# Remote Virtual Lab Access: A Model to Building K-12 Career Pathway in Cyber

Joanne Sexton
Founding Dean
School of Computer and Cyber Sciences

Karen Ribble
Assistant Director
AU Cyber Institute

Franklin Perrin
Systems Administrator
AU Cyber Institute

# Welcome!

- **NICE Strategic Plan/Goals**
- **About Augusta University**
- **Community Partners: Alliance for Cybersecurity Education**
- **GA K-12 Career Pathways/NICE Cybersecurity Framework**
- **Remote Access to University Cyber Virtual Labs**
- **White Hat Agreement**

# NICE Strategic Plan/Goals

*Goal #2: Nurture a Diverse Learning Community – Strengthen education and training across the ecosystem to emphasize learning, measure outcomes, and diversify the cybersecurity workforce*

- *Objective 2.1: Improve education programs, co-curricular experiences, and training and certifications*
- *Objective 2.3: Inspire cybersecurity career awareness with students in elementary school, stimulate cybersecurity exploration in middle school, and enable cybersecurity career preparedness in high school*
- *Objective 2.5: Facilitate the development and dissemination of academic pathways for cybersecurity careers.*

# AUGUSTA UNIVERSITY

# ACADEMIC PROFILE

**8,534** Total Enrollment

**5,137** Undergraduates

**2,802** Grad/Professional

**595** Residents

**133** academic programs

**145+** student organizations

10 ~~9~~ Schools & Colleges

Total Applicants **9,433**

Total Admitted **3,819**

**2,385** New Enrollees

**1,648** Undergraduates

**737** Grad/Professional

female students **61%**

male students **39%**

**1,872** degrees conferred

first year retention **75.1%**

freshmen progression **52%**

**67** countries represented by students

**$107.6M** sponsored support

**$248.1M** grant submissions

**$15.9M** F&A costs

**996** publications

**1,661** faculty

1,110 FT | 551 PT

**92%** with terminal degrees

**Campus Locations in:**

★Augusta
Albany
Athens
Columbus
Macon
Rome
Savannah

Clinical Teaching Sites: **1,210**

Total Living Alumni: **56,000+**

prepared by the Division of Institutional Effectiveness | augusta.edu/facts/ | as of September 2016

## About Augusta University…

- One of four research universities in Georgia
- State's only public Academic Health center
- Become a leader in cybersecurity education and training
- Home to Hull-McKnight Georgia Cyber Training and Innovation Center

JULY 2017:
School of Computer and Cyber Sciences

# Achieved Designation as a Center of Academic Excellence in Cyber Defense (CAE-CD)

AUGUSTA UNIVERSITY
Cyber Institute

2016 - 2021

*Less than 250 universities nationwide have the CAE-CD designation*

*The BS in Computer Science program is accredited by the Computing Accreditation Commission of ABET, http://www.abet.org.*

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# SCHOOL OF COMPUTER AND CYBER SCIENCES

Offering academic programs in Computer Science, Information Technology, and Cybersecurity

Current Enrollment over 400/ 200 cyber

Undergraduate Programs

- BS in Computer Science
- BS in Information Technology (IT)
- BS in IT with a concentration in cybersecurity
- Future BS in Computer Science with a concentration in Cyber Ops
- Cyber Defender/Advanced Cyber Defender Certificate

