

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, VirtualBox and Kali Linux installation, feedback, closing

49

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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

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

“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

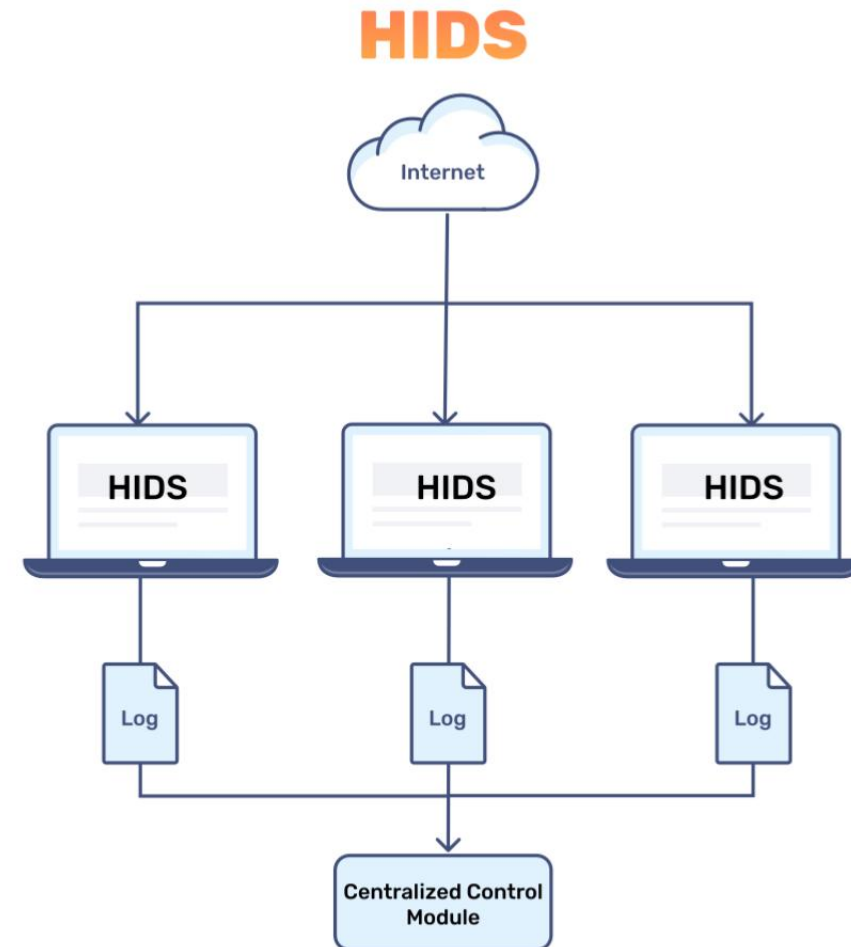
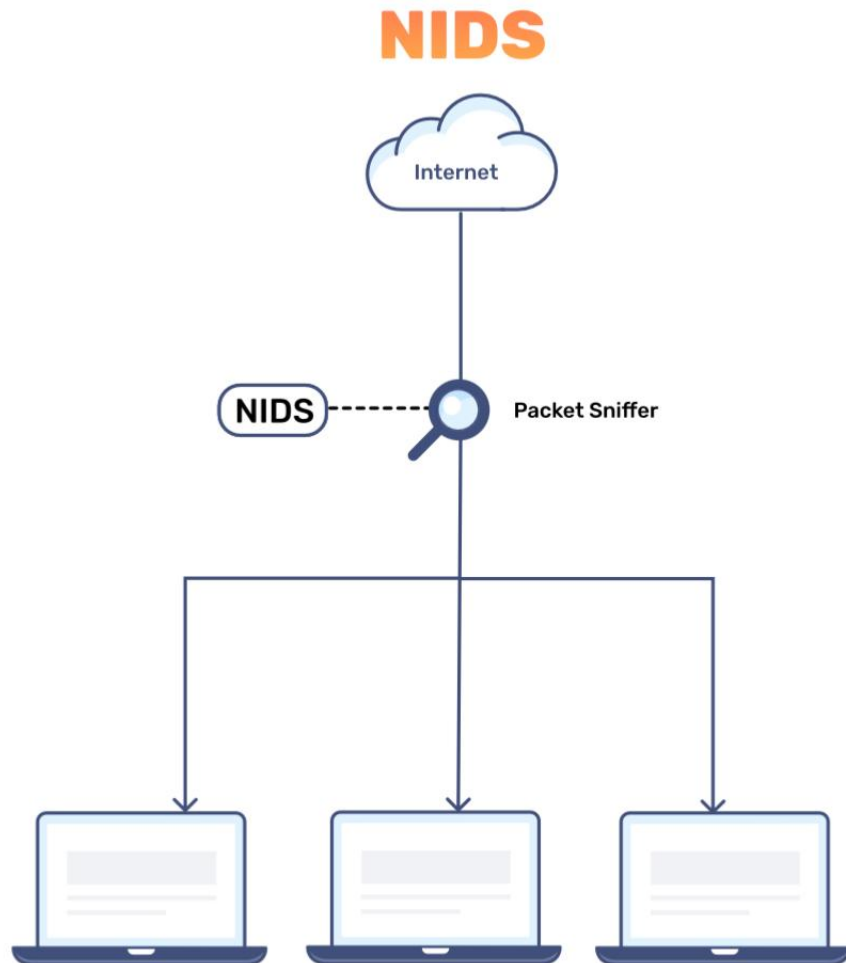
Operating System (OS) Security

