



Piscine Reloaded

It's good to be back

Summary:

The Piscine was good but the time has past. This serie of exercises will help you to remind all the basics you've learned during the piscine. Functions, loops, pointers, structures, let's remind together the syntactic and semantic bases of the C

Version: 1.2

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Chapter I

Foreword

Edward Joseph Snowden (born June 21, 1983) is an American computer professional, former Central Intelligence Agency (CIA) employee, and former contractor for the United States government who copied and leaked classified information from the National Security Agency (NSA) in 2013 without authorization. His disclosures revealed numerous global surveillance programs, many run by the NSA and the Five Eyes Intelligence Alliance with the cooperation of telecommunication companies and European governments.

In 2013, Snowden was hired by an NSA contractor, Booz Allen Hamilton, after previous employment with Dell and the CIA. On May 20, 2013, Snowden flew to Hong Kong after leaving his job at an NSA facility in Hawaii, and in early June he revealed thousands of classified NSA documents to journalists Glenn Greenwald, Laura Poitras, and Ewen MacAskill. Snowden came to international attention after stories based on the material appeared in *The Guardian* and *The Washington Post*. Further disclosures were made by other publications including *Der Spiegel* and *The New York Times*.

On June 21, 2013, the U.S. Department of Justice unsealed charges against Snowden of two counts of violating the Espionage Act of 1917 and theft of government property. Two days later, he flew into Moscow's Sheremetyevo Airport, but Russian authorities noted that his U.S. passport had been cancelled and he was restricted to the airport terminal for over one month. Russia ultimately granted him right of asylum for one year, and repeated extensions have permitted him to stay at least until 2020. He reportedly lives in an undisclosed location in Moscow, and continues to seek asylum elsewhere in the world.

A subject of controversy, Snowden has been variously called a hero, a whistleblower, a dissident, a traitor and a patriot. His disclosures have fueled debates over mass surveillance, government secrecy, and the balance between national security and information privacy.

If you'd like to find out more, we recommend you watch the documentary *Citizenfour*.

Chapter II

Introduction

The `Piscine Reloaded` is a best-of of the exercises you did during the `C Piscine` to remind you all the basics of the `C` programming language.

If you have already done some of these exercises during the `Piscine C`, we highly recommend not be tempted to retrieve your old code. The learning of programming involves practice and making an existing code has no interest.

Chapter III


General rules

- Only this page will serve as reference; do not trust rumors.
- Make sure you have the appropriate permissions on your files and directories.
- You have to follow the turn-in procedures for every exercise.
- Your exercises will **only** be checked and graded by a program called Moulinette.
- Moulinette is very meticulous and strict in its evaluation of your work. It is entirely automated and there is no way to negotiate with it. So if you want to avoid bad surprises, be as thorough as possible.
- Exercises in Shell must be executable with `/bin/sh`.
- You cannot leave any additional file in your directory than those specified in the subject.
- Got a question? Ask your peer on the right. Otherwise, try your peer on the left.
- Your reference guide is called `Google / man / the Internet /`
- Examine the examples thoroughly. They could very well call for details that are not explicitly mentioned in the subject...
- Moulinette is not very open-minded. It won't try and understand your code if it doesn't respect the Norm. Moulinette relies on a program called `norminette` to check if your files respect the norm. TL;DR: it would be idiotic to submit a piece of work that doesn't pass `norminette`'s check.
- Using a forbidden function is considered cheating. Cheaters get **-42**, and this grade is non-negotiable.
- You'll only have to submit a `main()` function if we ask for a program.
- Moulinette compiles with these flags: `-Wall -Wextra -Werror`, and uses `CC`.
- If `ft_putchar()` is an authorized function, we will compile your code with our `ft_putchar.c`.
- If your program doesn't compile, you'll get 0.

- By Odin, by Thor! Use your brain!!!

Chapter IV

Exercise 00 : Oh yeah, mooore...

