Hands-on Workshop on Open vSwitch and Software-defined Networking

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Western Academy Support and Training Center (WASTC)
2021 Summer Conference
June 21 – June 25

Introduction to Team Members

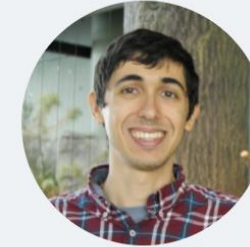# USC – CI Lab

- Members

Dr. Jorge Crichigno

Associate Professor
Integrated Information Technology

Elie Kfoury

Ph.D. Student (01/2019 - present)
Department of Computer Science and Engineering

Jose Gomez

Ph.D. Student (01/2019 - present)
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Ali AlSabeh

Ph.D. Student (09/2019 - present)
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Shahrin Sharif

M.S. Student (09/2019 - present)
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Workshop Overview

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- The University of South Carolina (USC) has developed custom labs for topics related to networks and cybersecurity
- The topics complement other programs (for example, CCNA)
- Emphasis on open-source software
  - Linux
  - Mininet
  - Open-source routers
  - Open-source Software-defined Networking devices (ONOS controller, SDN switches - OvS)

Workshop Overview

- These labs are available for NETLAB+ customers

- Material is posted in the following webpage:

  ➤ http://ce.sc.edu/cyberinfra/workshop_2021_wast_2.html

- For the workshop, we will use UofSC's NETLAB system

  ➤ URL: https://netlab.cec.sc.edu/

  ➤ Username: email used for registration

  ➤ Password: wastc2021

  If you registered to the workshop and are not able to access the NETLAB system, please contact Jose Gomez in the chat window (or via email at gomezgaj@email.sc.edu)

Workshop Overview

- The workshop is from Monday June 21 to Friday June 25

- Morning 9:00 – 12:00 PDT
  - ➢ Discussion of topics, labs

- Afternoon 13:00 – 13:45 PDT
  - ➢ Office hours

Agenda

- Please refer to the workshop's website:

http://ce.sc.edu/cyberinfra/workshop_2021_wast_2.html

USC – Promoting Hands-on

- The IEEE and ACM are the main societies which guide IT education
- According to them, the IT curriculum should emphasize "learning IT core concepts combined with authentic practice" and "use of professional tools and platforms"
- The University of South Carolina (USC) – Cyberinfrastructure Lab (CI) promotes hands-on education, training, and research
- URL: http://ce.sc.edu/cyberinfra/

Virtual Labs

- USC works closely with the Network Development Group (NDG) (www.netdevgroup.com)
- NDG provides a scalable platform the labs can run on
- USC's lab libraries incorporate performance and realism along with NETLAB's features

Feature	Description
Performance	Virtual labs emulate high-performance systems (e.g., high-speed networks running at 40 Gbps)
Functional realism	Virtual labs have the same functionality as real hardware in a real deployment, and execute the same code[1]
Traffic realism	Devices within the virtual lab environment are capable of generating and receiving real, interactive network traffic to and from the Internet[1]
Presentation layer	Navigating through an experiment is easy for an inexperience learner
Topology flexibility	Easy to create an experiment with any topology, including inter-connecting heterogeneous VMs

1. N. Handigol, Reproducible Network Experiments Using Container-Based Emulation, CoNEXT'12, Dec. 2012.

USC – Lab Libraries

- The learning-by-doing approach is essential in networking; textbooks and lectures are not sufficient
- Insight and appreciation of how technologies operate in practice can only be achieved via first-hand experience, hands-on experiments
- Laboratory experience allows learners to see networking in action, to understand each component, and to appreciate details
- All laboratory experiments include a background reading section before undertaking the experiments
- Then, experiments are described step-by-step

USC – Lab Libraries

- List of USC's lab libraries can be found online:
  http://ce.sc.edu/cyberinfra/cybertraining.html

- Network Tools and Protocols

- SDN

- Introduction to BGP

- MPLS and Advanced BGP Topics

- Open vSwitch

- Introduction to perfSONAR

- Zeek/Bro Intrusion Detection System