BUILDING A DETECTION ENGINEERING LAB

Fort Wayne Bsides 2024

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Agenda

- Introductions
- Home Labbing Recap
- Why Build a Detection Engineering Lab
- Detection Engineering
- The Lab Environment
- Creating Detections
- Generating Badness (Testing)
- Summary
- Bonus?

$> whoami

- IT/Cybersecurity for 12+ years in a variety of industries
- Worked with companies ranging in size from <$1M ARR to >$200B ARR
- BS Cybersecurity & Information Assurance from WGU
  AAB Network Administration & Computer Programming from NSCC
- CISSP, CCSP, SSCP, GISP, CEH, ECES, CySA+, and many more
- Participate in InfraGard, ISSA, (ISC)2, SANS Advisory Board, NSCC IT Advisory Board, CAMO at NSCC, Adjunct Teacher at NSCC
- I enjoy spending time with my wife and kids, traveling, cooking, public speaking, and tinkering with my home lab

$> who

- Cybersecurity Professionals?
- Students?
- Have a home lab?
- Have experience doing detection engineering?
- Are red teamers/penetration testers?

Home Labbing Recap

- Home labs are nonproduction environments where you can test out new ideas and concepts to evaluate solutions, or teach yourself new concepts, technologies, and skills
- They can be any combination ranging from a single system like a laptop to a full datacenter of enterprise infrastructure
- Can be physical systems, containers, virtual machines, cloud systems – or any combination of these
- You can then replicate real world environments or host “productionized” solutions for home

