perfSONAR News and Updates

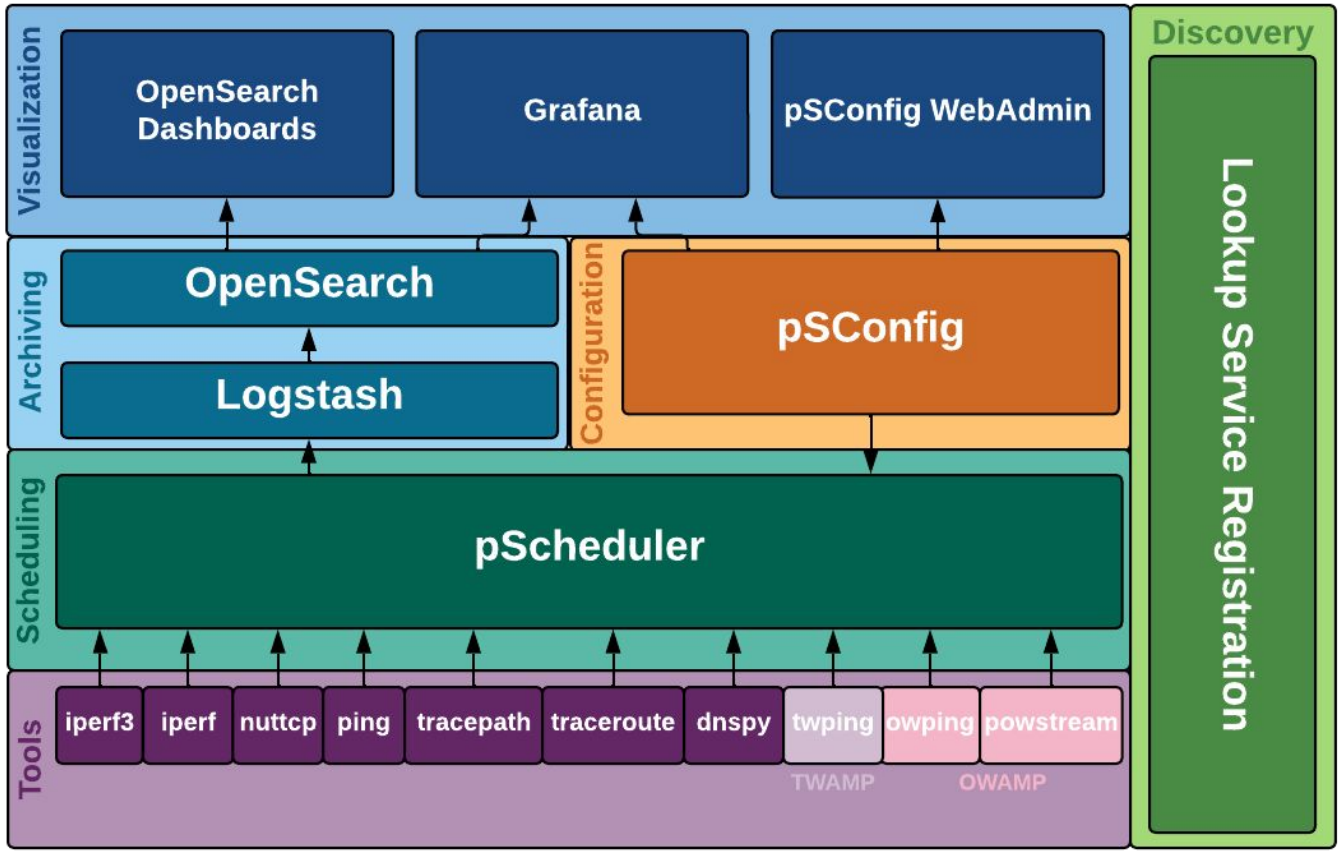
LHCOPN-LHCONE meeting, Beijing

October 10, 2024

Szymon Trocha · PSNC / GÉANT · szymon.trocha@psnc.pl

perfSONAR is developed by a partnership of

New perfSONAR architecture



perf5ONAR 5.1.3

- **OpenSearch backend** (already in 5.0)
- **No Toolkit ISO** (already in 5.0)

- **New Grafana Interface**
  - Customizable visualization, better integration with other data
- **Threaded iperf3 Support**
  - Ability to test at 100Gbps+
- **Python pSConfig**
  - Better maintainability of more modern codebase
- **Installation helper scripts**
- **Better Instrumentation and Troubleshooting Tools**
  - Makes it easier to identify issues when perfSONAR misbehaves
- **New OS Support**
  - Debian 11/12 and Ubuntu 20/22 support (+ Alma and Rocky Linux 9)
  - No CentOS 7 support

Image: New default Grafana UI

OpenSearch Archive Replaces Esmond

- perfSONAR has removed the Esmond software and now provides support for **OpenSearch**
  - Existing data not migrated on update. Data still live on disk.
- Clients can still write to Esmond so they should operate until administrators choose to migrate
- A central OpenSearch instance can be run in parallel with a legacy Esmond instance

pScheduler test plugins enchancements*

* since 5.0

clock	Measure the clock difference between hosts
dhcp	**Measure DHCP Response Time***
disk-to-disk	Network testing of throughput and Read/Write speeds
dot1x	**Test 802.1x Authentication***
dns	Measure DNS transaction time
http	Measure HTTP Response Time
idle	Consume time in the background
idlebgm	Consume time in the background - NOT FOR PRODUCTION
idleex	Consume time exclusively - NOT FOR PRODUCTION
latency	Measure network latency between hosts
latencybg	Run one-way latency tests in the background
mtu	**Find Maximum Transmission Unit (MTU)**
noop	Do nothing
psresponse	**Measure pScheduler Response Time**
rtt	Measure the round trip time between hosts
s3throughput	Test throughput of S3 web service storage
simplestream	Test communication between two hosts using TCP
throughput	Measure network throughput between hosts
trace	Trace the path between IP hosts
wifibssid	**Outputs a list of BSSIDs in json format with the given SSID**

* Requires manual installation

NOTE: Run **`pscheduler plugins test`** to see all INSTALLED plugins

pScheduler tool plugins enchancements*

* since 5.0

bssidscanner	**Scans given interface for all BSSIDs. Returns a list of all associated BSSIDs in json format for the given SSID**
curl	cURL-based tool for HTTP tests
dhclient	**Measure DHCP response time***
dnspy	Measure DNS transaction time
ethr	Measure network throughput with ethr
fwmtu	**Measure Maximum Transmission Unit (MTU)**
halfping	**halfping tool for approximate latency**
iperf2	Measure network throughput with iperf2
iperf3	Measure network throughput with iperf3
nuttcp	Measure network throughput with nuttcp
owping	Determine one-way latency with OWAMP
paris-traceroute	Determine the route between hosts with Paris Traceroute
passthrough	Pass data from noop through as a result
ping	Measure the round-trip time to another host with ping
powstream	Repeatedly measure latency with OWAMP's powstream
psclock	Compare the clocks on two pScheduler nodes
pstimer	Measure pScheduler response time
s3-benchmark	Tool for measuring perfomance of an S3 web server
simplestreamer	Stream data from one node to another with TCP
sleep	Sleep for periods longer than 15 seconds
sleepbgm	Consume time in the background multiple times
snooze	Sleep for periods of 60 seconds or less
tcpping	Measure the round-trip time to another host with tcpping
tracepath	Map the route between hosts with tracepath
traceroute	Map the route between hosts with traceroute
twping	Determine latency with TWAMP

* Requires manual installation

NOTE: Run **`pscheduler plugins tools`** to see all INSTALLED plugins

What is iperf3?

