

# CYBERSECURITY WORKSHOP AGENDA

feat. defense against the dark cyber arts

by Vitaly Ford @ Arcadia University  
July 2025



# Big Picture

## DAY 1

Intro, grant housekeeping, pre-workshop survey, core cyber concepts, cyber.org registration, OS security, intrusion detection

3

## DAY 2

Pentesting (ethical hacking), OSINT, social engineering, simple malware analysis

23

## DAY 3

Passwords (manager, hash, salt) & MFA, VPN, zero-trust model, backups, TryHackMe rooms

30

## DAY 4

Speaker, cryptography, Linux, bash scripting, Capture The Flag (CTF), cyber competitions

34

## DAY 5

Wi-Fi security, ethics and privacy, CTF Unplugged, unplugged exercises from teaching materials, famous hacks, VirtualBox and Kali Linux installation, feedback, closing

50

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# DAY 1

Intro, grant housekeeping, pre-workshop survey, core cyber concepts, cyber.org registration, OS security, intrusion detection

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# whoami

Introductions

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# Why are we here?

Structured and spontaneous scaffolded learning

Joint NSF Grant: Elmhurst University & Arcadia University

# Grant Housekeeping

- Stipend (\$400, prorated based on the attended ## hours) after the workshop ends
  - You will send W-9 directly to our Accounts Payable, and I will take care of the check requests
  - Stipend will be prorated based on the completed hours
- Up to 36 CE hours, reported to PDE at the beginning of August
- Availability of an extra \$225 to register a student team at the [Cyber Patriot](#) competition
- Pre- and post-surveys (today and in the fall, respectively)
- Teaching materials
  - Each topic with a lesson plan, quiz [Kahoot-ready], homework, exercise, and slides
  - Also available as an online self-paced platform at <https://cysia.vford.com> (work-in-progress)
- Free existing resources outside of the grant

# CE Hours and PPID

- Email me your PPID if you need the hours to be registered
  - PPID can be found at  
<https://www.perms.pa.gov/screens/wfpublicaccess.aspx>
  - Hours will be sent to MCIU
  - MCIU will provide them to PDE

# PRE-WORKSHOP SURVEY

[HTTPS://ELMHURST.  
CO1.QUALTRICS.CO  
M/JFE/FORM/SV\\_0C  
G1BBUZUGAFXDC](https://ELMHURST.CO1.QUALTRICS.COM/JFE/FORM/SV_0CG1BBUZUGAFXDC)





# Cybersecurity Careers

- Refer to <https://www.cyberseek.org>

# Teaching Materials Google Drive Folder

- [https://drive.google.com/drive/folders/1XCEZ2DmGTV\\_k-Bda59eHQV12IF6NAOy6?usp=sharing](https://drive.google.com/drive/folders/1XCEZ2DmGTV_k-Bda59eHQV12IF6NAOy6?usp=sharing)

# Cyber.org: Cyber Range Registration

- Refer to the Cyber.org teaching materials available at [https://drive.google.com/drive/folders/1XCEZ2DmGTV\\_k-Bda59eHQV12IF6NAOy6?usp=sharing](https://drive.google.com/drive/folders/1XCEZ2DmGTV_k-Bda59eHQV12IF6NAOy6?usp=sharing)

# “Hacker” Terms (ex. FB market)

- Threat
- Vulnerability
- Exploit
- Attack (passive/active, software/network/human)
  - Refer to:
    - <https://attack.mitre.org>
    - <https://www.shodan.io/dashboard> with search queries like `has_screenshot:true camera` and <https://github.com/jakejarvis/awesome-shodan-queries>

# Core Cyber Concepts (ex. Website)

- CIA Triad (Confidentiality, Integrity, Availability)
- Authentication/authorization
- Non-repudiation
- Defense in Depth
- Secure by Design
- Least Privilege
- Risk Management (id, impact, mitigate, monitor)
- User Education

