Nevada Cyber Range (NCR)
A Cybersecurity Sandbox everyone can use

Cybersecurity Center
University of Nevada, Reno

Shamik Sengupta, Executive Director, ssengupta@unr.edu
Nancy LaTourrette, Deputy Director, nancy@unr.edu

https://www.unr.edu/cybersecurity

UNIVERSITY of NEVADA, RENO

- R1 and Tier1 Institution
- Land Grant and Flagship University of Nevada
- NSF EPSCoR State
- Emerging HSI (23%)
- Serving Rural Northern Nevada
- Nevada Indigenous Students Tuition-Free
- 21,000 Student Population
- Expanding Cybersecurity Programs and Facilities
- Center of Academic Excellence in Cyber Defense (CAE-CD)
- Interdisciplinary Cybersecurity Center: Research, Education and Outreach

CYBERSECURITY CENTER - FACULTY

AFFILIATED FACULTY

Multi-Disciplinary Cybersecurity Center

- 30 Members
- 9 Disciplines
  - Computer Science & Engineering
  - Electrical & Biomedical Engineering
  - Information Systems
  - School of Journalism
  - Political Science
  - Criminal Justice
  - Psychology
  - History
  - Public Health

RESEARCH AREAS

- Vulnerability Assessments
- Malware Analysis
- Network Security Management
- Cyber-Physical System Security
- AI-Cybersecurity
- Data and User Privacy
- Data Mining and Analytics Privacy
- Biometrics
- Surveillance and Privacy Balance
- Sociopolitical Contexts of Disaster
- Behavioral System Analysis
- Organizational Behavior and Decision Making
- Cybersecurity Literacy
- Combating Misinformation and Disinformation

CYBERSECURITY CENTER - RESEARCH

NSF Funded Research

- Scholarship for Service (SFS)
- Research Experiences for Teachers in Engineering and Computer Science (RET)
  - 2015-2018
  - 2019-2022
  - 2023-2026
- Campus Cyberinfrastructure (CC*)
- CyberCorps® Capacity 2015-2017
- CyberCorps® Capacity 2017-2019
- Cybersecurity Innovation for Cyberinfrastructure (CICI)
- Faculty Early Development Career Program (CAREER)
- Innovations in Graduate Education (IGE)
- Improving Undergraduate STEM Education (IUSE)
- Research Experience for Undergraduates (REU)
- Secure and Trustworthy Cyberspace (SaTC)

13 NSF funded projects
> $8M in funding

CYBERSECURITY CENTER – EDUCATION

UNDERGRADUATE CYBERSECURITY PROGRAMS

- Minor in Cybersecurity
  - Hands-on, in-depth, technical expertise in cyber defense
- Minor in Interdisciplinary Cybersecurity
  - Well-rounded curriculum from a range of disciplinary perspectives

GRADUATE CYBERSECURITY PROGRAMS

- Graduate Certificate in Cybersecurity
  - Current graduate students plus working professionals
- Online M.S. in Cybersecurity
  - Flexible program entirely online
- Personalized Advising
  - Advising with deputy and executive directors

CYBERSECURITY CENTER - OUTREACH

- RET Site: Research Experience in Cybersecurity for Nevada Teachers (RECNT)
- Annual Cybersecurity Conference
- Nevada Cyber Range
- Nevada Cyber Club
- Cybersecurity Seminar Series

Nevada Cyber Range (NCR)
- Cybersecurity Sandbox
- Operational Environment for Research, Training, Education
- Physical and Remote Access

INVITED TALKS

- Department of Homeland Security, **Janet Napolitano**
- U.S. Army Research Laboratory
- U.S. Army Cyber Command
- National Security Agency
- FBI, Cyber & Counterintelligence
- National Research Labs
- IBM Research Center
- Symantec, Global Security Intelligence Operations
- State of Nevada, CISO
- Nevada Office of Cyber Defense Coordination
- National Cyber League Commissioner
- Bay Area Cyber League, Regional Coordinator
- National and Local Security Corporations
- University Faculty and Researchers

CYBERSECURITY CENTER – COMMUNITY COLLABORATORS

- Nevada Army National Guard
- Nevada Air National Guard
- Army Research Lab
- Nevada National Security Test Site
- Electronic Frontier Foundation (EFF)
- Nevada School Districts & Community Colleges
- Local, Regional and National Corporations

- NV Energy
- Sierra Nevada Corporation
- CISCO Systems
- Hewlett Packard Enterprise
- Startup companies…

NEVADA CYBER RANGE (NCR)

