Cybersecurity Training for Users of Remote Computing

SEHET'23 @ PEARC'23

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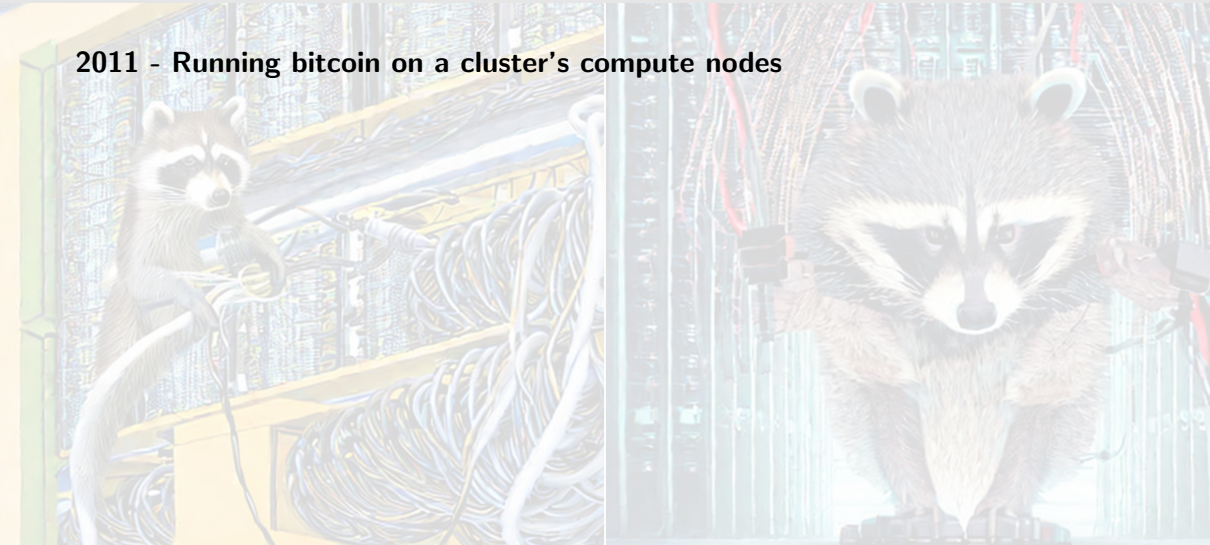
Content

Motivation

Security Incident Example 1

2011 - Running bitcoin on a cluster's compute nodes



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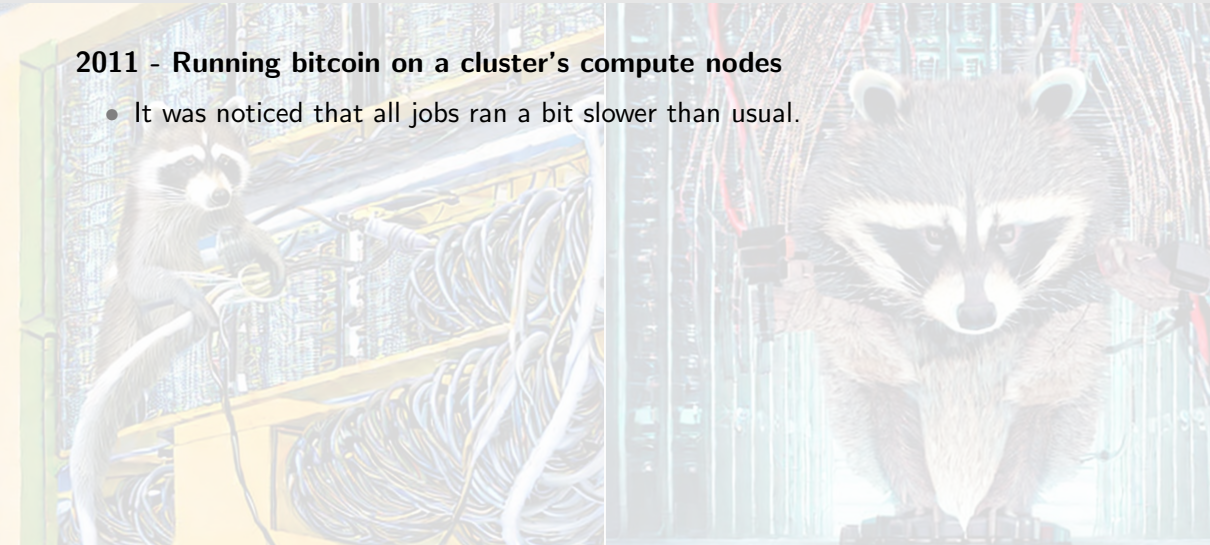