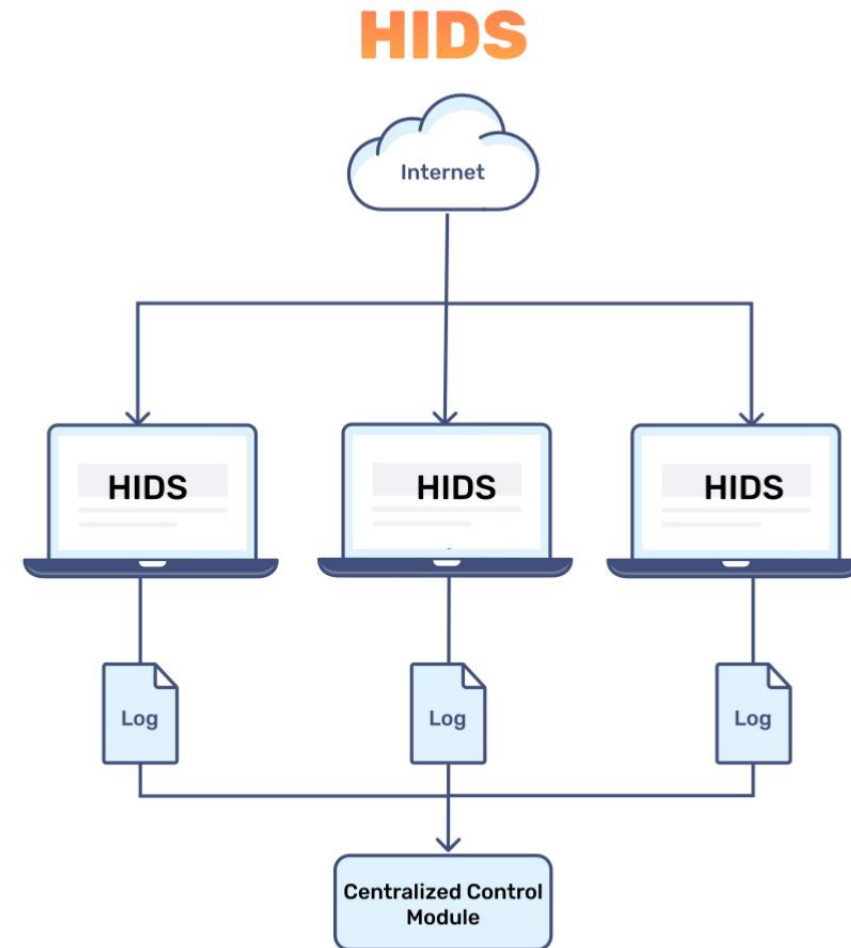
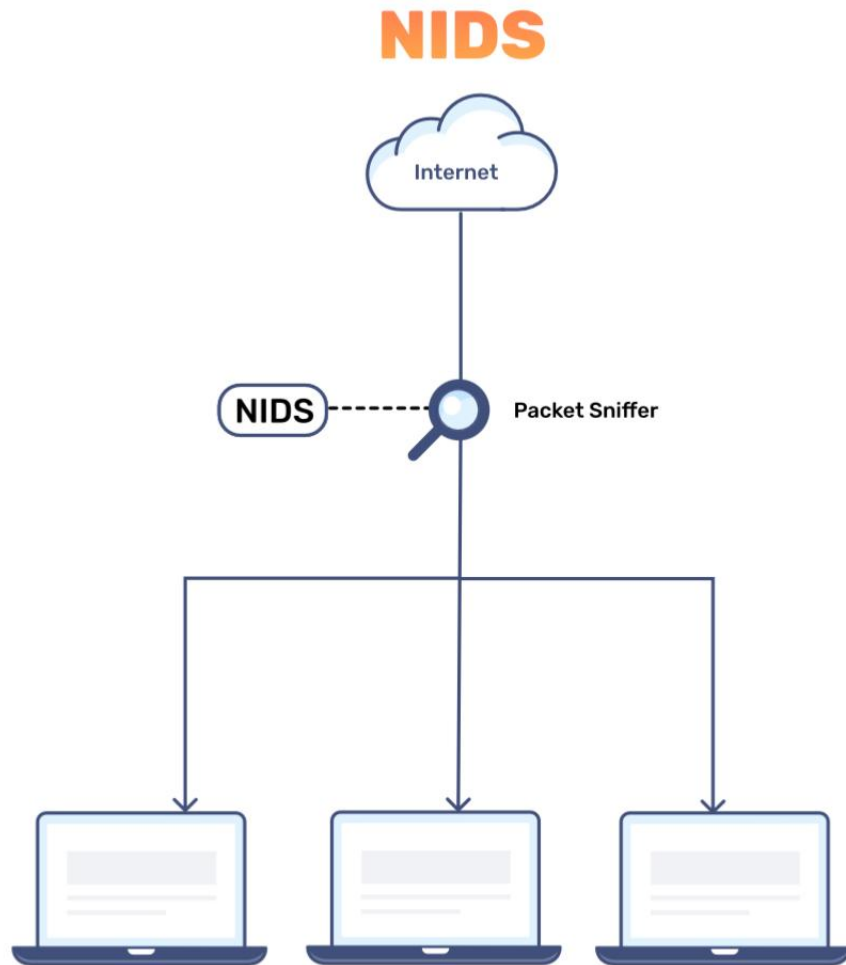
# Operating System (OS) Security

- How do people get hacked in the first place?
  - Refer to phishing, smishing, vishing, and malware teaching materials
- Default antivirus
- Free on-demand virus scanners ([BitDefender\\*](#), [Malwarebytes\\*](#))
- Firewall VS anti-virus
  - Intro to networking concepts: IP, port, host, network
  - Refer to the How the Internet Works teaching material and <https://netflow.vford.com>
- Adblocker (uBlock Origin; uBlock Origin Light for Chrome) or [Brave Browser](#) (for mobile too)
  - But why?
- User/admin access/permissions/local security policies
- Domain-level restrictions
- Storage encryption, BIOS/UEFI password, TPM (Trusted Platform Module)
- Startup executables & [sysinternals](#) for Windows
- Windows Defender advanced settings

# Defenses Against Intrusions

- IDS (Intrusion Detection System)
  - HIDS/NIDS (Host/Network-based Intrusion Detection System)
- IPS (Intrusion Prevention System)
- EDR (Endpoint [threat] Detection and Response)
- XDR (Extended Detection and Response)
- SIEM (Security Information and Event Management)
- SOAR (Security Orchestration, Automation, and Response)
- SOC (Security Operations Center)

