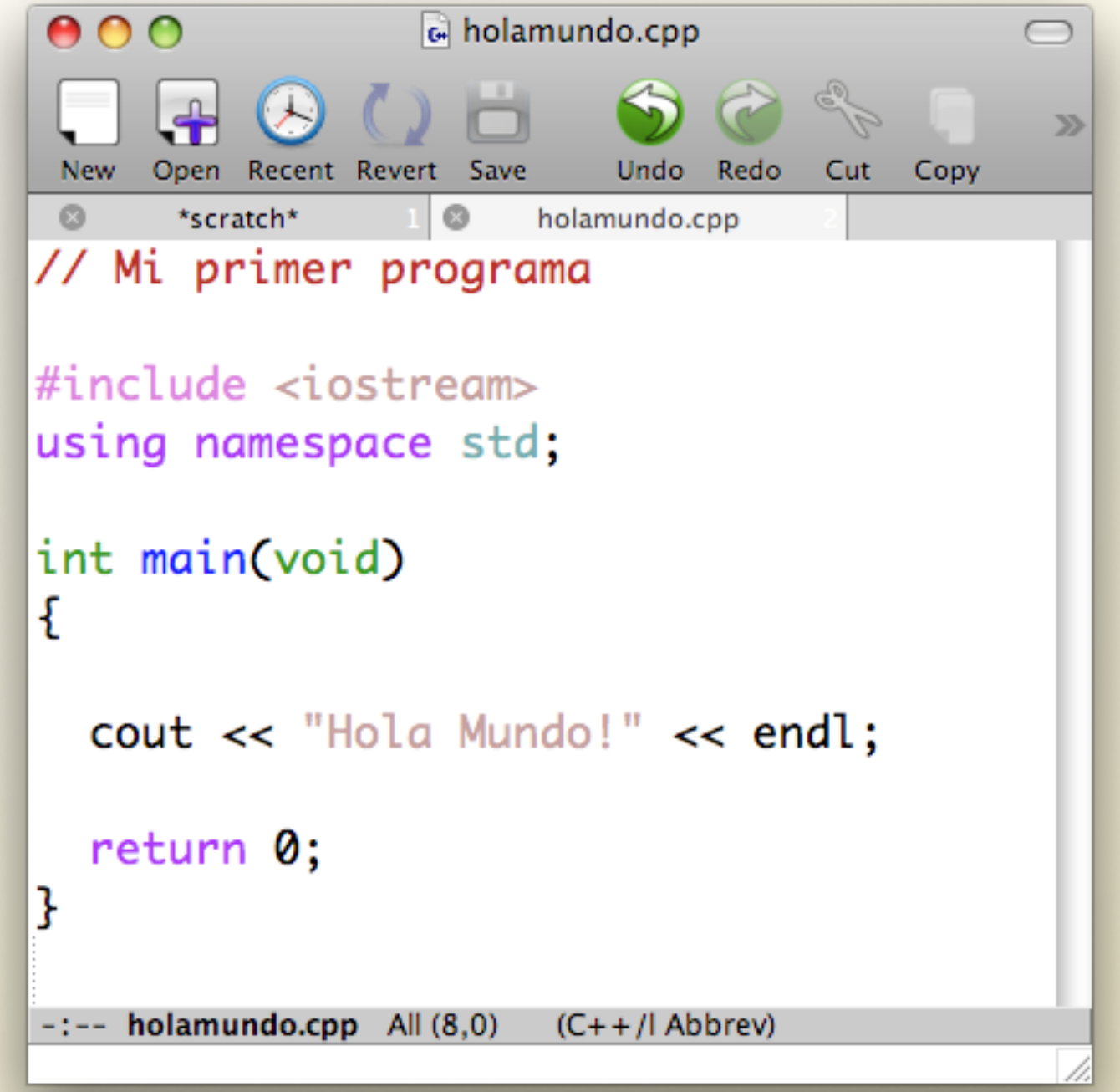
Usar el espacio de nombres standar

Funcion principal

Retorno de la funcion (final)



Hola mundo


holamundo.cpp
New
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holamundo.cpp
// Mi primer programa
#include <iostream>
using namespace std;
int main(void)
{
cout << "Hola Mundo!" << endl;
return 0;
}
-:-- holamundo.cpp All (8,0) (C++/l Abbrev)