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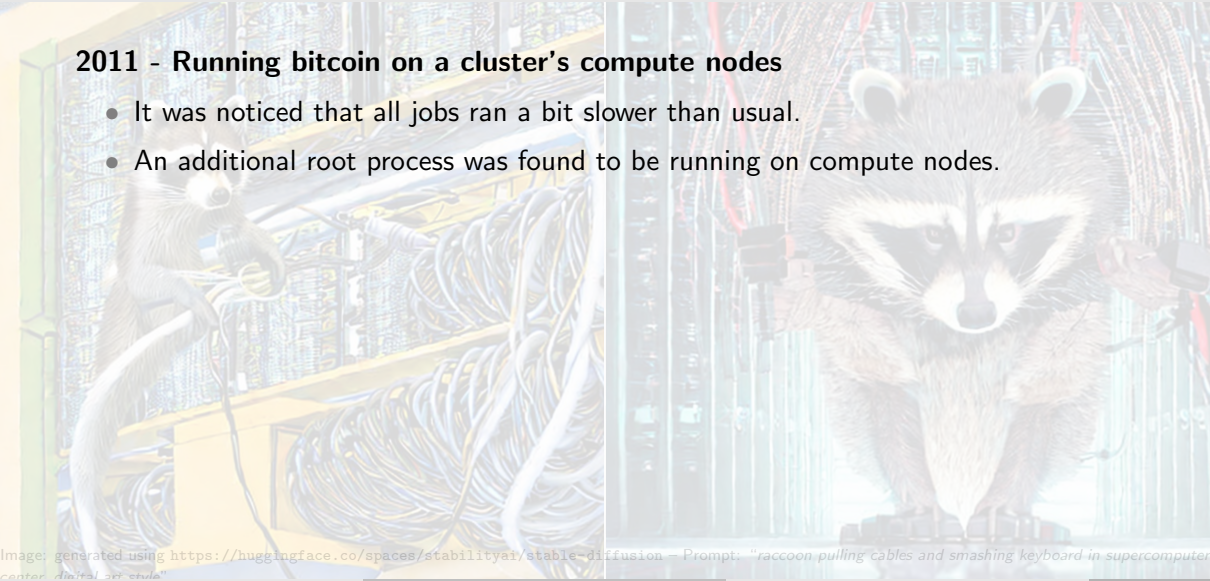

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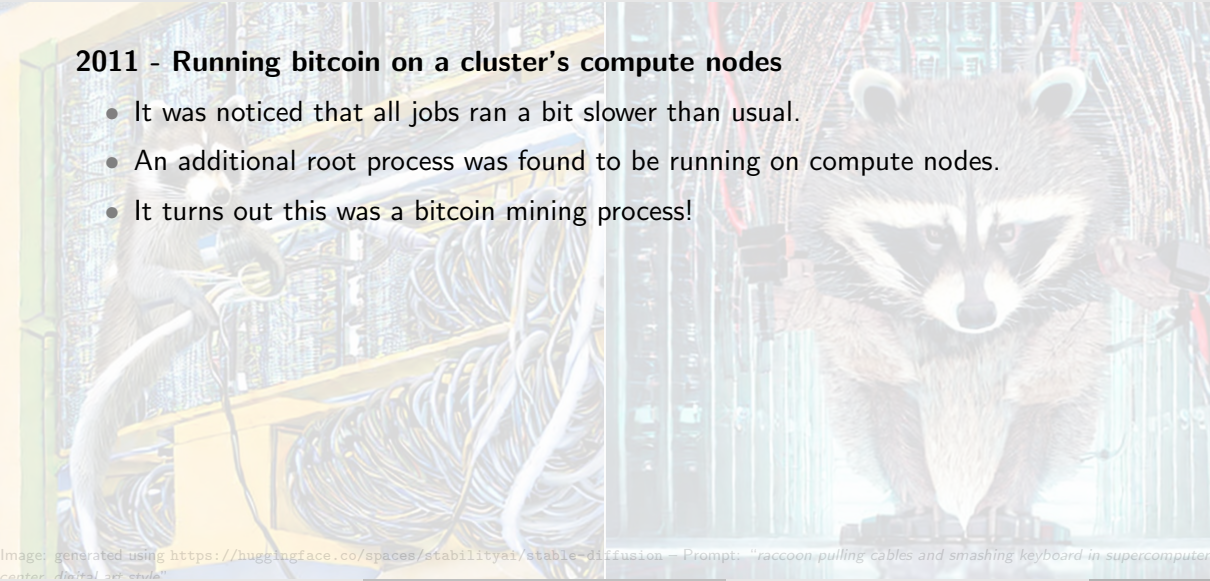

