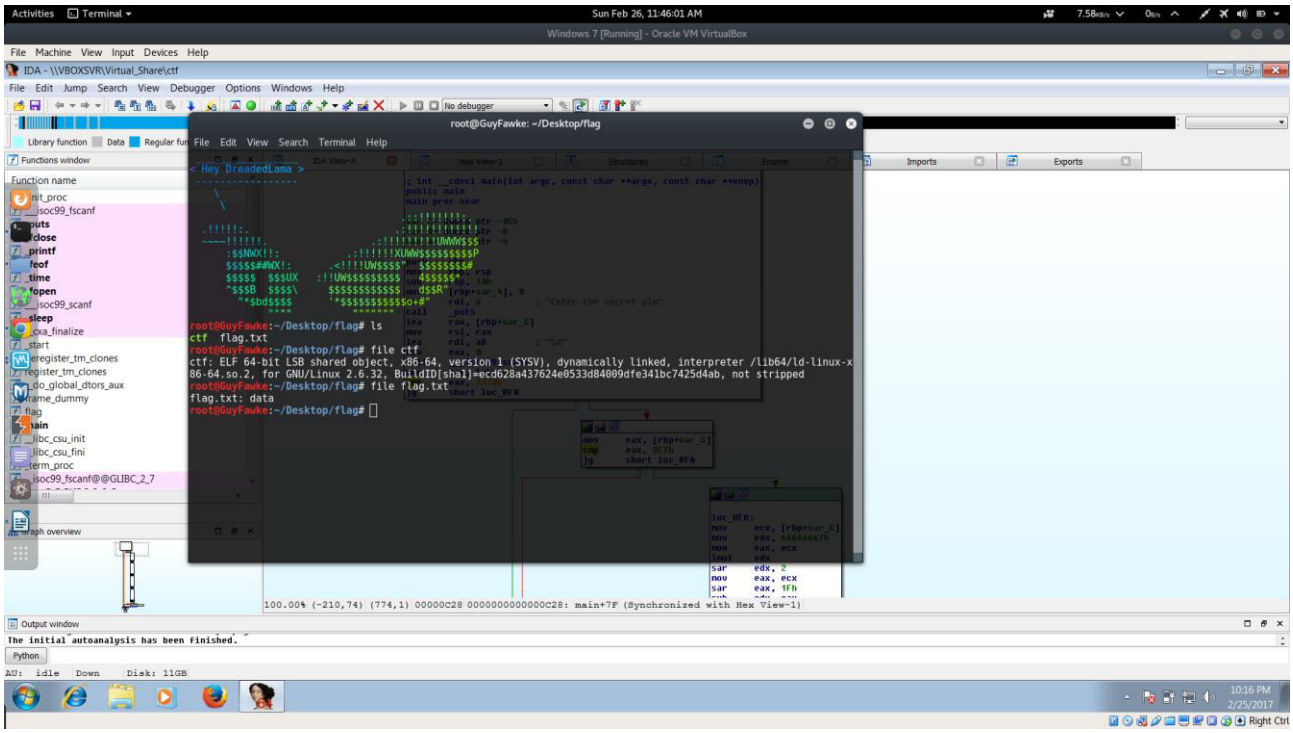
Challenge :

Calling the Uncalled

Even my girlfriend doesn't make me wait this long .... (UNIX library modification)

Note: Extract the zip into one folder i.e. keep both the files in the same folder

