

Celebrating 20 Years of perfSONAR

June 12, 2025

Lætitia A Delvaux, PSNC

perfSONAR is developed by a partnership of

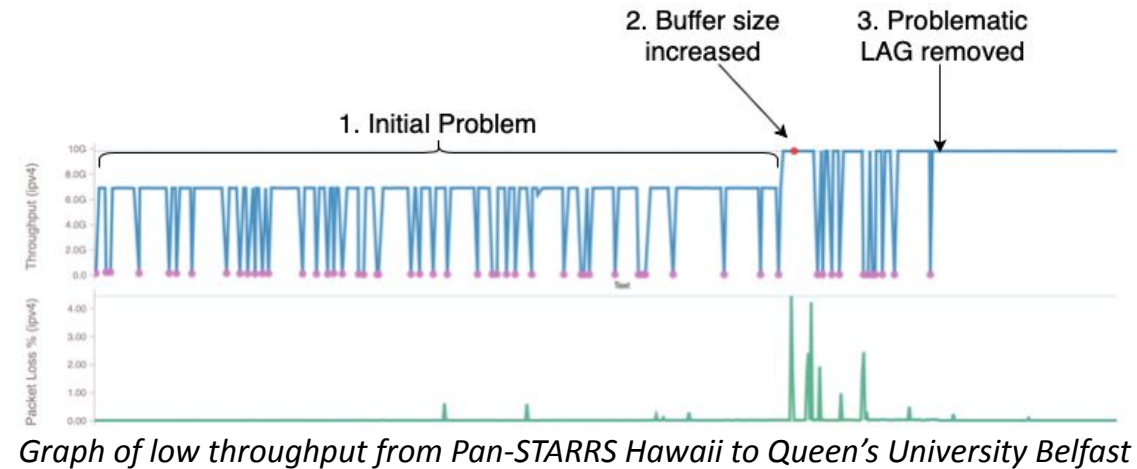


perfSONAR

- perfSONAR is an **open source software suite** that runs, stores and displays **active measurements** such as **throughput, packet loss, latency and traceroute**
- Primarily maintained by consortium of **ESnet, GEANT, Indiana University, Internet2, RNP** and the **University of Michigan**
- **Over 2000 registered public deployments** around the world across hundreds of institutions



Map of perfSONAR deployments around the globe



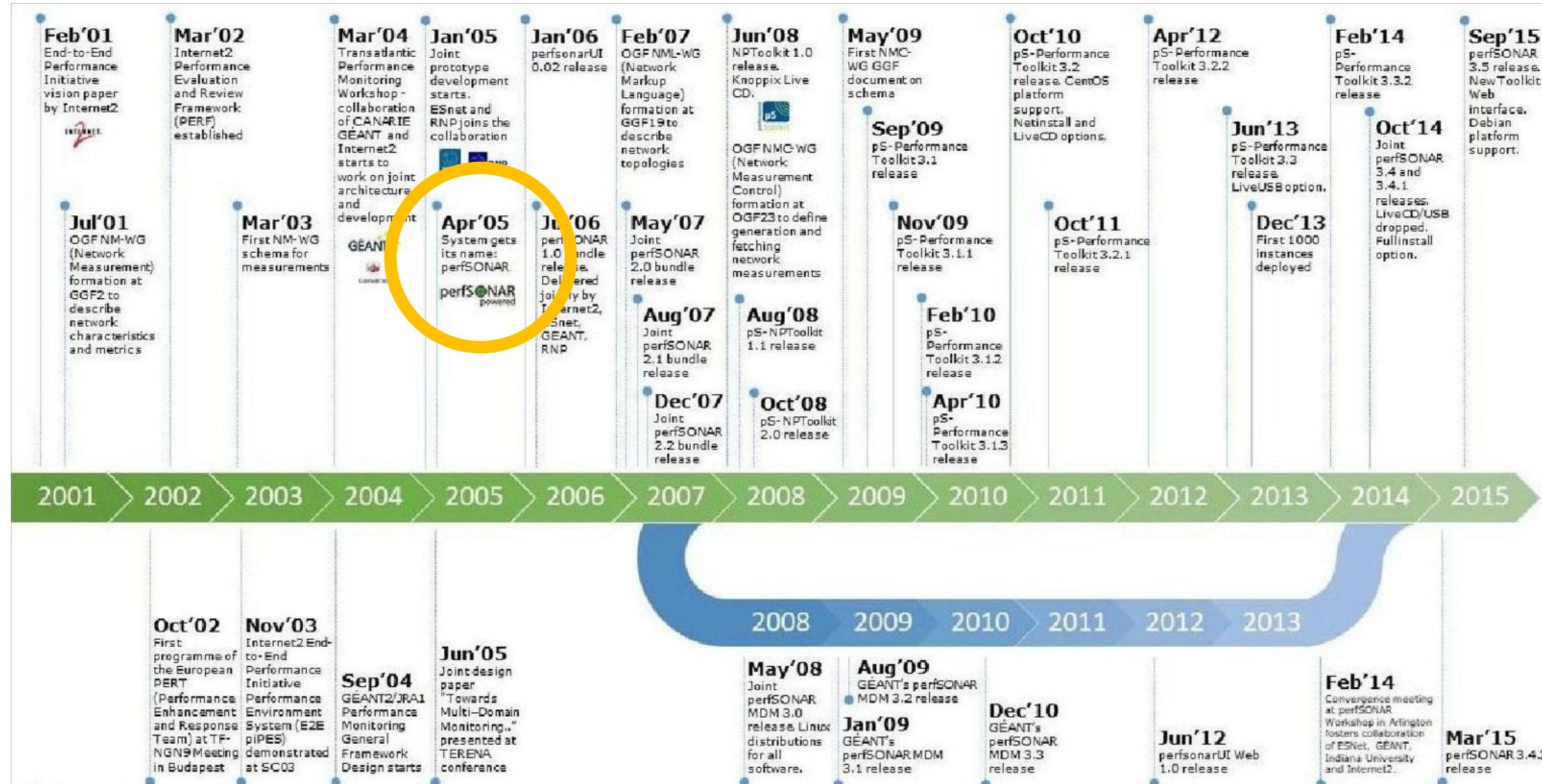
Graph of low throughput from Pan-STARRS Hawaii to Queen's University Belfast

Example perfSONAR use cases:

- Solving global network performance issues for researchers transmitting data from **Pan-STARRS Hawaii to Queen's University Belfast** (see above graph)
- Identifying packet loss issues at **UT Arlington**
- Identifying performance bottlenecks as **Large Hadron Collider (LHC)** prepares for the "high luminosity" era

