Lab1: Build a heuristic malware detection system (8 Points)

Objectives and Targets

Please download **malware_lab_1.zip** from our class website, unzip it. It should release the following malware sample:

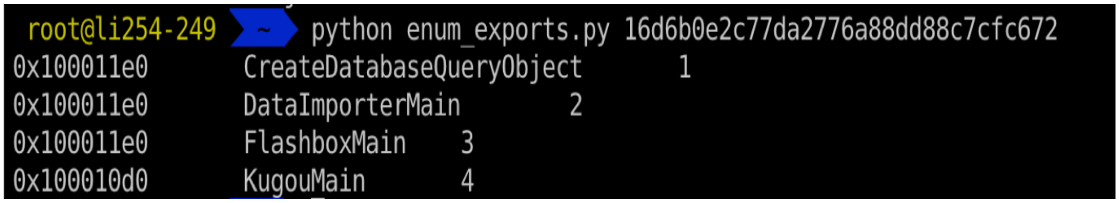
- 16d6b0e2c77da2776a88dd88c7cfc672
- 0fd6e3fb1cd5ec397ff3cdbaac39d80c
- 6a764e4e6db461781d080034aab85aff
- cc3c6c77e118a83ca0513c25c208832c
- e0bed0b33e7b6183f654f0944b607618
- 1c1131112db91382b9d8b46115045097

Please **create a runnable program** (recommend using Python).

This program should be able to scan a folder, and analysis the PE structure of each malware sample. (2 points)

Then, implement the following heuristic rules:

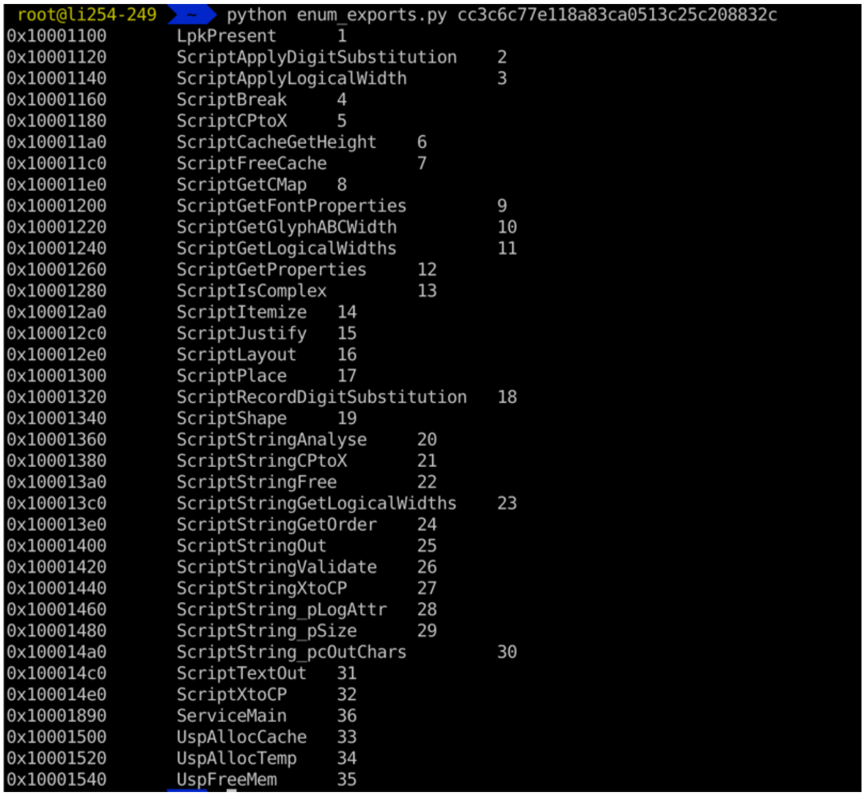
1. **If three or more export functions have the same memory address, it's a malware. (2 points)**



```
root@li254-249  ~  python enum_exports.py 16d6b0e2c77da2776a88dd88c7cfc672
0x100011e0      CreateDatabaseQueryObject       1
0x100011e0      DataImporterMain        2
0x100011e0      FlashboxMain    3
0x100010d0      KugouMain       4
```

All three export function have the same memory address `0x100011e0` (CreateDatabaseQueryObject, DataImporterMain, FlashboxMain), so it's a malware.

2. **If three or more export functions have the same memory offset (the difference between two export functions are the same), it's a malware. (2 points)**



```
root@li254-249  ~  python enum_exports.py cc3c6c77e118a83ca0513c25c208832c
0x10001100      LpkPresent      1
0x10001120      ScriptApplyDigitSubstitution    2
0x10001140      ScriptApplyLogicalWidth         3
0x10001160      ScriptBreak     4
0x10001180      ScriptCPtoX     5
0x100011a0      ScriptCacheGetHeight    6
0x100011c0      ScriptFreeCache         7
0x100011e0      ScriptGetCMap   8
0x10001200      ScriptGetFontProperties         9
0x10001220      ScriptGetGlyphABCWidth          10
0x10001240      ScriptGetLogicalWidths          11
0x10001260      ScriptGetProperties     12
0x10001280      ScriptIsComplex         13
0x100012a0      ScriptItemize   14
0x100012c0      ScriptJustify   15
0x100012e0      ScriptLayout    16
0x10001300      ScriptPlace     17
0x10001320      ScriptRecordDigitSubstitution   18
0x10001340      ScriptShape     19
0x10001360      ScriptStringAnalyse     20
0x10001380      ScriptStringCPtoX       21
0x100013a0      ScriptStringFree        22
0x100013c0      ScriptStringGetLogicalWidths    23
0x100013e0      ScriptStringGetOrder    24
0x10001400      ScriptStringOut         25
0x10001420      ScriptStringValidate    26
0x10001440      ScriptStringXtoCP       27
0x10001460      ScriptString_pLogAttr   28
0x10001480      ScriptString_pSize      29
0x100014a0      ScriptString_pcOutChars         30
0x100014c0      ScriptTextOut   31
0x100014e0      ScriptXtoCP     32
0x10001890      ServiceMain     36
0x10001500      UspAllocCache   33
0x10001520      UspAllocTemp    34
0x10001540      UspFreeMem      35
```

The memory offset (difference) between each export functions is always `0x20`, so it's a malware.

3. **If two or more export functions have the same name, it's a malware. (2 points)**

When running your program, **it should be able to scan through all malware samples**, and **output which rules that malware sample violate**.

Deliverables:

- A zip file (**source_code.zip**) that contains the source code of your malware detection program.

- A detailed project report (**lab1_report.pdf**) in **PDF format** to describe what you have done, including screenshots and code snippets.
- **DO NOT** upload malware sample to D2L

Submission

- Check lab due date on the course website. Late submission will not be accepted.
- The assignment should be submitted to D2L directly.
- Your submission should include two separated files **(source_code.zip and lab1_report.pdf)**
- No copy or cheating is tolerated. If your work is based on others', please give clear attribution. Otherwise, you **WILL FAIL** this course.

ATTENTION

- This lab uses actual malware, **DO NOT** execute any of these files on your pc unless you know exactly what you are doing.