Laboratorio di Tecnologie dell'Informazione

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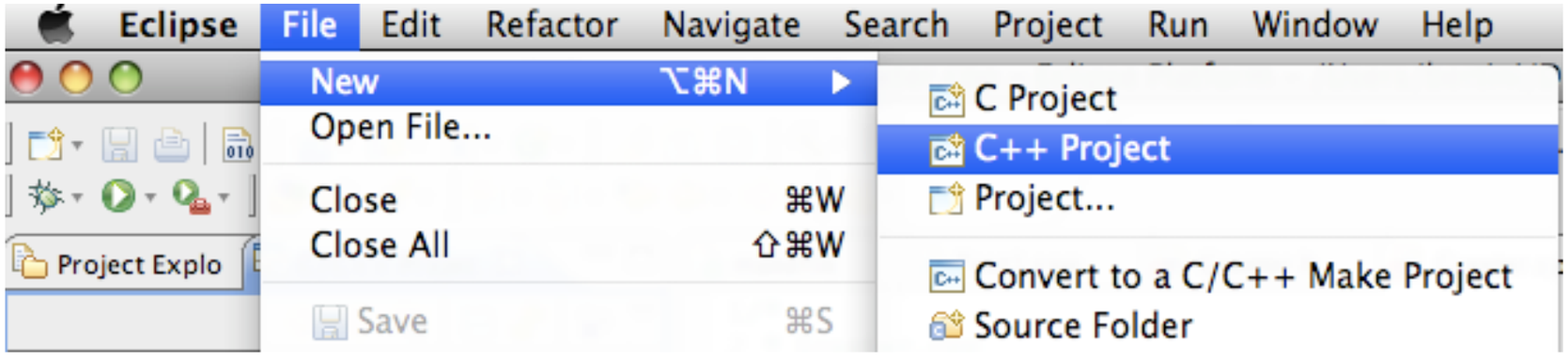
Building a "Hello world" with Eclipse

"When debugging, novices insert corrective code; experts remove defective code."
- Richard Pattis

