



# Network Technologies for Secure Data Movement

## perfSONAR Lab Series

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<https://research.cec.sc.edu/cyberinfra/>

Boston, MA  
December 9, 2024



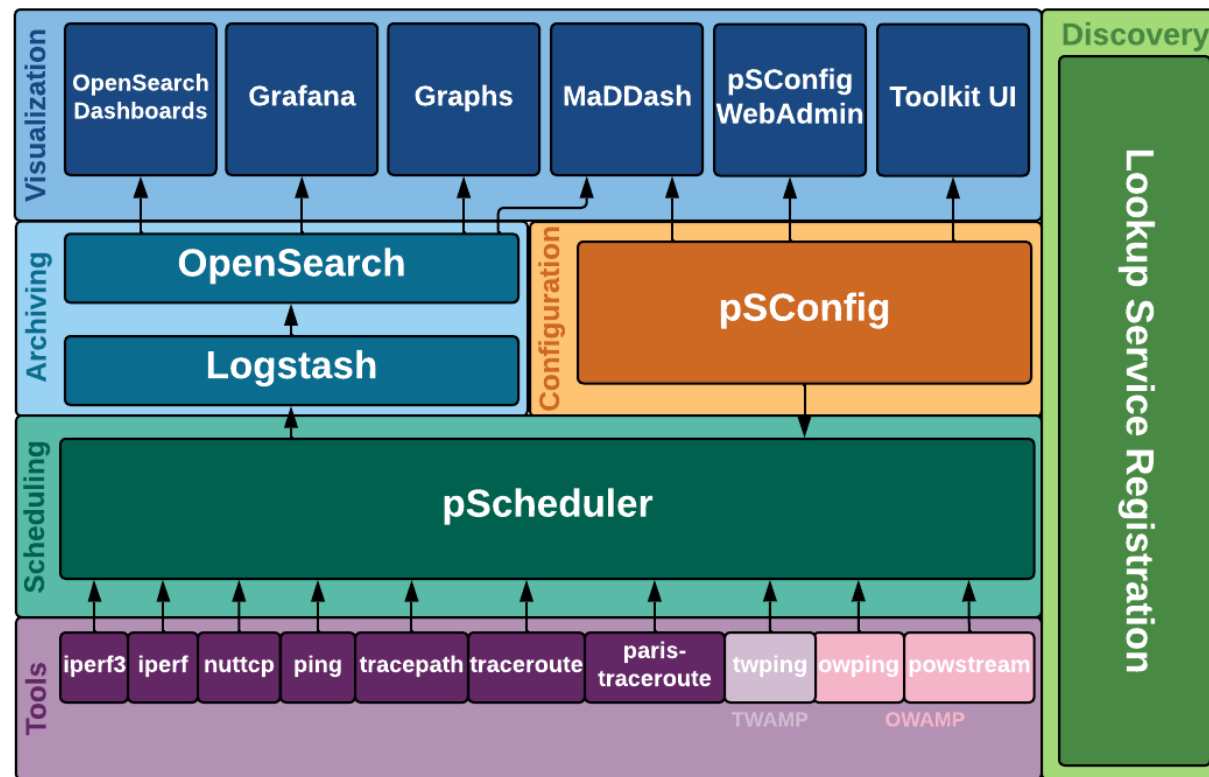
# Workshop Website

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- Presentations are posted on the website of the tutorial:  
<https://research.cec.sc.edu/cyberinfra/datamovement-techex2>

# perfSONAR 5 Lab Library

- The labs are based on perfSONAR version 5, running within a Docker container for easy setup and management
- Networks run on Mininet. Mininet provides easy configuration modifications
- The perfSONAR lab library covers all components of perfSONAR



perfSONAR layers

# perfSONAR 5 Lab Library

1. Lab 1: Introduction to Mininet
2. Lab 2: Setting Administrative Information via perfSONAR Toolkit GUI
3. Lab 3: Scheduling Regular Tests Using perfSONAR GUI
4. Lab 4: Configuring Regular Tests Using pScheduler CLI Part I (throughput, latency, and traceroute)
5. Lab 5: Configuring Regular Tests Using pScheduler CLI Part II (repeat, store, monitor, and cancel)
6. Lab 6: Defining Regular Tests with a pSConfig Template
7. Lab 7: Configuring pScheduler Limits
8. Lab 8: Visualizing pScheduler Measurements using Grafana
9. Lab 9: Observing the Impact of TCP Window Scaling and Small TCP Buffer Sizes
10. Lab 10: Investigating the Effects of MTU Mismatch