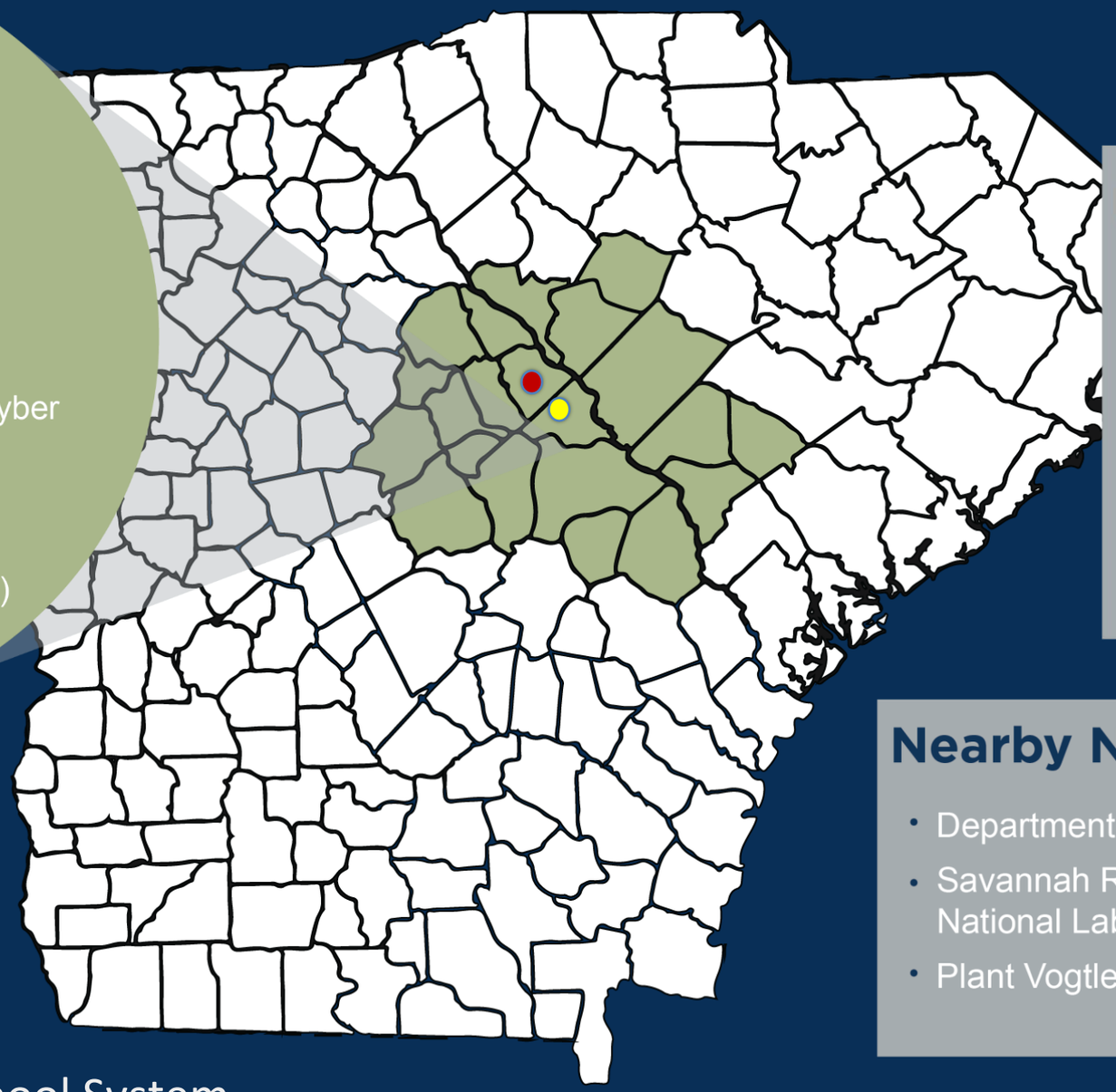
Graduate Programs

- Master in Information Security Management
- Health Security Certificate

# Augusta – Location, Location, Location

## DOD Neighbors

- NSA Georgia
- Cyber Center of Excellence (Cyber CoE)
  - Cyber School
  - Signal School
- Joint Force Headquarters - Cyber (JFHQ-C)
- Cyber Protection Brigade
- Future home of US Army Cyber Command (ARCYBER)



## Medical Neighbors

- AU Medical Center
- Charlie Norwood VA Medical Center
- Eisenhower Army Medical Center
- Augusta Warrior Project

## Nearby Neighbors

- Department of Energy
- Savannah River National Laboratory
- Plant Vogtle

- Columbia County School System
- Richmond County School System

# The Alliance for Cybersecurity Education

http://ace.tsjackson.com/

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# Mission & Membership

Aiken Technical College

Augusta Technical College

Augusta University

Augusta Metro Chamber of Commerce

CSRA Alliance

Columbia County School System

Columbia County Chamber of Commerce

Fort Gordon

Richmond County School System

- ACE founded to facilitate the creation of a community-based cybersecurity niche to raise the effective value of the 6-12 educational system and its integration into post-secondary education.

- ACE seeks to increase area students' capabilities, generate an employable cybersecurity workforce, and position the CSRA as a resource and partner to the NSA/Cyber COE/Ft. Gordon in cybersecurity expertise.

# Deliverables

- Foster teacher/faculty-preparedness programs relative to cybersecurity curriculum.
- Identify and appropriate technology resources to support cybersecurity curriculum.
- Achieve certification for cybersecurity curriculum.
- Develop branding for the ACE consortium, including a marketing and communications plan.
- Identification of potential industry and education partners.
- Develop an advisory board with community partners to provide guidance and oversight to ensure mutual benefits in the future.

**Guidance and Counseling**

Guidance and Counseling Overview

Career Development

Counselor Resources

Guidance and Counseling

Capstone Career Related Project

Hospital Homebound Services

School Counselor Information

School Social Work

**Clusters/Pathways**

**Development and Transition**

Development and Transition Overview

Career Related Education

Transition Career Partnerships

High School Pathway Performance Standards

# Information Technology

**Web and Digital Design**

- Introduction to Digital Technology
- Digital Design
- Web Design

**Programming**

- Introduction to Digital Technology
- Computer Science Principles
- Programming, Games, Apps, and Society

**Information Support and Services**

- Introduction to Digital Technology
- IT Essentials
- IT Support

**Health Information Technology**

- Introduction to Healthcare Science
- Essentials of Health Information Technology
- Applications of Health Information Technology

**Networking**

- Introduction to Digital Technology
- Networking Fundamentals
- Networking Systems and Support

**Computer Science**

- Introduction to Digital Technology
- Computer Science Principles
- AP Computer Science (Contact College Board for standards)

**Cybersecurity**

- Introduction to Digital Technology
- Introduction to Cybersecurity
- Advanced Cybersecurity

# 9th Grade
# Introduction to Digital Technology

- Identify, describe, evaluate, select and use appropriate technology.
- Understand, communicate, and adapt to a digital world.
- Explore and explain the basic components of computer networks.
- Use computational thinking procedures to analyze and solve problems.
- Create and organize web pages through the use of a variety of web programming design tools.
- Design, develop, test and implement programs using visual programming.
- Describe, analyze, develop and follow policies for managing ethical and legal issues in the business world and in a technology-based society.

