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ONAP: Commercial Deployment

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https://lfnetworking.org

Contents

Objective & Background

Objective

- Speed-up digital transformation and programmable networking adoption across all network services
- Ensure fast introduction of new services and technologies based on business requirements
- Avoid being locked to a specific vendor and therefore restricted to their feature roadmap and incurring higher CAPEX/OPEX price

Background

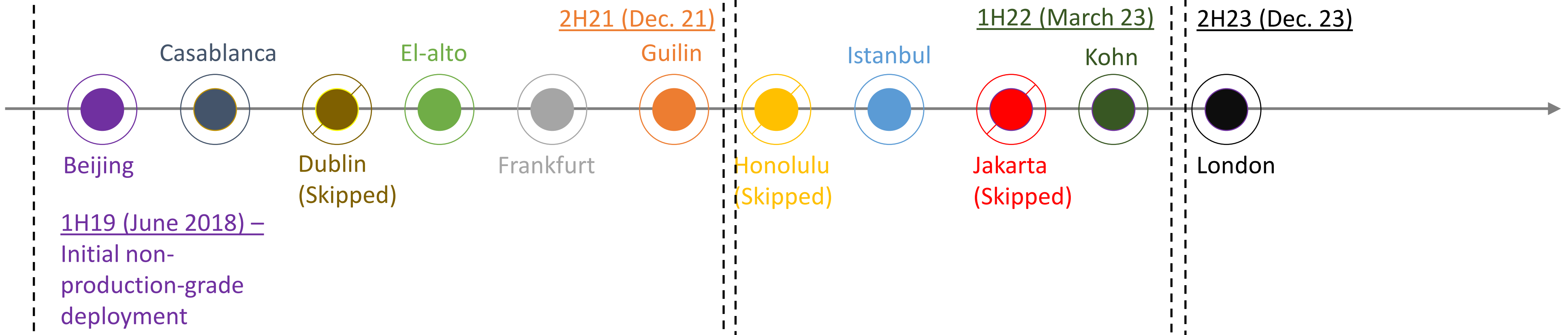
- Our team has been evaluating ONAP and working with it since Beijing Release (R2) in 2018.
- ONAP is considered a mature platform now after the successful release of its 13th version in June 2023, i.e., London Release (R13).
- Complete evaluation of ONAP based on Ethernet BOD use case was concluded in December 2021. Prototyping and demo is completed using Gullin Release (R7) and now also available on Kohn Release (R12)
- Completed an additional use case (IP-based service orchestration) prototyping development & demo in June 2023 based on ONAP R12 (Kohn Release)

Our Journey

1. Evaluation & LAB POC Phase
2. MEF-based standard L2 E-Line service orchestration
3. Completed Evaluation December 2021 using Guilin (R7).

1. Post Evaluation & Production-Grade Phase (LAB)
2. Additional use case prototyping
3. Enhanced security & observability
4. Internal demos, and initiation of commercial deployment

1. Commercial Deployment Phase (Production Environment)



ONAP Based Orchestration Program

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Overview

- Tata Communications is building a service orchestration (SO) development program based on ONAP which can be used to develop and support its own in-house production-grade SO to speed-up the digital transformation for core connectivity services. The program focuses on 2 aspects:
    - ONAP Platform & Customization
    - Use Case Development & Onboarding
- In this presentation, we will go over our journey from the time we started evaluating and testing ONAP R2, to our current plan to offer commercial deployment for some services we provide to our customers.

Program

- Implement a hierarchical orchestration design for all network services in terms of both domain orchestration and cross domain (master) orchestration.
- Our approach is not to use ONAP "as is" as a complete product, rather a baseline platform to be augmented with custom-developed use cases to support our business needs and achieve best tata communications solutions.
- Additional open-source tools needed for platform support, as well as analytical and AI capabilities will also be integrated in ONAP platform based on operations and product requirements.

Development Scope in FY24

- Develop production-grade and customized ONAP based service orchestration platform

- Initial three service use cases in FY24

- Four independent projects
  - Project 1: Production-Grade Platform/Customization
  - Project 2: Service Use Case 1
  - Project 3: Service Use Case 2
  - Project 4: Service Use Case 3

Areas of Platform Customization

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Operational Support	Monitoring
	Logging
	Health-checks and threshold alerts
Deployment, Administration & Maintenance	High availability for infra & ONAP
	NFS HA deployment
	Offline ONAP installation
	Backup
	ONAP Upgrade
ONAP Security	Replace hardcoded certificates
	Change all the credentials for inter-component communication (Password credentials only)
	ONAP User Management (RBAC)
	Platform hardening

Commercial Deployment Timeline

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Activity	Start Date	Target Date	Status
LAB Qualification (Kohn Release)	Dec. 2022	March 2023	Completed
ONAP Program Proposal & Formal Approval	March 2023	July 2023	Completed
Platform Customization (London)	August 2023	Dec. 2023	In-Progress
Production Deployment (Platform ONLY)	Dec. 2023	Dec. 2023	Yet to Start
Use Case 1 Development	August 2023	Jan. 2024	In-Progress
Use Case 1 Production Deployment & Early Customers	Jan. 2024	Jan. 2024	Yet to Start
Use Case 2 Development	Jan. 2024	March 2024	Yet to Start
Use Case 2 Production Deployment & Early Customers	March 2024	March 2024	Yet to Start
Use Case 3 Development	April 2024	June 2024	Yet to Start
Use Case 3 Production Deployment & Early Customers	June 2024	June 2024	Yet to Start

Operational Support

- Enhance the troubleshooting and diagnostic processes for all deployed applications by implementing mechanisms that support health-check execution and threshold alarms, including an email and/or messaging (Slack/MS Teams) notification feature.

