Dynamic Analysis

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What is Dynamic Analysis?

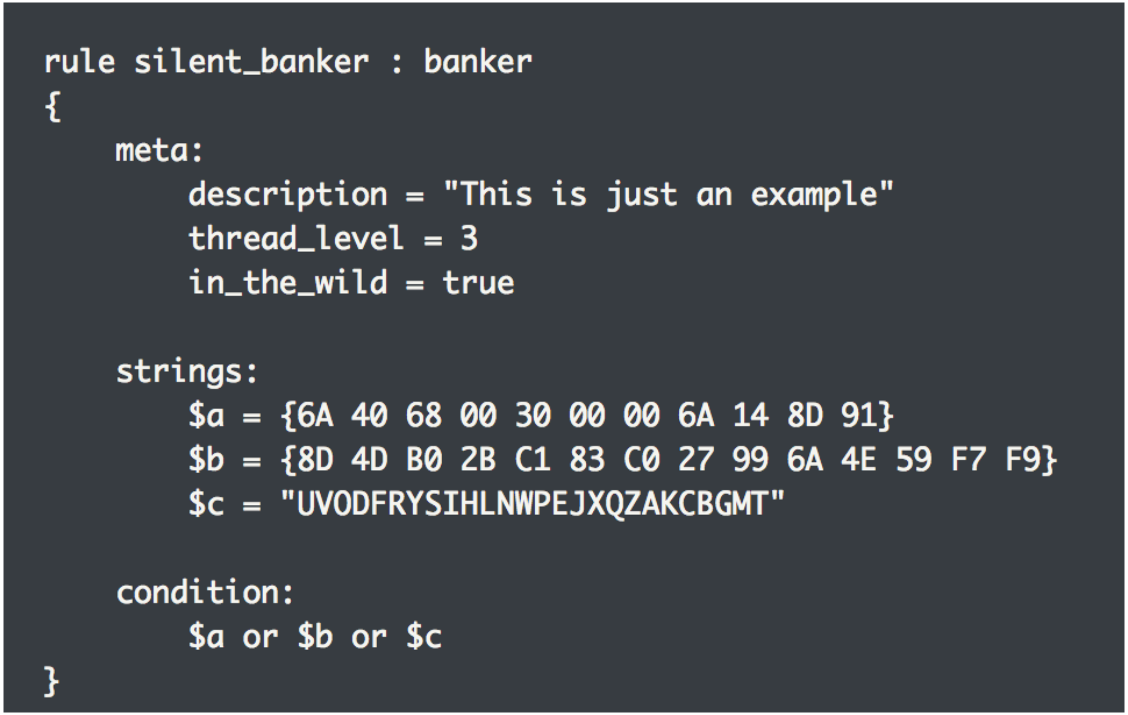
Dynamic or behavioral analysis is observing the behavior of the malware while it is actually running on a host system

Uses Cases

- Computer security incident management
- Malware research
- Indicator of compromise extraction

YARA

- Helping malware researchers to identify and classify malware samples



```
rule silent_banker : banker
{
    meta:
        description = "This is just an example"
        thread_level = 3
        in_the_wild = true

    strings:
        $a = {6A 40 68 00 30 00 00 6A 14 8D 91}
        $b = {8D 4D B0 2B C1 83 C0 27 99 6A 4E 59 F7 F9}
        $c = "UVODFRYSIHLNWPEJXQZAKCBGMT"

    condition:
        $a or $b or $c
}
```

MAEC

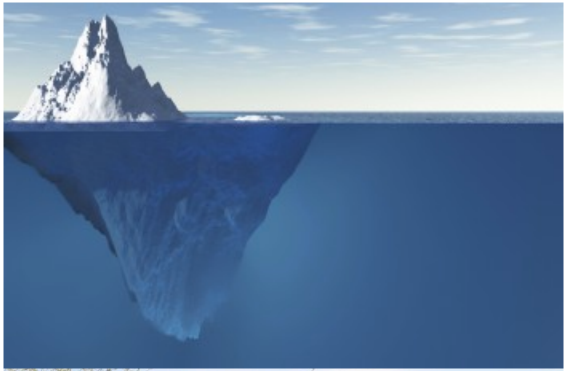
- “A standardized language for encoding and communicating high-fidelity information about malware based upon attributes such as behaviors, artifacts, and attack patterns”