# 10th Grade
# Introduction to Cybersecurity

- Fundamental principles of networking (wired/wireless), local area networks (elements, perimeter networks, IP addressing, access methods and topologies), client-server/peer-to-peer networking models, and wide area networks.
- Fundamental principles of the Open Systems Interconnection Model, Internet Protocol IPv4 and IPv6, and common networking services to include Name Resolution Techniques.
- Work with the basic & advanced command prompts.
- Network infrastructures and network security.
- Fundamental components of cybersecurity.
- Employ host system and application security.
- Implement proper security administration.
- Implement proper access controls & identity management.
- Basic principles of cryptology.

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# 11th Grade
# Advanced Cybersecurity

- Concepts of sound cyber practices, legal, and ethical decision making.
- Concepts of malware threats.
- Analyze and react to various threats and vulnerabilities.
- Advanced principles of cryptology.
- Advanced communications/wireless security techniques.
- Implement organizational security techniques.
- Implement contingency planning (incident response and disaster recovery) techniques.
- Perform security and testing and evaluation.
- Implement risk management techniques.
- Work with advanced methods of cybersecurity.

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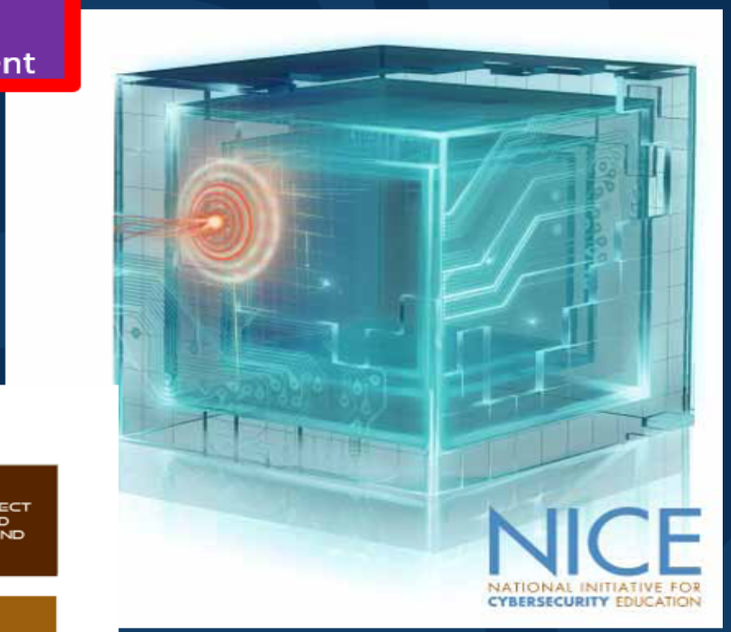
# 12th Grade Internships

- Military Organizations (e.g., NSA)
- Government Organizations (e.g., DHS)
- Financial Institutions
- Medical Institutions
- Energy Institutions
- Cybersecurity Providers

# GaDOE Cybersecurity Pathway Targets

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Securely Provision** | Information Assurance Compliance | Software Assurance & Scty Eng | Systems Security Architecture | Technology Research & Development | Systems Requirements Planning | Test & Evaluation | Systems Development |
| **Operate & Maintain** | Data Administration | Knowledge Management | Customer Service & Tech Support | Network Services | Systems Administrator | Systems Security Analyst | |
| **Oversight & Development** | Legal Advice & Advocacy | Strategic Planning & Policy | Education & Training | Info Systems Security Operations | Security Program Management | | |
| **Protect & Defend** | Computer Net Defense Analysis | Incident Response | CND Infrastructure Support | Vulnerability Assessment & Management | | | |
| **Analyze** | Threat Analysis | Exploitation Analysis | All-Source Analysis | Targeting | | | |
| **Operate & Collect** | Collection Operations | Cyber Operational Planning | Cyber Operations | | | | |
| **Investigate** | Investigations | Digital Forensics | | | | | |



# Achievements to Date

- ✓ Created Cybersecurity (Curriculum) Pathway for Georgia High Schools.
  - Curriculum approved by the Georgia Board of Education in Spring 2015
  - Curriculum offered Fall 2015
  - Richmond County: Academy of Richmond County, Technical Career Magnet School, and Hephzibah High School.
  - Columbia County: Lakeside, Greenbrier, and Grovetown High Schools.
- ✓ Conducted Training for HS Teachers
- ✓ Allowed Remote Access to AU Virtual Lab to enhance cybersecurity learning for four high schools
  - Richmond County: Academy of Richmond County, and Technical Career Magnet School.
  - Columbia County: Greenbrier and Lakeside High Schools.

