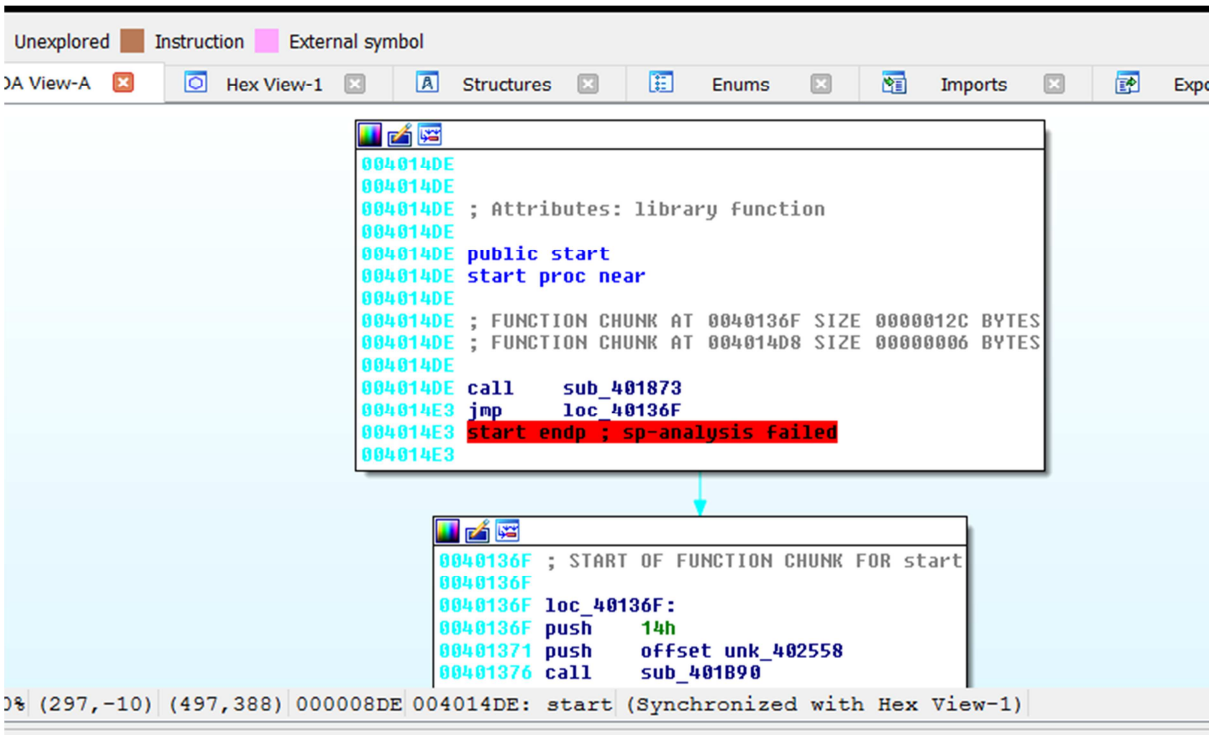
PART 27

We will solve the exercise that we left to solve in the previous part called IDA_STRUCT.7z. If you did not do it or you do not have it, download it from here.
http://ricardo.crver.net/WEB/INTRODUCCION%20AL%20REVERSING%20CON%20IDA%20PRO%20DESDE%20CERO/EJERCICIOS/IDA_STRUCT_RESOLVER%20DESPUES%20DE%20LA%20PARTE%2026.7z

The executable is called ConsoleApplication4.exe and the symbols are in the same folder.

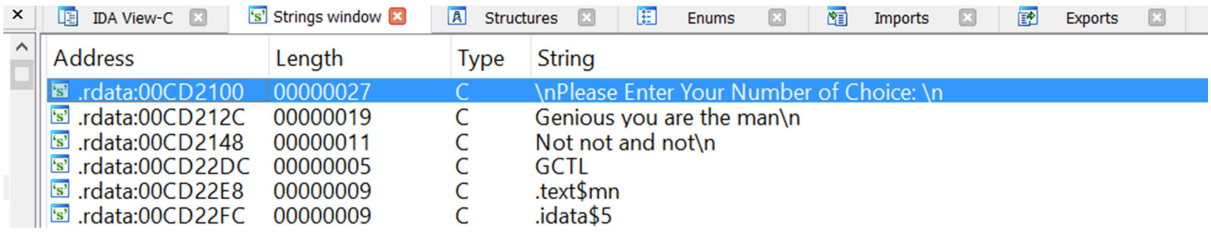
ConsoleApplication4.pdb.

When it starts and tells you that it will try to find the symbols, you can point to that file and load them with which it clears up a bit, but I will delete or rename the pdb file to load it without symbols which is what we will normally find, though more complex, it is more real.

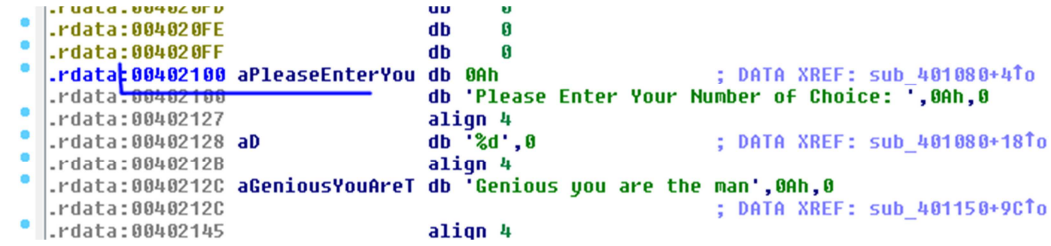


Obviously, having no symbols, this will not detect the main. We can get to it as it is a console application looking for the argv or argc or if not, more generic, looking at the strings.

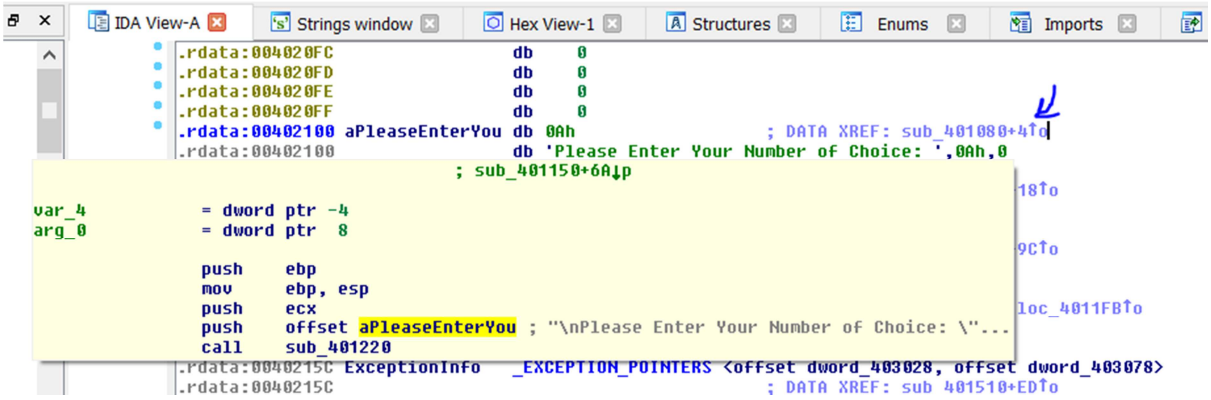
If we ever run it, we see that the first thing it does is ask us to enter a number. There, you see the strings that appear to be those of good boy and bad boy.

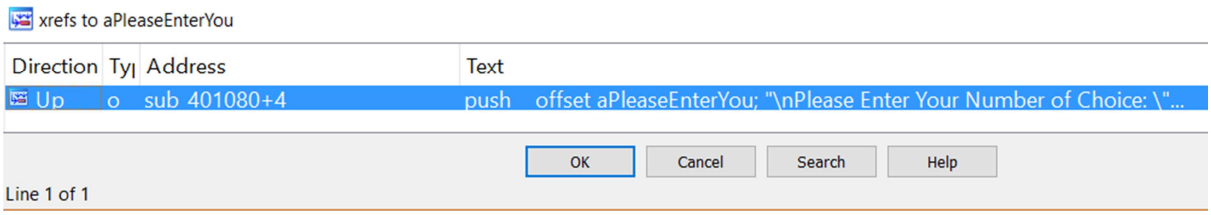


Click on the string “**Please enter your number….**”

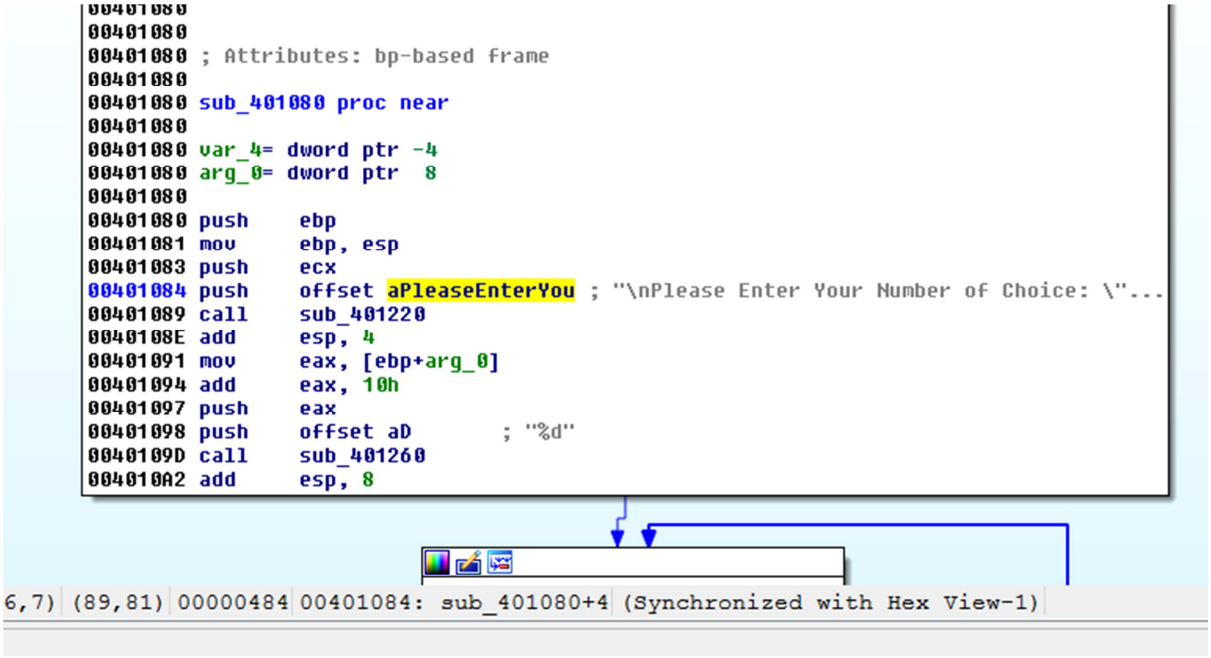


There, we see that it has references by passing the mouse by the arrow, or by pressing X in the direction.

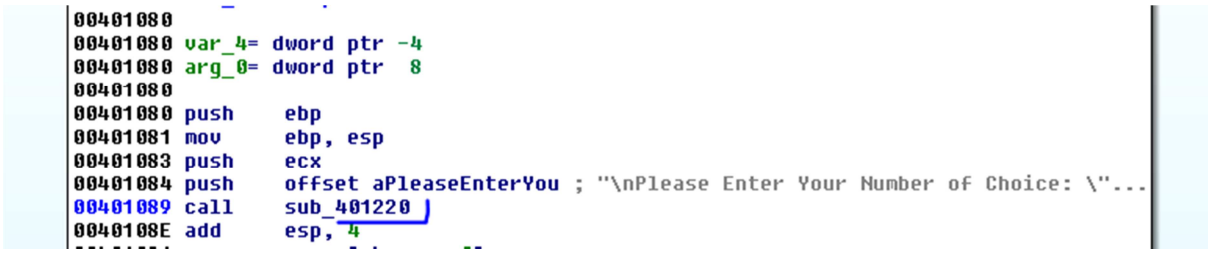




Let's go there.

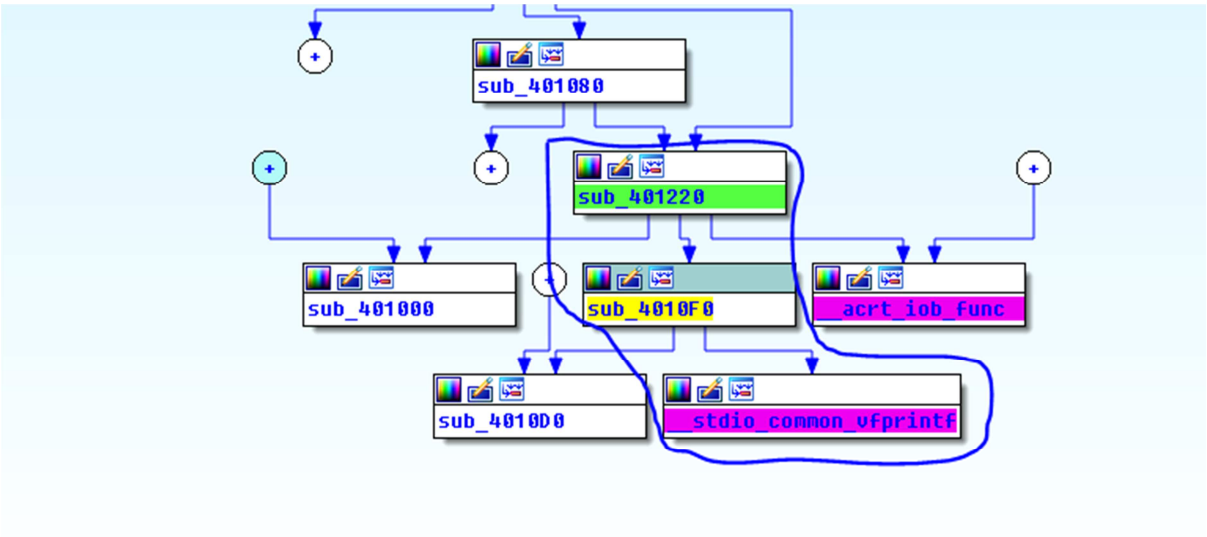


We see that we are in a function, we see the string out there and the call to print it, as we have no symbols, it does not tell us that it is 0x401220 is printf, if we look inside it.

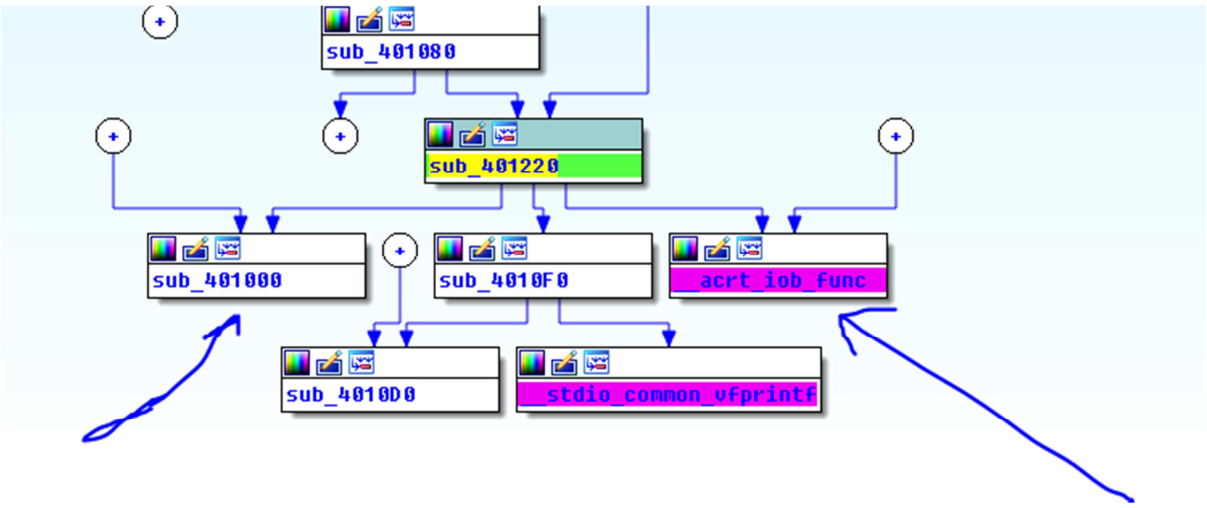


You can look inside and see that there are several functions.

```
00401220
00401220 push    ebp
00401221 mov     ebp, esp
00401223 sub     esp, 8
00401226 call    sub_401000
0040122B lea     eax, [ebp+arg_4]
0040122E mov     [ebp+var_4], eax
00401231 mov     ecx, [ebp+var_4]
00401234 push    ecx
00401235 push    0
00401237 mov     edx, [ebp+arg_0]
0040123A push    edx
0040123B push    1
0040123D call    ds:__acrt_iob_func
00401243 add     esp, 4
00401246 push    eax
00401247 call    sub_4010F0
0040124C add     esp, 10h
0040124F mov     [ebp+var_8], eax
00401252 mov     [ebp+var_4], 0
00401259 mov     eax, [ebp+var_8]
0040125C mov     esp, ebp
01247: sub_401220+27
```



In the proximity view that is entered by pressing the - key and exiting by pressing +, we see that 0x401220 calls those same three functions, but both 0x401000 and acrt_iob_func are functions that do something and return, do not follow to other child functions.



There, where the arrows that I added are, it is seen that it does not follow to other functions, the only one that follows is 0x4010f0 that calls to two functions and one is vfprintf, and from there it returns, there is no more down.

That can be seen also in the disassembly if I look inside each function I will see the same thing. We see that 0x401000 does not follow. It just makes a nuisance and comes back.

```
00401000
00401000
00401000 ; Attributes: bp-based frame
00401000
00401000 sub_401000 proc near
00401000 push    ebp
00401001 mov     ebp, esp
00401003 pop     ebp
00401004 retn
00401004 sub_401000 endp
00401004
```

```
0040123A push    edx
0040123B push    1
0040123D call    ds:__acrt_iob_func
00401243 add     esp, 4
00401246 push    eax
```

And **_acrt_iob_func** is an API, so it will not continue. It will only initialize stdout and then print.