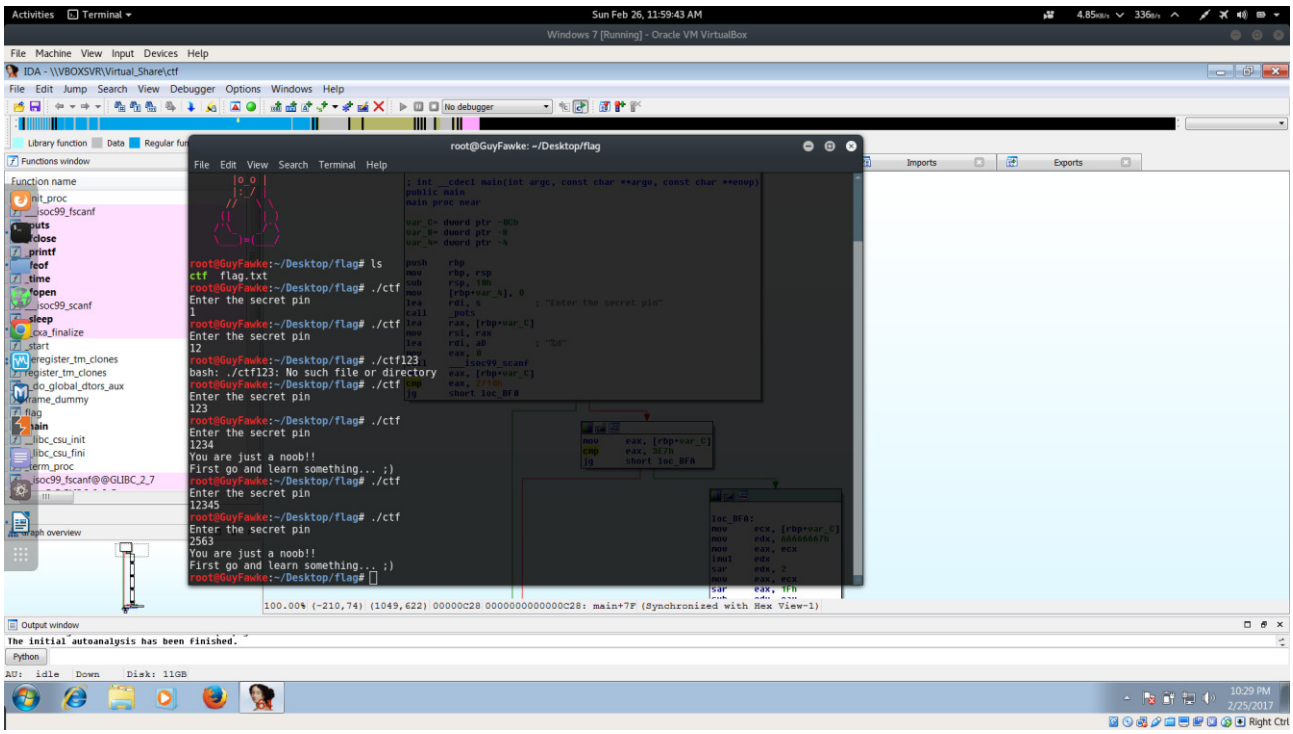
First let us run file command on both the files given to us.



The file command says ‘ctf’ is ELF executable and ‘flag.txt’ is data file.

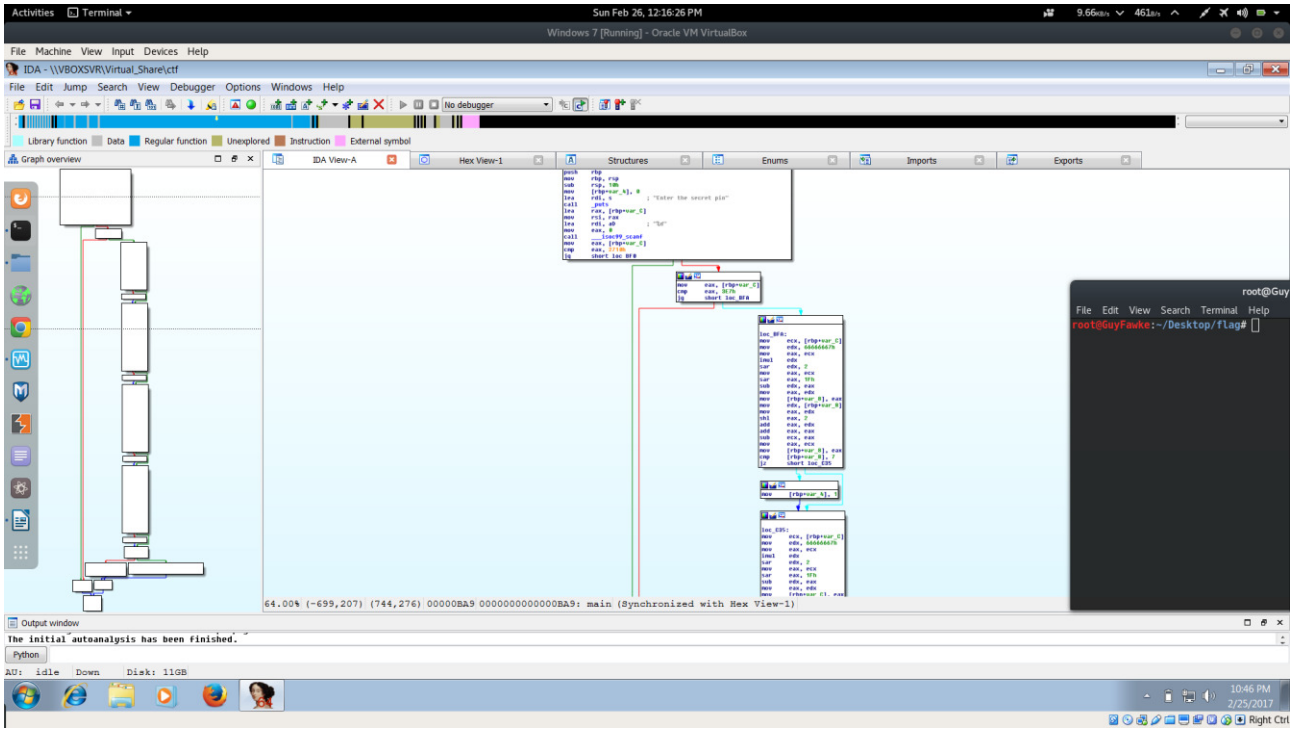
Running cat on flag.txt shows some random text, looks like some encrypted file.