# Technical Overview

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# Technical Overview

- Accessing Augusta University's Cybersecurity Virtual Lab.
  - Available to our supported High Schools via an HTML 5 compatible web browser. Such as Firefox, Google Chrome, or Safari on a Mac or PC.
  - We provide 24 simultaneous connections for each of our High Schools and support over 300 students from both Richmond County and Columbia County.
  - Available 24 hours a day for our teachers and during class time for students.
- Supporting our High School Teachers and Students.
  - We provide teachers with training videos and documentation on how to utilize our virtual lab. This includes creating student accounts, enrolling students in courses, and creating lab reservations.
  - Augusta University provides on-going IT support.

# NETLAB+

NETLAB+ is a remote access solution developed by Network Development Group (NDG) that allows academic institutions to host IT equipment, virtual machines, and custom courseware.

➢ NDG has over a decade of experience and partnerships with the following organizations:

- The Center for Systems Security and Information Assurance (CSSIA) uses NETLAB+ to facilitate hands-on cybersecurity competitions.
- The National Cyber League (NCL) utilizes NETLAB+ to support cyber competition stadiums.

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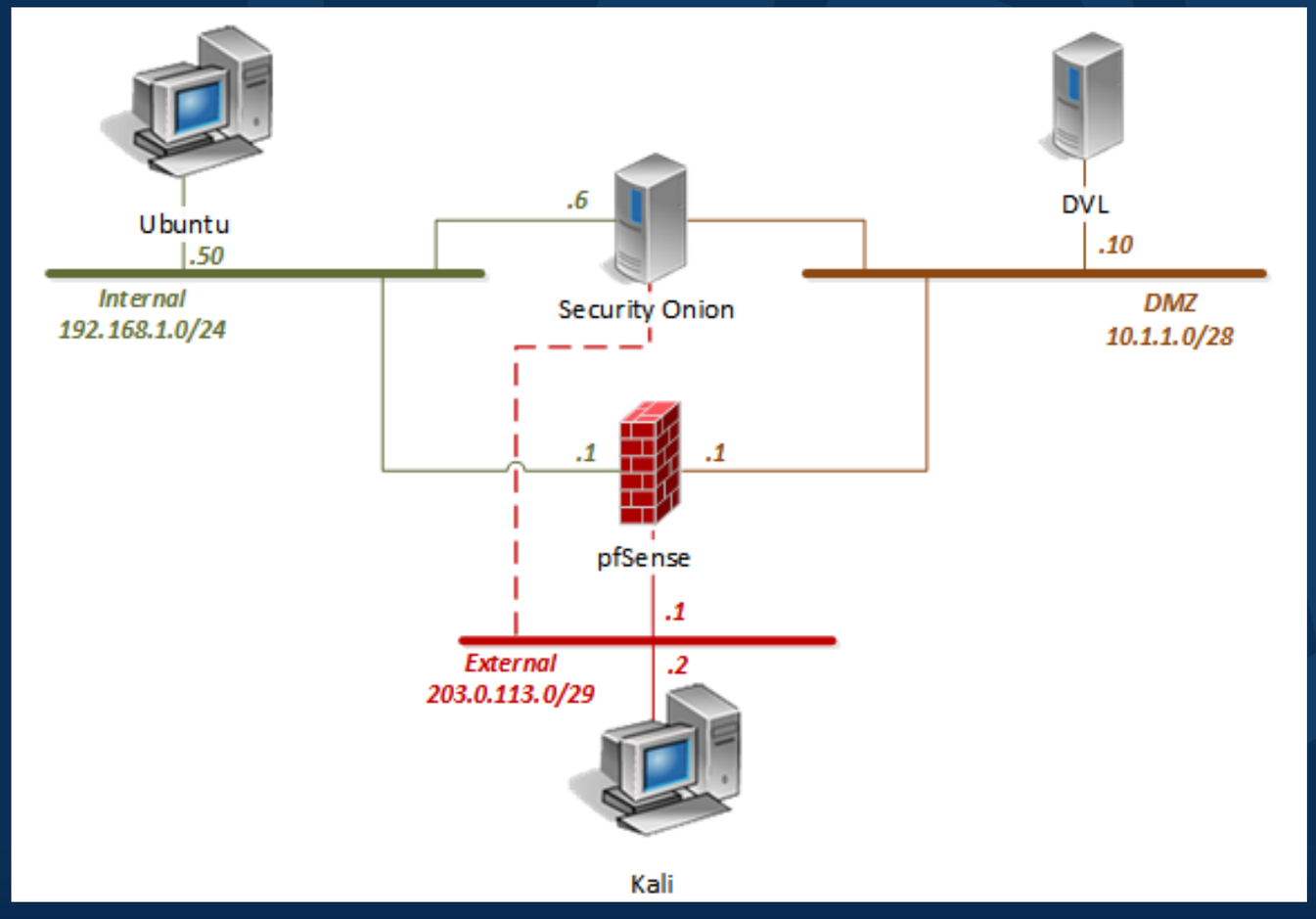
# Technical Overview Cont.

