Practical Malware Analysis Lab 3-2

Questions

1. How can you get this malware to install itself?
2. How would you get this malware to run after installation?
3. How could you find the process under which this malware is running?
4. What are the malware's host based indicators?
5. Are there any useful network-based signatures for this malware?

Static Analysis

File: Lab03-02.dll
Imports: Kernel32.dll, ADVAPI32.dll, WS2_32.dll, WININET.dll, MSVCRT.dll

Kernel32.dll → CreateProcessA, CreateThread, GetModuleFileName. GetCurrentDirectoryA, Sleep, LoadLibraryA, ReadFile, GetTempPathA, GetSystemTime, GetStartupInfo

ADVAPI32.dll → CreateServiceA, DeleteService. OpenServiceA, RegCloseKey, RegOpenKeyExA, RegCreateKey, RegQueryValueExA, RegSetValueExA, SetServiceStatus

WS2_32.dll → closesocket,connect,htons, ioctlsocket, inet_addr, recv, select, send, shutdown, gethostname, WSASocketA, WSAStartup, WSACleanup, __WSAFDIsSet.

WININET.dll → HttpOpenRequestA, HttpQueryInfoA, HttpSendRequestA, InternetCloseHandle, InternetConnectA, InternetOpenA, InternetReadFile.

MSVCRT.dll → Basic C++ functions

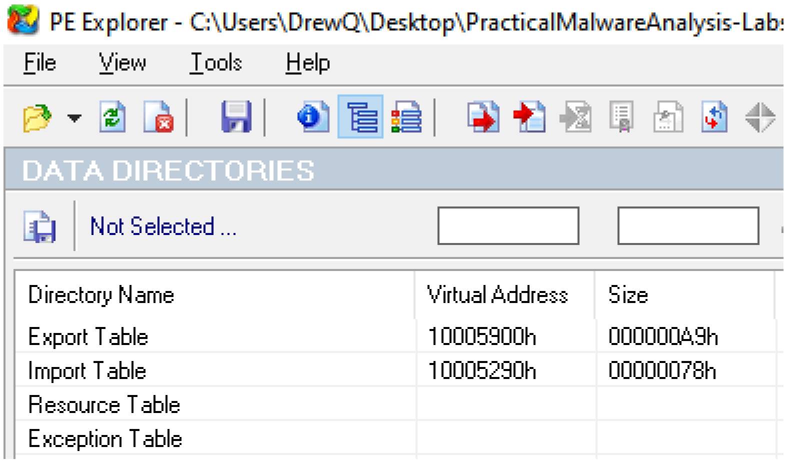
Results for checking strings using the program binText.

```
000000004D78   000010005978     0   ServiceMain
000000004E28   000010006028     0   practicalmalwareanalysis.com
000000004F7C   00001000617C     0   cmd.exe /c
000000004F74   000010006174     0   getfile
000000004F38   000010006138     0   HTTP/1.1
000000005048   000010006248     0   Parameters
00000000505C   00001000625C     0   Start
000000004E68   000010006068     0   serve.html
000000005018   000010006218     0   ServiceDll
000000004D95   000010005995     0   installA
0000000050A4   0000100062A4     0   Depends INA+, Collects and stores network
configuration and location information, and notifies applications when this information changes.
```

```
00000000513C   00001000633C     0   %SystemRoot%\System32\svchost.exe -k
000000005254   000010006454     0   RegQueryValueEx(Svchost\netsvcs)
0000000052D8   0000100064D8     0   SOFTWARE\Microsoft\Windows NT\CurrentVersion\Svchost
0000000051A4   0000100063A4     0   Intranet Network Awareness (INA+)
000000005164   000010006364     0   SYSTEM\CurrentControlSet\Services\
```