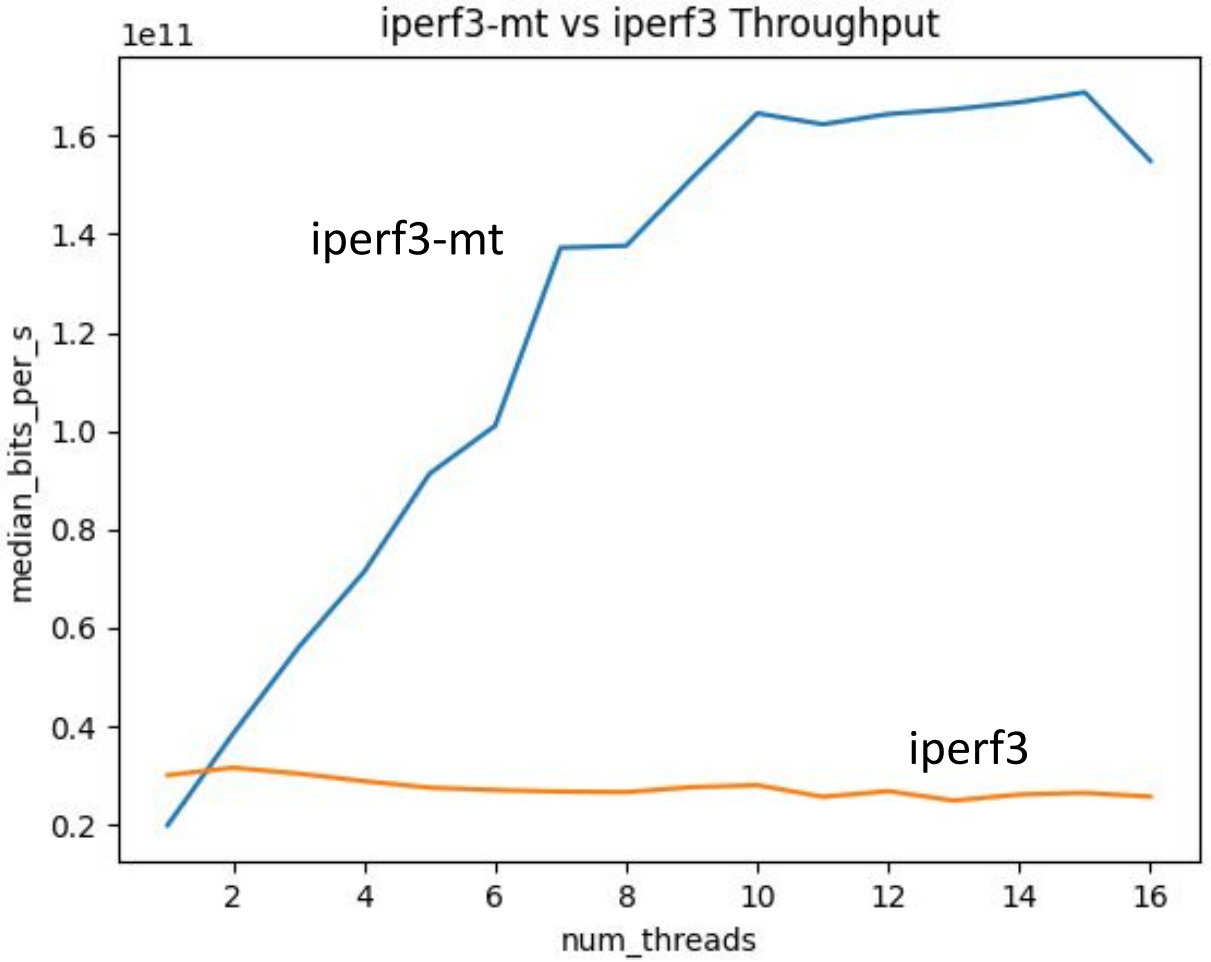
- iperf3 is an open-source tool that measures network traffic performance between a client and server
- It was designed to be used in perfSONAR, but can also be used on its own
- Linux, MacOS, and FreeBSD are all officially supported

iperf3 Multi-Threading

- Before multi-threading, iperf3 was capable of 30-50 Gbps, with single stream TCP, possibly more with tuning
- Many links are faster than iperf3
  - Site connections: N x 100G
  - Backbone: 400G +
- So what if we want to support connections with higher bandwidth? How do we get more throughput?
- The problem: Adding more parallel connections doesn't increase throughput
- Solution: Adding multi-threading to iperf3 to use multiple CPU cores

Effects on Performance

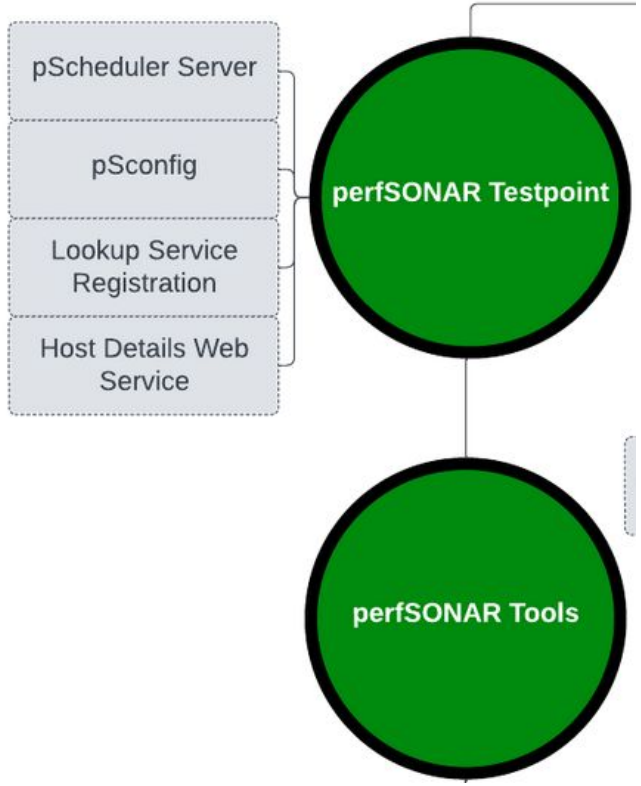
Internal testing showed that iperf3-mt has significant improvements in throughput performance over iperf3