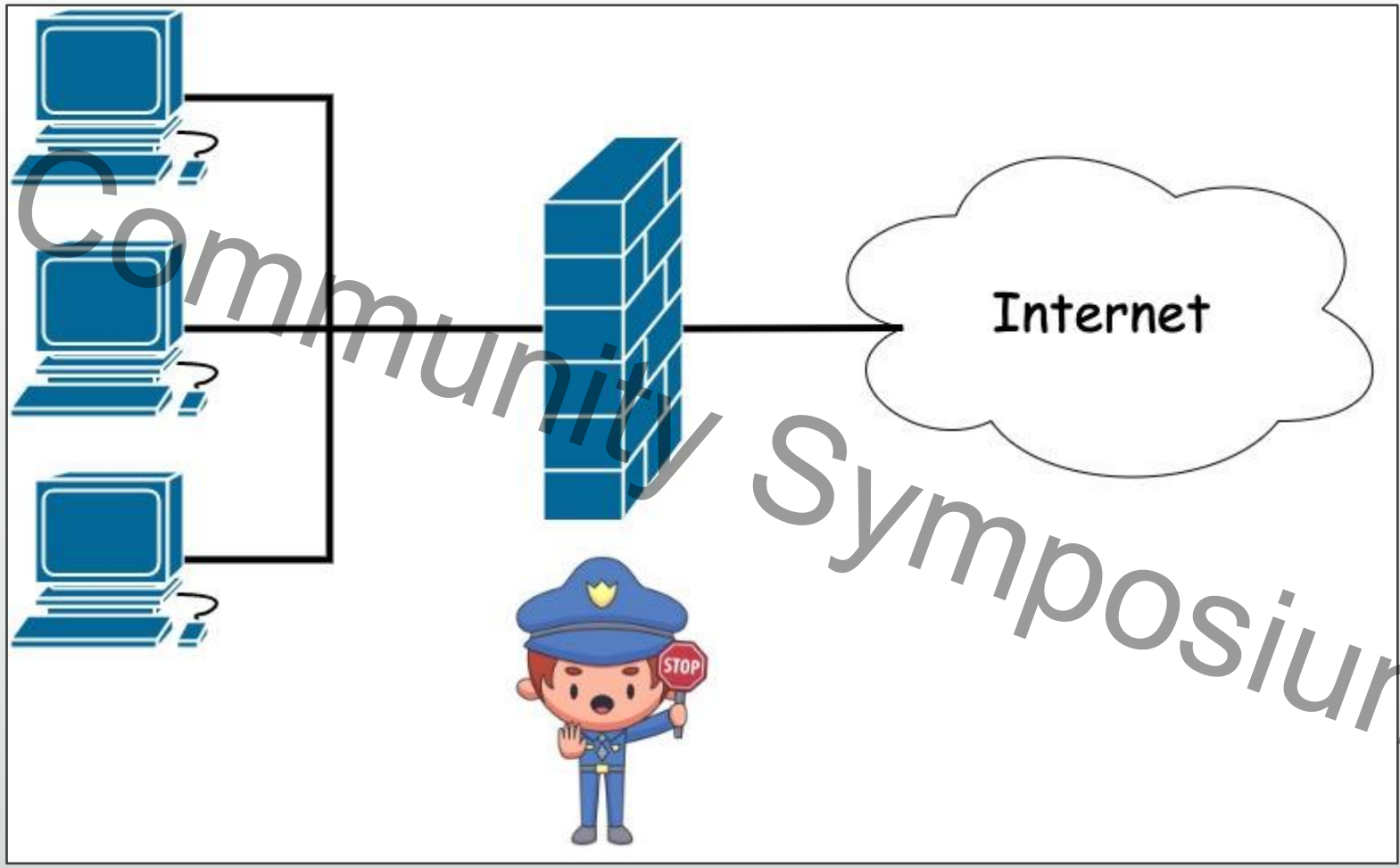
A CYBERSECURITY SANDBOX FOR RESEARCH, EDUCATION & OUTREACH

Problems

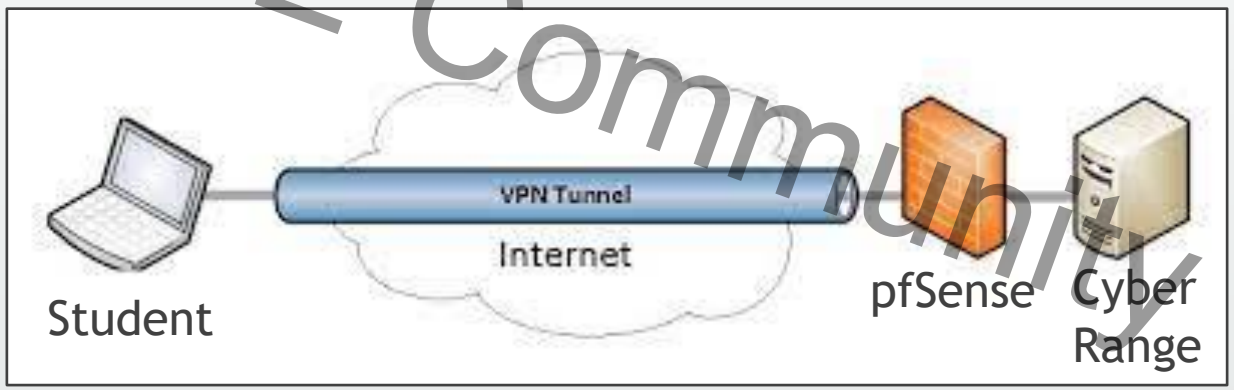
- Limited access to websites because of firewalls
- Customizable environments
- Ease of access from anywhere
- Administrative control of machine
- Instructor access to student environment
- Reproducible instances
- Realistic experience for students