- VMware ESXI Cluster:
  - 80 Physical CPU Cores at 2.30 GHz with Hyper-Threading support.
  - 1.53 TB of Memory (RAM)
  - 19.6 TB of RAID 5 local storage.
- Storage Network for VM Traffic:
  - 40 TB of redundant storage configured in RAID 5 for virtual machine storage.
  - Redundant 10 GbE SFP+ network switches.
- Dedicated Internet Connection
  - Completely isolated from Augusta University's Enterprise network.
  - 50 Mbps of dedicated network bandwidth.

# NISGTC Security+

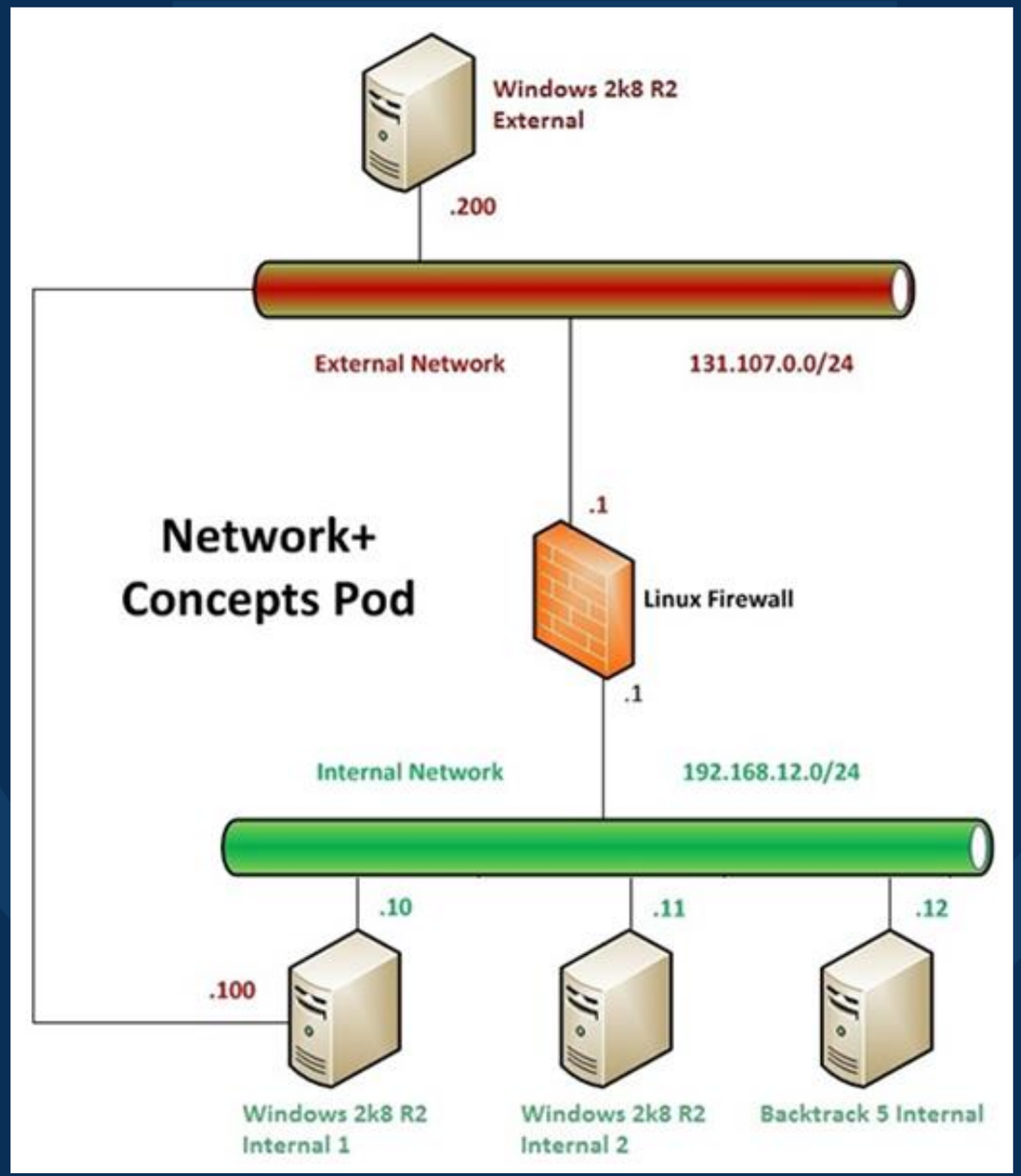
- Overview:
  - Students gain hands-on practice in the skills needed to secure a network.
  - Aligns with CompTIA Security+ Certification.

- Content:
  - 5 Virtual Machines.
  - 16 Lab Exercises.