- Develop user-friendly dashboards to aid in quick decision-making & provides insight into current performance
  - Use Prometheus and Grafana solutions for time-series data storage and visualization. Prometheus is an effective open-source tool that ensures reliable monitoring and alerting, specifically designed to handle high-volume time-series data.
  - Grafana, a top-tier graph and dashboard builder, stands out for its flexibility in visualizing time-series infrastructures. Unlike Kibana, Grafana does not have a rigid data source binding, thereby making it a superior option

- Develop a dependable and efficient logging system for applications within the platform.
  - Utilize the ELK stack as recommended by the community.
  - Ensure a clear distinction between infrastructure and application log data.
  - No ONAP components source code modification.

Health-Check & Threshold Alerts Customization

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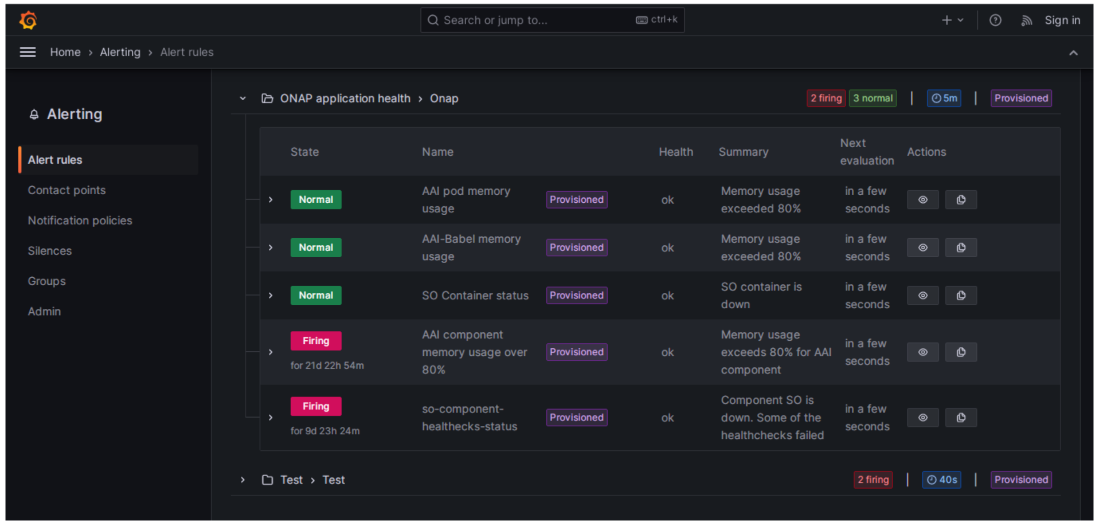
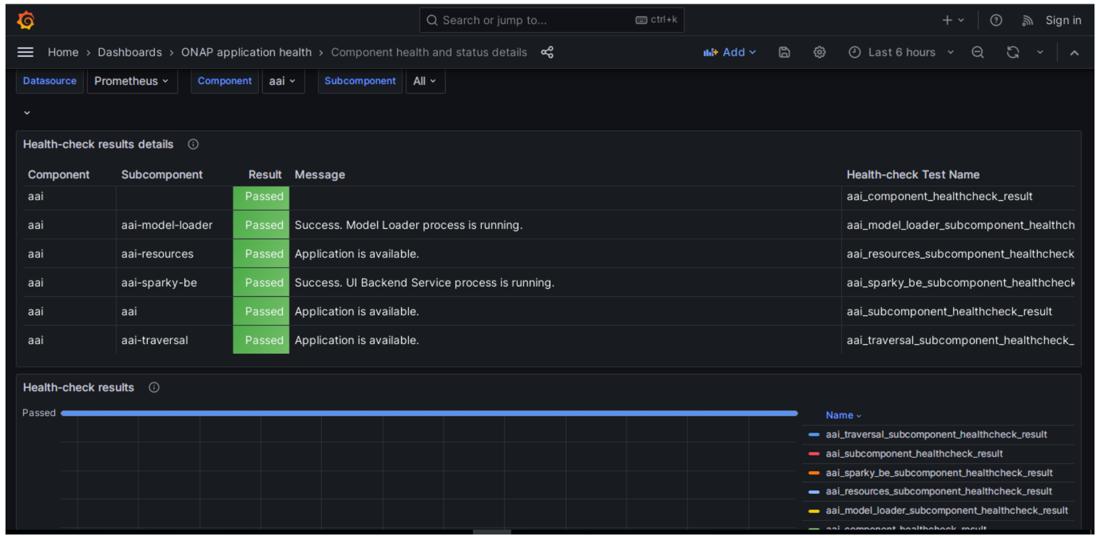


