Do you really see what’s happening on your NFV infrastructure?

(and what can you do about it?)
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Agenda

- Intro
- Barometer
- Collectd
- Back to Barometer
- Use cases
- Plans and upcoming features
- Questions
Why do I need to know what’s going on in my infrastructure?

Data Centres are powering our everyday lives. Organizations lose an average of $5,600 per minute of downtime. [1].

Telco and Enterprise alike are asking how they get and provide Service Assurance, QoS and provide SLA’s on the platform and services when deploying NFV.

It is vital to monitor systems for malfunctions or misbehaviours that could lead to service disruption and promptly react to these faults/events to minimize service disruption/downtime.
What is Barometer?
What is OPNFV?

• The mission of OPNFV\(^{(1)}\) is to drive the evolution of Network Function Virtualization (NFV) by
  › Developing an integrated and tested open software platform
  › Contributing changes to and influencing upstream projects
  › Building new open source components where needed
  › Leveraging open implementations to drive an open standards and open-source-based ecosystem for NFV solutions

(1) See OPNFV charter
What does Barometer do?

- Testing
- Integration
- Deployment
- Development
- Metrics collection

Support the monitoring of the NFVI by gathering network, platform and applications metrics, and exposing them to higher level monitoring and fault management systems.
So what upstream project(s) does Barometer contribute to?
Basically A Rather Old METrics collector
Collectd

- Statistics collection daemon
- Has been around since 2004, written in c
- Built for small footprint
- Open source (MIT, GPLv2)
- Runs on Linux, BSD, Solaris, MacOS, Windows
- Metrics and events
- Over 140 plugins (c) of various types
  - Read and write plugins
  - Binding plugins (python, java, perl, ...)
  - Logging plugins
  - Notification plugins
  - Others, such as network, aggregation, threshold
Collectd provides the metrics collection, but what can you actually do with these?
Existing standards

CNTT Ref Model Chapter 4
ETSI NFV-TST 008 Spec
## What is available in collectd to monitor NFVi?

<table>
<thead>
<tr>
<th>Plugin Domain</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Run Sure Technology/ RAS</td>
<td>Mcelog, PCIe AER, logparser: Metrics &amp; notifications pertaining to Intel Run Sure Technology</td>
</tr>
<tr>
<td>Intel® RDT</td>
<td>Intel® Resource Director Technologies (CMT, MBM) related metrics</td>
</tr>
<tr>
<td>Virt</td>
<td>Libvirt related metrics</td>
</tr>
<tr>
<td>OVS</td>
<td>Ovs_stats, ovs_events: Metrics related to Open Virtual Switch</td>
</tr>
<tr>
<td>DPDK</td>
<td>Dpdk_stats, dpdk_events, hugepages: DPDK related metrics</td>
</tr>
<tr>
<td>OpenStack*</td>
<td>Gnocchi, Aodh: Integration in OpenStack projects</td>
</tr>
<tr>
<td>Cloud</td>
<td>Write_Kafka, Write_Prometheus, VES: Integration into various cloud platforms</td>
</tr>
<tr>
<td>Storage</td>
<td>RAID, SMART, NVMe*: Storage related Metrics</td>
</tr>
<tr>
<td>Power/Energy</td>
<td>CPUFreq, Turbostat: Frequency &amp; power related metrics</td>
</tr>
<tr>
<td>Platform</td>
<td>IPMI, RedFish, PMU: Out of Band metrics &amp; platform counters</td>
</tr>
</tbody>
</table>

**Not a comprehensive list**
How does Barometer relate to collectd?

- Collectd helps us collect metrics!
- How has Barometer given back to the collectd community?
- How can I install Barometer/collectd?
- How are the collectd metrics consumed?
  - Consumed via influx
  - Consumed via vanilla prometheus
  - SAF (current)
InfluxDB and Grafana

Network plugin
Prometheus
A full list of plugins is available at [https://redhat-service-assurance.github.io/saf-documentation/#appe-saf-collectd-plugins](https://redhat-service-assurance.github.io/saf-documentation/#appe-saf-collectd-plugins)
What are all these metrics used for?
First Proof-of-Concept of live, end-to-end, open source 5G network

https://www.youtube.com/watch?v=IL4nxbmUIX8
Closed Loop Resiliency

Goal: Maximize Service Availability of Virtual Border Network Gateway (vBNG) in memory corruption scenario