- 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

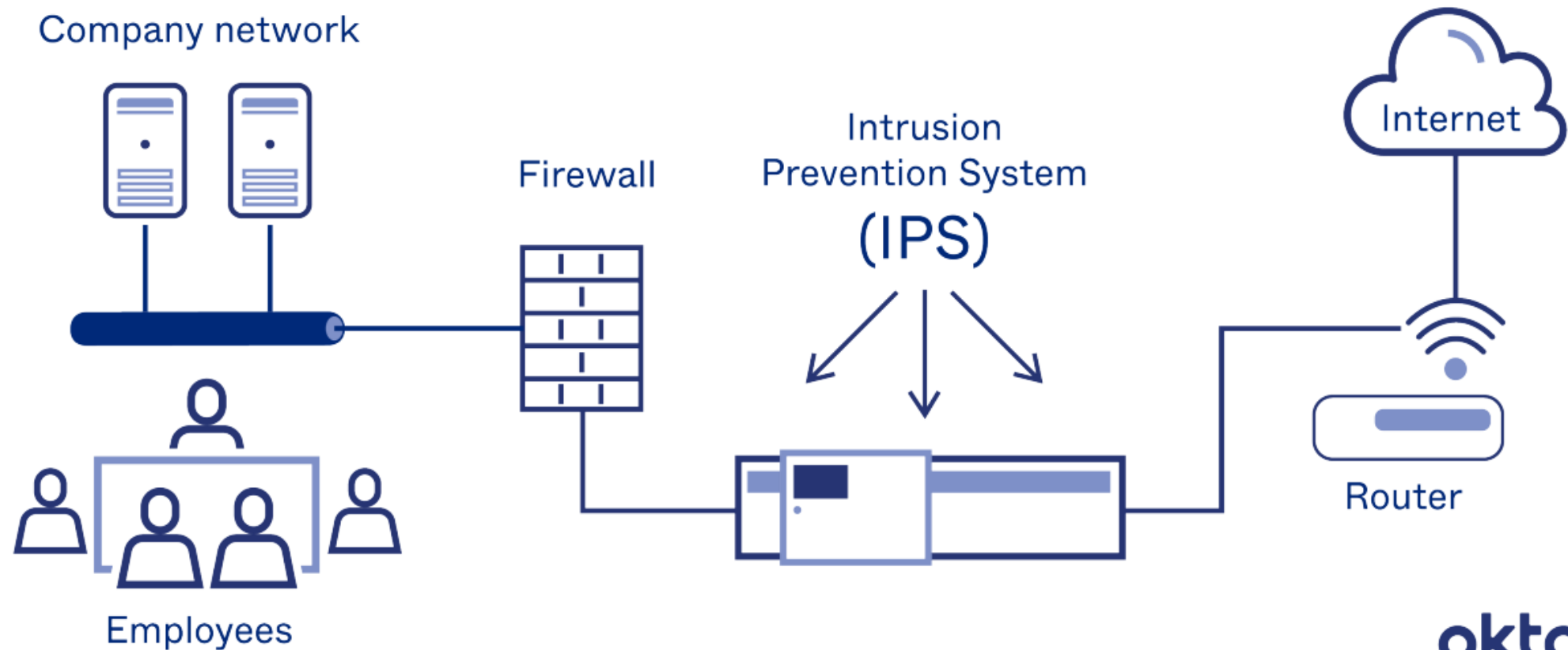
- IDS (Intrusion Detection System)
 - HIDS/NIDS (Host/Network-based Intrusion Detection System)
- IPS (Intrusion Prevention System)
- EDR (Endpoint [threat] Detection and Response)
- XDR (Extended Detection and Response)
- SIEM (Security Information and Event Management)
- SOAR (Security Orchestration,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