ONAP application health › Onap — 2 firing, 3 normal | 5m | Provisioned

State	Name		Health	Summary	Next evaluation	Actions
Normal	AAI pod memory usage	Provisioned	ok	Memory usage exceeded 80%	in a few seconds	
Normal	AAI-Babel memory usage	Provisioned	ok	Memory usage exceeded 80%	in a few seconds	
Normal	SO Container status	Provisioned	ok	SO container is down	in a few seconds	
Firing for 21d 22h 54m	AAI component memory usage over 80%	Provisioned	ok	Memory usage exceeds 80% for AAI component	in a few seconds	
Firing for 9d 23h 24m	so-component-healthecks-status	Provisioned	ok	Component SO is down. Some of the healthchecks failed	in a few seconds	

Test › Test — 2 firing | 40s | Provisioned


Search or jump to... ctrl+k
Sign in
Home › Dashboards › ONAP application health › Component health and status details
Add
Last 6 hours

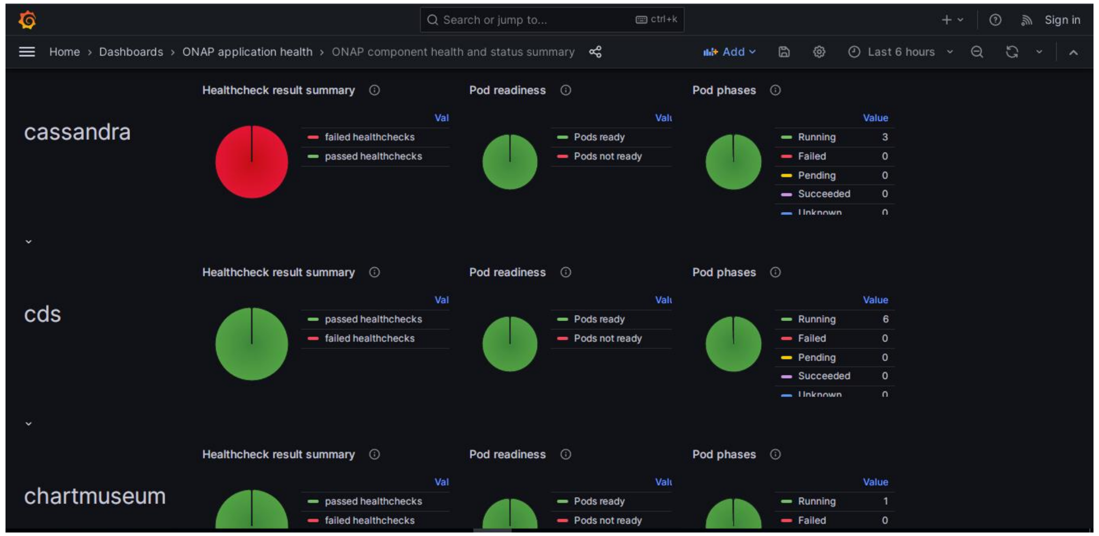
Datasource: Prometheus — Component: aai — Subcomponent: All