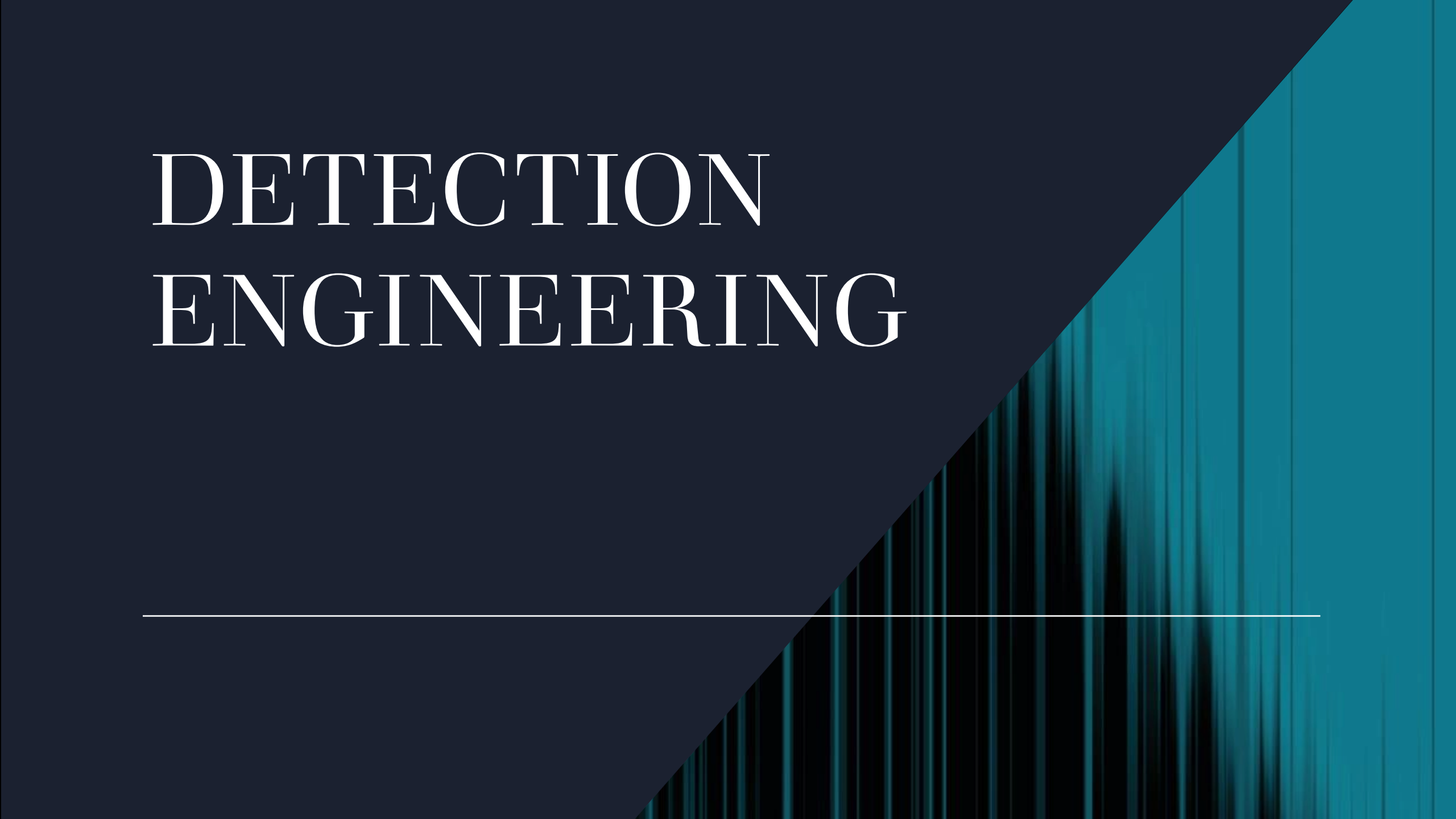
Why Build a Detection Engineering Lab

- Detection engineering requires an understanding of the systems in which you are building detection logic for
- Each environment is unique so every company will likely have different detection logic
- Advanced detection engineering requires understanding common tactics, techniques, and procedures (TTPs) which are constantly changing
- This is a skill that can set you apart amongst other professionals in the field (aka resume building)

Word of Warning (Considerations & Caveats)

- What this session is not
  - An in-depth course on engineering detections
  - An in-depth presentation on how to build home labs (see recorded session for that)
- What this session is
  - An introduction to the concepts of detection engineering
  - Some fundamental specifications to develop detections based on a variety of source data
  - Provides some design patterns on how you can construct a home lab to facilitate developing, testing, and refining detections that could benefit you, your career, and your company

DETECTION ENGINEERING



What is Detection Engineering

- Detection engineering is the process of designing, developing, testing, and maintaining threat detection logic to identify and respond to potentially malicious events
- Leverages threat intelligence for a combination of indicators of compromise (IoCs) and/or indicators of attack (IoAs)
- Usually presented in the form of rules, signatures or complex queries
- Usually involves a SIEM and/or IDS as main components