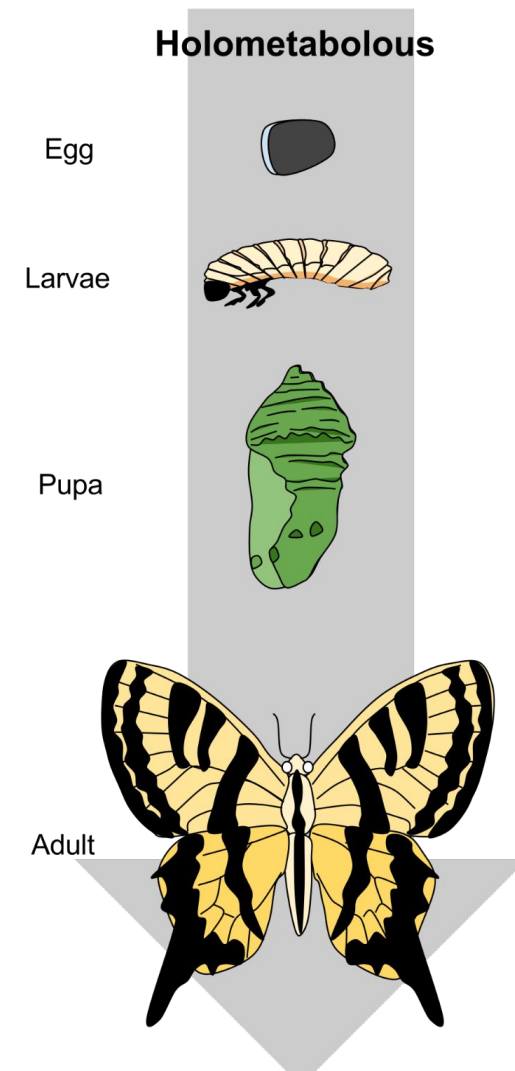
perf20NAR years

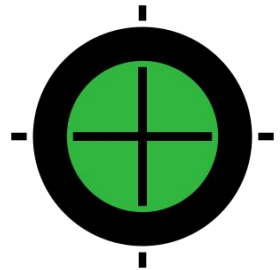
20 years of experience



perfSONAR's Metamorphosis

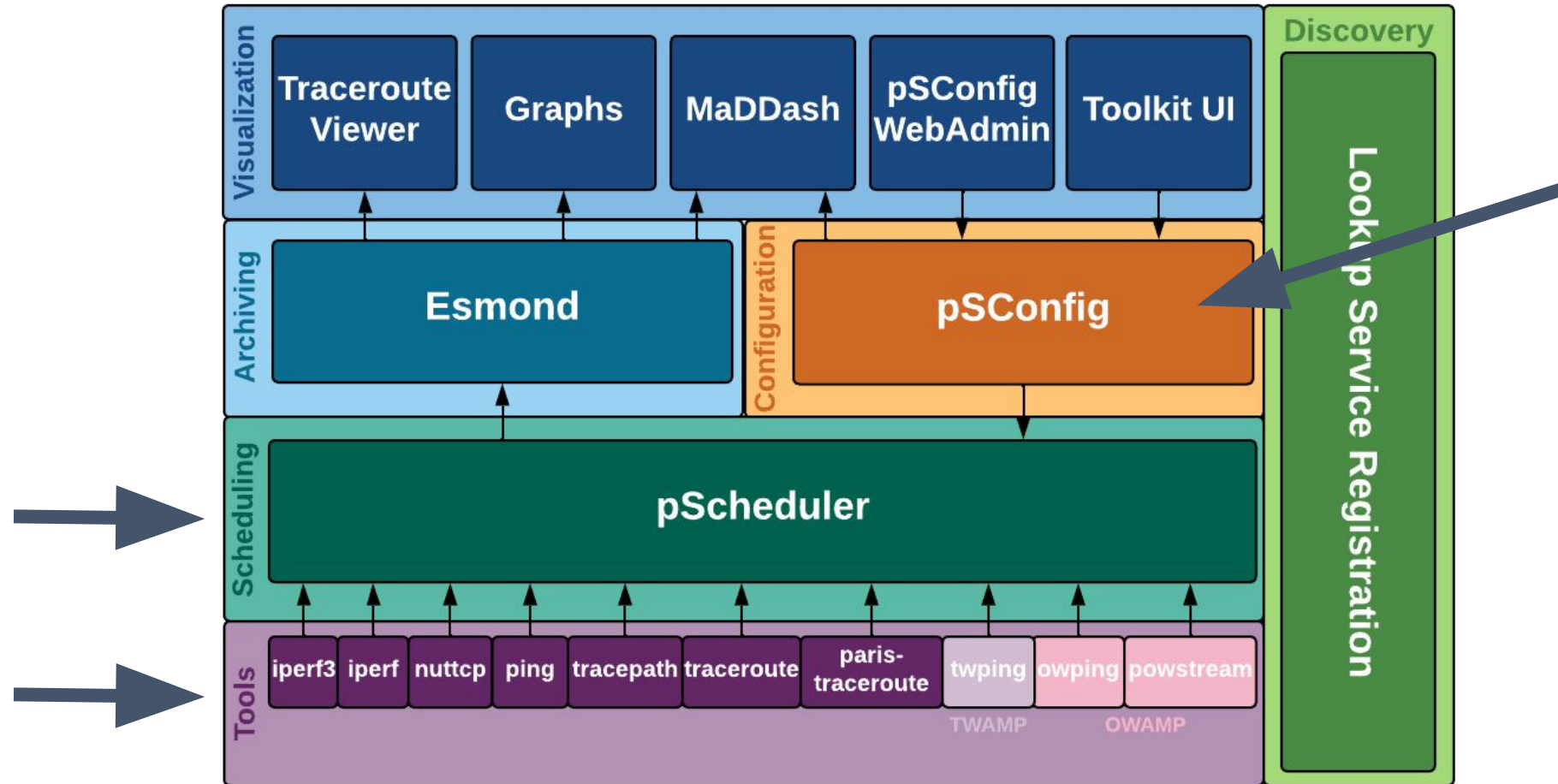
- As perfSONAR reaches 20 years old, it also approaches an important point in its history
- 5.0 kicked off a stage of metamorphosis that will largely wrap-up by the time we hit 5.3.0 later this year
- Let's take a step back and look at these changes...



