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The bridge to possible

Grafana Dashboards for ACI Monitoring

an Open-Source approach to in depth visibility

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DEVNET-2210

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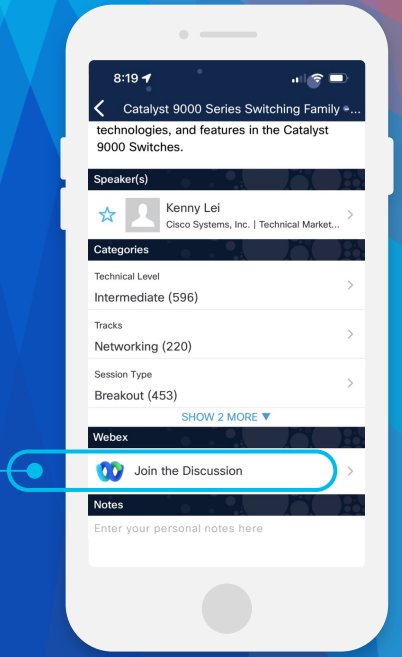

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Agenda

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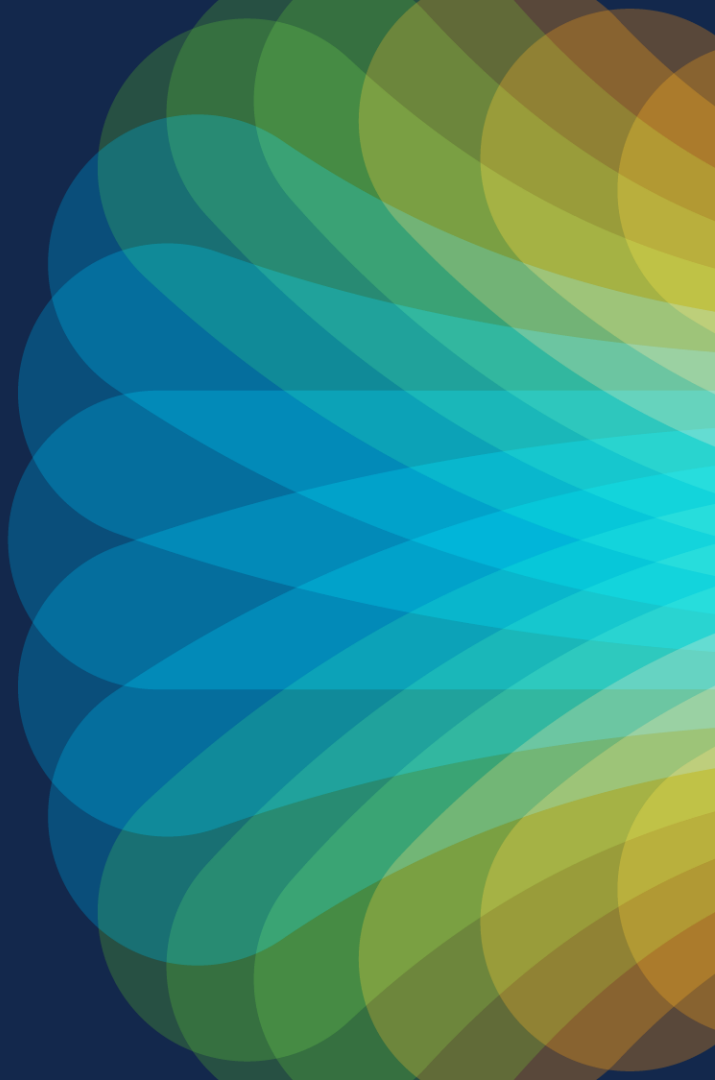
Conclusion