	Exercise 00
Oh yeah, mooore...	
Turn-in directory : <i>ex00/</i>	
Files to turn in : <i>exo.tar</i>	
Allowed functions : None	

- Create the following files and directories. Do what's necessary so that when you use the `ls -l` command in your directory, the output will looks like this :

```
%> ls -l
total XX
drwx--xr-x 2 XX XX XX Jun 1 20:47 test0
-rwx--xr-- 1 XX XX 4 Jun 1 21:46 test1
dr-x---r-- 2 XX XX XX Jun 1 22:45 test2
-r-----r-- 2 XX XX 1 Jun 1 23:44 test3
-rw-r-----x 1 XX XX 2 Jun 1 23:43 test4
-r-----r-- 2 XX XX 1 Jun 1 23:44 test5
lrwxrwxrwx 1 XX XX 5 Jun 1 22:20 test6 -> test0
%>
```


- About the hours, it will be accepted if the year is diplayed in the case of the exercise's date (1 Jun) is outdated by six month or more.
- Once you've done that, run `tar -cf exo.tar *` to create the file to be submitted.



Don't worry about what you've got instead of "XX".

Chapter V

Exercise 01 : Z


	Exercise 01
Only the best know how to display Z	
Turn-in directory : <i>ex01/</i>	
Files to turn in : z	
Allowed functions : None	

- Create a file called **z** that returns "Z", followed by a new line, whenever the command **cat** is used on it.

```
?>cat z
Z
?>
```

Chapter VI

Exercise 02 : clean

	Exercise 02
Turn-in directory : <i>ex02/</i>	
Files to turn in : clean	
Allowed functions : None	

- In a file called **clean** place the command line that will search for all files - in the current directory as well as in its sub-directories - with a name ending by ~, or with a name that start and end by #
- The command line will show and erase all files found.
- Only one command is allowed: no ';' or '&&' or other shenanigans.



`man find`


Exercise 03 : find_sh



- ```
$> ./find_sh.sh | cat -e
find_sh$
file1$
file2$
file3$
$>
```

# Chapter VIII

## Exercise 04 : MAC

|                                                                                   |                                  |
|-----------------------------------------------------------------------------------|----------------------------------|
|  | Exercise 04                      |
|                                                                                   | MAC.sh                           |
|                                                                                   | Turn-in directory : <i>ex04/</i> |
|                                                                                   | Files to turn in : <b>MAC.sh</b> |
|                                                                                   | Allowed functions : <b>None</b>  |


- Write a command line that displays your machine's MAC addresses. Each address must be followed by a line break.



`man ifconfig`

# Chapter IX

## Exercise 05 : Can you create it ?

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 05 |
| Can you create it ?                                                               |             |
| Turn-in directory : <i>ex05/</i>                                                  |             |
| Files to turn in : "\?\${*}MaRViN'*\$?\\"                                         |             |
| Allowed functions : None                                                          |             |

- Create a file containing only "42", and NOTHING else.
- Its name will be :


```
"\?${*}MaRViN'*$?\\"
```

- Example :

```
$>ls -lRa *MaRV* | cat -e
-rw---xr-- 1 75355 32015 2 Oct 2 12:21 "\?${*}MaRViN'*$?\\"$
$>
```

# Chapter X

## Exercise 06 : ft\_print\_alphabet


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 06 |
| ft_print_alphabet                                                                 |             |
| Turn-in directory : <i>ex06/</i>                                                  |             |
| Files to turn in : <code>ft_print_alphabet.c</code>                               |             |
| Allowed functions : <code>ft_putchar</code>                                       |             |

- Create a function that displays the alphabet in lowercase, on a single line, by ascending order, starting from the letter 'a'.
- Here's how it should be prototyped :

```
void ft_print_alphabet(void);
```

# Chapter XI

## Exercise 07 : ft\_print\_numbers


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 07 |
| ft_print_numbers                                                                  |             |
| Turn-in directory : <i>ex07/</i>                                                  |             |
| Files to turn in : <code>ft_print_numbers.c</code>                                |             |
| Allowed functions : <code>ft_putchar</code>                                       |             |

- Create a function that displays all digits, on a single line, by ascending order.
- Here's how it should be prototyped :

```
void ft_print_numbers(void);
```

