BUILDING HOME LABS FOR FUN & CAREER DEVELOPMENT

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$>WHOAMI

- IT/Cybersecurity over 10 years
  - Cybersecurity, Network Administration, Windows/Linux Server Administration, Web App Development
  - Telecommunications, Healthcare, Consulting, Manufacturing
  - Worked with businesses ranging from <$1M to >$100B (Currently work for Fortune 20 company)
- A.A.S. – Network Administration & Computer Programming @ NSCC
- Finishing B.S. – Cybersecurity & Information Assurance @ WGU
- CCSP, SSCP, CEH, ECES, CySA+, Security+, Network+, A+, and various vendor certs
- Participate in InfraGard, ISSA, (ISC)2, Advisory Board for NSCC, CAMO at NSCC
- I enjoy spending time with family, grilling/smoking, tinkering with my home lab, and traveling

WHAT & WHY

- What
  - Home labs are basically a test environment at home
  - Can be just software (e.g. running something like XAMPP)
  - Can be a container/VM (Docker/LXC or Virtual Box/VMware/Parallels)
  - Full enterprise network with switching, VLANs, hypervisor, NAS, etc
- Why
  - Why not, it’s fun!
  - Learn new concepts or technologies (networking, system administration, programming, pen testing, etc)
  - Test out ideas or changes without effecting a production environment
  - Implement services at home (e.g. PiHole, Plex, NextCloud, GitLab, Network monitoring, SIEM, Syncthing, etc)
  - Resume/skills building

HOW – SOFTWARE, CONTAINERIZATION, OR VIRTUALIZATION

- Software
  - XAMPP
  - Installing services directly on a home PC or laptop (e.g. Apache, MySQL, Metasploit, Plex)
- Containerization (OS Level Virtualization)
  - BSD Jails
  - Docker
  - LXC
  - OpenVZ
  - Kubernetes
- Type 2 Virtualization
  - VMware Workstation/Fusion
  - VirtualBox
  - Parallels (Mac)
  - Hyper-V
  - WSL
- Network Virtualization
  - GNS3
  - Cisco Packet Tracer
  - Cisco VIRL

HOW - HARDWARE

- Network gear
  - MikroTik
  - Ubiquiti
  - Old stuff off eBay/auctions
- Servers/Storage
  - Old computers
  - Single board computers (Rasberry Pi)
  - Old stuff off eBay/auctions
- Dedicated Type 1 Hypervisor
  - ProxMox VE
  - VMware ESX
  - Hyper-V
  - Xen
- Dedicated network storage
  - FreeNAS
  - UnRAID
  - Synology
  - QNAP

HOW - CLOUD

- Azure
  - Dreamspark
- GCP
- AWS
- VPC
  - Digital Ocean
  - Linode

HURDLES/CAVEATS

- Cost
- Space
- Physical hardware availability
- Power
- Time
- Nested virtualization
- Ease of management

INSPIRATION

- r/Homelab
- PiHole
- Media server (Plex/Emby)
- Personal Cloud (NextCloud)
- Multiple device synchronization (Syncthing)
- Monitoring systems (Zabbix, Zeek, Security Onion, SIEM)

SECURITY LABS – ATTACK VS DEFEND

- Lots of CTF style options for attack
  - Vulnhub
  - HackTheBox
  - TryHackMe
  - Many, many more
- Not so much for defense…
  - Build a lab and attack it
  - Grab occasional packet captures or system images and analyze

ENVIRONMENTAL CONSIDERATIONS

- Networking, networking, networking – SEGMENTATION IS KEY
  - If physical, separate by VLANs and firewall them off
  - If virtualizing, ensure you have a host only network, or bridge with an interface on separate network – if possible try to use a dedicated lab system
  - You do not want something to escape your lab and target production systems
- Endpoint protection
  - In a lot of scenarios, you will either not have endpoint protection or it will be disabled
- Physical gadgets
  - Hak5 gear (BashBunny, RubberDucky, Wifi Pineapple)

VULNHUB

- Collection of VirtualBox and VMware virtual machines for download
  - https://www.vulnhub.com/
- Typically CTF style
- Lots of cool OSCP like options
  - https://www.abatchy.com/2017/02/oscp-like-vulnhub-vms
  - https://docs.google.com/spreadsheets/d/1dwSMIAPIam0PuRBkCiDI88pU3yzrqqHkDtBngUHNCw8/edit#gid=0
- Use caution, anyone can create and upload these (recommend dedicated system for this)

HACK THE BOX

- Amazing Website with tons of boxes to work with
- Updated all the time
- Premium options
- VPN to their environment
- https://www.hackthebox.eu/
- Open registration, used to require “hacking” your way to register