In visual studio 2015, stdin, stderr, stdout are defined as follow :

```
#define stdin  (__acrt_iob_func(0))
#define stdout (__acrt_iob_func(1))
#define stderr (__acrt_iob_func(2))
```

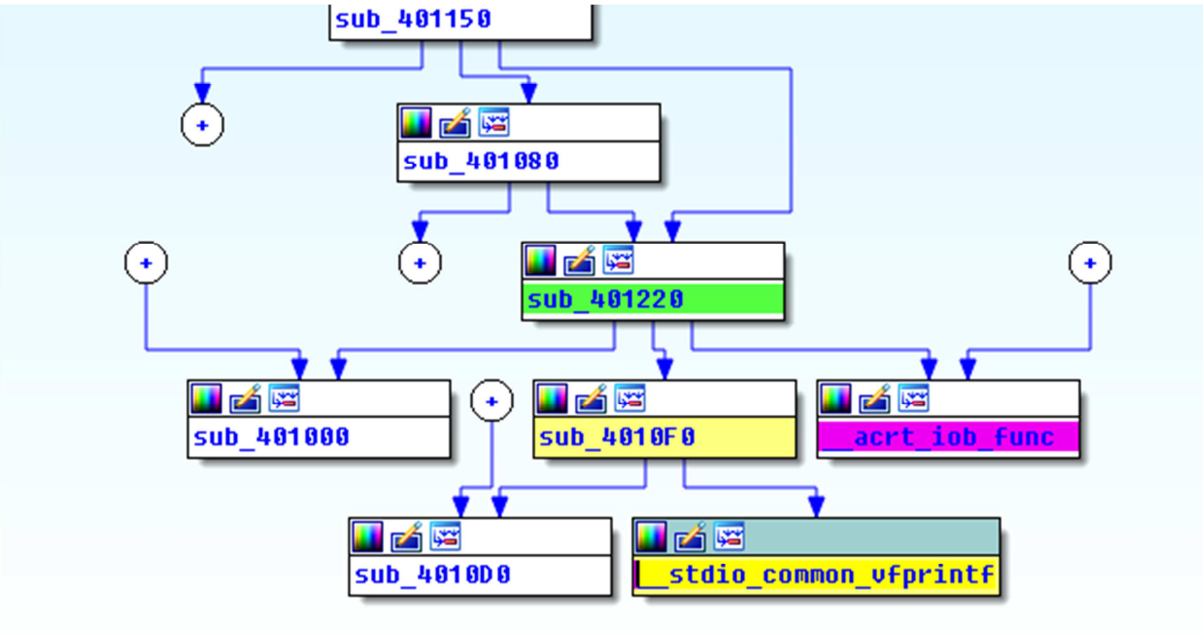
In other words, passing argument 1 as in our case will initialize stdout.

```
00401237 mov     edx, [ebp+arg_0]
0040123A push    edx
0040123B push    1
0040123D call    ds:__acrt_iob_func
00401243 add     esp, 4
```

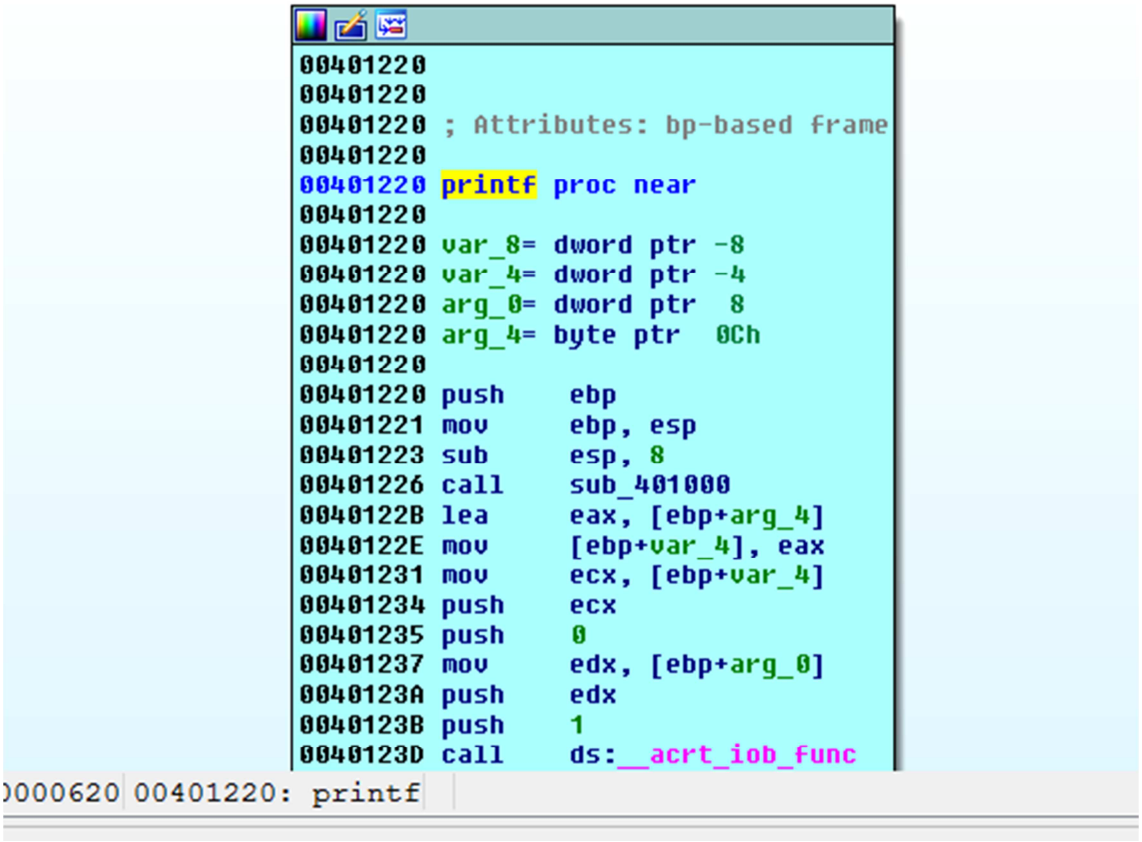
And the third function that calls.

```
004010F0 arg_C= dword ptr  14h
004010F0
004010F0 push    ebp
004010F1 mov     ebp, esp
004010F3 mov     eax, [ebp+arg_C]
004010F6 push    eax
004010F7 mov     ecx, [ebp+arg_8]
004010FA push    ecx
004010FB mov     edx, [ebp+arg_4]
004010FE push    edx
004010FF mov     eax, [ebp+arg_0]
00401102 push    eax
00401103 call    sub_4010D0
00401108 mov     ecx, [eax+4]
0040110B push    ecx
0040110C mov     edx, [eax]
0040110E push    edx
0040110F call    ds:__stdio_common_vfprintf
00401115 add     esp, 18h
00401118 pop     ebp
00401119 retn
```

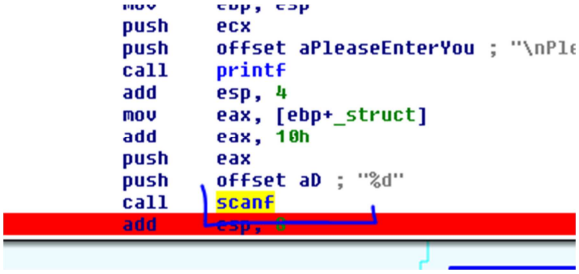
It ends by calling vfprintf, or we end up seeing the same as in the proximity view but it takes longer.



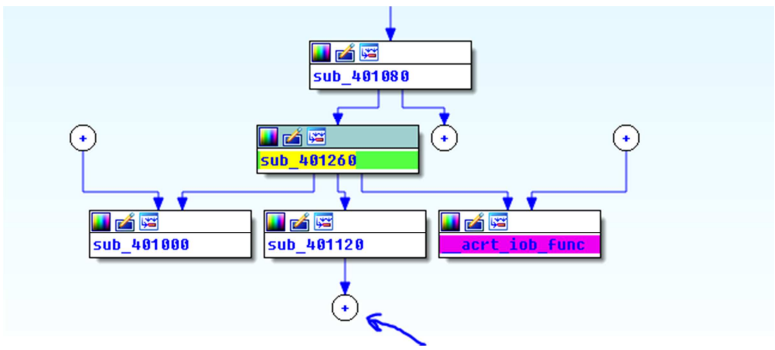
So, we rename 0x401220 as printf.



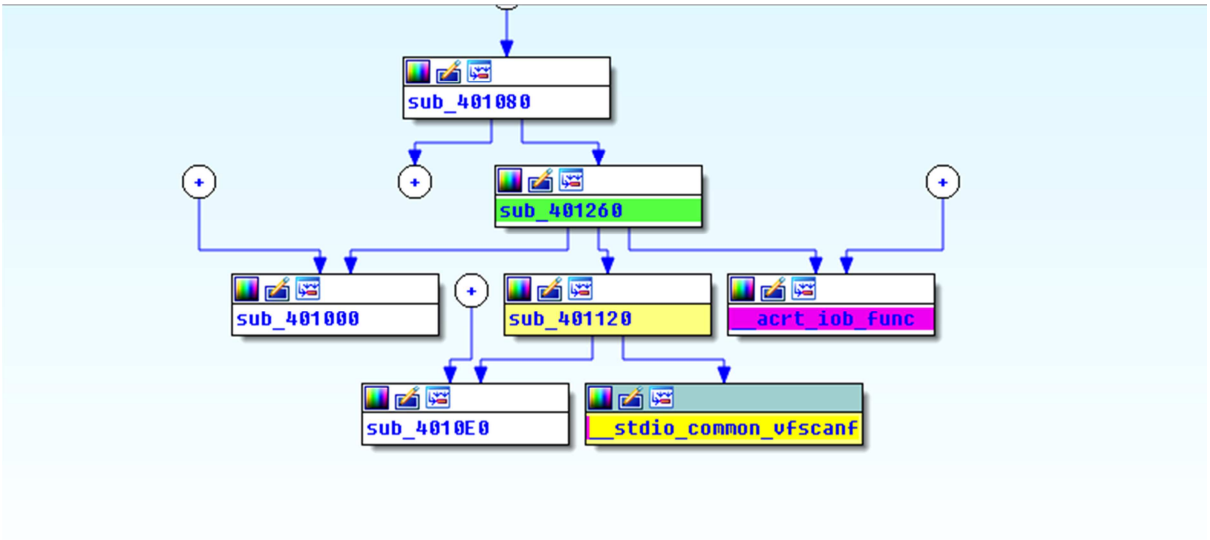
I paint celestial ones that end up being an API like in this case printf. Everyone will do it to their liking.



The next function of 0x40109D is surely scanf if we enter and we see the proximity view.

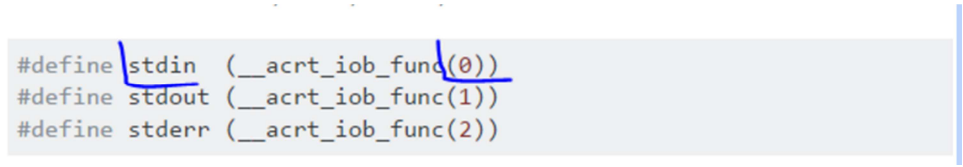


There, it follows. I click to make it unfold.

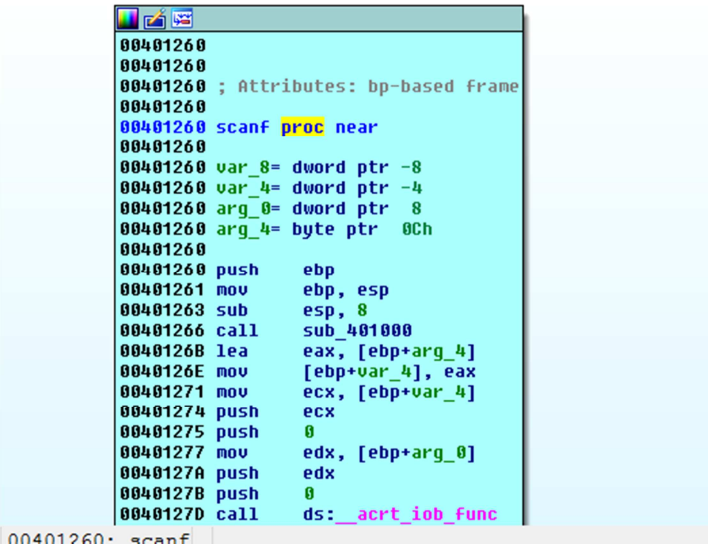


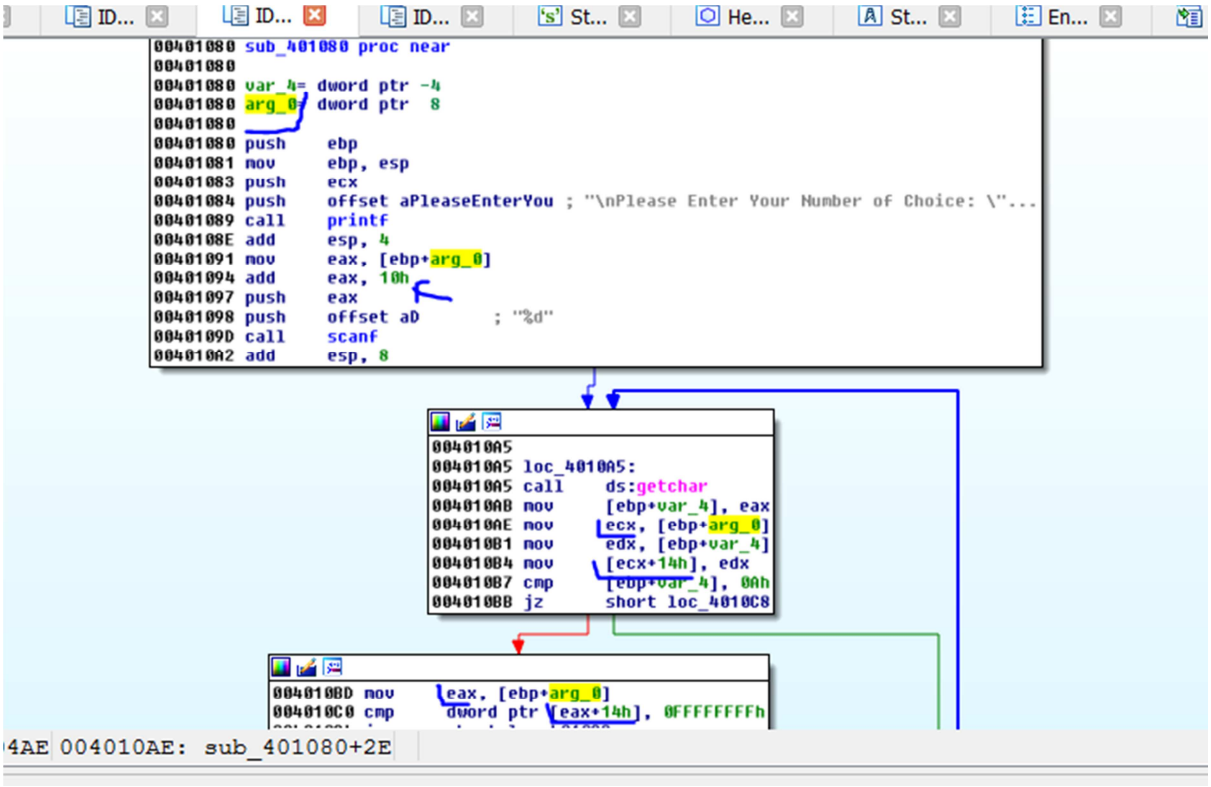
We see it is scanf.

And in this case the function _acrt_iob_func with the argument 0 initializes stdin.



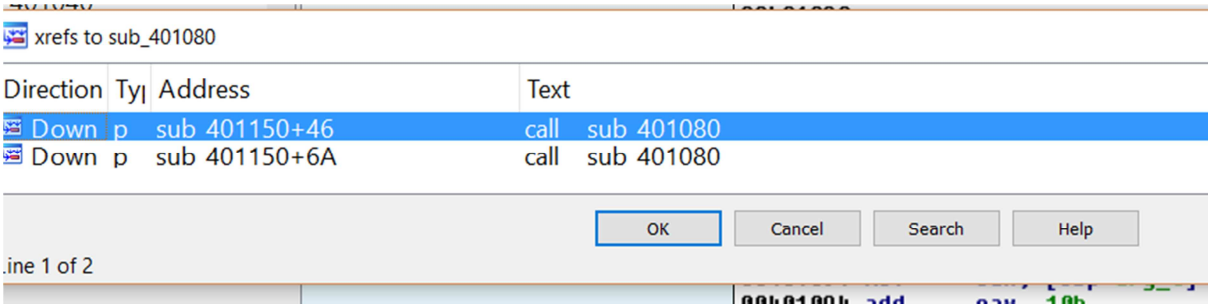
So, we rename scanf.





We see something that is possibly a structure because when you pass an address as an argument and then retrieve and add offsets to access the fields in each place that is used, it is possibly the address of a structure.

Let's look at the references of this function.



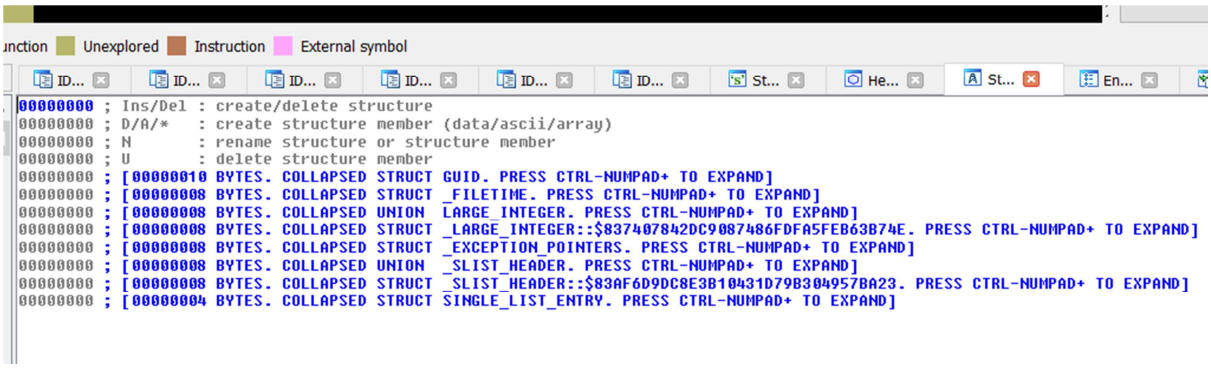
We see that there are two places if I look there.

```
0040118E mov     [ebp+var_28], 0
00401192 lea     eax, [ebp+Buf]
00401195 push    eax
00401196 call    sub_401080
0040119B add     esp, 4
0040119E lea     ecx, [ebp+Buf]
004011A1 push    ecx                     ; Buf
004011A2 call    sub_401010
004011A7 add     esp, 4
004011AA lea     edx, [ebp+Buf]
004011AD push    edx
004011AE call    sub_401060
004011B3 add     esp, 4
004011B6 lea     eax, [ebp+var_44]
004011B9 push    eax
004011BA call    sub_401080
004011BF add     esp, 4
```

I see that the argument in both cases is a direction, which gives the idea of structures.

As two different directions give the impression that they were two structures of the same type, we will start creating a single one, without knowing the size, without knowing the fields or anything. We will reverse them little by little.

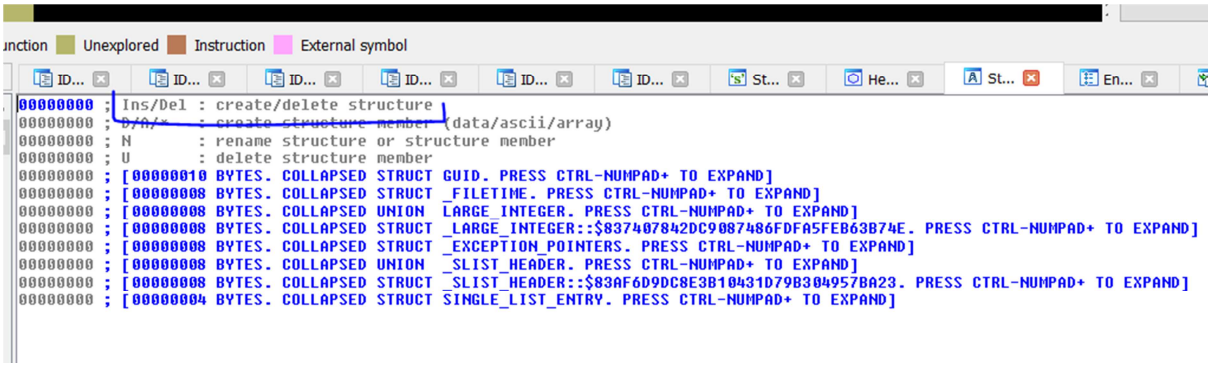
We see that the maximum offset that I find so far is 0x14 so I will create a structure of that length, if it becomes bigger I will enlarge it.