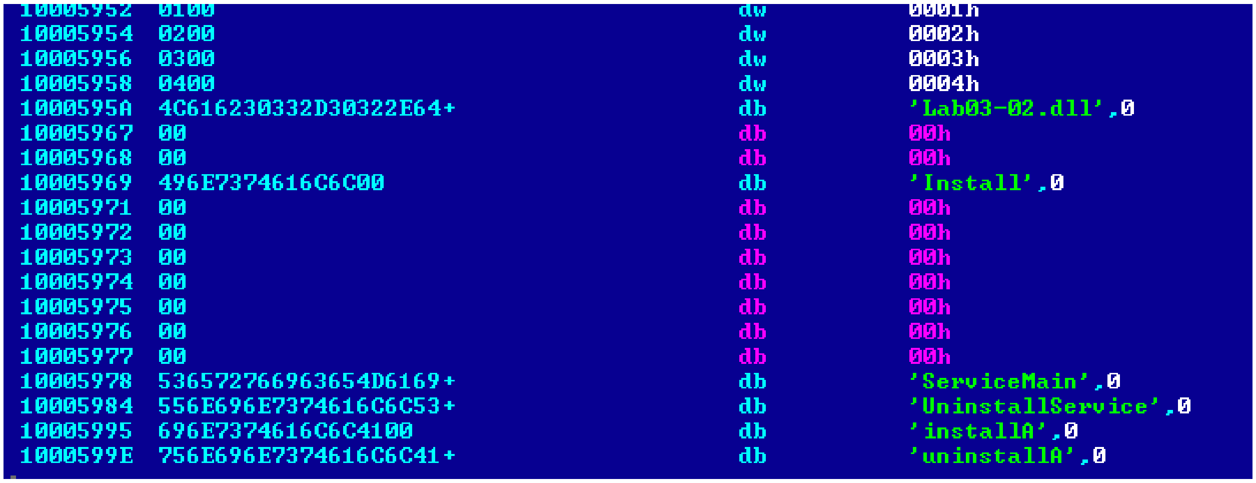
Dynamic Analysis

To find the export table of the dll I used the program PE Explorer


PE Explorer - C:\Users\DrewQ\Desktop\PracticalMalwareAnalysis-Lab
File
View
Tools
Help
DATA DIRECTORIES
Not Selected ...

Directory Name	Virtual Address	Size
Export Table	10005900h	000000A9h
Import Table	10005290h	00000078h
Resource Table		
Exception Table		

Then I used the debugger to find the export options



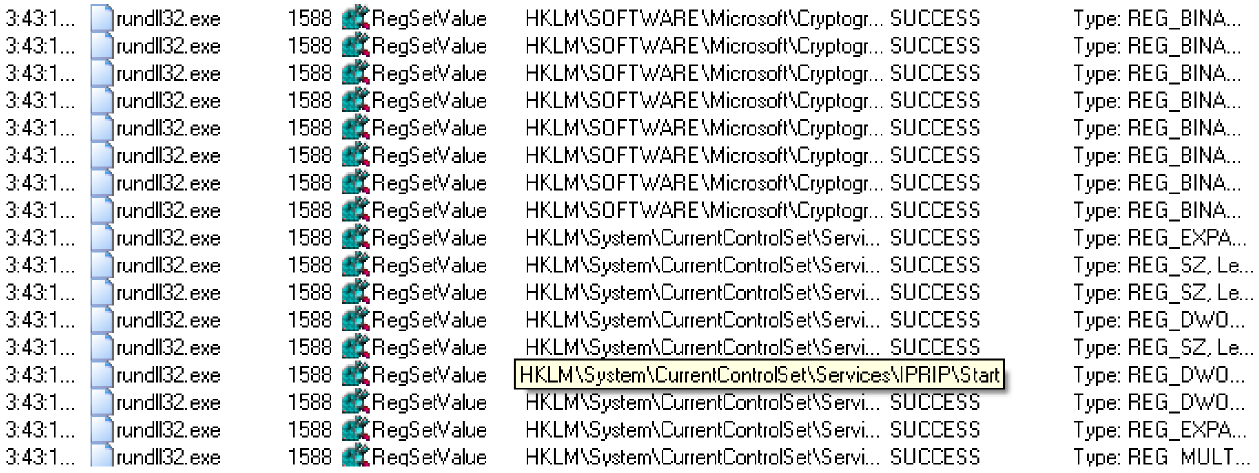
```
10005952  0100                                   dw      0001h
10005954  0200                                   dw      0002h
10005956  0300                                   dw      0003h
10005958  0400                                   dw      0004h
1000595A  4C616230332D30322E64+                  db      'Lab03-02.dll',0
10005967  00                                     db      00h
10005968  00                                     db      00h
10005969  496E7374616C6C00                       db      'Install',0
10005971  00                                     db      00h
10005972  00                                     db      00h
10005973  00                                     db      00h
10005974  00                                     db      00h
10005975  00                                     db      00h
10005976  00                                     db      00h
10005977  00                                     db      00h
10005978  536572766963654D6169+                  db      'ServiceMain',0
10005984  556E696E7374616C6C53+                  db      'UninstallService',0
10005995  696E7374616C6C4100                     db      'installA',0
1000599E  756E696E7374616C6C41+                  db      'uninstallA',0
```