Limited Access from campus

- School district firewall rules can make access to resources a problem!
- Tools needed to ensure student safety on the Internet

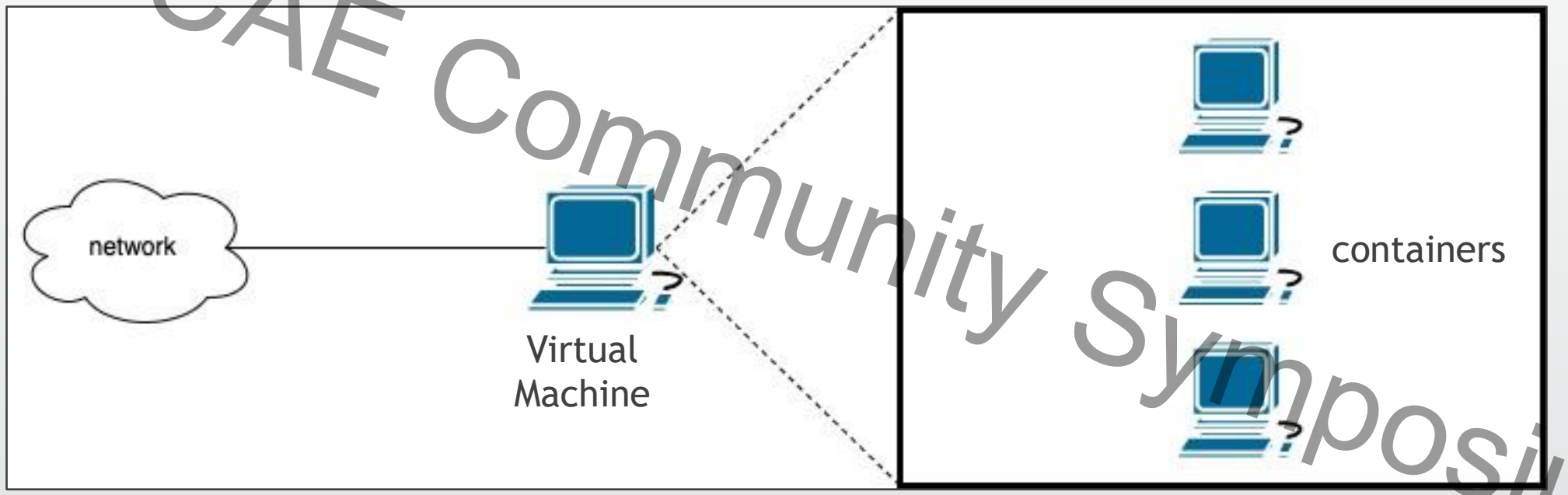


System access via vpn tunnel and remote firewall



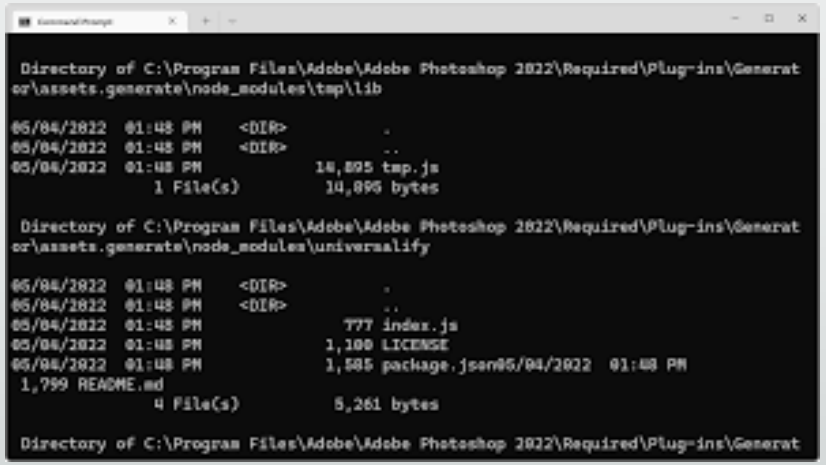
- VPN provides tunnel access to remote network
- Users are authenticated via OpenVPN
- Student machine becomes part of the remote network
- Traffic can traverse the local firewall

Customizable environments



Accessible from anywhere

- Remote system available via a browser
- Can be accessed from any OS
- Accessible through mobile devices
- Accessible via command line



Full administrative control

- Student has ‘root’ administrative privileges on their own machine
- Able to make changes to OS
- Can install/uninstall/update software
- Can destroy the environment without affecting other users
- Instances can easily be restored (with some loss of work)

Instructor Access

- Instructor can be added to all machines to provide support
- Access to machine logs to monitor activity
- Environment can be prepped to support instruction