- A standard is necessary to provide a common way to share malware analysis results among organizations to avoid duplicate, inaccurate work

https://maec.mitre.org/index.html

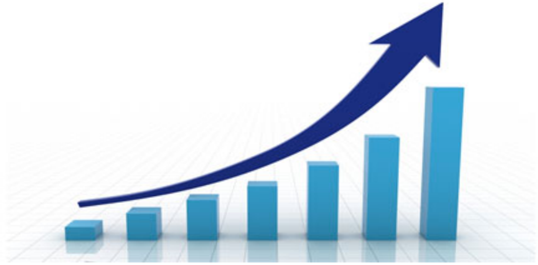
Sandbox Goals

Visibility



Resistance to detection

Scalability



Necessary Questions

- What kind of files do I want to analyze?
- What volume of analyses do I want to be able to handle?
- Which platform do I want to use to run my analysis on?
- What kind of information I want about the file?

Environment Setup

- What operating system should I use? Hardware?

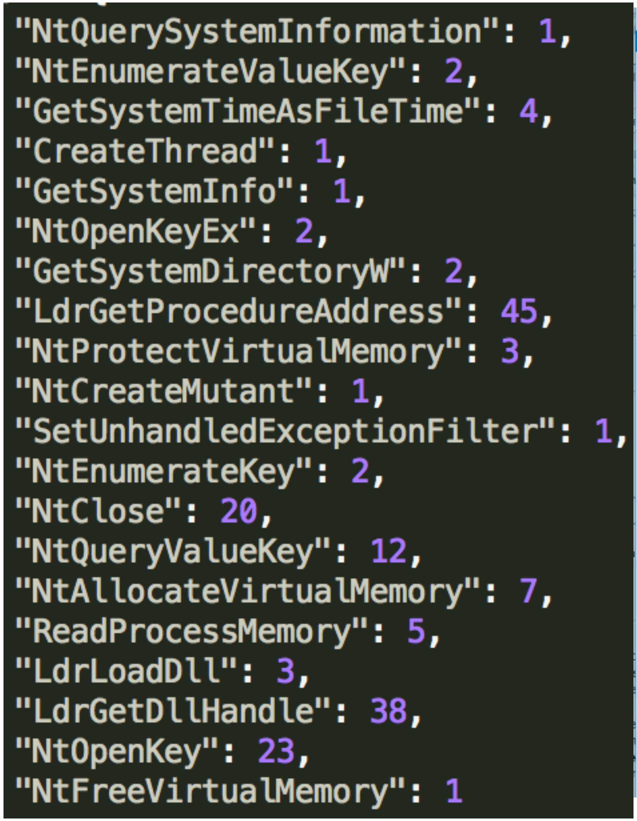
- Intentional traces of normal usage
  - browsing history
  - Cookies
  - Documents
  - Images

