



2024 CAE Community Symposium

Shared Pedagogy: Undergrads Write a Cyber Textbook

Mathew J. Heath Van Horn, PhD

About me

AAS Electronics Repair

AA General Studies

AAS Computer Studies

BS Computer Science

MS Computer Science

MS Info Resource Mgmt

PhD Information Technology

- Farm Town – Couldn't spell "IT"
- Joined the Air Force
- Electronics Repair
- Interfaced Electronics with Computers
- Computer Science Degree
- Cyberspace Operations Officer
- Retired – Started a Business
- Missed the Cyber Peeps
- Teaching
 - SUNY Delhi – 5 years
 - Embry-Riddle – 2 years



2024 CAE

Teaching Cyber

Lecture

VS

Hands-on

- Works
 - Organized
 - Keep on Track
 - Visual & Audio Learners
- Easy
 - Memory Joggers
 - Infrequent updates
 - Use textbook slides



- Works
 - Create
 - Analyze
 - Kinesthetic Learners
- Hard
 - Herding Squirrels
 - Frequent Updates
 - Time hog



Symposium

Spring 2023

- Students Approached Me
- Shared a few hands on Labs
- Students wanted more
- Explained difficulties
 - Time
 - Hardware
 - Real estate
- Students - *"We'll Help!"*

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Meanwhile...

- I love Open Educational Resources (OER)
- Embry-Riddle is also a big supporter of OER
- June 23 – A call for ideas
- Beat out 22 other applicants to win the OER resources
- Undergraduate Research gave two grants (~ \$10,000 total) for Student Workers
- We worked all summer long

Community Symposium

2024 CAE

Established Ground Rules

- Roles and Expectations
 - Authors – make them
 - Testers – test them
 - Editors – make them pretty
- Hands-on focus – Not theory
- Use freely available resources
- Modest laptop capable
- About 60 minutes long
- Must get pedagogical experts review



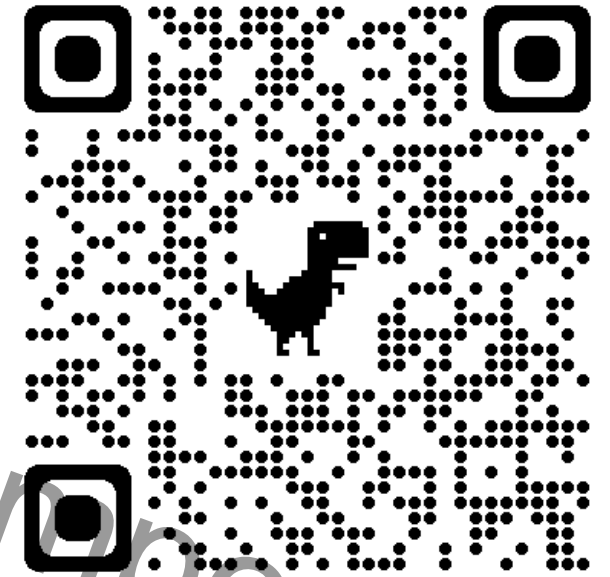
Community Symposium

2024 CAE Product

- Create -
- Defend -
- Attack -

Mastering Enterprise Networks

Step-by-step labs to create, attack, and defend enterprise networks



Symposium

2024 Chapters

- Intro
- Objectives
- Prereqs
- Deliverables
- Resources
- Contributors
- Content
- Homework

LEARNING OBJECTIVES

- Create a working GNS3 Learning Environment on a PC or laptop

PREREQUISITES

- Install [Oracle VirtualBox](#)

DELIVERABLES

- None - This is for student needs

RESOURCES

- [GNS3 Documentation](#)

CONTRIBUTORS AND TESTERS

Testers:

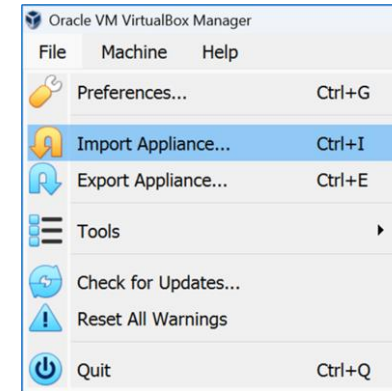
- Quinton D. Heath Van Horn, 7th Grade
- David Reese, Mathematics Student, SUNY Brockport
- Cody Shinkyu Park, Honeywell Software Engineer, ERAU-Prescott Alumni
- Salvador Morales, Safety Management System Analyst, ERAU-Prescott Alumni
- Evan Paddock, Cybersecurity Student, ERAU-Prescott
- Dante Rocca, Cybersecurity Student, ERAU-Prescott
- Sawyer Hansen, Cybersecurity Student, ERAU-Prescott
- Bernard Correa, Cybersecurity Student, ERAU-Prescott

NOTES

This lab has been tested on various Intel CPUs running Windows 10 or Windows 11

Phase I – Install GNS3 Environment

GNS3 comes in two parts: the GNS3 working environment and the GNS3 Virtual Machine (VM). This section covers the installation of the GNS3 environment.