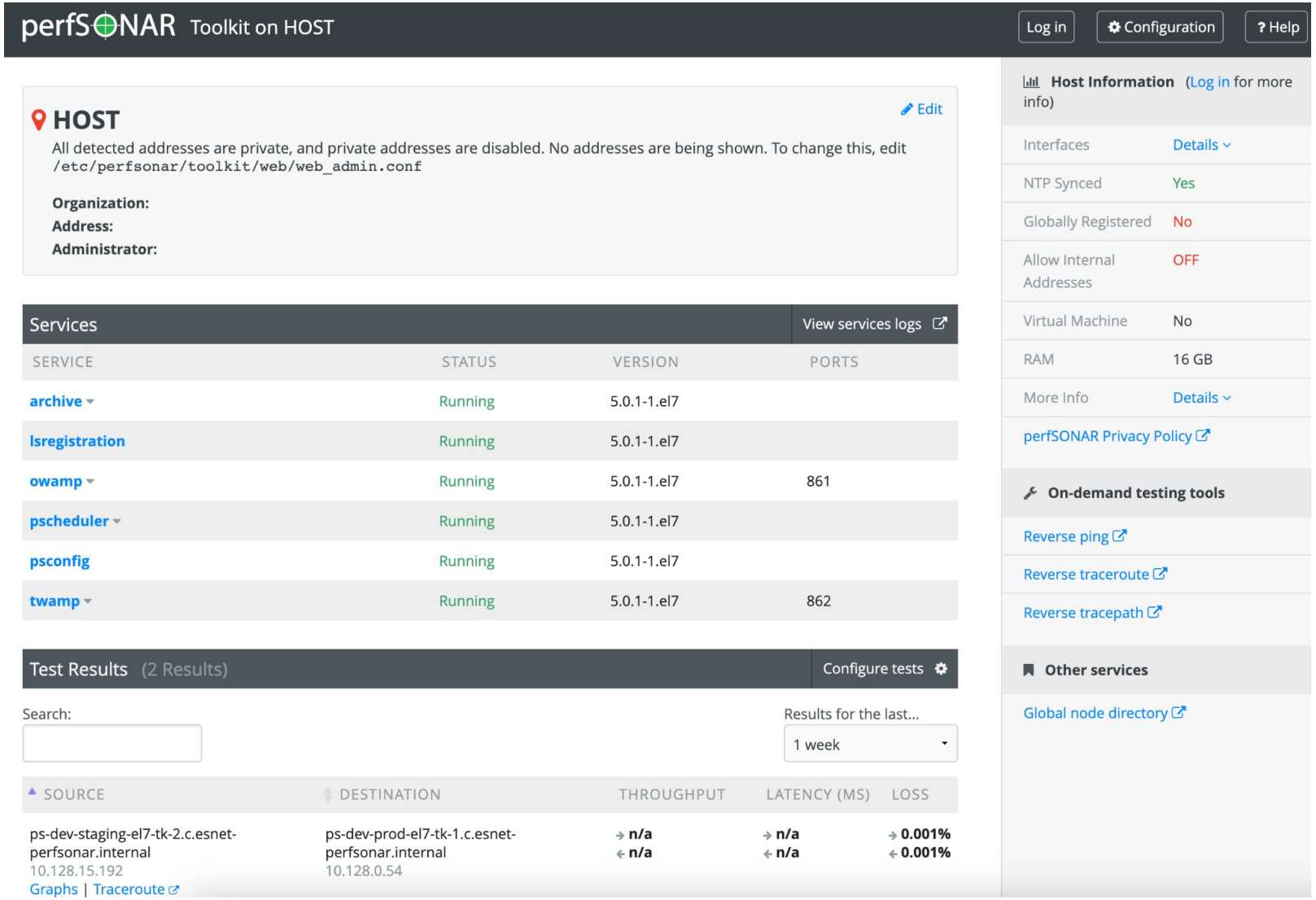
Simple deployments

- `perfsonar-testpoint` bundle

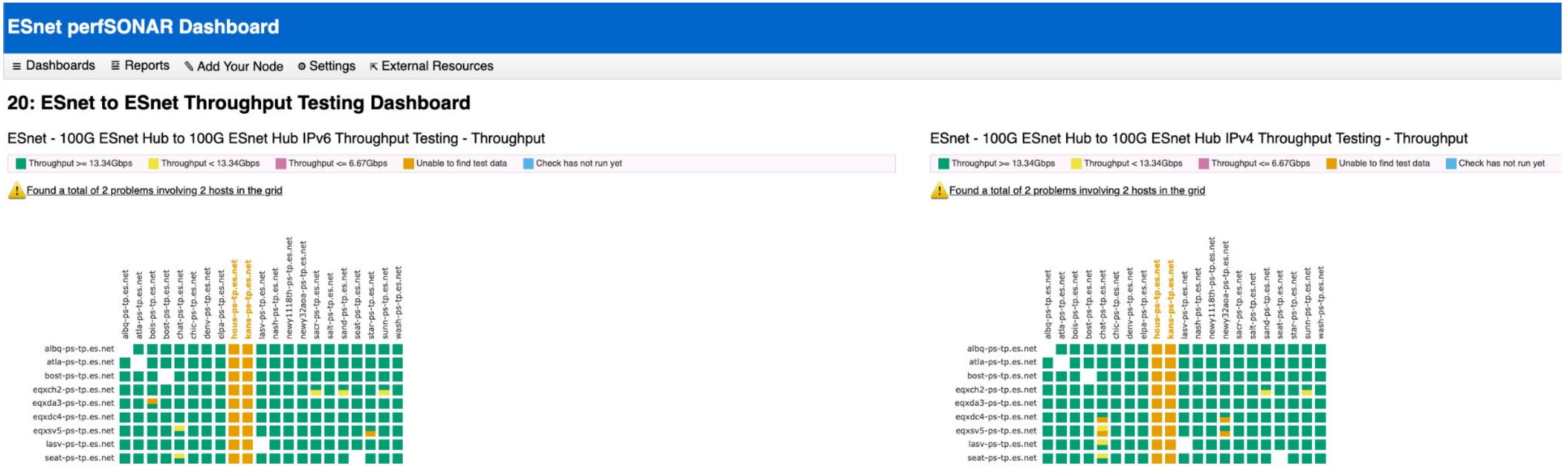
- Automated scripts installation
  - `curl -s https://downloads.perfsonar.net/install | sh -s - testpoint`
- To have auto-updates install `perfsonar-toolkit-systemenv-testpoint` bundle
- By default has host monitoring capabilities with Prometheus exporter



