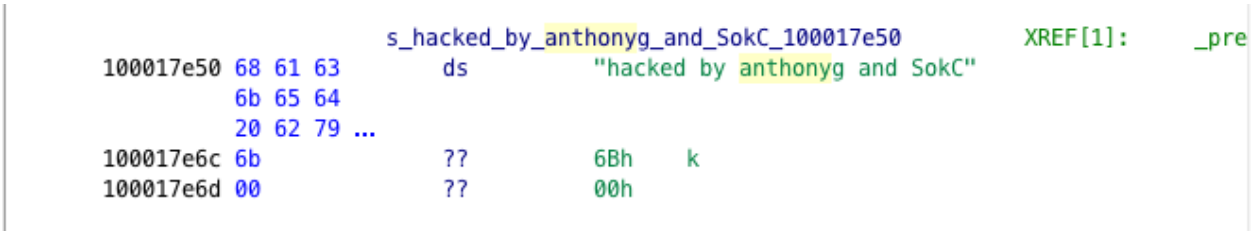
Soksery Chan

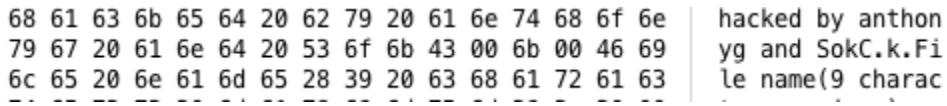
11/4/2022

CECS 478 Sec 02

478 Malware Lab

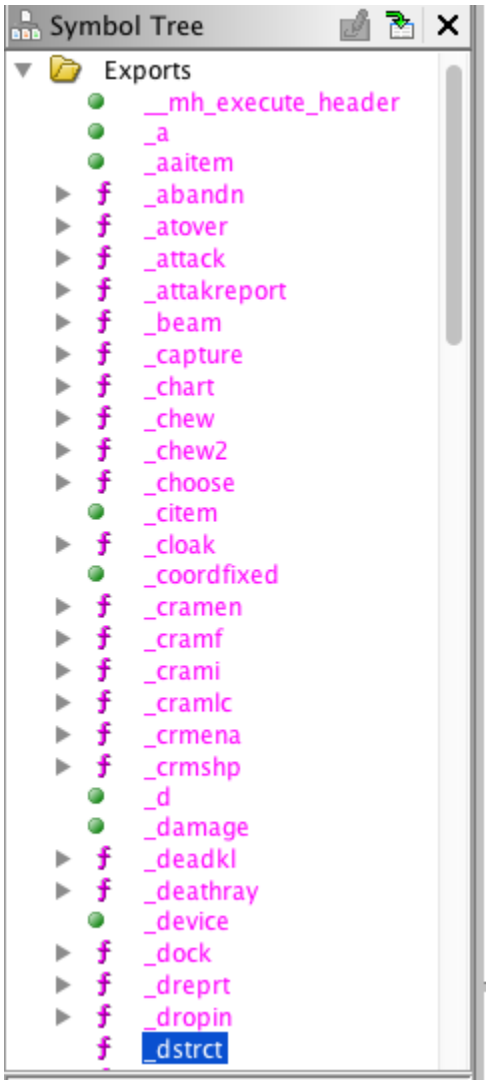
I was able to find the hacking credits name of the professor by using the search function for text and string “anthonyg”. Which led me to the address 100017e50 which previously have the string “hacked by anthonyg”. I opened the Display Bytes in Ghidra to perform Hex editing. I realized that I cannot fit my full name into the same line as what the professor had previously so I abbreviated it to SokC. I changed the Hex to 61 6e 64 20 53 6f 6b 43 to get the string of “and SokC”.