There are multiple strings here, but the correct one is installA.

rundll32.exe Lab03-02.dll installA

Process Monitor Results

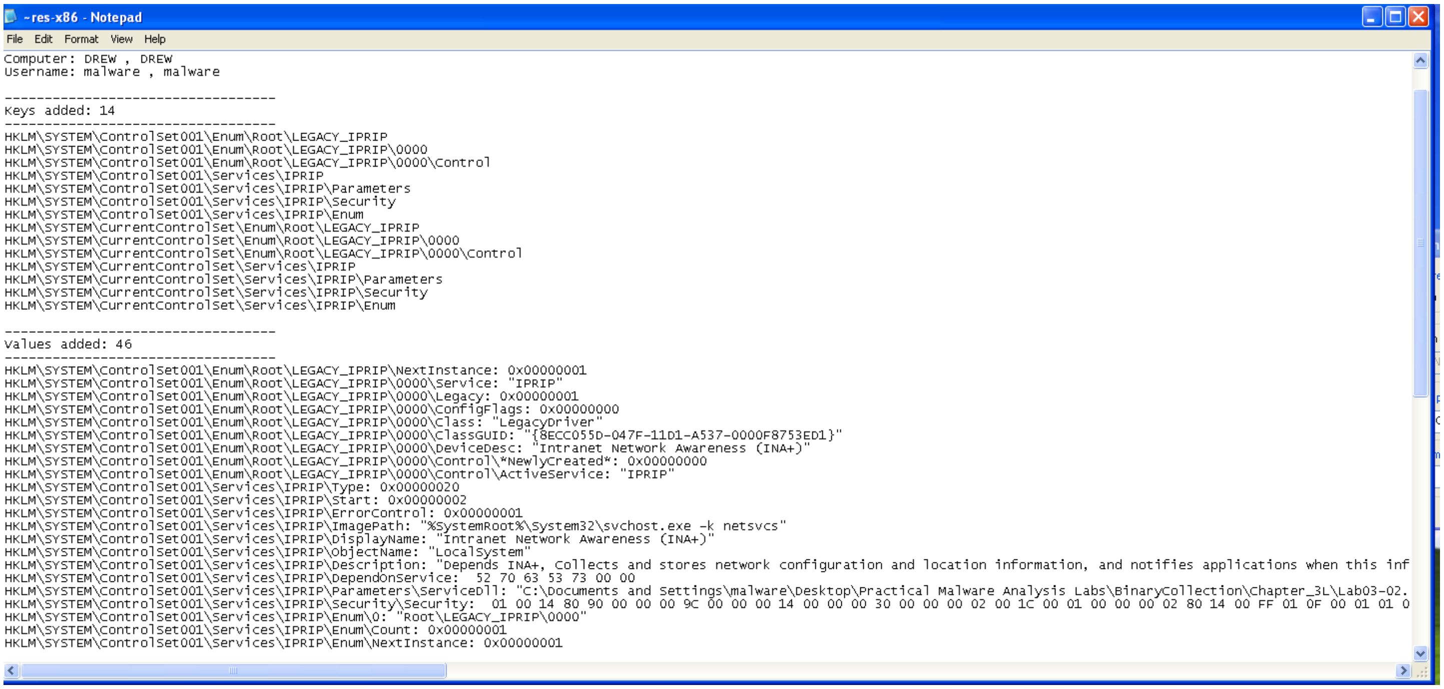
The service IPRIP was created. To start the service you would use net start IPRIP



```
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\SOFTWARE\Microsoft\Cryptogr...  SUCCESS  Type: REG_BINA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_EXPA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_SZ, Le...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_SZ, Le...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_DWO...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_SZ, Le...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Services\IPRIP\Start  Type: REG_DWO...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_DWO...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_EXPA...
3:43:1...  rundll32.exe  1588  RegSetValue  HKLM\System\CurrentControlSet\Servi...  SUCCESS  Type: REG_MULT...
```