# Organization of the Labs

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Each lab starts with a section *Overview*

- Objectives
- Lab topology
- Lab settings: passwords, device names
- Roadmap: organization of the lab

## *Section 1*

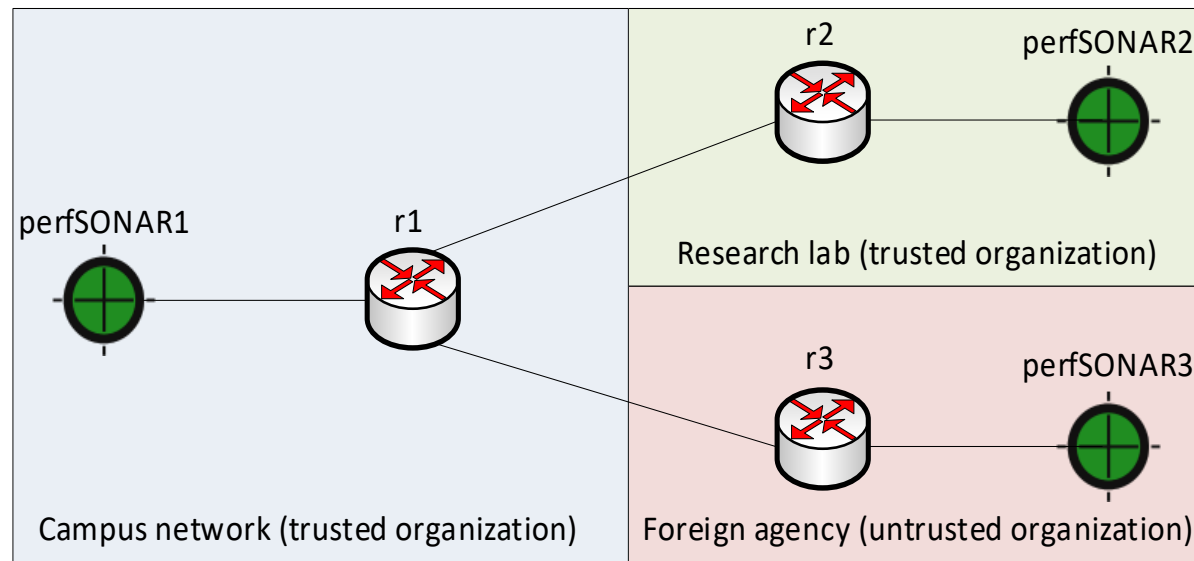
- Background information of the topic being covered (e.g., fundamentals of perfSONAR)
- Section 1 is optional (i.e., the reader can skip this section and move to lab directions)

## *Section 2... n*

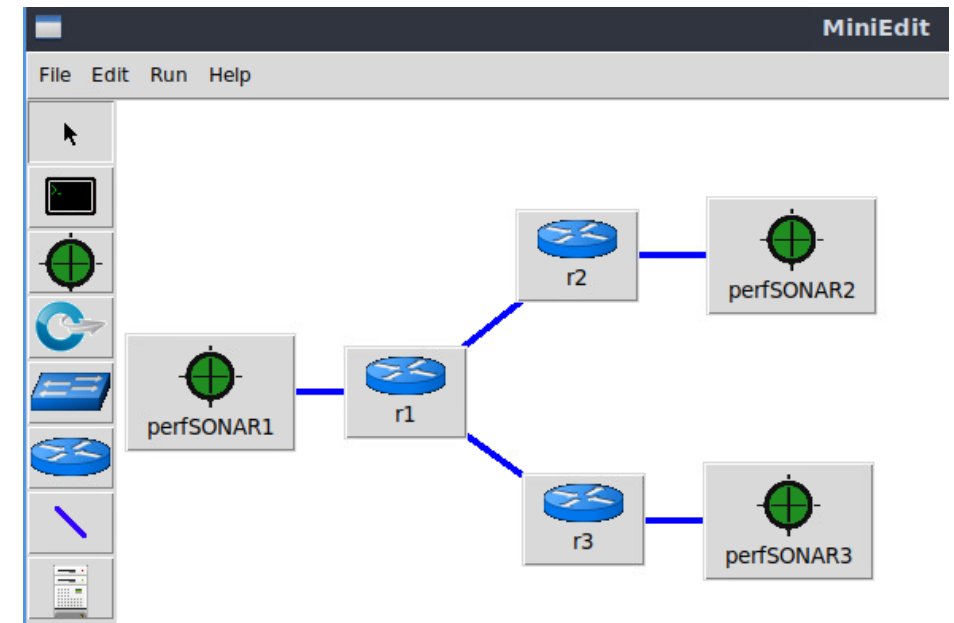
- Step-by-step directions

# Netlab Platform

- The perfSONAR labs are implemented using Mininet
- MiniEdit (GUI network editor) enables learners to create custom topologies
- Labs run efficiently on a single virtual machine