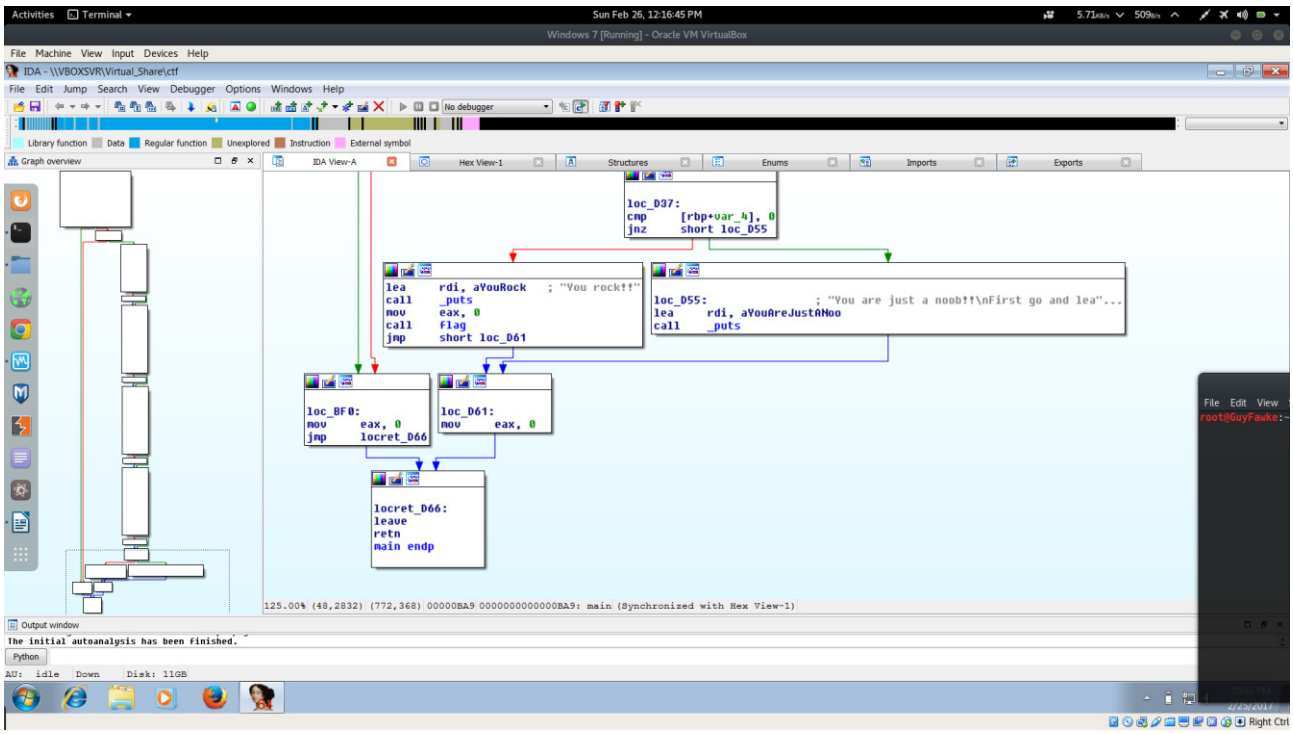
Running strings command doesn’t reveal much either.
Let us try executing the file



On executing the file its asks for a secret pin.
Trying some random pins with different digits, we notice that on entering 4 digit pin “You are just a noob!!” is displayed.
We get this output only on 4 digits pin, so maybe the pin is a 4 digit pin.