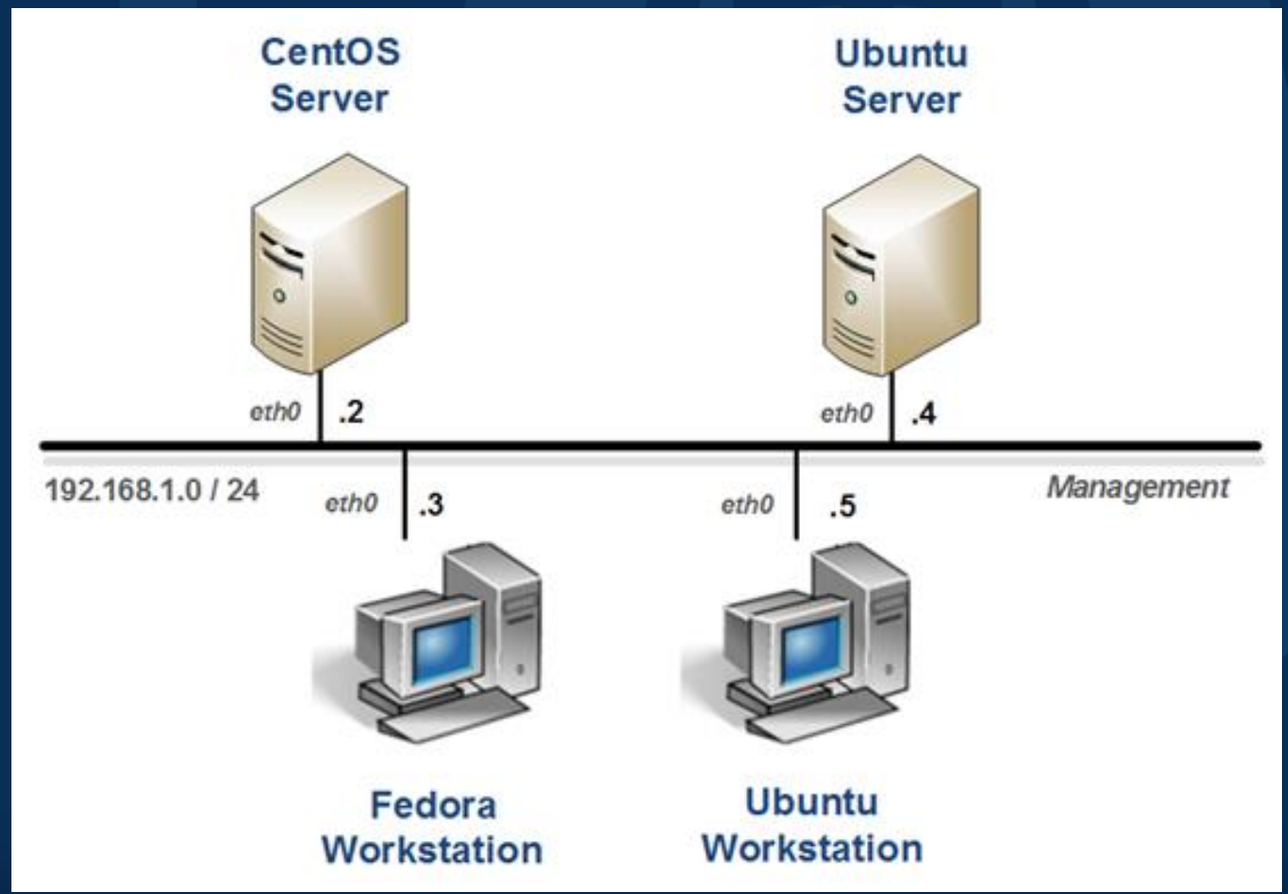
# NISGTC Network+

- Overview:
  - Students learn key skills to troubleshoot, configure, and manage a network.
  - Aligns with CompTIA Network+ Certification.
- Content:
  - 5 Virtual Machines.
  - 12 Lab Exercises.



