SANS

Unconventional Logging and Detection

Justin Henderson (@SecurityMapper)

About Me

Justin Henderson

- SEC555 Author / SEC455 and SEC530 Co-Author
- GSE #108 / Cyber Guardian Blue + Red / 60 certs
- Owner and Principal Consultant of H & A Security Solutions
- **Twitter**: @SecurityMapper
- **GitHub**: github.com/HASecuritySolutions
- And security hobbyist and community supporter
  - Collecting interns/contributors in bulk (research teams)
  - Release research to the community

Unconventional Tactics

Log Collection

- Focus on picking up logs
  - Without requiring agents on each endpoint
  - Or without agents entirely
- Upgrading logs
  - Adding context (log enrichment)

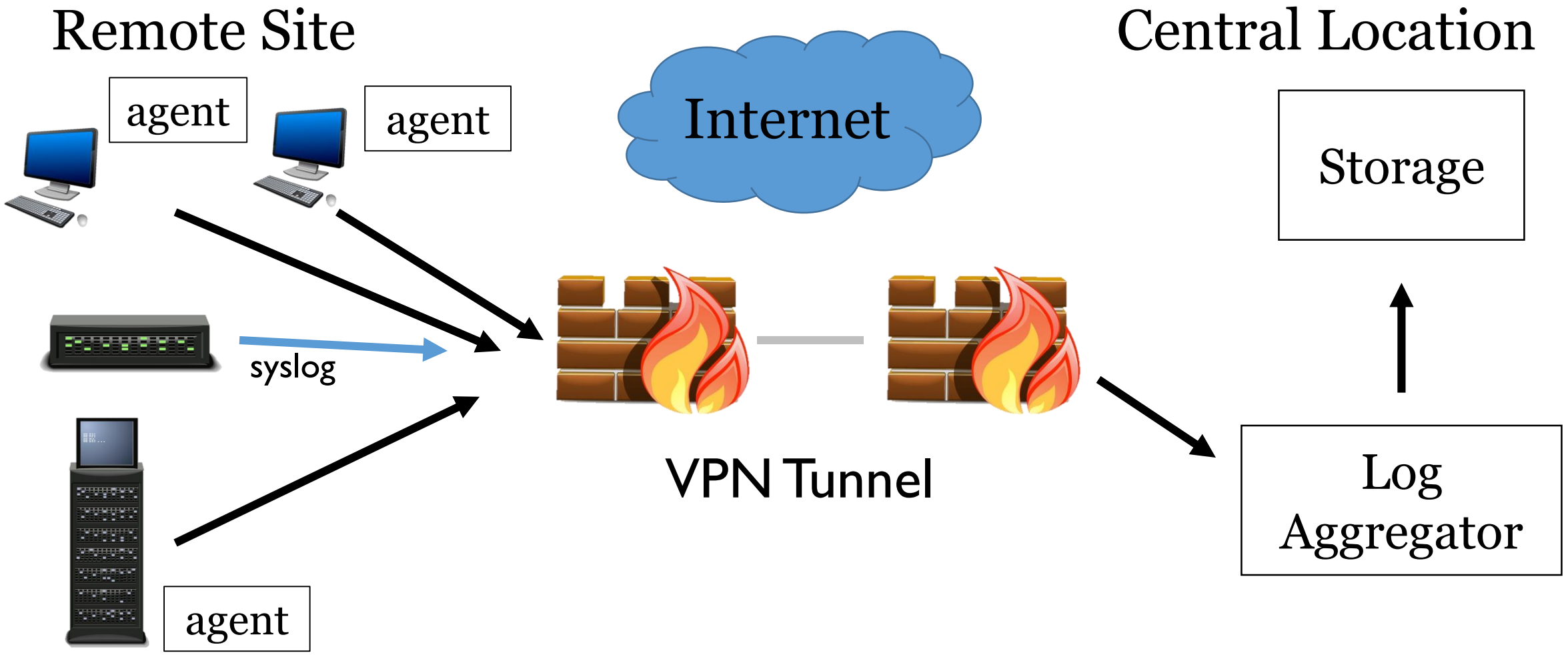
Methods work regardless of SIEM in use

Detection

Implement detection capabilities

- Without requiring security software or agents
- Remove requirement for remote polling software
  - osquery
  - SSH
  - WMI