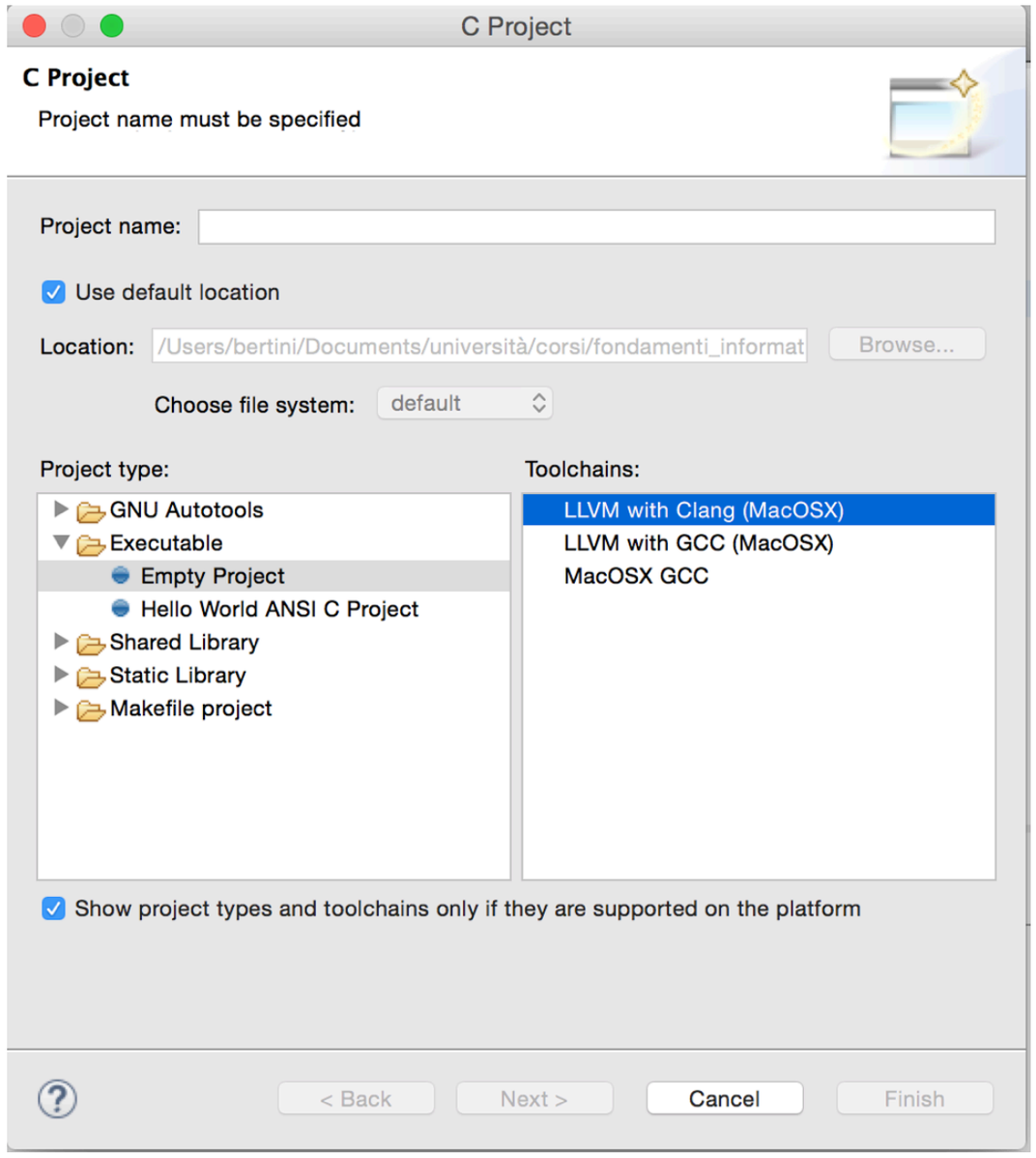
Use the project wizard

- File > New > C++ Project
- Select the "Executable" type: Eclipse will manage automatically the Makefile
- The Makefile project instead requires that the user manages the Makefile (though Eclipse can create a sample one)