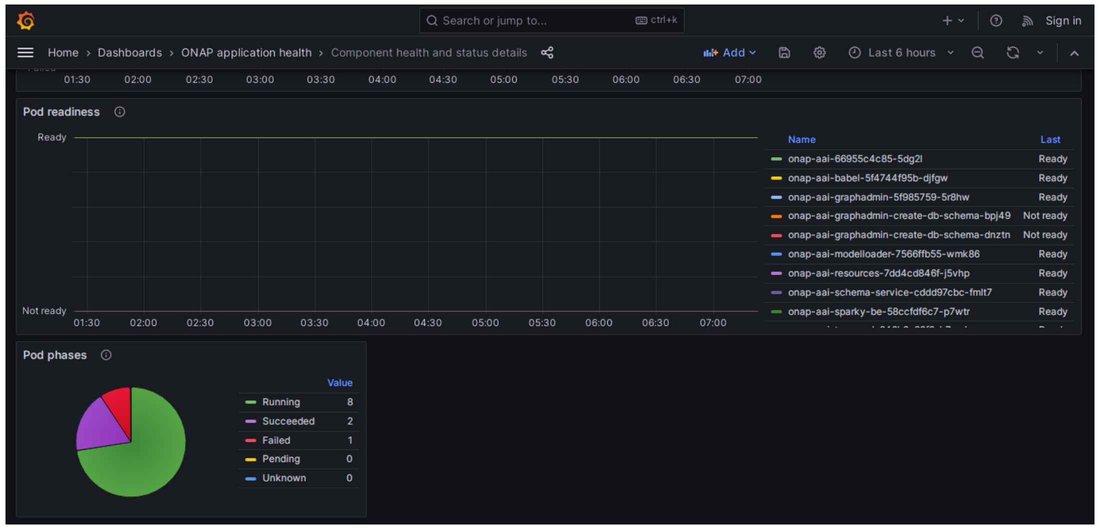
Health-check results details

Component	Subcomponent	Result	Message	Health-check Test Name
aai		Passed		aai_component_healthcheck_result
aai	aai-model-loader	Passed	Success. Model Loader process is running.	aai_model_loader_subcomponent_healthch
aai	aai-resources	Passed	Application is available.	aai_resources_subcomponent_healthcheck
aai	aai-sparky-be	Passed	Success. UI Backend Service process is running.	aai_sparky_be_subcomponent_healthcheck
aai	aai	Passed	Application is available.	aai_subcomponent_healthcheck_result
aai	aai-traversal	Passed	Application is available.	aai_traversal_subcomponent_healthcheck_

Health-check results

Passed
Name
aai_traversal_subcomponent_healthcheck_result
aai_subcomponent_healthcheck_result
aai_sparky_be_subcomponent_healthcheck_result
aai_resources_subcomponent_healthcheck_result
aai_model_loader_subcomponent_healthcheck_result



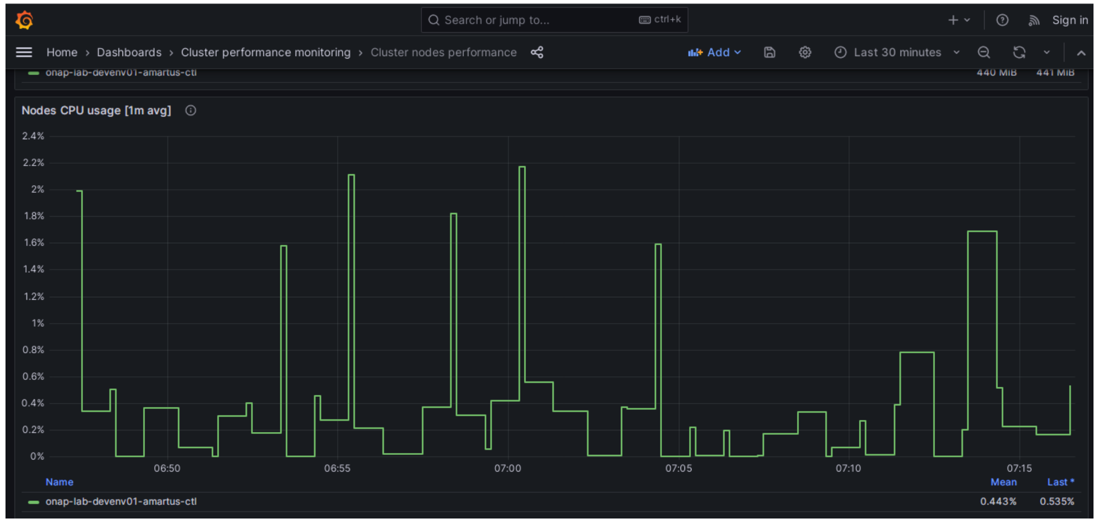


Name	Last
onap-aai-66955c4c85-5dg2l	Ready
onap-aai-babel-5f4744f95b-djfgw	Ready
onap-aai-graphadmin-5f985759-5r8hw	Ready
onap-aai-graphadmin-create-db-schema-bpj49	Not ready
onap-aai-graphadmin-create-db-schema-dnztn	Not ready
onap-aai-modelloader-7566ffb55-wmk86	Ready
onap-aai-resources-7dd4cd846f-j5vhp	Ready
onap-aai-schema-service-cddd97cbc-fmlt7	Ready
onap-aai-sparky-be-58ccfdf6c7-p7wtr	Ready