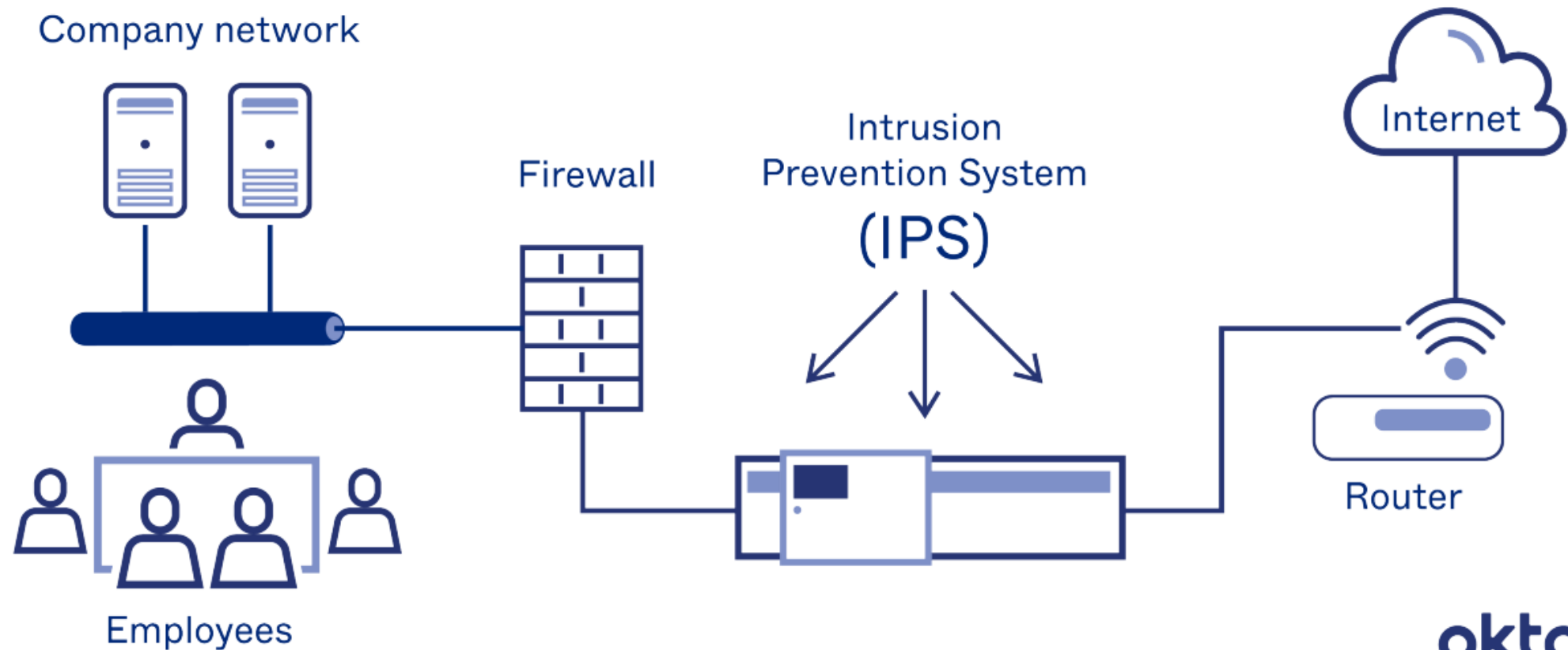
# IDS (HIDS/NIDS)