OTHER ATTACK LAB RESOURCES

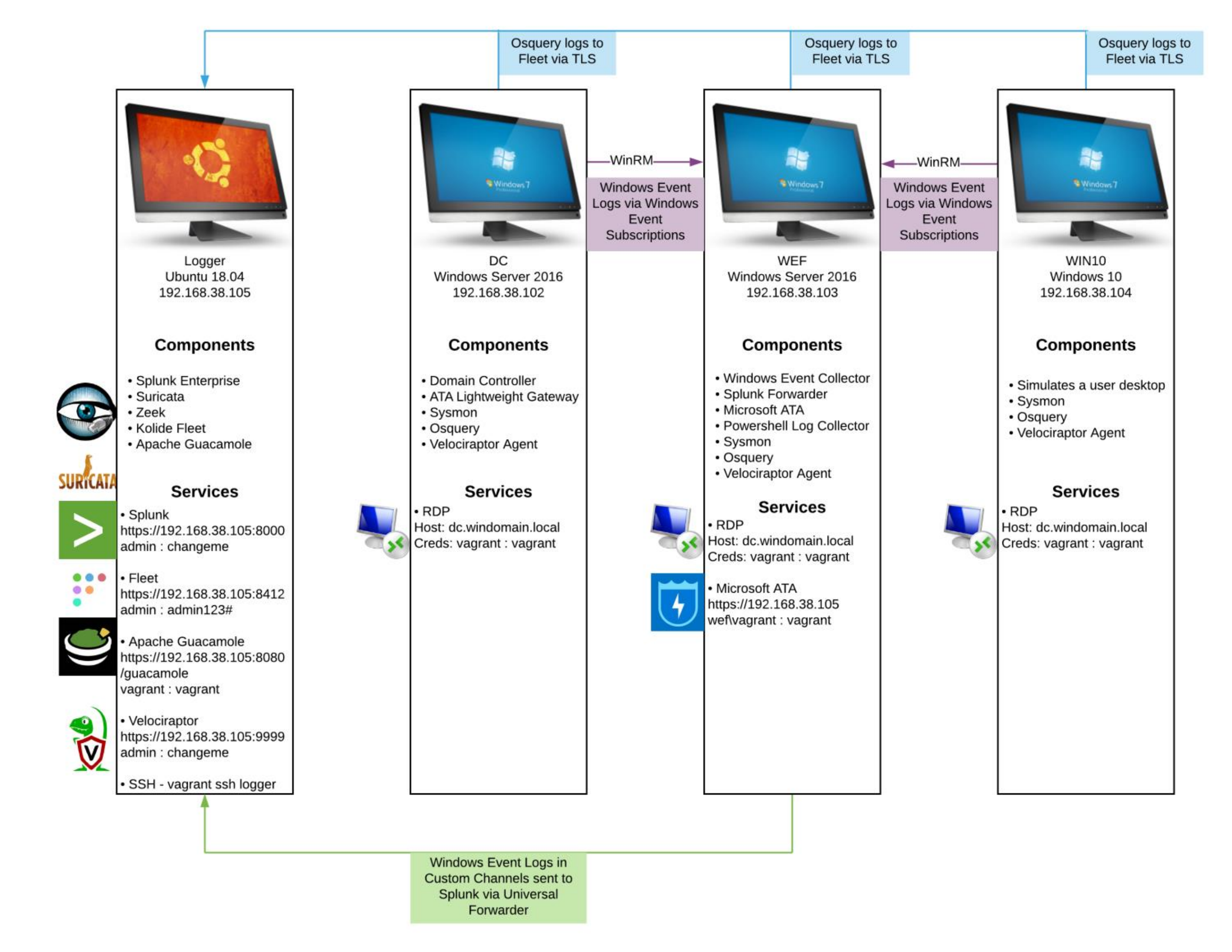
- Metasploitable
  - https://information.rapid7.com/download-metasploitable-2017.html
  - https://github.com/rapid7/metasploitable3
- Metasploit Unleashed
  - https://www.offensive-security.com/metasploit-unleashed/
- TryHackMe
  - https://tryhackme.com/
- Root Me
  - https://www.root-me.org/?lang=en

BUILDING A DEFENSE LAB

- Target Machines
  - Windows Servers, Windows Endpoints, Linux Servers, Network Equipment
  - May or may not have EDR/Sysmon/EPP
- Attack Machines
  - An offensive system or a few to execute attacks from (typically Kali/Parrot)
- Analysis Machines
  - SIEM/Log Collector, IDS, Network monitoring, Malware Analysis (Cuckoo)

DETECTION LAB

- "Easy Button" for a defensive environment
- Close to reality
- Lots of resources
  - 50GB+ Storage
  - 16GB+ RAM
- https://detectionlab.network/



Osquery logs to Fleet via TLS

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Osquery logs to Fleet via TLS