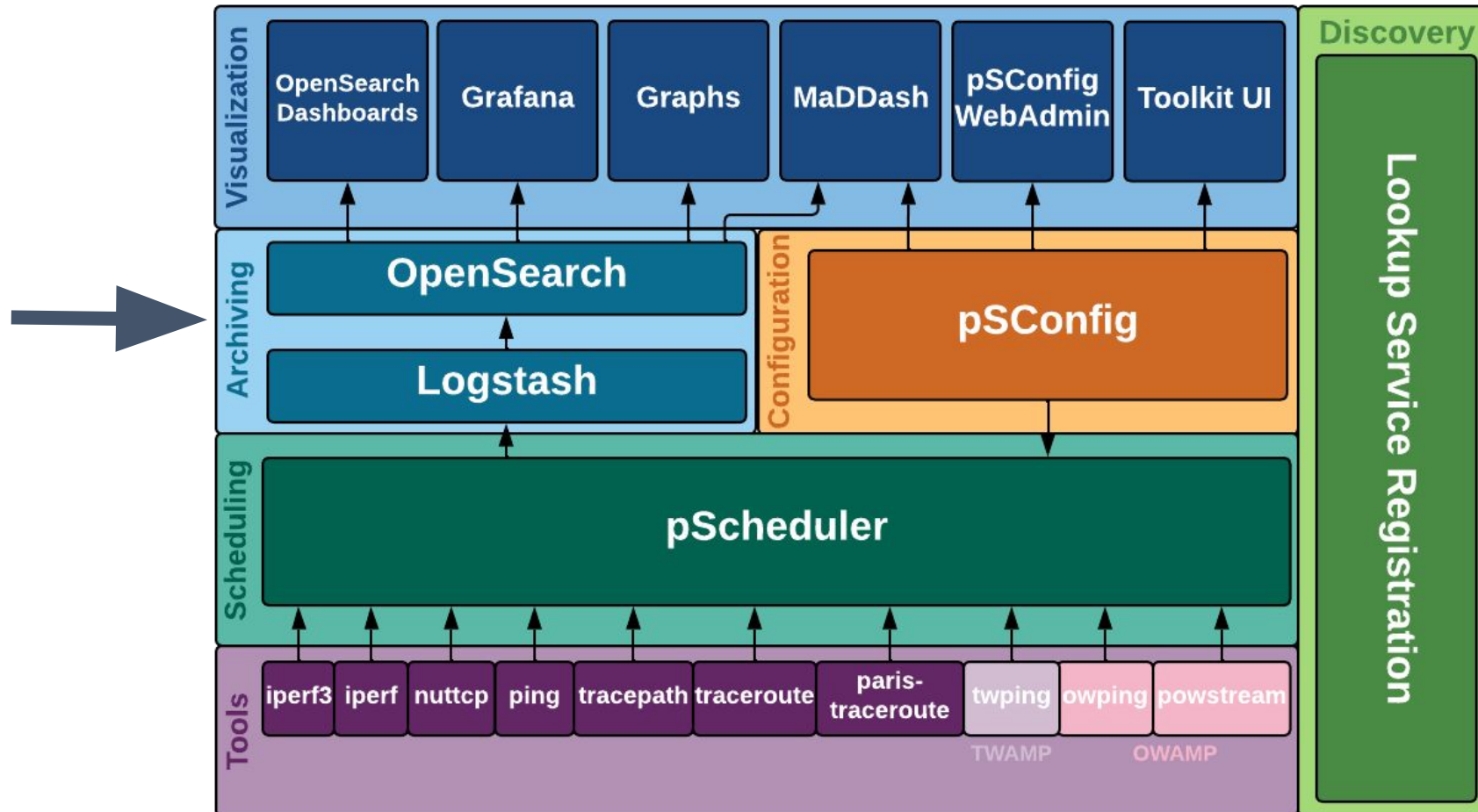


What's been happening the past few years?

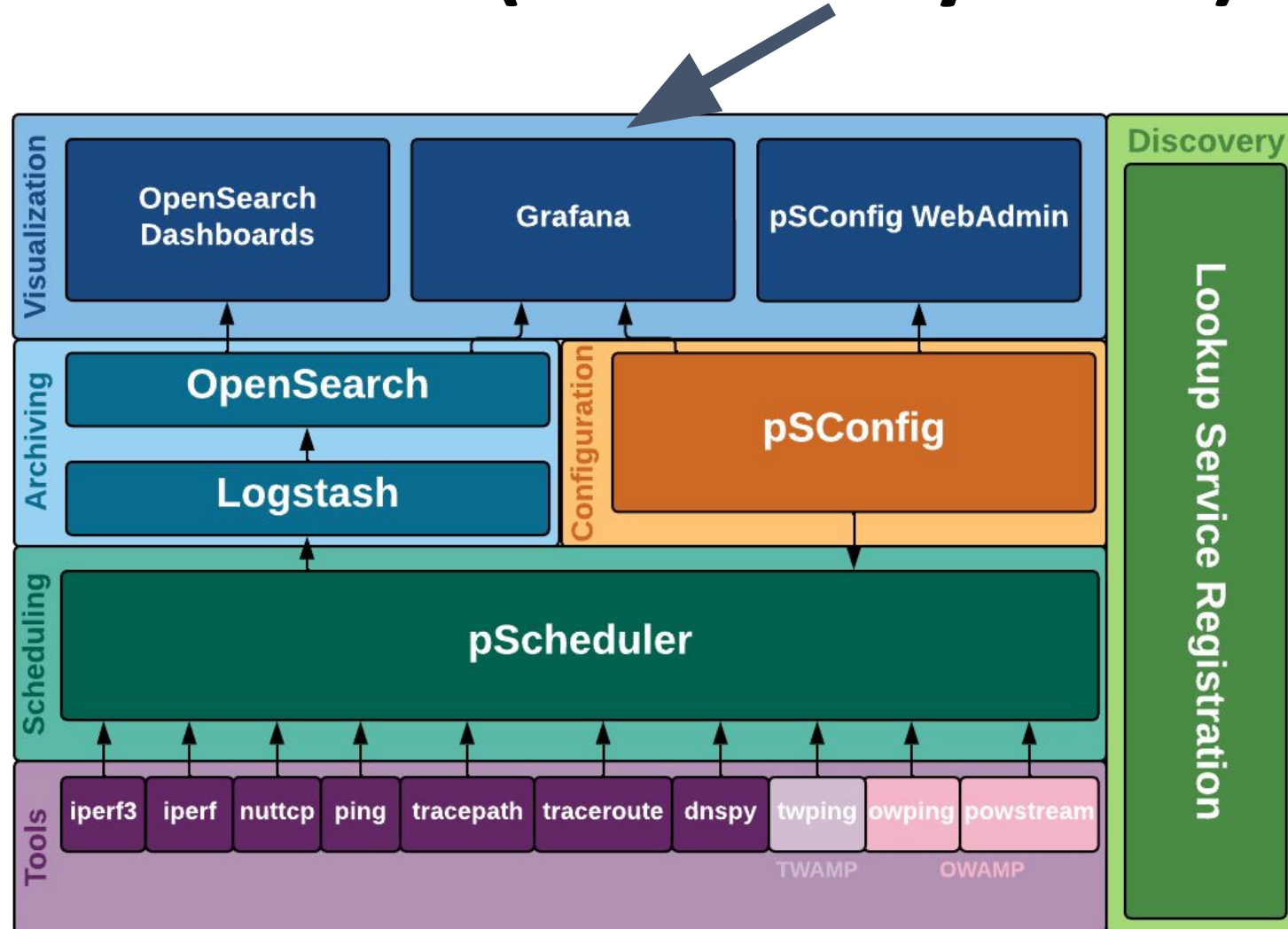
perfSONAR in 2020 (4.X)



perfSONAR 5.0 (2023)

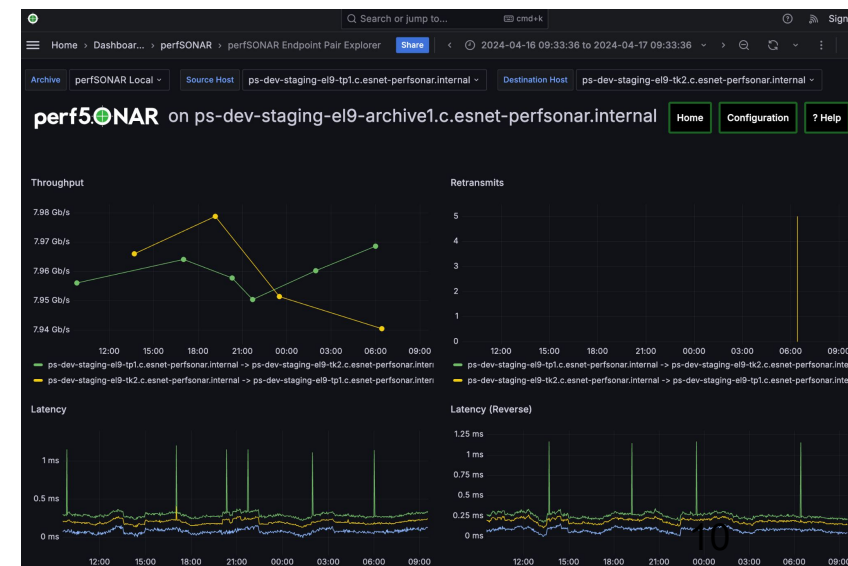
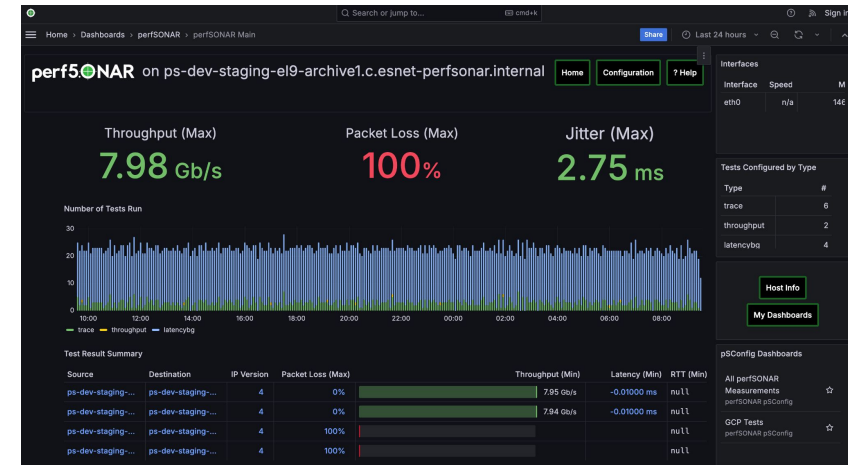