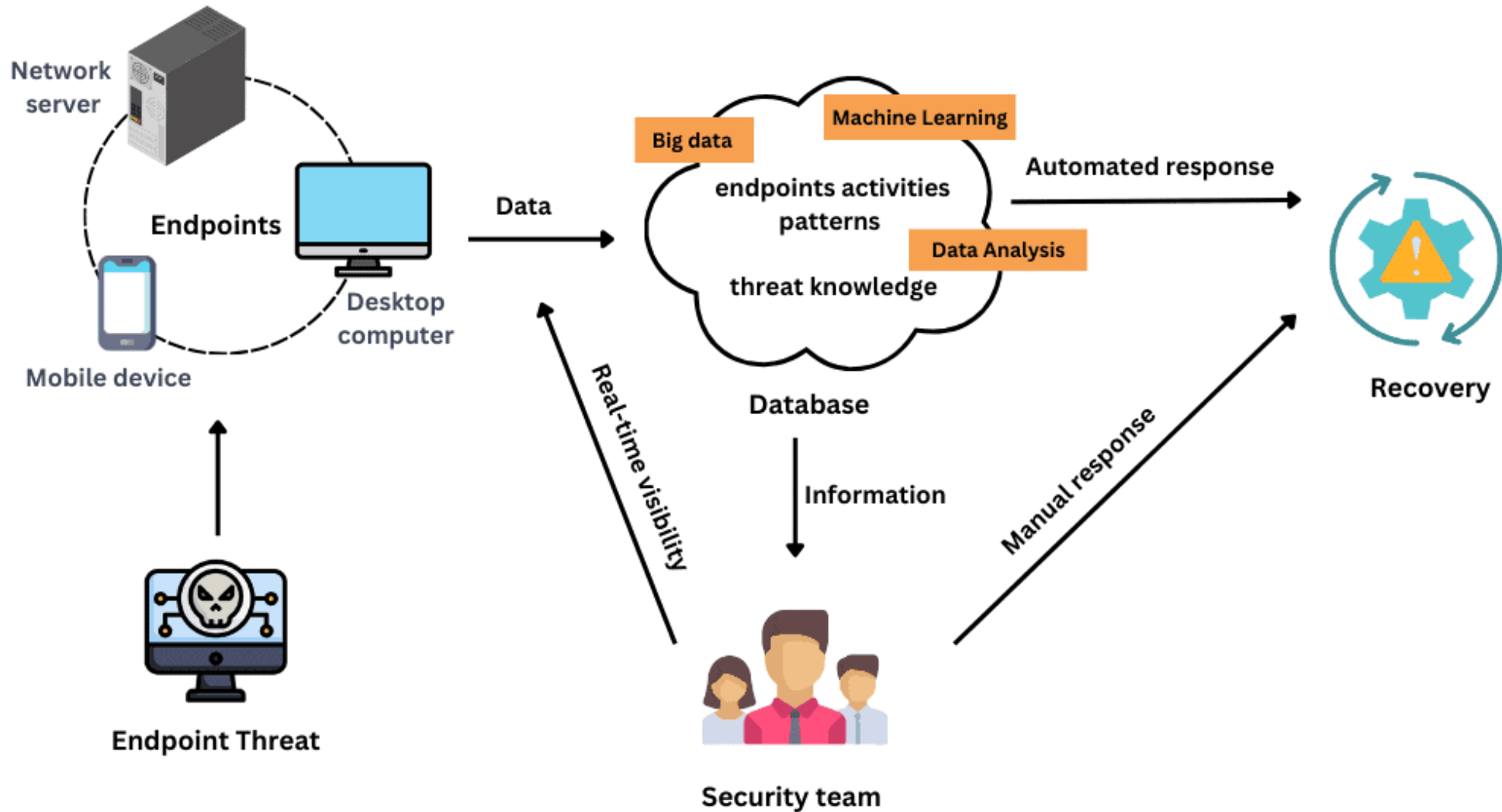


# IPS

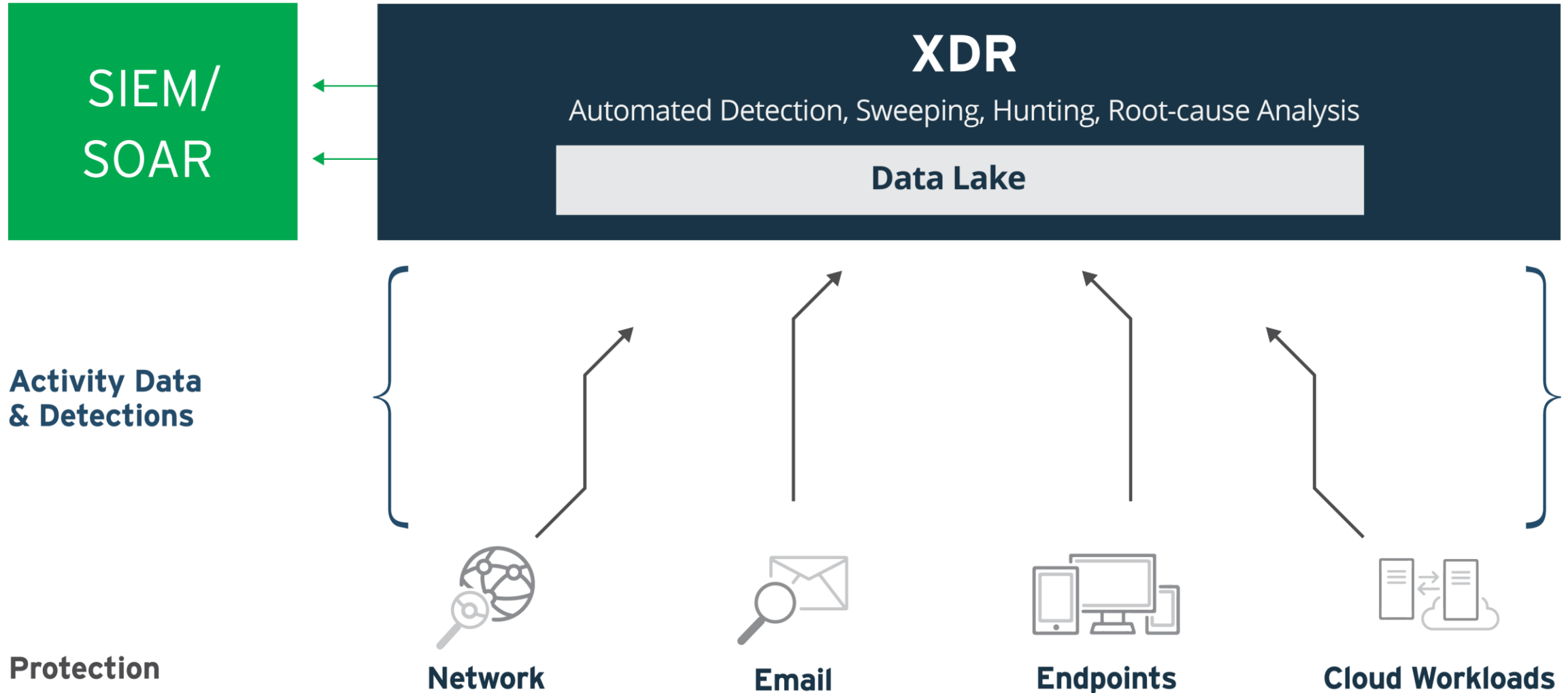
## Intrusion Prevention Systems



# EDR



# XDR → SIEM/SOAR



# SOC



# OpenSOC

- Refer to <https://opensoc.io>

# Cyber.org Cyber Range

- Get familiar with the machines
- If time permits, register on [TryHackMe.com](https://tryhackme.com)

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# DAY 2

Pentesting (ethical hacking), OSINT, social engineering, simple malware analysis

# Fun Cyber and Social Engineering

- Refer to the videos section at <https://teachcyber.vford.com/nifty> (skip password videos for later during Day 3)
- Refer to <https://github.com/drk1wi/Modlishka>
- Refer to <https://github.com/SygniaLabs/evilginx3>
- Refer to <https://getgophish.com>
- Refer to <https://github.com/Ahaz1701/EvilWorker>