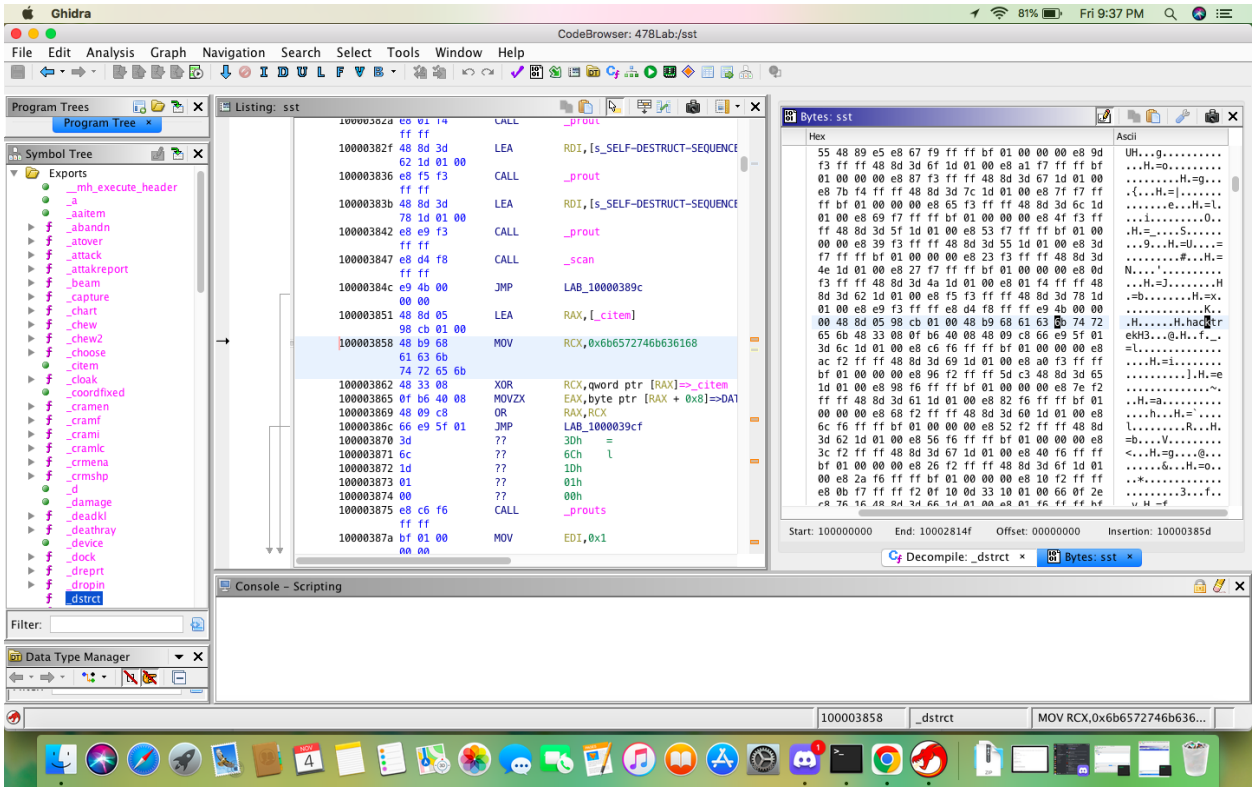


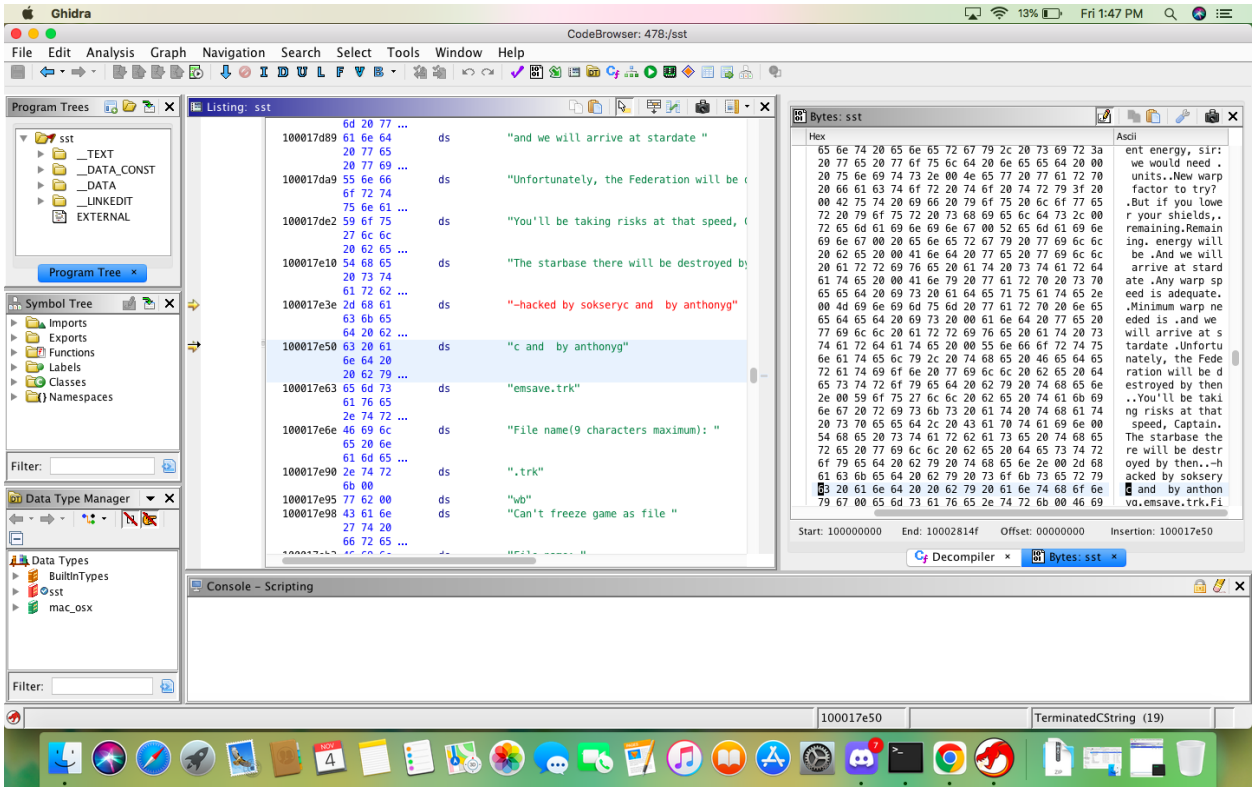
Next, I tried to find the self-destruct process of the code which took some time to see because I needed to learn how to navigate or know where everything was. After some time of navigating and some youtube tutorials, I was able to use Symbol Tree and opened the Exports folder to guide me to the _dstruct function which I assumed had something to do with the Self-Destruction process and I was corrected. I also double-checked just to make sure by switching to Display Bytes which shows hacktrek to be in the offset of 1000149b8 to 1000149bf which stands out to me the most so I decided to run the program and input hacktrek as a

password which was correct. (credits



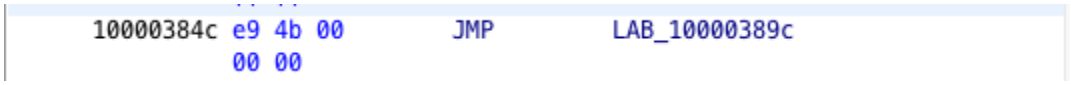
https://www.youtube.com/watch?v=2xUqLLQu0NI)