What Makes a “Good” Detection

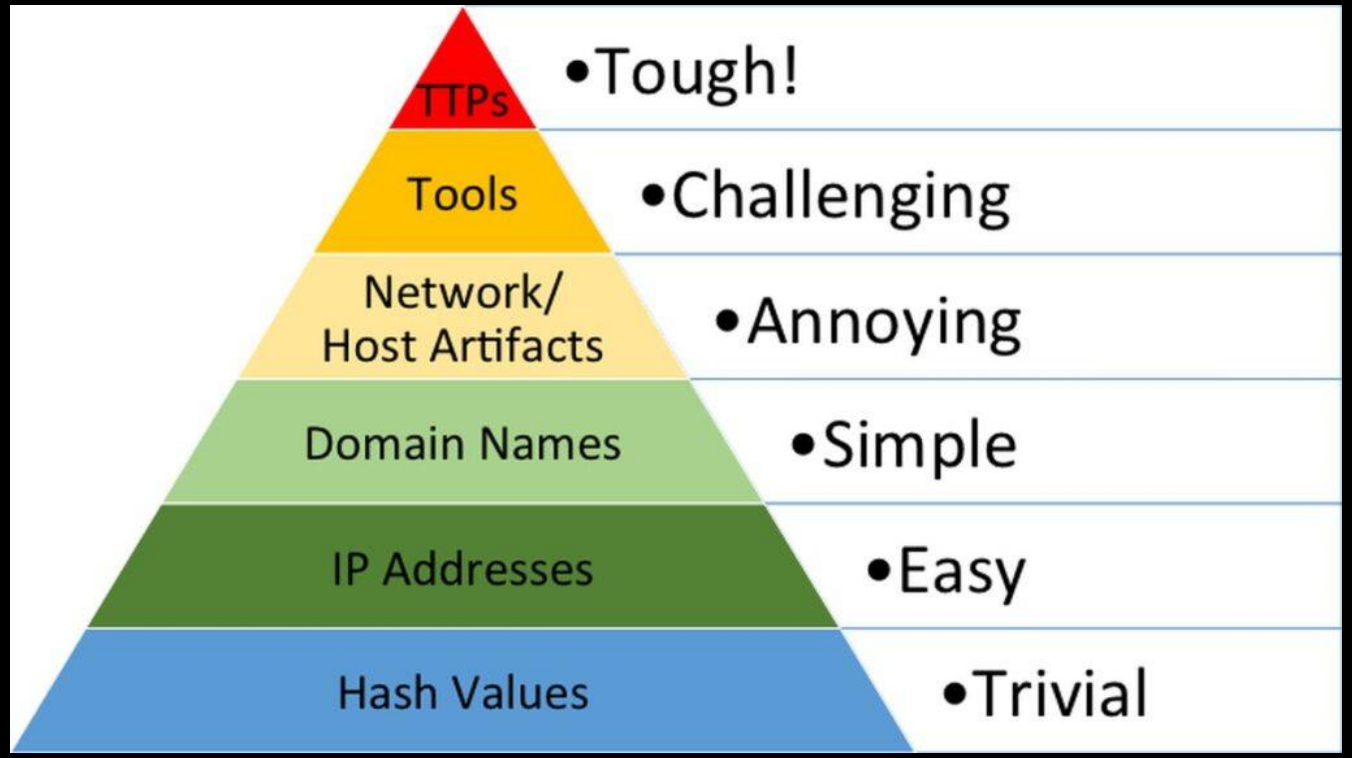
Repeatable

High fidelity

Applicable and relevant

Scalable

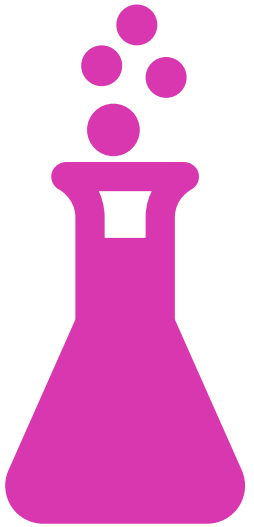
The Pyramid of Pain



Data Sources

- Authentication Logs
- Network traffic logs (NetFlow, proxy logs, etc)
- Intrusion Detections System (IDS) logs
- Firewall logs (network and host)
- Endpoint Detection and Response (EDR) logs (process executions, network connections, etc)
- DNS Logs
- Application Logs
- Many more....