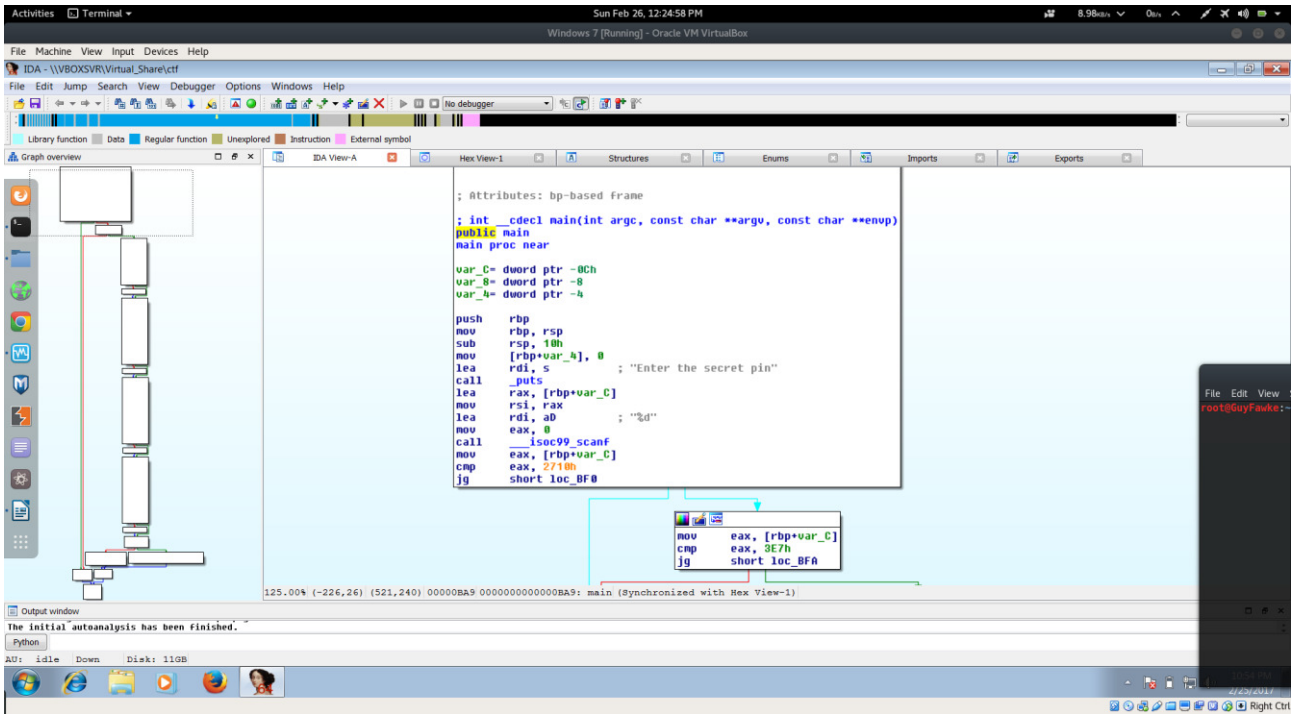
Now let us put this file in IDA (to those who don’t know what it is – its a disassembler used to disassemble executables to assembly codes) .