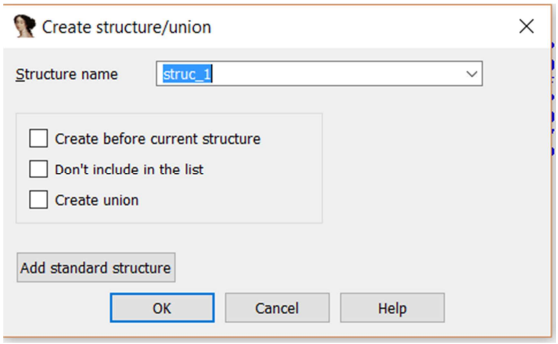
I go to the **structures** tab. It is one of the options to create it. The other would be to go to LOCAL TYPES and create it as code in C. We will do it for now here.

It's a little annoying and not really intuitive, but when we are in the place where it is defined to do CREATE STRUCT FROM SELECTION, we will usually create it here without knowing anything.

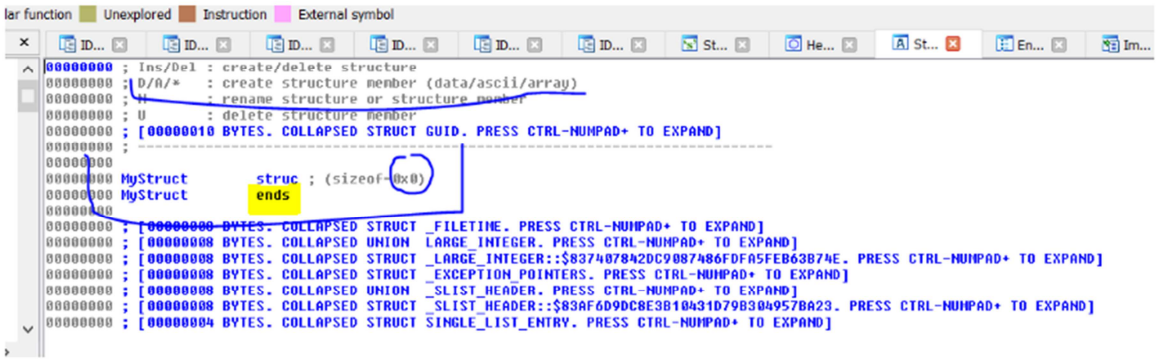
Obviously, if I analyze the representation of the stack of main, I could use CREATE STRUCT FROM SELECTION and it would make my life easier, but let's take the worst case, that we are in a function of a very large program and that we are very far from where it was defined and we have to fix them as we can.



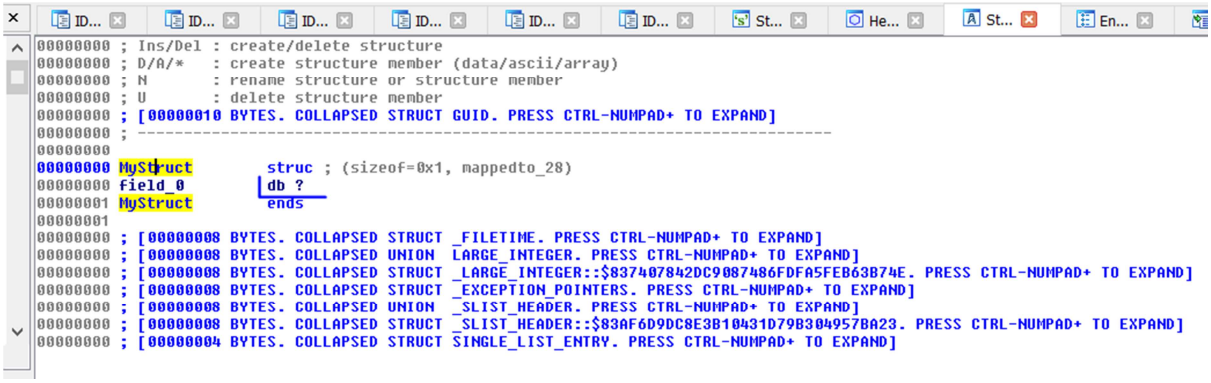
There, we see that to create a structure we have to press the INS key, we do it.



I can rename it as I want. I'll call it MyStruct.

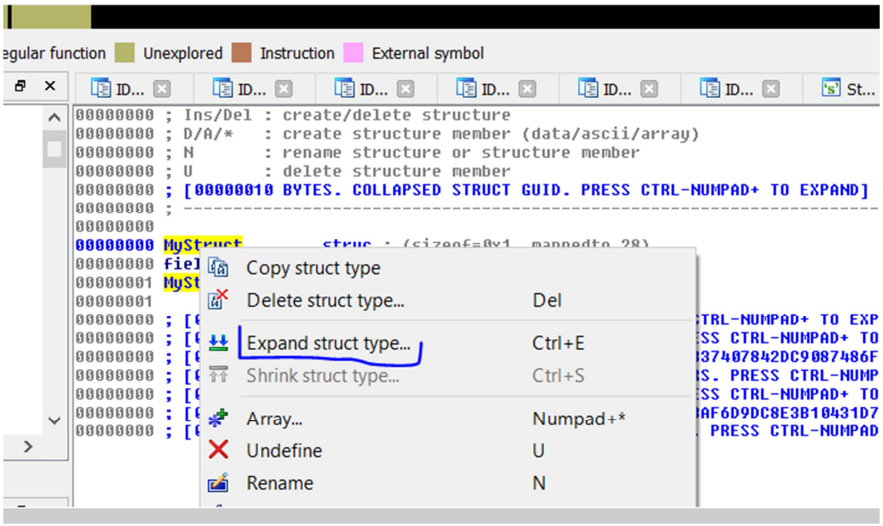


There, it was created with size 0. Now, I will do a trick for when I still do not know the fields or anything and I want to give a size, first press D on the word **ends** to add a single field.

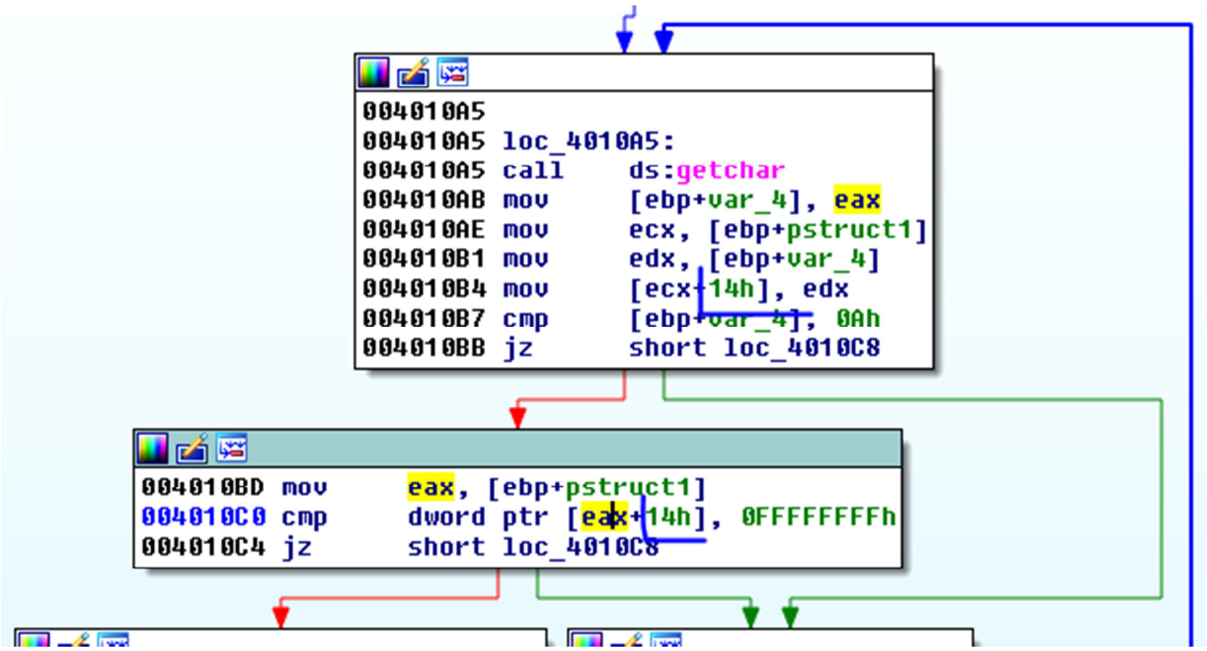


There, I add a field of 1 byte long DB. If I would press D again I would switch to word DW and then to DWORD DD.

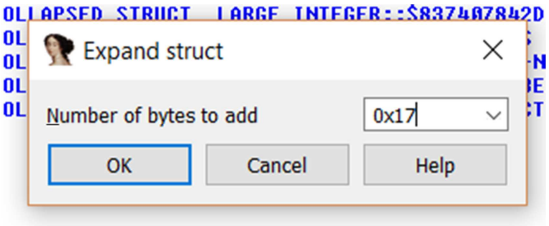
But here as we do not know, we leave it like this and right click on the structure.



Since I've seen a field in 0x14.



So, as to fill that field with a dword, it needs 4 more bytes, I will create it with 0x18. I will add 0x17 to the byte it had.




```
00000000
00000000 MyStruct       struc ; (sizeof=0x18, mappedto_29)
00000000                db ? ; undefined
00000001                db ? ; undefined
00000002                db ? ; undefined
00000003                db ? ; undefined
00000004                db ? ; undefined
00000005                db ? ; undefined
00000006                db ? ; undefined
00000007                db ? ; undefined
00000008                db ? ; undefined
00000009                db ? ; undefined
0000000A                db ? ; undefined
0000000B                db ? ; undefined
0000000C                db ? ; undefined
0000000D                db ? ; undefined
0000000E                db ? ; undefined
0000000F                db ? ; undefined
00000010                db ? ; undefined
00000011                db ? ; undefined
00000012                db ? ; undefined
00000013                db ? ; undefined
00000014                db ? ; undefined
00000015                db ? ; undefined
00000016                db ? ; undefined
00000017 field_0        db ?
00000018 MyStruct       ends
```

I see that I was left with size 0x18 for now we will leave it like this. We need to enlarge it.

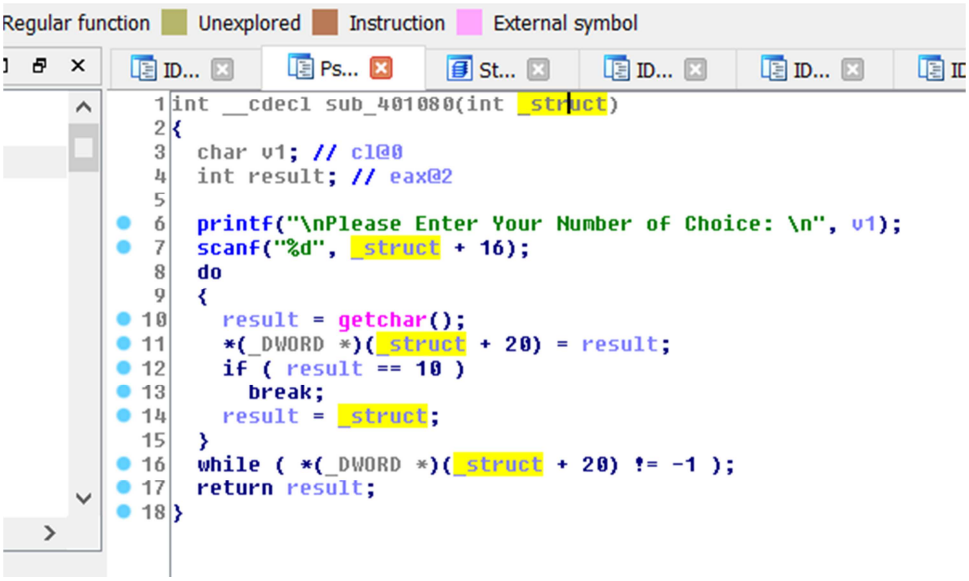
As this function is called twice, the first with the address of a first MyStruct type structure that we will call arbitrarily **pepe** and the second with the address of a second structure of the same MyStruct type that we will call **juan**, within the function we will put a generic name that serves both.

In the source code, this looks like this, to clarify two variables of MyStruct type one called pepe and another called **juan**, both are passed their address as argument to the functions.

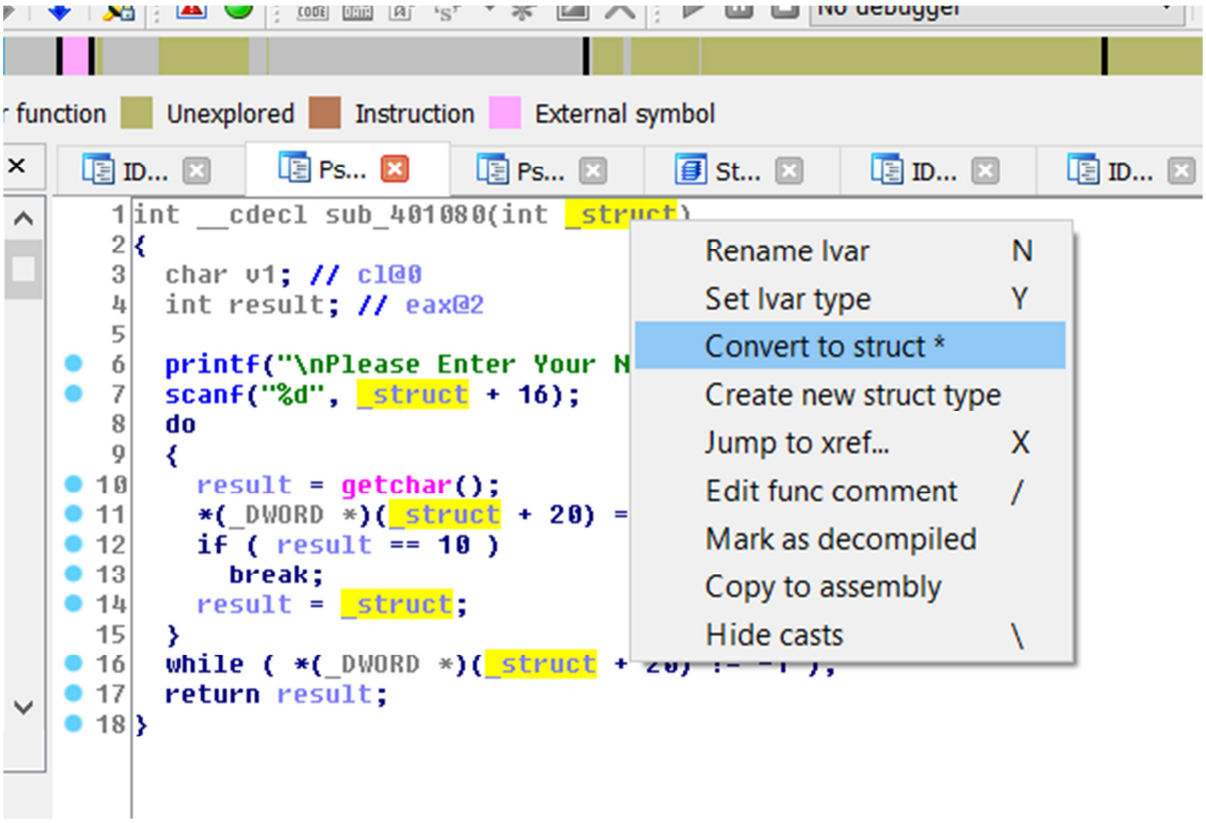
```
    MyStruct pepe;
    MyStruct juan;

    pepe.cookie = 0;
    pepe.size = 0;
    pepe.c = 0;
    pepe.flag = false;

    juan.cookie = 0;
    juan.size = 0;
    juan.c = 0;
    juan.flag = false;

    enter(&pepe);
    check(&pepe);
    desicion(&pepe);

    enter(&juan);
    check(&juan);
    desicion2(&juan);
```

```
00401080
00401080
00401080 ; Attributes: bp-based frame
00401080
00401080 sub_401080 proc near
00401080
00401080 var_4= dword ptr -4
00401080 _struct= dword ptr  8
00401080
00401080 push    ebp
00401081 mov     ebp, esp
00401083 push    ecx
00401084 push    offset aPleaseEnterYou ; "\nPlease Enter Your Nu
00401089 call    printf
0040108E add     esp, 4
00401091 mov     eax, [ebp+_struct]
00401094 add     eax, 10h
00401097 push    eax
00401098 push    offset aD       ; "%d"
0040109D call    scanf
004010A2 add     esp, 8
.00% (-145,-85) (38,53) 00000491 00401091: sub_401080+11
```

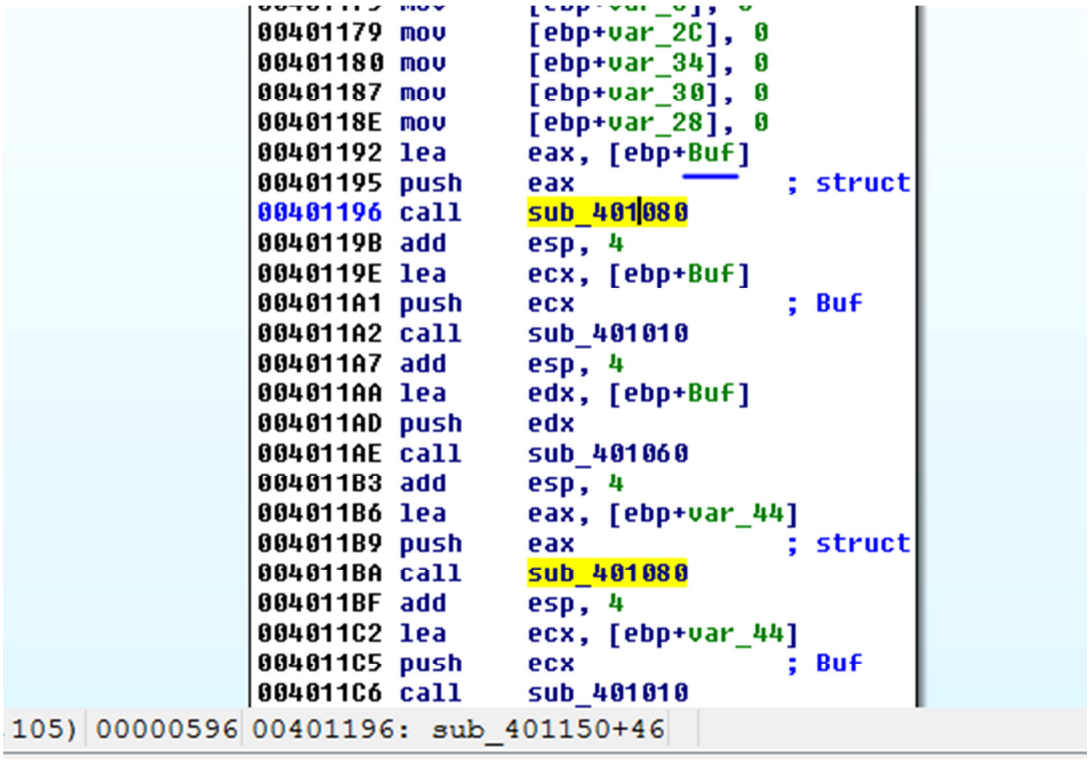
Since the function will first have the address of the first structure or pepe in arg0 and the second time it is called it will have the address of the juan structure, I will give it a generic name for both, for example _struct. If I decompile the function with F5 I see that it is not right.