THE LAB

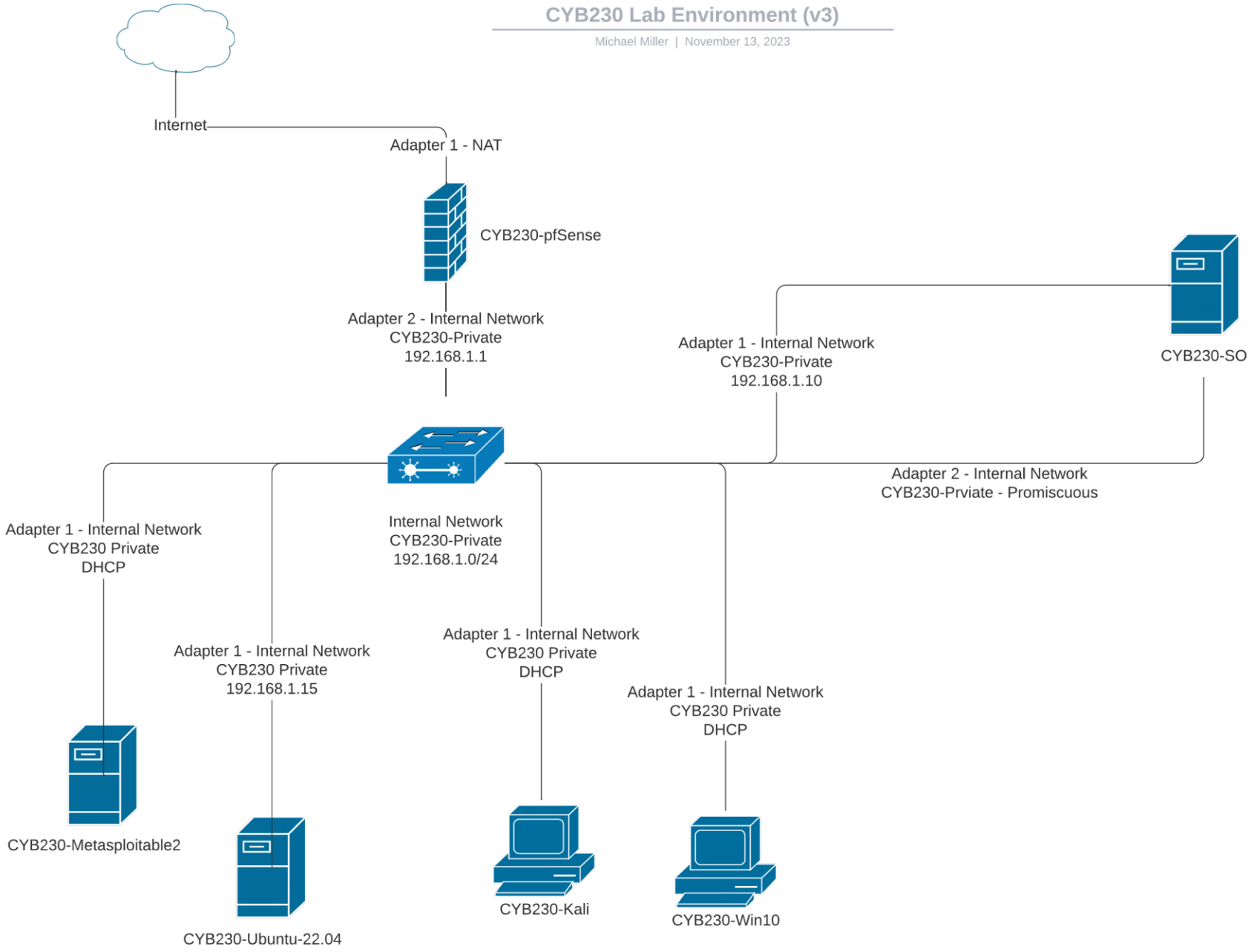


The Lab Environment

- Firewall – pfSense, OPNsense - REQUIRED
- SIEM/Log Collector – Security Onion, ELK Stack, Splunk - REQUIRED
- NIDS – Security Onion, Suricata, Snort - RECOMMENDED
- Windows System(s) – Windows endpoint(s), Windows server(s) - OPTIONAL
- Linux System(s) – RHEL or Debian based system(s) - OPTIONAL
- Attack Machine(s) – Kali - OPTIONAL