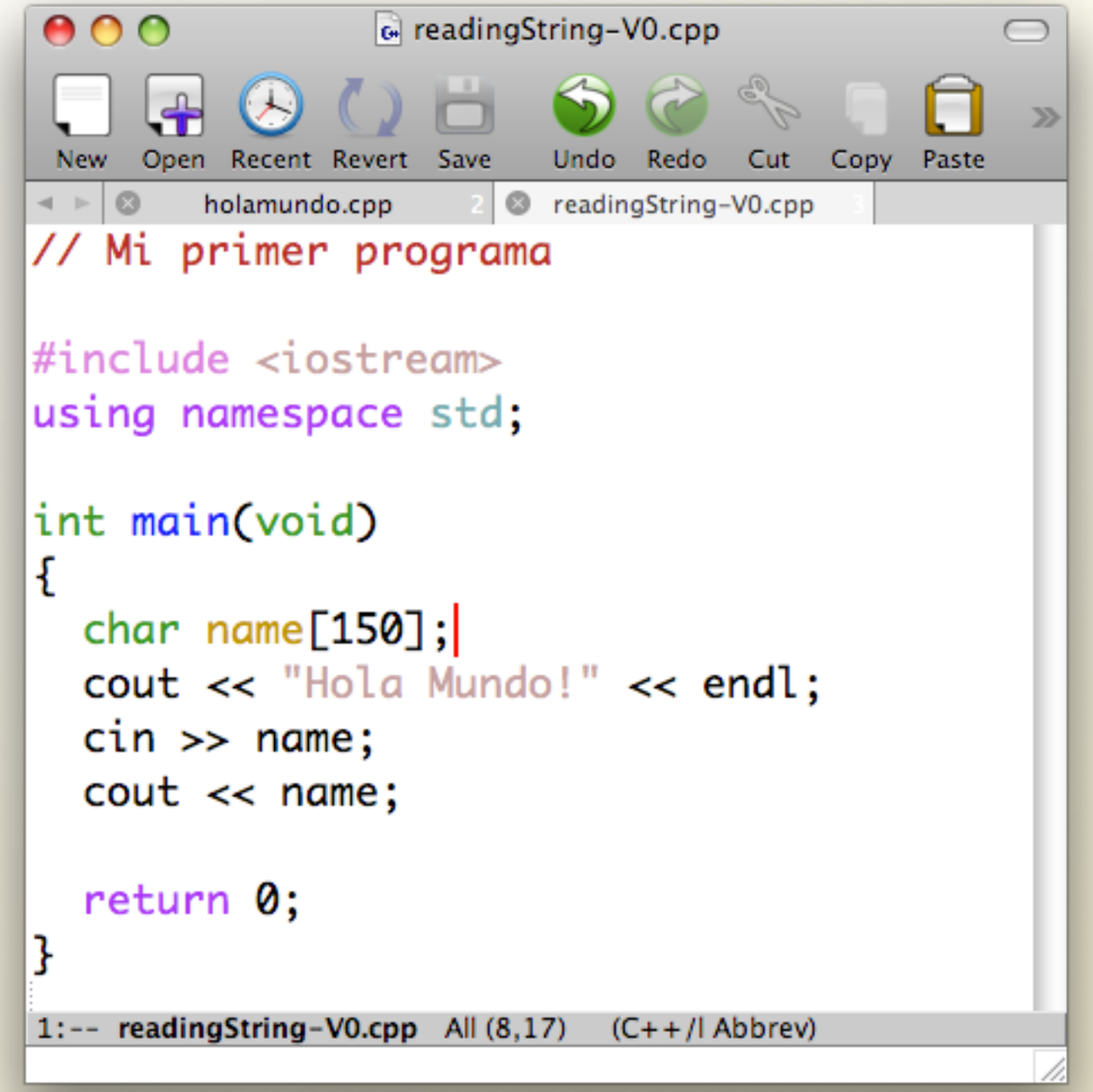
Compiling and running

Default

Default | Default | Default

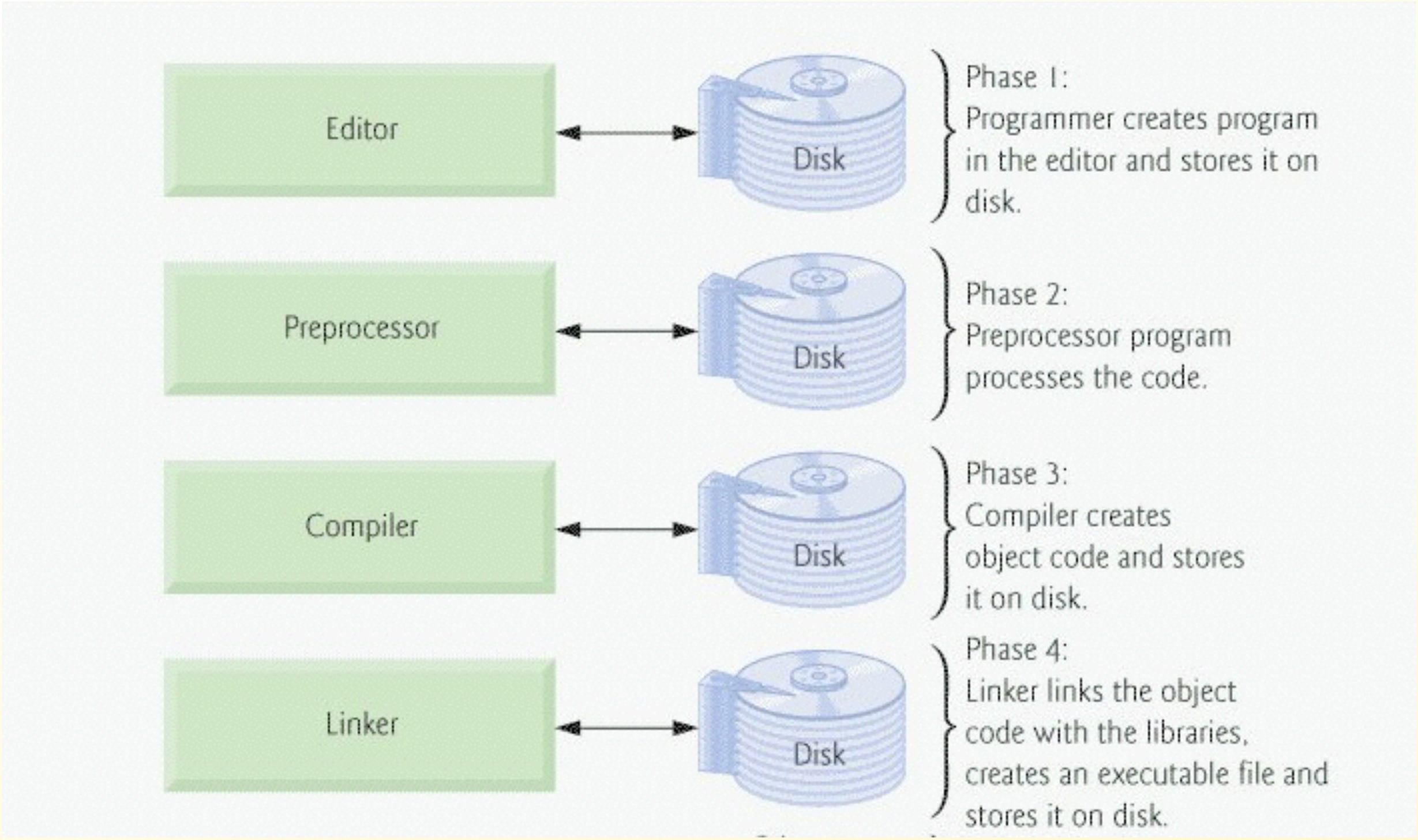
```
Last login: Thu Aug 13 22:52:01 on ttys001
iluvatarMacBookPro:~ oquendo$ cd Desktop/work/
iluvatarMacBookPro:work oquendo$ ;s
-bash: syntax error near unexpected token `;'
iluvatarMacBookPro:work oquendo$ ls
academic/                                   images/
adminSSF/                                   letters/
bib/                                        personal/
bibliographies-SmartFolder.savedSearch*     stuff/
bin/                                        tmp/
books/                                      trabajos/
docs/
iluvatarMacBookPro:clase01-intro oquendo$
iluvatarMacBookPro:clase01-intro oquendo$
iluvatarMacBookPro:clase01-intro oquendo$
iluvatarMacBookPro:clase01-intro oquendo$
iluvatarMacBookPro:clase01-intro oquendo$
iluvatarMacBookPro:clase01-intro oquendo$ g++ holamundo.cpp
iluvatarMacBookPro:clase01-intro oquendo$ ./a.out
Hola Mundo!
iluvatarMacBookPro:clase01-intro oquendo$
```