Introduction

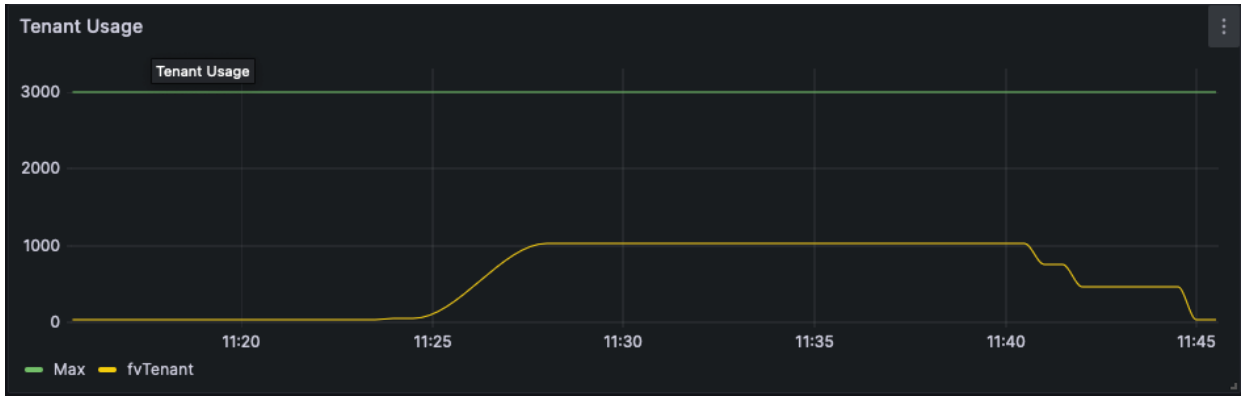


Why

- APIC Native Monitoring covers only the basics, for example the capacity dashboard has no historical data
- Nexus Dashboard Insight (NDI) provides a comprehensive solution for ACI Monitoring but has a relatively large footprint
- You might already be monitoring your infrastructure with Grafana and want to add ACI to your existing environment
- Grafana can be built to tailor specific use cases that are not yet covered by NDI
- You can run NDI and Grafana at the same time

Grafana

- Metrics visualizations and alerts tool
- Provides customizable Dashboards & panels
- Support proactive Monitoring & Alerting
- Offers dynamic visualization panels



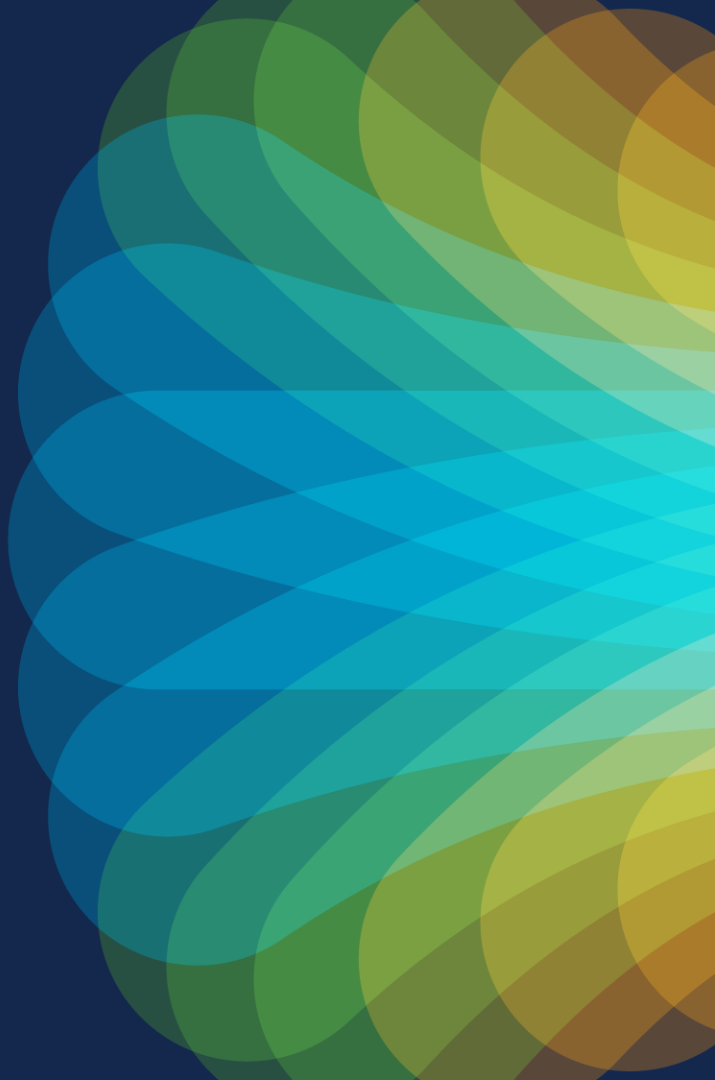
Prometheus

- Open-Source project from the Cloud Native Computing Foundation (CNCF)
- Prometheus: Collect, Store & Query time series metrics
- Every *time series* is uniquely identified by its metric name and optional key-value pairs called labels
- It consist of:
  - Exporters which collect and expose the metrics
  - Prometheus server which periodically scrapes and stores time series data

APIC and Prometheus

- APIC does not implement time series metrics
- We need a translation layer between APIC and Prometheus

ACI Exporter



ACI Exporter

- Ingest Metrics by using the ACI Rest API
- Converts them into time series metrics
- Opensource
- Developed by “OPSDIS” https://github.com/opsdis/aci-exporter
  - Scale Tested and Enhanced with Cisco
- Which metrics are ingested needs to be configured by defining a query.
  - The query can be of any supported ACI class
  - The Metric name needs to be manually defined
  - The labels can be extracted trough a RegEx