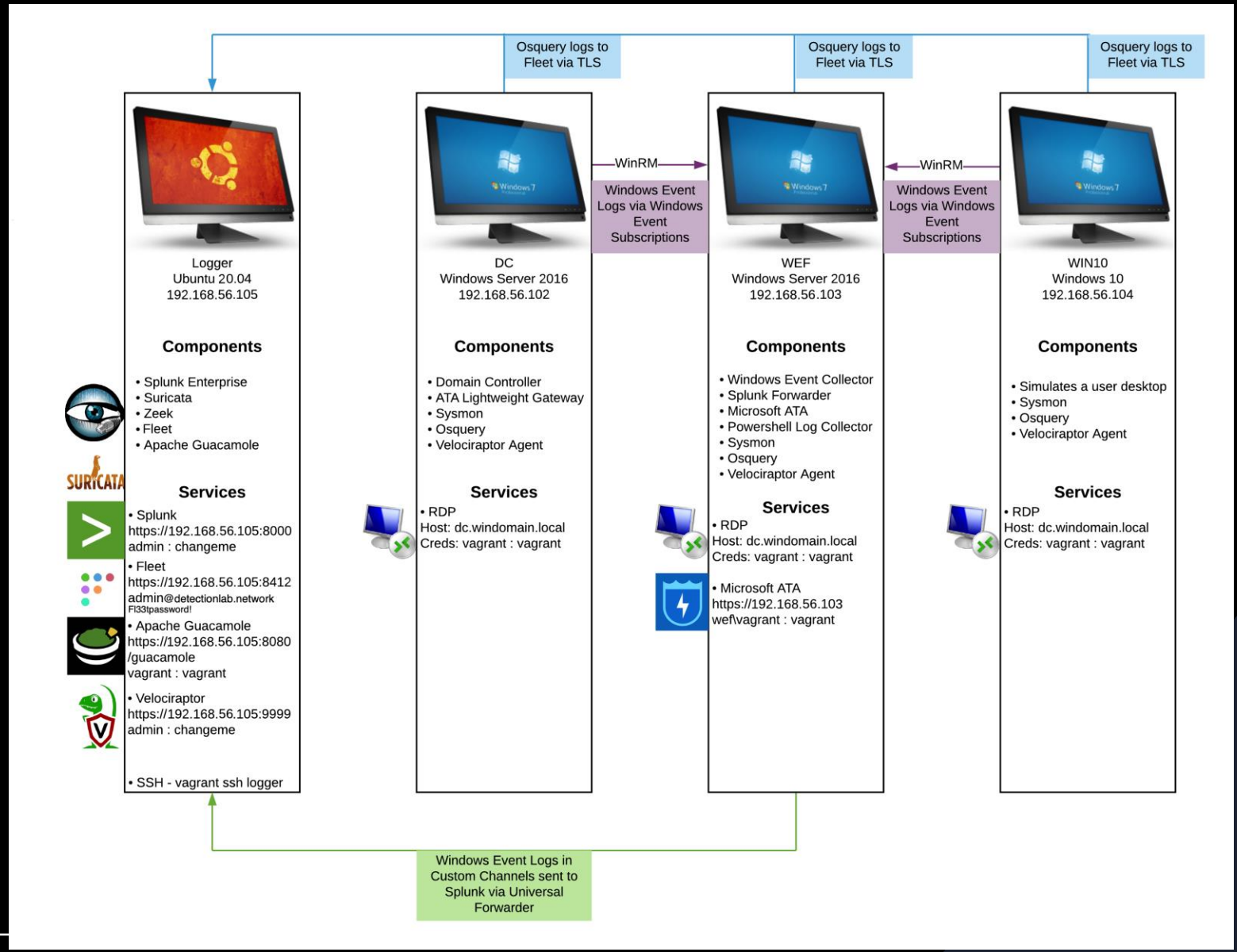
CYB230 Lab Environment (v3)