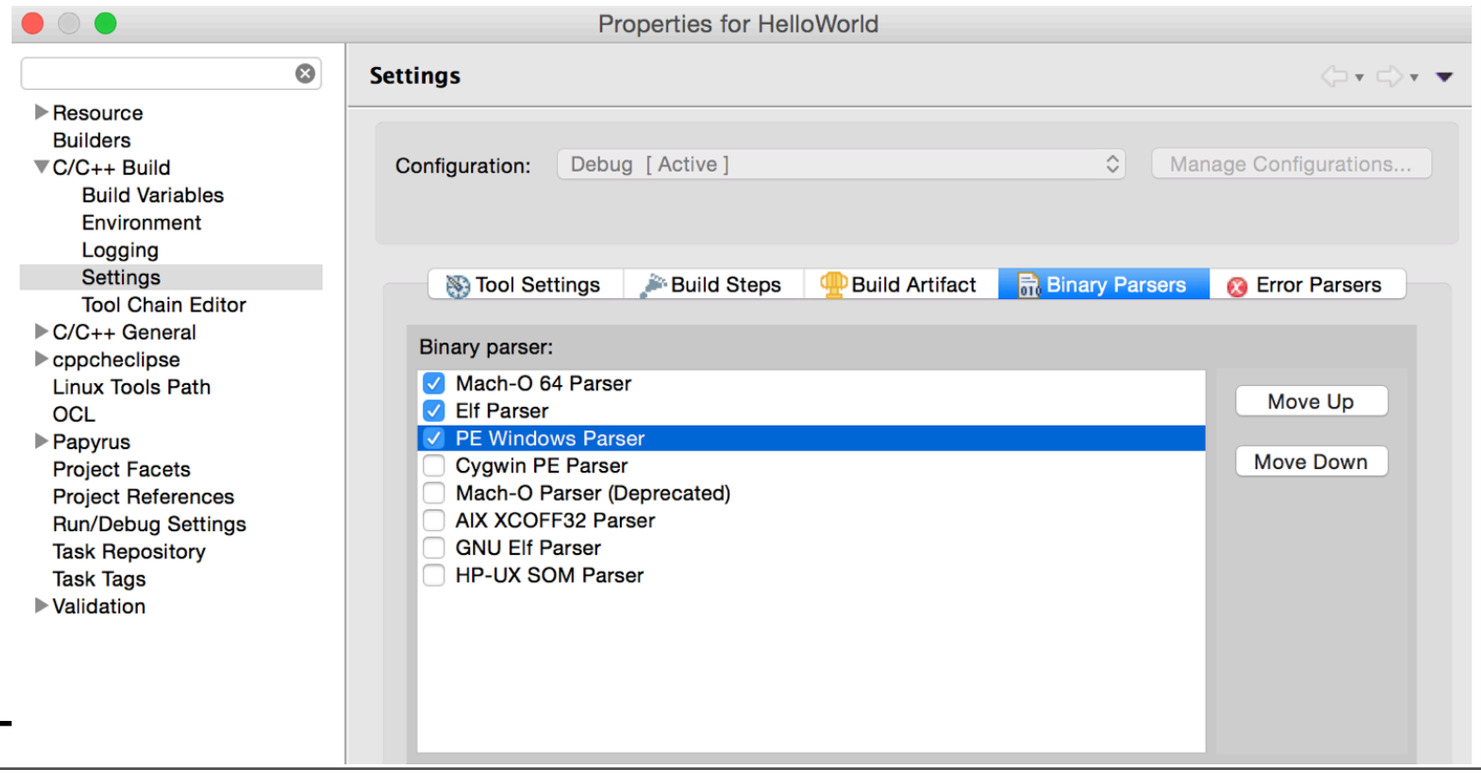
Select the right toolchain

- Eclipse can compile using different compilers, check that the toolchain is the right one:
  - OS X: LLVM with Clang (most recent)
  - Windows: MINGW GCC



Check the binary parser

- Eclipse can compile for different operating systems. Check that it can recognize the binary file (e.g. program) of your current operating system.
- Project properties ->C/C++ Build ->Settings -> Binary parsers
  - OS X: Mach-O 64 Parser
  - Windows: PE Windows Parser
  - Linux: Elf Parser



Add a .cpp and .h files

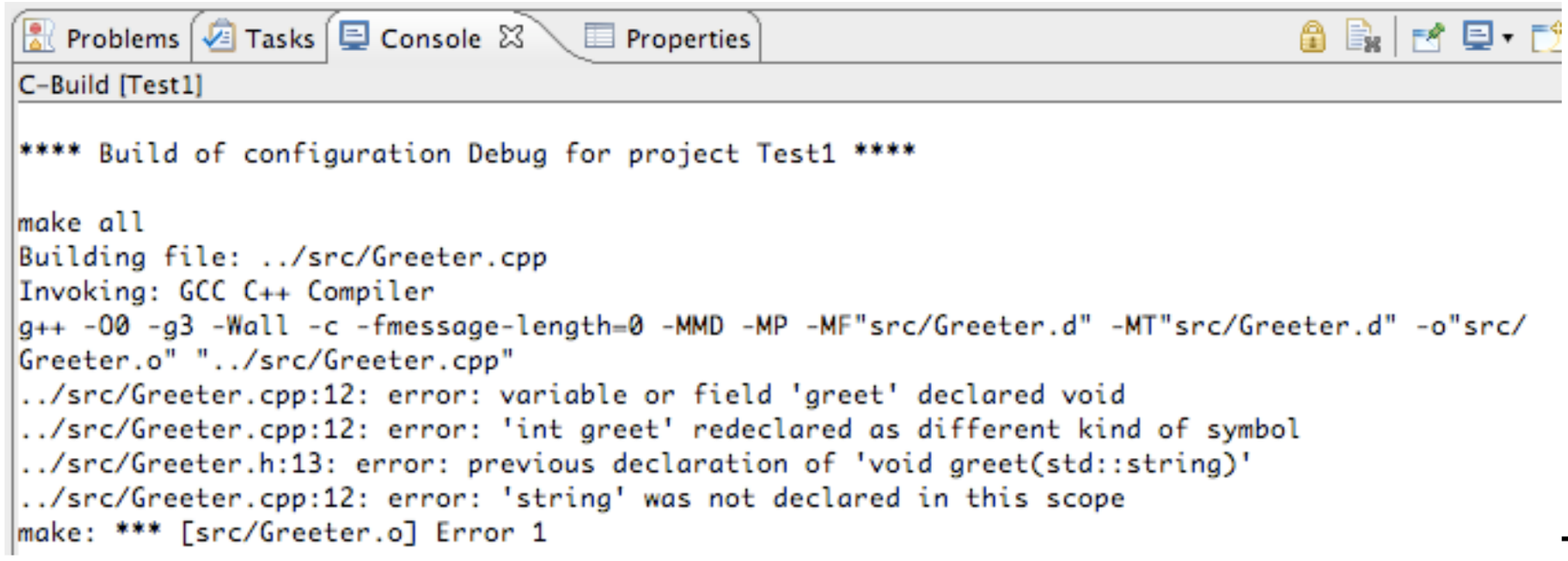
- Add, for example a .h file that contains a function to greet a user, given his name, and add the prototype in the include
  - if the include is generated by Eclipse, it will provide automatically the #define guards

```
/*
 * Greeter.h
 *
 *  Created on: 26-feb-2009
 *      Author: bertini
 */

#ifndef GREETER_H_
#define GREETER_H_

#include <string>

void greet(std::string name);


#endif /* GREETER_H_ */
```