Exercise

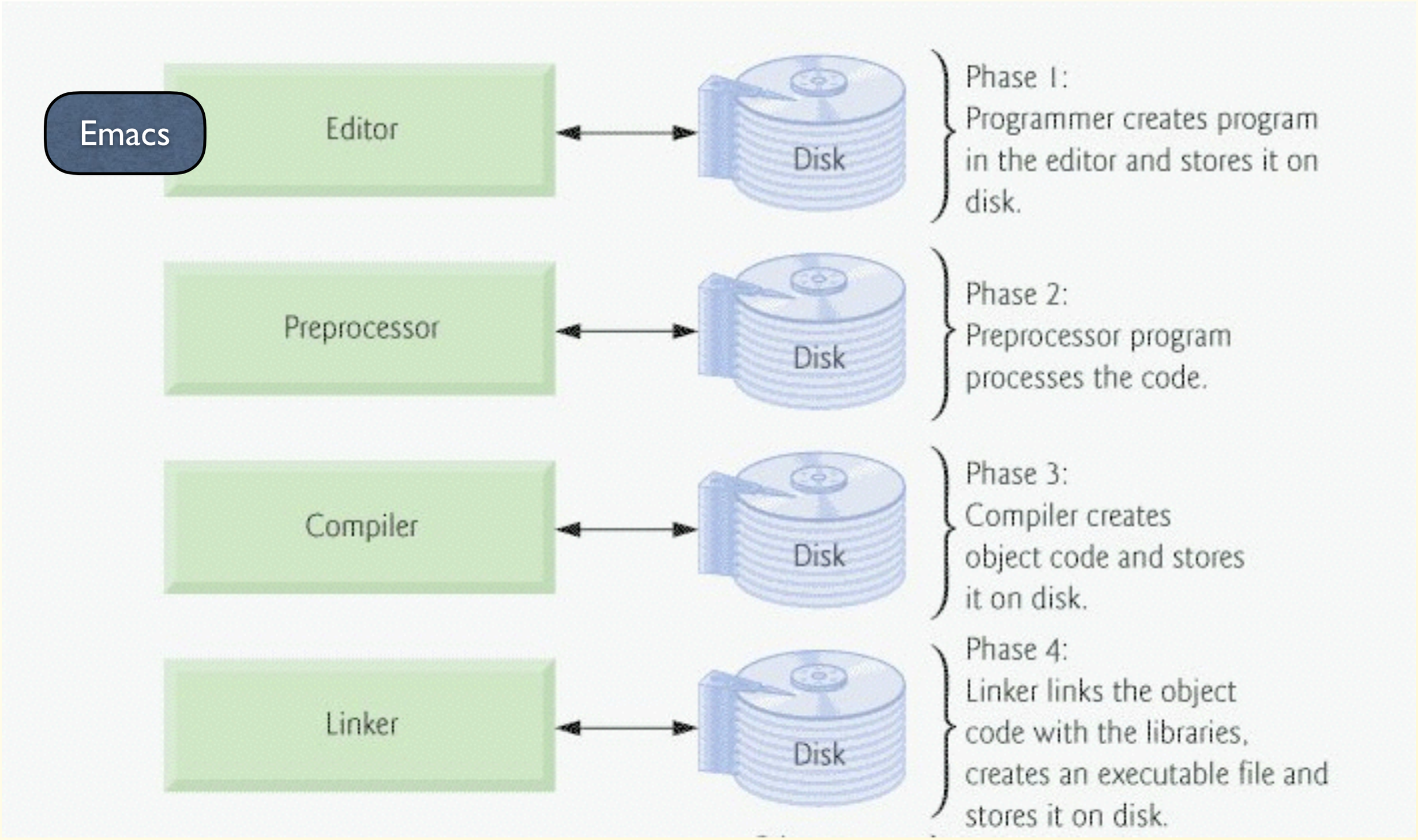


- Print your name.
- Print your age.

