perfSONAR

perf5.0NAR

What to Expect from the Next Major Evolution of perfSONAR

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What’s in perfSONAR 5.0

• Bump from 3.X to 4.X was almost 5 years ago

• Enough of a change we thought was right time to go from 4.X to 5.X

• Multiple things going into perfSONAR 5.0, but this talk is mostly going to be focused on the archiving of measurements since that’s the biggest change
perfSONAR Today: MaDDash

- Provide a dashboard of “grids” called MaDDash
- Highlight problems when metrics like throughput or packet loss fall below a certain threshold
- ESnet’s lives at [http://ps-dashboard.es.net](http://ps-dashboard.es.net)

ANL seeing packet loss for traffic entering ANL from ESnet
One direction has much higher throughput than the other

Low throughput direction has quite a bit of loss

“Bad direction” has choppier latency
Looking closer at network problems

- At some point problems get complicated enough you want to be able to easily integrate with other data such as:
  - Interfaces stats (e.g. SNMP)
  - Flow
  - Optical
  - More…
- These are hard problems, but we think we can better position perfSONAR for this type of integration
- It starts with the metadata and data that we archive
What do we mean by an archive?

- **Archive** is where we store measurements long-term

- Archive is where visualizations get their data
What is Esmond?

- Default archive that most users run
- Django app with custom REST API
- Use two backend databases
  - PostgreSQL
  - Cassandra
Why replace esmond?

- Many good open source options for time-series storage
  - Rich query languages
  - Integration with off-the-shelf visualization platforms
  - Better support for backups, scaling, etc
  - Cloud vs On-Prem Deployments
- Stability
  - Cassandra one of the main source of issues on user list
- Maintainability
  - Less custom code
- Community successes from which we can learn
  - WLCG
  - NetSage
Elasticsearch, Logstash, Kibana (ELK) and Grafana

- **Elasticsearch** - Stores and indexes documents and lets you do searches
- **Logstash** - Accepts input from lots of different sources, enriches with location data and more, can output it to different places (like Elasticsearch)
- **Kibana** - Visualizes data in Elasticsearch
- **Grafana** - Visualization platform for ElasticSearch and more
Moving to OpenSearch

- Because of licensing changes
- Default perfSONAR bundles will rely on OpenSearch
  - Might be OpenDistro on Debian

- Will maintain compatibility with Elasticsearch for those with existing installations
The Software Pieces

- Kafka Archiver
- HTTP Archiver
- RabbitMQ Archiver
- Tool Plugin
The Software Pieces

- Elasticsearch
- Logstash
- Kafka Archiver
- HTTP Archiver
- RabbitMQ Archiver
- Tool Plugin

Metadata Sources:
- GeoIP
- Your Network DB
- pS Lookup Service
- Other
The Software Pieces

Visualization
- Traceroute Viewer
- Graphs
- MaDDash
- Grafana
- Kibana

Archiving
- Elmond
- Elasticsearch
- Logstash

pScheduler
- Kafka Archiver
- HTTP Archiver
- RabbitMQ Archiver
- Tool Plugin
How does this fit together?

- Multiple new parts, but not a radical shift in architecture
- New components map to existing bundles
Packages relationship 4.x
Packages relationship 5.x
Elmond

- Converts Esmond queries to queries understood by Elastic
- Python 3 Flask application

```json
{
    "ELASTIC_HOSTS": [
        "https://admin:5y3...MsI@localhost:9200"
    ],
    "ELASTIC_PARAMS": {
        "use_ssl": true,
        "ca_certs": "/etc/elasticsearch/root-ca.pem",
        "client_cert": "/etc/elasticsearch/admin.pem",
        "client_key": "/etc/elasticsearch/admin-key.pem"
    },
    "PROXY_PATH": "/esmond/perfsonar/archive",
    "FORCE_HTTPS_URLS": true,
    [...] 
}
```

/etc/perfsonar/elmond/elmond.conf
Logstash

- The perfSONAR Logstash pipeline used to enrich data before archiving

1. Input (IP/port)
2. Build pscheduler object
3. Normalize IP addresses
4. Convert ISO8601 durations to seconds
5. Lookup GeoIP information
6. Process each type of task
7. Output (index template)
5.0 Drawbacks

- Unfortunately, there are some
- Data history challenge
  - Very difficult to move data from Esmond to OpenSearch
  - Possibility to keep both backends up, during a transition period
Other features of 5.0

- Various pScheduler improvements and some new plugins
- Some Toolkit UI improvements
- pSConfig Web Admin (PWA) changes
- Optional packages if you want
  - to keep Esmond
  - to use Kibana
Thanks!

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