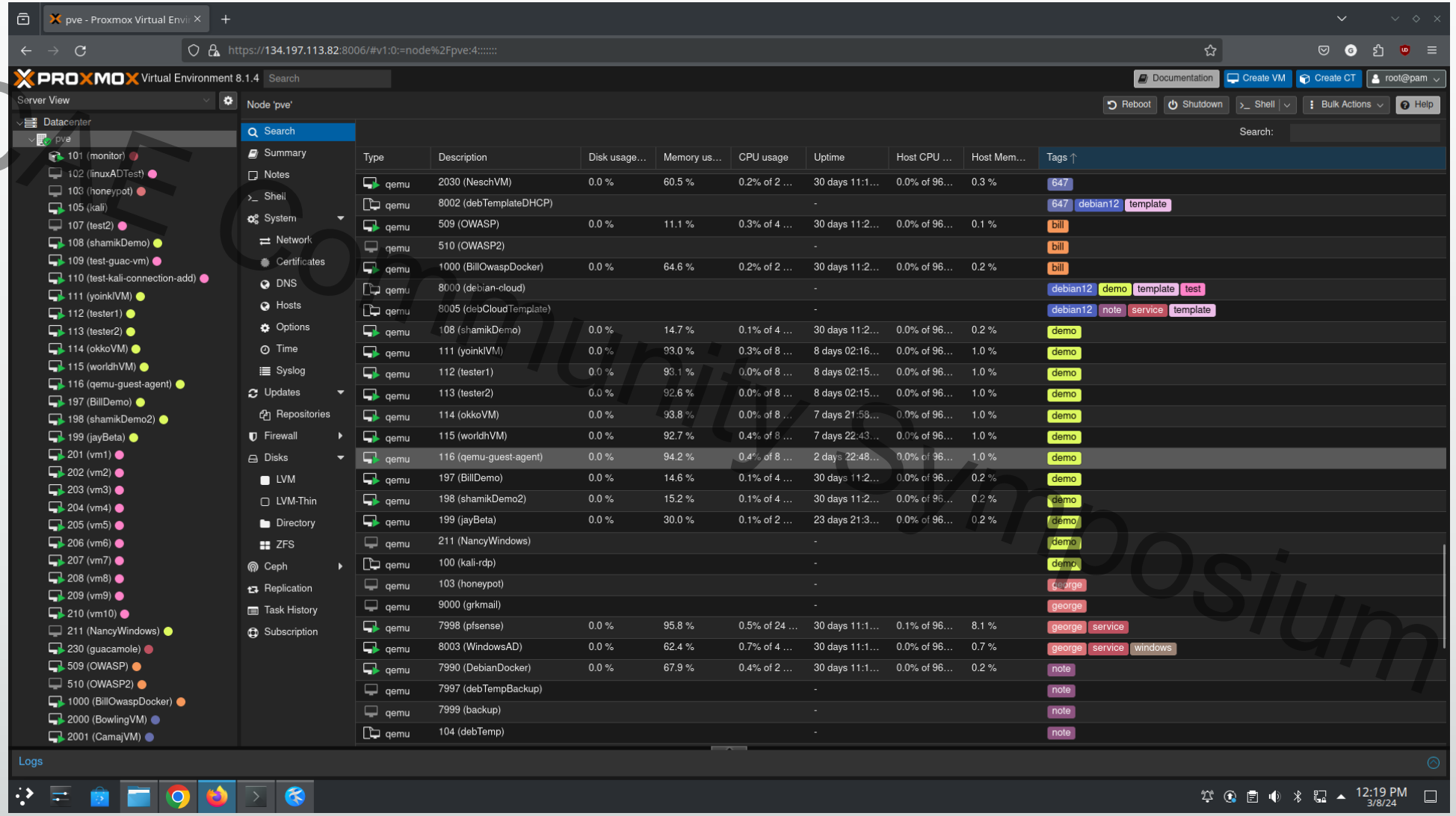
Recoverable instances

- Periodic backups are made of each instance
- Student VM can be replaced if destroyed
- Minimal loss of previous work