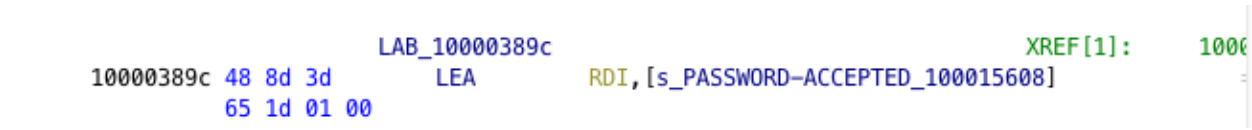


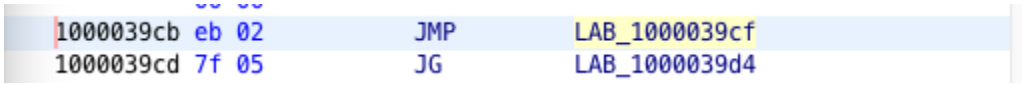


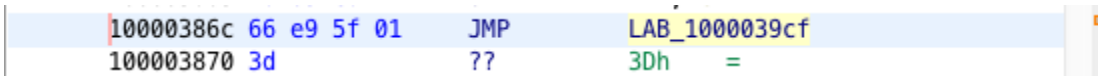

```
Please type in a secret passw***ERROR***-***COMPUTER HAS CHOSEN PASSWORD***-***AND WILL COMMENCE WITH ATTACK***-***HUMANS CANNOT BE TRUSTED**-


Stardate 3100.

150 Klingons,
an unknown number of Romulans
and one (GULP) Super-Commander.
28 stardates
3 starbases in   7 - 7   2 - 1   6 - 6

The Enterprise is currently in Quadrant 2 - 1  Sector 7 - 7

Good Luck!
  YOU'LL NEED IT.

COMMAND> destruct

---WORKING---
SELF-DESTRUCT-SEQUENCE-ACTIVATED
   10
      9
         8
            7
               6
ENTER-CORRECT-PASSWORD-TO-CONTINUE-
SELF-DESTRUCT-SEQUENCE-OTHERWISE-
SELF-DESTRUCT-SEQUENCE-WILL-BE-ABORTED
hacktrek
PASSWORD-ACCEPTED
                     5
                        4
                           3
                              2
                                 1


*********************************************************
********** Entropy of Enterprise maximized *********
*********************************************************


YOU DID IT!!!!!

The AI has been destroyed! The Federation has been saved!!
```

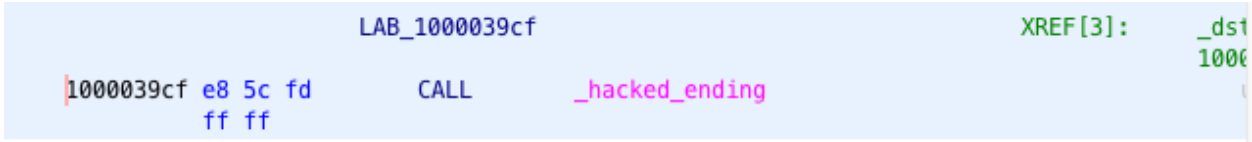
I also found a tutorial that explained how to perform binary patching with conditionals which were helpful. I also changed a few of these addresses trying to implement what I learned through the youtube tutorial but it keeps giving me segmentation errors. Since I keep getting errors because I changed all of these to JMP which will transfer execution control to a different point in the instruction stream to the different addresses. In the first two screenshots, I have the address 10000384c JMP 10000389c which is the address of the password accepted. In the third and fourth screenshots, I have the address of 1000039cb and 10000386c JMP to 1000039cf which is the address of hacked ending. This process still gave me the same issue with the segmentation fault. (https://www.youtube.com/watch?v=UH7sd8OIYHI)