Log Agents


Remote Site
Central Location
agent
agent
Internet
Storage
syslog
VPN Tunnel
Log Aggregator
agent

Windows Event Forwarding

To collect logs using Windows event forwarding is a two-step process

- An event collector must be set up
- Then, either the collector must be configured to pull events or endpoints must be configured to push events

GPO is used to tell endpoints what logs to push

- Configuration of event selection is similar for push/pull

The end destination is intended to be Windows, not SIEM

Blind Drop

Windows event forwarding cannot ship file logs

- Only handles native Windows events

Business requirement may require no third-party agents

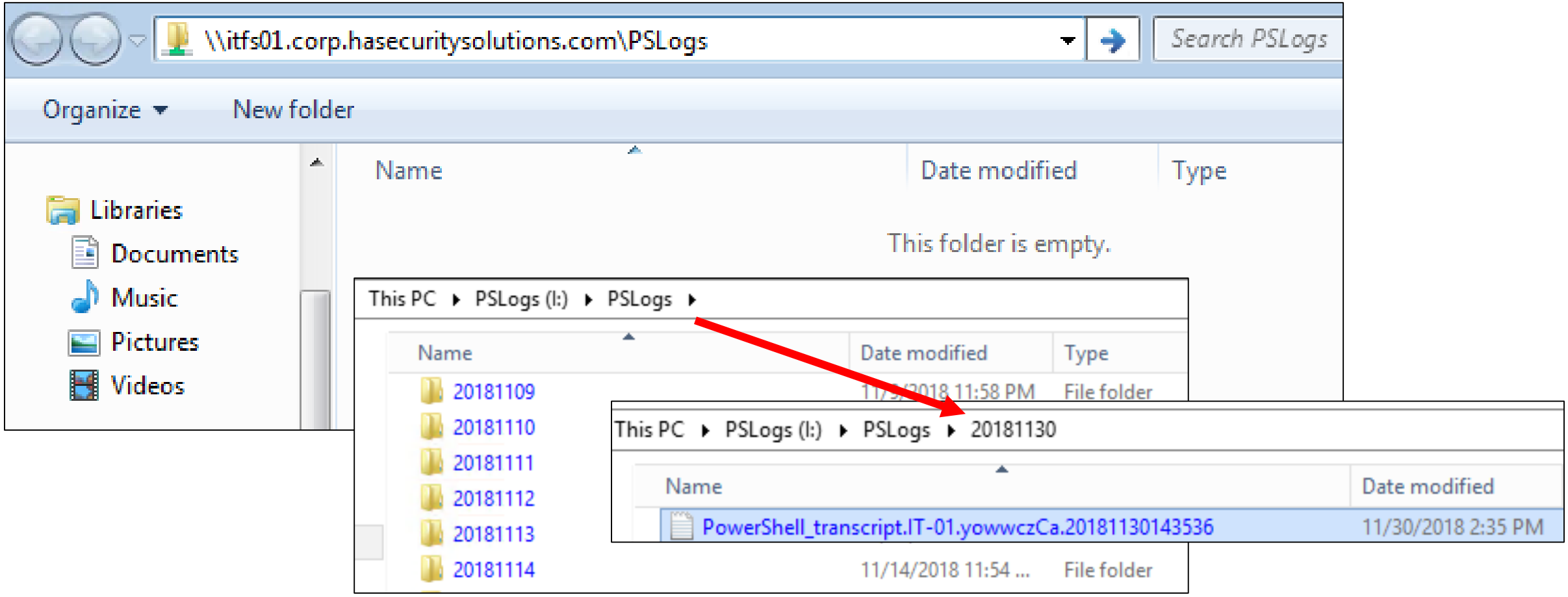
- Can be handled by using a blind file share

Requires a single file server to have a third-party agent or PowerShell script

- Share is created with write permissions only
- Log files are then saved to this share

Blind Drop with PowerShell Transcription Logging

List folder contents at root folder, write only on subfolders



Log Collection of Key Data Source != Good Data

A SIEM is often treated as a mainstream consumer of data

- Yet it should emphasize analysis and detection

Case Study / Example - Which would you rather analyze?