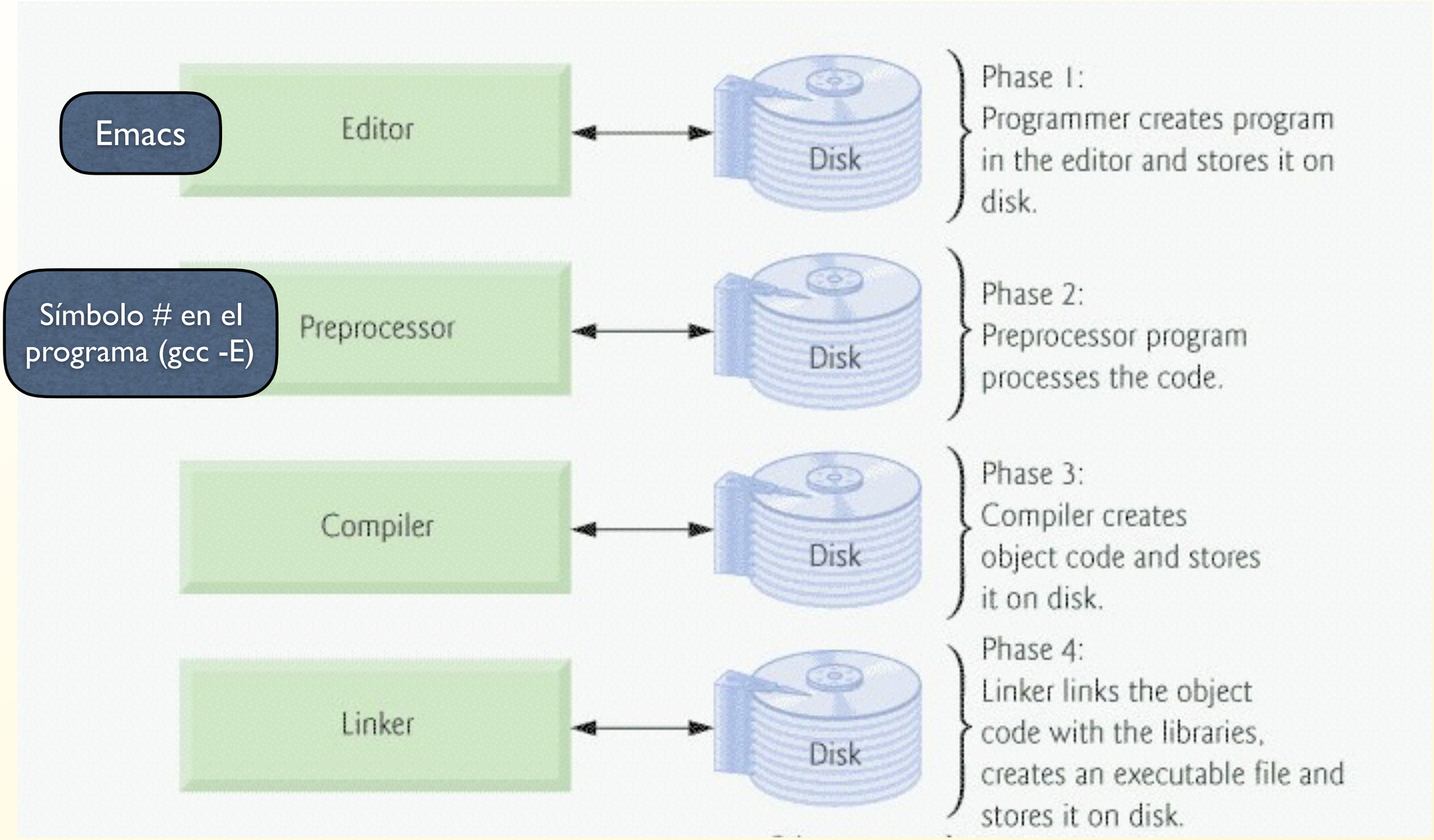
C++ development cycle



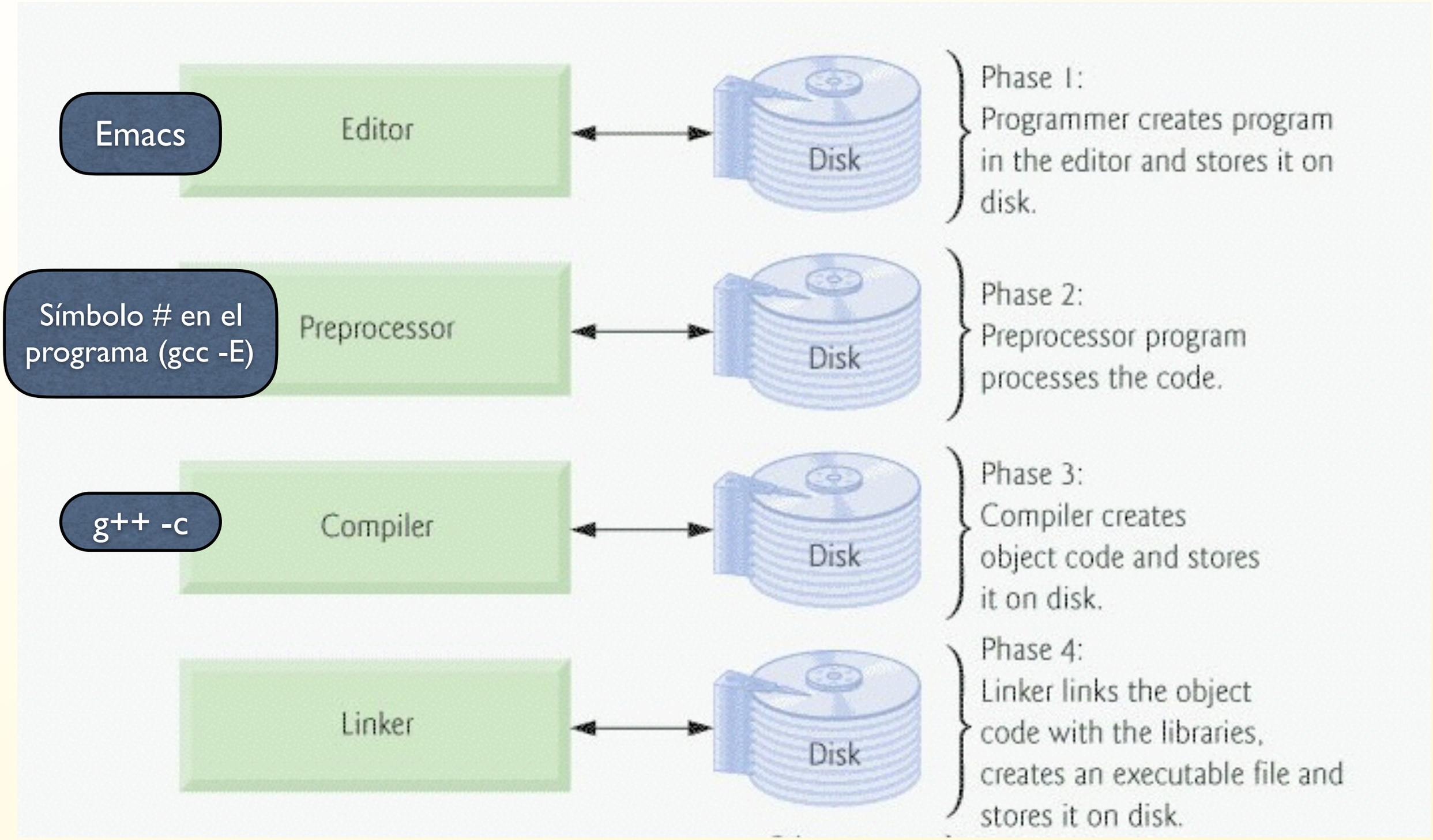
C++ development cycle



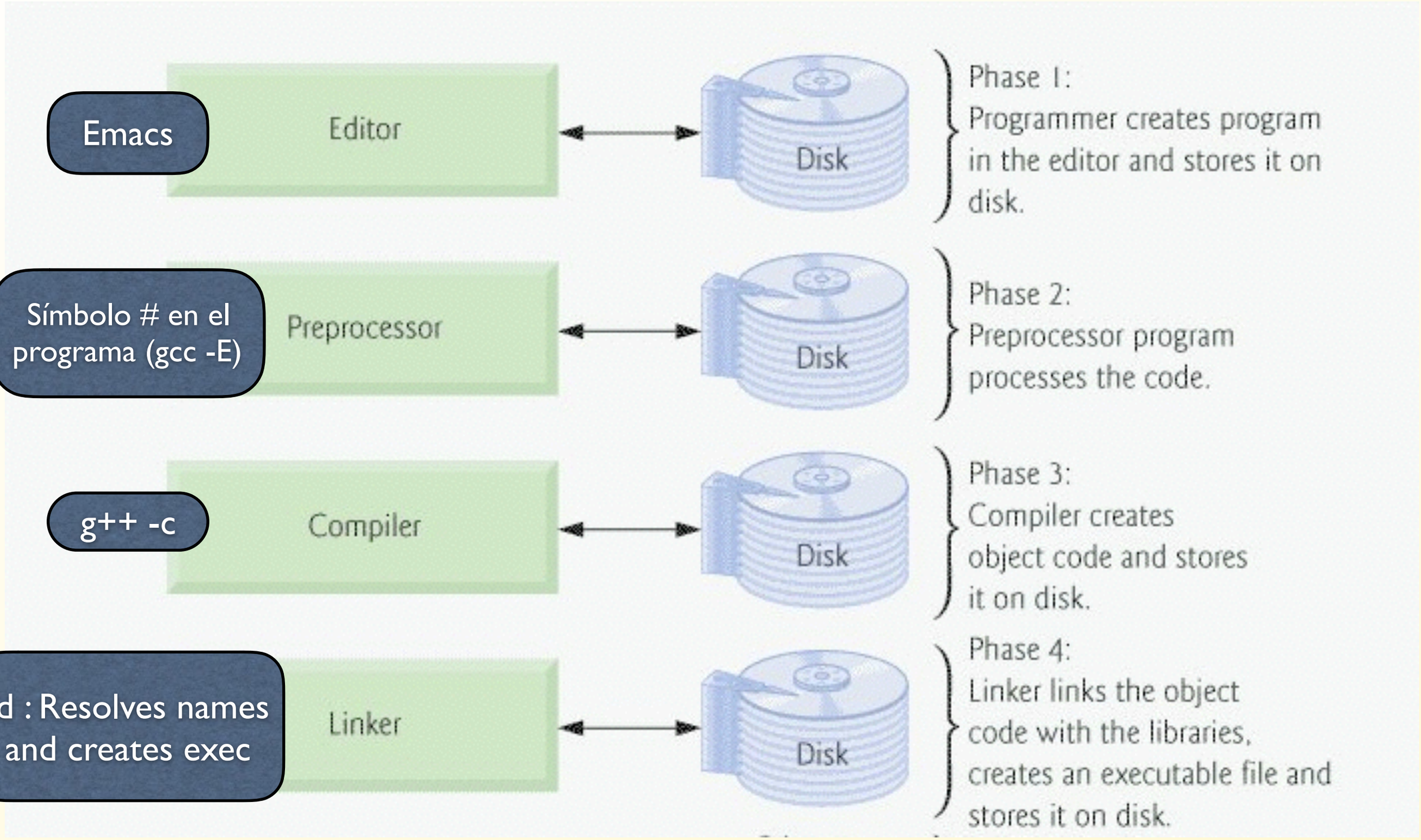
C++ development cycle



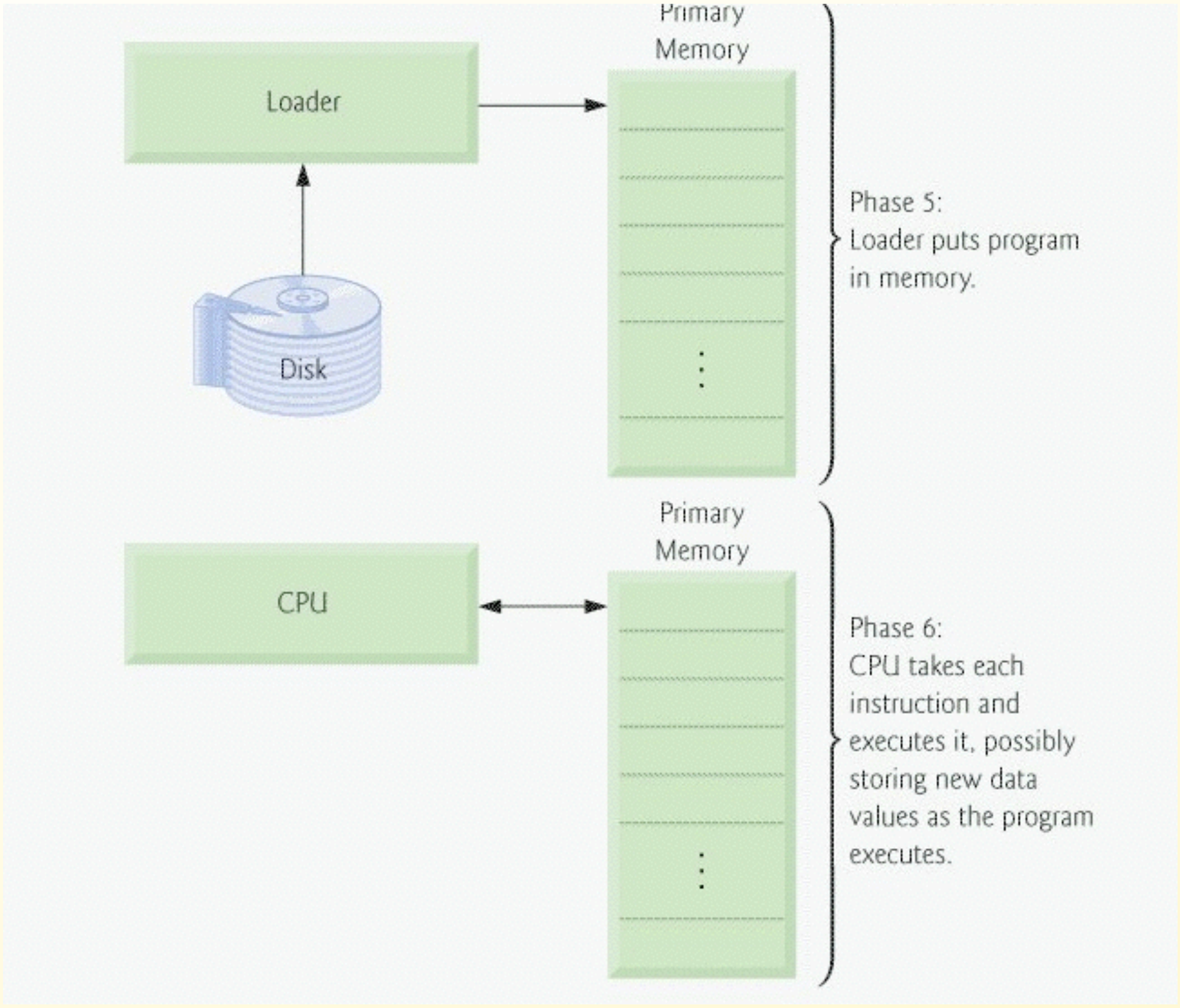
C++ development cycle



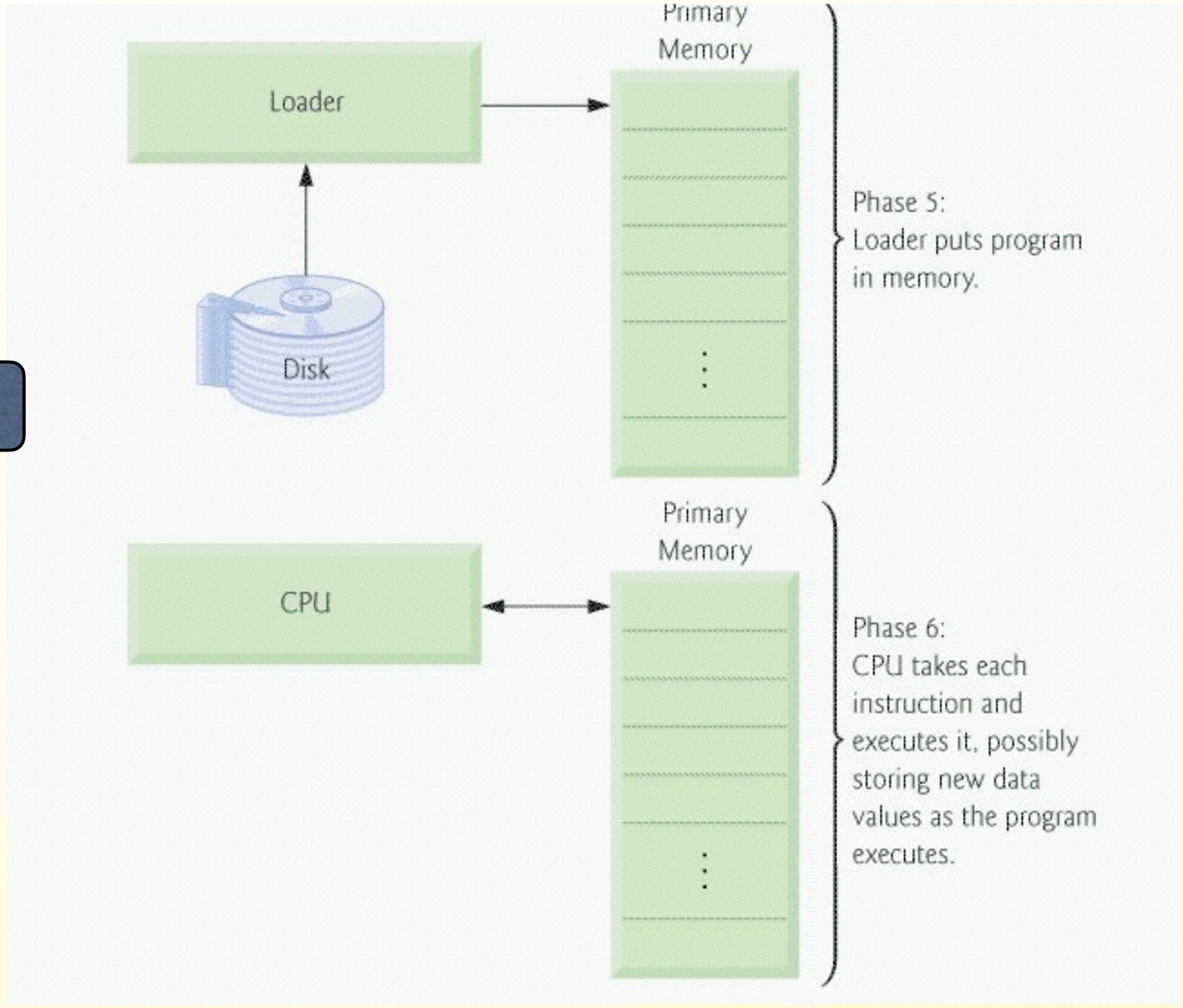
C++ development cycle