Pod phases

	Value
Running	8
Succeeded	2
Failed	1
Pending	0
Unknown	0

Performance Monitoring Customization



Search or jump to...
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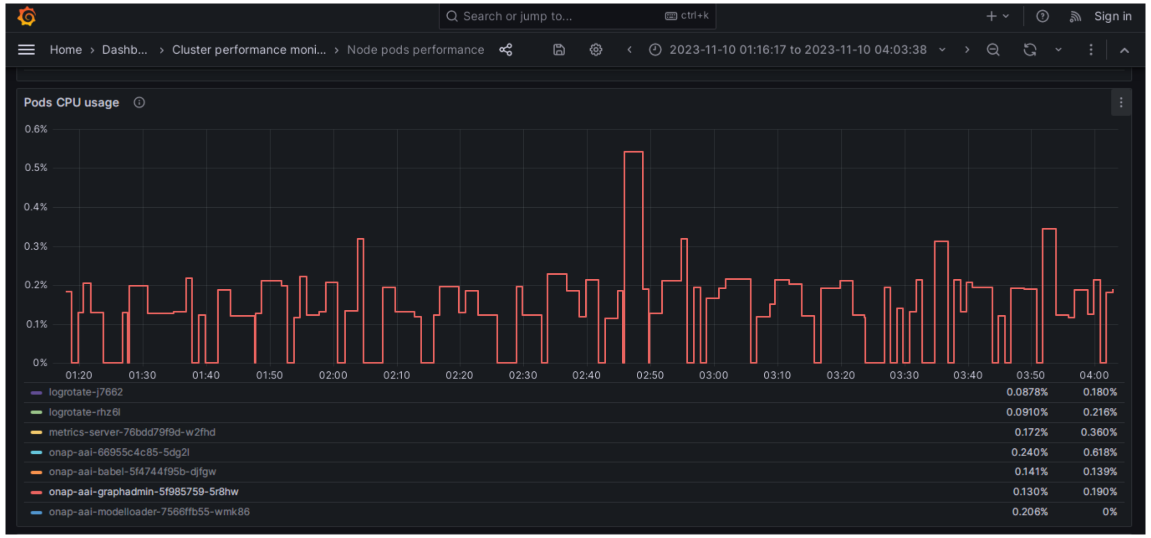
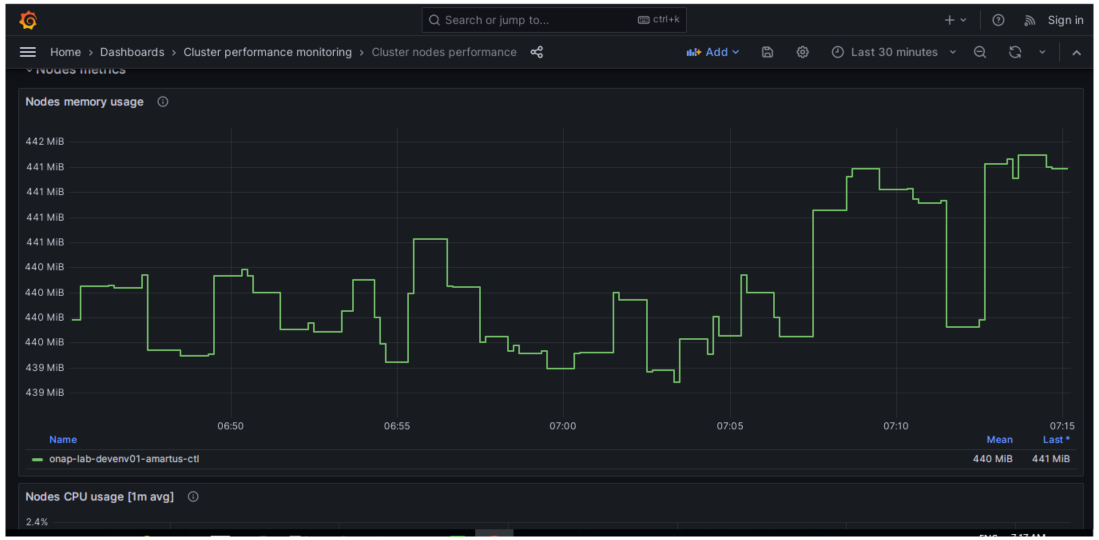
Home › Dashboards › Cluster performance monitoring › Cluster nodes performance
Add
Last 30 minutes
Nodes CPU usage [1m avg]

Name	Mean	Last *
🟩 onap-lab-devenv01-amartus-ctl	0.443%	0.535%

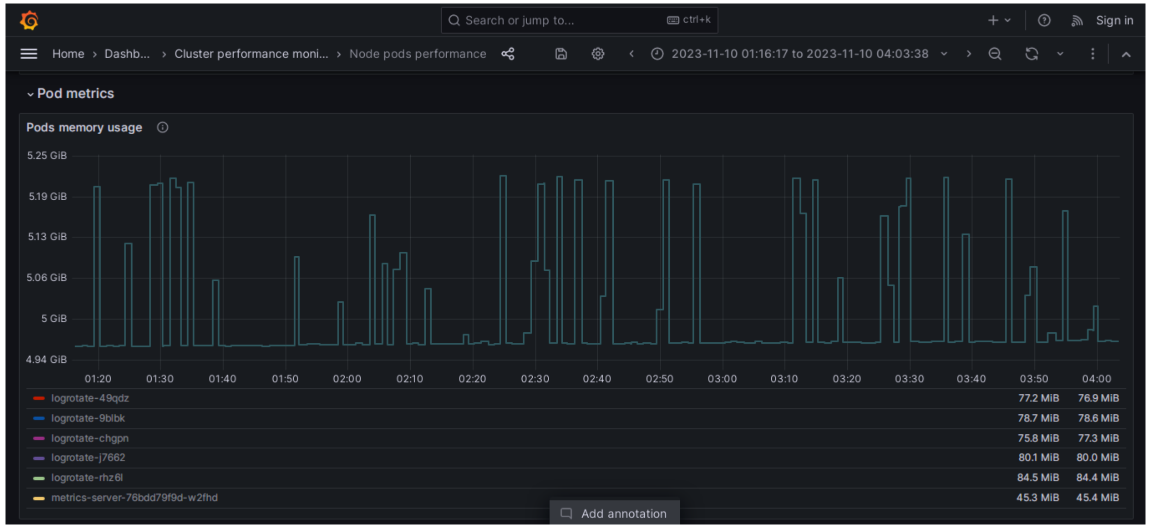


Search or jump to...
Sign in
Home › Dashb... › Cluster performance moni... › Node pods performance
2023-11-10 01:16:17 to 2023-11-10 04:03:38
Pods CPU usage