# “I Bypassed The Firewall” (?!)

- A famous line in movies
- Let's draw it out

# Penetration Testing by Peter Kim

1. Intelligence Gathering
2. Initial Foothold
3. Local/Network Enumeration
4. Local Privilege Escalation
5. Persistence
6. Lateral Movement
7. Domain Privilege Escalation
8. Dumping Hashes
9. Data Exfiltration
10. Reporting

# OSINT

- Open-source intelligence gathering
  - <https://haveibeenpwned.com>
  - <https://truepeoplesearch.com>
  - Google Dorking ([GHDB](#)), exploits databases (exploit-db, vulmon.com)
  - Automated toolsets
    - Metasploit: <https://www.offsec.com/metasploit-unleashed>
    - Cobalt Strike: <https://www.cobaltstrike.com>
    - Cybersecurity AI: <https://github.com/aliasrobotics/cai>

# Simple Malware Analysis

- Refer to the malware teaching materials
- Refer to <https://virustotal.com>
- Refer to <https://any.run>
- Refer to <https://hybrid-analysis.com>
- Refer to <https://www.joesandbox.com>
- Generate malware using `msfvenom` (Metasploit) and upload to the above

# TryHackMe Rooms

- Register at TryHackMe and launch <https://tryhackme.com/room/blue>
  - If TryHackMe is giving us trouble with captchas, check out <https://youtu.be/U4uZktyGfkM> (my recording of a full compromise of Windows 7 using a generated malware with `msfvenom`)
- Show how to run your own Kali/Ubuntu box with VPN for TryHackMe access on Cyber.org
- If time permits, launch <https://tryhackme.com/room/basicpentestingjt> and use the OpenVPN (no limits) to connect to the room instead of the Attack Box (it's limited to 1 hour/day)

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# DAY 3

Passwords (manager, hash, salt) & MFA, VPN, zero-trust model, backups, TryHackMe rooms

# Passwords

- Refer to the password videos at <https://teachcyber.vford.com/nifty>
- Refer to the passwords teaching materials
  - Hash cracking (+try on Kali on cyber.org)
  - MFA, 2FA, biometrics, passkeys
- Password manager (sign up and install [Bitwarden](#))

# Backups

- Ensure you backup your phone
- Use Google Drive, Dropbox, OneDrive, iCloud Drive
- Some cloud providers give you lifetime access for a lump sum
  - E.g., pCloud.com gives 2 TB for \$400



# TryHackMe Rooms

- Use Cyber.org Kali or Ubuntu machines
- Start with <https://tryhackme.com/hackactivities>
- Launch <https://tryhackme.com/room/offensivesecurityintro> and switch to <https://tryhackme.com/soc-sim> (SOC sim can take 10-15 mins)
  - While waiting to boot SOC simulator, go back to the offensive security intro room
- Go over <https://tryhackme.com/room/introtonetworking>

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# DAY 4

Speaker, cryptography, Linux, bash scripting, Capture The Flag (CTF), cyber competitions

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# **SPEAKER**

Sarah Putterman, retired teacher in Cheltenham

# Cryptography (the next 4 slides)

- Refer to the cryptography teaching material
  - Simple ciphers
  - Asymmetric/symmetric encryption
  - Digital signatures and HTTPS certificates

# confidentiality

asymmetric

enc/decr

digital  
signatures

pub  
key

priv  
key

enc

C

I

~~A~~

can we  
protect  
both?