IDS (HIDS/NIDS)

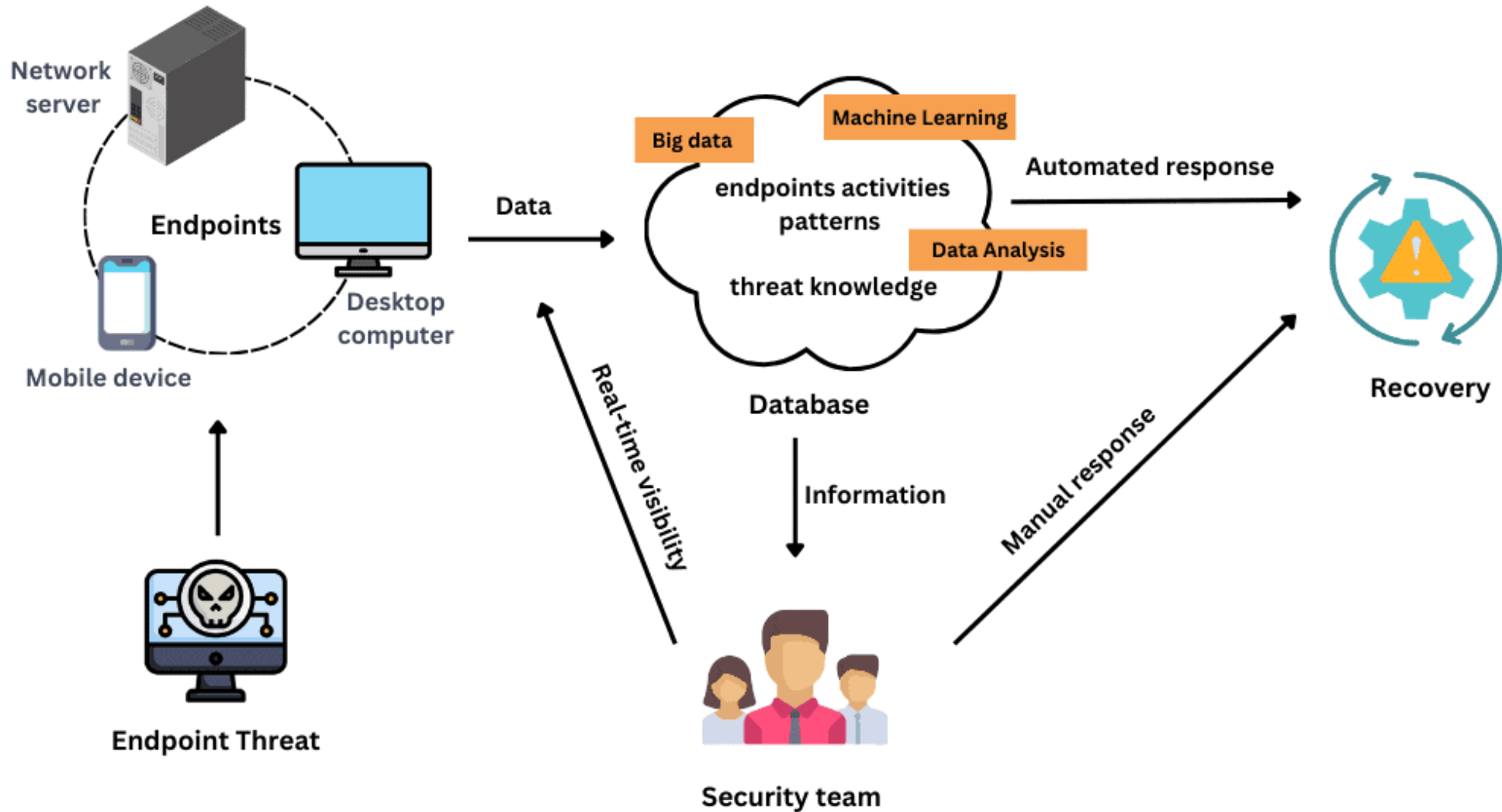


IPS

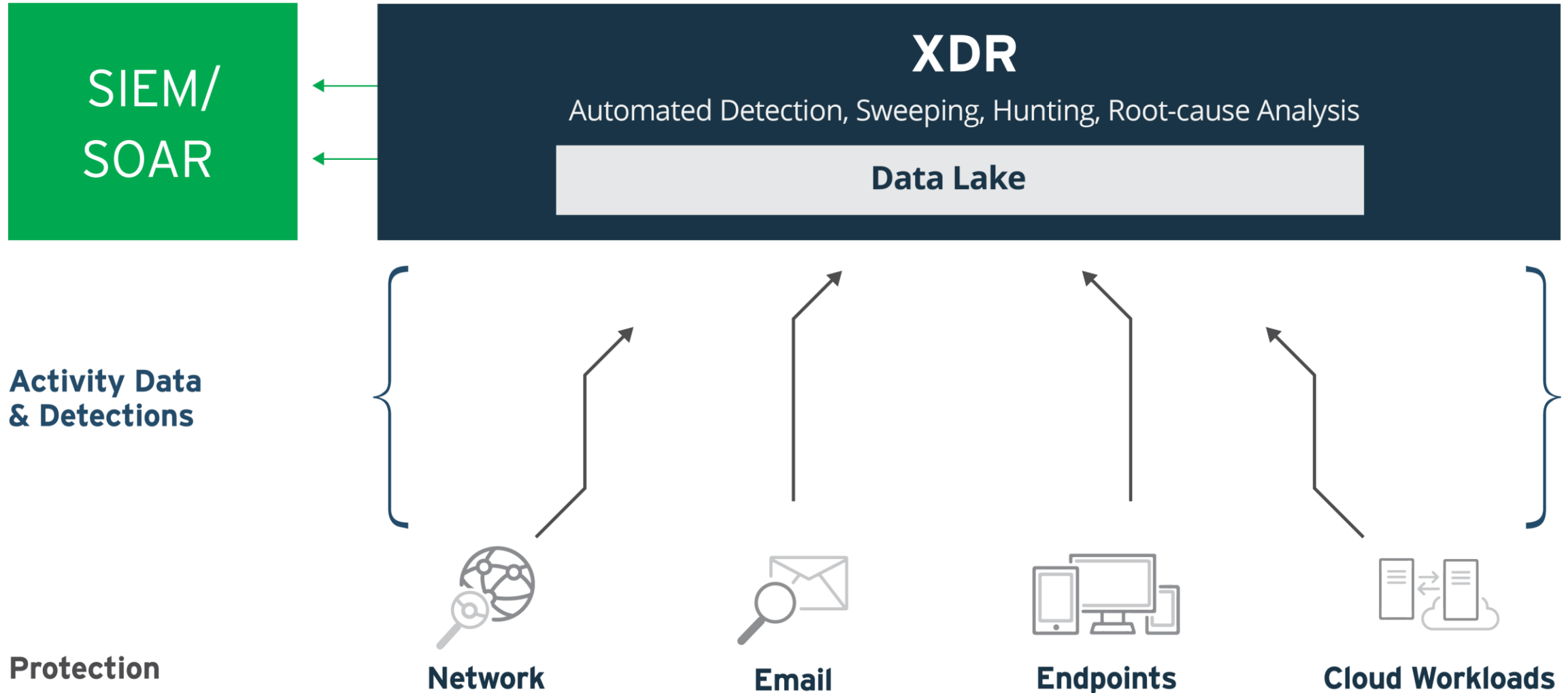
Intrusion Prevention Systems



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://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