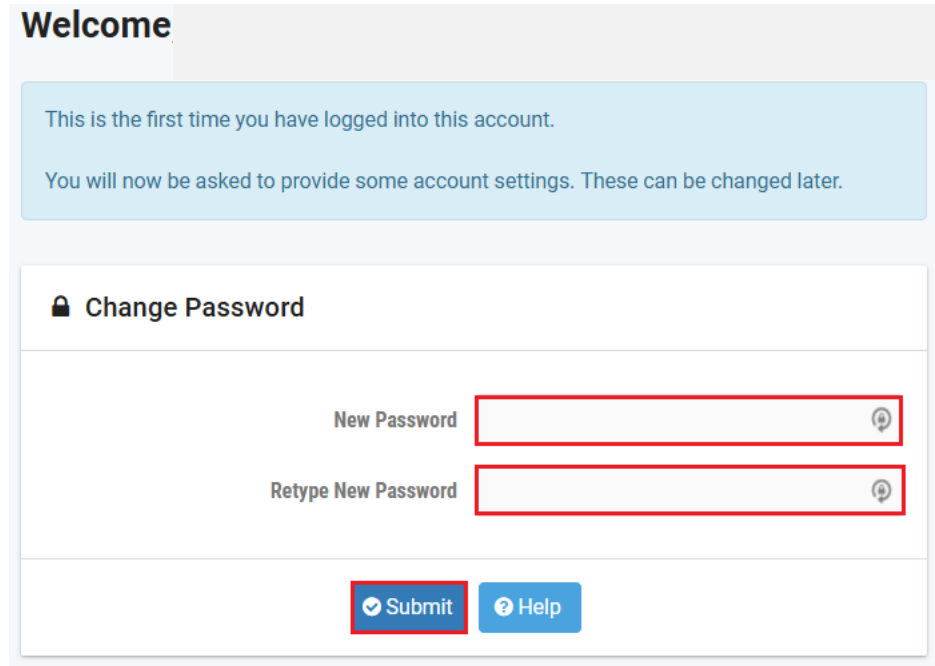
Lab scenario



Mininet topology

# Accessing the Platform

- Please use the following link to access the platform:  
<https://netlab.cec.sc.edu/>
- Login using your credentials
- **Username:** Email address used for registration
- **Temporary Password:** nsf2024



Cyberinfrastructure  
Lab @ UofSC

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Please enter a valid e-mail address.  
You can leave this blank if you do not want to receive e-mail from the system.