Compile

- Let's say the code has been written in the .cpp (including all the includes required, e.g. iostream and the greeter.h): compile using Project > Build project

- Check the compile errors (shown in the console panel and in the problems panel)



Compile errors

- Don’t panic
- Start reading (carefully) the messages from the first to the last. Solve the first errors, perhaps they have an influence on the others.
- In the example the first error is in the .cpp

Compile errors - cont.

Eclipse shows where there's a problem

makefile | Test1.cpp | Greeter.h | Greeter.cpp | »70

```
1 /*
2  * Greeter.cpp
3  *
4  *  Created on: 26-feb-2009
5  *      Author: bertini
6  */
7
8 #include "Greeter.h"
9
10 #include <iostream>
11
12 void greet(string name) {
13     std::cout << name << std::endl;
14 }
15
```

Problems | Tasks | Console | Properties

C-Build [Test1]

```
**** Build of configuration Debug for project Test1 ****

make all
Building file: ../src/Greeter.cpp
Invoking: GCC C++ Compiler
g++ -O0 -g3 -Wall -c -fmessage-length=0 -MMD -MP -MF"src/Greeter.d" -MT"sr
Greeter.o" "../src/Greeter.cpp"
../src/Greeter.cpp:12: error: variable or field 'greet' declared void
../src/Greeter.cpp:12: error: 'int greet' redeclared as different kind of
../src/Greeter.h:13: error: previous declaration of 'void greet(std::strin
../src/Greeter.cpp:12: error: 'string' was not declared in this scope
make: *** [src/Greeter.o] Error 1
```

Read the message: the declaration does not match the prototype; the string was not declared

Compile errors - cont.

- Correct the error: in this case it was necessary to add `std::` to string (we are not using "`using namespace std;`" in this file !
- Build again to check the correction

makefile | Test1.cpp | Greeter.h | Greeter.cpp | »70

```
1/*
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3 *
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12void greet(std::string name) {
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15
```

Problems | Tasks | Console | Properties

C-Build [Test1]