SAMPLES

6. List all the interfaces on the router ([Figure 1](#)) by typing

```
interface print
```

7. Assign interface ether1 the IP address of 200.200.200.1/24 by typing

```
ip address add address=200.200.200.1/24 interface=ether1
```

8. Verify the IP was assigned by typing

```
ip address print
```


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Results

- 45+ Chapters
- 60,000+ Words
- 600+ Figures
- 1K+ Unique Visitors Monthly
- 93% positive feedback
 - Into Networks
 - Network Security
 - CEH
- Testers
 - Middle and High Schoolers
 - Non-Cyber Majors

Deliverables

5 screenshots are needed to receive credit for this exercise:

- Wireshark - DHCP Packets for PC2
- Wireshark - DHCP Packets for PC3
- Wireshark - ARP Packets for router
- GNS3 Workspace with 3 PCs, switch, router, and DHCP server - all devices labeled with their IP addresses
- Configuration settings of Windows Server DHCP

Homework

Assignment 1 - Combined network traffic watching

- Turn off all devices
- Replace the switch with a hub and reconnect all devices
- Monitor any of the PCs with Wireshark and capture ARP, DHCP, and ICMP packets for all three PC's as you turn devices back on
- RECOMMENDED GRADING CRITERIA
 - Screenshot of GNS3 environment with everything labeled
 - Screenshot of server-router ARP
 - Screenshot of DHCP for one PC
 - Screenshot of ICMP for one PC

Assignment 2 - Reconfigure the DHCP server

- Figure out the number of devices that can be attached to the switch
- Generate a random IP address and choose a subnet that will allow the use of all the switch connections with as few wasted IP addresses as possible
- Reconfigure the network to use these new network addresses
- Reconfigure the DHCP settings to issue IPv4 address in this new space
- RECOMMENDED GRADING CRITERIA
 - Screenshot of the DHCP configuration
 - Screenshot of the GNS3 workspace
 - Screenshot of server-router ARP
 - Screenshot of DHCP of one PC
 - Screenshot of ICMP of one PC

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Results Continued

- Author Credit
- Jobs and Internships
- Colleges Viewing to Adopt
- Critical Writing/Thinking
- NCAE Games Training Tool
 - 1st, 3rd, and 4th Place Southwest 1 Regionals
 - Going to Nationals



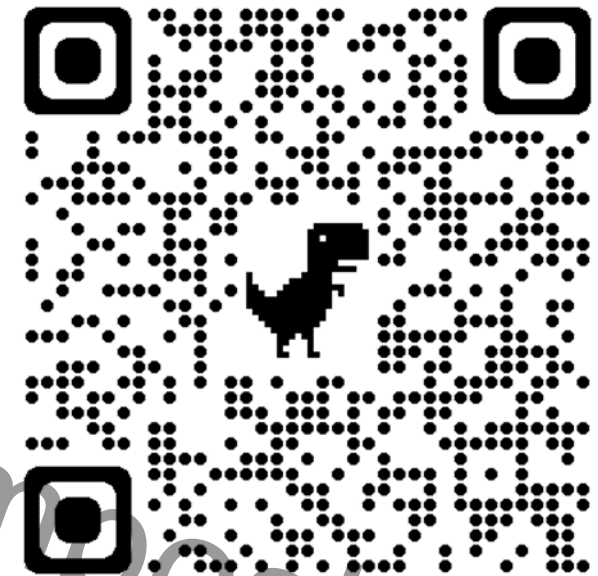
CHAMPLAIN
COLLEGE



The State University
of New York

Way Ahead

- Linux and Windows Labs
- Add more Self-Checks
- Involve Other Colleges
- Prep for Feedback
- M2 Environment
- Switch to Qemu

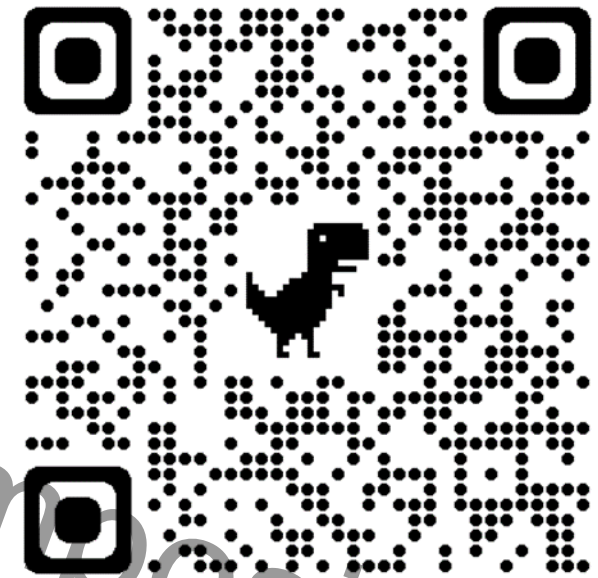


<https://eaglepubs.erau.edu/mastering-enterprise-networks-labs/>

2024 CAE

Dates

- **1st Edition Publishes 1 May 2024**
 - Expecting Lots of Edit Requests
 - Didn't get everything - 12 labs tabled
- **2nd Edition Begins 1 July 2024**
 - Students have graduated
 - New lead editor
 - 4 New Testers
 - 2 Testers Becoming Authors



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Questions

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