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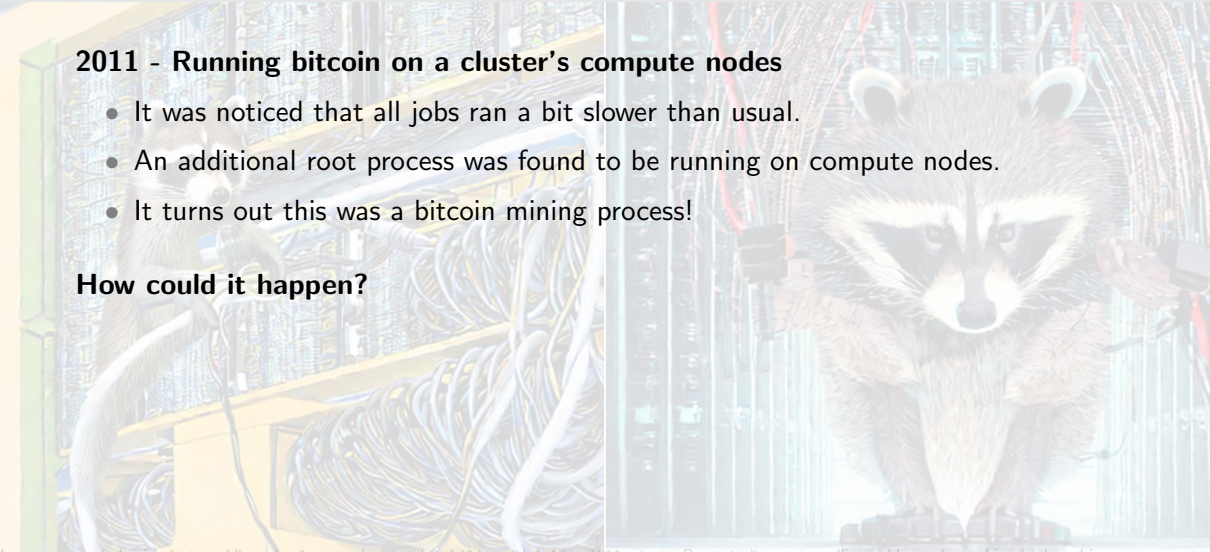

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- Sshd was replaced, and passwords sniffed.
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Security Incident Example 2