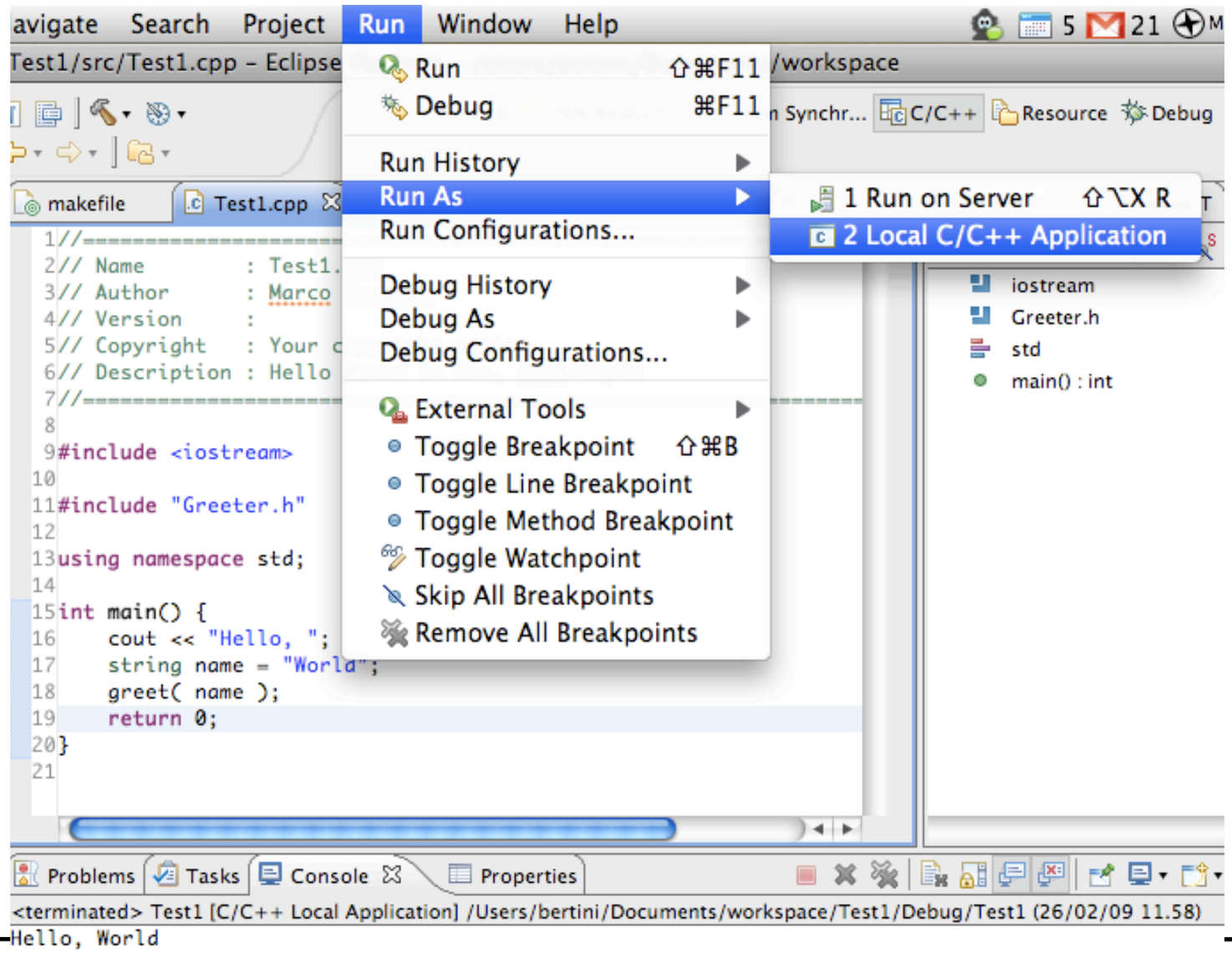
```
Finished building: ../src/Greeter.cpp

Building file: ../src/Test1.cpp
Invoking: GCC C++ Compiler
g++ -O0 -g3 -Wall -c -fmessage-length=0 -MMD -MP -MF"src/Test1.d" -MT"src
"../src/Test1.cpp"
Finished building: ../src/Test1.cpp

Building target: Test1
Invoking: MacOS X C++ Linker
g++  -o "Test1"  ./src/Greeter.o ./src/Test1.o
Finished building target: Test1
```