symmetric

one key

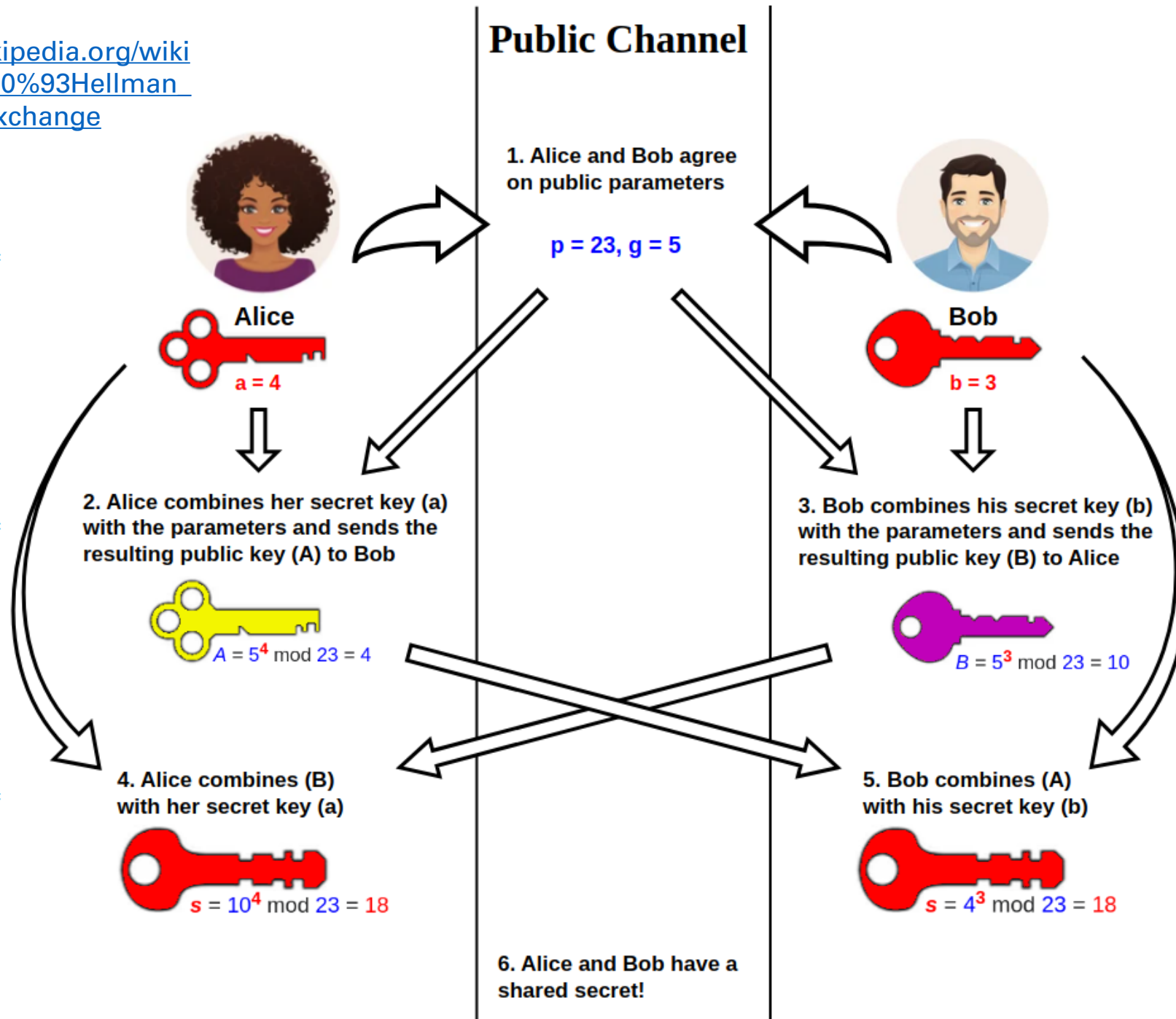
Alice

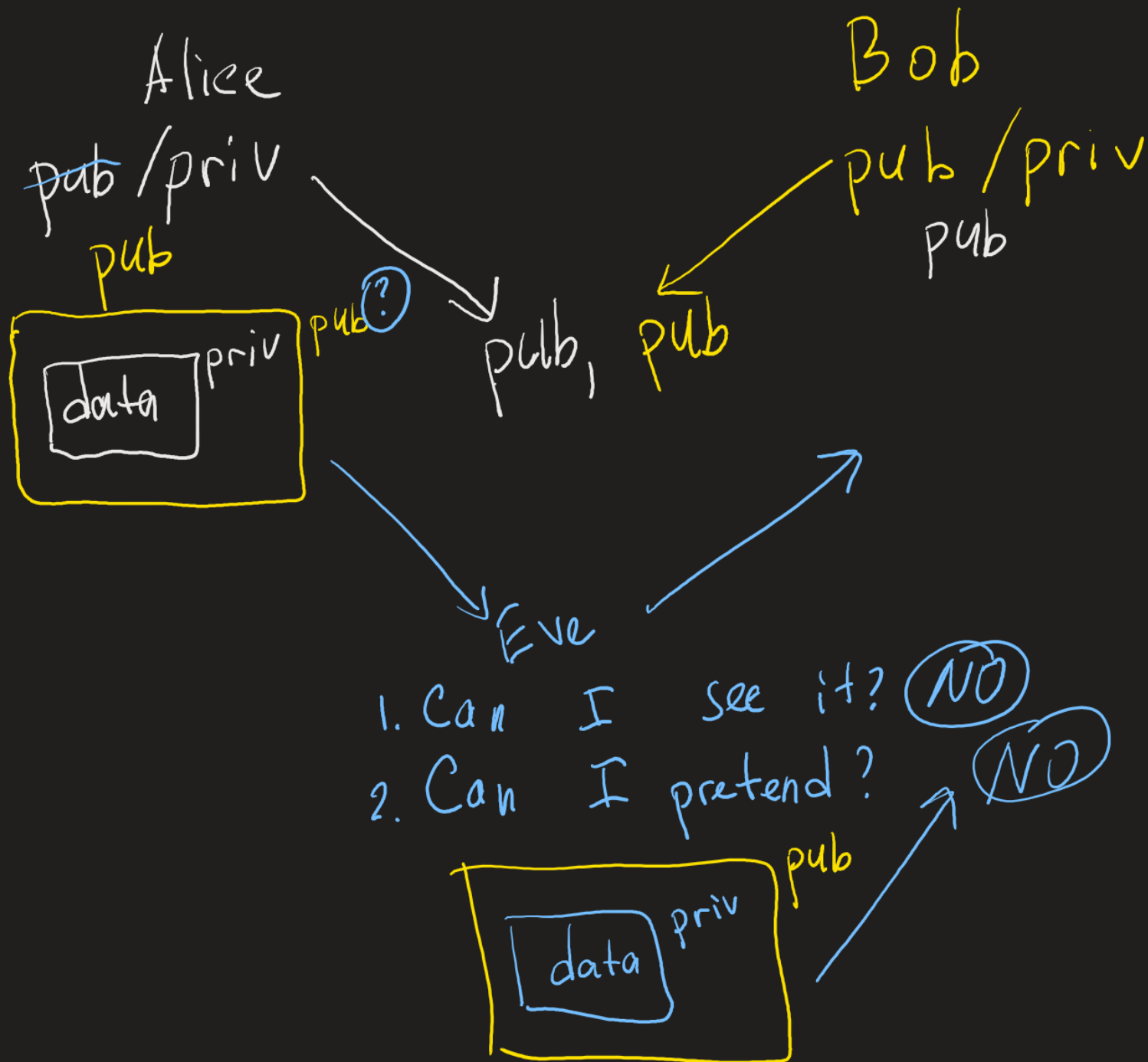
AES (256) bits  
key  
(128)