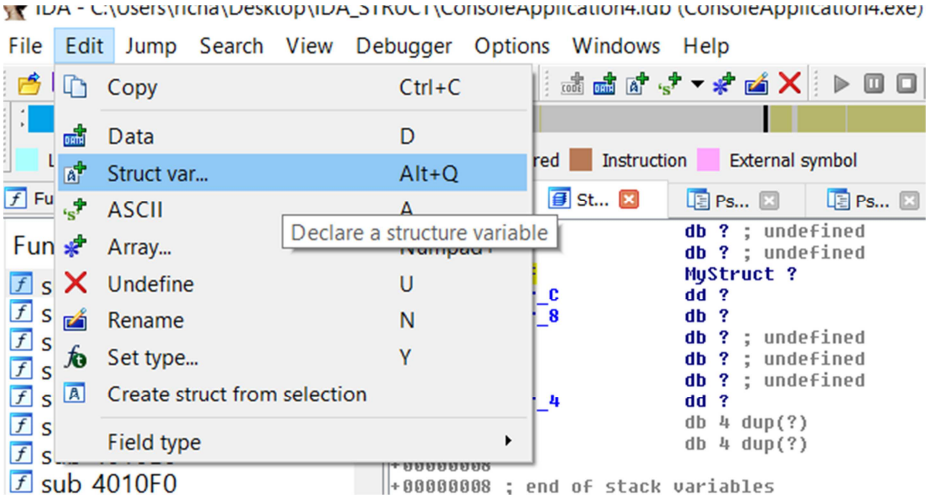
I see that the definition of the variable is a simple int and not as in the original code as the address of a structure. I can fix it here.



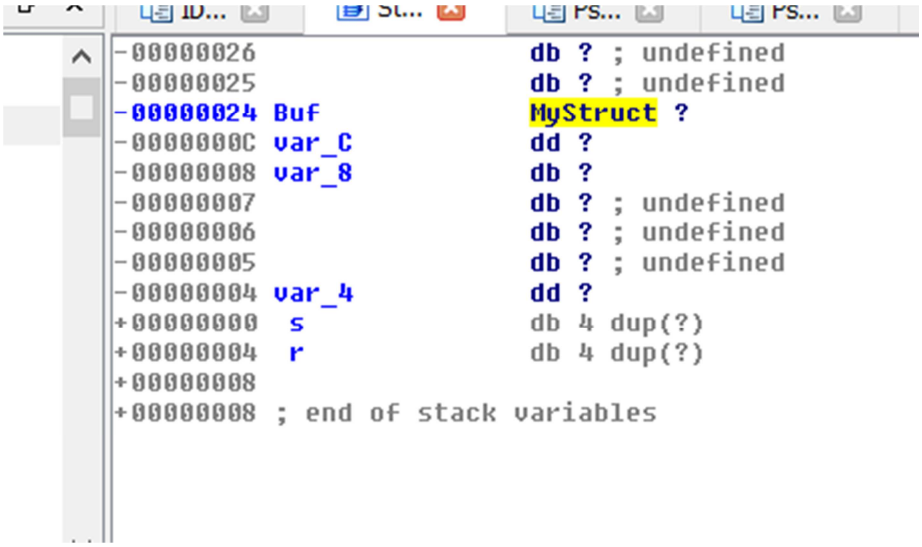
This shows to choose the address of which structure it is and here we will choose of MyStruct type.



Obviously, Buf is pepe and there it gets its address and passes it as an argument, let's see Buf in the representation of the stack. As the structure is not necessary to create it because it already exists. I just have to tell you that Buf is MyStruct type. For that, press ALT + Q in Buf.



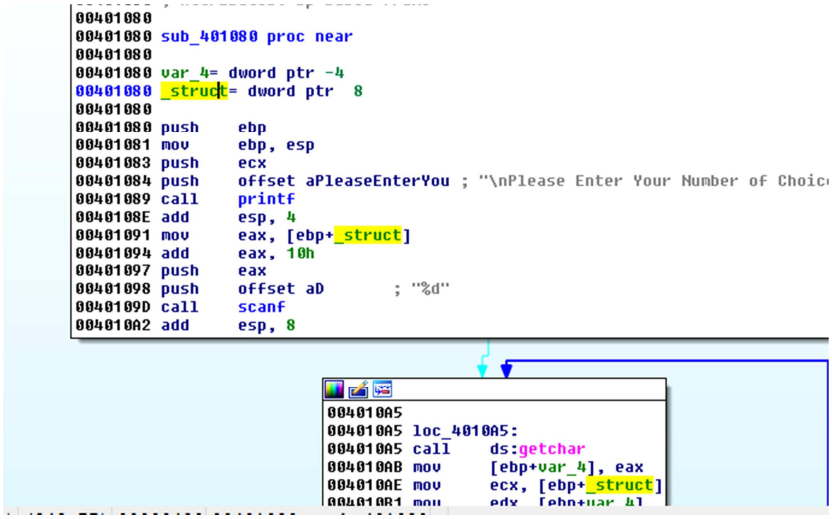
And it will allocate to Buf the MyStruct type if we put the size down, some fields will be left out, but after that it will be possible to enlarge MyStruct and it will be corrected only here (if it does not break, hehe)

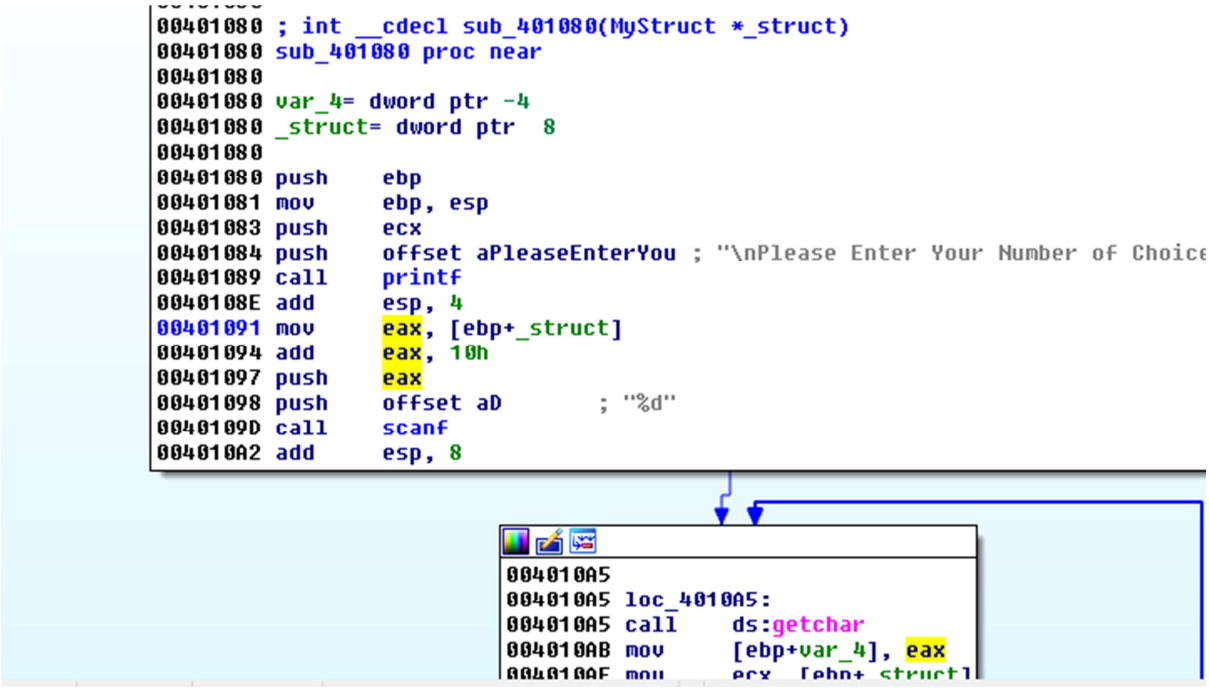


We rename Buf as pepe.

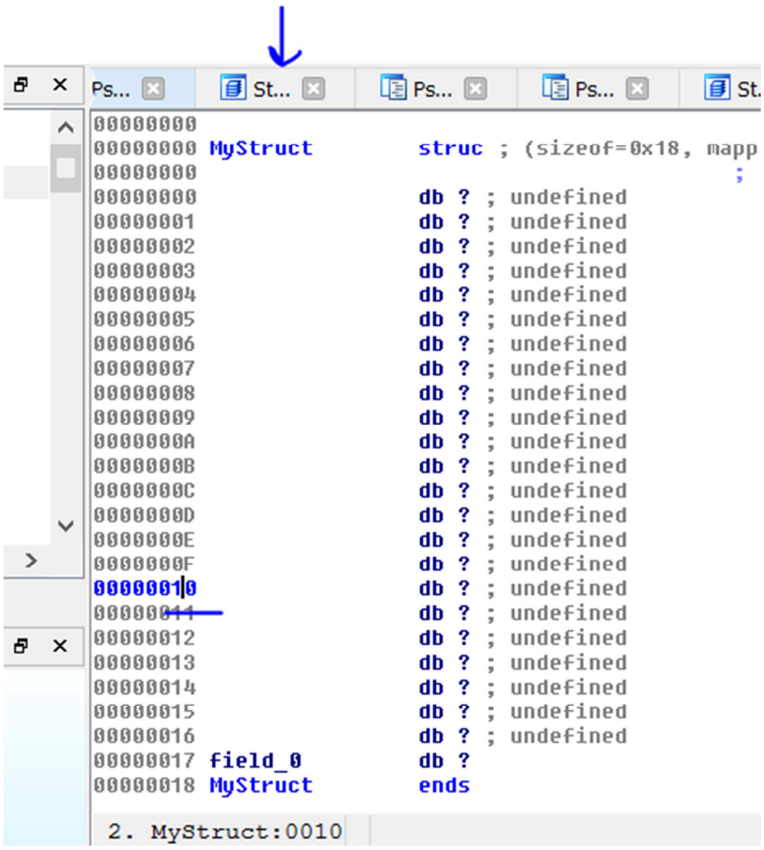
We see that, there, the address of pepe is passed and in the second call the address of var_44 is passed that will also be the other juan variable of the MyStruct type, so we go to the representation of the stack and in var_44 we also press ALT + Q.

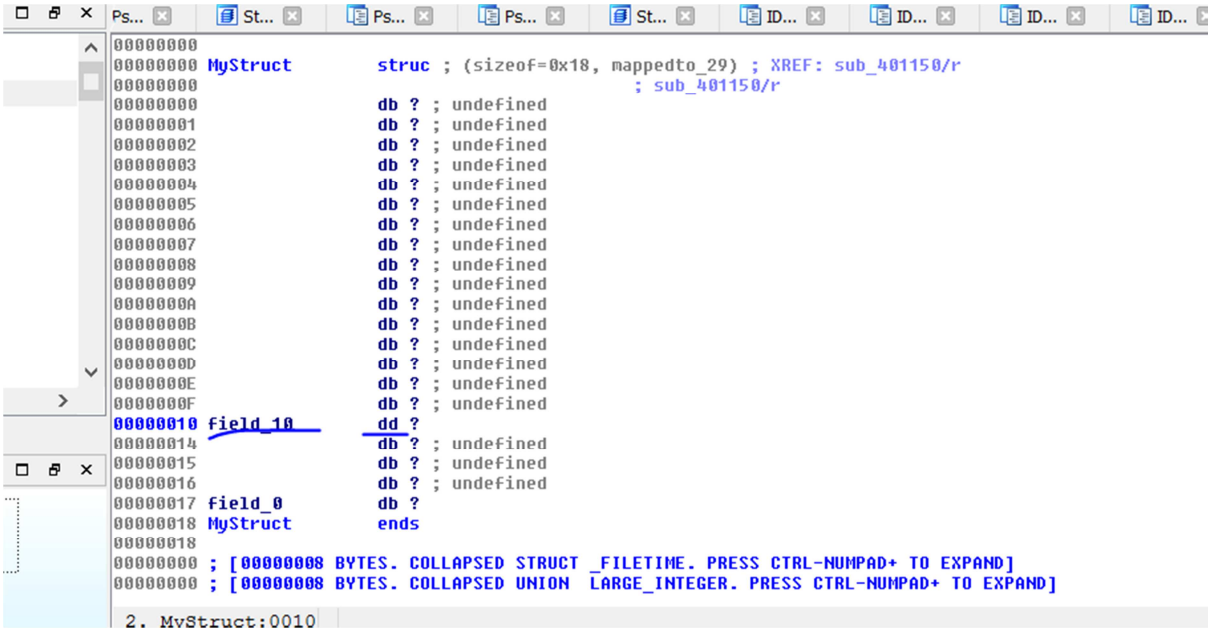
We already have the two structures of MyStruct type. I return to the function.



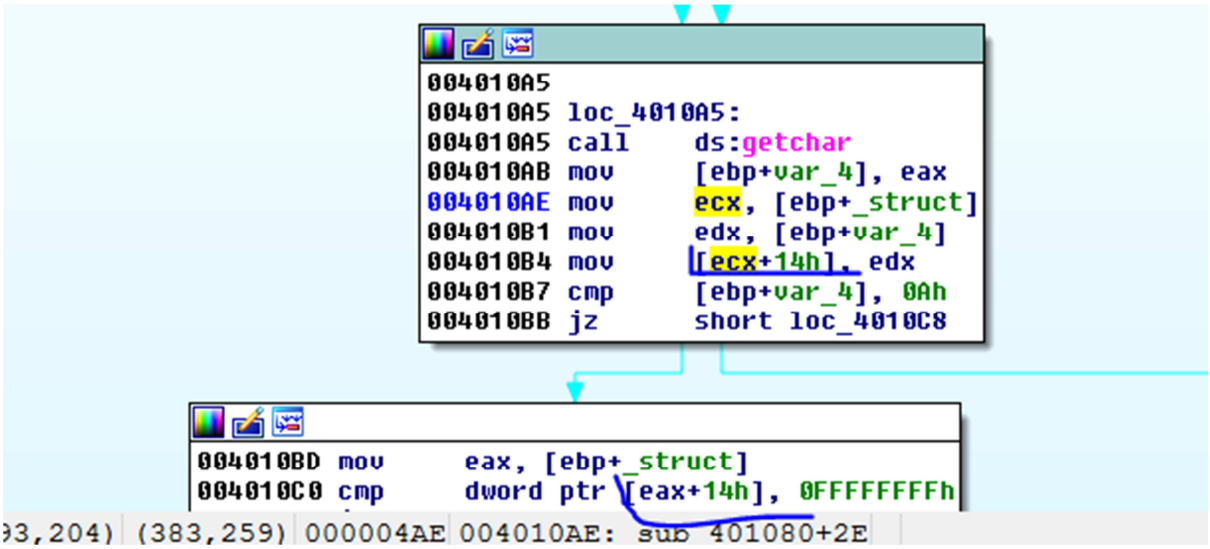


We see that the field in 0x10 is a dword where it receives the value of scanf, so we go to MyStruct and in 0x10 we press the D until it is of DWORD DD type.

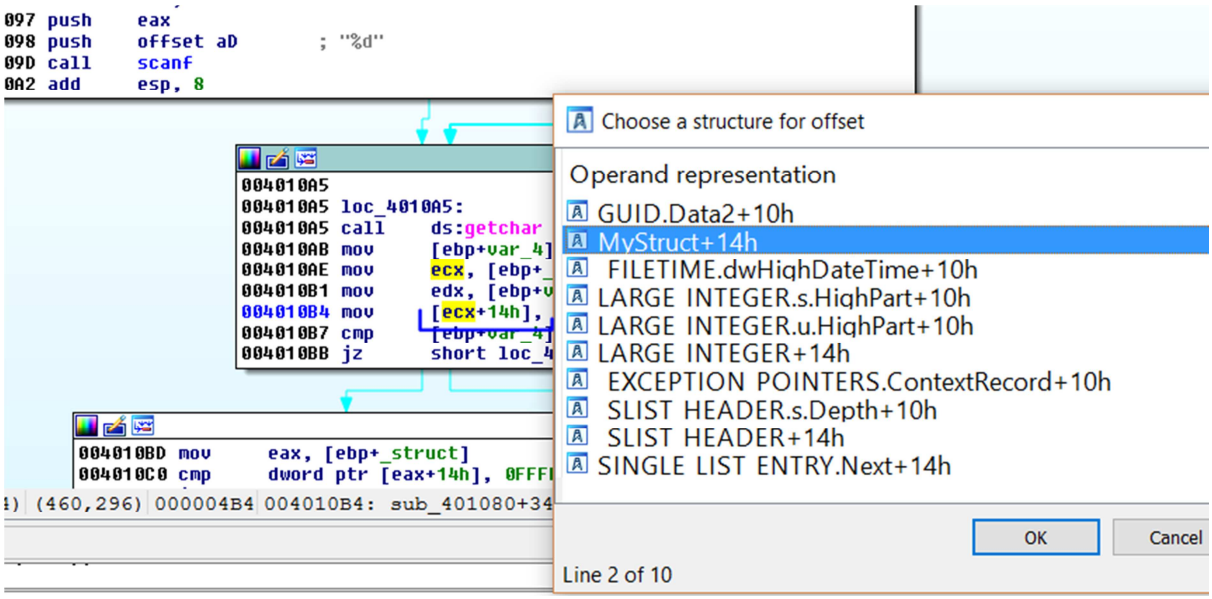




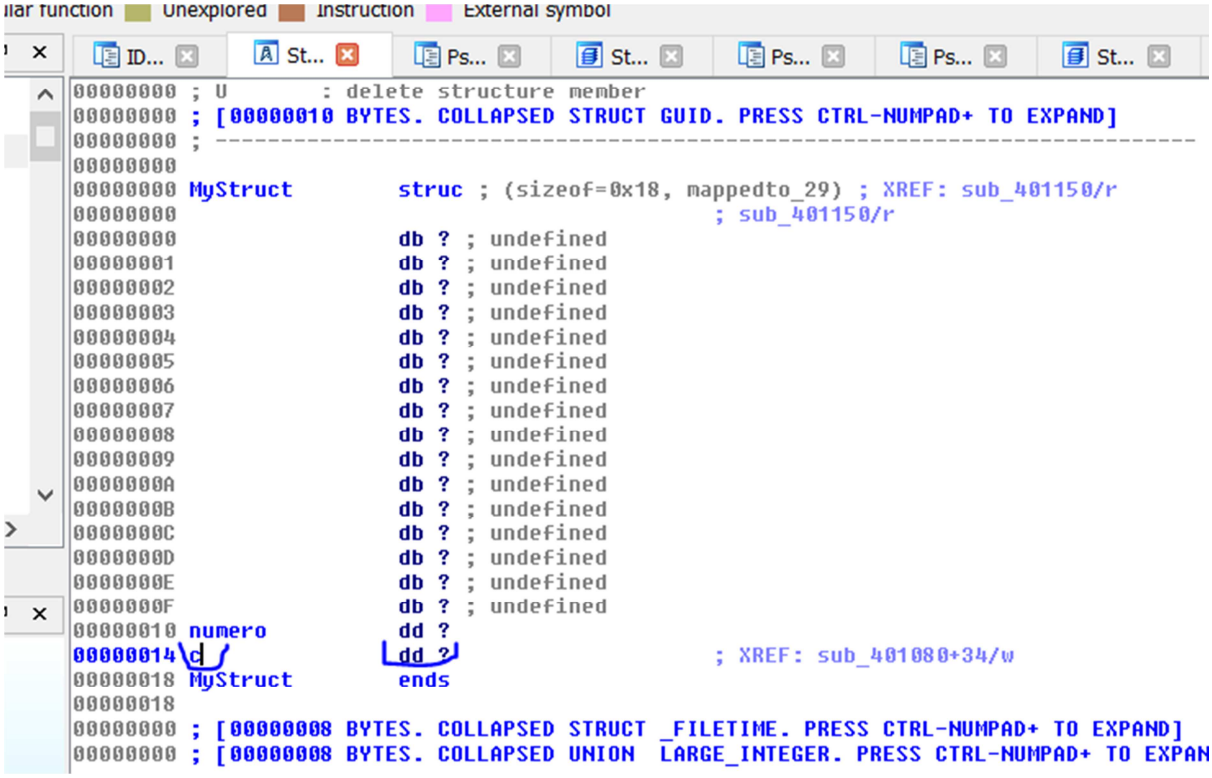
I will rename it as **numero**.