AppLocker Block Event

File = PATH/SEC555_ROCKS.EXE

File Hash = empty

User = jhenderson

Policy Name = exe

%OSDRIVE%\SEC555_ROCKS.exe was prevented from running.

Modified Block Event

File = PATH/SEC555_ROCKS.EXE

File Hash = empty

User = jhenderson

Policy Name = exe

Signed = false

Signature = Unknown

Hashes = MD5|SHA1 hash here

Sandbox = 9/10 evilness rating

Getting Context

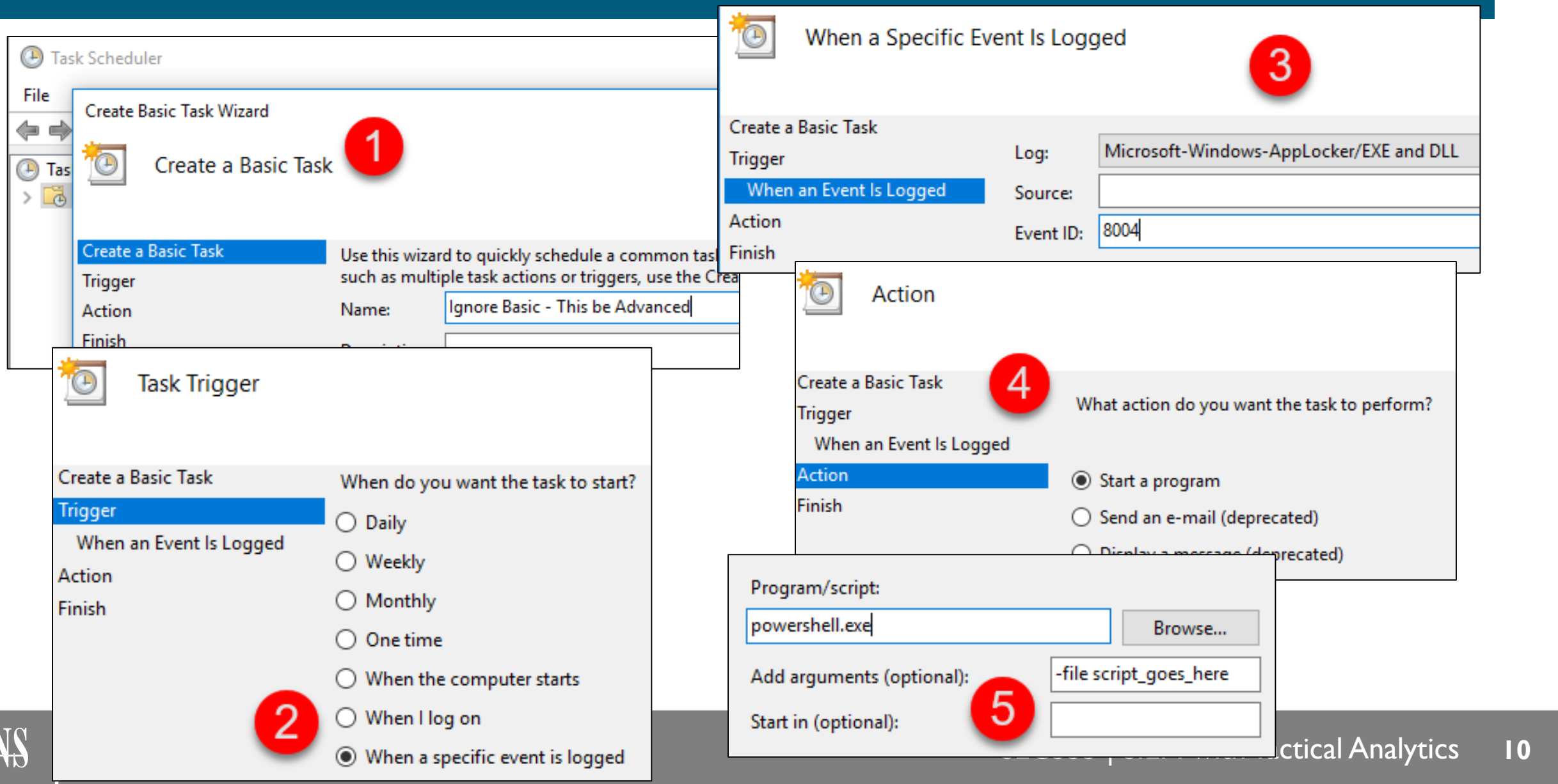
Problem is how to gain context with a SIEM (multiple options)