perfSONAR 5.1-5.2 (2024-Early 2025)



perfSONAR 5.1.0-.4

- **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
- **Better Instrumentation and Troubleshooting Tools**
 - Makes it easier to identify issues when perfSONAR misbehaves
- **OS Support**
 - Debian 11, Debian 12 and Ubuntu 22 support. No CentOS 7 support.

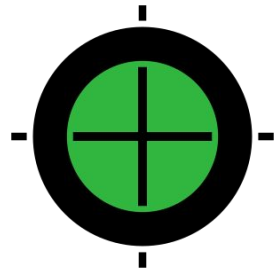


perfSONAR years

5.2.0

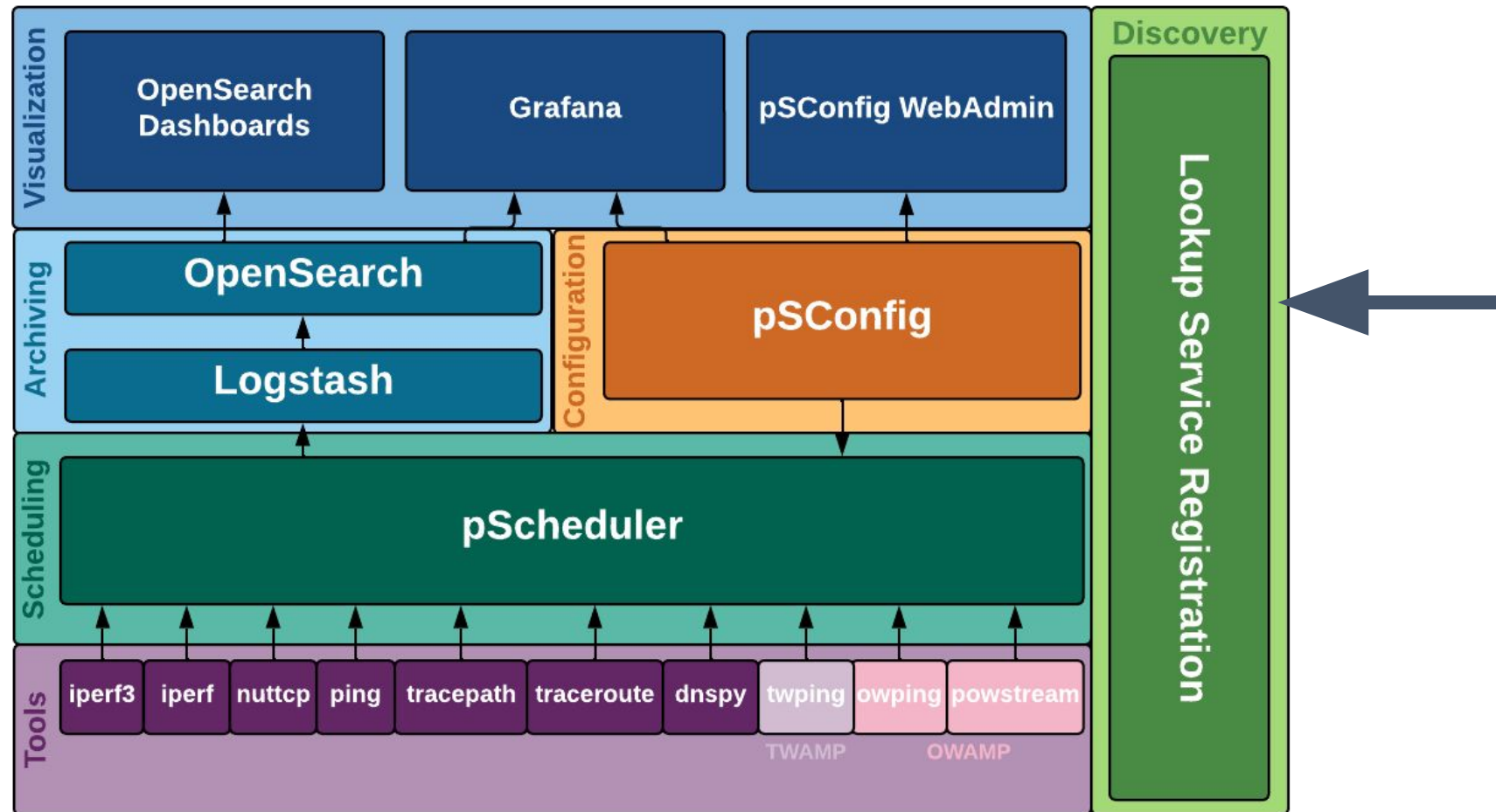
- **5.2.0 just released**
 - 20th anniversary release
- **No major new features**
 - Inside components updates (Grafana, OpenSearch)
- **New OS Support: Ubuntu 24**
 - Debian 11 & 12 and Ubuntu 20, 22 and 24
 - Alma Linux 9 or Rocky Linux 9
- **Docker image for ARM64**
- **Install it with our installer script**



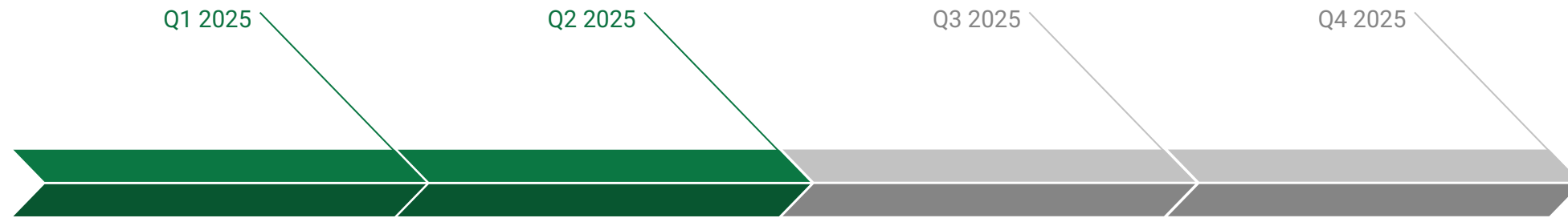


What does 2025 look like?

perfSONAR 5.3 (2025)