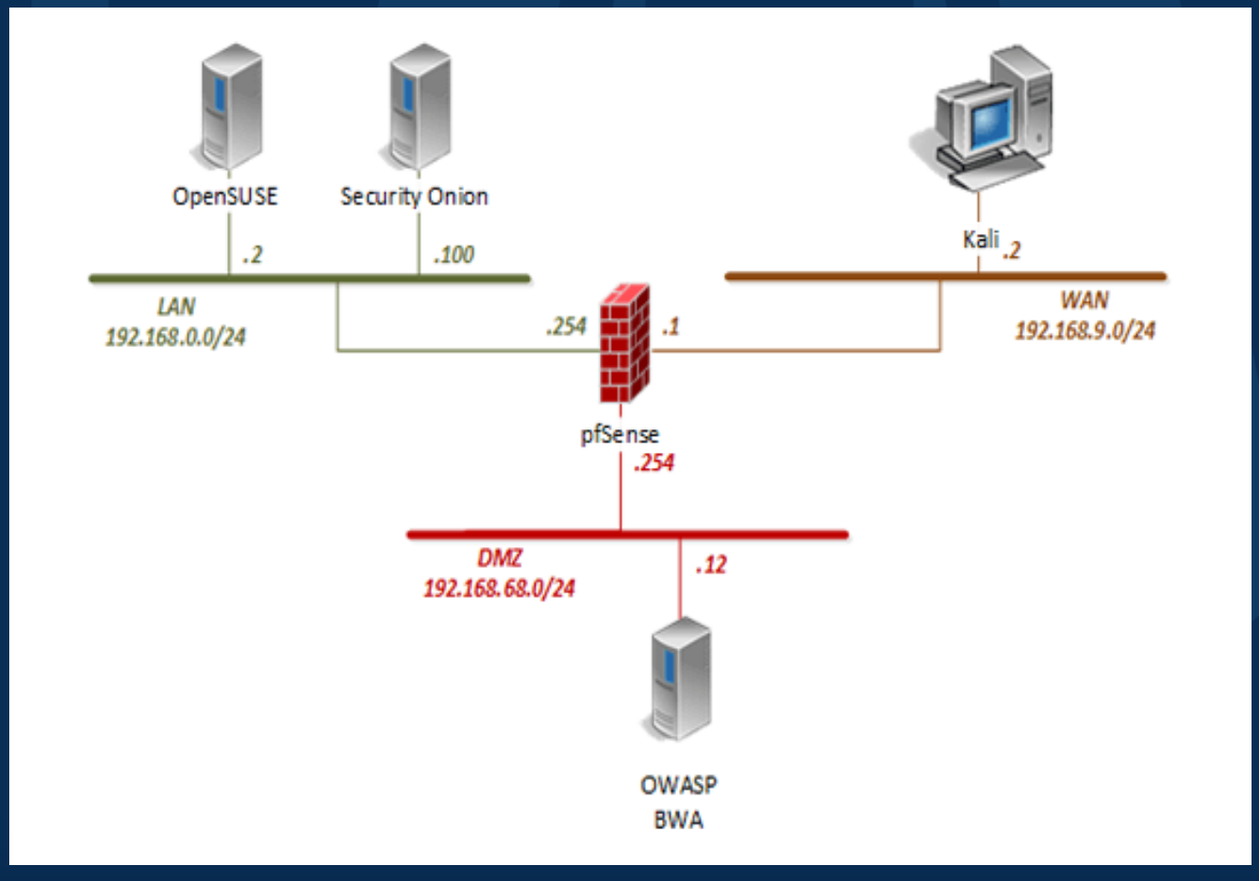
# NISGTC Linux+

- Overview:
  - Students gain hands-on practice in the skills needed to configure, manage, and troubleshoot Linux systems.
  - Aligns with CompTIA Linux+ Certification (LPIC-1).
- Content:
  - 4 Virtual Machines.
  - 22 Lab Exercises.



# NDG Ethical Hacking

- Overview:
  - Students gain hands-on practice conducting a variety of ethical hacking techniques.
  - Prepares students for a variety of IT positions, including: Cyber Security Analyst or Penetration Tester.
- Content:
  - 5 Virtual Machines.
  - 20 Lab Exercises.



# NICE Cybersecurity Workforce Framework

CompTIA / NICE NATIONAL INITIATIVE FOR CYBERSECURITY EDUCATION

CompTIA A+ | CompTIA Network+ | CompTIA Security+ | CompTIA Project+ | CompTIA Server+ | CompTIA Cloud+ | CompTIA CSA+ | CompTIA CASP

WORKFORCE FRAMEWORK CATEGORIES

| Investigate | Oversight & Development | Protect & Defend | Operate & Maintain | Securely Provision | Analyze | Collect & Operate |
|---|---|---|---|---|---|---|
| Digital Forensics | Information Systems Security Operations | Computer Network Defense (CND) Analysis | Customer Service and Technical Support | Information Assurance Compliance | Exploitation Analysis | Cyber Operation Planning |
| | | CND Infrastructure Support | Data Administration | Systems Security Architecture | Threat Analysis | Cyber Operations |
| | | Incident Response | Network Services | Test and Evaluation | | |
| | | Vulnerability Assessment and Management | System Administration | | | |
| | | | Systems Security Analysis | | | |

WORKFORCE FRAMEWORK SPECIALTY AREAS

## CompTIA and NICE:

### Setting the standard for safe cyber practices

The National Initiative for Cybersecurity Education (NICE), sponsored by the National Institute of Standards and Technology (NIST), is a partnership between the U.S. government, academia, and the private sector focused on cybersecurity education, training, and workforce development. The NICE Workforce Framework provides an easy way to classify cyber workers by describing cyber work roles across work categories.

CompTIA Certifications like A+, Network+, Security+ and CASP are updated regularly to focus on key cyber job roles and best practices, and are well-aligned to the NICE Workforce Framework. With CompTIA credentials, government employees can verify their cyber knowledge and skills and also fulfill government directives like FISMA and DoD 8570/8140.

