Web Architectures
Assignment 1

Antonio Pio Padalino

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Contents

1 Developing a Java Web Server and launching a process

1.1 Introduction

The first part of the Assignment concerns the development of a Web Server which responds to dynamic queries launching an external process. In particular, all the URLs starting with the token "process" should launch an external Java class, which takes a string as parameter and returns it reversed. To achieve that, the simple `TinyHttpd` seen in class has been used as starting point, modifying the way it handles requests with the `process` token.

1.2 Methods

To address the assignment, `TinyHttpdConnection.java` has been extended to make it able to dynamically respond to the presence of the `process` token: if the URL starts with `process` and no parameters are passed, a simple .html page containing a form is presented to the user, to fill in with the string to reverse; if the URL starts with `process` and a parameter has been passed (be it through the form or directly in the URL) an external process (`StringFormatter`)[2] is launched to revert the string. Such process is called using a `ProcessBuilder`[3] and a shell command `java <path-to-class> arg` to pass the argument string. Finally the reversed word, together with the original one, is shown in a simple result page. For general issues regarding Java programming, help websites such as geeksforgeeks.org [1] have been consulted.

1.3 Screenshots

Here is the app running through the various steps:

Figure 1: The web server redirects on a generic Hello World page if no token is specified.

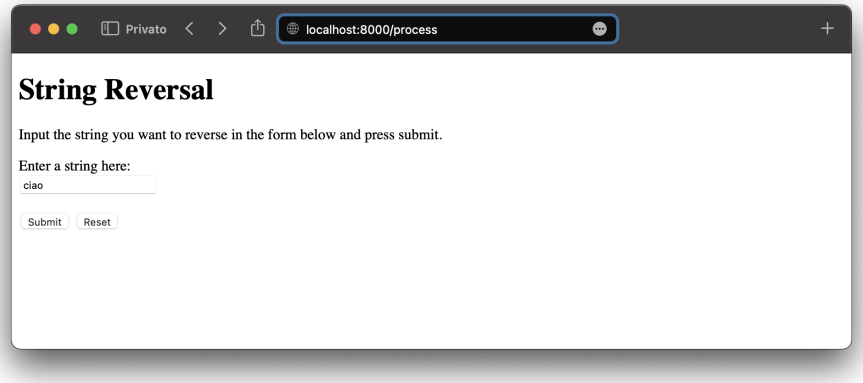

Figure 2: If `process` is specified but no parameters are passed, the server displays an .html page with a form to fill in with the string to reverse.

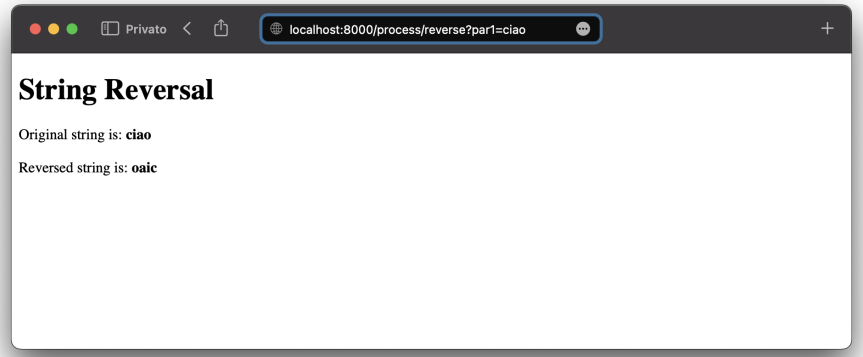

Figure 3: After supplying the parameter `par1`, the server execute the external process `StringFormatter.java` and display the reversed string together with the original one.

2 Running an external process on an Apache Web Server

2.1 Introduction

The second part of the Assignment concerns the use of an Apache Web Server to run dynamic queries to the `StringFormatter.java` class defined before, using a .sh or .bat file.

2.2 Methods

After installing XAMPP and starting an Apache Web Server, a `reverse.bat` has been written[4] inside `/xampp/cgi-bin` to call the java class created for the part 1 of the assignment. The batch file is as following:

```
@echo off
set arg1=%1
echo Content-type: text/plain
echo.
cd C:\Users\azel\Assignment1\target\classes
for /f %%i in ('java it.unitn.padalino.assignment1.StringFormatter %1') do set RESULT
    =%%i
echo String Reversal
echo.
echo Original string is: %1
echo Reversed string is: %RESULT%
```

The `reverse.bat` file takes a string as argument and echoes the reversed string together with the original one. In the server, one can pass a string with `?` followed by the argument. For example, `localhost/cgi-bin/reverse.bat?roma` will pass `roma` to the `StringFormatter` and return `amor`. Notice that `echo Content-type: text/plain` is used to specify to the client that the content is to be written as plain text.