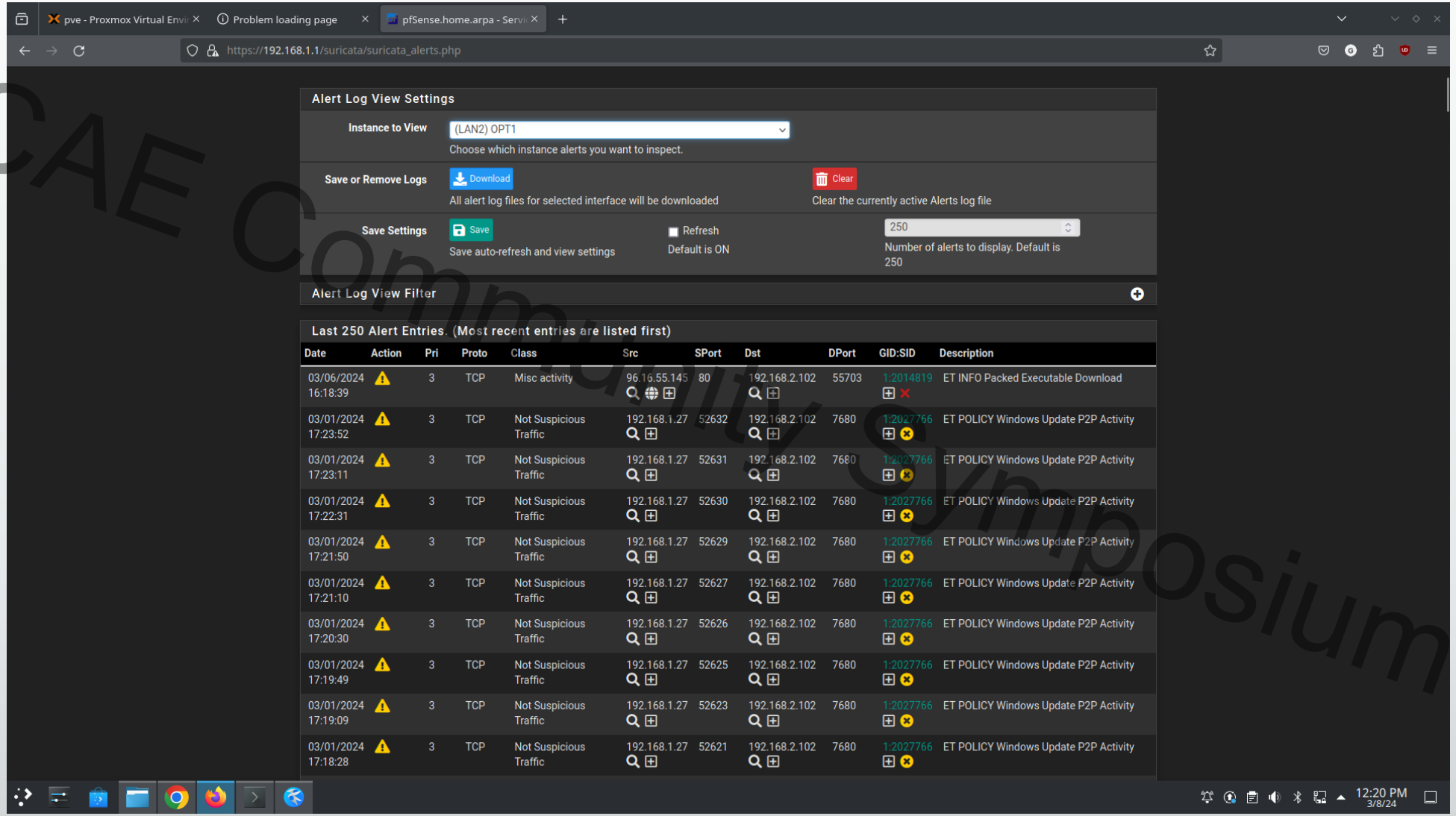
Realistic user experience

- Students have adjustable levels of control
- Changes can be made
- Realistic user experience