Questions about CompTIA Certifications and the NICE Workforce Framework? Contact us at **Governmentsales@CompTIA.org**

Certification.CompTIA.org

Csrc.nist.gov/nice

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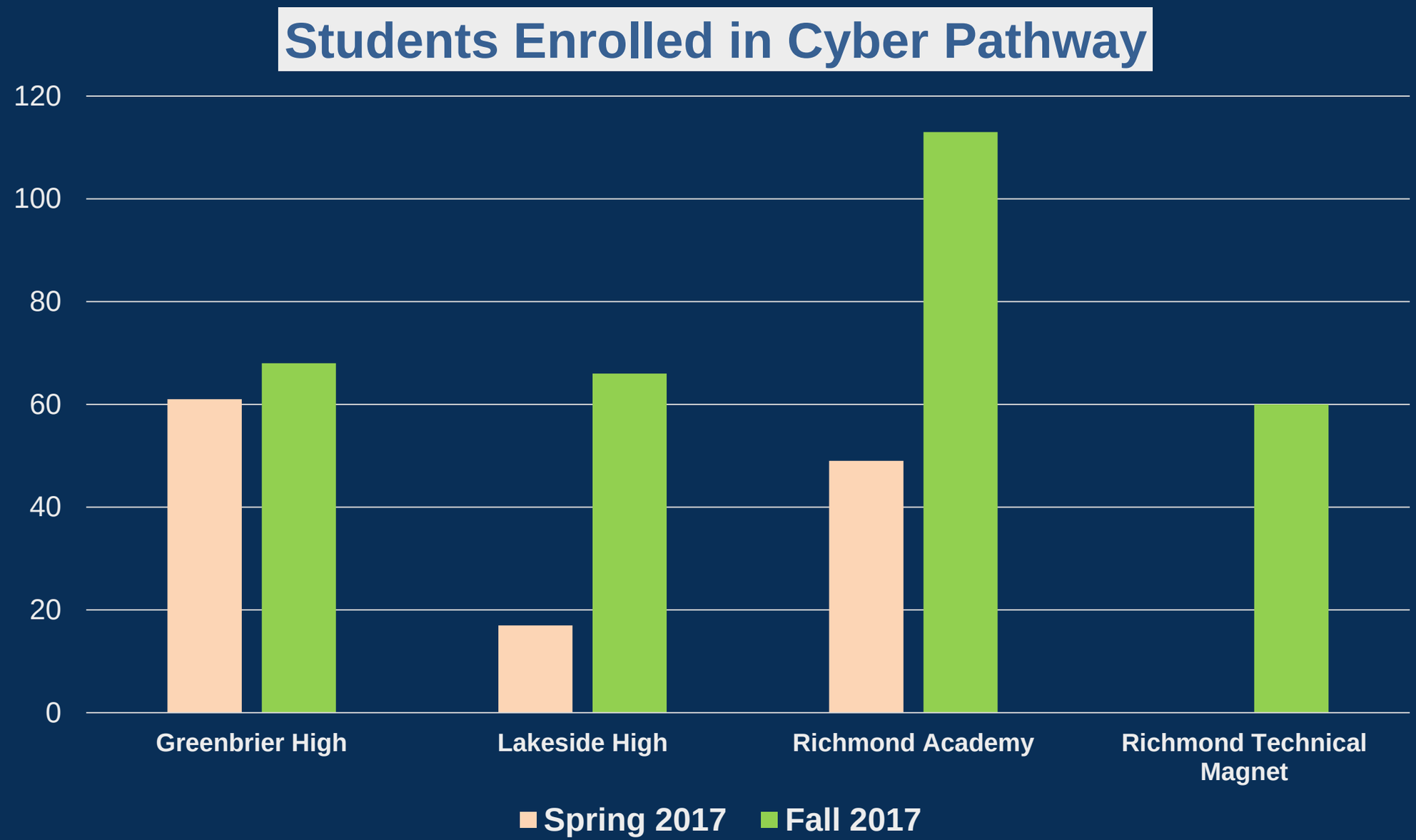
# Impact


Students Enrolled in Cyber Pathway
120
100
80
60
40
20
0
Greenbrier High
Lakeside High
Richmond Academy
Richmond Technical Magnet
Spring 2017
Fall 2017

# Major Milestones

2018-
AU create new
SCCS/GCITC

Fall 2016-PD for K-12
HS teachers

Spring 2016-AU designated as a
CAE-Cyber Defense

2015 Dr. Keel commits
$3.5M investment

Spring 2015-GDOE approves
cyber pathway

Fall 2014-
Cyber Summit

2015 construction
begins on AY Cyber Lab

2017-Pilot K-12 HS
Remote access to
AU Cyber Lab

Spring 2015-
AU creates Cyber Institute
Seeks NSA/DHS CAE-Cyber Defense

Spring 2014-
ACE is formed

Dec 2013-Army Cyber Command
Announces Move to FT Gordon

Fall 2013-AU creates
and offers BS IT

# Questions?

Joanne Sexton
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Assistant Director
AU Cyber Institute
kribble@augusta.edu

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Systems Administrator
AU Cyber Institute
fperrin@augusta.edu

**Hull McKnight Georgia Cyber and Innovation Training Center – July 2018**
**Home for the new School of Computer and Cyber Sciences**
https://vimeo.com/atomicstudios/review/238797533/de1562df59