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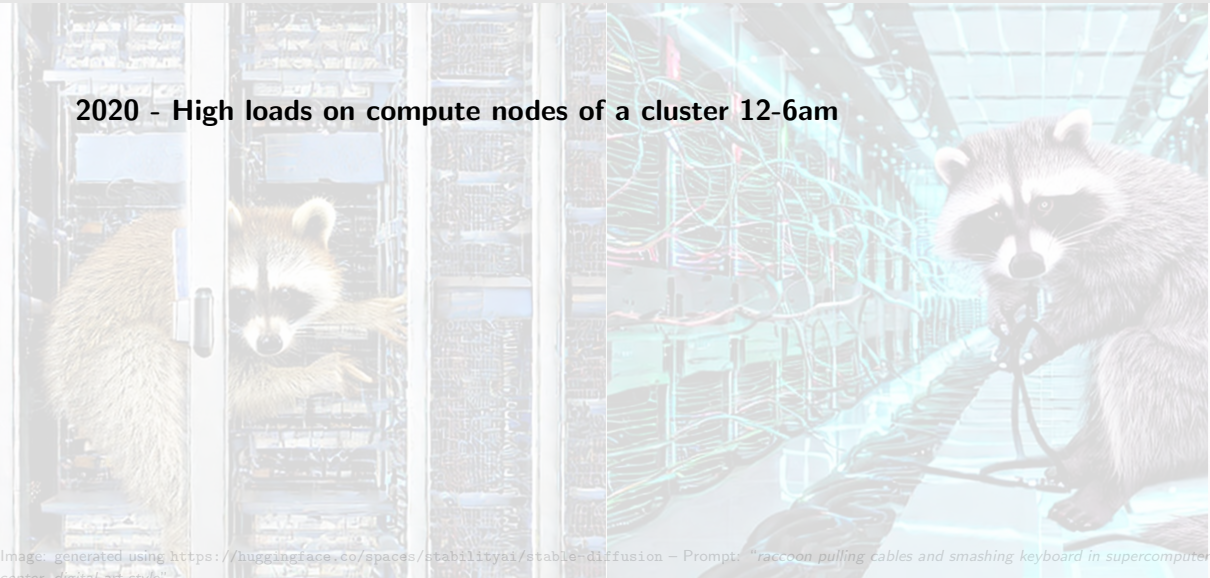

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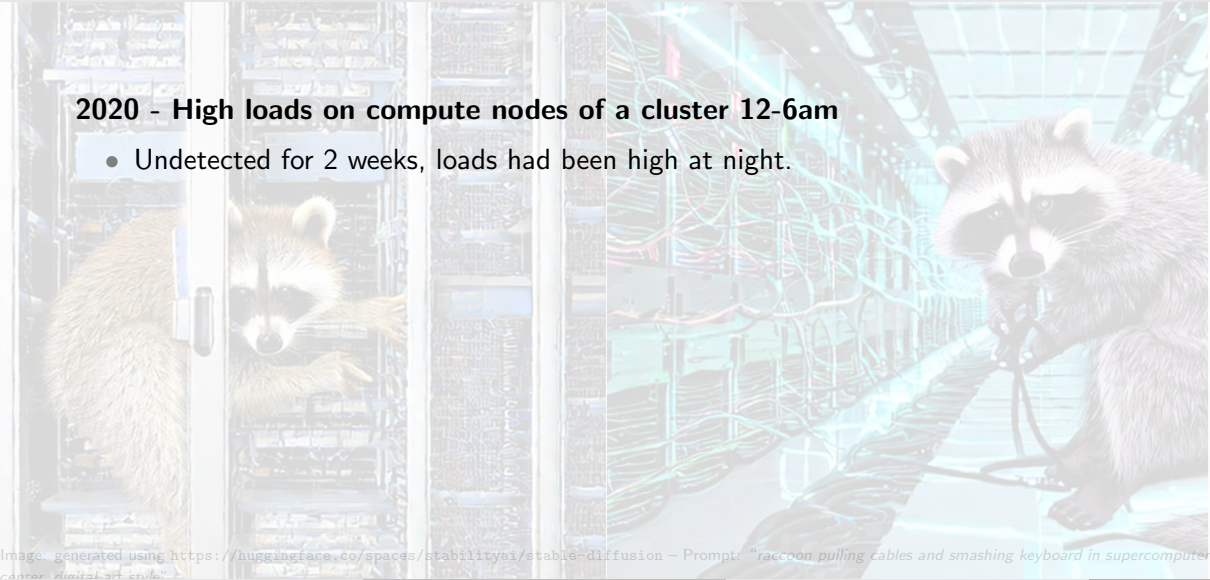