Release Plan for 2025



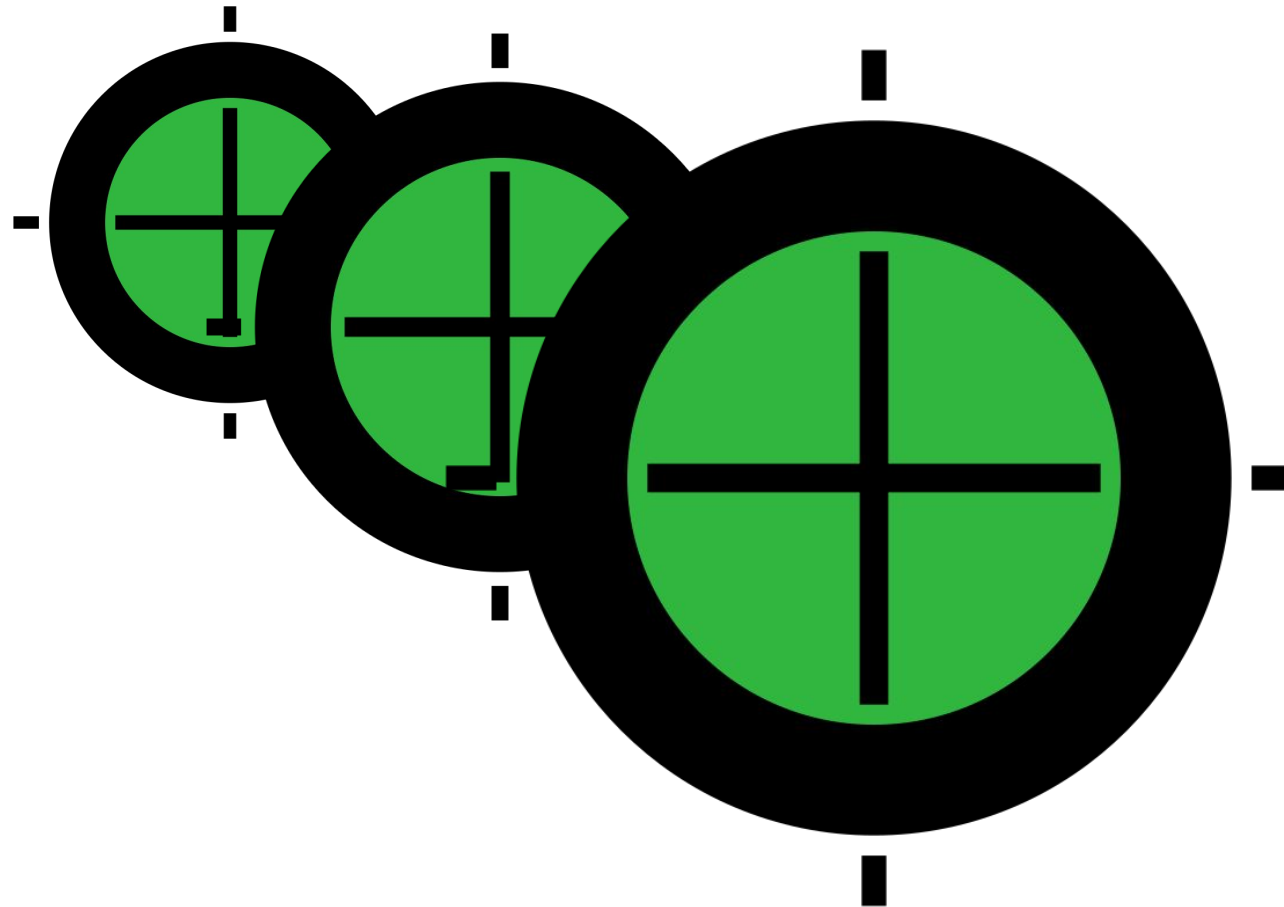
perfSONAR 5.2.0

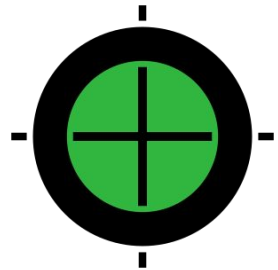
- Not a huge feature release, but multiple changes too big for a bugfix release
- Ubuntu 24 support
- Grafana and OpenSearch updates
- Lots of fixes and quality of life improvements

perfSONAR 5.3.0

- Improving test configuration experience
- Lookup service enhancements
- Timekeeping improvements
- Micro-dependency analysis interface
- psGUI on-demand measurement UI

Let's zoom in on a few specific features....





pSCompose

Next generation UI for test configuration

Test Configuration Today

CONFIGS
Showing registered configs

7 Configs

owamp1	Owamp Test 111	Nov 29, 2017
testz	Development Testbed	May 9, 2018
testz	testz	Nov 29, 2017
throughput1 tcp	throughput1 tcp	Dec 4, 2017
Testbed1	Testbed1	Apr 25, 2018
Multi-type test mesh	Multi-type test mesh	Dec 7, 2017
Throughput1 based on Mar 27, 2018 toolkit8	Throughput1 based on Mar 27, 2018 toolkit8	

MeshConfig URL: `http://mca-dev.grnoc.iu.edu/pub/config/owamp1` [Open MeshConfig](#)

Name * Owamp Test 111

Description An owamp test

Admins Michael Johnson <mj82@loba1noc.iu.edu>

Users who can update this configuration

Central MA URLs `https://perfsnar-testbed-ma.grnoc.iu.edu/esmond/perfsnar/archive/`

Providing Measurement Archive URLs (one per line) will allow you to send test results for all tests in the config to one or more central measurement archives.

Force endpoint MAs Force archiving to the MA on each endpoint
Enabling this option will force the all test results to be stored in the Individual MA for each host. This is useful if you don't have a central MA, or if you need to store at each endpoint for some other reason.

Tests

Enabled (include in mesh config) [Remove Test](#)

Test Name Throughput1

Service Type Throughput Topology Mesh

Host Group A Throughput Hostgroup 1 (4 Hosts)

- gis perfsnar-dev9.grnoc.iu.edu
- gis resnet-ps.gatech.edu
- Adhoc mca-dev.grnoc.iu.edu
- atlas uc2-net2.mw2.org

No Agent Hosts (Optional) Enter Hostnames

Defines an address that will not initiate tests when used in this group. This will override the `no_agent` field specified in the host directive if defined. It is recommended you use the host directive to define this if a address cannot initiate tests for any group. Only use this form if you want a host to initiate tests when used in some groups but not others.

Testspec iperf3 TCP Test Between Testbeds Testspecs

random_start_percentage 25 ipv4_only 1

tool bwctl/iperf3 interval 14400 duration 20

protocol tcp

[Add New Test](#) or [Import from existing meshconfig](#)

Add Test Cancel OK

Test parameters

Type: Throughput

Test name/description: Test name Test Status: Enabled

Interface: Default Protocol: TCP

Time between tests: 6 Hours Test duration: 20 Seconds

[Advanced Parameters](#)

Tool(s), in order of preference: iperf3 iperf

Direction: Send and Receive Use Autotuning: Enabled

Number of Parallel Streams: Omit Interval (sec): Use Zero Copy: Disabled TOS bits: 0

Home / Configuration / Tests

Administrative Information Host Services Tests

All scheduled tests

▲ Throughput tests will be running 0% of the time

Configure tests between this host and other hosts. + Host + Test

View by: Test | Host

TEST NAME	TYPE	INTERVAL	TEST MEMBERS	ENABLED	ACTIONS
My Throughput Test	Throughput - TCP	6 hours	1 host	<input checked="" type="checkbox"/>	⚙️ 🗑️

Resources

[Configuring Tests](#)

You've made changes that haven't been saved. Cancel Save

pSConfig Test Configuration

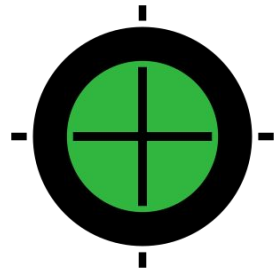
- **Simplified and Consolidate UIs**
 - We want one UI to serve Toolkit UI and PWA role
 - Leverage Lookup Service for host completion
 - Make it easy and clear to set common fields needed for Grafana, etc
- **Align Tech Stack**
 - An update call not strictly required, need to determine what is easiest for clients (delete+add vs update)
- **Leverage Flexibility of pScheduler and pSConfig**
 - We don't want to issue a code update everytime a new test type implemented or new options added

Development Underway...