1. Log enrichment during **data ingestion** (Example - Logstash)
2. Log enrichment while **viewing the log** (Example - Splunk)
3. Log enrichment via **orchestration** (Example - Phantom)

Above implementations are tool specific (use of all would be ideal)

- And may be difficult to maintain / implement
- Any certain techniques do not scale well with above methods
  - Waiting for malware sandbox analysis takes minutes

Different Approach



Script Logic

When task schedule is triggered the script could do the following:

- Get the recent **8004** event ID from **AppLocker**
- Send the file to malware sandbox
- Run **sigcheck.exe** against file
- See if **Sysmon** events exist to find parent process info
- Perform any other additional checks
- Write a new custom log

Custom Logging with PowerShell

PowerShell makes writing custom logs easy

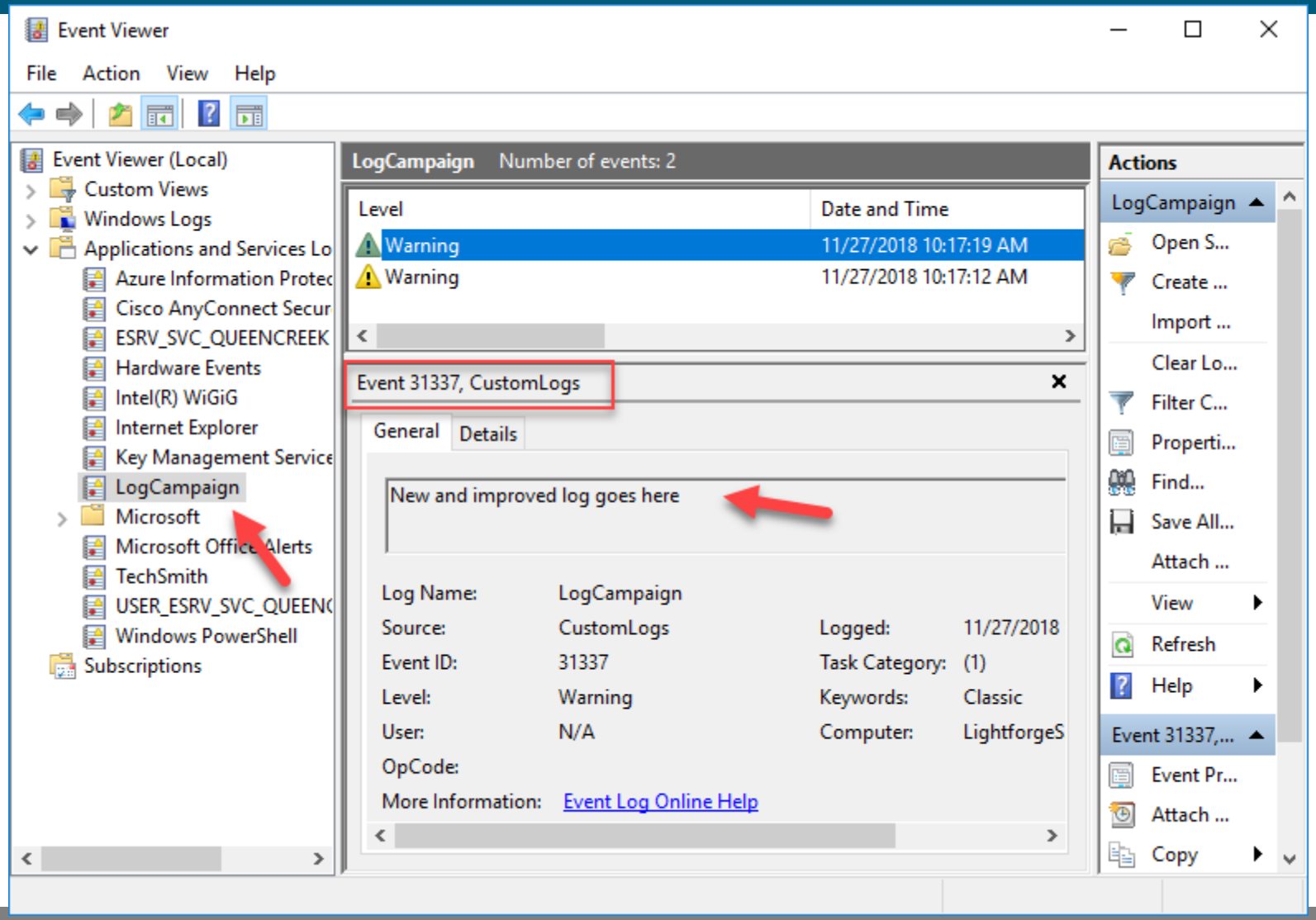
- Simply use Write-EventLog to generate a custom log
- If you want a custom channel, first, use New-EventLog

```
1    New-EventLog -LogName LogCampaign -Source CustomLogs
2    Write-EventLog -LogName LogCampaign -Source CustomLogs
     -EventId 31337 -EntryType Warning -Message "New and
     improved log goes here"
```