Yesterday's Toolkit UI



Yesterday's MaDDash UI

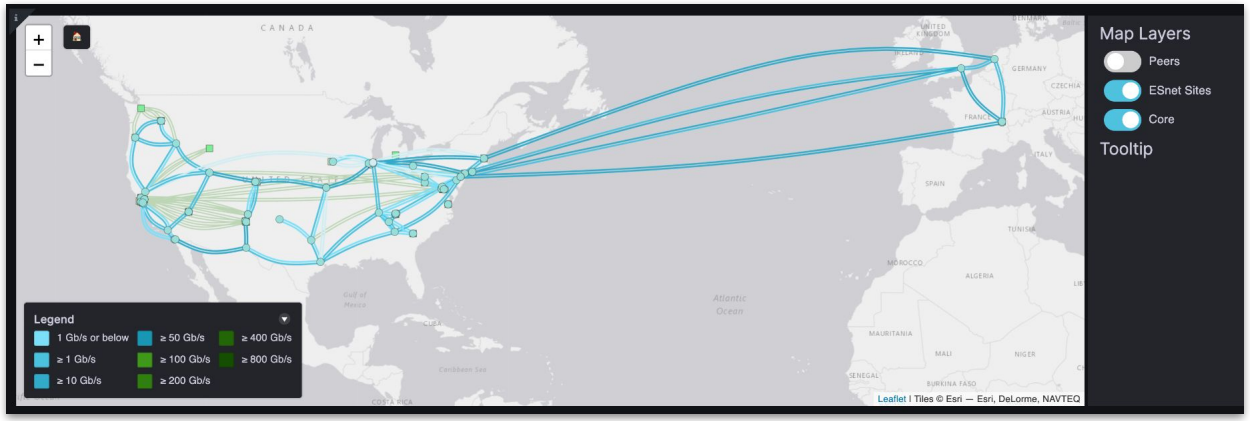


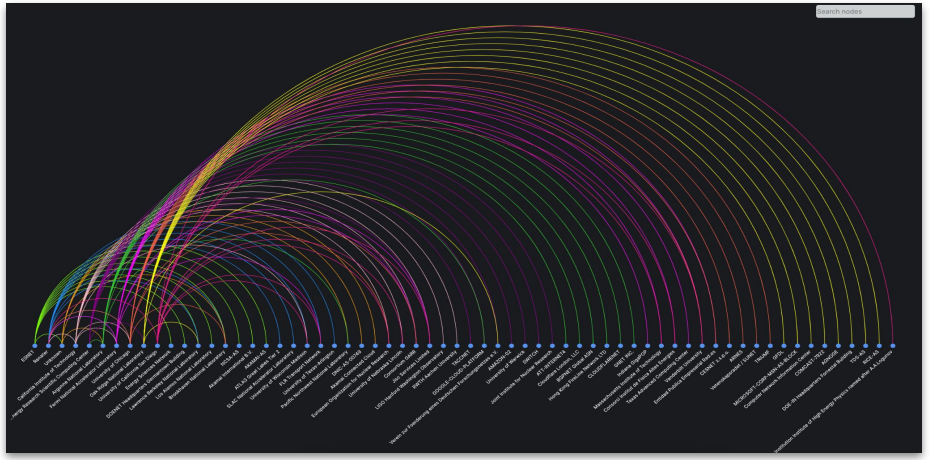
Introducing Grafana

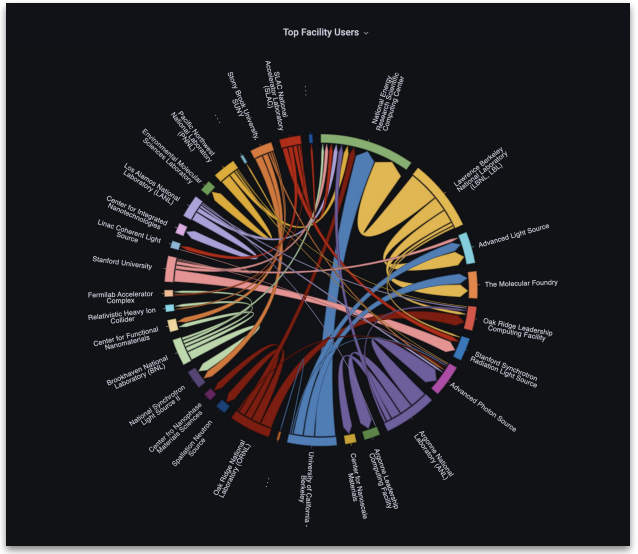
- Grafana is an **open source platform** for for exploring data from a variety of sources
- It has a few key features
  - Its **multi-data source**
  - It has a bunch of **built-in visualizations** that **don't require you to be a Javascript developer** to use
  - It has a **plugin framework** for all of the above so they can be extended and a process for becoming official plug-ins
- More Info: https://grafana.com/docs/grafana/latest/introduction/