The 'Getting Started' screen in psCompose features a sidebar with navigation icons for Templates, Tasks, Contexts, Tests, Archives, Schedules, Groups, and Hosts. The main content area includes a 'Welcome to psCompose!' message with a question about starting a template from scratch. Below this are two primary actions: 'Import Template' (with a sub-note about importing JSON files) and 'Create New Template' (with a sub-note about creating from scratch). A 'Published Templates' table is shown below, and a 'Recently Edited' and 'Favorites' sidebar on the right lists existing templates like 'Test Template', 'ESnet Test Group', and 'Andy's Template'.

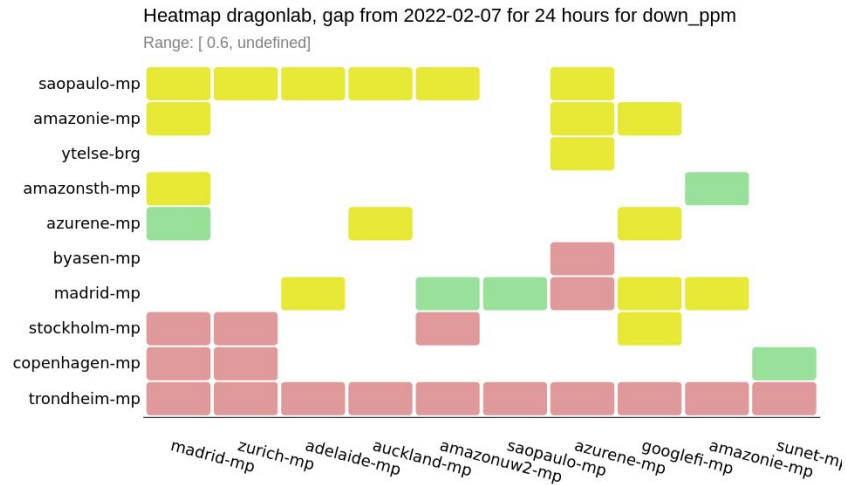
Name	Tasks	Interval	Test Members	Enabled	Actions
My First Template	Task A, Task B	6 hours	1 host	<input checked="" type="checkbox"/>	
My Next Template	Throughput - TCP	6 hours	1 host	<input type="checkbox"/>	

The 'New Template' screen shows a progress bar with five steps, with the fifth step, 'Tests', currently active. Below the progress bar, a message instructs the user to ensure their test is in the list or add one now. The main area contains two panels: 'Existing Tests' and 'Test D' configuration. The 'Existing Tests' panel has a search bar and a list of tests (Test A through Test J), with 'Test D' highlighted. The 'Test D' configuration panel includes fields for Name, Type (Throughput), Protocol (TCP), Source (ESnet), Destination (CERN), Intervals (24 hours), Durations (20 seconds), and Other Meta (Enter json). 'Save' and 'Cancel' buttons are at the bottom right.



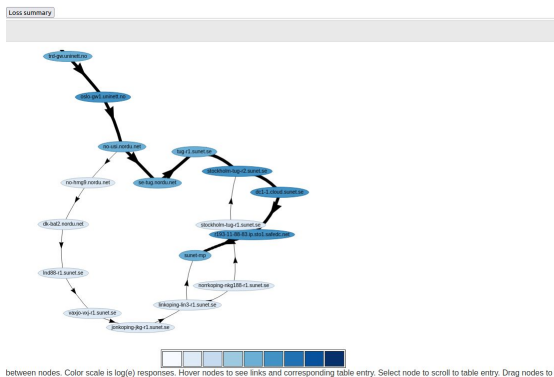
Micro-dependency

Microdep: spot micro outages

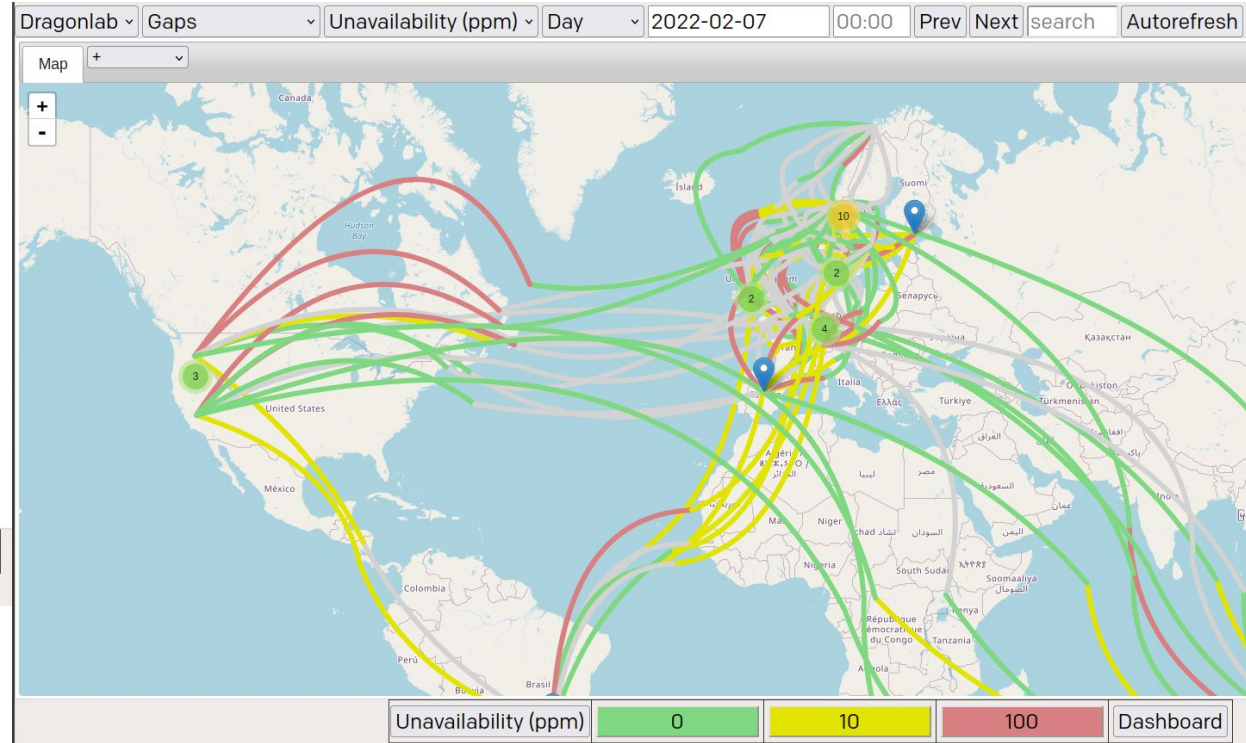


Last status:16:41:13 Got 9692 gap records for 2022-02-07 ;; Last error:none
(*) The positions of sites are a guess and not official

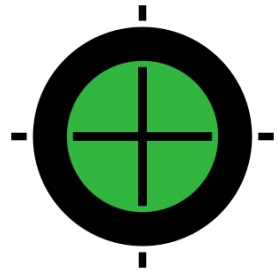
trondheim-mp to sunet-mp(89.45.232.192) on 2022-02-07



between nodes. Color scale is log(e) responses. Hover nodes to see links and corresponding table entry. Select node to scroll to table entry. Drag nodes to fit