logrotate-j7662	0.0878%	0.180%
logrotate-rhz6l	0.0910%	0.216%
metrics-server-76bdd79f9d-w2fhd	0.172%	0.360%
onap-aai-66955c4c85-5dg2l	0.240%	0.618%
onap-aai-babel-5f4744f95b-djfgw	0.141%	0.139%
onap-aai-graphadmin-5f985759-5r8hw	0.130%	0.190%
onap-aai-modelloader-7566ffb55-wmk86	0.206%	0%



Name	Mean	Last *
🟩 onap-lab-devenv01-amartus-ctl	440 MiB	441 MiB



Search or jump to...
Sign in
Home › Dashb... › Cluster performance moni... › Node pods performance
2023-11-10 01:16:17 to 2023-11-10 04:03:38
Pod metrics
Pods memory usage
Add annotation

logrotate-49qdz	77.2 MiB	76.9 MiB
logrotate-9blbk	78.7 MiB	78.6 MiB
logrotate-chgpn	75.8 MiB	77.3 MiB
logrotate-j7662	80.1 MiB	80.0 MiB
logrotate-rhz6l	84.5 MiB	84.4 MiB
metrics-server-76bdd79f9d-w2fhd	45.3 MiB	45.4 MiB

Logging Systems Customization

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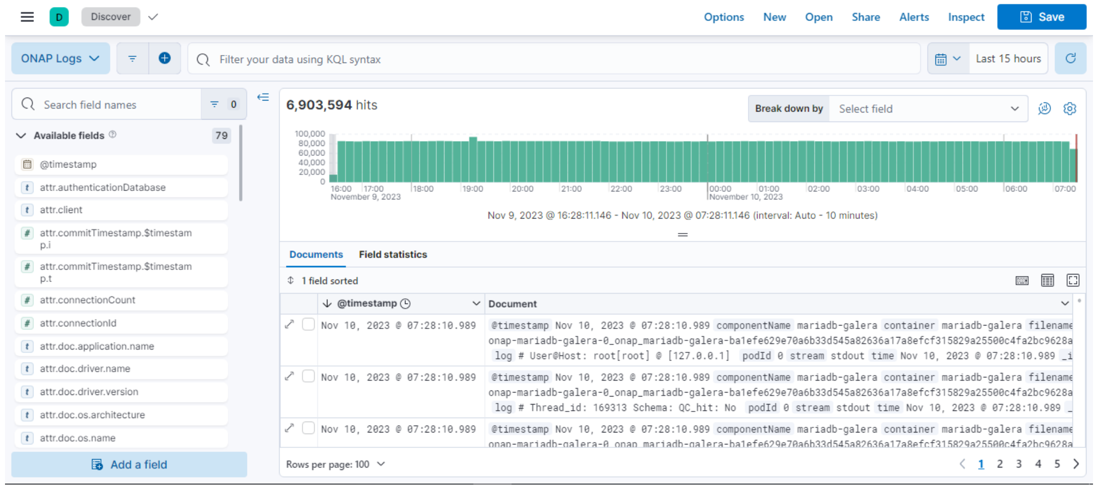
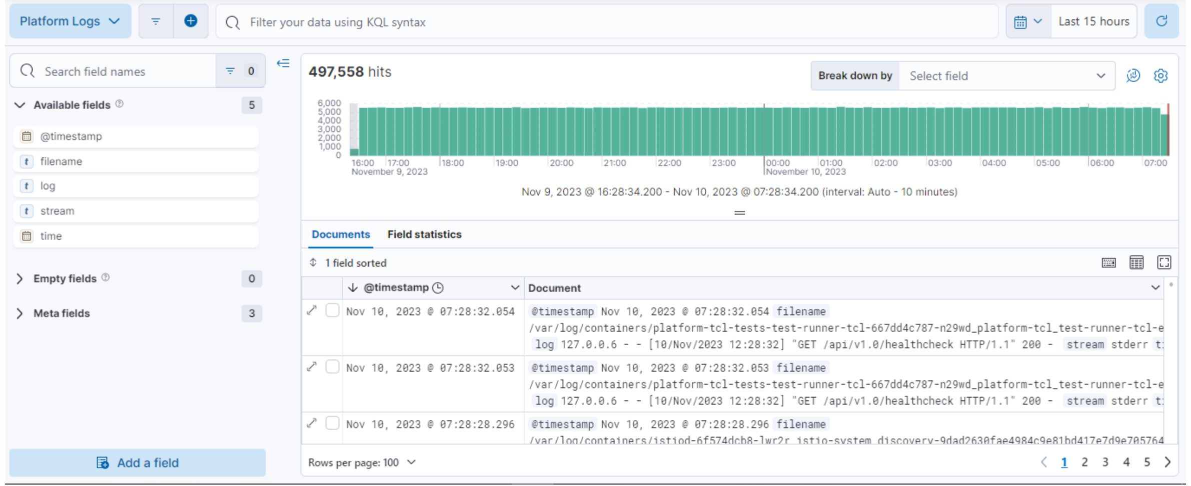