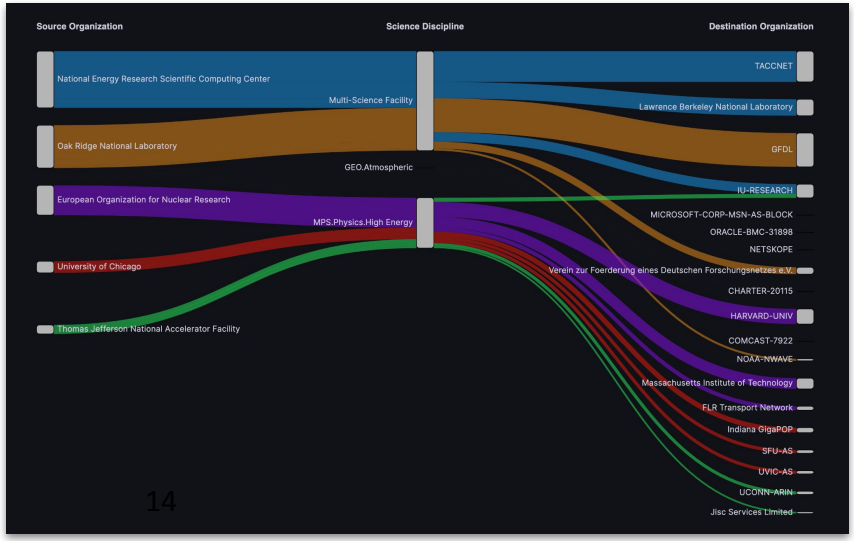
perfSONAR

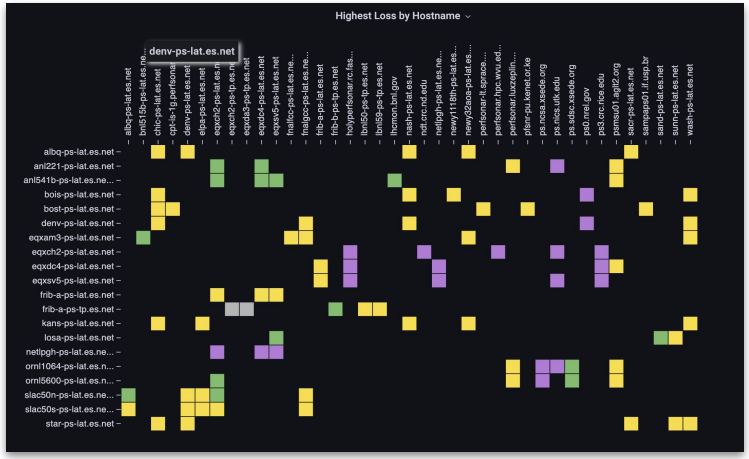
Custom Plugins by NetSage and ESnet

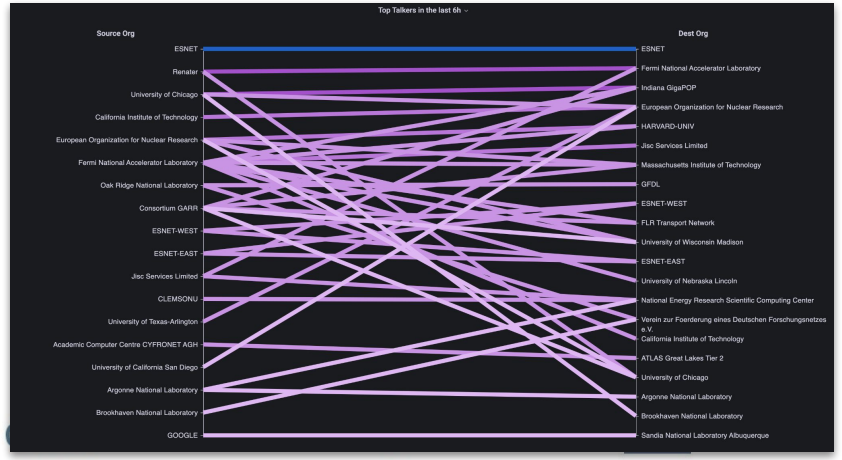






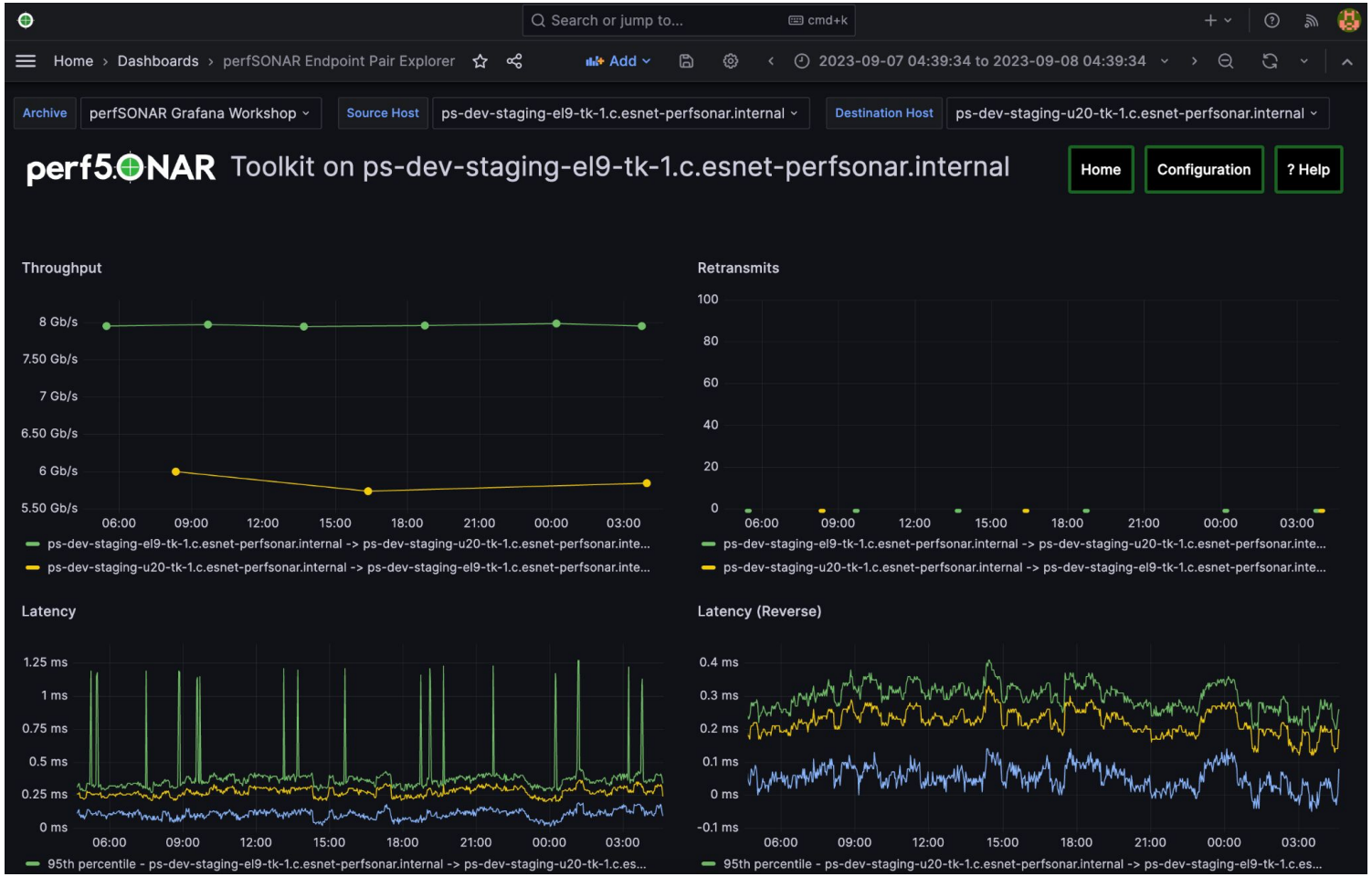




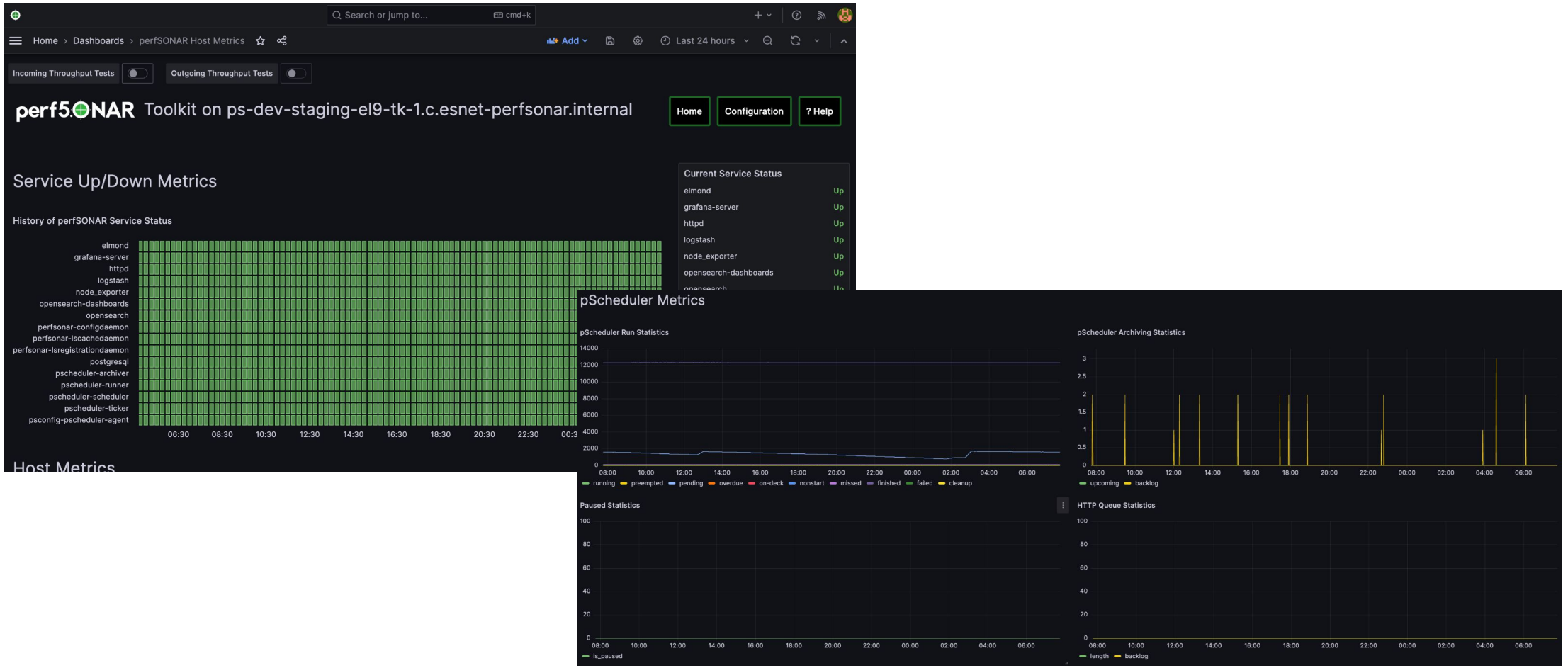


New UI: Focus on Measurements

New UI: Enhancing the Fundamentals



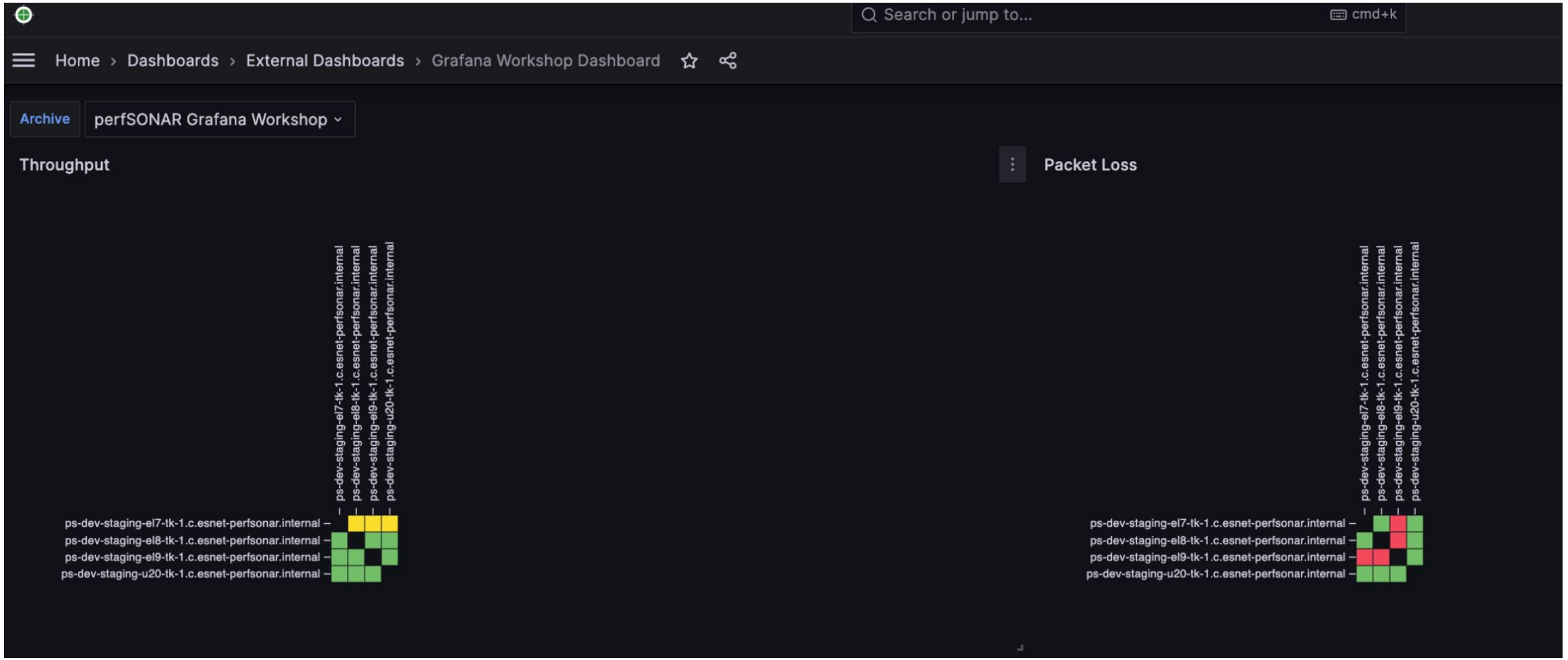