ACI Exporter – Example Node CPU

ACI Exporter – CPU Example

```
node_cpu:
   class_name: procSysCPU5min
   metrics:
      - name: node_cpu_user
        value_name: procSysCPU5min.attributes.userAvg
        type: "gauge"
        unit: "ratio"
        value_calculation: "value / 100"
      - name: node_cpu_kernel
        value_name: procSysCPU5min.attributes.kernelAvg
        type: "gauge"
        unit: "ratio"
        value_calculation: "value / 100"
   labels:
      - property_name: procSysCPU5min.attributes.dn
        regex: "^topology/pod-(?P<podid>[1-9][0-9]*)/node-(?P<nodeid>[1-9][0-9]*)/sys/procsys/CDprocSysCPU5min"
```

```
{
    "totalCount": "1",
    "imdata": [
        {
            "procSysCPU5min": {
                "attributes": {
                    "dn": "topology/pod-1/node-201/sys/procsys/CDprocSysCPU5min",
                    "userAvg": "2.234497”,
                    ”kernelAvg": "3.816219"
                }
            }
        }
    ]
}
```

ACI Exporter – CPU Example

```
node_cpu:
   class_name: procSysCPU5min
   metrics:
      - name: node_cpu_user
        value_name: procSysCPU5min.attributes.userLast
        type: "gauge"
        unit: "ratio"
        value_calculation: "value / 100"
      - name: node_cpu_kernel
        value_name: procSysCPU5min.attributes.kernelLast
        type: "gauge"
        unit: "ratio"
        value_calculation: "value / 100"
   labels:
      - property_name: procSysCPU5min.attributes.dn
        regex: "^topology/pod-(?P<podid>[1-9][0-9]*)/node-(?P<nodeid>[1-9][0-9]*)/sys/procsys/CDprocSysCPU5min"
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                    "kernelLast": "3.816219"
                }
            }
        }
    ]
}
```
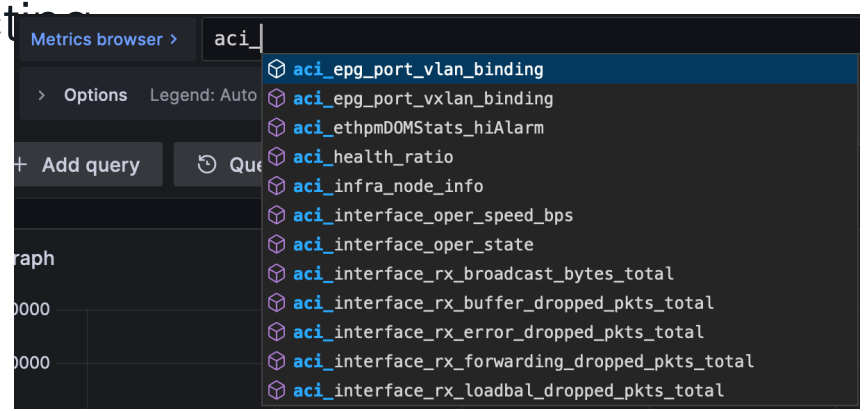

Building Grafana Dashboards

Querying Metrics - Explore

- A handy way to check what we are ingesting in Prometheus
- All metrics starts with a user defined prefix so is easy to find what we are collecting