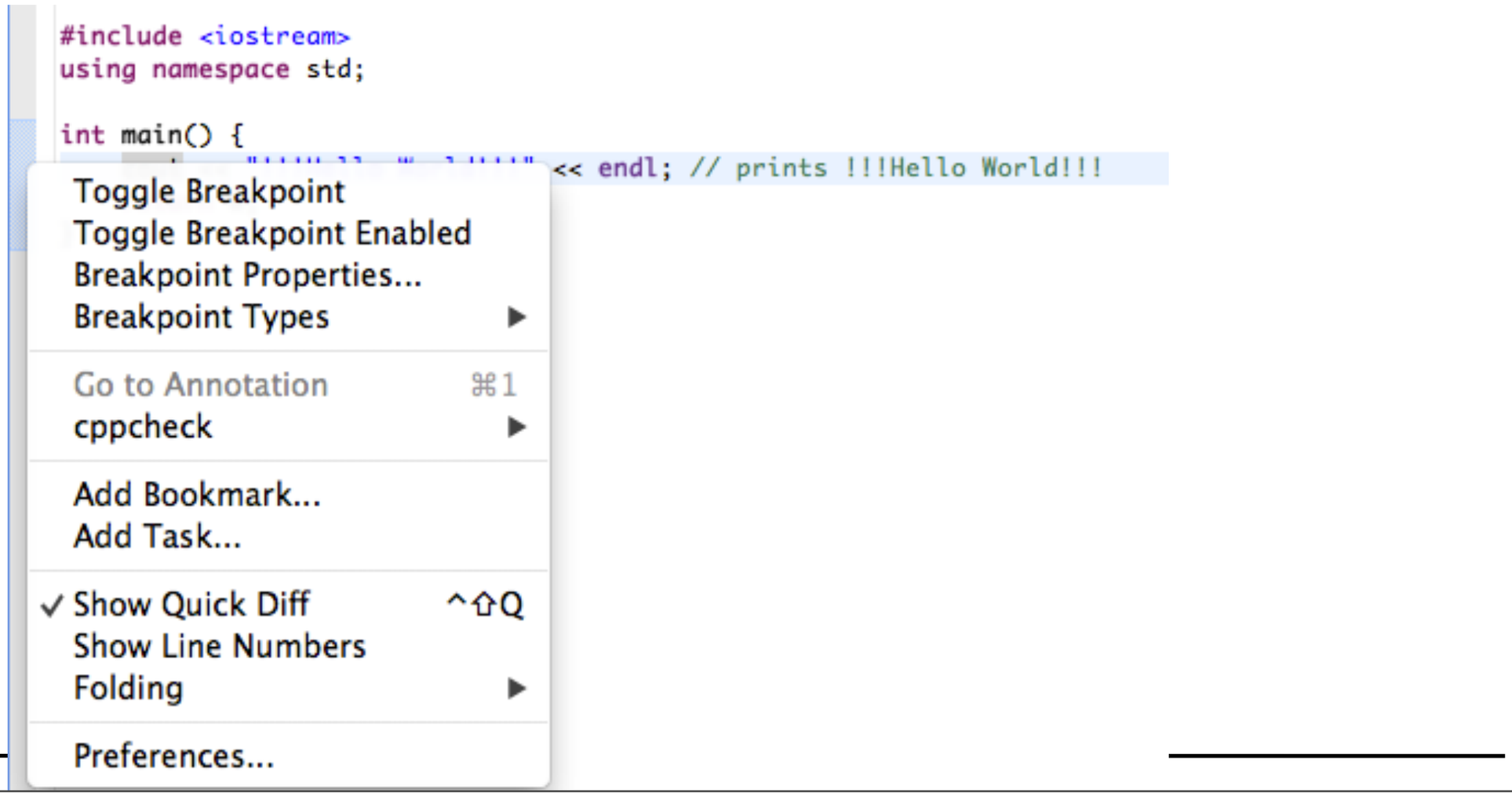
Run the program

- Use the menu Run > Run as > Local C/C++ application. Later on the program will appear in the Run History



Debug the program

- In order to debug the program must be compiled so that additional information, useful for the debugger, is added to the files
- Add a breakpoint in Eclipse (right menu on the right side of the line), then execute the program in the debugger (Run > Debug as > Local C/C++ application)