# Chapter XII

## Exercise 08 : ft\_is\_negative

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 08 |
| ft_is_negative                                                                    |             |
| Turn-in directory : <i>ex08/</i>                                                  |             |
| Files to turn in : <b>ft_is_negative.c</b>                                        |             |
| Allowed functions : <b>ft_putchar</b>                                             |             |


- Create a function that displays 'N' or 'P' depending on the integer's sign entered as a parameter. If **n** is negative, display 'N'. If **n** is positive or null, display 'P'.
- Here's how it should be prototyped :

```
void ft_is_negative(int n);
```



# Chapter XIII

## Exercise 09 : ft\_ft


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 09 |
| ft_ft                                                                             |             |
| Turn-in directory : <i>ex09/</i>                                                  |             |
| Files to turn in : <b>ft_ft.c</b>                                                 |             |
| Allowed functions : <b>None</b>                                                   |             |

- Create a function that takes a pointer to int as a parameter, and sets the value "42" to that int.
- Here's how it should be prototyped :

```
void ft_ft(int *nbr);
```

# Chapter XIV

## Exercise 10 : ft\_swap


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 10 |
| ft_swap                                                                           |             |
| Turn-in directory : <i>ex10/</i>                                                  |             |
| Files to turn in : <b>ft_swap.c</b>                                               |             |
| Allowed functions : None                                                          |             |

- Create a function that swaps the value of two integers whose addresses are entered as parameters.
- Here's how it should be prototyped :

```
void ft_swap(int *a, int *b);
```

# Chapter XV

## Exercise 11 : ft\_div\_mod

|                                                                                   |                                        |
|-----------------------------------------------------------------------------------|----------------------------------------|
|  | Exercise 11                            |
|                                                                                   | ft_div_mod                             |
|                                                                                   | Turn-in directory : <i>ex11/</i>       |
|                                                                                   | Files to turn in : <i>ft_div_mod.c</i> |
|                                                                                   | Allowed functions : None               |


- Create a function `ft_div_mod` prototyped like this :

```
void ft_div_mod(int a, int b, int *div, int *mod);
```

- This function divides parameters `a` by `b` and stores the result in the `int` pointed by `div`. It also stores the remainder of the division of `a` by `b` in the `int` pointed by `mod`.

# Chapter XVI

## Exercise 12 : ft\_iterative\_factorial

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 12 |
| ft_iterative_factorial                                                            |             |
| Turn-in directory : <i>ex12/</i>                                                  |             |
| Files to turn in : <b>ft_iterative_factorial.c</b>                                |             |
| Allowed functions : <b>None</b>                                                   |             |


- Create an iterated function that returns a number. This number is the result of a factorial operation based on the number given as a parameter.
- If there's an error, the function should return 0.
- Here's how it should be prototyped :

```
int ft_iterative_factorial(int nb);
```

- Your function must return its result in less than two seconds.

# Chapter XVII

## Exercise 13 : ft\_recursive\_factorial


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 13 |
| ft_recursive_factorial                                                            |             |
| Turn-in directory : <i>ex13/</i>                                                  |             |
| Files to turn in : <b>ft_recursive_factorial.c</b>                                |             |
| Allowed functions : None                                                          |             |

- Create a recursive function that returns the factorial of the number given as a parameter.
- If there's an error, the function should return 0.
- Here's how it should be prototyped :

```
int ft_recursive_factorial(int nb);
```

# Chapter XVIII

## Exercise 14 : ft\_sqrt

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 14 |
| ft_sqrt                                                                           |             |
| Turn-in directory : <i>ex14/</i>                                                  |             |
| Files to turn in : <b>ft_sqrt.c</b>                                               |             |
| Allowed functions : None                                                          |             |


- Create a function that returns the square root of a number (if it exists), or 0 if the square root is an irrational number.
- Here's how it should be prototyped :

```
int ft_sqrt(int nb);
```

- Your function must return its result in less than two seconds.