WinRM

Windows Event Logs via Windows Event Subscriptions

WinRM

Windows Event Logs via Windows Event Subscriptions

Logger
Ubuntu 18.04
192.168.38.105

Components

- Splunk Enterprise
- Suricata
- Zeek
- Kolide Fleet
- Apache Guacamole

Services

- Splunk
https://192.168.38.105:8000
admin : changeme
- Fleet
https://192.168.38.105:8412
admin : admin123#
- Apache Guacamole
https://192.168.38.105:8080
/guacamole
vagrant : vagrant
- Velociraptor
https://192.168.38.105:9999
admin : changeme
- SSH - vagrant ssh logger

DC
Windows Server 2016
192.168.38.102

Components

- Domain Controller
- ATA Lightweight Gateway
- Sysmon
- Osquery
- Velociraptor Agent

Services

- RDP
Host: dc.windomain.local
Creds: vagrant : vagrant

WEF
Windows Server 2016
192.168.38.103

Components

- Windows Event Collector
- Splunk Forwarder
- Microsoft ATA
- Powershell Log Collector
- Sysmon
- Osquery
- Velociraptor Agent

Services

- RDP
Host: dc.windomain.local
Creds: vagrant : vagrant
- Microsoft ATA
https://192.168.38.105
wef\vagrant : vagrant

WIN10
Windows 10
192.168.38.104

Components

- Simulates a user desktop
- Sysmon
- Osquery
- Velociraptor Agent

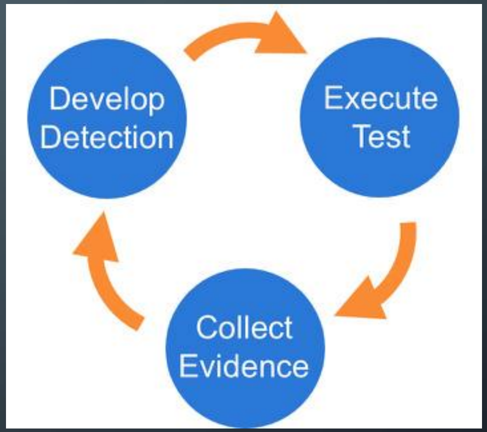
Services

- RDP
Host: dc.windomain.local
Creds: vagrant : vagrant

Windows Event Logs in Custom Channels sent to Splunk via Universal Forwarder

ATOMIC RED TEAM & CALDERA

- Atomic Indicator Generator
- Maps to MITRE ATT&CK
- https://atomicredteam.io/
- https://caldera.mitre.org/



OTHER DEFENSE TESTING METHODS

- Metasploit
- Nmap
- OpenVAS
- Wireshark
- Cobalt Strike

STATIC TESTING RESOURCES

- https://www.malware-traffic-analysis.net/training-exercises.html
- https://letsdefend.io/
- https://cyberdefenders.org/labs/
- https://dfirmadness.com/
- https://github.com/stuxnet999/MemLabs

HOME LABBING RESOURCES

- https://www.apachefriends.org/index.html
- https://www.docker.com/
- https://linuxcontainers.org/
- https://openvz.org/
- https://www.vmware.com/products/workstation-pro.html
- https://www.vmware.com/products/fusion.html
- https://www.parallels.com/
- https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/about/
- https://www.osboxes.org/
- https://www.gns3.com/
- https://www.gns3.com/marketplace/featured
- https://www.netacad.com/courses/packet-tracer
- https://learningnetwork.cisco.com/s/virl
- https://learningnetworkstore.cisco.com/cisco-modeling-labs-personal/cisco-cml-personal
- https://mikrotik.com/
- https://www.ui.com/

- https://www.proxmox.com/en/
- https://kb.vmware.com/s/article/2107518
- https://www.cbtnuggets.com/blog/certifications/cloud/vmware-esxi-free-vs-paid-a-look-at-license-limitations
- https://xenproject.org/
- https://www.freenas.org/
- https://www.synology.com/en-us
- https://www.qnap.com/en-us/
- https://www.pfsense.org/
- https://www.zabbix.com/
- https://pi-hole.net/
- https://nextcloud.com/
- https://about.gitlab.com/
- https://www.turnkeylinux.org/
- https://www.reddit.com/r/homelab/
- https://www.reddit.com/r/homelabsales/

DEFENSIVE SECURITY RESOURCES

- https://securityonionsolutions.com/
- https://thehelk.com/intro.html
- https://cybersecurity.att.com/products/ossim
- https://www.elastic.co/what-is/elk-stack
- https://thehive-project.org/
- https://cuckoosandbox.org/
- https://suricata.io/
- https://www.snort.org/
- https://www.ossec.net/
- https://wazuh.com/
- https://osquery.readthedocs.io/en/stable/
- https://www.velocidex.com/
- https://openedr.com/
- https://docs.microsoft.com/en-us/sysinternals/downloads/sysmon

QUESTIONS?

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