## Combine metrics

<table>
<thead>
<tr>
<th>Collectd Data</th>
<th>Exact Metric</th>
<th>Threshold</th>
<th>Host Health Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPMI Metrics</td>
<td>Temperature (Temperature value from the list of available sensors)</td>
<td>Range Checks *</td>
<td>Normal</td>
</tr>
<tr>
<td>PMU Metrics</td>
<td>LLC Load Misses (of the cores of interest)</td>
<td>Range Checks *</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Cache-misses (of the cores of interest)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RDT Metrics</td>
<td>LLC Occupancy (of interested cores)</td>
<td>Range Checks *</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Memory Bandwidth (of interested cores)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAS Metrics</td>
<td>Corrected Memory Errors</td>
<td>Range Checks *</td>
<td></td>
</tr>
</tbody>
</table>

* = Check each metric value against expected values and generate appropriate alert when outside range

Service Healing and Platform Resiliency with Telemetry Aware Scheduler


https://github.com/intel/telemetry-aware-scheduling
Power saving

Setup Info:
2x Intel Xeon Gold 6130
HyperThread Enabled
Turbo Enabled
RAM 192Gb DDR4
2x Intel Corporation Ethernet Controller XL710 40GbE
Network speed 10GbE

https://networkbuilders.intel.com/closed-loop-platform-automation-power-savings-demo
Power saving

https://networkbuilders.intel.com/closed-loop-platform-automation-power-savings-demo
<table>
<thead>
<tr>
<th>Category</th>
<th>Use Case</th>
</tr>
</thead>
</table>
| Service Healing  | Reliability Aware Workload Placement *  
|                  | • Improved Placement decisions using Platform Reliability Counters  
|                  | • Ensures reliable platform selection  
|                  | Predictive Fault Detection *  
|                  | • Improves reliability by detecting recoverable faults  
|                  | • Move workload and traffic before outage  
|                  | Reliability Aware Auto-Scaling [Scale Out] *  
|                  | • Improved Scaling decisions using Platform Reliability Counters  
|                  | • Ensures reliable platform resource selection  
| Energy Optimisation | Green Story/Energy Efficiency  
|                  | • Improved IDLE power consumption  
|                  | • Electricity OPEX  
|                  | • Runtime power management based on policy  
|                  | Performance/Watt Improved  
|                  | • Improved Performance in same Power Envelope CLX  
|                  | Power Aware Workload Placement  
| Application QoS  | Noisy Neighbour/Priority App QoS  
|                  | • Resource Sharing  
|                  | • Guarantee/Improve SLA management  
| Security         | Help runtime discovery of security threats using Intel® TDT  

More?

- Barometer usage in other OPNFV projects:  
  - VSPerf - performance optimization and benchmarking in lab environment (TST010)  
  - Bottlenecks and Yardstick - collect performance data during VNF testing executions for characterization and fault detection  
- And still grows...
What’s next for Barometer?

- Collectd release - 5.11
  - DPDK telemetry plugin
  - Capabilities plugin
  - Redfish plugin
  - mdevents - RAID events
- Collectd CI
- Documentation updates
- vsperf requests
- MANO API conformance testing collaboration
- CNTT collab
Get in touch!

Barometer weekly meeting  Collectd bi-weekly
Tuesdays @ 5pm UTC  Mondays @ 3pm UTC

opnfv-tech-discuss@lists.opnfv.org  collectd@verplant.org
Try it out!

https://github.com/opnfv/barometer
https://github.com/collectd/collectd
https://github.com/redhat-service-assurance/service-assurance-operator

https://collectd.org/wiki/index.php/Main_Page
How to create a simple collectd plugin:
https://wiki.opnfv.org/display/fastpath/Collectd+how+to+implement+a+simpler+plugin
https://wiki.opnfv.org/display/fastpath/Monitoring%2C+Metrics+and+Events+Requirements+High+Level+List
Would like contribute to collectd?

- **Code contribution**
  - Clone repo from github
  - Make your changes
  - Create PR (and add Changelog)
  - Check upstream CI and collaborate on any code review feedback
  - More on [https://github.com/collectd/collectd/blob/master/docs/CONTRIBUTING.md](https://github.com/collectd/collectd/blob/master/docs/CONTRIBUTING.md)

- **Other contributions**
  - Ask a question under pending PR’s if you are unsure or just curious about something
    - Yes, doing code reviews helps you to learn
  - Come, keep calm and have chat, user feedback is always appreciated
    - Let us know how collectd helped you or may help
Join us!

2020 Collectd meet up

Munich, Feb 17-18, 2020

https://etherpad.openstack.org/p/collectd-meetup-2020

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Questions?
Thank you!