Michael Miller | November 13, 2023



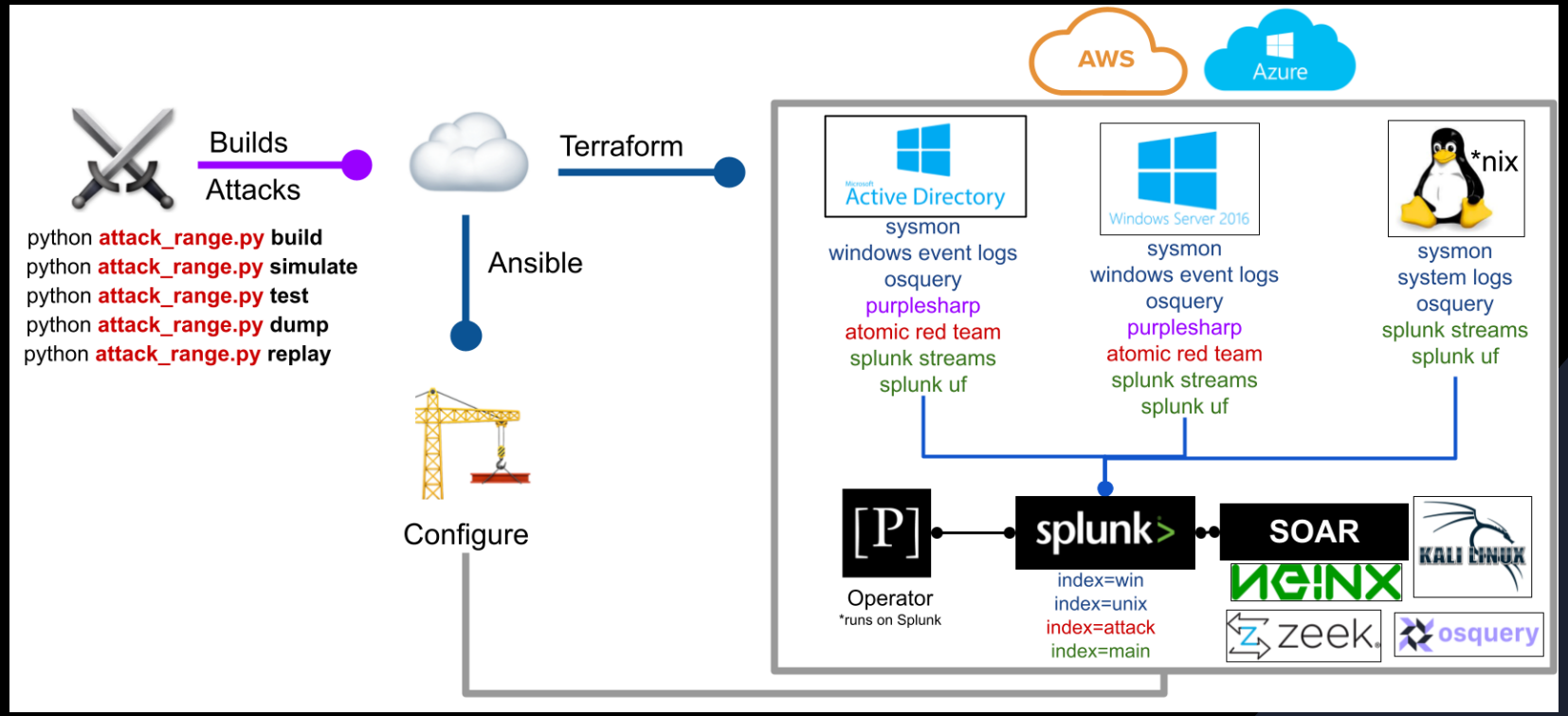
Detection Lab

https://www.detectionlab.network/



Splunk Attack Range

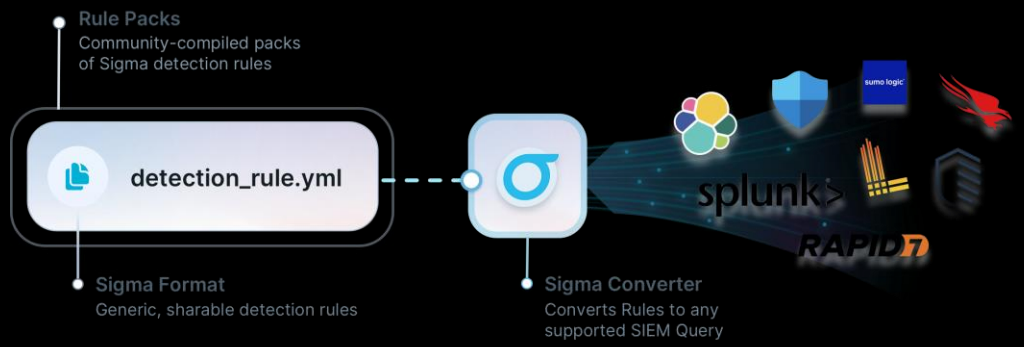
https://github.com/splunk/attack_range



CREATING DETECTIONS

Sigma – Log Based Detections

- Open source, YAML based, portable signature format
- Vendor agnostic
- Large baseline rulesets (generic, threat hunting, emerging threats)
- https://sigconverter.io/