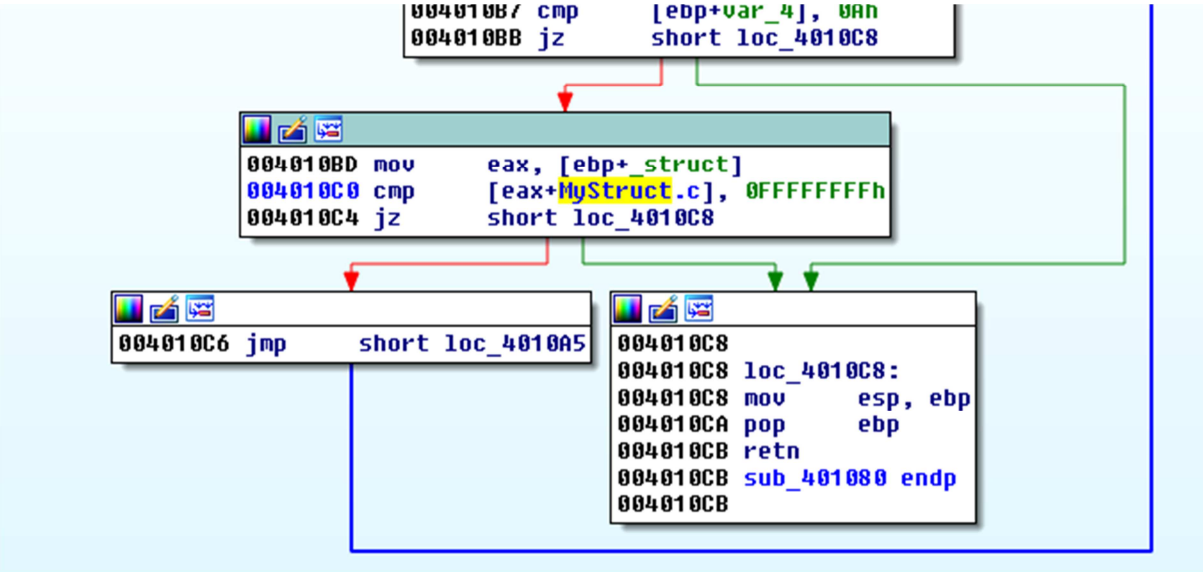


The other input is the 0x14 field that is used in the loop to remove the 0A. I will rename it c.



Let's go to MyStruct's 0x14 and press D until it's a DWORD and name it c.





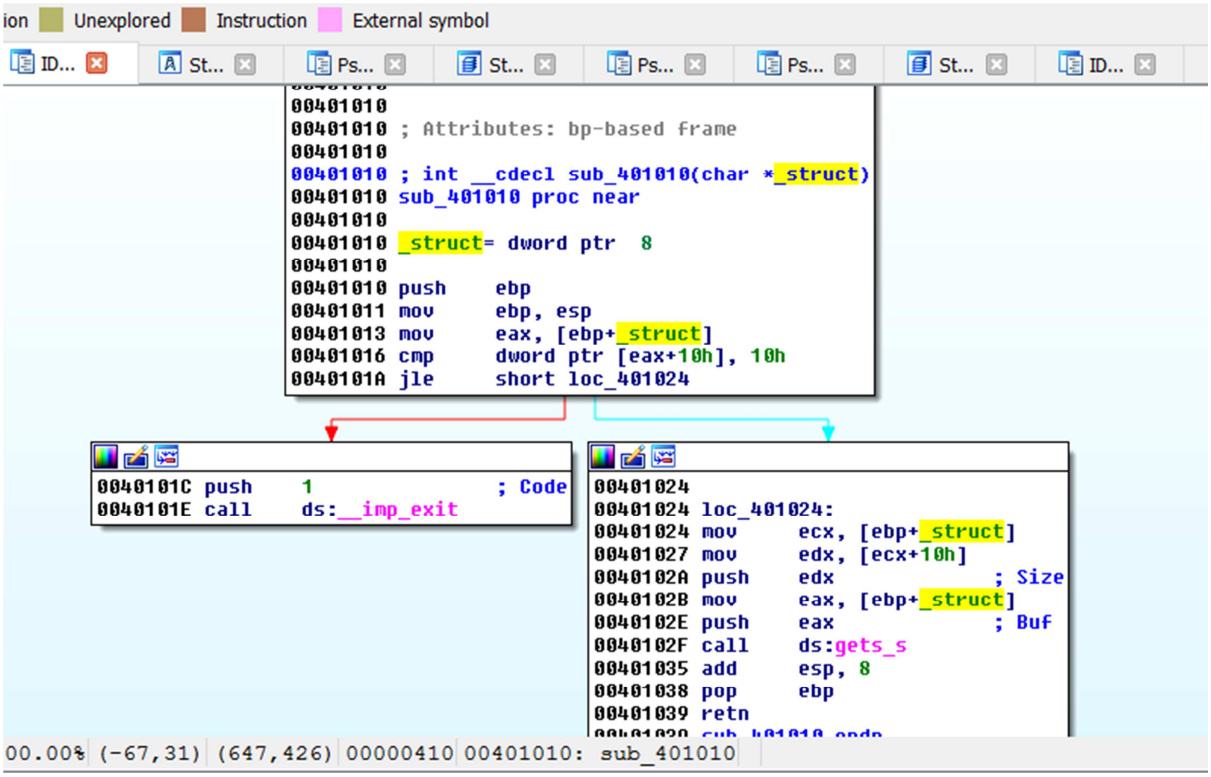
There, we press T and it is already.

Finally, rename the function as **enter**.

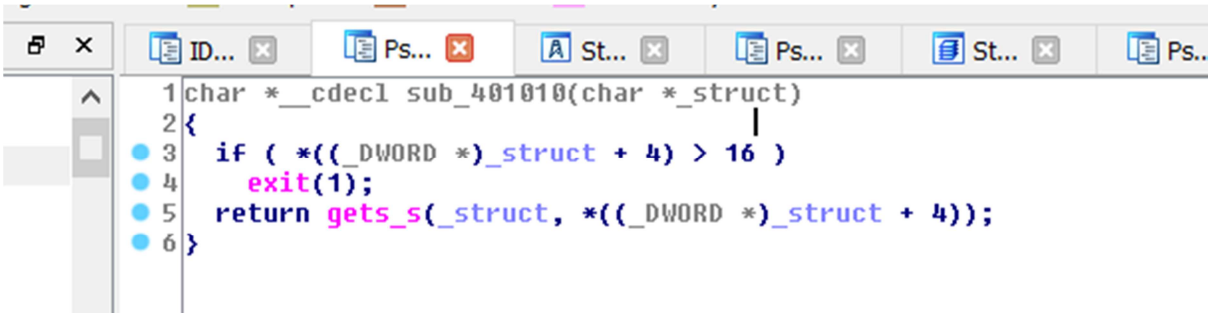
```
00401180        mov     [ebp+juan.numero], 0
00401187        mov     [ebp+juan.c], 0
0040118E        mov     [ebp+juan.flag], 0
00401192        lea     eax, [ebp+pepe]
00401195        push    eax ; _struct
00401196        call    enter
0040119B        add     esp, 4
0040119E        lea     ecx, [ebp+pepe]
```

We see that the first three functions call them passing it pepe and the next three passes it juan.

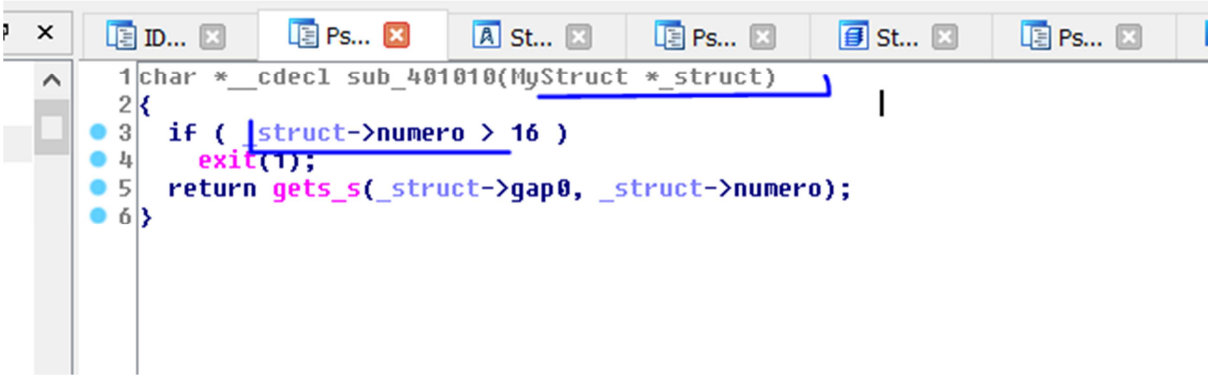
Let's look at the next function.



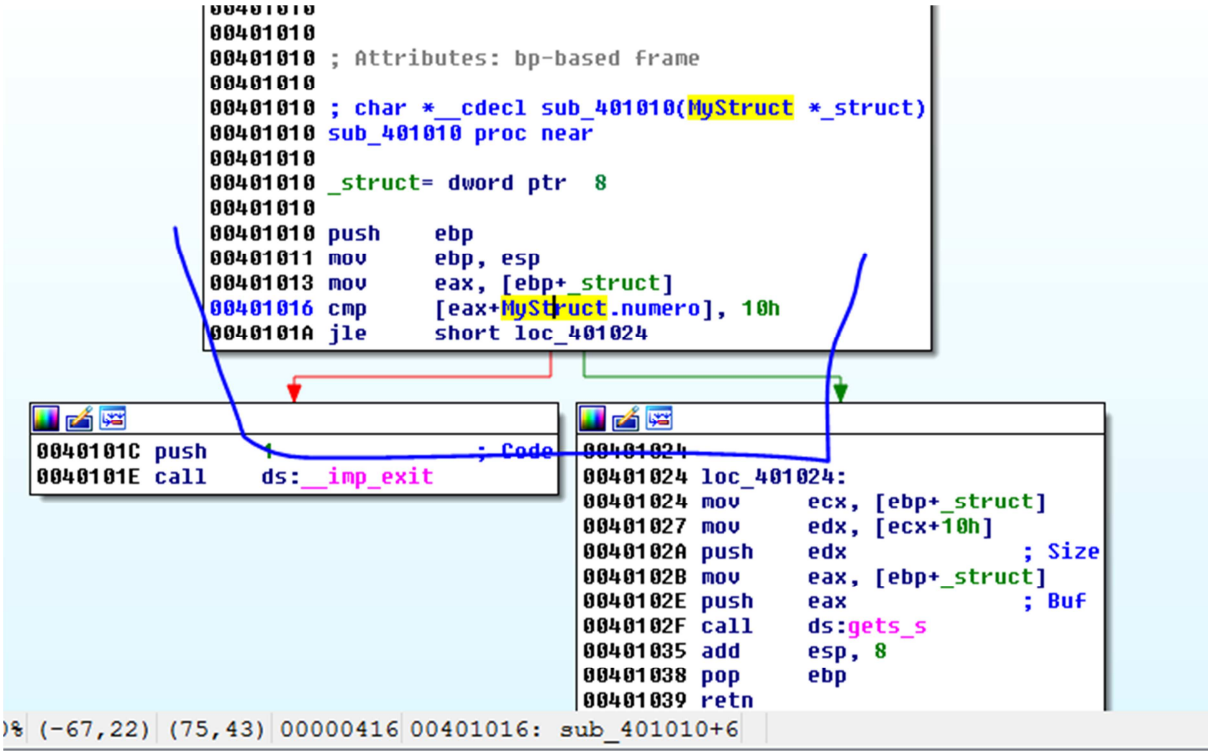
Also, this is called by both structures so you can as in the previous one by pressing F5.



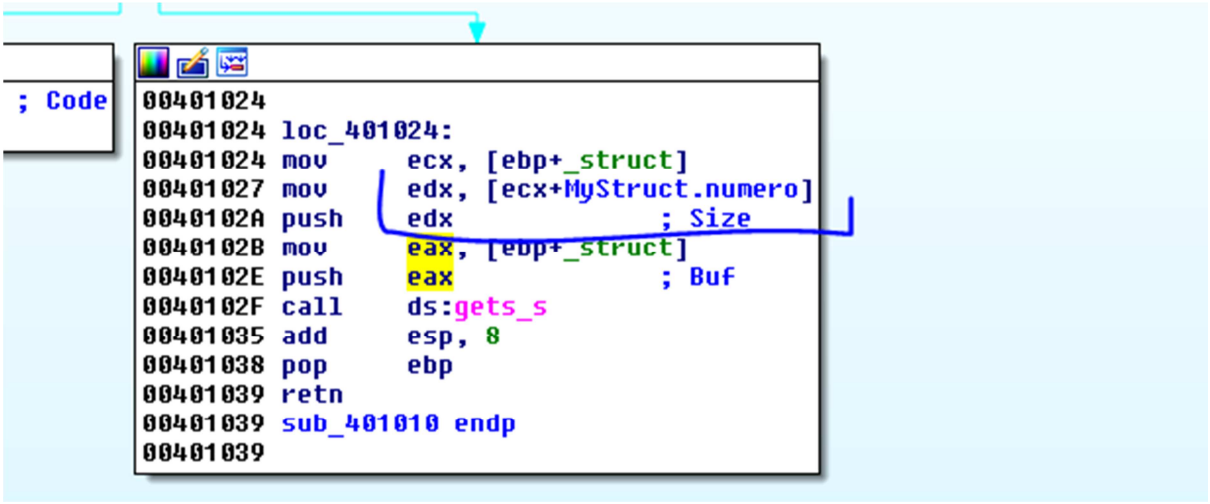
There, in the _struct variable, right click CONVERT TO STRUCT *.



Now, this is the address of a MyStruct structure and just as before we will see the fields, pressing T where it corresponds.



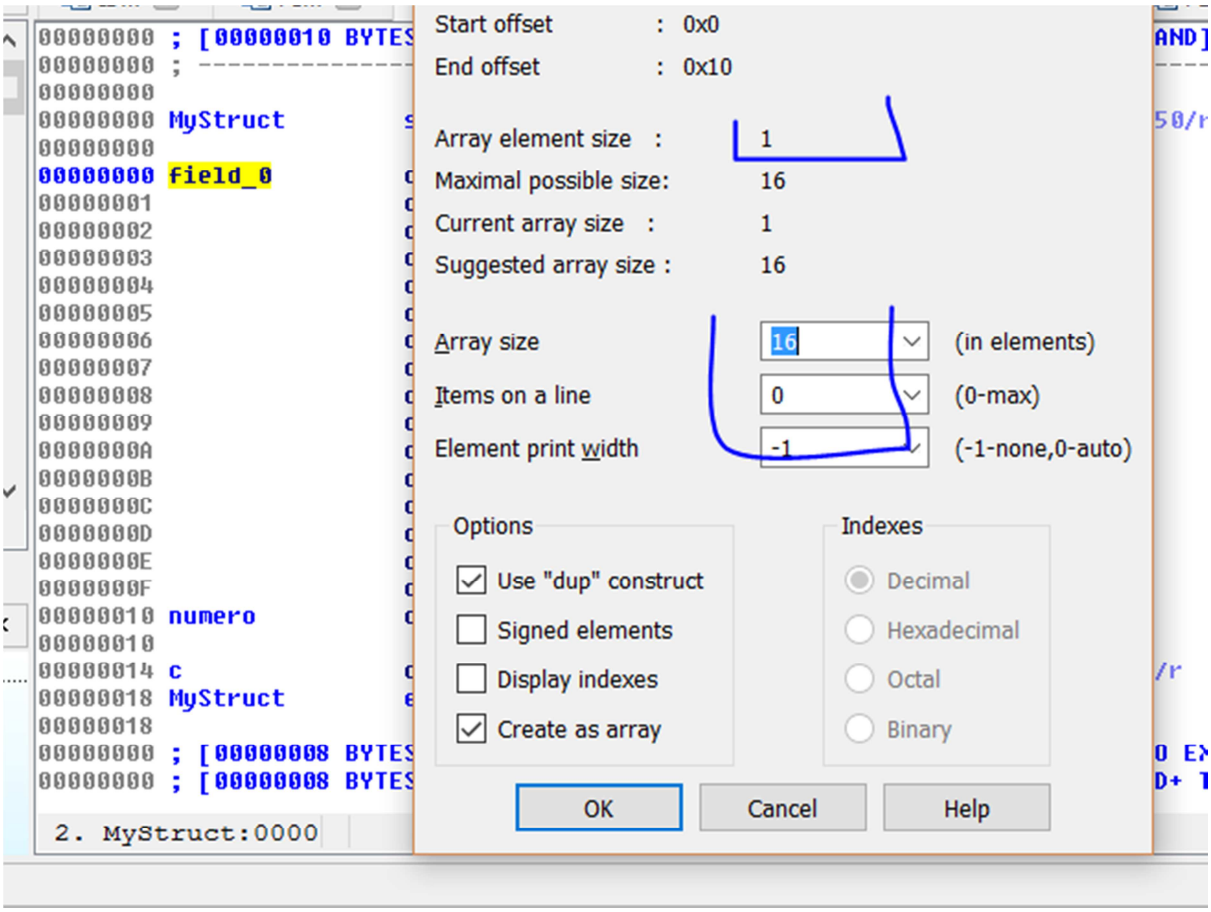
There, we see that it compares the number we passed with 0x10 and because the comparison is signed, any negative number can pass it as for example 0xFFFFFFFF which is -1 which is less than 0x10.



Then, it uses the number that we passed as the size of gets_s, and the other argument, it must be a buffer that is at the beginning of the structure because it uses its address. I go to MyStruct and in 0x0 press D once to create a single byte field.