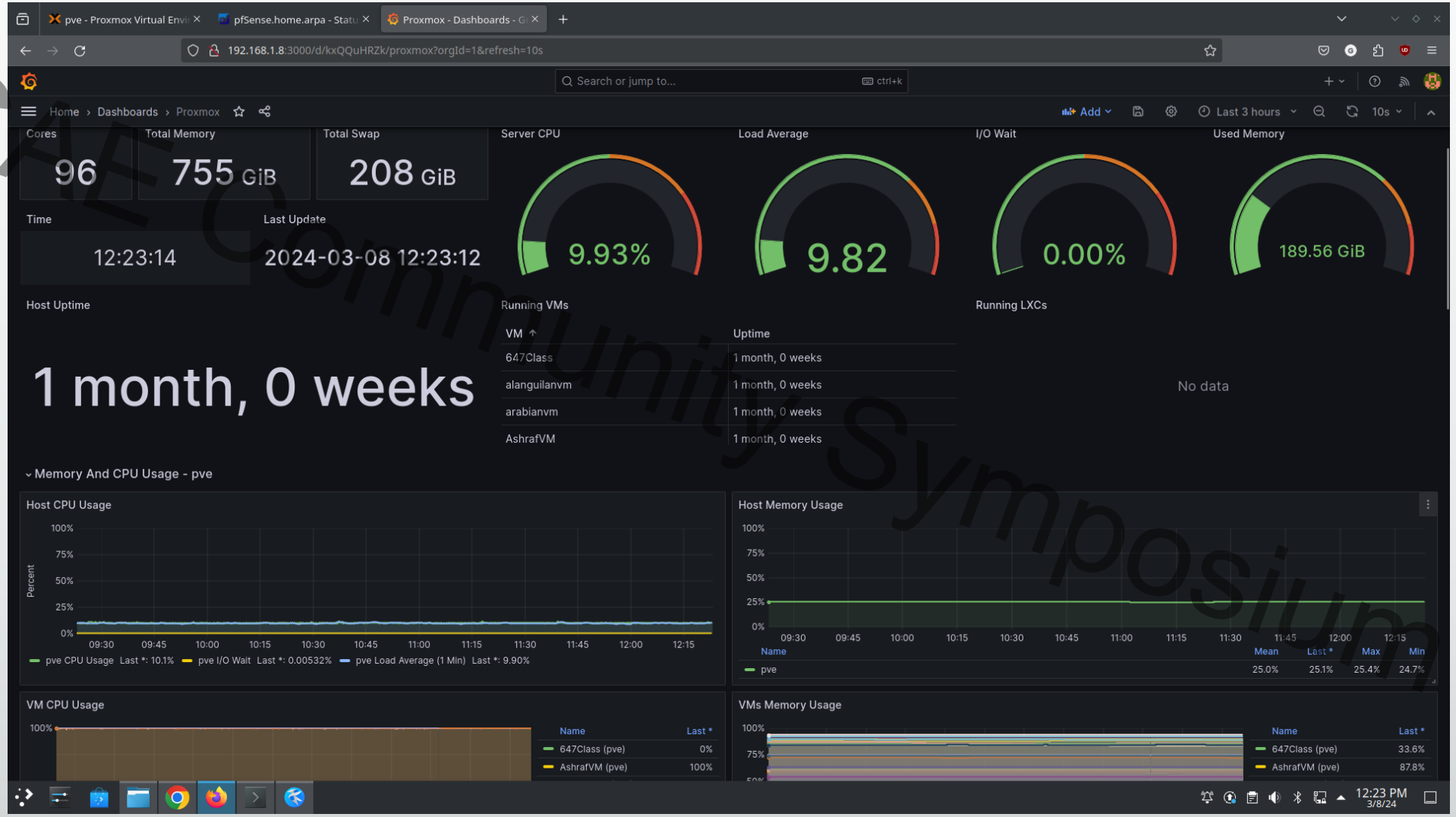
Scalable hosting capability



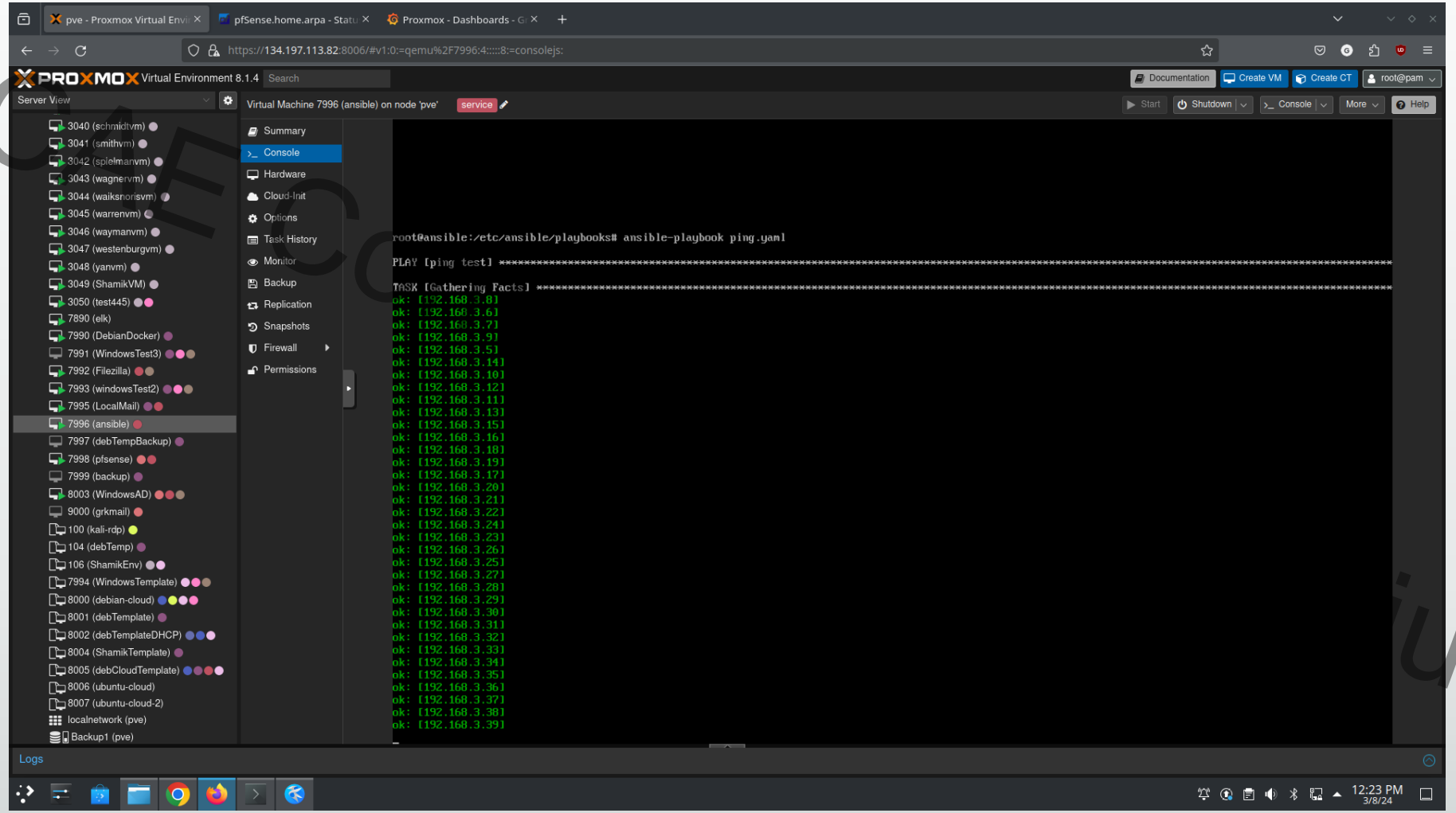
IDS capability (snort/suricata)