Regshot Results

The malware added various entries including the service IPRIP. This service is also known as Intranet Network Awareness (INA+).



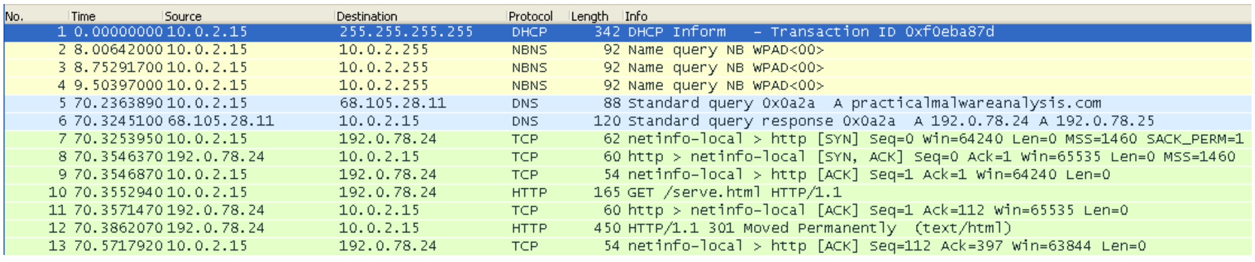
```
Computer: DREW , DREW
Username: malware , malware

----------------------------------
Keys added: 14
----------------------------------
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Control
HKLM\SYSTEM\ControlSet001\Services\IPRIP
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Parameters
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Security
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Enum
HKLM\SYSTEM\CurrentControlSet\Enum\Root\LEGACY_IPRIP
HKLM\SYSTEM\CurrentControlSet\Enum\Root\LEGACY_IPRIP\0000
HKLM\SYSTEM\CurrentControlSet\Enum\Root\LEGACY_IPRIP\0000\Control
HKLM\SYSTEM\CurrentControlSet\Services\IPRIP
HKLM\SYSTEM\CurrentControlSet\Services\IPRIP\Parameters
HKLM\SYSTEM\CurrentControlSet\Services\IPRIP\Security
HKLM\SYSTEM\CurrentControlSet\Services\IPRIP\Enum

----------------------------------
Values added: 46
----------------------------------
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\NextInstance: 0x00000001
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Service: "IPRIP"
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Legacy: 0x00000001
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\ConfigFlags: 0x00000000
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Class: "LegacyDriver"
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\ClassGUID: "{8ECC055D-047F-11D1-A537-0000F8753ED1}"
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\DeviceDesc: "Intranet Network Awareness (INA+)"
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Control\*NewlyCreated*: 0x00000000
HKLM\SYSTEM\ControlSet001\Enum\Root\LEGACY_IPRIP\0000\Control\ActiveService: "IPRIP"
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Type: 0x00000020
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Start: 0x00000002
HKLM\SYSTEM\ControlSet001\Services\IPRIP\ErrorControl: 0x00000001
HKLM\SYSTEM\ControlSet001\Services\IPRIP\ImagePath: "%SystemRoot%\System32\svchost.exe -k netsvcs"
HKLM\SYSTEM\ControlSet001\Services\IPRIP\DisplayName: "Intranet Network Awareness (INA+)"
HKLM\SYSTEM\ControlSet001\Services\IPRIP\ObjectName: "LocalSystem"
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Description: "Depends INA+, Collects and stores network configuration and location information, and notifies applications when this inf
HKLM\SYSTEM\ControlSet001\Services\IPRIP\DependOnService:  52 70 63 53 73 00 00
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Parameters\ServiceDll: "C:\Documents and Settings\malware\Desktop\Practical Malware Analysis Labs\BinaryCollection\Chapter_3L\Lab03-02.
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Security\Security:  01 00 14 80 90 00 00 00 9C 00 00 00 14 00 00 00 30 00 00 00 02 00 1C 00 01 00 00 00 02 80 14 00 FF 01 0F 00 01 01 0
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Enum\0: "Root\LEGACY_IPRIP\0000"
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Enum\Count: 0x00000001
HKLM\SYSTEM\ControlSet001\Services\IPRIP\Enum\NextInstance: 0x00000001
```