# Chapter XIX

## Exercise 15 : ft\_putstr


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 15 |
| ft_putstr                                                                         |             |
| Turn-in directory : <i>ex15/</i>                                                  |             |
| Files to turn in : <b>ft_putstr.c</b>                                             |             |
| Allowed functions : <b>ft_putchar</b>                                             |             |

- Create a function that displays a string of characters on the standard output.
- Here's how it should be prototyped :

```
void ft_putstr(char *str);
```

# Chapter XX

## Exercise 16 : ft\_strlen

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 16 |
| ft_strlen                                                                         |             |
| Turn-in directory : <i>ex16/</i>                                                  |             |
| Files to turn in : <b>ft_strlen.c</b>                                             |             |
| Allowed functions : <b>None</b>                                                   |             |


- Reproduce the behavior of the function **strlen** (man strlen).
- Here's how it should be prototyped :

```
int ft_strlen(char *str);
```



# Chapter XXI

## Exercise 17 : ft\_strcmp


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 17 |
| ft_strcmp                                                                         |             |
| Turn-in directory : <i>ex17/</i>                                                  |             |
| Files to turn in : <b>ft_strcmp.c</b>                                             |             |
| Allowed functions : None                                                          |             |

- Reproduce the behavior of the function **strcmp** (man strcmp).
- Here's how it should be prototyped :

```
int ft_strcmp(char *s1, char *s2);
```

# Chapter XXII

## Exercise 18 : ft\_print\_params


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 18 |
| ft_print_params                                                                   |             |
| Turn-in directory : <i>ex18/</i>                                                  |             |
| Files to turn in : <code>ft_print_params.c</code>                                 |             |
| Allowed functions : <code>ft_putchar</code>                                       |             |

- We're dealing with a program here, you should therefore have a function `main` in your `.c` file.
- Create a program that displays its given arguments.
- Example :

```
$>./a.out test1 test2 test3
test1
test2
test3
$>
```

# Chapter XXIII


## Exercise 19 : ft\_sort\_params

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 19 |
| ft_sort_params                                                                    |             |
| Turn-in directory : <i>ex19/</i>                                                  |             |
| Files to turn in : <b>ft_sort_params.c</b>                                        |             |
| Allowed functions : <b>ft_putchar</b>                                             |             |

- We're dealing with a program here, you should therefore have a function **main** in your **.c** file.
- Create a program that displays its given arguments sorted by ascii order.
- It should display all arguments, except for **argv[0]**.
- All arguments have to have their own line.

# Chapter XXIV

## Exercise 20 : ft\_strdup


|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 20 |
| ft_strdup                                                                         |             |
| Turn-in directory : <i>ex20/</i>                                                  |             |
| Files to turn in : <b>ft_strdup.c</b>                                             |             |
| Allowed functions : <b>malloc</b>                                                 |             |

- Reproduce the behavior of the function **strdup** (man strdup).
- Here's how it should be prototyped :

```
char *ft_strdup(char *src);
```

# Chapter XXV

## Exercise 21 : ft\_range

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 21 |
| ft_range                                                                          |             |
| Turn-in directory : <i>ex21/</i>                                                  |             |
| Files to turn in : <b>ft_range.c</b>                                              |             |
| Allowed functions : <b>malloc</b>                                                 |             |


- Create a function **ft\_range** which returns an array of **ints**. This **int** array should contain all values between **min** and **max**.
- **Min** included - **max** excluded.
- Here's how it should be prototyped :

```
int *ft_range(int min, int max);
```

- If **min**'value is greater or equal to **max**'s value, a null pointer should be returned.

# Chapter XXVI

## Exercise 22 : ft\_abs.h

|                                                                                   |                                    |
|-----------------------------------------------------------------------------------|------------------------------------|
|  | Exercise 22                        |
|                                                                                   | ft_abs.h                           |
|                                                                                   | Turn-in directory : <i>ex22/</i>   |
|                                                                                   | Files to turn in : <b>ft_abs.h</b> |
|                                                                                   | Allowed functions : None           |

- Create a macro ABS which replaces its argument by its absolute value :


```
#define ABS(Value)
```



You are asked to do something that is normally banned by the Norm, that will be the only time we authorize it.