Creating Sigma Rules

```
title: a short capitalised title with less than 50 characters
id: generate one here https://www.uuidgenerator.net/version4
status: experimental
description: A description of what your rule is meant to detect
references:
    - A list of all references that can help a reader or analyst understand the meaning of a triggered rule
tags:
    - attack.execution  # example MITRE ATT&CK category
    - attack.t1059      # example MITRE ATT&CK technique id
    - car.2014-04-003   # example CAR id
author: Michael Haag, Florian Roth, Markus Neis  # example, a list of authors
date: 2018/04/06  # Rule date
logsource:                    # important for the field mapping in predefined or your additional config fi
    category: process_creation  # In this example we choose the category 'process_creation'
    product: windows            # the respective product
detection:
    selection:
        FieldName: 'StringValue'
        FieldName: IntegerValue
        FieldName|modifier: 'Value'
    condition: selection
fields:
    - fields in the log source that are important to investigate further
falsepositives:
    - describe possible false positive conditions to help the analysts in their investigation
level: one of five levels (informational, low, medium, high, critical)
```

https://github.com/SigmaHQ/sigma/wiki/Rule-Creation-Guide

Sigma Example

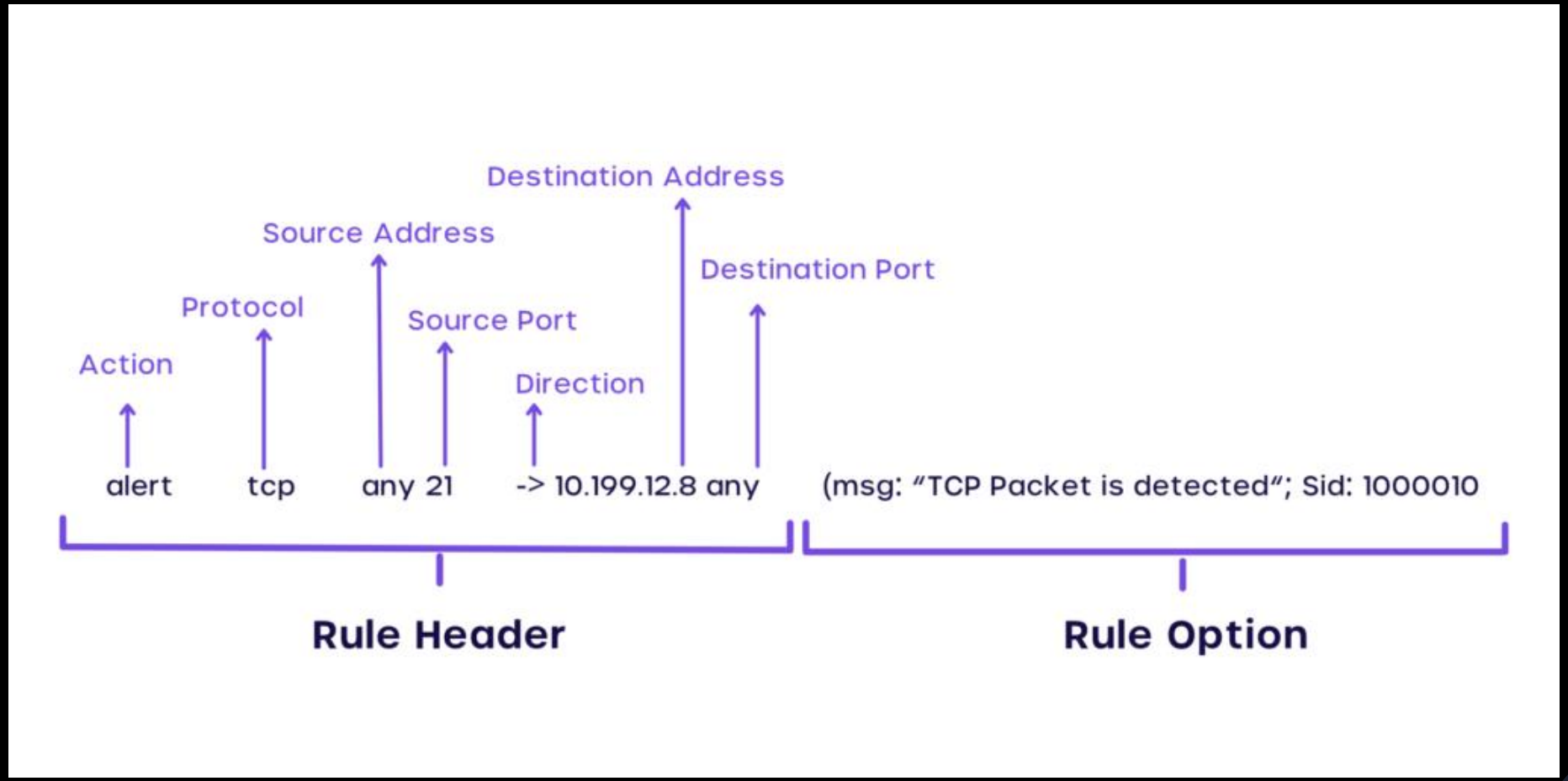
```yaml
title: Network Connection Initiated Via Notepad.EXE
id: e81528db-fc02-45e8-8e98-4e84aba1f10b
status: test
description: |
    Detects a network connection that is initiated by the "notepad.exe" process.
    This might be a sign of process injection from a beacon process or something similar.
    Notepad rarely initiates a network communication except when printing documents for example.
references:
    - https://web.archive.org/web/20200219102749/https://www.sans.org/cyber-security-summit/archives/file/summit-archive-1492186586.pdf
    - https://www.cobaltstrike.com/blog/why-is-notepad-exe-connecting-to-the-internet
author: EagleEye Team
date: 2020/05/14
modified: 2024/02/02
tags:
    - attack.command_and_control
    - attack.execution
    - attack.defense_evasion
    - attack.t1055
logsource:
    category: network_connection
    product: windows
detection:
    selection:
        Image|endswith: '\notepad.exe'
    filter_optional_printing:
        DestinationPort: 9100
    condition: selection and not 1 of filter_optional_*
falsepositives:
    - Printing documents via notepad might cause communication with the printer via port 9100 or similar.
level: high
```