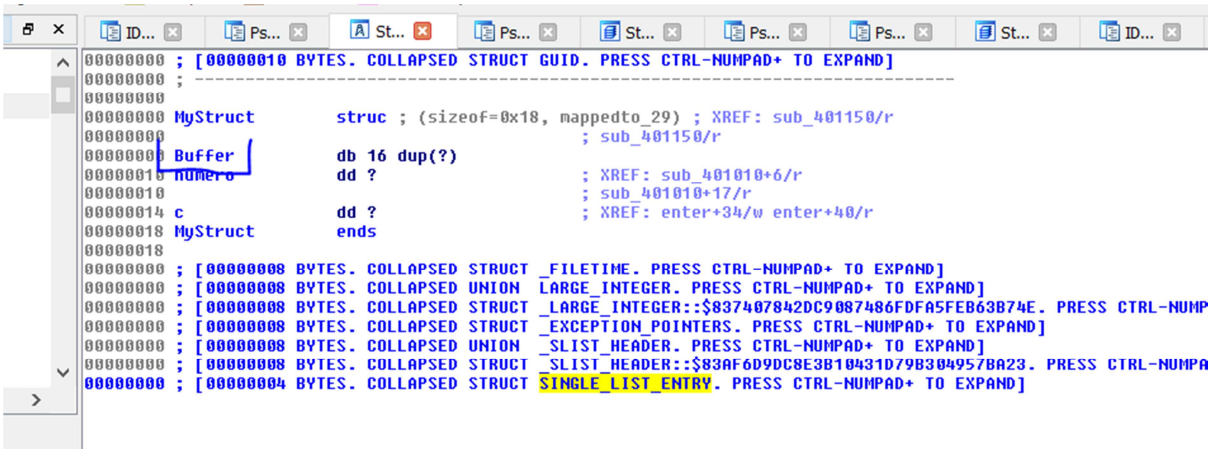
```
00000000 ; [00000010 BYTES. COLLAPSED STRUCT GUID. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; ---------------------------------------------------------------------------

00000000 MyStruct        struc ; (sizeof=0x18, mappedto_29) ; XREF: sub_401150/r
00000000                                                    ; sub_401150/r
00000000 field_0         db ?
00000001                 db ? ; undefined
00000002                 db ? ; undefined
00000003                 db ? ; undefined
00000004                 db ? ; undefined
00000005                 db ? ; undefined
00000006                 db ? ; undefined
00000007                 db ? ; undefined
00000008                 db ? ; undefined
00000009                 db ? ; undefined
0000000A                 db ? ; undefined
0000000B                 db ? ; undefined
0000000C                 db ? ; undefined
0000000D                 db ? ; undefined
0000000E                 db ? ; undefined
0000000F                 db ? ; undefined
00000010 numero          dd ?                       ; XREF: sub_401010+6/r
00000010                                            ; sub_401010+17/r
00000014 c               dd ?                       ; XREF: enter+34/w enter+40/r
00000018 MyStruct        ends
00000018
00000000 ; [00000008 BYTES. COLLAPSED STRUCT _FILETIME. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED UNION  LARGE_INTEGER. PRESS CTRL-NUMPAD+ TO EXPAND]
```

There, right click - array.



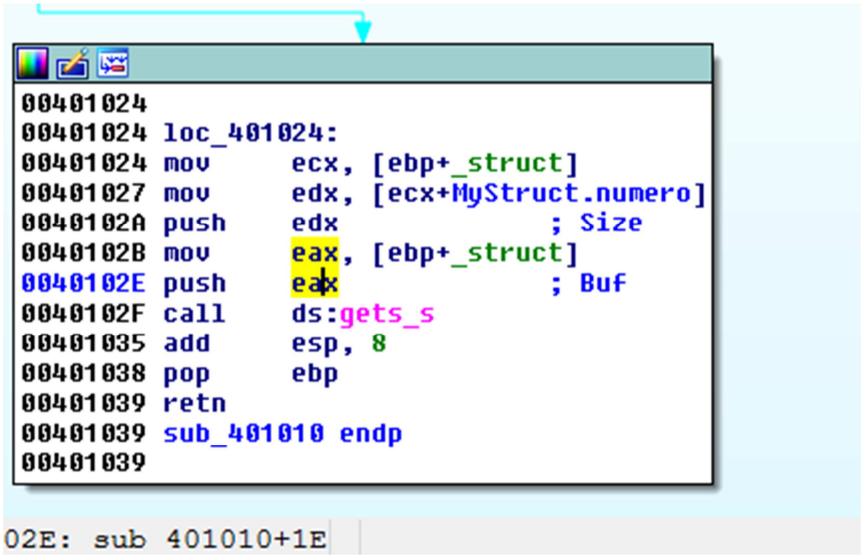
The length of the buffer will be 16. I accept it.

And I rename it as **Buffer**.



Size = 16 decimal.

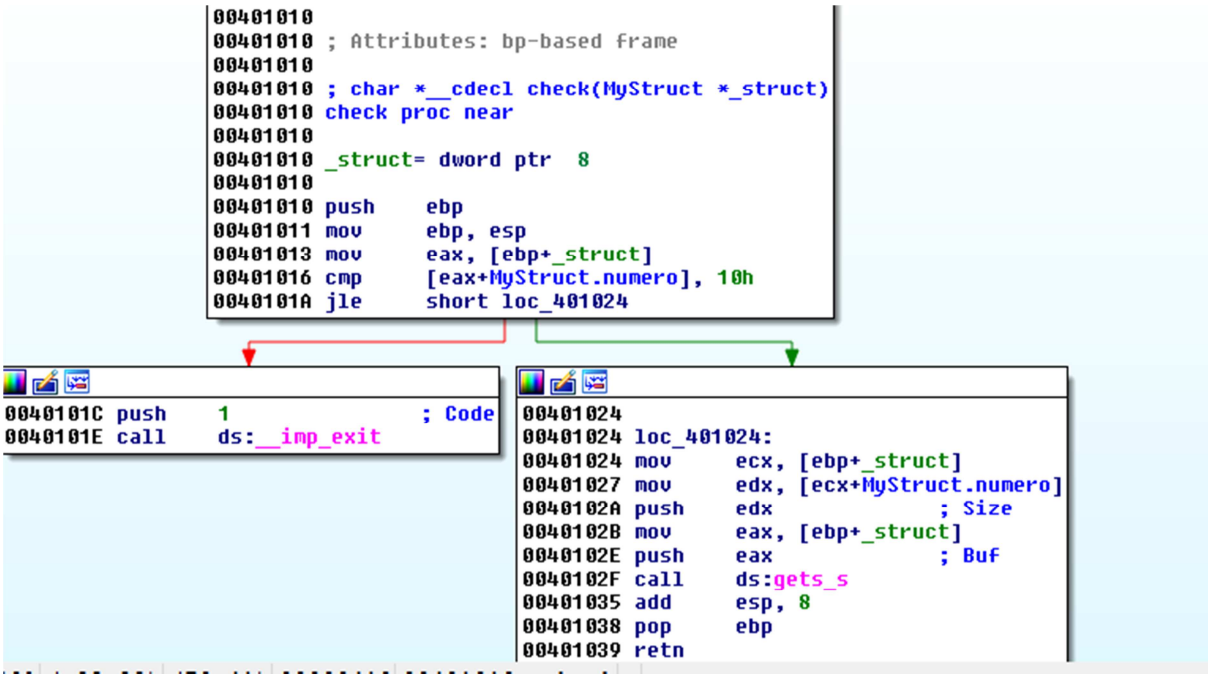
Let’s continue reversing.



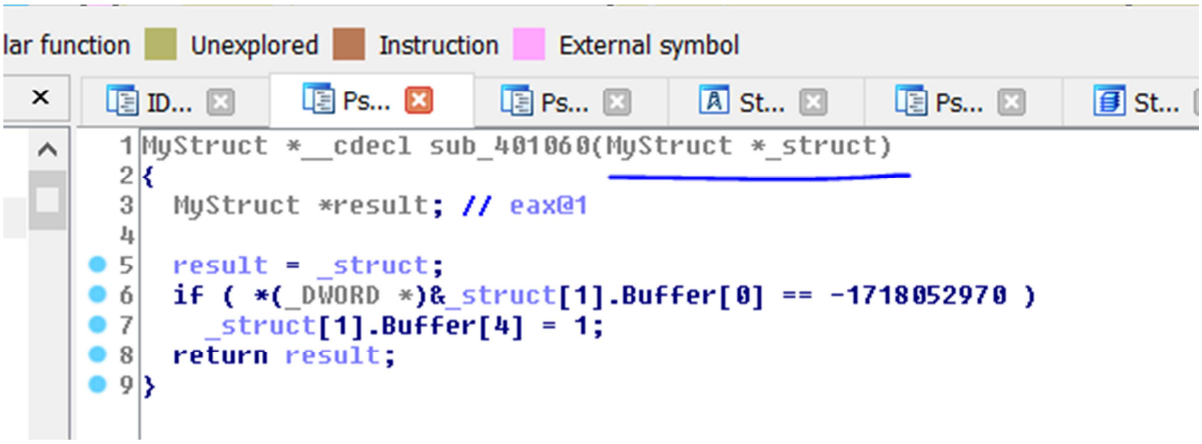
The question is that the gets_s can be overflowed, since the check passes negative values when used as size. They will be taken as unsigned values and will be large,

If, for example, we pass 0xFFFFFFFF in the comparison, it will be -1 because it is signed and it will be less than 0x10, but using it as size, it will be the positive value 0xFFFFFFFF which allows us to pass the number of characters we want in the gets_s to the buffer and overflow it .

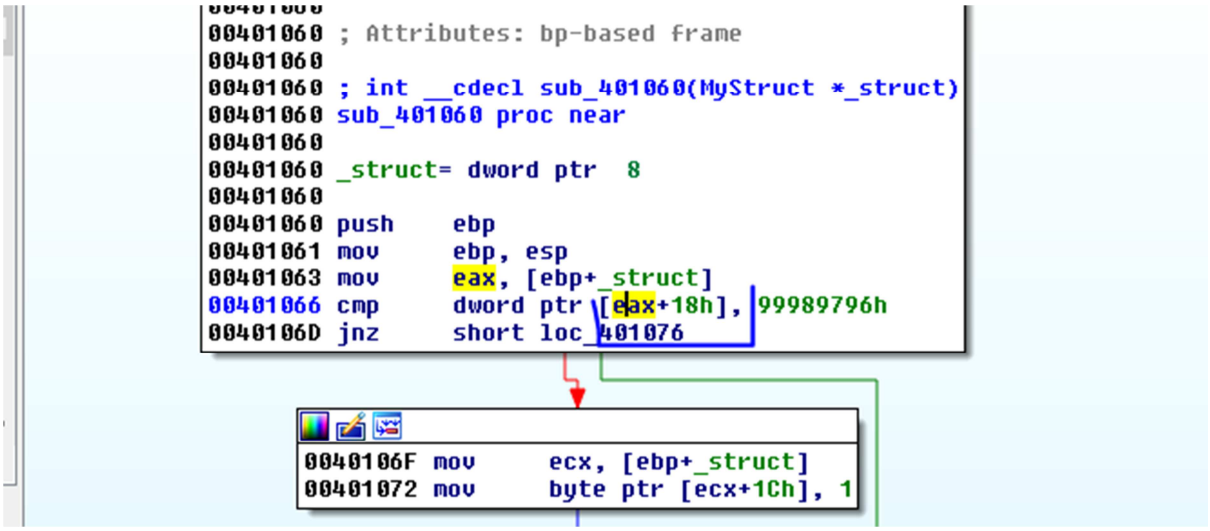
So we could rename the function as check or get whatever we want it to be representative of what the function does. We will check it to match.



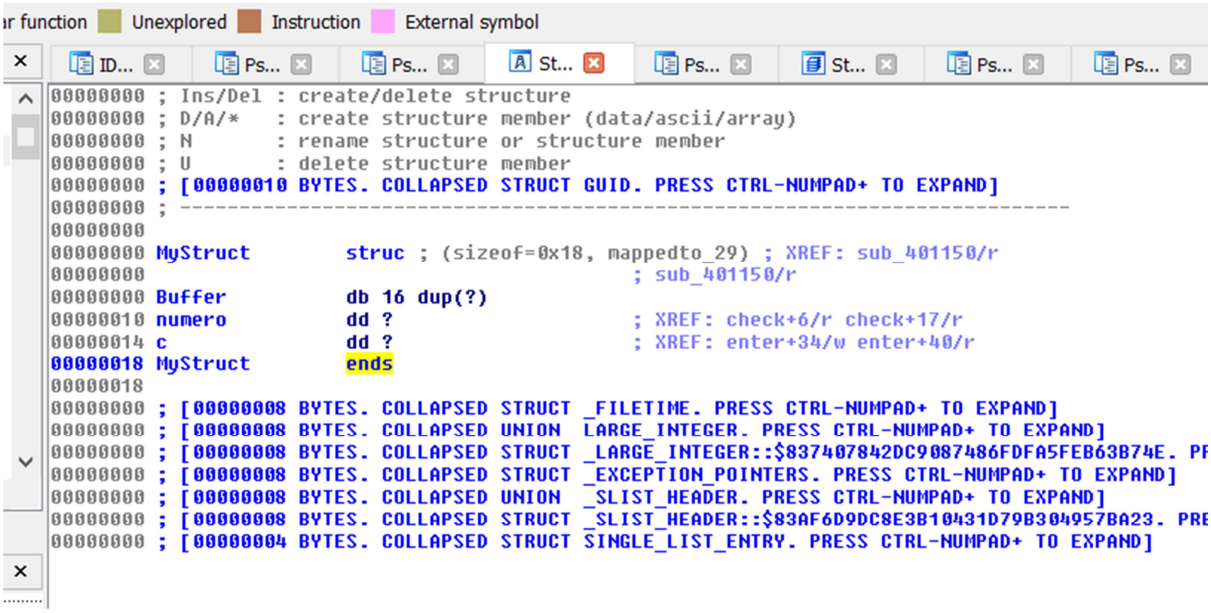
I have the third function. The argument is the same so I repeat the procedure, press F5 and change the argument type.



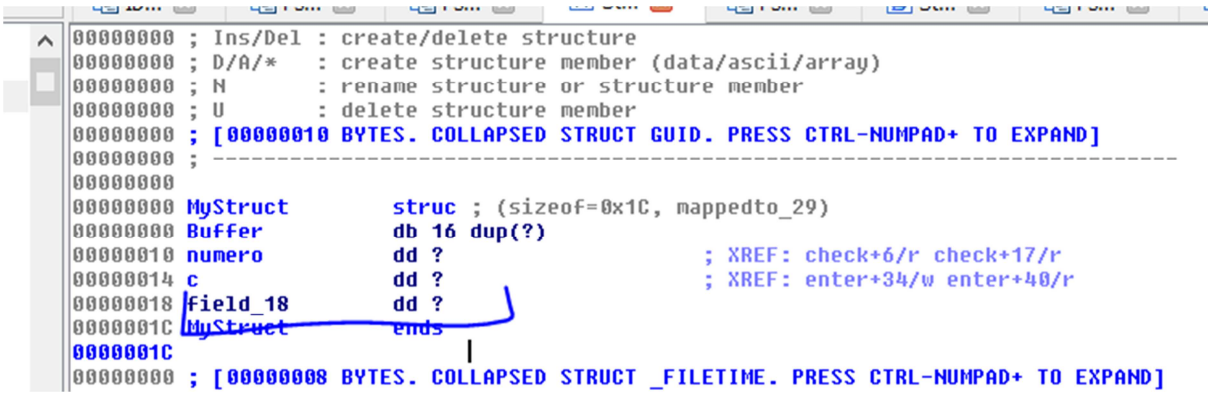
I keep working.



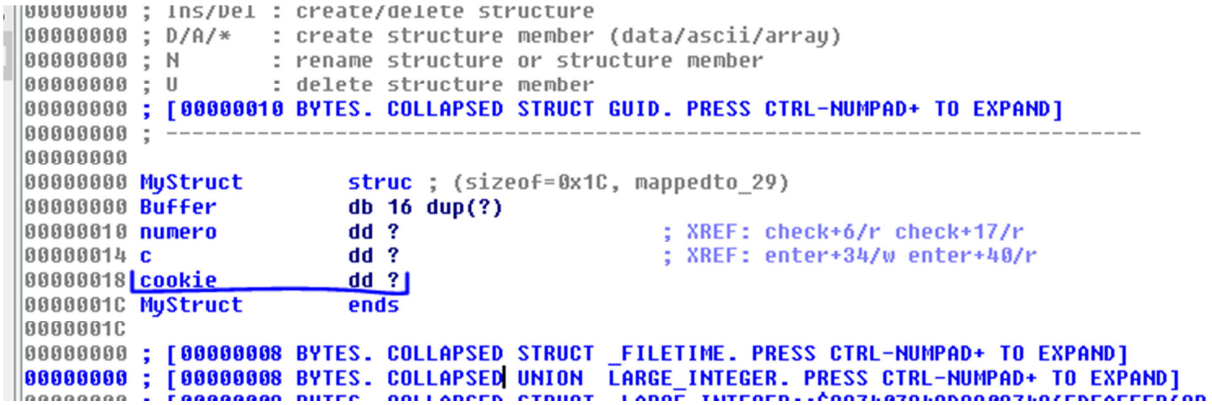
We see that there is one more field since it is trying to compare the [EAX + 0x18], which we have not defined since the last field of our MyStruct is 0x14. We will add it.



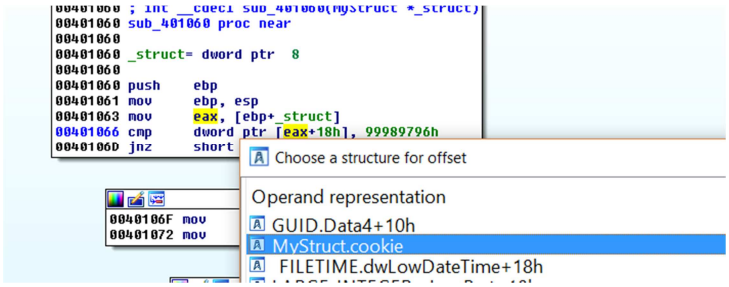
On the word **ends**, press D until a new DD DWORD field is created.



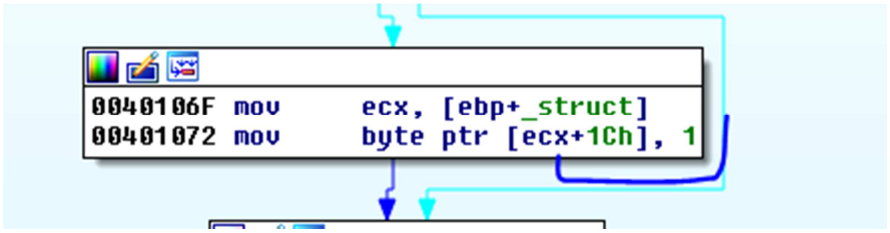
Rename it as **cookie**.



I return to the function and press T.



We see that there is another field. This is a single byte.

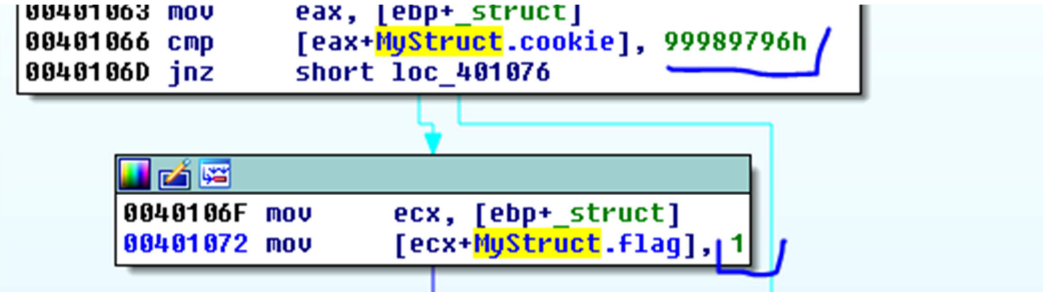


So, we go back to MyStruct and over ends we press D once and we will have a one byte field.