Bob

AES (256) bits  
key  
(128)

Eve



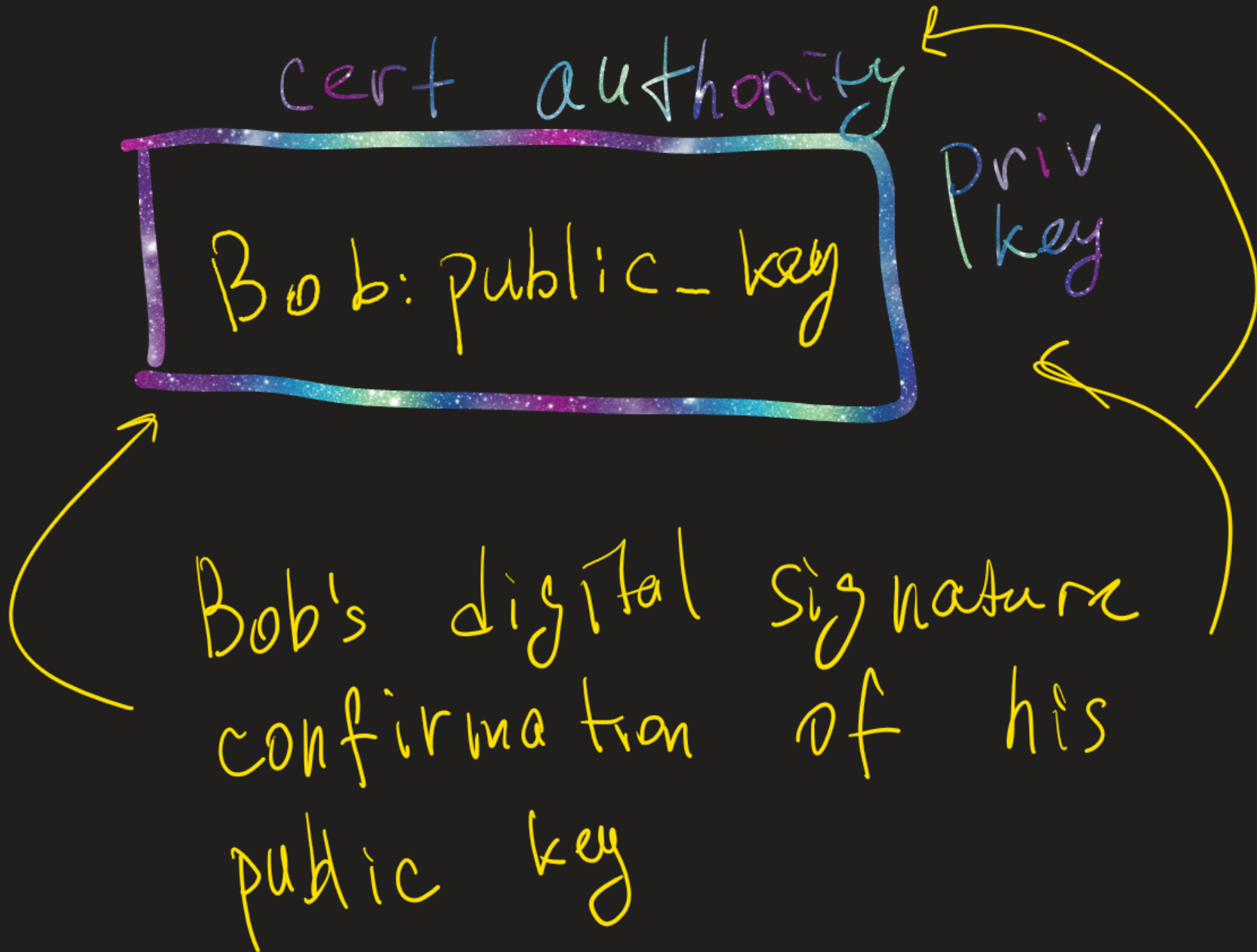


cert authority

priv  
key

Bob: public\_key

Bob's digital signature  
confirmation of his  
public key





# Crypto Algorithms - Visualized

- Commonly used hashing: <https://sha256algorithm.com/>
- RSA: <https://www.cryptool.org/en/cto/rsa-step-by-step/>
- AES: [https://legacy.cryptool.org/en/cto/aes-step-by-step](https://legacy.cryptool.org/en/cto/aes-step-by-step/)

# Linux

- Open and go into town in the Ubuntu and Kali machines on cyber.org cyber range
  - Refer to <https://linuxjourney.com> for Linux learning
  - Refer to <https://overthewire.org/wargames/bandit/> to practice

# Bash

- Refer to <https://www.learnshell.org> for Bash scripting and automation
  - You can even use ChatGPT for both Linux simulation and script generation

# CTF

- Capture The Flag
  - <https://practice.ctfcyber.org>
  - <https://picoctf.org>
  - <https://316ctf.com>
  - <https://ctf.vford.com> (secure coding CTF)
  - <https://gencybercoin.vford.com> (secure coding CTF)
  - TryHackMe does Advent of Cyber every December
  - For more skilled folks, try hackthebox.com
  - List of global CTFs: <https://ctftime.org>
- CTF write-ups