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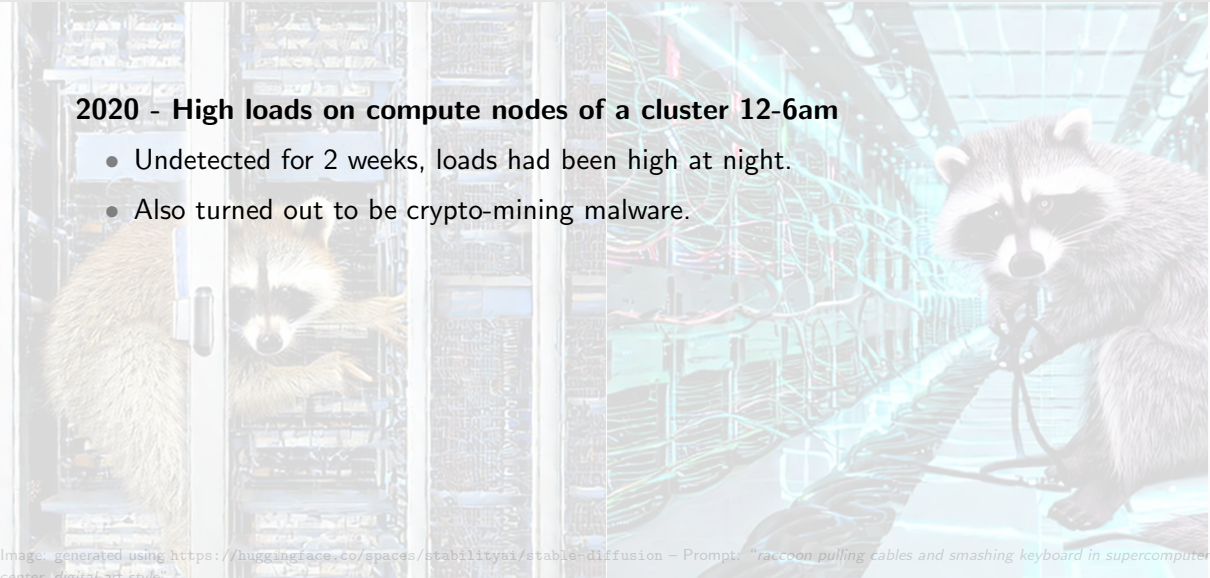

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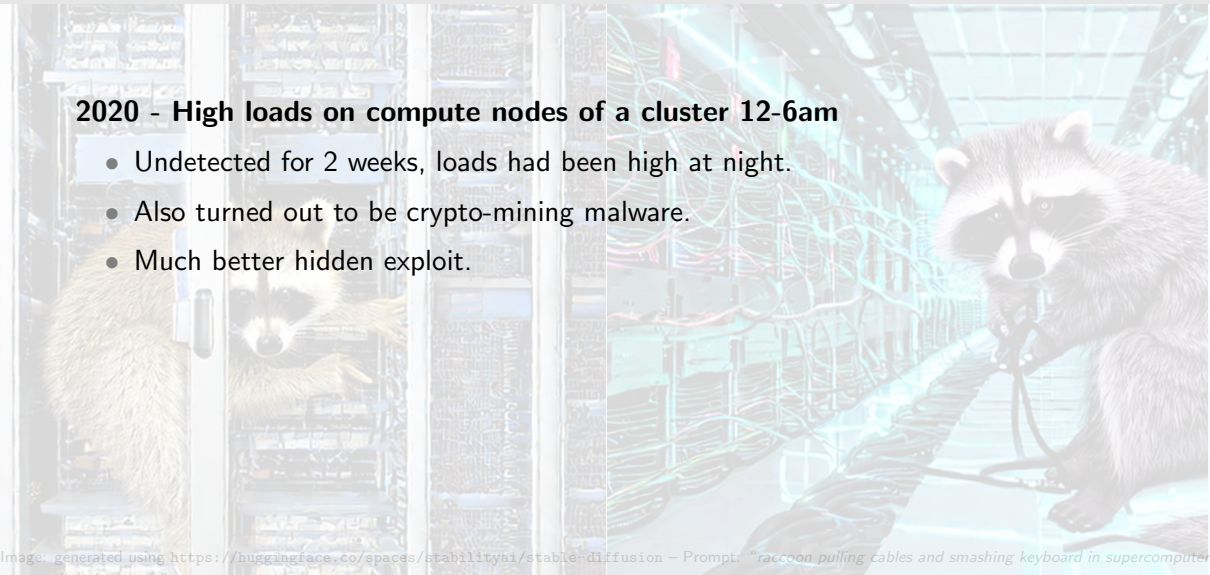