✉ Change E-mail Address

E-mail Address

🕒 Date and Time Settings

Time Zone (GMT-05:00) Eastern Time (US & Canada) ▼

Date Display Format YYYY-MM-DD (2016-09-15) ▼

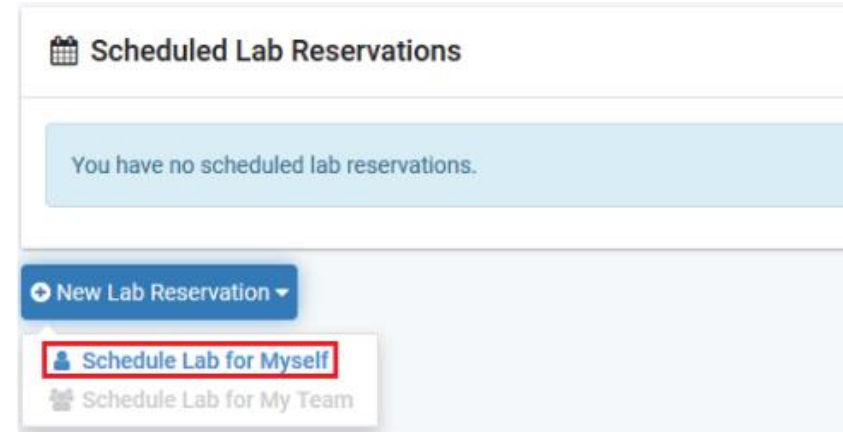
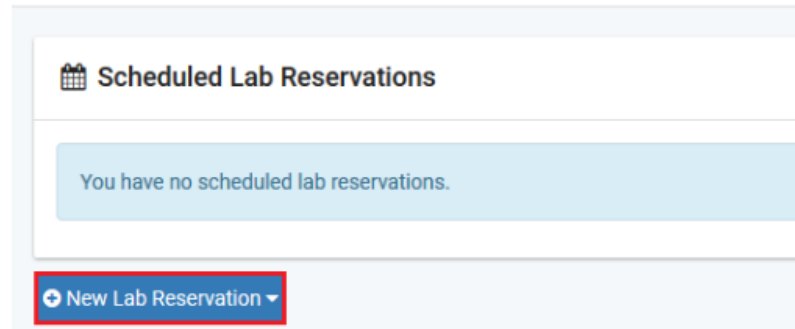
Time Display Format 24 Hour (15:37) ▼

First Day of Week Sunday ▼



# Accessing the Platform

- Click on New Lab Reservation
- Click on Schedule Lab for Myself



# Accessing the Platform

- Select lab library

Multiple course topics are available in this class. Please select one.

## Cybersecurity Applications on P4

This pod uses P4 programmable data planes to present security applications

## Cybersecurity Fundamentals

Introduction to Cybersecurity Fundamentals

## Introduction to perfSONAR 5

This lab series focuses on perfSONAR 5 using Mininet

## Network Tools and Protocols

Network Tools and Protocols

## P4-DPDK Labs

This lab series covers P4-DPDK

## P4-DPDK Security

This lab series cover security labs with P4-DPDK

## P4-perfSONAR Labs

This lab series cover P4-BMv2 and perfSONAR5

# Accessing the Platform

- Select lab experiment

🚧 This lab series focuses on perfSONAR using Mininet

Lab Name	Action
<a href="#">Lab 1: Setting up Administrative Information via perfSONAR Toolkit GUI</a>	▼
<a href="#">Lab 2: Scheduling Regular Tests Using perfSONAR GUI</a>	▼
<a href="#">Lab 3: Configuring Regular Tests Using pScheduler CLI Part I (throughput, latency, and traceroute)</a>	▼
<a href="#">Lab 4: Configuring Regular Tests Using pScheduler CLI Part II (repeat, store, monitor, and cancel)</a>	▼
<a href="#">Lab 5: Defining Regular Tests with a pSConfig Template</a>	▼
<a href="#">Lab 6: Configuring pScheduler Limits</a>	▼
<a href="#">Lab 7: Visualizing pScheduler Measurements using Grafana</a>	▼
<a href="#">Lab 8: Observing the Impact of TCP Window Scaling and Small TCP Buffer Sizes</a>	▼
<a href="#">Lab 9: Investigating the Effects of MTU Mismatch</a>	▼
<a href="#">Lab 10: Observing the Effects of Packet Reordering</a>	▼

Show  entries Showing 1 to 10 of 10 items

< 1 >

# Accessing the Platform

- Select the next available POD and allocate time

## Pod Scheduler

September 2023

Selected Day: September 5, 2023

Current Time: 18:37 Eastern Time (US & Canada)

Time	perfSONAR_H3_Master	perfSONARv3_H3_17001	perfSONARv3_H2_17002	perfSONAR_H3_17003
18:00	occupied	available	available	available
19:00	occupied	available	available	available
20:00	occupied	available	available	available
21:00	occupied	available	available	available
22:00	occupied	available	available	available

A red arrow points to the 19:00 slot in the 'perfSONARv3\_H2\_17002' column.

## Add Reservation

Pod: perfSONARv3\_H2\_17002

Reservation Type: Instructor Private Reservation

Reserve For: Jose Gomez

Lab Exercise: Lab 3: Configuring Regular Tests Using pScheduler CLI Part I

Time Zone: Eastern Time (US & Canada)

Start Time: 2023-09-05 18:38

End Time: 2023-09-05 19:30

Length of Reservation: 41 mins.

Buttons: Submit, Previous, Cancel

# Accessing the Platform

- **URL:** <https://netlab.cec.sc.edu/>
- **Username:** Email address used for registration
- **Temporary Password:** nsf2024