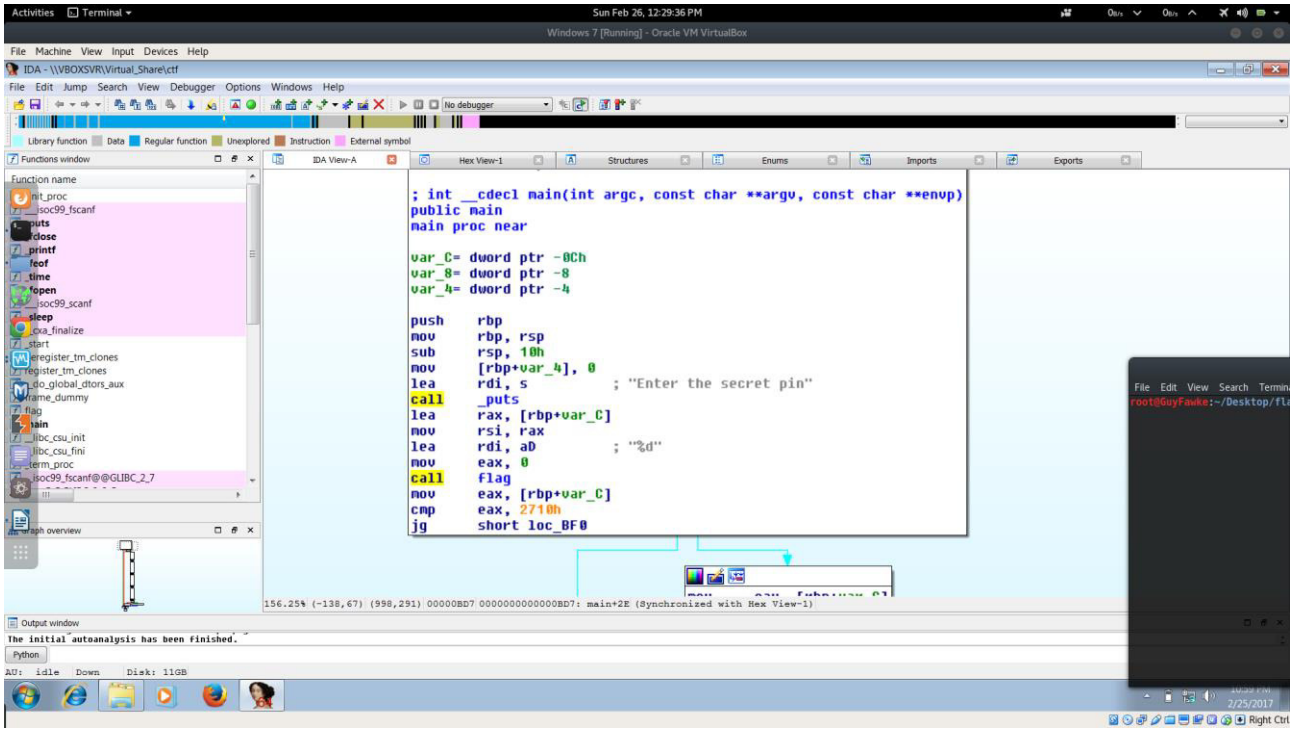


We see few comparisons, few branching but at the end of the graph we notice an interesting branching, showing the string we get when we enter a 4 digit pin “You are just a noob!!”.
But there is another string in the other branch saying “You Rock!!”, that must be the branch that gives us the flag (hope so).
On seeing the other branch, we notice that there is an instruction ‘call flag’ which calls a function flag.
That must be the function that prints our flag. So we just need to call it.

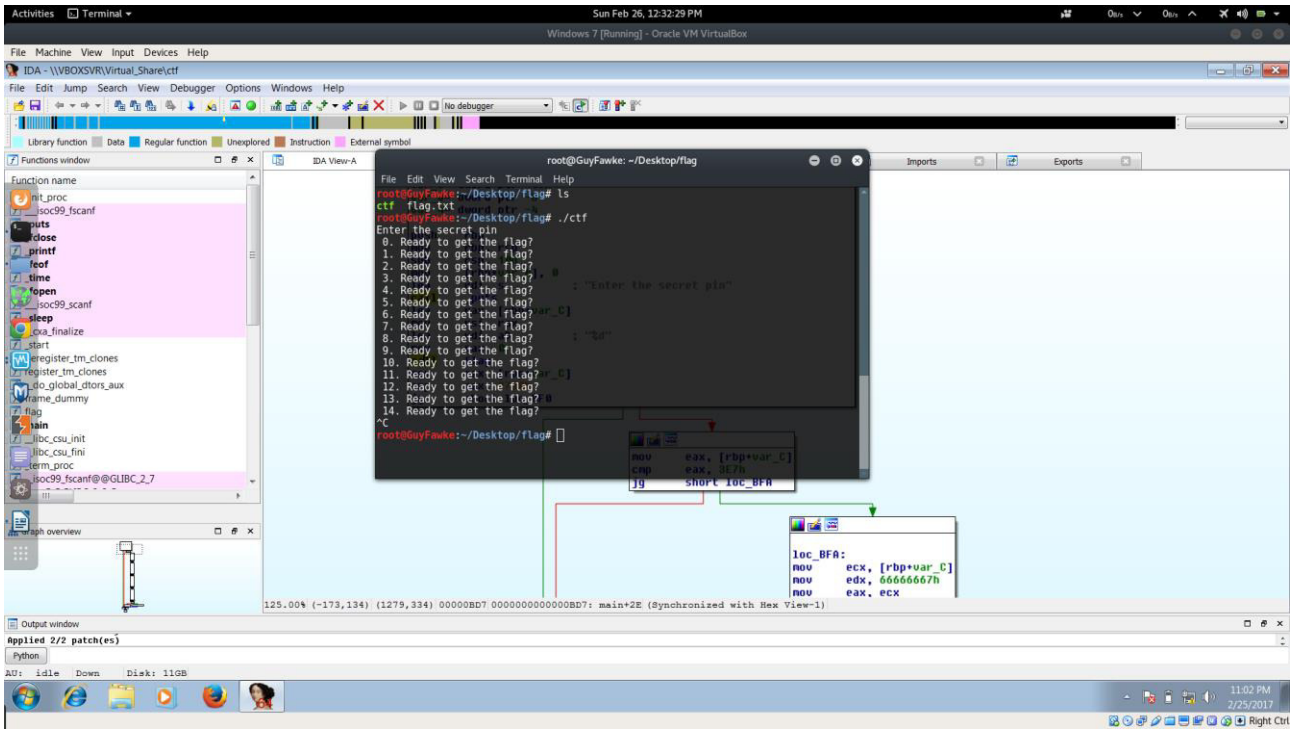
So we can either do the time consuming work of understanding the assembly code to get the secret pin or we can change the assembly code to directly call the function flag without asking us for pin.