Nov 9, 2023 @ 16:28:11.146 - Nov 10, 2023 @ 07:28:11.146 (interval: Auto - 10 minutes)

```
Nov 10, 2023 @ 07:28:10.989  @timestamp Nov 10, 2023 @ 07:28:10.989 componentName mariadb-galera container mariadb-galera filename
                             onap-mariadb-galera-0_onap_mariadb-galera-ba1efe629e70a6b33d545a82636a17a8efcf315829a25500c4fa2bc9628a
                             log # User@Host: root[root] @ [127.0.0.1]  podId 0 stream stdout time Nov 10, 2023 @ 07:28:10.989 _i
Nov 10, 2023 @ 07:28:10.989  @timestamp Nov 10, 2023 @ 07:28:10.989 componentName mariadb-galera container mariadb-galera filename
                             onap-mariadb-galera-0_onap_mariadb-galera-ba1efe629e70a6b33d545a82636a17a8efcf315829a25500c4fa2bc9628a
                             log # Thread_id: 169313 Schema: QC_hit: No  podId 0 stream stdout time Nov 10, 2023 @ 07:28:10.989 _
Nov 10, 2023 @ 07:28:10.989  @timestamp Nov 10, 2023 @ 07:28:10.989 componentName mariadb-galera container mariadb-galera filename
```



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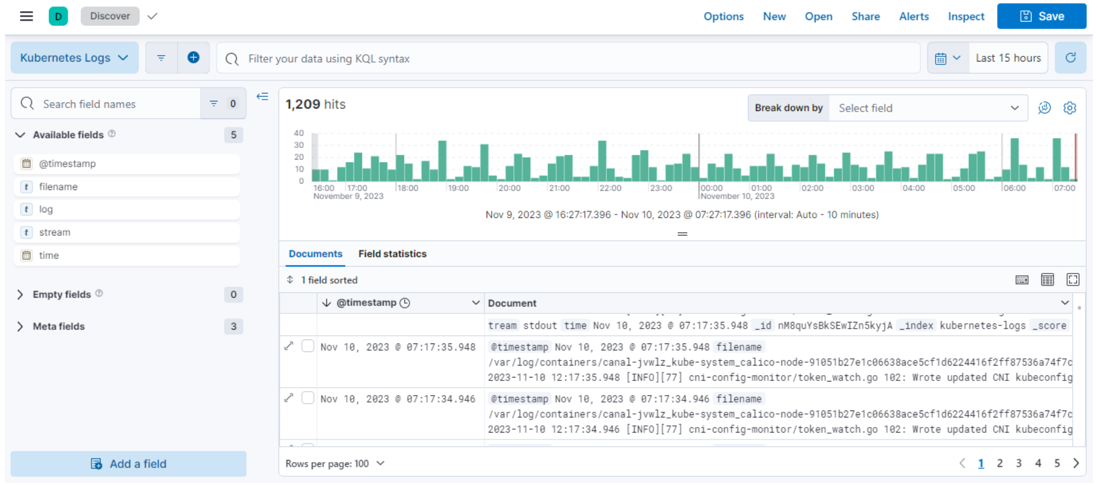
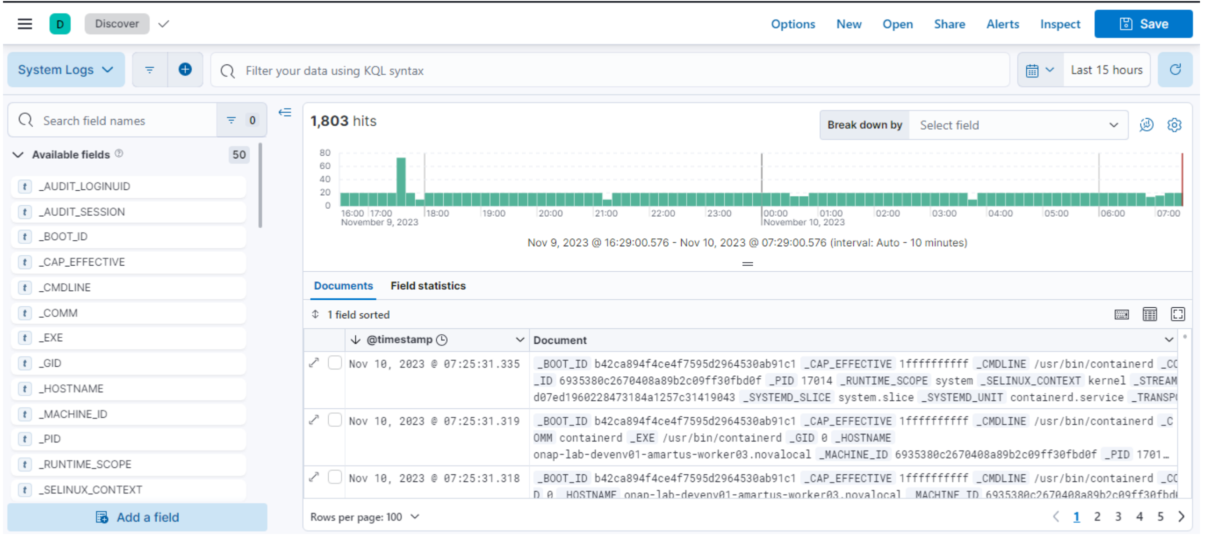
```
Nov 10, 2023 @ 07:28:32.054  @timestamp Nov 10, 2023 @ 07:28:32.054 filename
                             /var/log/containers/platform-tcl-tests-test-runner-tcl-667dd4c787-n29wd_platform-tcl_test-runner-tcl-e
                             log 127.0.0.6 - - [10/Nov/2023 12:28:32] "GET /api/v1.0/healthcheck HTTP/1.1" 200 -  stream stderr t
Nov 10, 2023 @ 07:28:32.053  @timestamp Nov 10, 2023 @ 07:28:32.053 filename
                             /var/log/containers/platform-tcl-tests-test-runner-tcl-667dd4c787-n29wd_platform-tcl_test-runner-tcl-e
                             log 127.0.0.6 - - [10/Nov/2023 12:28:32] "GET /api/v1.0/healthcheck HTTP/1.1" 200 -  stream stderr t
Nov 10, 2023 @ 07:28:28.296  @timestamp Nov 10, 2023 @ 07:28:28.296 filename
```