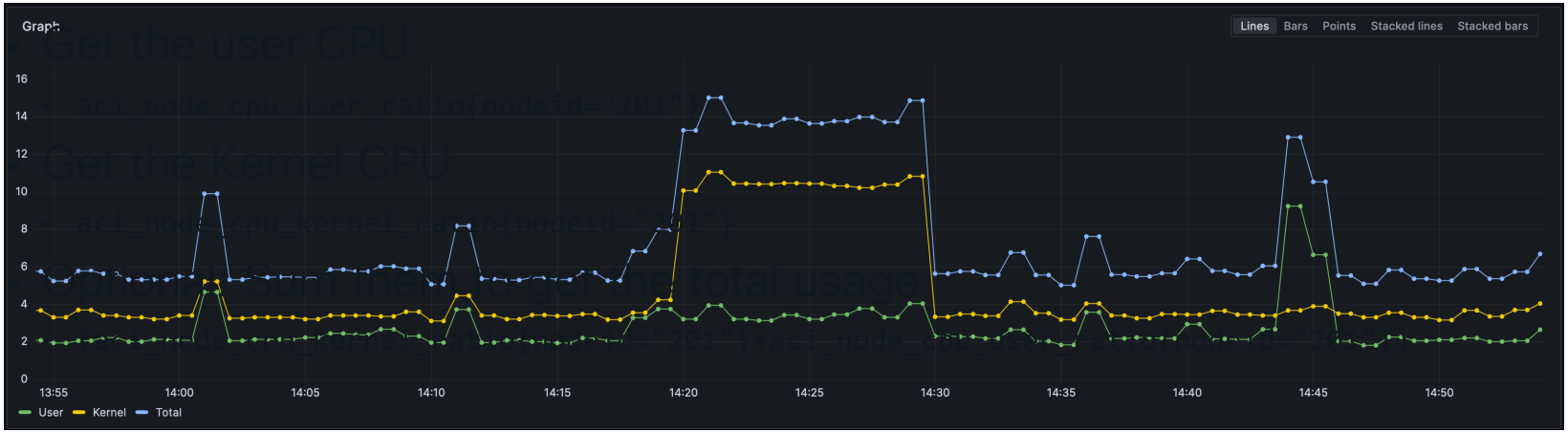


Querying Metrics – Explore

- Metrics can be filtered by labels
- If we want to get the `CPU usage for a specific switch we can do this:`
  - Get the user CPU
    - `aci_node_cpu_user_ratio{nodeid="201"}`
  - Get the Kernel CPU
    - `aci_node_cpu_kernel_ratio{nodeid="201"}`
  - Optional: Sum them to get the total usage
    - `(aci_node_cpu_kernel_ratio{nodeid="201"}+aci_node_cpu_user_ratio{nodeid="201"})`

Querying Metrics - Explore

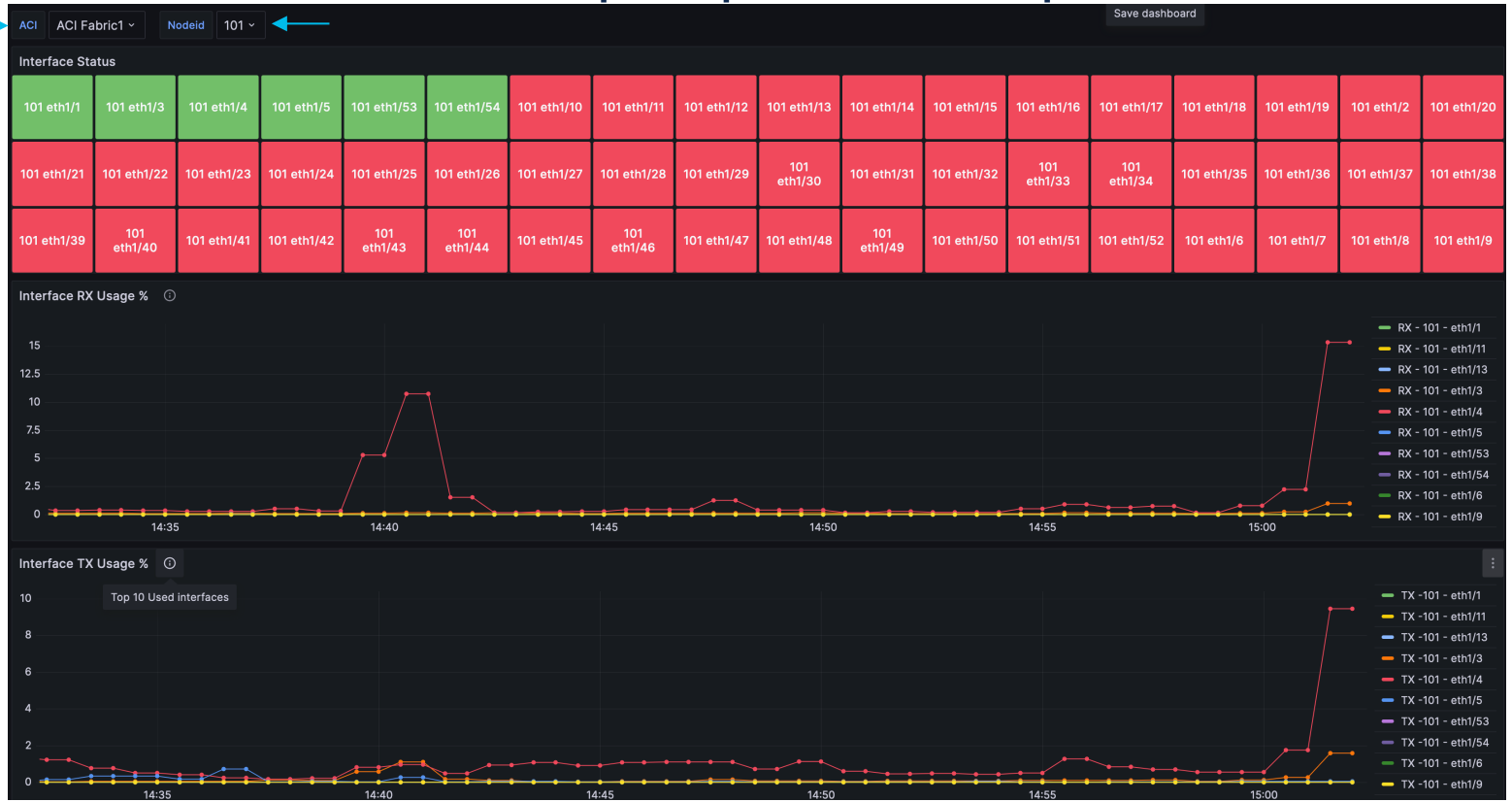
- Metrics can be filtered by labels
- If we want to get the `CPU usage for a specific switch we can do this:`