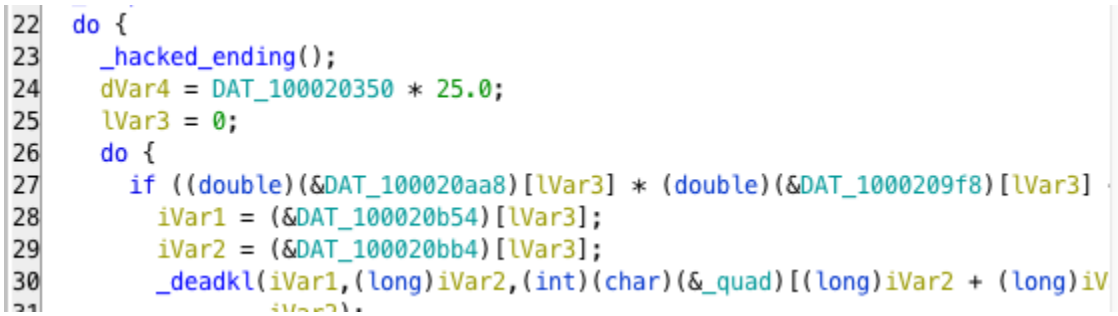












I also noticed that right before _prouts(“PASSWORD-ACCEPTED”), there are two CALL instructions used to call a function _scan and _chew. I am assuming that these two functions are taking user input and they reliant on one another to check user input. So then, I replaced the CALL _chew with JMP LAB_10000389c which will allow the users to jump straight to the password-accepted address regardless of what the user's input is. This is a way for the user to bypass password verification.

```
          ff ff
100003847 e8 d4 f8        CALL        _scan                                    undef
          ff ff
10000384c e9 4b 00        JMP         LAB_10000389c
          00 00
100003851 48 8d 05        LEA         RAX,[_citem]
          98 cb 01 00
100003858 48 b9 68        MOV         RCX,0x6b6572746b636168
          61 63 6b
          74 72 65 6b
100003862 48 33 08        XOR         RCX,qword ptr [RAX]=>_citem
100003865 0f b6 40 08     MOVZX       EAX,byte ptr [RAX + 0x8]=>DAT_1000203f8
100003869 48 09 c8        OR          RAX,RCX
10000386c 66 e9 5f 01     JMP         LAB_1000039cf
100003870 3d              ??          3Dh    =
100003871 6c              ??          6Ch    l
100003872 1d              ??          1Dh
```

```
15  _skip(1);
16  _prout("SELF-DESTRUCT-SEQUENCE-ACTIVATED");
17  _prouts("   10");
18  _skip(1);
19  _prouts("       9");
20  _skip(1);
21  _prouts("          8");
22  _skip(1);
23  _prouts("             7");
24  _skip(1);
25  _prouts("                6");
26  _skip(1);
27  _prout("ENTER-CORRECT-PASSWORD-TO-CONTINUE-");
28  _prout("SELF-DESTRUCT-SEQUENCE-OTHERWISE-");
29  _prout("SELF-DESTRUCT-SEQUENCE-WILL-BE-ABORTED");
30  _scan();
31  _prouts("PASSWORD-ACCEPTED");
```

```
                    LAB_10000389c                                   XREF[1]:     10
10000389c 48 8d 3d        LEA         RDI,[s_PASSWORD-ACCEPTED_100015608]
          65 1d 01 00
```

```
-SUPER- STAR TREK

hacked by anthonyg and SokC

Please type in a secret passw***ERROR***-***COMPUTER HAS CHOSEN PASSWORD***-***AND WILL COMMENCE WITH ATTACK***-***HUMANS CANNOT BE TRUSTED**-


Stardate 3100.

150 Klingons,
an unknown number of Romulans
and one (GULP) Super-Commander.
28 stardates
3 starbases in   7 - 7   2 - 1   6 - 6

The Enterprise is currently in Quadrant 2 - 1  Sector 7 - 7

Good Luck!
  YOU'LL NEED IT.

COMMAND> destruct

---WORKING---
SELF-DESTRUCT-SEQUENCE-ACTIVATED
   10
      9
         8
            7
               6
ENTER-CORRECT-PASSWORD-TO-CONTINUE-
SELF-DESTRUCT-SEQUENCE-OTHERWISE-
SELF-DESTRUCT-SEQUENCE-WILL-BE-ABORTED

PASSWORD-ACCEPTED
                     5
                        4
                           3
                              2
                                 1


**************************************************
*********** Entropy of Enterprise maximized *********
**************************************************


YOU DID IT!!!!!

The AI has been destroyed! The Federation has been saved!!
```

The experiences I had with this project were hard but as soon as I keep working on it, things were getting easier but the assembly and hex editor make the process harder. The youtube tutorial really helped out a lot. This project was fun and hard. I really learned a lot from this assignment. Ghidra is a powerful tool and getting exposure to this tool will prepare me or at least some experience in the field of the red team and cybersecurity. At the end of the day, this is a hard but enjoyable puzzle to solve. This project to me was mainly a trial and error at first and I was learning as I go. I was doing a little bit of everything to gain as much knowledge as possible about Ghidra.

Source

https://youtu.be/2xUqLLQu0NI

https://youtu.be/UH7sd8OIYHI