Wireshark Results

Wireshark shows traffic to the website practicalmalwareanalysis.com and /serve.html



```
No.  Time        Source        Destination      Protocol Length Info
  1  0.00000000  10.0.2.15     255.255.255.255  DHCP     342 DHCP Inform   - Transaction ID 0xf0eba87d
  2  8.00642000  10.0.2.15     10.0.2.255       NBNS      92 Name query NB WPAD<00>
  3  8.75291700  10.0.2.15     10.0.2.255       NBNS      92 Name query NB WPAD<00>
  4  9.50397000  10.0.2.15     10.0.2.255       NBNS      92 Name query NB WPAD<00>
  5  70.2363890  10.0.2.15     68.105.28.11     DNS       88 Standard query 0x0a2a  A practicalmalwareanalysis.com
  6  70.3245100  68.105.28.11  10.0.2.15        DNS      120 Standard query response 0x0a2a  A 192.0.78.24 A 192.0.78.25
  7  70.3253950  10.0.2.15     192.0.78.24      TCP       62 netinfo-local > http [SYN] Seq=0 Win=64240 Len=0 MSS=1460 SACK_PERM=1
  8  70.3546370  192.0.78.24   10.0.2.15        TCP       60 http > netinfo-local [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460
  9  70.3546870  10.0.2.15     192.0.78.24      TCP       54 netinfo-local > http [ACK] Seq=1 Ack=1 Win=64240 Len=0
 10  70.3552940  10.0.2.15     192.0.78.24      HTTP     165 GET /serve.html HTTP/1.1
 11  70.3571470  192.0.78.24   10.0.2.15        TCP       60 http > netinfo-local [ACK] Seq=1 Ack=112 Win=65535 Len=0
 12  70.3862070  192.0.78.24   10.0.2.15        HTTP     450 HTTP/1.1 301 Moved Permanently  (text/html)
 13  70.5717920  10.0.2.15     192.0.78.24      TCP       54 netinfo-local > http [ACK] Seq=112 Ack=397 Win=63844 Len=0
```

Question 1

rundll32.exe Lab03-02.dll installA

Question 2

Then to start the malware service you use net start “Intranet Network Awareness (INA+)”.

Question 3

By using the command net start without any arguments I was able to list all services on the uninfected computer. When installing the malware I ran the same command and saw the extra service “Intranet Network Awareness (INA+)”. This had to be the service the malware installed.

Question 4

The service IPRIP/Intranet Network Awareness (INA+).

Question 5

Traffic to the website practicalmalwareanalysis.com and a request to serve.html