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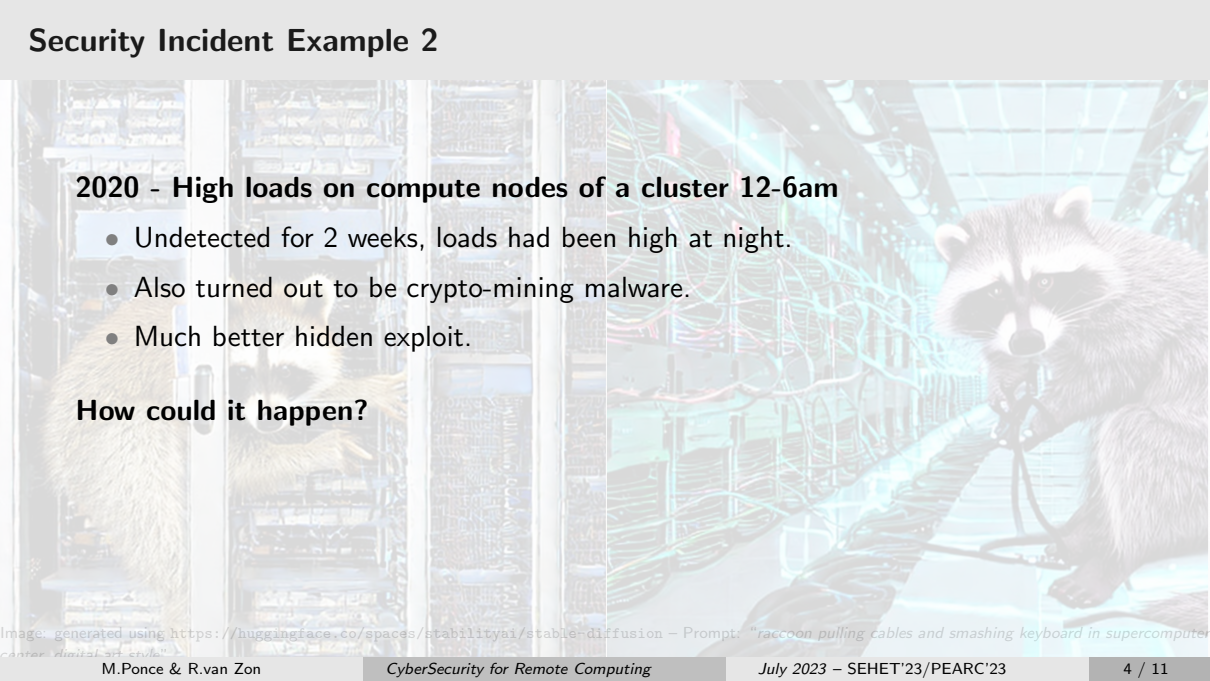

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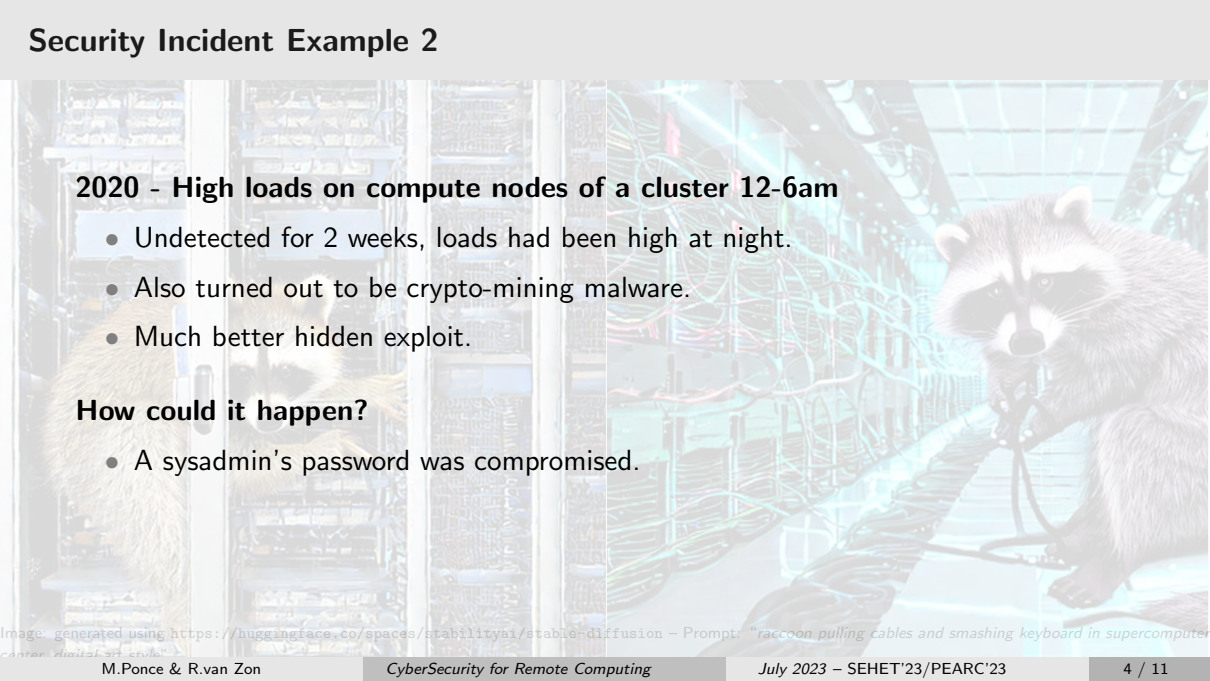