Last status:16:41:13 Got 9692 gap records for 2022-02-07 ;; Last error:none
(*) The positions of sites are a guess and not official.



psGUI

A pScheduler on-demand UI

perfSONAR GÉANT

Home Run measurement

Nodes

Source: Toggle choices Destination:

Test parameters

Test:

IPv4 IPv6

[Advanced parameters](#)

[Submit](#)

Test:

IPv4 IPv6

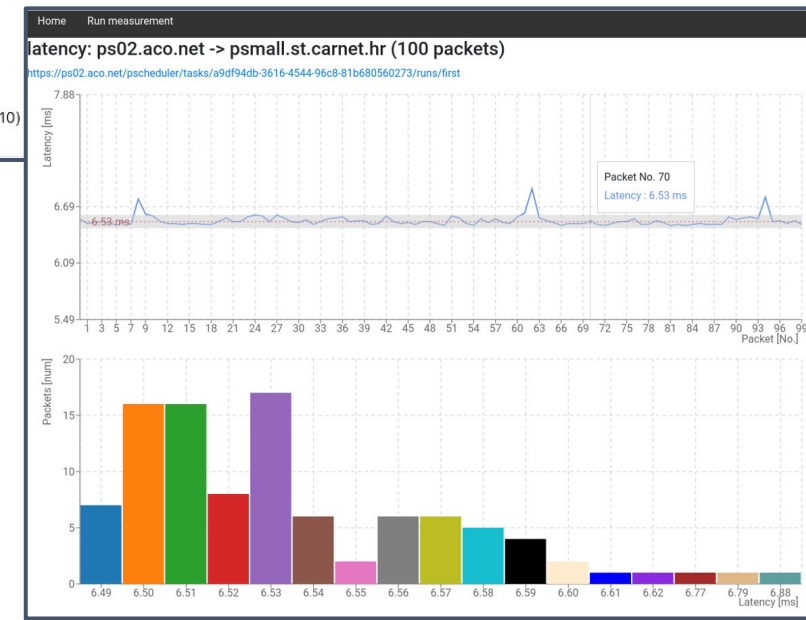
[Advanced parameters](#)

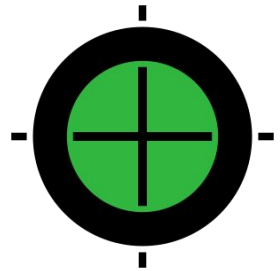
Packet Count:
The number of packets to send (10 - 1000000)

Packet Interval:
The number of seconds to delay between sending packets (0.000001 - 1)

Packet Timeout:
The number of seconds to wait before declaring a packet lost (1 - 10)

Latency, throughput, trace

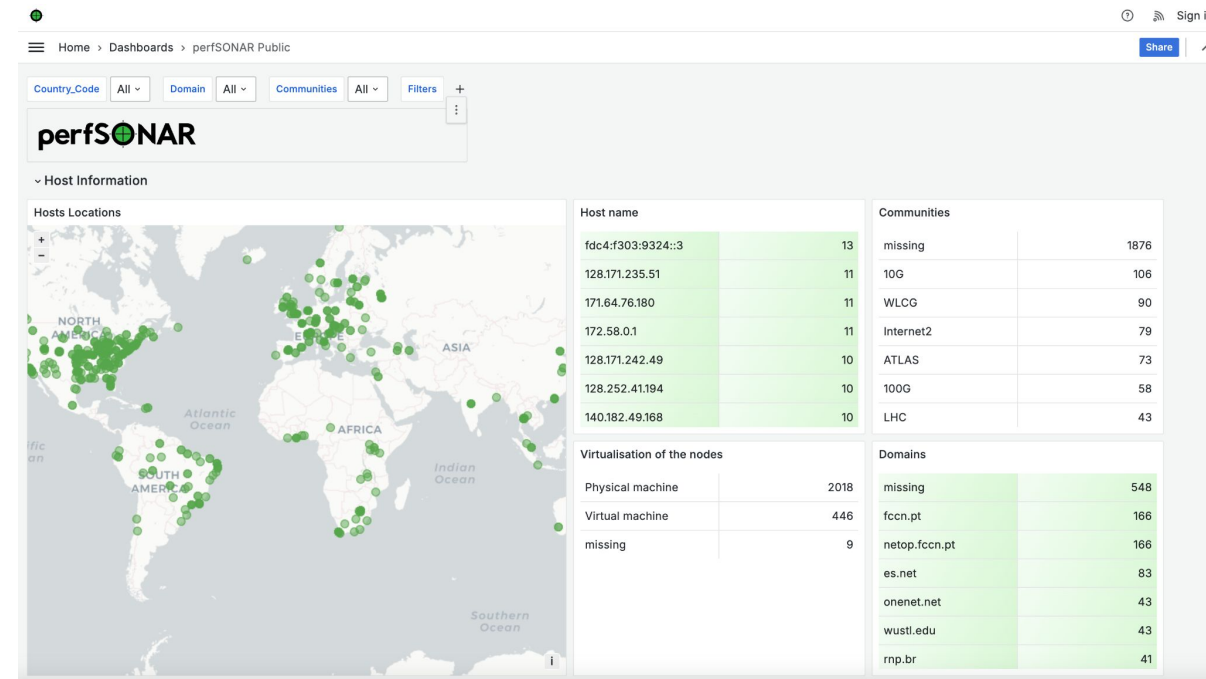




Lookup Service Updates

Lookup Service - What is it?

- Hosts register records to the service
 - Information about toolkit nodes
 - Hosts
 - Interfaces
 - Services
 - metadata
- APIs to discover toolkit hosts and related information
- Records are ensured to be current by setting expiration date
 - Hosts to re-register before expiry