2.3 Screenshots

Here is the app running through the various steps:

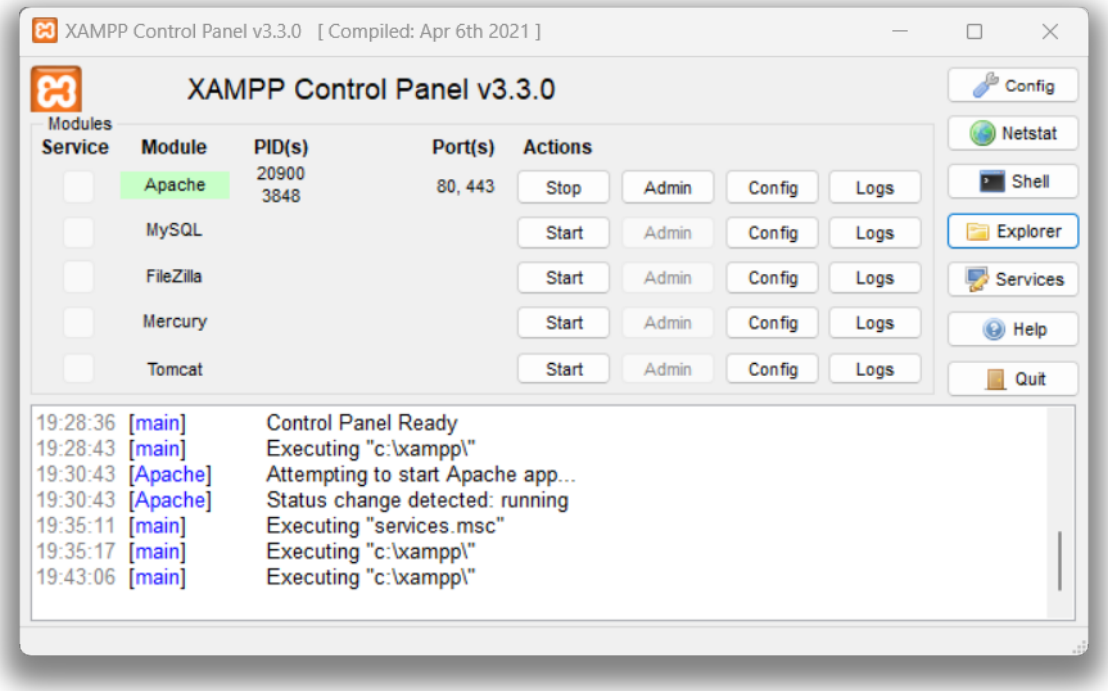

Figure 4: XAMPP running on Windows. The Apache Web Server is active on port 80.