C++ development cycle



C++ development cycle



./a.out

Standard output, input, error

- Code 0 : Standard input (typically the keyboard)
- Code 1 : Standard output (typically the screen)
- Code 2 : Standar error (typically the screen)

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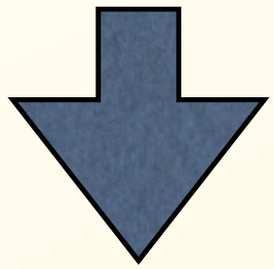

- Code 0 : cin (stdin)
- Code 1 : cout (stdout)
- Code 2 : cerr , clog (stderr)

Standard output, input, error

- Code 0 : Standard input (typically the keyboard)
- Code 1 : Standard output (typically the screen)
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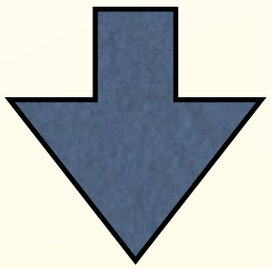

- Code 0 : cin (stdin)
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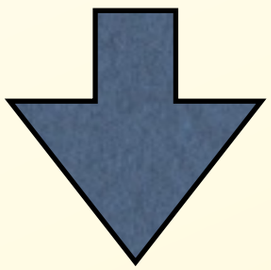
- Code 2 : cerr , clog (stderr)



- ./a.out > datos.dat *(imprimir stdout al archivo datos.dat)*
- ./a.out 1> datos.dat *(imprimir stdout al archivo datos.dat)*
- ./a.out 1> datos.dat 2>log.dat *(imprimir stdout a datos.dat y el stderr a log.dat)*
- ...