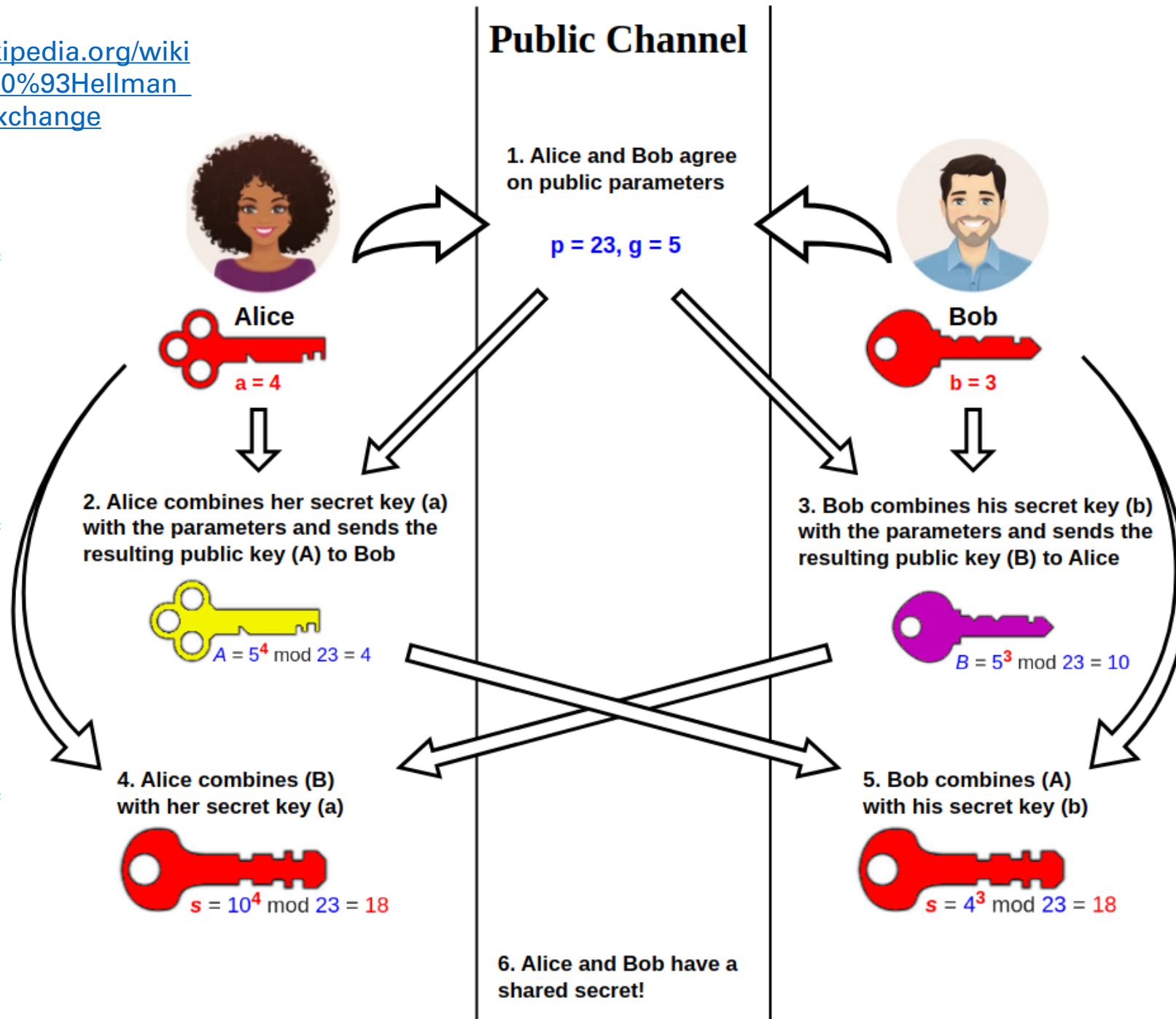
Alice

