B2 - Elementary Programming in C

B-CPE-201

Corewar

Introduction

1.0

{EPITECH.}

1995 - 20th Century Fox Building
-And so, the humans plant a virus in the Alien computer system. It cuts off its entire protection system, which enables them to counterattack, destroying the invaders' UFO's.

- You're saying that the humans win thanks to an computer virus?
- Well, yeah. It's like in "War of the Worlds", except modern. Computer viruses are in style. It's going to be awesome.
- Uh…but your idea is completely stupid. How would the humans be familiar with the Alien system? The Alien spaceship, does it run with Windows '95?
- Well we don't care about that…it'll work out. We're making a mainstream action movie.
- Yes, we do care. You're paying me to be a Script Doctor and to analyze your script, and I'm telling you that it doesn't hold up.
- What would you do?
- The virus idea is interesting but you need to show the virus' research, analysis and conception.
- Hmm, I guess…
- How about this: I'll go se the IT team, ask for their opinion, and I'll come back with an airtight script.
- Offer accepted, but hurry up. Filming starts soon.

The Script Doctor left Roland E.'s office, reached the elevator, and angrily pressed the button to go to the building's 42nd floor, where the company's IT director's headquarters were located.
Wandering from empty offices into cleanrooms, he approached a door on which a sheet of graph-ruled notebook paper was hanging, and on which "Studies and Development of everything and especially nothing" was humbly scribbled. After having knocked without getting a reply, the screenwriter pushed the door open - an intruder in the developers' lair. An unlikely quartet, their eyes glued to a series of screens, on which, he assumed, were written enigmatic source lines.

- Yes? What do you want? asked the group's leader.
- I need to pick your brain concerning the feasability of an extraterrestrial virus.

Hearing the word, "extraterrestrial", the leader and his stooges awoke from their ostensible stupor in order to pay close attention to the Script Doctor's questions.
After a quick description of the problem, the leader explained his perspective of things.

- If I had to realistically develop this, three steps would be required.
- I'm listening, the screenwriter responded as he took out a little notebook and a pencil from his pocket.
- First of all, you need to analyze the Aliens' computers' operating systems.

The screenwriter jotted down, "Add the capture of an alien spaceship with computer intact to the script".

- But what do you mean by "analyze the computers' operating systems"?

- The goal is to be able to reproduce an Alien computer. That way, if we can make our machines run with a program that imitates a machine like that, we could run tons of tests.
- What do you mean?
- Let's call it a Virtual Machine. It's a program that will reproduce an Alien computer's operating system. In this machine, we're going to run little programs, like your viruses. These are programs. Each one of them will place little memory zones in the machine. The programs will influence each other. Each one of them is going to try to exterminate the other. Our viral attacks will need to defeat the opponent's defenses and vice-versa. In the end, only one program will remain active.
- Mmhm, mumbled the suspicious visitor.
- The Script Doctor gradually jotted everything down that his interlocutor revealed, and was planning to try to understand the explanation later.
- Then again, the virtual machine's parameters can vary. They'll need to be configurable in order to mimic different types of computers. After that, we'll need a pc.
- A PC? Won't a Mac work? asked the screenwriter, whose smile betrayed his joy at understanding his interlocutor.
- No, a pc. A program counter. It's the machine's special register that indicates exactly what the memory address is of the next instruction to be decoded and executed. It's going to allow us to control the machine's scheduling. And, finally, we need the carry.
- The what? A carry? You want to eat dinner at a restaurant from the Reunion?

Giving a faint mocking smile, the computer specialist began again:

- No, a carry. It's a simple flag that's worth "1" if the last operation returned "0".

"1 if we return 0". The screenwriter pulled out a Kleenex from his pocket and blotted his forehead before beginning again.

- Your little tale of 1 and 0 is all well and good, but what, in concrete terms, does the virtual machine do?
- Its role is simply to execute the instructions of the programs it houses. From the beginning, we define a variable that we call, CYCLE_TO_DIE. The machine checks that each process calls the "live" instruction from all the CYCLE_TO_DIE. Next, we also define NBR_LIVE and CYCLE_DELTA. If, after NBR_LIVE calls the "live" function, all of the processus that are still alive will remain so. We lower CYCLE_TO_DIE to CYCLE_DELTA units and then we start over until no more processes are alive.
- Alive processes?
- Yes, your virus. The goal will be to crush the other programs. Once the other's program no longer works, you've won. The winner in this type of combat is the last one to say "live". The machine will then display a message like: "the player x (name_of_player) has won". For example: "player 3 (Zork) has won".

The screenwriter caught a glimpse of what the impassioned computer specialist was trying to say. It was a simple game in which two programs fought, and tried to crush, each other. Suddenly, a flash of lucidity ran through him.

- I still have a big question. Your programs are, in fact, written in computer science language?
- Yes, I was going to come to that.
- What do you mean, he worriedly asked.
- You need to know the language used by the Alien machine. It can be assumed that Alien computers have a low-level language, probably assembler.
- An assembler language?
- Yes, a computer only understands binary. 0 or 1. But it's almost impossible to program it in binary. So the assembler language was invented. It's a language that is easier to work with. Next, there is a way to transform the program into 0 and 1. It's called an assembler; it transforms your "readable" code into binary.
- Can you give me a quick summary of that?
- It's not rocket science. You capture an alien spaceship in order to take a computer and understand how it operates. Next you can begin to work on your own computers. You will begin by creating a virtual machine, which is a system that will copy the operating system of the alien machine. And, lastly, with this language, you'll only have to create champions, which are your viruses, that will be destined to crush the others. Easy peasy, right?

Stunned by the magnitude of the task at hand, the Script Doctor went back to his office. He consulted his notebook for a long time, scribbled in it, scoured it and then put it away before going to see the director.

- Roland, I've been to see the IT guys.
- So, what needs to be changed?
- Nothing, it's perfect. It's common knowledge that the whole universe, even Aliens, runs on Windows 95. We will change absolutely nothing. Your guys will board the Alien's UFO, pull the virus out of thin air and stick it somewhere, and there you go, fqst as lightning, no one will notice anything.

-Are you sure?

- Yes, it's just a story, Cary.
- Do you want to go to the Reunion Island restaurant tonight?
- Forget about it…

Tech 1, have you, too, ever dreamed of who could make such a cinematographic flop? It's your turn to demonstrate that that entire thing deserved better…
You are now the team who manages the studio's IT.

~

Now, your only task is to show us a Virtual Machine, a champion assembler that is capable of defeating the Alien threat.

~

To be continued…