Lesson 0: What is CTF and who is flagbot?

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What is CTF?

- Stands for Capture the Flag
- Sport consisting of solving hacking challenges
- Usually done in a team
- Flag as proof of solving a challenge
  - Example flag: `flagbot{sh0uld_h4ve_g0ne_f0r_the_he4d}`
- Challenges grouped into five major categories: pwn, reversing, web, crypto and misc

pwn challenges

- Usually a small application
- Get remote code execution by finding a vulnerability
- Often need to use a disassembler / decompiler


```
vagrant@ubuntu-bionic:~/CTF/google/regex$ ./regex

*****   *****   *****

REGEX FORMAT :
> Enclose every `concatenation` and `or` section by parentheses
> Enclose the entire regular expression with parentheses
> Use square brackets as a shortcut to `or` ranges.

For example : (a(b|c)[a-c]*)


Enter a regular expression in the above mentioned format, or QUIT to quit.

(a*)
Your regex was saved as regex #0.
Enter REGEX to create another regex, or TEST to test your regexes.
TEST
Which regex do you want to test? (zero-indexed)
0
Enter a string to match against the regex, or QUIT to quit and enter more regexes:
```

reversing challenges

- Very similar to pwn challenges
- Figure out, what the program **exactly** does
- Examples are:
  - Key generator
  - Heavily obfuscated binary

```
text:080482E7
text:080482E7                   public master_loop
text:080482E7 master_loop:                              ; DATA XREF: .data:sa_loop↓o
text:080482E7                   mov     esp, off_83FD250 ; Alternative name is 'master_loop'
text:080482E7                                            ; _start0
text:080482ED                   mov     eax, toggle_execution
text:080482F2                   mov     eax, sel_on[eax*4]
text:080482F9                   mov     dword ptr [eax], 1
text:080482FF                   mov     toggle_execution, 0
text:08048309                   mov     eax, esp
text:0804830E                   mov     edx, 4
text:08048313                   mov     alu_x, eax
text:0804831B                   mov     alu_y, edx
text:0804831E                   mov     eax, 0
text:08048323                   mov     ecx, 0
text:08048328                   mov     alu_c, 0
text:08048332                   mov     ax, word ptr alu_x
text:08048338                   mov     cx, word ptr alu_y
text:0804833F                   mov     edx, alu_add16[eax*4]
text:08048346                   mov     edx, [edx+ecx*4]
text:08048349                   mov     cx, word ptr alu_c+2
text:08048350                   mov     edx, alu_add16[edx*4]
text:08048357                   mov     edx, [edx+ecx*4]
text:0804835A                   mov     word ptr alu_s, dx
text:08048361                   mov     alu_c, edx
text:08048367                   mov     ax, word ptr alu_x+2
text:0804836D                   mov     cx, word ptr alu_y+2
text:08048374                   mov     edx, alu_add16[eax*4]
text:0804837B                   mov     edx, [edx+ecx*4]
text:0804837E                   mov     cx, word ptr alu_c+2
text:08048385                   mov     edx, alu_add16[edx*4]
text:0804838C                   mov     edx, [edx+ecx*4]
text:0804838F                   mov     word ptr alu_s+2, dx
text:08048396                   mov     alu_c, edx
text:0804839C                   mov     eax, alu_s
text:080483A1                   mov     eax, eax
text:080483A3                   mov     stack_temp, eax
text:080483A8                   mov     eax, offset off_83FD250
text:080483AD                   mov     edx, on
text:080483B3                   mov     data_p, eax
text:080483B8                   mov     eax, sel_data[edx*4]
text:080483BF                   mov     edx, off_83FD250
text:080483C5                   mov     edx, [edx-200068h]
text:080483CB                   mov     [eax], edx
text:080483CD                   mov     eax, off_83FD250
text:080483D2                   mov     edx, on
text:080483D8                   mov     data_p, eax
text:080483DD                   mov     eax, sel_data[edx*4]
text:080483E4                   mov     edx, stack_temp
text:080483EA                   mov     [eax], edx
text:080483EC                   mov     eax, esp
text:080483F1                   mov     eax, [eax]
text:080483F3                   mov     eax, eax
text:080483F5                   mov     stack_temp, eax
text:080483FA                   mov     eax, offset off_83FD250
text:080483FF                   mov     edx, on
text:08048405                   mov     data_p, eax
text:0804840A                   mov     eax, sel_data[edx*4]
text:08048411                   mov     edx, off_83FD250
text:08048417                   mov     edx, [edx-200068h]
text:0804841D                   mov     [eax], edx
```

web challenges

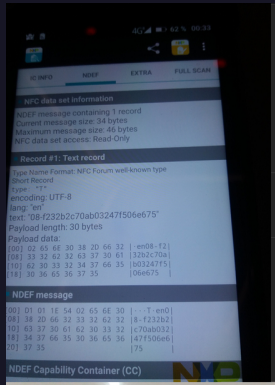
- Focuses on web services, languages and frameworks
- Often a “blackbox”
- Could even have to exploit language bugs
- Examples are:
  - SQL Injection
  - XSS
  - Badly implemented authentication

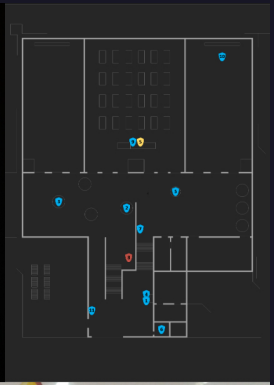
crypto challenges

- Short for cryptography
- Find weaknesses in specific implementation of existing cryptography protocol
- Analyze published research for specific cryptography protocol
- Examples are:
  - Using 3 as the exponent in RSA
  - Not initializing the IV

misc challenges

- No real focus
- Often includes steganography and some cryptography
- Examples are:
  - Hidden data inside an image
  - Scavenger hunt
  - Reading unknown symbols





Who is flagbot?

- We are a VIS committee
- Meet every Monday for Training
- Participate in cool CTF events over the Weekends
- Currently ranked #1 in Switzerland and #68 overall on CTFtime

Who is organizers

- Joint team between polyglots (EPFL), cr0wn (UK) and secret.club
- Team up together for larger events
- Currently ranked #9 worldwide
- Multiple big wins, such as best European team at DEF CON and #1 at Tencent CTF 2021

Some Impressions

DEF CON Finals in Las Vegas

Some Impressions

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Some Impressions

DEF CON Finals in Las Vegas

Some Impressions

Tencent CTF Yesterday

ctf@vis.ethz.ch Mailing list

- Subscribe at https://lists.vis.ethz.ch/postorius/lists/ctf.lists.vis.ethz.ch/
- We will send E-Mails there, whenever we participate in a CTF event
- Can be used to ask questions, but please keep them **spoiler free!**
- In general used for announcements

Practical Example

- zeroboot
- Fresh of the press
- Exploits a UEFI BIOS

picoCTF

- Beginner CTF
- Ideal way to introduce people to CTF
- Register here: play.picoctf.org