2023 Internet2 Technology Exchange

Science DMZs and Networking for All

Workshop Introduction

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Workshop Website

- All material is posted on the website of the tutorial

  https://research.cec.sc.edu/cyberinfra/workshop-techex2

Agenda

Time	Topic	Presenter
1:00 - 1:05	Workshop introduction	Jorge Crichigno
1:05 - 1:25	Science DMZ concepts, campus network deployments, perfSONAR	Jorge Crichigno
1:25 - 1:45	End-to-end monitoring with perfSONAR, NETLAB platform	Jose Gomez
1:45 - 1:55	Break	
1:55 - 2:25	Hands-on session 1: configuration of perfSONAR	Jose Gomez
2:25 - 2:55	Hands-on session 2: measuring performance metrics with perfSONAR and displaying them on Grafana	Jose Gomez
2:55 – 3:05	Break	
3:05 – 3:25	Importance of TCP congestion control for research and education data transfers	Jorge Crichigno, Elie Kfoury
3:25 – 4:10	Hands-on Session 3: bandwidth-delay product and TCP buffer sizing	Elie Kfoury
4:10 – 4:30	Discussions	Jose Crichigno, Elie Kfoury

perfSONAR 5 Lab Series

- Lab experiments

Lab 1: Introduction to Mininet

Lab 2: Setting Administrative Information Using perfSONAR Toolkit GUI

Lab 3: Scheduling Regular Tests Using perfSONAR GUI

Lab 4: Configuring Regular Tests Using pScheduler CLI Part I (throughput, latency, traceroute)

Lab 5: Configuring Regular Tests Using pScheduler CLI Part II (Repeat, Store, Monitoring test, Plotting results)

Lab 6: Defining Regular Tests with a pSConfig Template

Lab 7: Configuring pScheduler Limits

Lab 8: Visualizing pScheduler Measurements using Grafana

Lab 9: Observing the impact of TCP window scaling and small TCP Buffer Sizes

Lab 10: Investigating the Effects of MTU mismatch

Network Tools and Protocols (NTP) Lab Series

- Lab experiments

Lab 1: Introduction to Mininet
Lab 2: Introduction to iPerf
Lab 3: WANs with latency, Jitter
Lab 4: WANs with Packet Loss, Duplication, Corruption
Lab 5: Setting WAN Bandwidth with Token Bucket Filter (TBF)
Lab 6: Traditional TCP Congestion Control (HTCP, Cubic, Reno)
Lab 7: Rate-based TCP Congestion Control (BBR)
Lab 8: Bandwidth-delay Product and TCP Buffer Size
Lab 9: Enhancing TCP Throughput with Parallel Streams
Lab 10: Measuring TCP Fairness
Lab 11: Router's Buffer Size
Lab 12: TCP Rate Control with Pacing
Lab 13: Impact of Maximum Segment Size on Throughput
Lab 14: Router's Bufferbloat
Lab 15: Hardware Offloading on TCP Performance
Lab 16: Random Early Detection
Lab 17: Stochastic Fair Queueing
Lab 18: Controlled Delay (CoDel) Active Queue Management
Lab 19: Proportional Integral Controller-Enhanced (PIE)
Lab 20: Classifying TCP traffic using Hierarchical Token Bucket (HTB)