New UI: Instrumentation



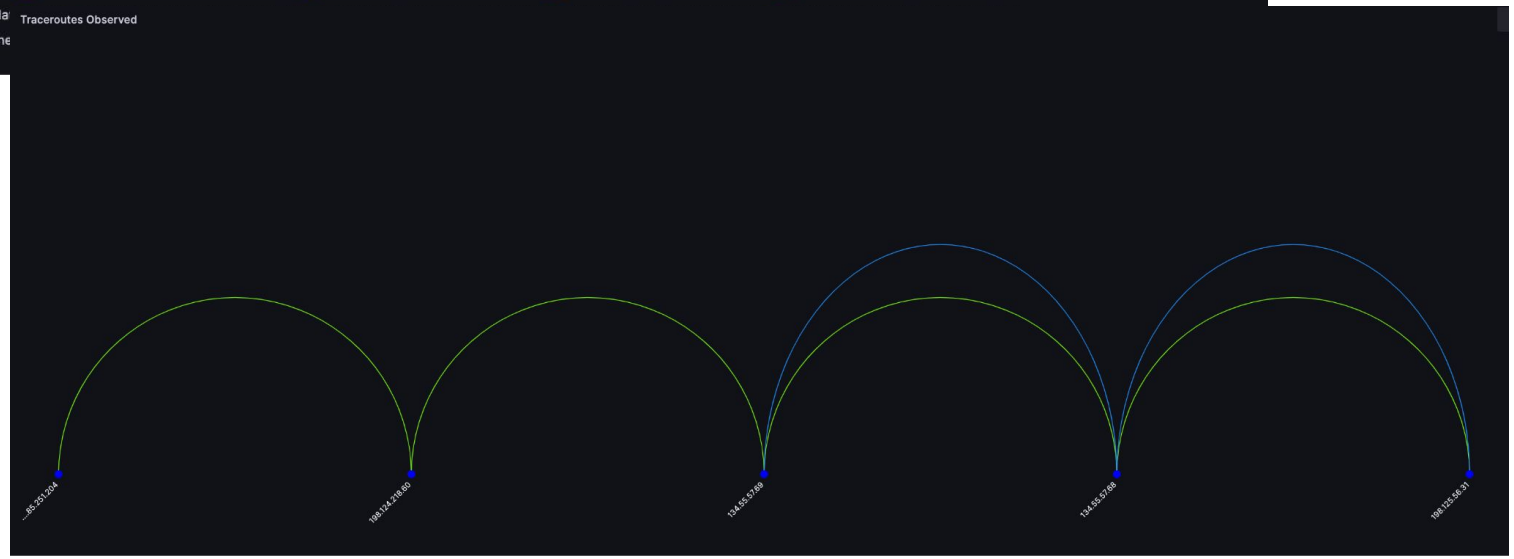
New UI: Data Correlation

Throughput test overlay on host metrics

New UI: MaDDash-like Integration



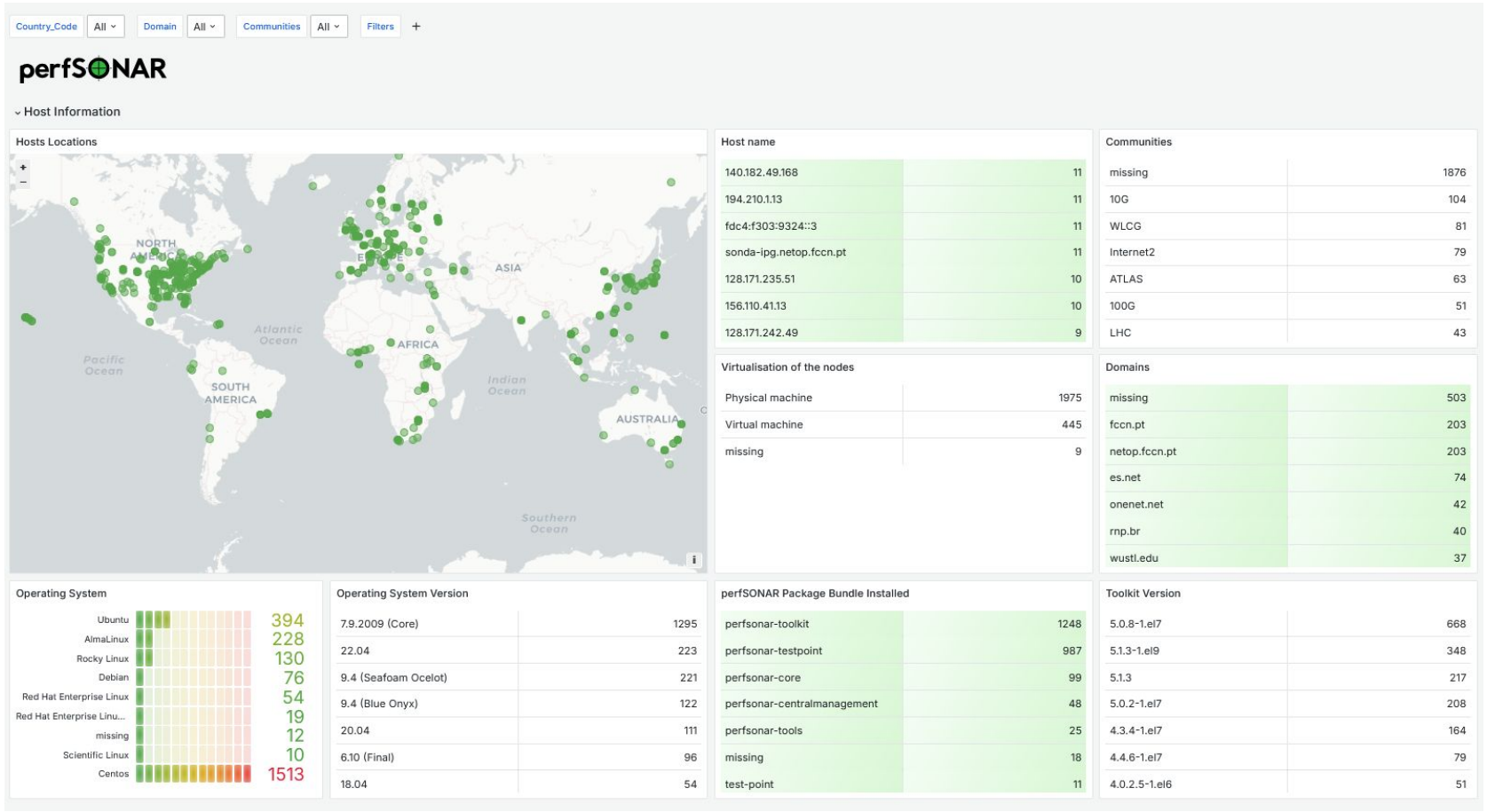
New UI: Customization



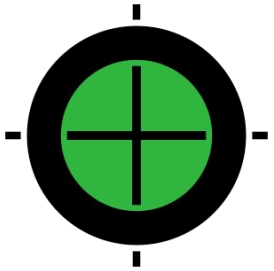
psarchive troubleshoot

```
[root@ps-dev-staging-el9-tk1 andy]# psarchive troubleshoot
OpenSearch running ..... OK
Logstash running ..... OK
OpenSearch API (Localhost) ..... OK
Logstash Endpoint (Localhost) ..... OK
OpenSearch API (HTTPS Proxy) ..... OK
Logstash Proxy Credentials ..... OK
Logstash Endpoint (HTTPS Proxy) ..... OK
Logstash->OpenSearch Credentials ..... OK
Logstash->OpenSearch Authentication ..... OK
OpenSearch Data Exists ..... OK
```