System monitoring



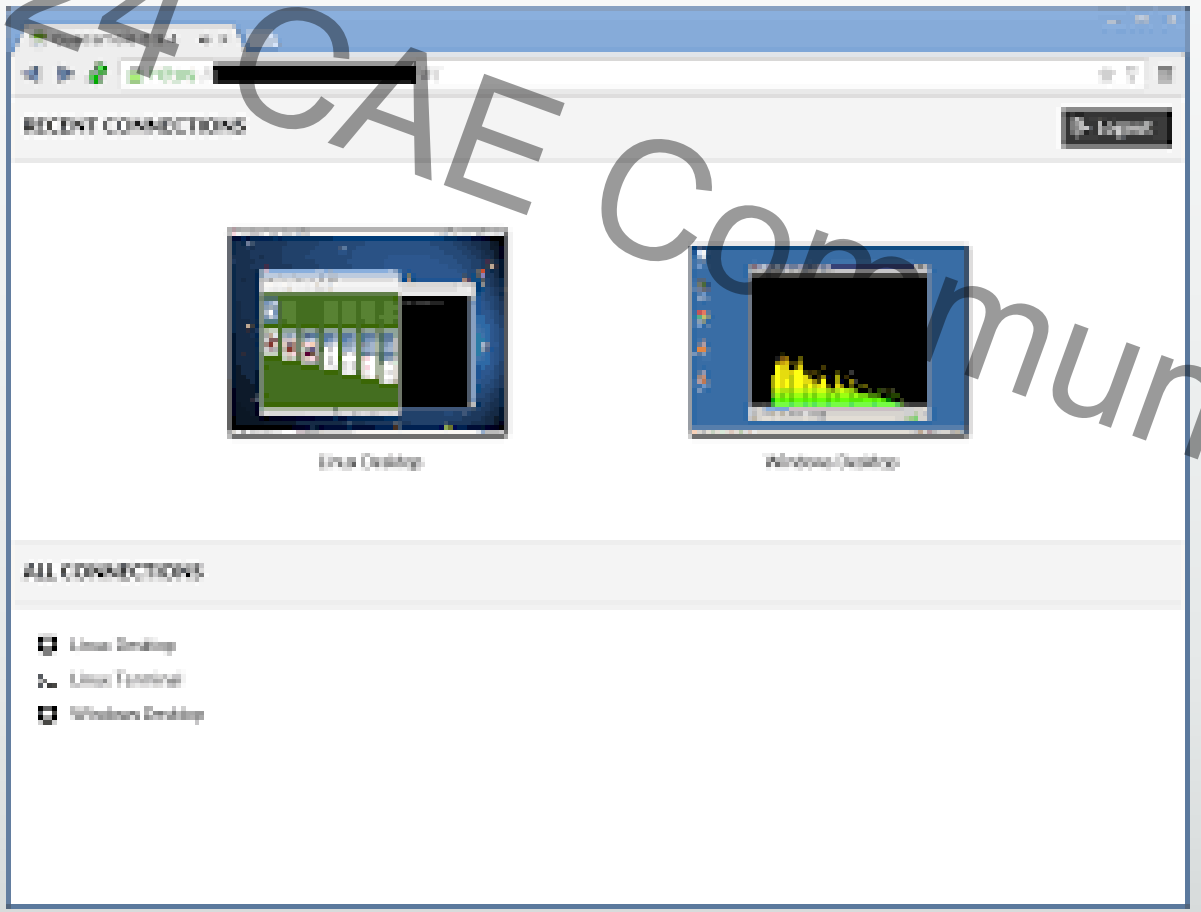
Automated management via Ansible

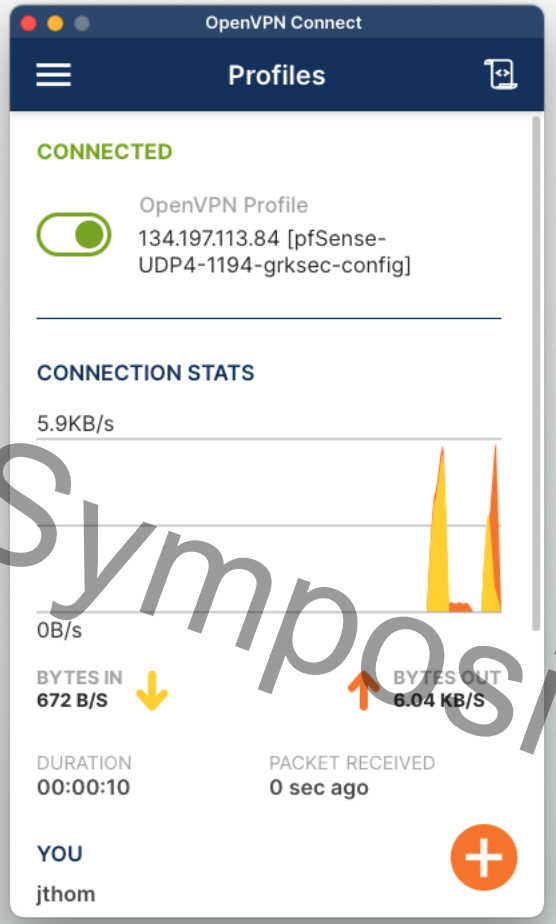


VPN or browser-based access

Openvpn - ssh connection to VM

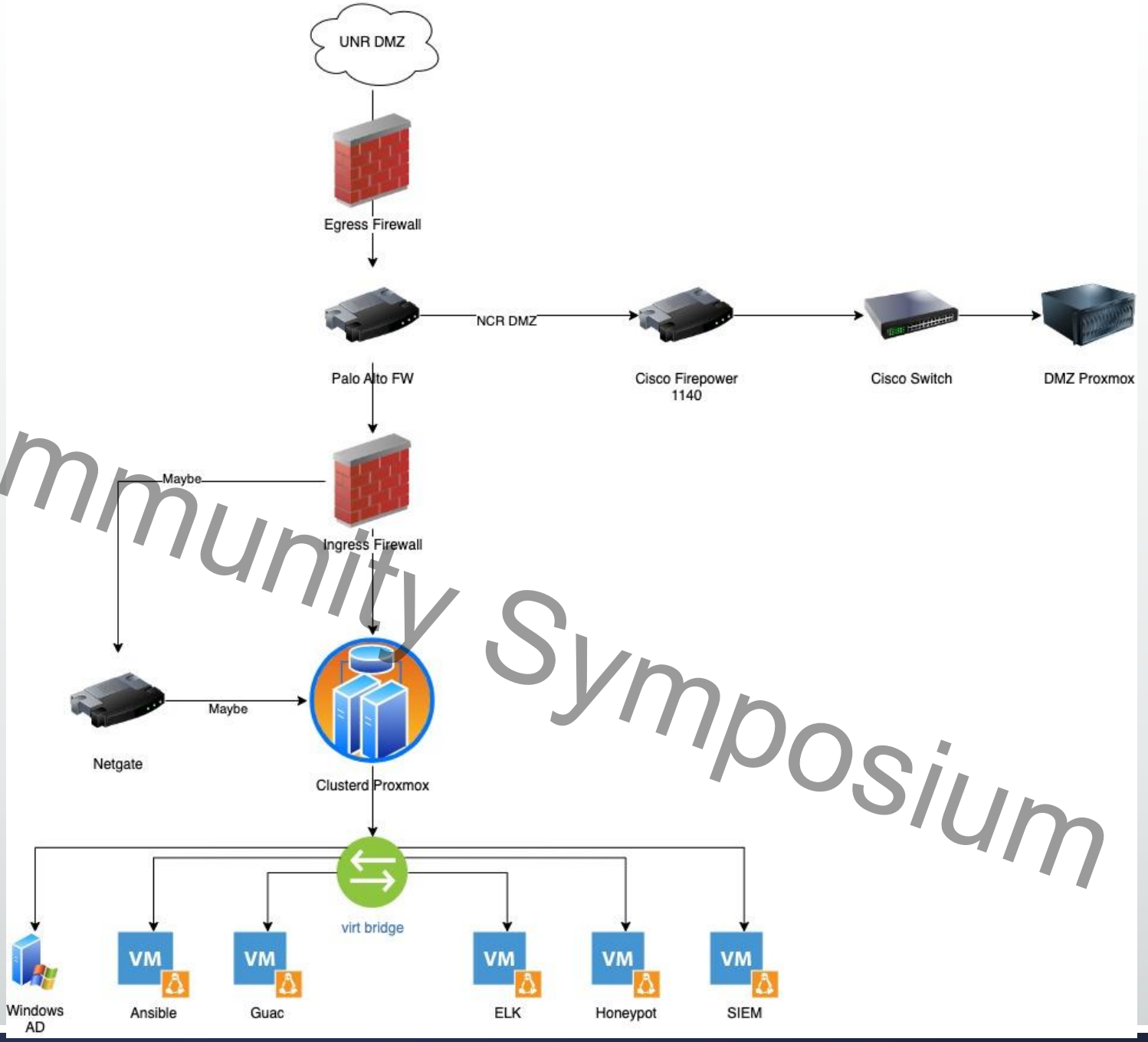
Guacamole - access via smart device or computer





Future Plans…

- Expanded Proxmox system
- Clustered servers for capacity
- DMZ within the UNR DMZ
- Multiple firewalls
- Multiple IDS/IPS
- Honeypots
- ELK stack SIEM
- Large visual monitor to view attacks
- Cisco subnet with routing (CCNA)



Are you interested to use Nevada Cyber Range for your class or lab? Reach out to Dr. Shamik Sengupta, Executive Director, UNR Cybersecurity Center at ssengupta@unr.edu

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