Basic program

```cpp
// my first program in C++
#include <iostream>

int main()
{
  std::cout << "Hello World!";
}
```

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```cpp
int main ()
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Basic program

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#include <iostream>

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  std::cout << "Hello World!";
}
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```cpp
int main ()
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  std::cout << " Hello World!";
}
```

```cpp
int main () { std::cout << "Hello World!"; }
```

Basic program

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// my first program in C++
#include <iostream>

int main()
{
  std::cout << "Hello World!";
}
```

```
int main ()
{
  std::cout << " Hello World!";
}
```

```
int main () { std::cout << "Hello World!"; }
```

```
int main ()
{
  std::cout <<
    "Hello World!";
  std::cout
    << "I'm a C++ program";
}
```

Basic program

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// my first program in C++
#include <iostream>

int main()
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  std::cout << "Hello World!";
}
```

```
int main ()
{
  std::cout << " Hello World!";
}
```

```
int main () { std::cout << "Hello World!"; }
```

```
int main ()
{
  std::cout <<
    "Hello World!";
  std::cout
    << "I'm a C++ program";
}
```

```
int main()
{ // prints "Hello, World!":
  cout << "Hello, W" << 'o' << "rld" << '!' << '\n';
}
```

Comments

```
1  /* my second program in C++
2     with more comments */
3
4  #include <iostream>
5
6  int main ()
7  {
8    std::cout << "Hello World! ";      // prints Hello World!
9    std::cout << "I'm a C++ program"; // prints I'm a C++ program
10 }
```

Ejercicios

1. Write a C++ program that displays your name and address (or if you value your privacy, a fictitious name and address).
2. Write a C++ program that asks for a distance in furlongs and converts it to yards. (One furlong is 220 yards.)

1. What is the correct value to return to the operating system upon the successful completion of a program?
A. -1
B. 1
C. 0
D. Programs do not return a value.

2. What is the only function all C++ programs must contain?
A. `start()`
B. `system()`
C. `main()`
D. `program()`

3. What punctuation is used to signal the beginning and end of code blocks?
A. `{ }`
B. `->` and `<-`
C. `BEGIN` and `END`
D. `(` and `)`

4. What punctuation ends most lines of C++ code?
A. `.`
B. `;`
C. `:`
D. `'`

5. Which of the following is a correct comment?
A. `*/ Comments */`
B. `** Comment **`
C. `/* Comment */`
D. `{ Comment }`

6. What header file do you need to use to get access to cout?
A. `stream`
B. nothing, it is available by default
C. `iostream`
D. `using namespace std;`

1.1 Describe the two ways to include comments in a C++ program.

1.2 What is wrong with this program?

```
#include <iostream>
int main()
{ //  prints "Hello, World!":
  cout << "Hello, World!\n"
}
```

1.3 What is wrong with the following C-style comment?

```
cout << "Hello, /* change? */ World.\n";
```

1.4 What's wrong with this program:

```
#include <iostream>;
int main
{ // prints "n = 22":
  n = 22;
  cout << "n = << n << endl;
}
```

1.5 What does a declaration do?

1.6 What is the purpose of the preprocessing directive:

```
#include <iostream>
```

1.7 What is the shortest possible C++ program?

1.8 Where does the name "C++" come from?

1.9 What's wrong with these declarations:

```
int first = 22, last = 99, new = 44, old = 66;
```

1.10 In each of the following, assume that `m` has the value 5 and `n` has the value 2 before the statement executes. Tell what the values of `m` and `n` will be after each of the following statements executes:

a. `m *= n++;`

b. `m += --n;`

1.11 Evaluate each of the following expressions, assuming in each case that `m` has the value 25 and `n` has the value 7:

a. `m - 8 - n`

b. `m = n = 3`

c. `m%n`

d. `m%n++`

e. `m%++n`

f. `++m - n--`

1.1 Write four different C++ statements, each subtracting 1 from the integer variable `n`.

1.2 Write a block of C++ code that has the same effect as the statement

```
n = 100 + m++;
```

without using the post-increment operator.

1.3 Write a block of C++ code that has the same effect as the statement

```
n = 100 + ++m;
```

without using the pre-increment operator.

1.4 Write a single C++ statement that subtracts the sum of `x` and `y` from `z` and then increments `y`.

1.5 Write a single C++ statement that decrements the variable `n` and then adds it to `total`.

1.6 Write a program that prints the first sentence of the Gettysburg Address (or your favorite quotation).

1.7 Write a program that prints the block letter "B" in a 7×6 grid of stars like this:

```
*****
*    *
*    *
*****
*    *
*    *
*****
```

1.8 Write and run a program that prints the first letter of your last name as a block letter in a 7×7 grid of stars.

1.9 Write and run a program that shows what happens when each of the following ten "escape sequences" is printed: `\a`, `\b`, `\n`, `\r`, `\t`, `\v`, `\'`, `\"`, `\\`, `\?`.

1.12 Parse the following program, identifying all the keywords, identifiers, operators, literals, punctuation, and comments:

```
int main()
{ int n;
  cin >> n;
  n *= 3;  // multiply n by 3
  cout << "n=" << n << endl;
}
```

1.13 Identify and correct the error in each of the following:

a. `cout >> count;`

b. `int double=44;`

1.14 How do the following two statements differ:

```
char ch = 'A';
char ch = 65;
```

1.15 What code could you execute to find the character whose ASCII code is 100?

1.16 What does "floating-point" mean, and why is it called that?

1.17 What is numeric overflow?

1.18 How is integer overflow different from floating-point overflow?

1.19 What is a run-time error? Give examples of two different kinds of run-time errors.

1.20 What is a compile-time error? Give examples of two different kinds of compile-time errors.