At the start of the graph we see few call instructions (call puts and call __isoc99_scanf), we can modify anyone of them to ‘call flag’ instruction and that shall do our work.



I changed the scanf instruction to flag.
Now instead of scanning input from us, the function shall call the flag function (and so no need to enter the pin... Well, that seems comforting!!).
Now let us run the program.



Hell yeah, we do jump to the flag function without entering any pin ;) .....

But wait, what the heck is this??

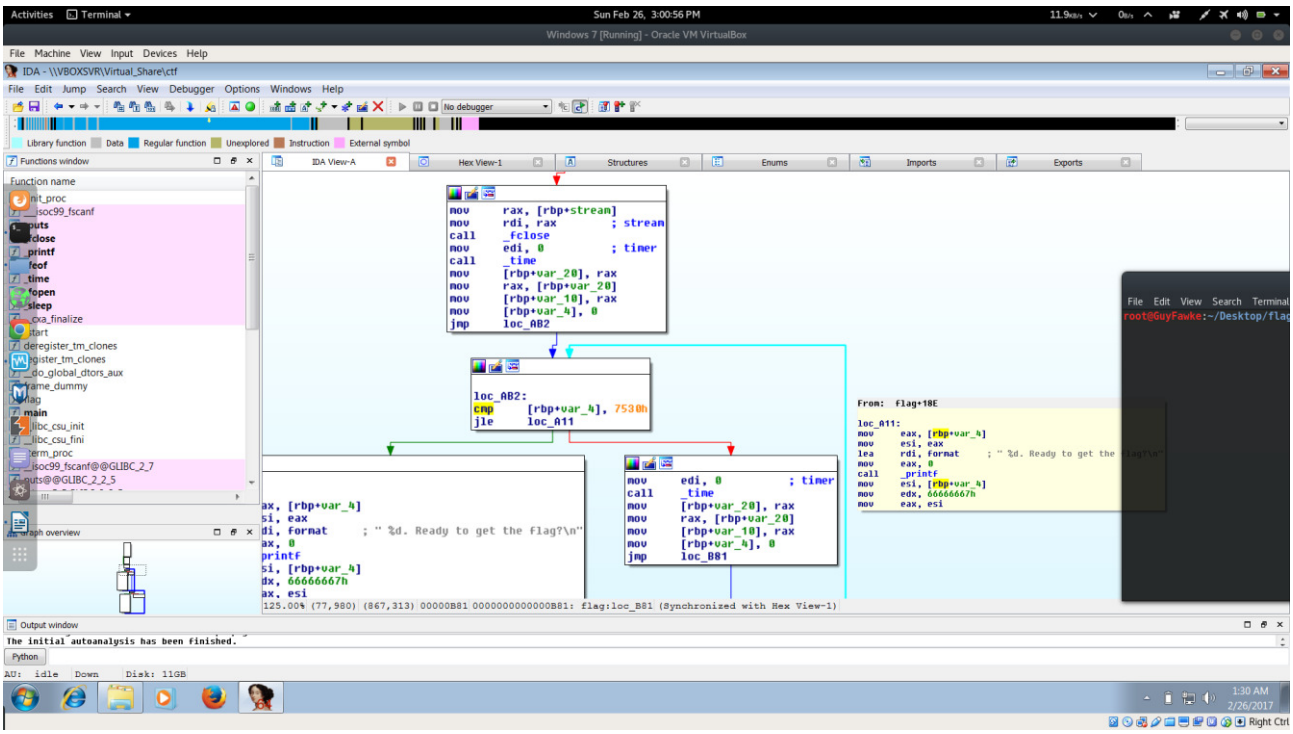
Here it just keeps on printing “Ready to get the flag” and the number at starting keeps on increasing.
Moreover to print each instruction the program takes about 1 second (indicates sleep function has been used in the program to delay the output)
So, all we need to do is to wait till we get the flag??
Obviously not, there must be a way around!! :)