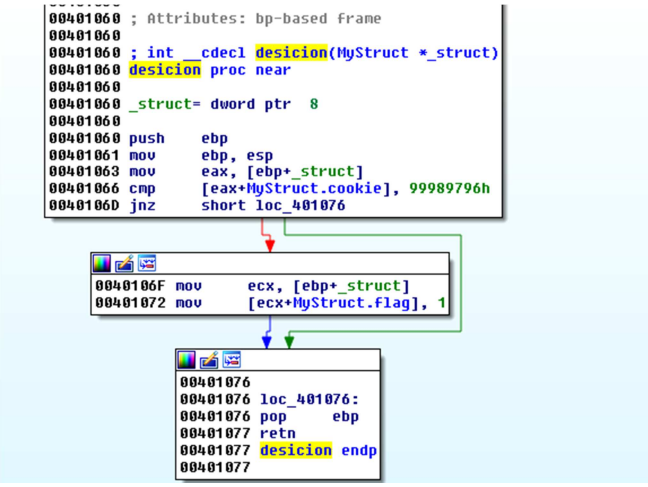
```
00000000 ; [00000010 BYTES. COLLAPSED STRUCT GUID. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; ---------------------------------------------------------------------------
00000000
00000000 MyStruct        struc ; (sizeof=0x1D, mappedto_29)
00000000 Buffer          db 16 dup(?)
00000010 numero          dd ?                    ; XREF: check+6/r check+17/r
00000014 c               dd ?                    ; XREF: enter+34/w enter+40/r
00000018 cookie          dd ?                    ; XREF: sub_401060+6/r
0000001C flag            db ?
0000001D MyStruct        ends
0000001D
00000000 ; [00000008 BYTES. COLLAPSED STRUCT _FILETIME. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED UNION  LARGE_INTEGER. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED STRUCT _LARGE_INTEGER::$837407842DC9087486FDFA5FEB63B74E. PRESS CTF
00000000 ; [00000008 BYTES. COLLAPSED STRUCT _EXCEPTION_POINTERS. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED UNION  _SLIST_HEADER. PRESS CTRL-NUMPAD+ TO EXPAND]
00000000 ; [00000008 BYTES. COLLAPSED STRUCT _SLIST_HEADER::$83AF6D9DC8E3B10431D79B304957BA23. PRESS CTRL
00000000 ; [00000004 BYTES. COLLAPSED STRUCT SINGLE_LIST_ENTRY. PRESS CTRL-NUMPAD+ TO EXPAND]
```

I rename it as **flag** to match.

Returning to the function.



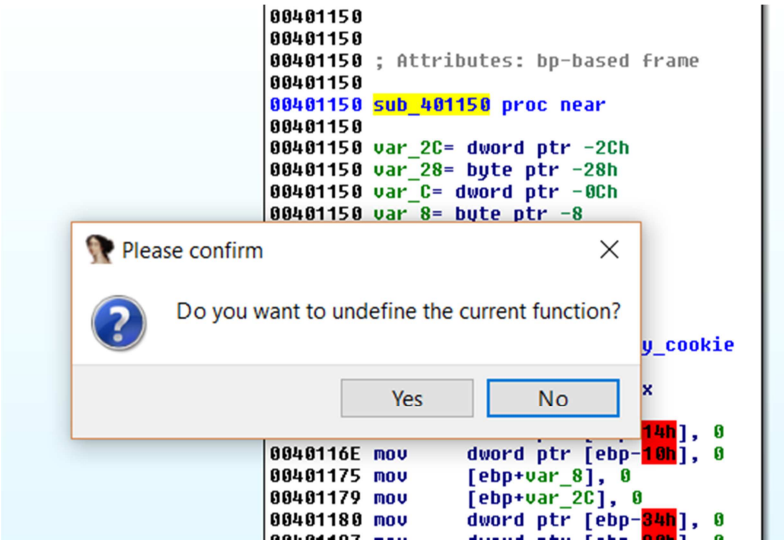
If cookie is equal to 0x99989796 then it will set the structure flag to 1.



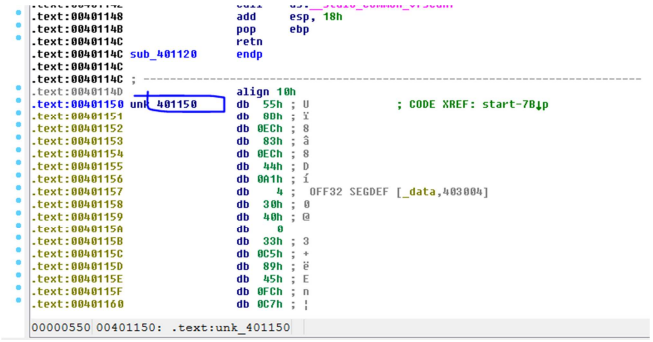
If for some change that did not propagate well, the main variables break and we did not snapshot as it happened to me.

```
00401150 sub_401150 proc near
00401150
00401150 var_2C= dword ptr -2Ch
00401150 var_28= byte ptr -28h
00401150 var_C= dword ptr -0Ch
00401150 var_8= byte ptr -8
00401150 var_4= dword ptr -4
00401150
00401150 push    ebp
00401151 mov     ebp, esp
00401153 sub     esp, 44h
00401156 mov     eax, ___security_cookie
0040115B xor     eax, ebp
0040115D mov     [ebp+var_4], eax
00401160 mov     [ebp+var_C], 0
00401167 mov     dword ptr [ebp-14h], 0
0040116E mov     dword ptr [ebp-10h], 0
00401175 mov     [ebp+var_8], 0
00401179 mov     [ebp+var_2C], 0
00401180 mov     dword ptr [ebp-34h], 0
00401187 mov     dword ptr [ebp-30h], 0
0040118E mov     [ebp+var_28], 0
00401192 lea     eax, [ebp-24h]
00401195 push    eax             ; struct
```

I go to the beginning of the broken function, and press U.



I accept and it will remain so.



Then, at the same start, I press C.

```
.text:0040114C ; ---------------------------------------------------------------------------
.text:0040114D                 align 10h
.text:00401150
.text:00401150 loc_401150:                             ; CODE XREF: start-7B↓p
.text:00401150                 push    ebp
.text:00401151                 mov     ebp, esp
.text:00401153                 sub     esp, 44h
.text:00401156                 mov     eax, ___security_cookie
.text:0040115B                 xor     eax, ebp
.text:0040115D                 mov     [ebp-4], eax
.text:00401160                 mov     dword ptr [ebp-0Ch], 0
.text:00401167                 mov     dword ptr [ebp-14h], 0
.text:0040116E                 mov     dword ptr [ebp-10h], 0
.text:00401175                 mov     byte ptr [ebp-8], 0
.text:00401179                 mov     dword ptr [ebp-2Ch], 0
.text:00401180                 mov     dword ptr [ebp-34h], 0
.text:00401187                 mov     dword ptr [ebp-30h], 0
.text:0040118E                 mov     byte ptr [ebp-28h], 0
.text:00401192                 lea     eax, [ebp-24h]
.text:00401195                 push    eax
.text:00401196                 call    enter
```

And then, right click - CREATE FUNCTION.

```
00401150
00401150
00401150 ; Attributes: bp-based frame
00401150
00401150 sub_401150 proc near
00401150
00401150 var_44= MyStruct ptr -44h
00401150 _struct= MyStruct ptr -24h
00401150 var_4= dword ptr -4
00401150
00401150 push    ebp
00401151 mov     ebp, esp
00401153 sub     esp, 44h
00401156 mov     eax, ___security_cookie
0040115B xor     eax, ebp
0040115D mov     [ebp+var_4], eax
00401160 mov     [ebp+_struct.cookie], 0
00401167 mov     [ebp+_struct.numero], 0
0040116E mov     [ebp+_struct.c], 0
00401175 mov     [ebp+_struct.flag], 0
00401179 mov     [ebp+var_44.cookie], 0
00401180 mov     [ebp+var_44.numero], 0
00401187 mov     [ebp+var_44.c], 0
0040118E mov     [ebp+var_44.flag], 0
00401192 lea     eax, [ebp+_struct]
00401195 push    eax                ; _struct
```

Now, it's okay.

Seeing the representation of the stack.

```
-00000044 ; Frame size: 44; Saved regs: 4; Purge: 0
-00000044 ;
-00000044
-00000044 var_44          MyStruct ?
-00000027                 db ? ; undefined
-00000026                 db ? ; undefined
-00000025                 db ? ; undefined
-00000024 _struct         MyStruct ?
-00000007                 db ? ; undefined
-00000006                 db ? ; undefined
-00000005                 db ? ; undefined
-00000004 var_4           dd ?
+00000000  s              db 4 dup(?)
+00000004  r              db 4 dup(?)
+00000008
+00000008 ; end of stack variables
```

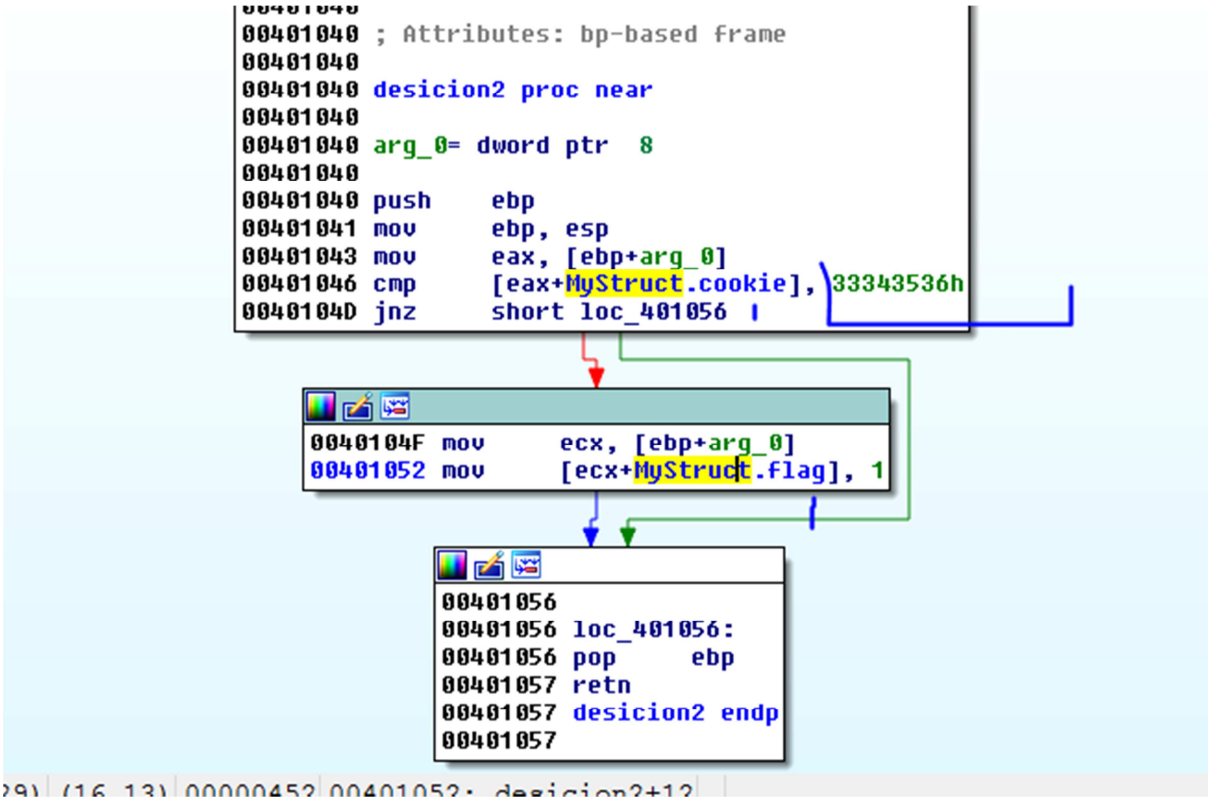
We see that after each structure there are three empty bytes because the last field was a single byte and there is nothing else.

Only the names of the structures went wrong, but I will change them as I did in the source code with Pepe and Juan.

```
int main(int argc, char *argv[])
{

    MyStruct pepe;
    MyStruct juan;

    pepe.cookie = 0;
    pepe.size = 0;
```

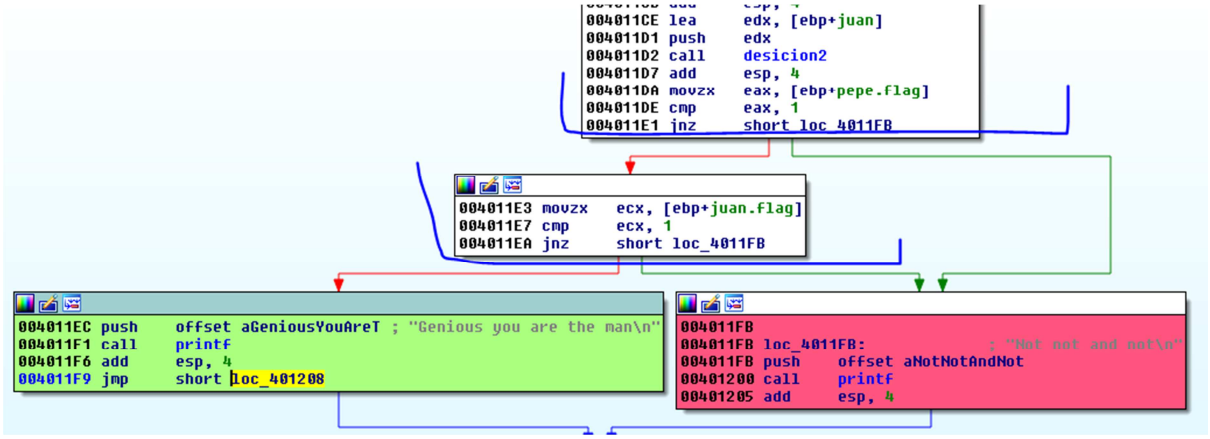
```
00401175 mov     [ebp+pepe.flag], 0
00401179 mov     [ebp+juan.cookie], 0
00401180 mov     [ebp+juan.numero], 0
00401187 mov     [ebp+juan.c], 0
0040118E mov     [ebp+juan.flag], 0
00401192 lea     eax, [ebp+pepe]
00401195 push    eax             ; _struct
00401196 call    enter
0040119B add     esp, 4
0040119E lea     ecx, [ebp+pepe]
004011A1 push    ecx             ; _struct
004011A2 call    check
004011A7 add     esp, 4
004011AA lea     edx, [ebp+pepe]
004011AD push    edx             ; _struct
004011AE call    desicion
004011B3 add     esp, 4
004011B6 lea     eax, [ebp+juan]
004011B9 push    eax             ; _struct
004011BA call    enter
004011BF add     esp, 4
004011C2 lea     ecx, [ebp+juan]
004011C5 push    ecx             ; _struct
004011C6 call    check
004011CB add     esp, 4
004011CE lea     edx, [ebp+juan]
004011D1 push    edx
004011D2 call    sub_401040
```

We see that with juan, it will do the same as it did with pepe on **enter** and **check**, but it has a third different function. Let's see what it does.



By pressing T in the fields, we see that it is similar to the "decision" function, except that the constant with which the cookie compares to juan is different, in this case, 0x33343536.

So the pepe cookie should be worth 0x99989796 and juan cookie should be worth 0x33343536 with that both flags of each structure will be 1.



We see that for this to arrive at the good boy both flags must be 1.

This exercise has many solutions because as the juan structure is higher in the stack…

```
-00000044 ; Use data definition commands to creat
-00000044 ; Two special fields " r" and " s" repr
-00000044 ; Frame size: 44; Saved regs: 4; Purge:
-00000044 ;
-00000044
-00000044 juan            MyStruct ?
-00000027                 db ? ; undefined
-00000026                 db ? ; undefined
-00000025                 db ? ; undefined
-00000024 pepe            MyStruct ?
-00000007                 db ? ; undefined
-00000006                 db ? ; undefined
-00000005                 db ? ; undefined
-00000004 var_4           dd ?
+00000000  s              db 4 dup(?)
+00000004  r              db 4 dup(?)
+00000008
+00000008 ; end of stack variables
```

When it does its gets_s we could overwrite all the flags so that they remain to 1 and that way, with a single overflow, to be able to pass the checks, also this can be done individually, overwriting in each gets_s the flag and it is not necessary to overwrite The cookie with the correct value, because we directly overwrote the flag without waiting to compare the cookie to change the same.

To overwrite the flag I have 16 decimal bytes, plus 3 dwords or 12,

This would be: 16 + 12=28 bytes.

```
00000000 MyStruct        struc ; (sizeof=0x1D, mappedto_29) ; XREF: sub_401150/r
00000000                                                    ; sub_401150/r
00000000 Buffer          db 16 dup(?)
00000010 numero          dd ?                               ; XREF: check+6/r check+17/r
00000014 c               dd ?                               ; XREF: enter+34/w enter+40/r
00000018 cookie          dd ?                               ; XREF: desicion2+6/r
00000018                                                    ; desicion+6/r
0000001C flag            db ?                               ; XREF: desicion2+12/w
0000001C                                                    ; desicion+12/w
0000001D MyStruct        ends
0000001D
```

Like this:

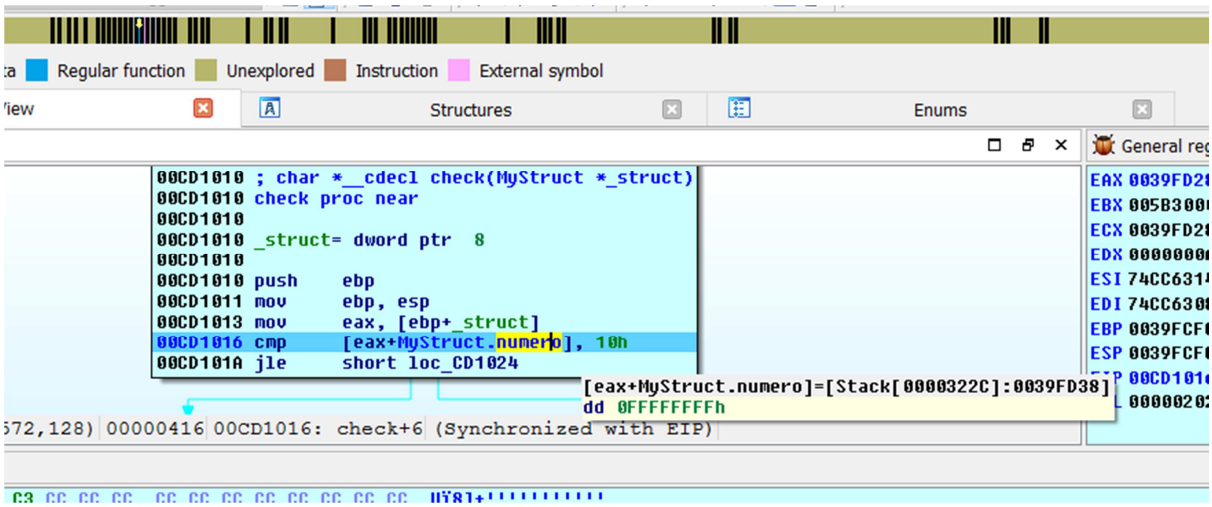
fruta= 28* “A” + “\x01”

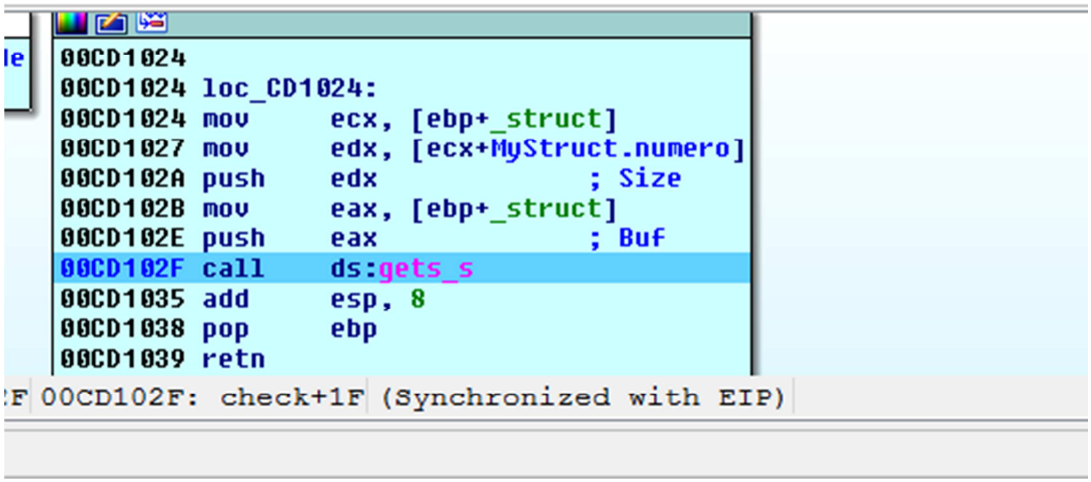
```
pepe.py ×
1  from subprocess import *
2  import struct
3  p = Popen([r'ConsoleApplication4.exe', 'f'], stdout=PIPE, stdin=PIPE, stderr=STDOUT)
4
5  print "ATACHEA EL DEBUGGER Y APRETA ENTER\n"
6  raw_input()
7
8  primera="-1\n"
9  p.stdin.write(primera)
10
11 fruta= fruta= 28* "A" + "\x01" +"\n"
12 p.stdin.write(fruta)
13
14 primera="-1\n"
15 p.stdin.write(primera)
16
17 fruta= fruta= 28* "A" + "\x01" +"\n"
18 p.stdin.write(fruta)
19
20 testresult = p.communicate()[0]
21
```

Of course, to each of the structures you have to pass the -1 or the negative value that it passes the check against 0x10, and then the fruit.