Dashboards

- To build dashboards we can use the same queries, but dashboards allows us to:
  - Customize the type of the Graph
  - Configure Threshold Based Alerts
  - Place multiple graph in a single dashboard
  - And much more

Dashboards – Example per node port stats



Demo 1 – Capacity Dashboard

Demo 2 – OSPF/BGP Peering and Routes

Conclusion

Take Aways

- Grafana with Prometheus can be effectively used to monitor ACI and create highly customizable dashboards however this requires
  - Development Effort
  - It is not real time, the Prometheus scraping interval can be be user configured but will be in the order of magnitudes of 2-5min for most environments
  - Limited feature set: “Just” a monitoring tool
- NDI is an out of the box solution that ”just works” and provide monitoring capabilities as well as advanced features like Flow Telemetry, Pre-Change Analysis, Compliance, Conformance and many more
- If needed remember you can use both!

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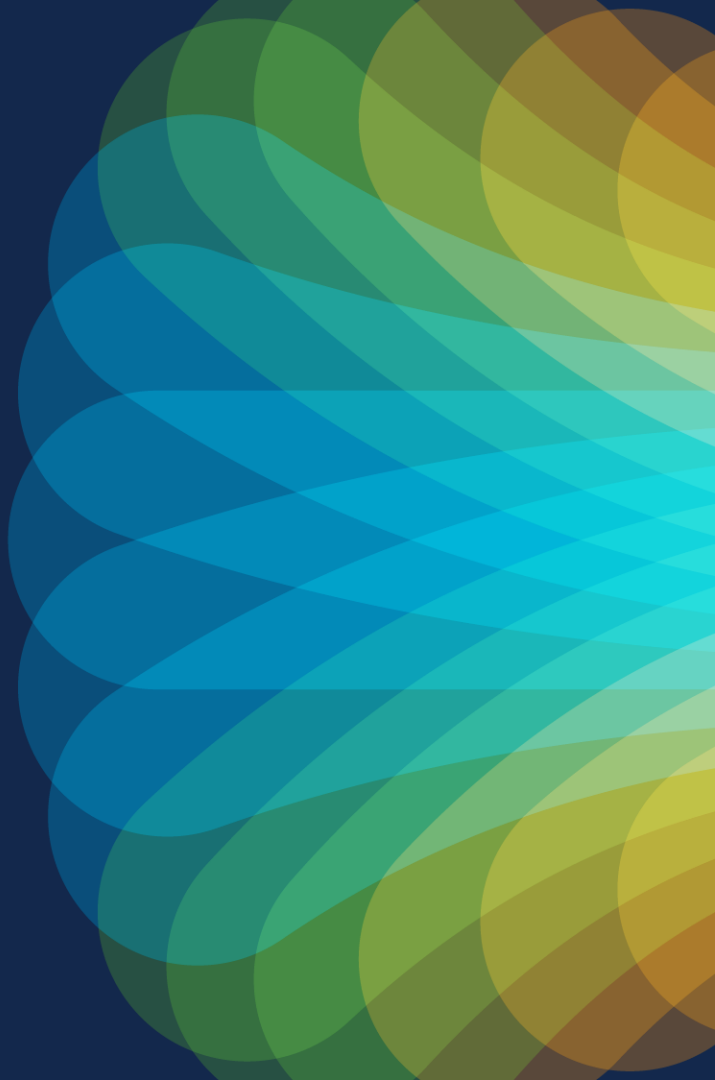
The bridge to possible

Thank you



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