https://github.com/SigmaHQ/sigma/blob/master/rules/windows/network_connection/net_connection_win_notepad.yml

Snort – Network Based Detections

- Open source intrusion detection/prevention system (IDS/IPS)
- Rule can be header based, payload based, or both

Snort Example



https://cyvatar.ai/write-configure-snort-rules/

Generating Badness

- Useful for testing the efficacy of your detections
- Manual intervention – using things like Kali, nmap, Metasploit
- Automated AE tools
  - Caldera
  - Atomic Red Team

Summary

- Home labs are a great way to test things our and learn new things
- Detection engineering is the process of creating detection logic
- A good detection is repeatable, relevant, scalable, and high fidelity
- The Pyramid of Pain can be a measuring stick for detection efficacy/complexity
- A detection engineering lab requires a “network” and a SIEM/Log Collector, but an IDS and an array of different machines are recommended
- Sigma (logs) and Snort (network) are two effective ways to start creating detections
- You can generate “true positives” for your detection logic to test it

BONUS LAB ENVIRONMENT!

Splunk BOTS Docker

- More “Threat Hunting” than ”Detection Engineering”
- Splunk BOTS versions 1-3 in a single Docker Compose file
  - All addons and apps included in the repo
- Great way to learn Splunk
- https://github.com/lexcilius/splunk-bots-docker

Q & A

Thank You!

Resources

- https://attack.mitre.org/
- https://github.com/SigmaHQ/sigma
- https://github.com/SigmaHQ/sigma/wiki/Rule-Creation-Guide
- https://sigconverter.io/
- https://www.snort.org/
- https://caldera.mitre.org/
- https://www.kali.org/
- https://atomicredteam.io/
- https://github.com/lexcilius/splunk-bots-docker