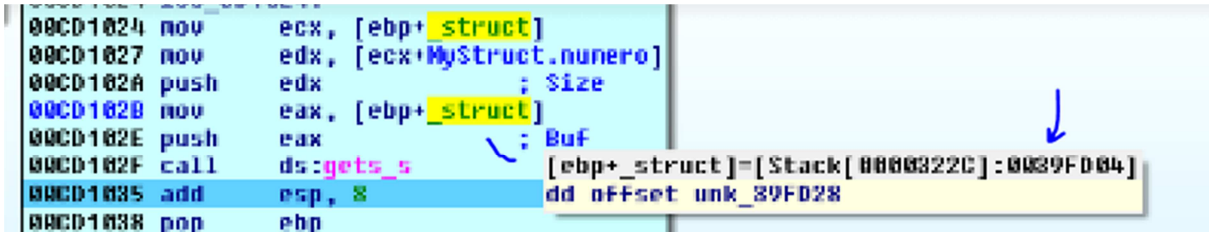
```
pe.py
ject
pepe.py
External Libraries
pepe.py ×
1  from subprocess import *
2  import struct
3  p = Popen([r'ConsoleApplication4.exe', 'f'], st
4
5  print "ATACHEA EL DEBUGGER Y APRETA ENTER\n"
6  raw_input()
7
8  primera="-1\n"
9  p.stdin.write(primera)
10
11 fruta= fruta= 28* "A" + "\x01" +"\n"
12 p.stdin.write(fruta)
13
pepe
Please Enter Your Number of Choice:

Please Enter Your Number of Choice:
Genious you are the man

Process finished with exit code 0
```

If we debug a little, we see the -1 that enters the field number of pepe.





It passes the check and arrives at gets_s and there, it reads the fruit.

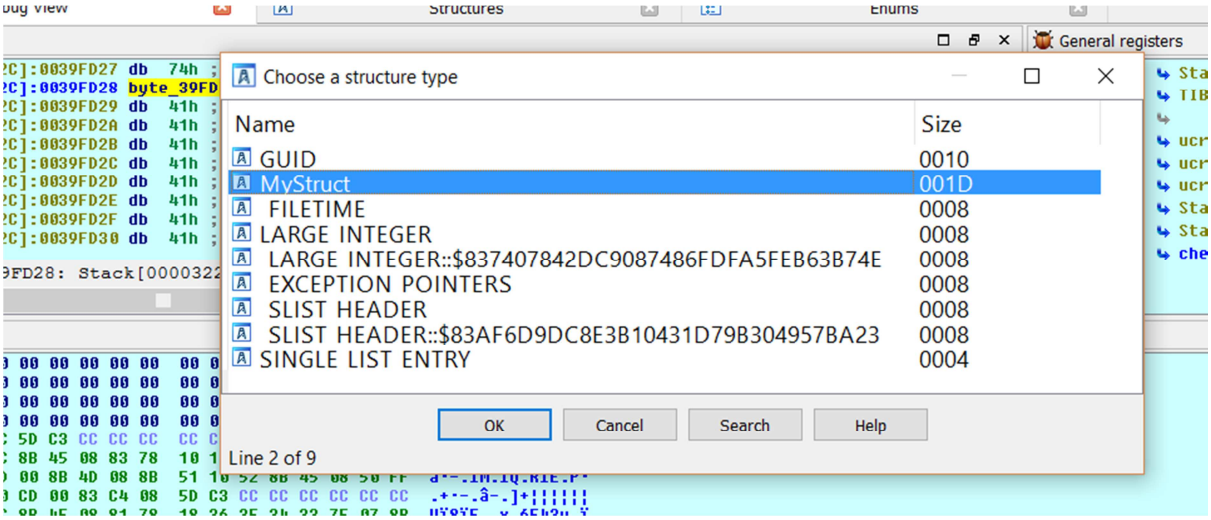


There, I see the address of pepe in my machine after going through the gets_s. If I go there…

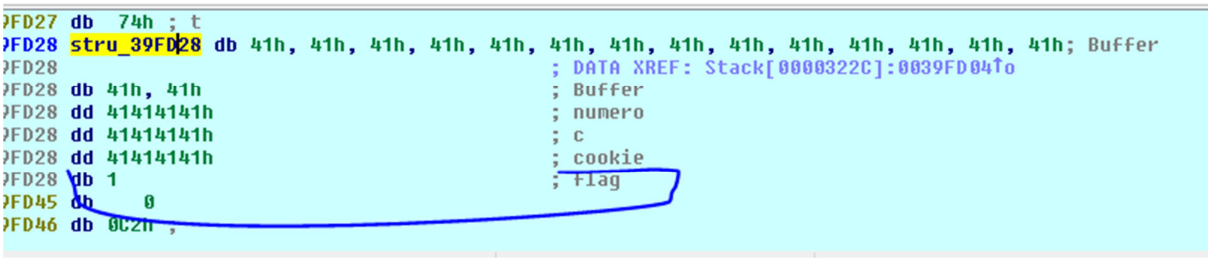
```
Stack[0000322C]:0039FD26 db 0C2h ; -
Stack[0000322C]:0039FD27 db  74h ; t
Stack[0000322C]:0039FD28 unk_39FD28 db  41h ; A                 ; DATA XREF: Stack[00
Stack[0000322C]:0039FD29 db  41h ; A
Stack[0000322C]:0039FD2A db  41h ; A
Stack[0000322C]:0039FD2B db  41h ; A
Stack[0000322C]:0039FD2C db  41h ; A
Stack[0000322C]:0039FD2D db  41h ; A
Stack[0000322C]:0039FD2E db  41h ; A
Stack[0000322C]:0039FD2F db  41h ; A
UNKNOWN 0039FD28: Stack[0000322C]:unk_39FD28 (Synchronized with EIP)
```

x View-1

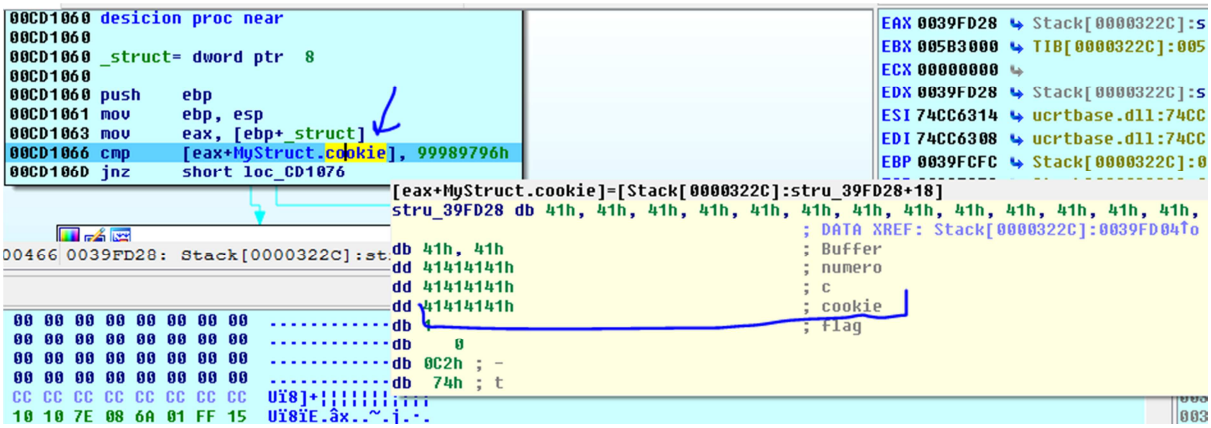
There, I see the fruit that I sent it. If I want to turn it into a structure, I press ALT + Q.



I select MyStruct.

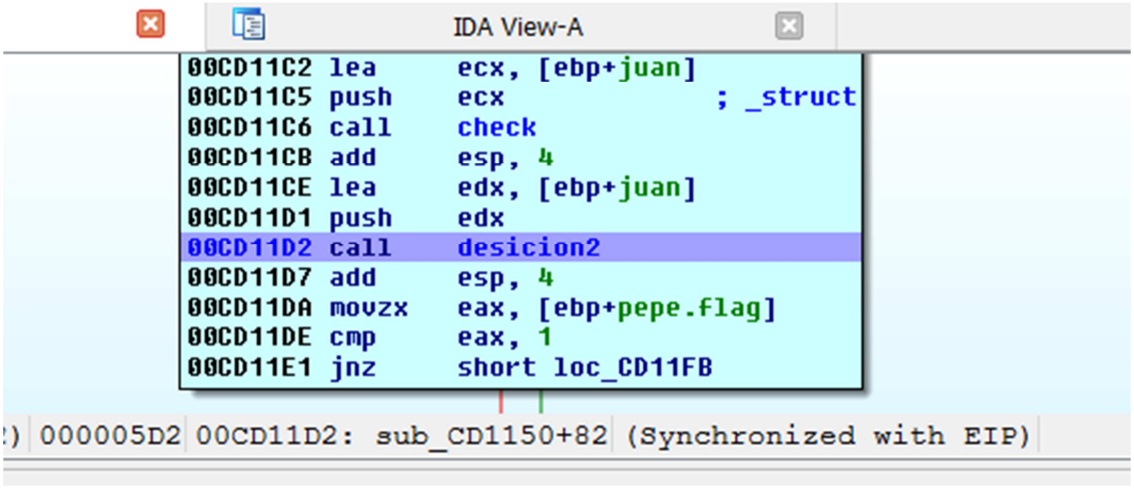


I see the fields and that flag is already overwritten to 1 by the overflow, without going through the other functions, I continue tracing.

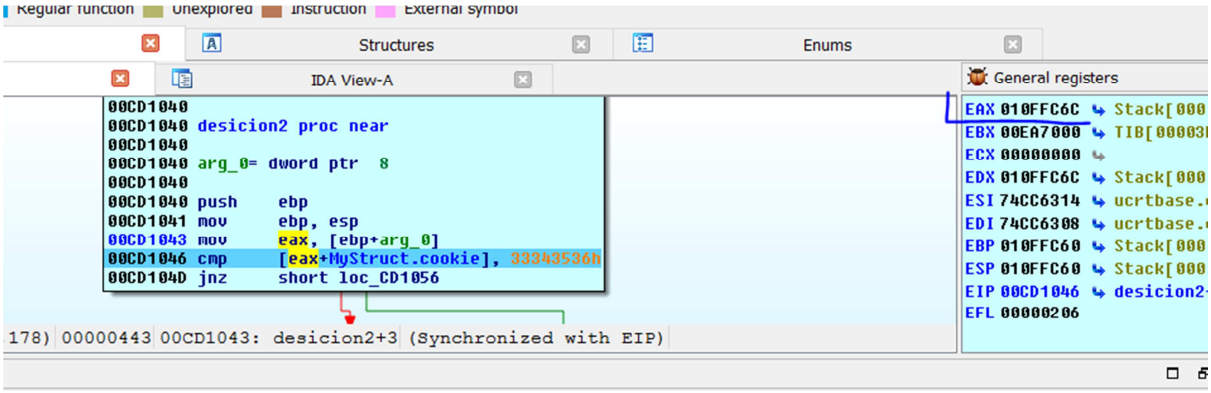


We see that this compares cookie with 0x99989796 and since it is not the same, it does not modify the flag but it is already 1, so I do not care.

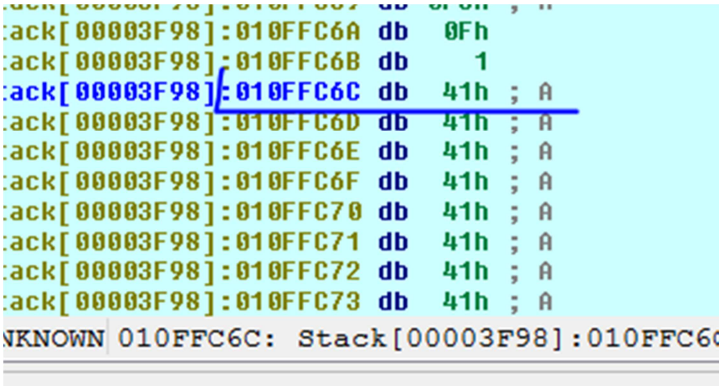
The same process will be repeated and we get to **decision2**.



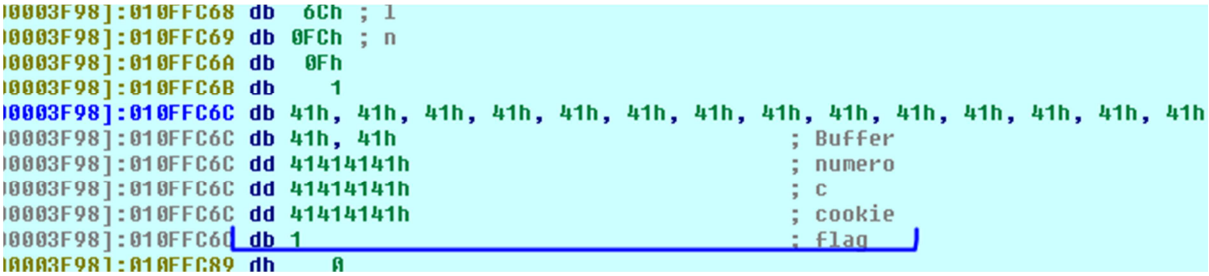
I enter it with F7.



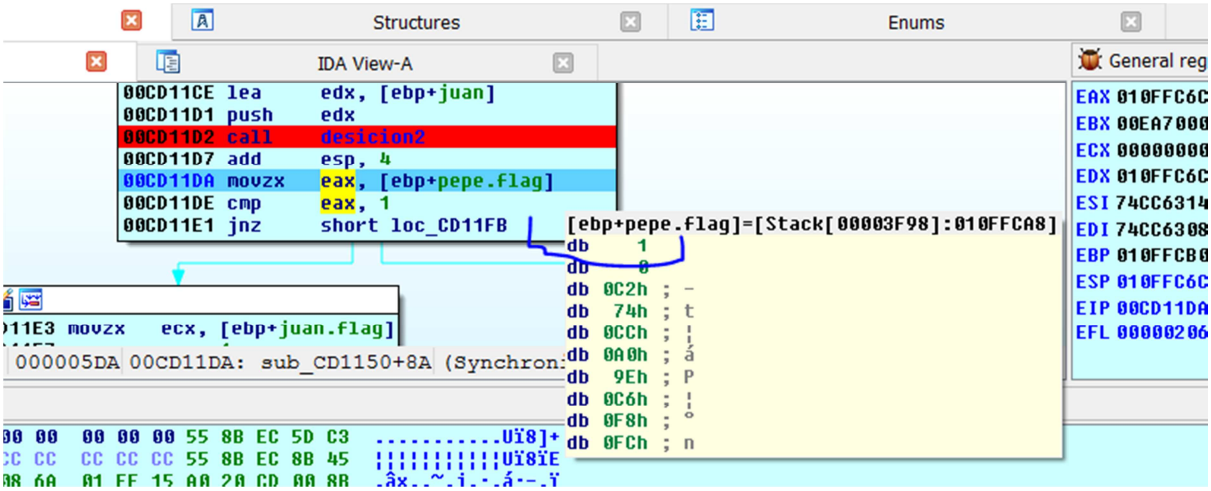
EAX has the beginning of juan structure. Let's see it.



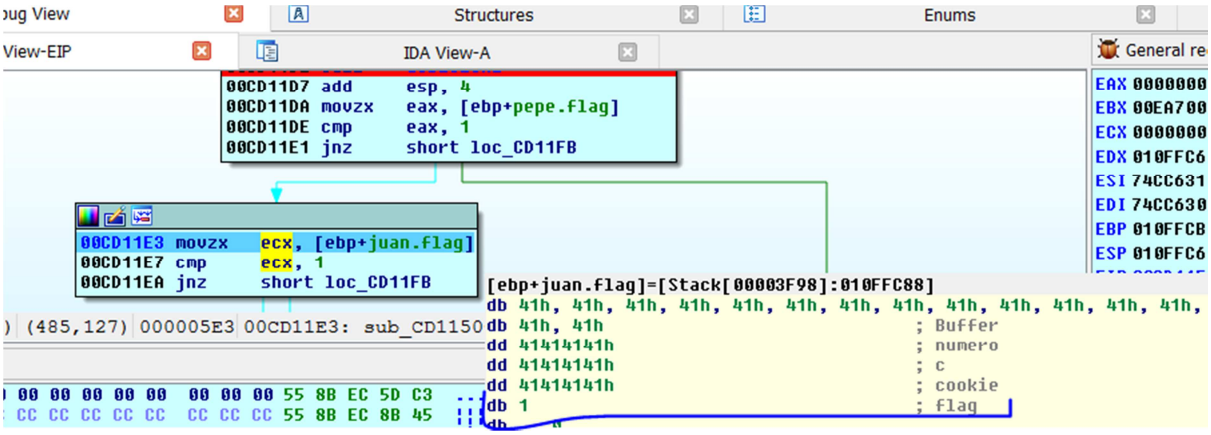
There, I also do ALT + Q to change it to structure and I choose MyStruct.



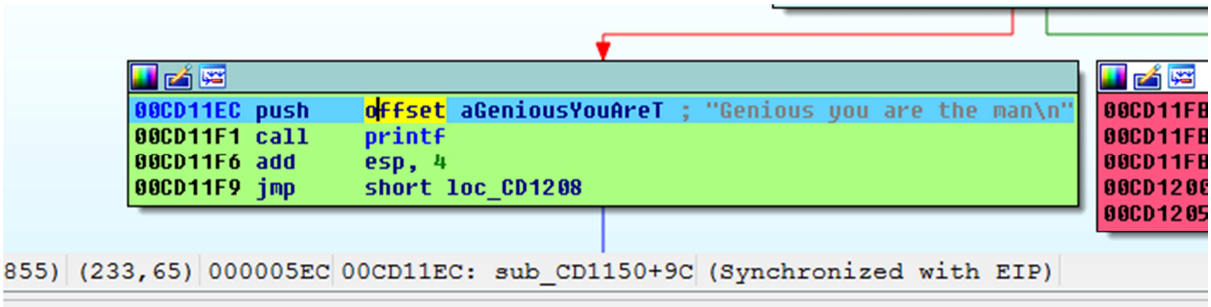
The same as before the flag will be 1. The comparison with the cookie will not be the same but it continued because the flag is already well.



pepe.flag is worth 1. It’s OK. Let’s continue.



Juan.flag is also correct so I get to the good boy msg.



And ready. This is already solved.

Ricardo Narvaja

Translated by: @IvinsonCLS