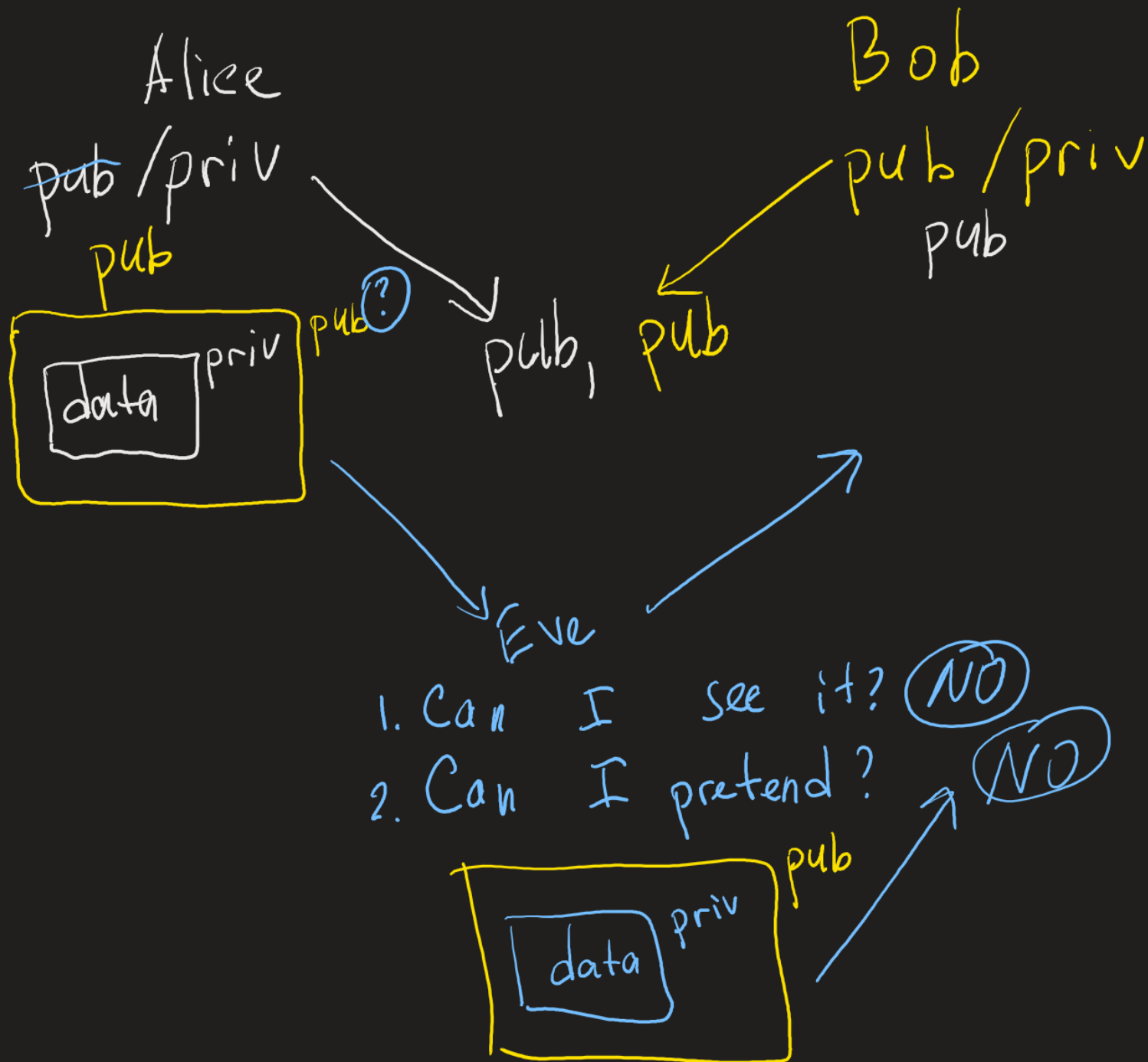
AES (256) bits
key
(128)