<https://stats.perfsonar.net> powered by lookup service

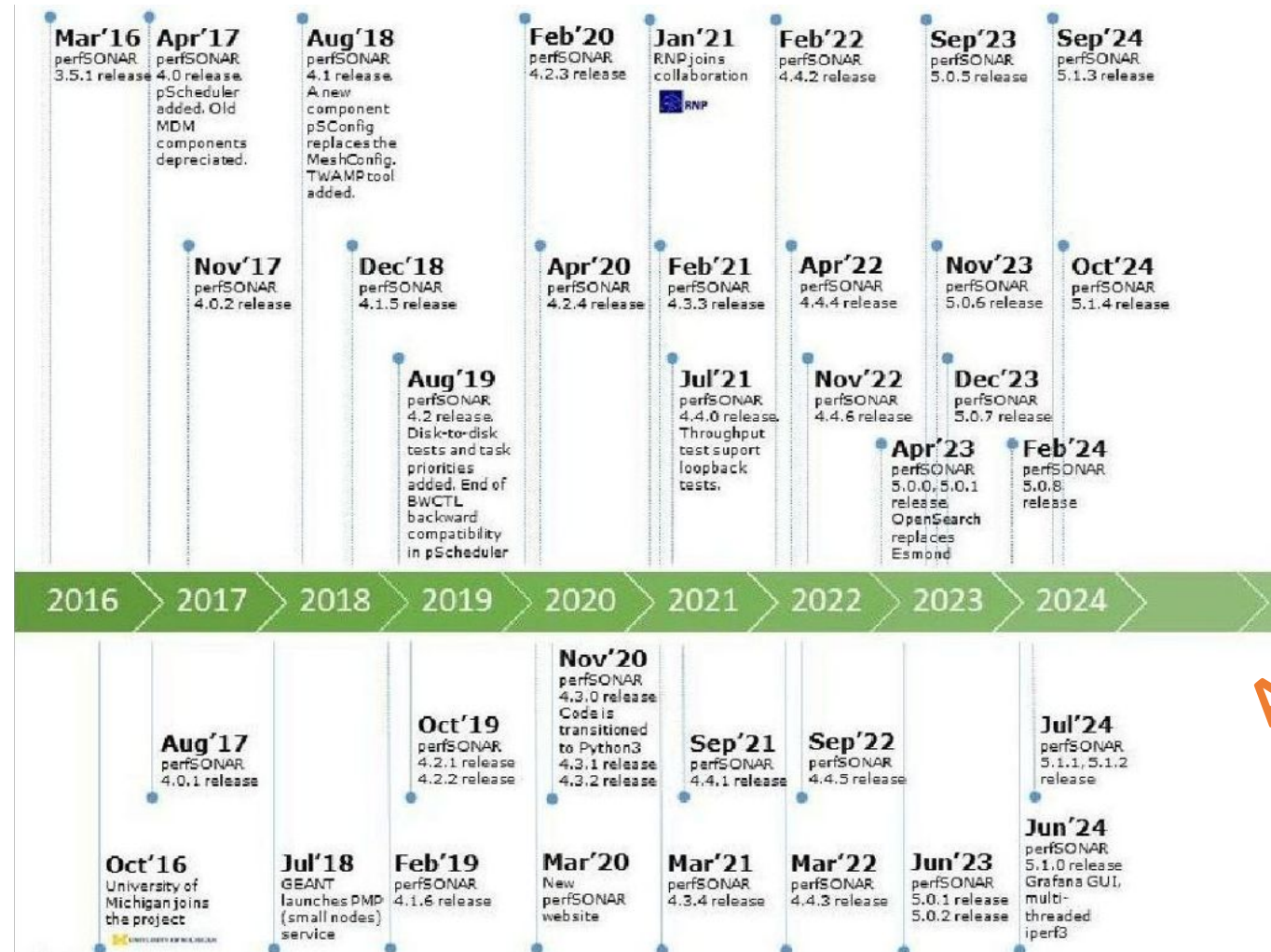
Why Redesign?

- Minimize the number of API calls for each host registration
- Provide a way for clients to check the authenticity of information in LS
- Validate the data sent for registration
- Provide richer API for querying
- Provide uniformity in fields across records for easier data analysis
- Provide a way to snapshot data for evaluating registration evolutions over time
- Continue supporting record updates



- Simplify the registration process
- Provide better storage and query capabilities

20 years of experience ...



April 2025

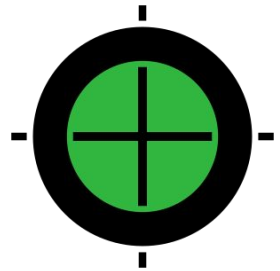
... means 20 years of collaboration

perf20NAR years

Put yourself (or your organization) on the map! <https://forms.gle/vsYmetjvyQRWwKUJ8>

Will then show up at
<https://stats.perfsonar.net>





What happens after 5.3.0?

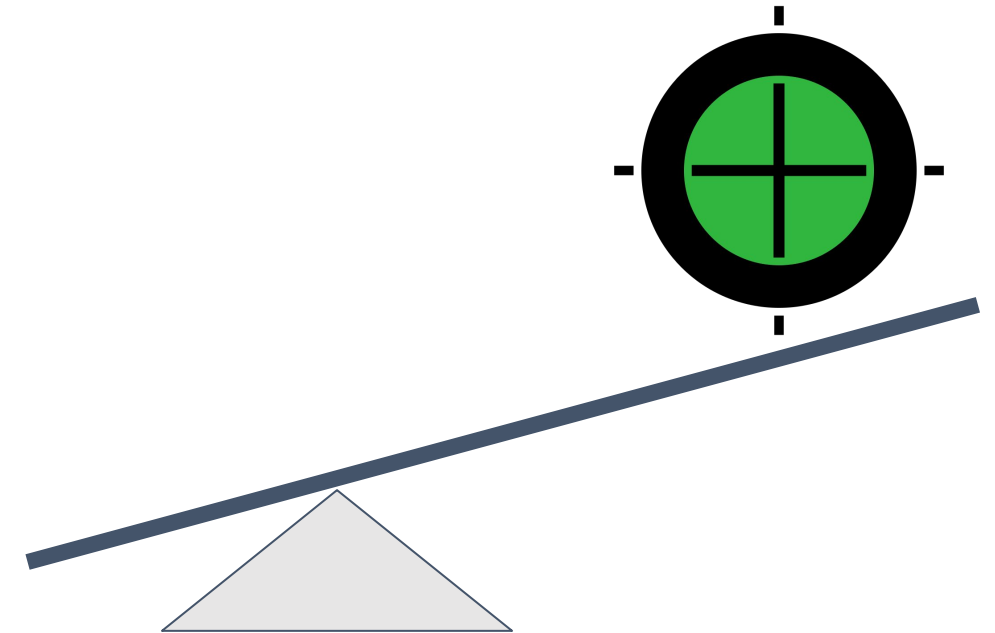
Make it easier

- We've introduced a lot of change, we want to focus on refining pain points
- Updated trainings that focus on the new pieces
- Continue to update documentation and add better guides
- Explore new ways to interact with documentation like training LLM on docs or similar



Leverage the changes of the last few years

- Our new platform opens up many new possibilities in
 - Alerting
 - Analysis
 - Visualization
 - Correlation with other data (e.g. Flow, SNMP/Streaming telemetry)
- Explore way to enable researchers to use the data

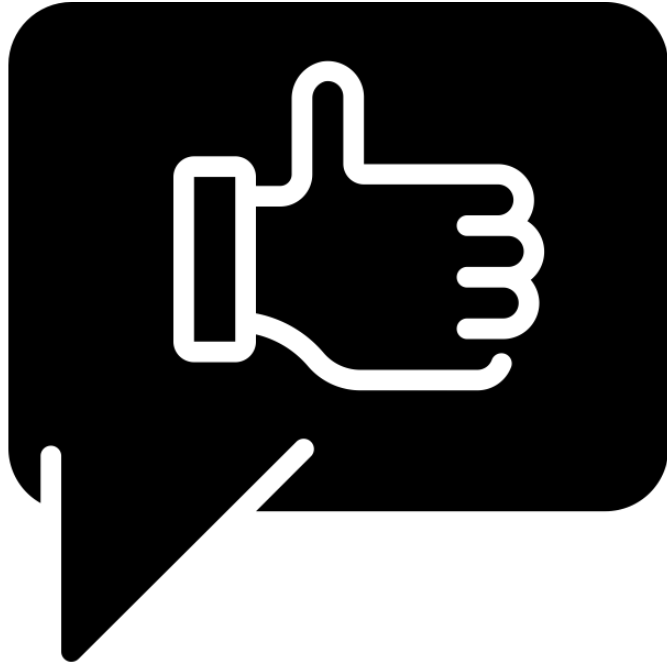


Guided by our Community

- Most important is your continued feedback to help shape the future
- Checkout quarterly office hours as part of <https://www.es.net/science-engagement/ci-engineering-lunch-and-learn-series>
- Join our mailing list perfsonar-user@perfsonar.net
- Watch for community surveys



perfSONAR



Thanks icon by priyanka from The Noun Project

Thanks!

For more information,
please visit our web site:
<https://www.perfsonar.net>

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