# CTF: Try it out

- Engage in cyber.org CTF and <https://gencybercoin.vford.com> for secure coding CTF (bug bounty hunting) and OSINT
  - Show <https://gchq.github.io/CyberChef>

# Cyber Competitions

- **National Cyber Cup:** <https://cyber.org/national-cyber-cup>
- National Cyber League: <https://nationalcyberleague.org>
- Cyber Patriot: <https://www.uscyberpatriot.org>
- Local CTF competitions like  
<https://sites.google.com/site/ccsceastern/participation/competition>
- CSAW: <https://www.csaw.io/ctf>
- Learn (videos) and practice: <https://mitrecyberacademy.org>
- <https://www.uscybergames.com>

# GenCyber Summer Camps

- Both camp types - teacher and students:

<https://public.cyber.mil/gencyber/camp-catalog>

# President's Cup by CISA

- <https://github.com/cisagov/prescup-challenges>



# TryCyber

- If we have time, let's try <https://trycyber.us>

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# DAY 5

Wi-Fi security, ethics and privacy, CTF Unplugged, unplugged exercises from teaching materials, famous hacks, VirtualBox and Kali Linux installation, feedback, closing

# Wi-Fi Attacks

- Evil twin like [Hak5 Pineapple](#)
- Rogue access point pretending to be real
- Man-in-the-middle (MITM) like [bettercap](#)
- Wi-Fi phishing captive portal
- MAC address (aka physical ID of the device issued by the manufacturer) spoofing
  - [ARP spoofing](#) as a follow up
- Refer to <https://wigle.net>

# Wi-Fi Defense

- Do not use public Wi-Fi unless you have a VPN
  - Free unlimited VPNs usually have red flags, except [Proton VPN](#) (my personal top pick among free ones), [Hide.me](#), and [Windscribe](#) (10GB)
  - Google Pixel and Pixel Tablets have built-in “VPN by Google”
- Ensure using the latest (at least WPA2, but better WPA3) security enabled at home, with a long passphrase
  - Hide your Wi-Fi SSID at the router level

# Ethics and Laws (non-exhaustive list)

- **Permission** separates an ethical hack from an illegal activity
- **Take it Down Act (2025)**
  - Criminalizes publishing nonconsensual, sexually explicit images and videos (including AI-generated) and requires platforms to remove the content within 48 hours of notice
- **COPPA** (Children's Online Privacy Protection Act, 1998)
  - Requires websites to obtain parental consent before collecting, using, or disclosing personal information from children under 13
- **CFAA** (Computer Fraud and Abuse Act, 1986)
  - Prohibits unauthorized computer access

# Tech and Privacy

- [Apple vs. FBI \(2016\)](#)
  - The FBI demanded Apple unlock an iPhone used by a terrorist; Apple refused to create a backdoor, citing privacy and security risks ([q/a ideas](#))
- [Facebook-Cambridge Analytica Scandal \(2018\)](#)
  - Data from millions of users harvested without consent and used for political influence
- [TikTok and National Security Concerns](#) (Ongoing)
  - Concerns over Chinese ownership of TikTok and potential data sharing with the Chinese government.
- [Google Project Maven \(2018\)](#)
  - Google helped the Pentagon use AI to analyze drone footage, sparking internal protests from employees as their work would be weaponized

# CTF Unplugged

- Available at [https://vford.me/ctf-unplugged/CTF Unplugged May 2019.docx](https://vford.me/ctf-unplugged/CTF%20Unplugged%20May%202019.docx)
  - Contact [Vitaly Ford](#) for answers

# Go over unplugged exercises

- Refer to the teaching materials



# Real Hacks and OSINT of Real Hackers

- Going after a famous Conti ransomware developer (\$10m prize by FBI): <https://justpaste.it/k72mv>
- Famous hack of the Hacking Team by Phineas Fisher:  
[https://gitlab.com/brn1337/phineas-fisher-collection/-/blob/master/2015\\_HackingTeam.txt?ref\\_type=heads](https://gitlab.com/brn1337/phineas-fisher-collection/-/blob/master/2015_HackingTeam.txt?ref_type=heads)

# VirtualBox and Kali Linux

- Install VirtualBox and its extensions
- Open downloaded Kali in VirtualBox

# Resources

- Structured content (check out cyber.org teaching material for instructions): <https://cyber.org>
- Various random nano-modules for all levels: <https://clark.center>
- NCYTE Curriculum: <https://www.ncyte.net/academia/faculty/cybersecurity-curriculum>
- Comprehensive high school cyber PDF content in different languages: <https://www.hackerhighschool.org/lessons.html>
- Cybersecurity guide: <https://cybersecurityguide.org>
- Cyber seek interactive visualization for careers: <https://www.cyberseek.org>
- 15 hours of video, 10 week course, with notes and detailed demonstration of a full penetration test: <https://github.com/hmaverickadams/Beginner-Network-Pentesting>
- Networking videos: <https://www.elithecomputerguy.com/2010/11/tcp-ip-and-subnet-masking/>
- Find more at <https://teachcyber.vford.com/diy/>

# News Feeds

- <https://news.ycombinator.com/>
- <https://krebsonsecurity.com/>
- <https://www.reddit.com/r/netsec/>
- <https://bytebytego.com/guides/>
- <https://dev.to/>

# Open Discussion

- Sign and write down your PPID
  - Pass around the hours list for signatures
- Feedback: <https://forms.gle/3op6kBYJPyPiozku6>
- Time to reflect and chat

# Stay Connected!

- Email: [fordv@arcadia.edu](mailto:fordv@arcadia.edu)
- Discord: vitalyford