Let us jump to the flag function in IDA and see what it has to say.

We see there is a loop which iterates 7530h times (30,000 in decimal). What we need to wait 30,000 sec ?? (As each instruction takes 1 sec , which we can see by running the program)

But wait, this wait isn’t over here yet, there is one more such loop which iterates 2710h times (10,000 in decimal).

So in total of 40,000 seconds. Are you f**king kidding me!! :0

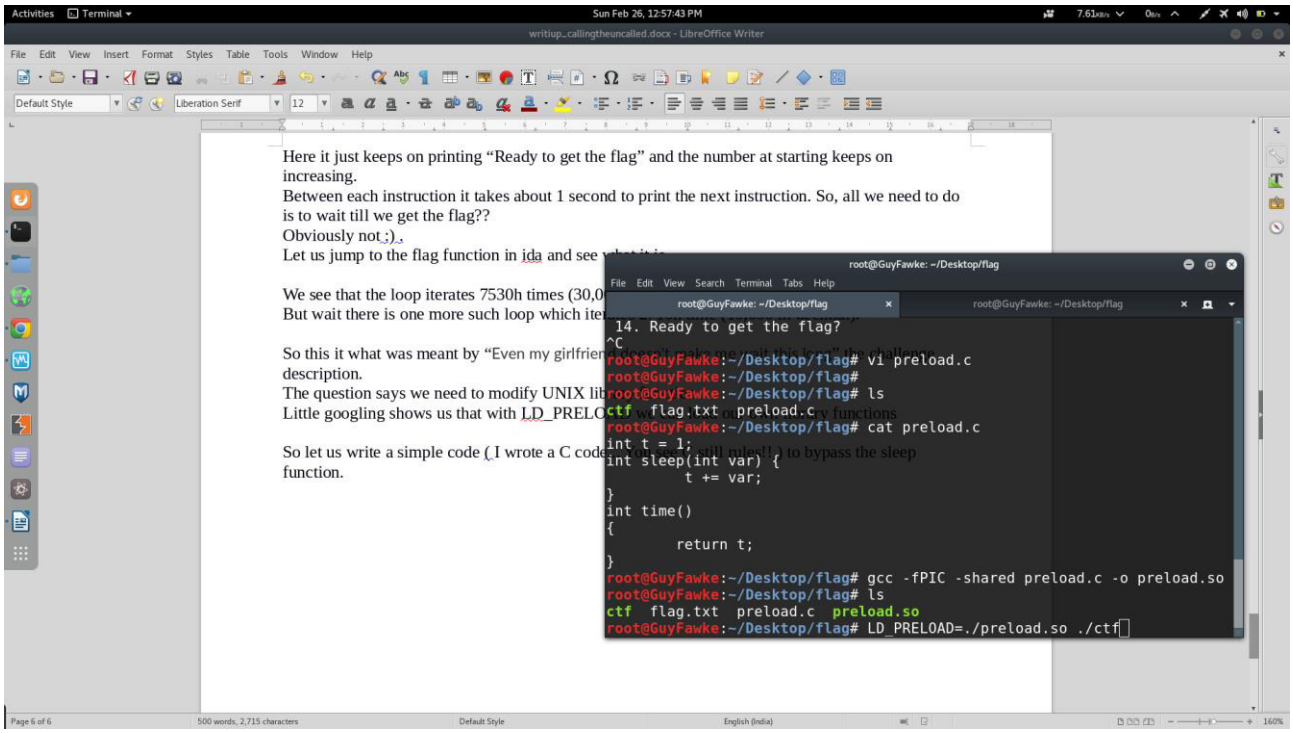


So this it what was meant by “Even my girlfriend doesn't make me wait this long” in the challenge description.

