

IT Security course

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SYS 2

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# Chapter 1

## SYS 2

### 1.1 Introduction

### 1.2 Handin

Don't be late!

Language to use : Shell

### 1.3 Rendu

Ne soyez pas en retard!

Langage à utiliser : Shell

## 1.4 Instructions

Here is what you *MUST* respect to do your work:

1. If a list of function is given at the beginning of the exercise, you can **ONLY** use these for that exercise.
2. If no function name is listed at the beginning of an exercise, you can use any function you want for that exercise.
3. The sign `>` represents the prompt of your shell. The line where you can write inputs.
4. You can do the work on team of 2 people max if you want. Only one will give a tarball back with both names in the file AUTHORS.
5. You **MUST** give back a tarball using template name: `your_lastname.tar.bz2`
6. Your tarball must be clean. No binaries, temporary files, ... or any other files than the ones asked.
7. Your solutions to the exercises **MUST** run on GNU/Linux 32bits machines using Debian-like operating systems (Ubuntu for example).

The tarball you'll be giving back must looks like this (using `tree` command):

```
$ tree your_lastname/
your_lastname/
|-- ANSWERS
|-- AUTHORS
|-- ex1
|   --- overflow.txt
|-- ex2
|   --- path.txt
|-- ex3
|   --- control.txt
|-- ex4
|   --- shellcode.txt
--- README
```

4 directories, 7 files

- ANSWERS contains your answers (questions out of exercises).
- AUTHORS contains you firstname + lastname (and the ones of your mates if you work in team).
- README contains comments on how you did the exercises. Short sentences are enough.

Hints:

- Remember to use the `man` command!
- Use GDB, it'll help you for every exercises (to do it and to verify it).

*Vous devez respecter les consignes suivante à la lettre :*

1. Si une liste de fonction est donnée pour un exercice, vous ne pourrez utiliser QUE ces fonctions pour résoudre l'exercice.
2. Si aucune fonction n'est listée pour un exercice, vous pouvez utiliser n'importe quelle fonction pour résoudre l'exercice.
3. Le signe `>` représente l'invité de commande du shell. Cela représente la ligne que vous écrivez pour tester l'exercice.
4. Vous pouvez faire le travail par groupe de 2 si vous le souhaitez. Une seule personne rendra le travail avec les noms des 2 membres du groupe dans le fichier AUTHORS.
5. Vous DEVEZ rendre votre travail en nommant votre fichier de rendu comme ceci : `your_lastname.tar.bz2`
6. Votre tarball de rendu doit être propre. Aucun fichier binaire, fichier temporaire, ... ou aucun autre fichier que ceux demandés.
7. Votre rendu doit s'exécuter sur une machine GNU/Linux 32bits sous une distribution Debian-like (Ubuntu par exemple).

La tarball que vous rendrez doit contenir **exactement** les fichiers suivants (vu avec la commande `tree`) :

```
$ tree your_lastname/
your_lastname/
|-- ANSWERS
|-- AUTHORS
|-- ex1
|   --- overflow.txt
|-- ex2
|   --- path.txt
|-- ex3
|   --- control.txt
|-- ex4
|   --- shellcode.txt
--- README
```

4 directories, 7 files

- Le fichier ANSWERS contient les réponses aux questions du sujet (questions hors exercices).
- Le fichier AUTHORS contient les noms des personnes ayant travaillé sur le contenu de la tarball au format : `firstname + lastname`, avec un nom par ligne.
- Le fichier README contient les commentaires sur la façon de résoudre les exercices si nécessaire.

Indices :

- Penser à utiliser la commande `man`!
- Utiliser GDB, Il vous aidera pour la résolution de tous les exercices.

## 1.5 Protection mechanisms

## 1.6 Stack protections

### 1.6.1 ASLR

ASLR means *Address Space Layout Randomization*.

Look here: <http://en.wikipedia.org/wiki/ASLR> and here <http://pax.grsecurity.net/docs/aslr.txt>

### 1.6.2 SSP

SSP means *Stack Smashing Protector*.

Look here: [http://en.wikipedia.org/wiki/Stack-smashing\\_protection#GCC\\_Stack-Smashing\\_Protector\\_.28ProPolice.29](http://en.wikipedia.org/wiki/Stack-smashing_protection#GCC_Stack-Smashing_Protector_.28ProPolice.29)

### 1.6.3 W $\hat{X}$

W $\hat{X}$  means *Write XOR Execute*.

Look here: <https://en.wikipedia.org/wiki/W%5EX>

## 1.7 Mécanismes de protection

## 1.8 Protections de la pile

### 1.8.1 ASLR

ASLR signifie *Address Space Layout Randomization*.

Pour plus d'information : <http://fr.wikipedia.org/wiki/ASLR> et <http://pax.grsecurity.net/docs/aslr.txt>

### 1.8.2 SSP

SSP signifie *Stack Smashing Protector*.

Pour plus d'information : [https://fr.wikipedia.org/wiki/Stack-Smashing\\_Protector](https://fr.wikipedia.org/wiki/Stack-Smashing_Protector)



## 1.9 Exercise 1: Stack overflow

You have to find a way to make the binary *ex* to fail.

Write the command you used to do that in a file named *overflow.txt*.

## 1.10 Exercise 2: Choose the path

You have to find a way to make the binary *ex* to return to the wrong address *0x11223344*.

Write the command you used to do that in a file named *path.txt*.

### 1.11 Exercise 3: Take control!

You have to find a way to make the binary *ex* to jump to the function writing *Control Granted!* on the output.

Write the command you used to do that in a file named *control.txt*.

### 1.12 Exercise 4: All your base are belong to us

You have to find a way to make the binary *ex* to jump to your shellcode you just put in memory. Your shellcode must execute a new shell */bin/bash* or */bin/sh*.

Write the command you used to do that in a file named *shellcode.txt*.

## Chapter 2

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