Bob

AES (256) bits
key
(128)

Eve



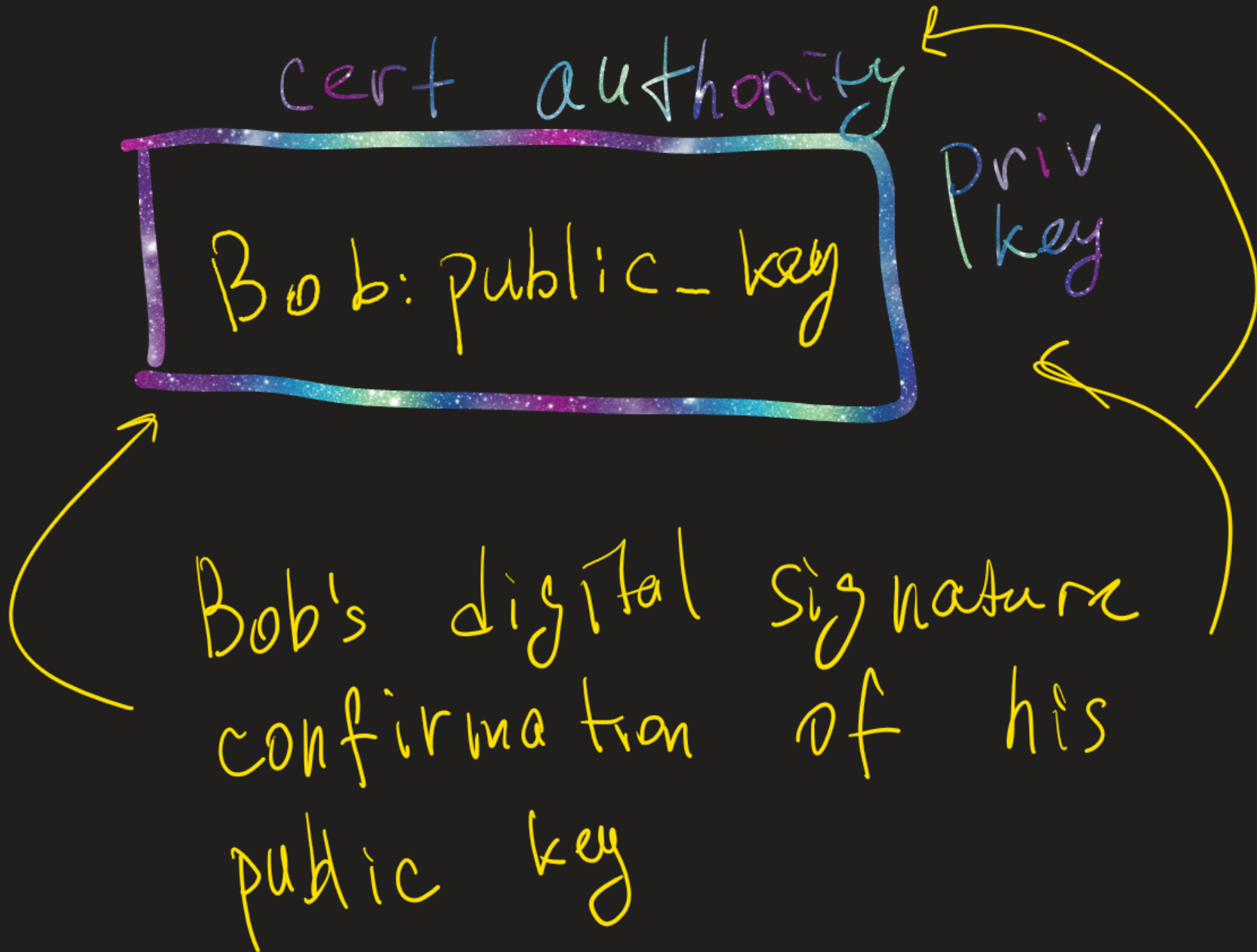


cert authority

priv
key

Bob: public_key

Bob's digital signature
confirmation of his
public key



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, 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

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/>

Open Discussion

- Email me 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
- Discord: vitalyford