- Necessary applications for malware to execute

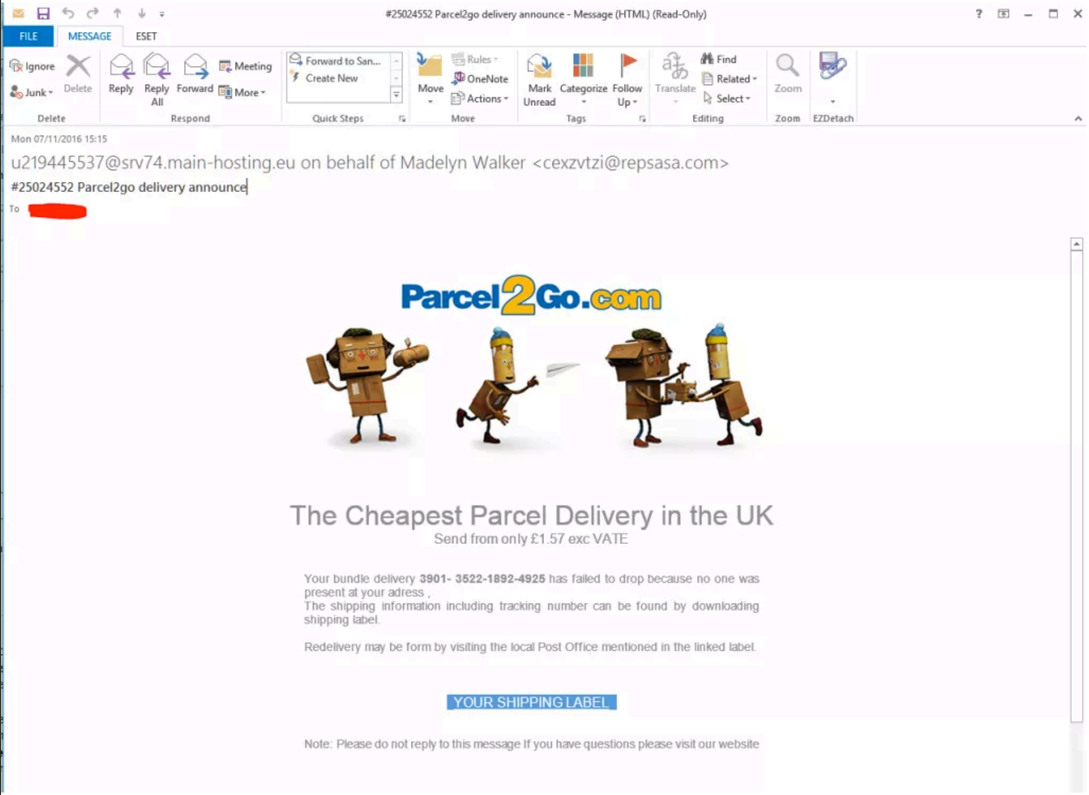
Features

- Traces of calls performed by all processes spawned by the malware.
- Files being created, deleted and downloaded by the malware during its execution.
- Memory dumps of the malware processes.
- Network traffic trace in PCAP format.
- Screenshots taken during the execution of the malware.
- Full memory dumps of the machines.

Examples of Features



```
"NtQuerySystemInformation": 1,
"NtEnumerateValueKey": 2,
"GetSystemTimeAsFileTime": 4,
"CreateThread": 1,
"GetSystemInfo": 1,
"NtOpenKeyEx": 2,
"GetSystemDirectoryW": 2,
"LdrGetProcedureAddress": 45,
"NtProtectVirtualMemory": 3,
"NtCreateMutant": 1,
"SetUnhandledExceptionFilter": 1,
"NtEnumerateKey": 2,
"NtClose": 20,
"NtQueryValueKey": 12,
"NtAllocateVirtualMemory": 7,
"ReadProcessMemory": 5,
"LdrLoadDll": 3,
"LdrGetDllHandle": 38,
"NtOpenKey": 23,
"NtFreeVirtualMemory": 1
```



Mon 07/11/2016 15:15

u219445537@srv74.main-hosting.eu on behalf of Madelyn Walker <cexzvtzi@repsasa.com>

#25024552 Parcel2go delivery announce

To [redacted]