# Chapter XXVII

## Exercise 23 : ft\_point.h

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 23 |
| ft_point.h                                                                        |             |
| Turn-in directory : <i>ex23/</i>                                                  |             |
| Files to turn in : ft_point.h                                                     |             |
| Allowed functions : None                                                          |             |

- Create a file `ft_point.h` that'll compile the following main :

```
#include "ft_point.h"


void set_point(t_point *point)
{
 point->x = 42;
 point->y = 21;
}

int main(void)
{
 t_point point;

 set_point(&point);
 return (0);
}
```

# Chapter XXVIII

## Exercise 24 : Makefile

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 24 |
| Makefile                                                                          |             |
| Turn-in directory : <i>ex24/</i>                                                  |             |
| Files to turn in : <b>Makefile</b>                                                |             |
| Allowed functions : <b>None</b>                                                   |             |

- Create the **Makefile** that'll compile your **libft.a**.
- The **Makefile** will get its source files from the "srcs" directory.
- The **Makefile** will get its header files from the "includes" directory.
- The lib will be at the root of the exercise.
- The **Makefile** should also implement the following rules: **clean**, **fclean** and **re** as well as **all**.
- **fclean** does the equivalent of a make clean and also erases the binary created during the make. **re** does the equivalent of a make fclean followed by a make.
- We'll only fetch your **Makefile** and test it with our files. For this exercise, only the following 5 mandatory functions of your lib have to be handled : (**ft\_putchar**, **ft\_putstr**, **ft\_strcmp**, **ft\_strlen** and **ft\_swap**).




Watch out for wildcards!



# Chapter XXIX

## Exercise 25 : ft\_foreach

|                                                                                   |                                        |
|-----------------------------------------------------------------------------------|----------------------------------------|
|  | Exercise 25                            |
|                                                                                   | ft_foreach                             |
|                                                                                   | Turn-in directory : <i>ex25/</i>       |
|                                                                                   | Files to turn in : <b>ft_foreach.c</b> |
|                                                                                   | Allowed functions : None               |

- Create the function **ft\_foreach** which, for a given ints array, applies a function on all elements of the array. This function will be applied following the array's order.
- Here's how the function should be prototyped :


```
void ft_foreach(int *tab, int length, void (*f)(int));
```

- For example, the function **ft\_foreach** could be called as follows in order to display all ints of the array :

```
ft_foreach(tab, 1337, &ft_putnbr);
```

# Chapter XXX

## Exercise 26 : ft\_count\_if

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 26 |
| ft_count_if                                                                       |             |
| Turn-in directory : <i>ex26/</i>                                                  |             |
| Files to turn in : <b>ft_count_if.c</b>                                           |             |
| Allowed functions : None                                                          |             |


- Create a function **ft\_count\_if** which will return the number of elements of the array that return 1, passed to the function **f**.
- Here's how the function should be prototyped :

```
int ft_count_if(char **tab, int (*f)(char*));
```

- The array will be delimited by 0.

# Chapter XXXI

## Exercise 27 : display\_file

|                                                                                   |             |
|-----------------------------------------------------------------------------------|-------------|
|  | Exercise 27 |
| display_file                                                                      |             |
| Turn-in directory : <i>ex27/</i>                                                  |             |
| Files to turn in : Makefile, and files needed for your program                    |             |
| Allowed functions : close, open, read, write                                      |             |

- Create a program called `ft_display_file` that displays, on the standard output, only the content of the file given as argument.
- The submission directory should have a **Makefile** with the following rules : `all`, `clean`, `fclean`. The binary will be called `ft_display_file`.
- The `malloc` function is forbidden. You can only do this exercise by declaring a fixed-sized array.
- All files given as arguments will be valid.
- Error messages have to be displayed on their reserved output followed by a new line.
- If no argument is given, it should display

```
File name missing.
```
- If there is more than one argument, it should display

```
Too many arguments.
```
- If the file cannot be read, it should display

```
Cannot read file.
```

# Chapter XXXII

## Submission and peer-evaluation

Turn in your assignment in your `Git` repository as usual. Only the work inside your repository will be evaluated during the defense. Don't hesitate to double check the names of your folders and files to ensure they are correct.