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

int main() {
    cout << "!!!Hello World!!!" << endl; // prints !!!Hello World!!!
    return 0;
}
```

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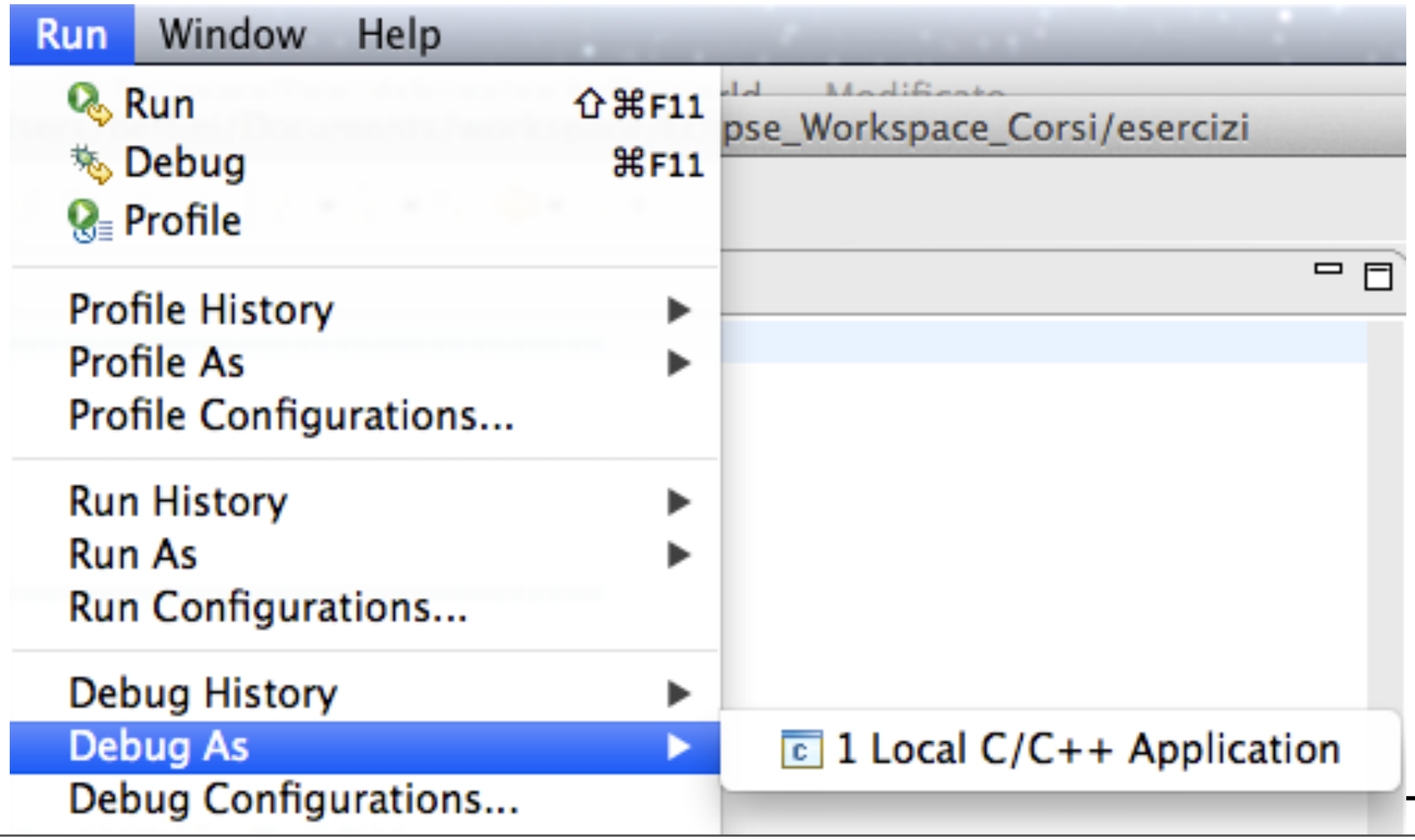

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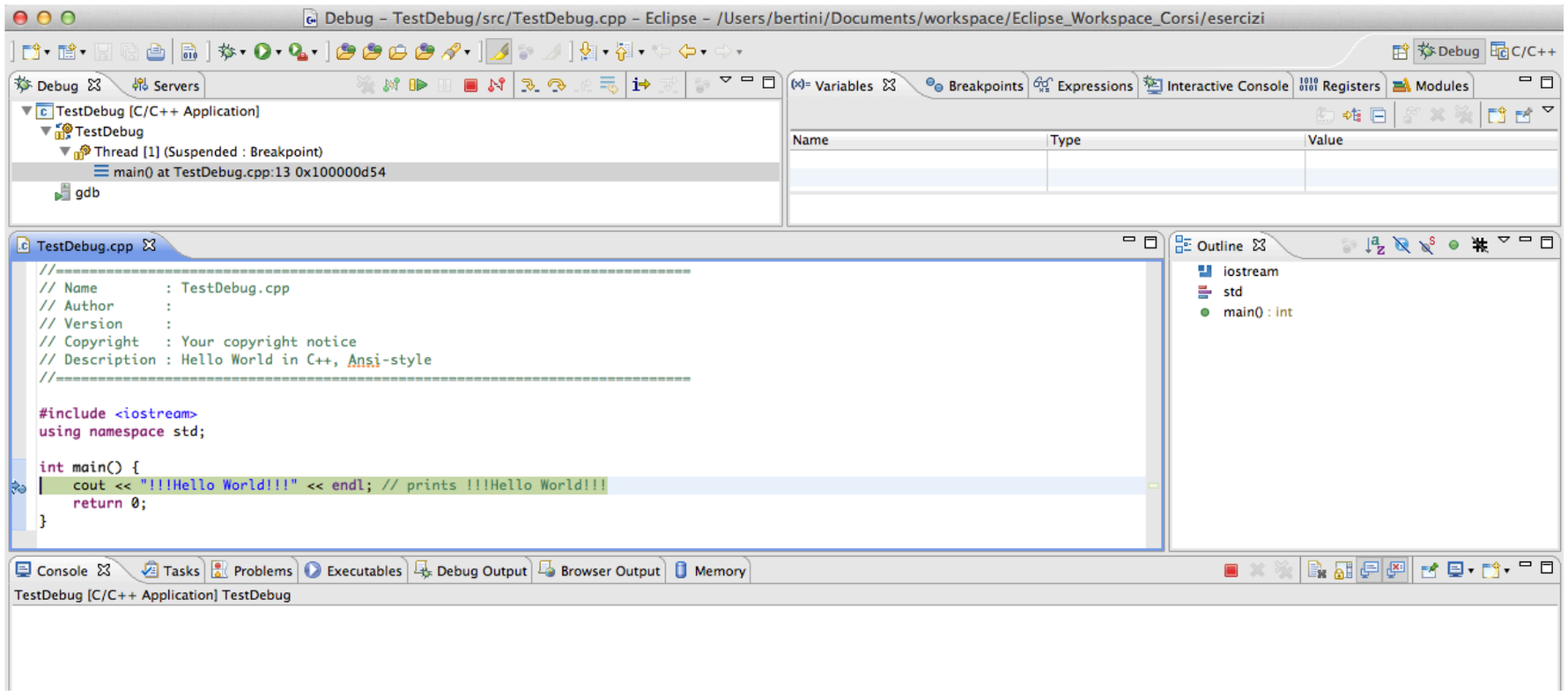

Some style guidelines

- There are a plethora of C++ coding style recommendations, sometimes even contradictory.
- Two very good recommendations:

1. Any violation to the guidelines is allowed if it enhances readability.
2. The rules can be violated if there are strong personal objections against them.

Naming conventions

- Names representing types must be in mixed case starting with upper case: follow this rule when writing classes.
- Variable names must be in mixed case starting with lower case (like Java).
- Names representing methods or functions must be verbs and written in mixed case starting with lower case (like Java).

Naming conventions - cont.

- Names representing namespaces should be all lowercase.
- All names should be written in English.

Files

- C++ header files should have the extension .h (preferred) or .hpp. Source files can have the extension .c++, .C, .cc or .cpp.
- A class should be declared in a header file and defined in a source file where the name of the files match the name of the class.
- Header files must contain an include guard.
- Include statements must be located at the top of a file only.