LS dashboard refreshment



https://stats.perfsonar.net/



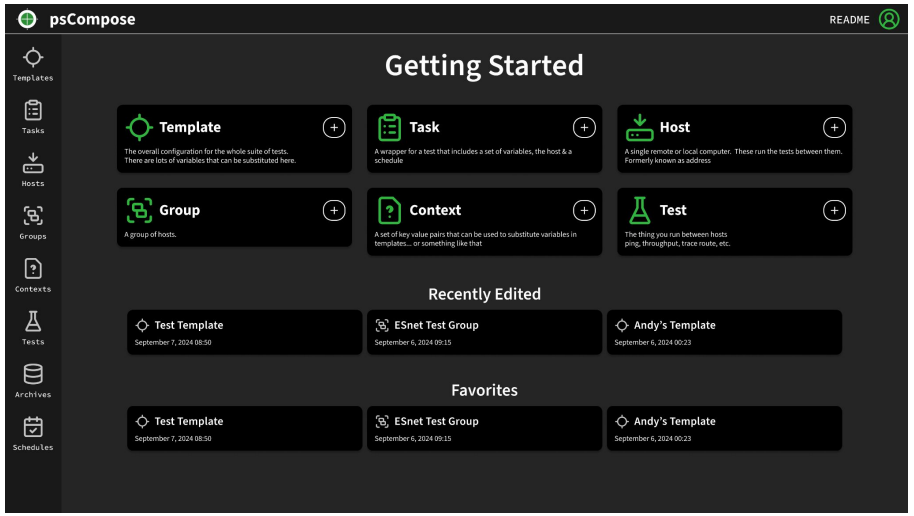
The Future of perfSONAR

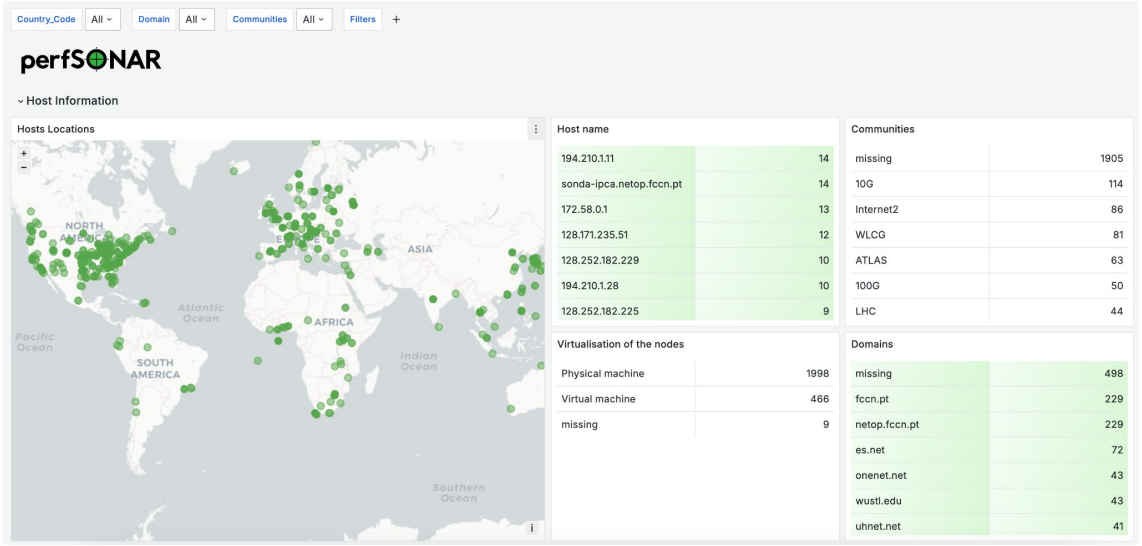
perfSONAR 5.2.0 (Q4 2024)

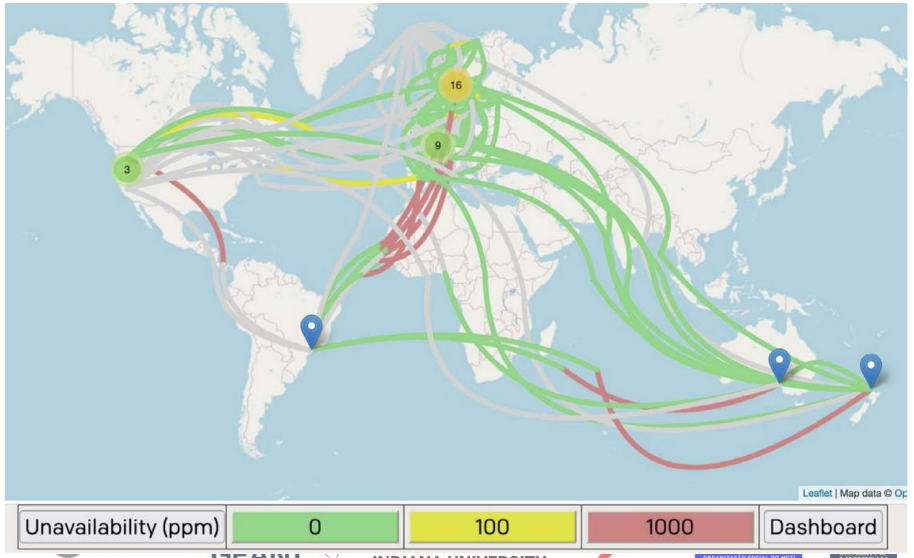
- More of a medium feature/technical debt update
- Ubuntu 24 support
- Some additional features for dashboard generation requested by LHC
- **Summary: Features too big for bugfix release, but we want to get in the wild sooner rather than later**

perfSONAR 5.3.0 (Q2 2025)

- **psCompose**: Improving test configuration experience
- On-demand measurement UI
- Lookup service enhancements
- Micro-dependency analysis
- Exploring PTP support







What comes next?

- **Operational analysis and alarming**
  - Leverage features of current technology stack
  - Better orchestration of debugging process
  - Integration with existing data, processes and projects (e.g. MetrANOVA)
  - Explore possibilities in AIOps for identifying relevant measurements

- **Training the community on the new generation of perfSONAR**
  - Refresh videos
  - Continue workshops
  - Can we leverage ML/NLP to better support user questions?

- **Continue to invest in software reliability and sustainability**
  - Continue to automate build and test processes
  - Eliminate single points of failure within the project

Upcoming Events

- *November 8th:* **perfSONAR Office Hours @ CI Lunch&Learn Zoom**
  2:00 p.m. ET / 8 p.m. CET, https://esnet.zoom.us/j/804696793

- *December 9th:* **perfSONAR Workshop @ Internet2's TechEx24**
  https://events.internet2.edu/website/69276/home/

Useful Resources

- *Central Archive with Grafana Cookbook*
  https://docs.perfsonar.net/cookbook_central_archive.html

- *Grafana perfSONAR Dashboard Cookbook*
  https://docs.perfsonar.net/grafana_cookbook.html

perfSONAR News and Updates

LHCOPN-LHCONE meeting, Beijing

October 10, 2024

The scientific work is published for the realization of the international project co-financed by Polish Ministry of Science and Higher Education from financial resources of the programme entitled "PMW"

Szymon Trocha · PSNC / GÉANT · szymon.trocha@psnc.pl

perfSONAR is developed by a partnership of