Can be used to generate logs that even basic log collectors can collect

- May remove the need for special log agents

PowerShell Generated Log



Offloading Job

Standard user privileges work with writing logs to Windows

- But custom channel must be created first
- Does not work to pre-built channels like **Security**
- Crafting log over network works as standard user

Possible to offload sensitive jobs off endpoints

- Example - Trigger custom log and copy file to blind share
  - Then perform automated analysis there
- Use SIEM to trigger automatic action

Custom Logging via Scripts

PowerShell

```
1    Install-Module Posh-Syslog
2    Import-Module Posh-Syslog
3    Send-SyslogMessage -Server "x.x.x.x"
     -Message 'Log message here' -Severity
     Informational -Facility syslog -Transport TCP
```

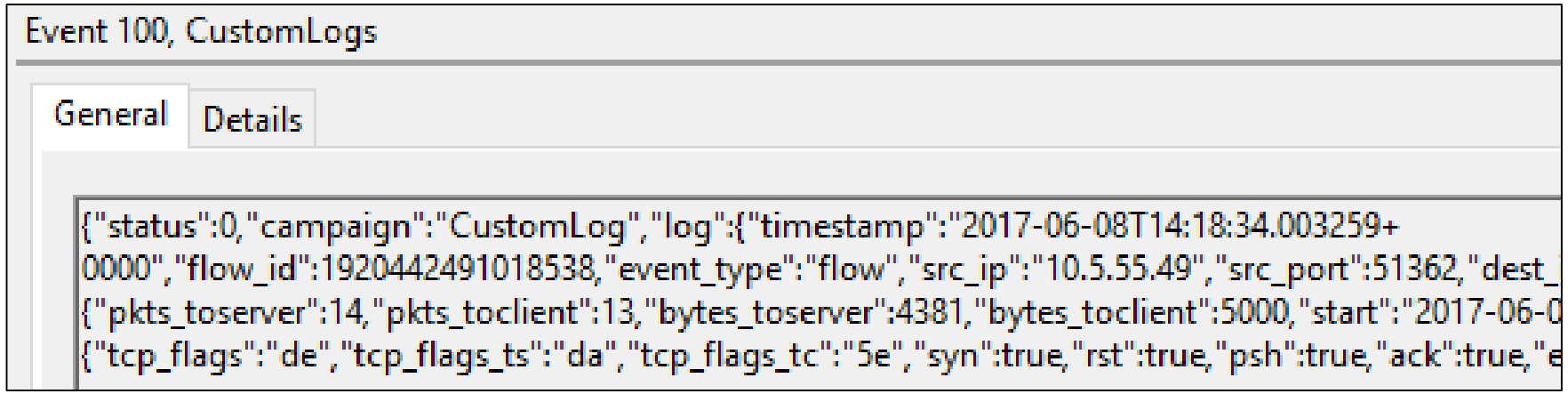
Python

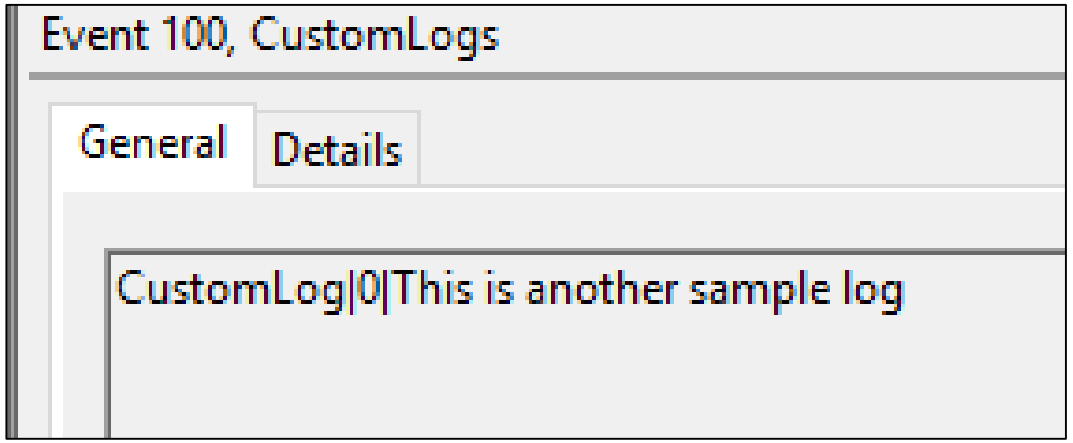
```
1    import logging
2    import logging.handlers
3    custom_logger = logging.getLogger('MyLogger')
4    custom_logger.setLevel(logging.INFO)
5    handler = logging.handlers.SysLogHandler
     (address = ('X.X.X.X',514))
6    custom_logger.addHandler(handler)
7    custom_logger.info("Log message here")
```

Custom Format

Scripting log allows output to be in any format

- CEF
- LEEF
- Syslog
- JSON
- Key-value
- CSV





Unconventional Logging

Collection

Multiple options outside of using agents to collect logs

- Script out / to Windows events
- Use script to send logs via syslog or custom formats
- Output as file to central file share
- Use Windows Event Forwarding

Enrichment

Take existing logs and make them better

- Windows Task Scheduler
  - To kick off script based on Windows Event ID
- Or read log with script

Then generate better log(s)

* Still need aggregator, search, and SOAR for other enrichment

Agentless Detection

Adversaries "live off the land" and use tools against you

- But defenders need to and should "live off the land"
- **PowerShell**, **Python**, and **Bash** provide scalable, easy to implement detection and response capabilities

Try running simple scripts on a re-occurring basis

- **Windows Task Scheduler** running every 5 minutes
- **Cron job** running every 1 minute
- Run at **startup script** that handles its own scheduling

Log Campaign - GitHub Project

```
PS C:\log_campaign> .\log_campaign.ps1 -Campaign ARPCach
e -Destination syslog -DestinationServer 10.5.55.2
PS C:\log_campaign> .\log_campaign.ps1 -Campaign ARPCach
e -Destination evtx -EventID 31337
```