But the question also says we need to modify UNIX library functions.

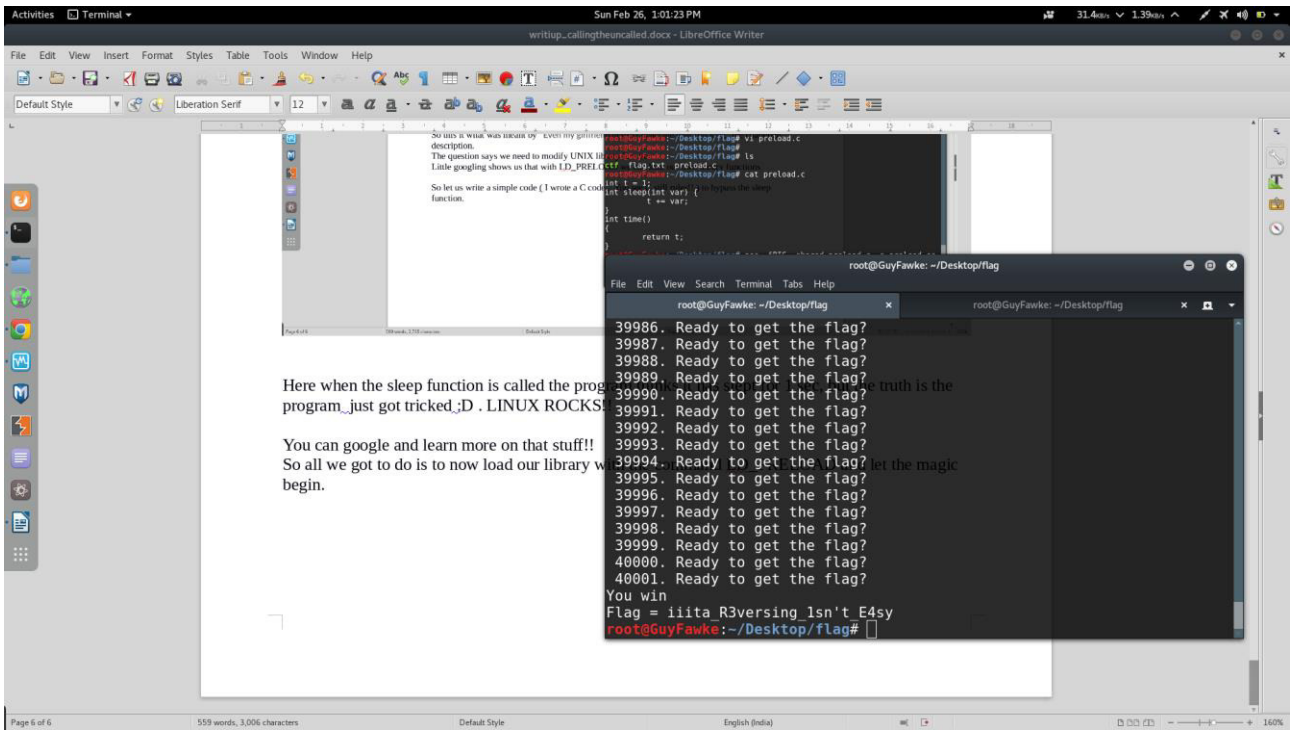
Little googling shows us that with LD_PRELOAD we can load our own library, overwriting default library funtions.

So let us write a simple code (I wrote a C code... You see C still rules!!) to overwrite the sleep and time functions.



Here when the sleep function is called the program thinks it has slept for 1 sec, but the truth is the program just got tricked :D . LINUX ROCKS!!

You can google and learn more on that stuff!!
So all we got to do is to now load our library with the command LD_PRELOAD and let the magic begin.



And Voila!!
Our 40,000 seconds of wait was computed in milliseconds revealing the flag “iiita_R3versing_1sn’t_E4sy”.
Well that seems true, isn’t it ?? :p

Note: There are many other ways to do this challenge such as converting the assembly code back to C code, and yeah the secret pin was 1337 (Try understanding the assembly code, hope you can figure it out).

-DreadedLama