Nov 9, 2023 @ 16:27:17.396 - Nov 10, 2023 @ 07:27:17.396 (interval: Auto - 10 minutes)

```
                             tream stdout time Nov 10, 2023 @ 07:17:35.948 _id nM8quYsBkSEwIZn5kyjA _index kubernetes-logs _score
Nov 10, 2023 @ 07:17:35.948  @timestamp Nov 10, 2023 @ 07:17:35.948 filename
                             /var/log/containers/canal-jvwlz_kube-system_calico-node-91051b27e1c06638ace5cf1d6224416f2ff87536a74f7c
                             2023-11-10 12:17:35.948 [INFO][77] cni-config-monitor/token_watch.go 102: Wrote updated CNI kubeconfig
Nov 10, 2023 @ 07:17:34.946  @timestamp Nov 10, 2023 @ 07:17:34.946 filename
                             /var/log/containers/canal-jvwlz_kube-system_calico-node-91051b27e1c06638ace5cf1d6224416f2ff87536a74f7c
                             2023-11-10 12:17:34.946 [INFO][77] cni-config-monitor/token_watch.go 102: Wrote updated CNI kubeconfig
```



Nov 9, 2023 @ 16:29:00.576 - Nov 10, 2023 @ 07:29:00.576 (interval: Auto - 10 minutes)

```
Nov 10, 2023 @ 07:25:31.335  _BOOT_ID b42ca894f4ce4f7595d2964530ab91c1 _CAP_EFFECTIVE 1ffffffffff _CMDLINE /usr/bin/containerd _CO
                             _ID 6935380c2670408a89b2c09ff30fbd0f _PID 17014 _RUNTIME_SCOPE system _SELINUX_CONTEXT kernel _STREAM
                             d07ed1960228473184a1257c31419043 _SYSTEMD_SLICE system.slice _SYSTEMD_UNIT containerd.service _TRANSP
Nov 10, 2023 @ 07:25:31.319  _BOOT_ID b42ca894f4ce4f7595d2964530ab91c1 _CAP_EFFECTIVE 1ffffffffff _CMDLINE /usr/bin/containerd _C
                             OMM containerd _EXE /usr/bin/containerd _GID 0 _HOSTNAME
                             onap-lab-devenv01-amartus-worker03.novalocal _MACHINE_ID 6935380c2670408a89b2c09ff30fbd0f _PID 1701…
Nov 10, 2023 @ 07:25:31.318  _BOOT_ID b42ca894f4ce4f7595d2964530ab91c1 _CAP_EFFECTIVE 1ffffffffff _CMDLINE /usr/bin/containerd _CO
```

Deployment, Administration & Maintenance

- Automate HA NFS storage setup

- Provide ONAP Upgrade guidelines to ensure, merging any customizations to the next community release as well as providing options for data migration.

- Provide an automated method to install ONAP in an offline environment as it is typical to be the case in any telecom production environment.

- Develop and automate a backup solution that will enable the restoration of the platform in the event of a disaster.

ONAP Security

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- Provide security between components and ensures that components can trust the identities of other components.
- Ensure that components communicate only with those they are authorized to interact with.
- Design RBACK system based on the ONAP community solution (which is in progress and not finalized)
- Adopting industry standards for authentication and authorization
- Securing Kubernetes cluster by implementing k8s role-Based Access Control (RBAC) define network policies to isolate workloads.
- Securing Linux system, by Auditing Patching and Updates of Firewall Configuration User Account Management System

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Thank You - Questions?