Provides detection capabilities with logging **Campaigns**

File Ingestion --->

Provides ability to read in files, convert them, and log to syslog or evtx

```
PS C:\log_campaign> .\log_campaign.ps1 -File .\test.txt
Text format found and selected. If you do not want this
use -AutoFormat:$false
PS C:\log_campaign> .\log_campaign.ps1 -File .\test.csv
Delimited file found with , as the delimeter. If you do
not want this use  -AutoFormat:$false
PS C:\log_campaign> .\log_campaign.ps1 -File .\test.json

JSON format found and selected. If you do not want this
use -AutoFormat:$false
```

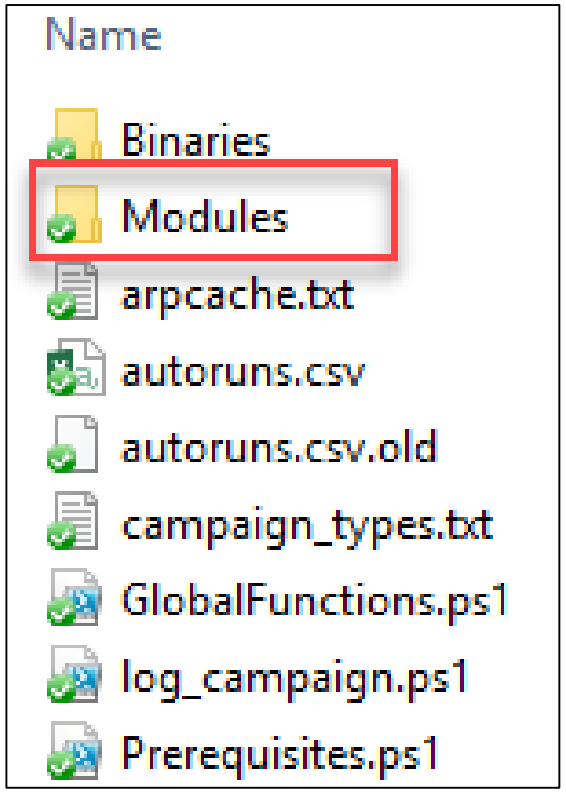
Modular Campaigns

Each Campaign is its own module

- Allows easy drop in of custom modules
- Or using pre-built modules

Example - **ARPCache.ps1** module

- On first run, saves ARP entry for default gateway
- Then generates log if MAC address changes
- Acts as an alert to ARP cache poisoning attacks



Autoruns.ps1 Module

Campaigns can call 3rd party binaries like **autorunsc.exe**

- Many organizations use autorunsc.exe for incident handling / forensics for finding persistence
- Works well for local or file server storage but not daily baseline to SIEM (or near real time monitoring)

Autoruns.ps1 module calls **autorunsc.exe**

- Generates logs only when new or changed entries found
- Can be run every X minutes without your SIEM dying

Baseline Data Sources

Good data requires getting your hands dirty

- May have to go "fetch" what you need

Useful data

- Active processes
- Certificates
- Drivers
- Host files
- Registry keys
- Route table
- Scheduled tasks
- Security status
- Services
- Shares
- Software
- USB devices
- Users and groups

Log Campaign - Scheduling

Log Campaign supports multiple methods of scheduling

- Control schedule via **Windows Task Scheduler**
- Implement schedule using **-Schedule** parameter
  - Supports per X minute repetitive scheduling
  - Great when combined with a startup task or script

```
.\log_campaign.ps1 -Campaign all -Schedule 1
```

Run all **Campaigns** or specific ones on custom schedules

Local Detection Strategies

- **Matching** (Blacklist) - Look for something that should not occur then generate alert
- **Anomaly** - Look for things that change
  - To save time and resources consider only sending "new" items
- **Change Monitoring** - Look for things that change
  - Treat as alert if change is not authorized / expected

Local use can be combined with things like **DeepBlueCLI**

- Any tool that can output to file may be easier to maintain

GitHub Link

Log Campaign can be found in this GitHub repo:

https://github.com/HASecuritySolutions/LogCampaign

Feel free to modify or make a Python or Bash equivalent