The Cheapest Parcel Delivery in the UK

Send from only £1.57 exc VATE

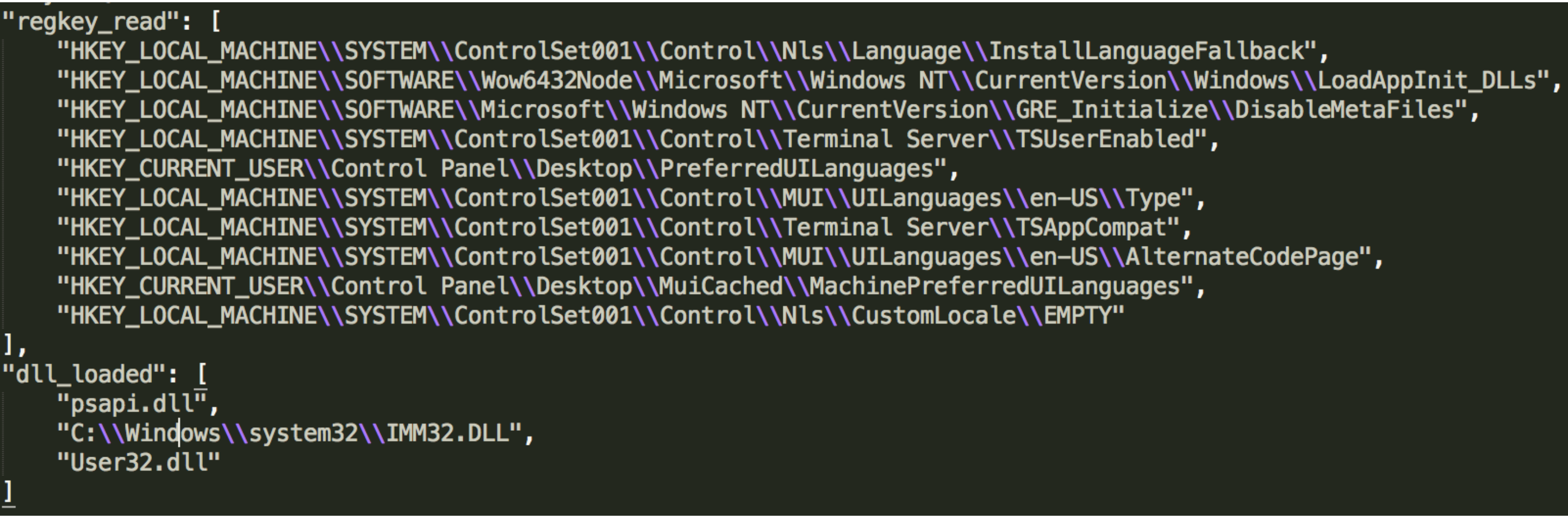
Your bundle delivery **3901- 3522-1892-4925** has failed to drop because no one was present at your adress ,
The shipping information including tracking number can be found by downloading shipping label.

Redelivery may be form by visiting the local Post Office mentioned in the linked label.

YOUR SHIPPING LABEL

Note: Please do not reply to this message If you have questions please visit our website

Examples of Features cont.



```
"regkey_read": [
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\Nls\\Language\\InstallLanguageFallback",
    "HKEY_LOCAL_MACHINE\\SOFTWARE\\Wow6432Node\\Microsoft\\Windows NT\\CurrentVersion\\Windows\\LoadAppInit_DLLs",
    "HKEY_LOCAL_MACHINE\\SOFTWARE\\Microsoft\\Windows NT\\CurrentVersion\\GRE_Initialize\\DisableMetaFiles",
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\Terminal Server\\TSUserEnabled",
    "HKEY_CURRENT_USER\\Control Panel\\Desktop\\PreferredUILanguages",
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\MUI\\UILanguages\\en-US\\Type",
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\Terminal Server\\TSAppCompat",
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\MUI\\UILanguages\\en-US\\AlternateCodePage",
    "HKEY_CURRENT_USER\\Control Panel\\Desktop\\MuiCached\\MachinePreferredUILanguages",
    "HKEY_LOCAL_MACHINE\\SYSTEM\\ControlSet001\\Control\\Nls\\CustomLocale\\EMPTY"
],
"dll_loaded": [
    "psapi.dll",
    "C:\\Windows\\system32\\IMM32.DLL",
    "User32.dll"
]
```

Dynamic Downfalls

- Dynamic malware analysis is not deterministic
  - Success depends on a billion factors

- Anti-sandboxing malware
  - Environmental awareness
  - Obfuscating internal data
  - Timing based evasion
  - Simulated Randomness

What tools are available?

https://github.com/rshipp/awesome-malware-analysis