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- A sysadmin's password was compromised.
- A few systems hadn't yet enforced multi-factor authentication for staff.
- The attacker used a "rootkit" to hide their activities.

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Lessons?

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E.g.:

- Users and staff's own computers must be up-to-date.
- Root access should restricted and logged on user-facing servers
- Root on user-facing servers cannot connect to other servers.
- Use ssh keys to avoid password sniffing.
- Multi-factor authentication.
- Increase user's cybersecurity awareness.

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- Multi-factor authentication.
- Increase user's cybersecurity awareness.

Many of these require the cooperation of users, who need **cybersecurity training**.

Typical Cybersecurity Threats of which to be Aware

- DoS, DDoS
- Sniffing, IP/DNS spoofing, Man-in-the-Middle
- Phishing
- Malware, Ransomware
- Social engineering

This is an incomplete list!

- Steal credentials, 0-day exploits
- Disable a service
- Steal secure information
- Install unauthorized software
- Abuse resources
- ...

Cybersecurity Awareness and Training

End-Users Training Program

Introductory Courses

- Introduction to Supercomputing (HPC101)
- Intro to SciNet, Niagara, and Mist (HPC105)

Operational Courses

- Intro to the Linux Shell (SCMP101)
- Advanced Linux Command Line (SCMP271)
- Bash command line with common idioms (SCMP281)
- Introduction to Apptainer (SCMP161)

Specialized Courses

- Securing File Access Permissions on Linux (SCMP283)
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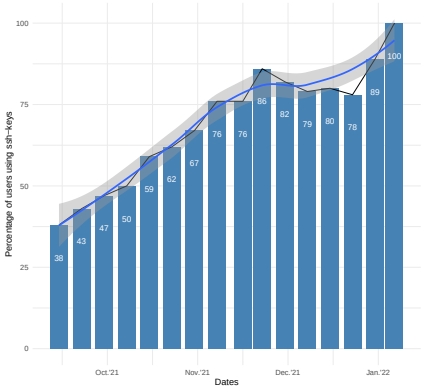

Courses materials available at

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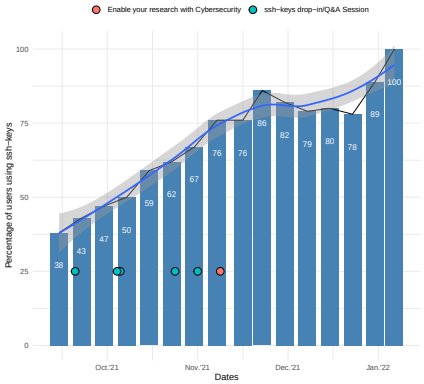

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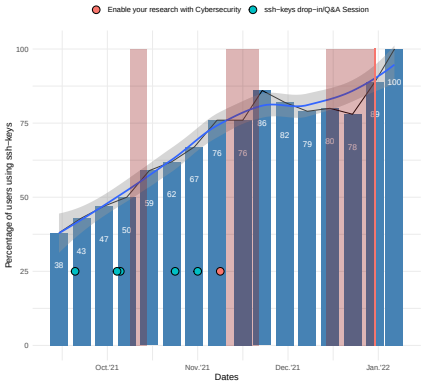

