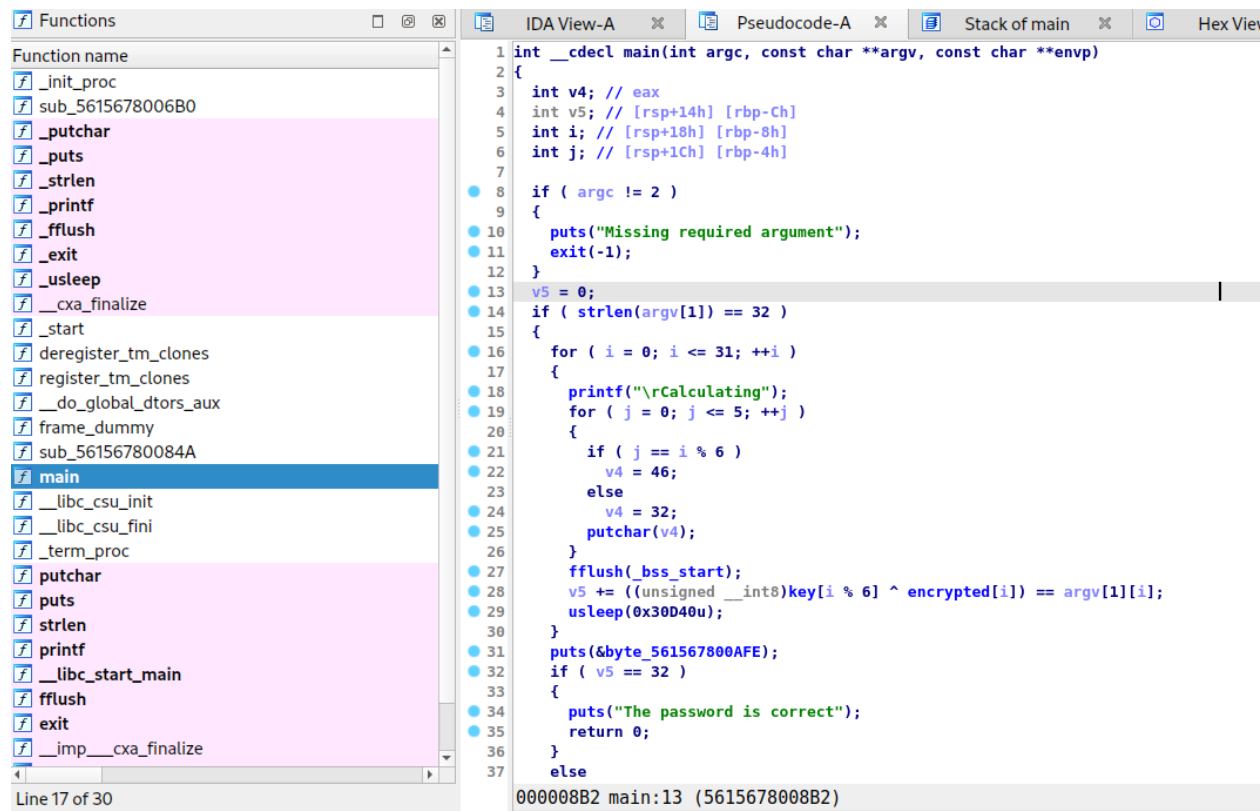


HTB Reverse Engineering: Rebuilding write up

Tools Used: Ghidra, IDA, Itrace

Running ./rebuilding shows preparing secret keys and missing required argument.

So before going further with that, I went into Ghidra and IDA to further debug the program.



```
1 int __cdecl main(int argc, const char **argv, const char **envp)
2 {
3     int v4; // eax
4     int v5; // [rsp+14h] [rbp-Ch]
5     int i; // [rsp+18h] [rbp-8h]
6     int j; // [rsp+1Ch] [rbp-4h]
7
8     if ( argc != 2 )
9     {
10         puts("Missing required argument");
11         exit(-1);
12     }
13     v5 = 0;
14     if ( strlen(argv[1]) == 32 )
15     {
16         for ( i = 0; i <= 31; ++i )
17         {
18             printf("\rCalculating");
19             for ( j = 0; j <= 5; ++j )
20             {
21                 if ( j == i % 6 )
22                     v4 = 46;
23                 else
24                     v4 = 32;
25                 putchar(v4);
26             }
27             fflush(_bss_start);
28             v5 += ((unsigned __int8)key[i % 6] ^ encrypted[i]) == argv[1][i];
29             usleep(0x30D40u);
30         }
31         puts(&byte_561567800AFE);
32         if ( v5 == 32 )
33         {
34             puts("The password is correct");
35             return 0;
36         }
37         else
```

I used IDA to read the decompiler data as it was a lot easier. The missing required argument seen earlier was from not inputting a password. So if we run (./rebuilding password) now we can see what happens.

We now get preparing secret keys and password length is incorrect.

If we look at the output above we can see on line 32 it says if

(v5 == 32)

puts ("The password is correct")

Going to Ghidra instead as some of the output is easier to read, we use the same decompiler of the main function and double click on encrypted to take us to some interesting hexidecimals.

We can see [0] - [32] with hexidecimals to compliment them. The 32 in length earlier reveals that this is our password, but it's encrypted. Converting these to various different formats did not provide any possible passwords because we are missing the key.

s_umans_00301042				XREF[4,5]:	Entry Point(*),
s_mans_00301043					_INIT_1:0010085a(W),
s_ans_00301044					main:00100991(*),
s_ns_00301045					main:00100998(R),
s_s_00301046					_INIT_1:00100861(W),
key					_INIT_1:00100868(W),
					_INIT_1:0010086f(W),
					_INIT_1:00100876(W),
					_INIT_1:0010087d(W)

00301041	68 75 6d	ds	"humans"
	61 6e 73 00		
	//		

At first I believed the key was humans but upon further inspection we found the real key was aliens.

I did a quick search for keys and found where in the decompile window were the real keys.

```

C# Decompile: _INIT_1 - (rebuilding)
1
2 void _INIT_1(void)
3
4 {
5     puts("Preparing secret keys");
6     key[0] = 'a';
7     key[1] = 'l';
8     key[2] = 'i';
9     key[3] = 'e';
10    key[4] = 'n';
11    key[5] = 's';
12    return;
13 }
14

```

We are nearly done, we just have to decode the hexadecimal with the key

We did this with 2 different methods. Python and the XOR Cipher website.

```
~ /HTB/CTF/Apocalypse2022/rev_rebuilding/flag.py - Mousepad
File Edit Search View Document Help
Untitled 2 flag.py
1 #!/usr/bin/python3
2 from itertools import cycle
3 def xor():
4     key = "aliens"
5     hex_array = [0x29, 0x38, 0x2b, 0x1e, 0x06, 0x42, 0x05, 0x5d, 0x07, 0x02, 0x31, 0x42, 0x0f,
6                 0x33, 0x0a, 0x55, 0x00, 0x00, 0x15, 0x1e, 0x1c, 0x06, 0x1a, 0x43, 0x13, 0x59, 0x36, 0x54, 0x00,
7                 0x42, 0x15, 0x11]
8     temp = ""
9     for i in hex_array:
10        temp += chr(i)
11    flag = ''.join(chr(ord(c)^ord(k)) for c,k in zip(temp, cycle(key)))
12    print(flag)
13
14 def main():
15     xor()
16
17 if __name__ == "__main__":
18     main()
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