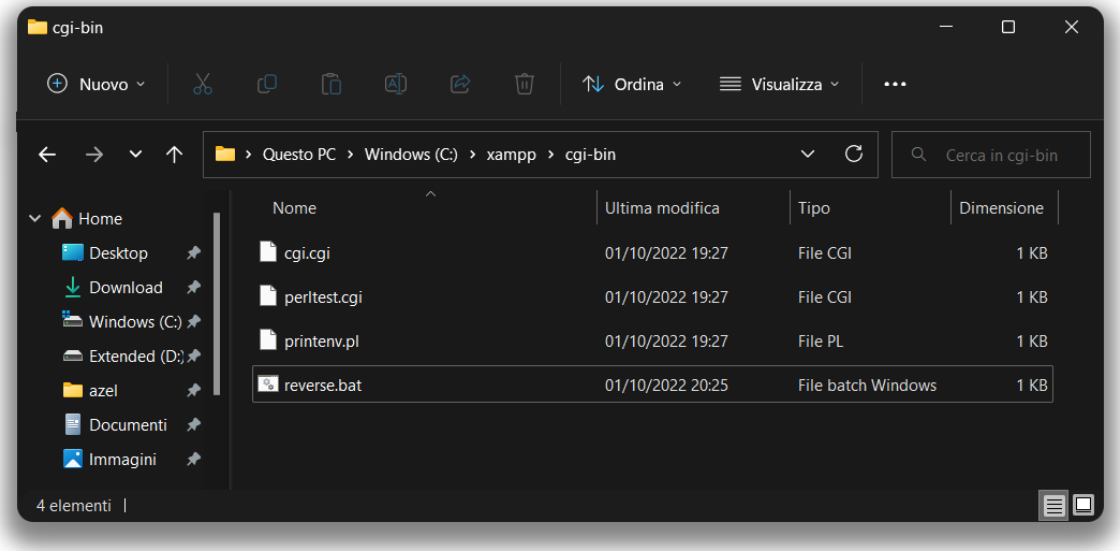

Figure 5: The `reverse.bat` file is placed inside `/xampp/cgi-bin`.

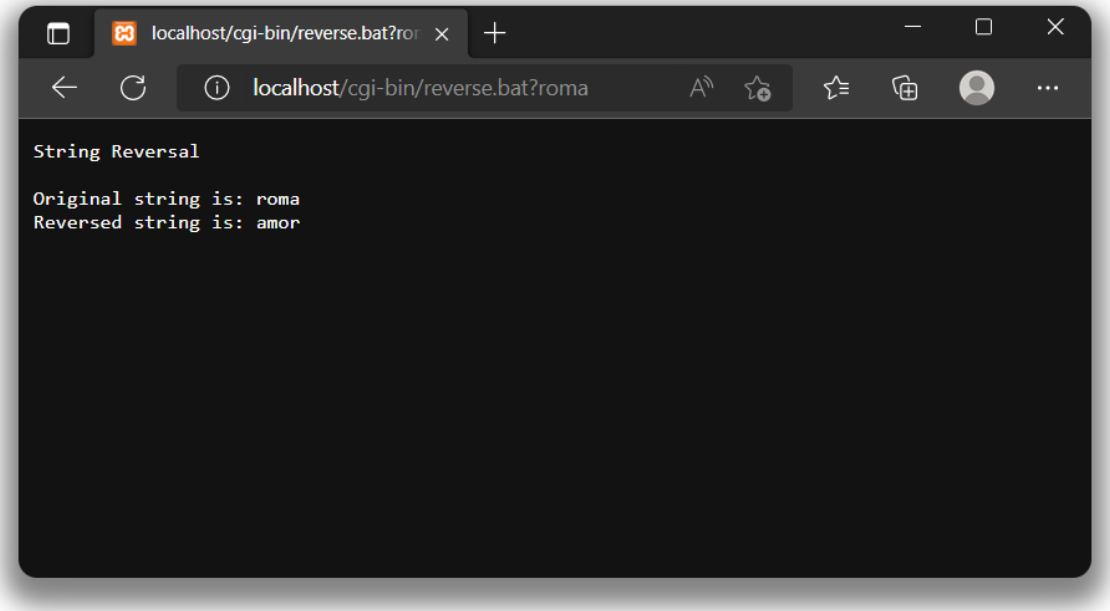

Figure 6: When inside `localhost/cgi-bin/reverse.bat` the batch script is executed, and with `?` a parameter is passed (in this case the string to reverse is `roma`.

2.4 Comments and notes

Notice that the first part of the assignment has been carried out in a UNIX environment (MacOS 12.6), while the XAMPP Web Server was deployed on a Windows machine. This is due to a problem with calling a java class from inside a shell file in `/cgi-bin` on Mac. The shell file which retrieve a string, call the java class and echoes the reverses string doesn't seem to work when called in `localhost/cgi-bin/reverse.sh`, but works fine if executed from terminal. Unfortunately, I was unable to find a correct solution on Mac, but on Windows - as it was also highlighted by other students on the Moodle forum - a workaround on the batch file solves the issue.

References

[1] geeksforgeeks.org. *Java programming fundamentals.* `https://www.geeksforgeeks.org/java/`.

[2] javatpoint.com. *How to reverse a string in Java.* `https://www.javatpoint.com/how-to-reverse-string-in-java`.

[3] mykong.com. *How to exeute shell command from java.* `https://mkyong.com/java/how-to-execute-shell-command-from-java/`.

[4] tutorialspoint.com. *Batch Scripting Tutorial.* `https://www.tutorialspoint.com/batch_script/index.htm`.