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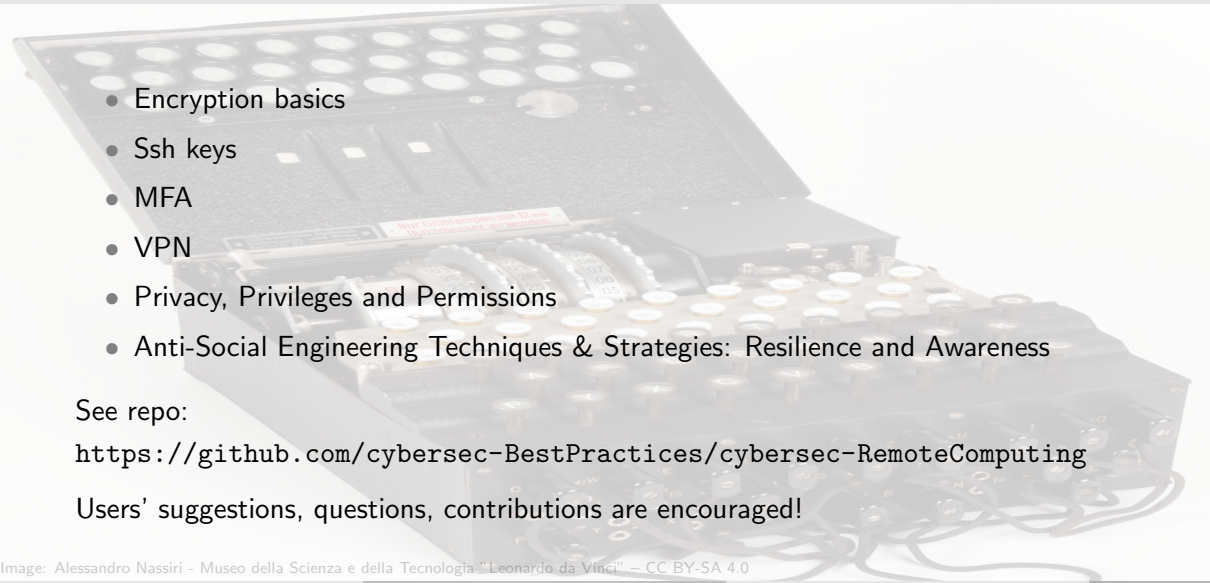
Teachable Topics in Remote Computing Cybersecurity



- Encryption basics
- Ssh keys
- MFA
- VPN
- Privacy, Privileges and Permissions
- Anti-Social Engineering Techniques & Strategies: Resilience and Awareness

See repo:

`https://github.com/cybersec-BestPractices/cybersec-RemoteComputing`

Users' suggestions, questions, contributions are encouraged!

Cybersecurity Best Practices & Checklist

connecting to remote systems

- use ssh keys, with passphrases
- use MFA
- use VPN
- check the information provided by the remote system
- avoid public wifi unsecure connections
- consider using "private browsing" and set restrictions on cookies policies

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in local systems

- use an anti-virus
- keep software up-to-date, OS & Apps
- be mindful of emails, malicious attachments and links:
  do not enter sensitive data in unknown sites, verify for https connections and SSL certificates
- do not plug any type of device of unknown origin or source, e.g. USB sticks, etc.
- use a password manager, do not store passwords in plain-text
- encrypt sensitive data

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Conclusions

Summary / Overview

- Increase awareness and improve cybersecurity posture in *remote computing* (HPC/ARC) users
- **Critical: training and education!** (recall usually the weakest element is the "human factor")
- One source of reference to point to users for recommending best practices
- Keep it updated with latest trends and updates

References & Resources

Resources

- Cybersecurity Best Practices repository,
  `https://github.com/cybersec-BestPractices/cybersec-RemoteComputing`
- Wiki,
  `https://github.com/cybersec-BestPractices/cybersec-RemoteComputing/wiki`
- Users' suggestions, questions, contributions are encouraged and welcome!

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