iDRAC Telemetry Reference Tools Setup Instructions (DRAFT)

This technical document describes Telemetry opensource tool setup instructions for various big database reference stacks.

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Revisions

Date	Description
January 2021	Add ELK stack setup instructions and details.
March 2021	Add InfluxDB stack setup instructions.
April 2021	Add Timescale stack setup instructions.
April 2021	Add Prometheus DB stack setup instructions.

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1 Setting up Dell servers with Telemetry and Enable Telemetry reports

1) Install firmware version 4.00.00 or higher in PowerEdge IDRACs. Telemetry is a Datacenter licensed feature.
2) Download the telemetry utilities from- https://github.com/dell/iDRAC-Telemetry-Scripting

```
$ wget https://github.com/dell/iDRAC-Telemetry-Scripting/archive/master.zip -O iDRAC-TelemetryScripting-master.zip
$ unzip iDRAC-TelemetryScripting-master.zip
$ cd iDRAC-Telemetry-Scripting-master
```

3) The following steps should be performed on each iDRAC9 to enable telemetry reports. Please note that Telemetry streaming is only available with Datacenter license.

   Note in the command below, replace $target with the IP address or DNS name of the iDRAC9, replace $user with an iDRAC9 username with administrator privileges, and replace $password with the specified user’s password

```
$ python3 ./ConfigurationScripts/EnableOrDisableAllTelemetryReports.py -ip $target -u $user -p $password -s Enabled
```

2 Assumptions and other technical considerations

1) The docker compose files included in this repository can serve as reference for deployments. Docker compose configuration and flow of data between the containers are not enabled to be secure or persistent and is required to be modified to suit the needs of your environment.
2) README at https://github.com/dell/iDRAC-Telemetry-Reference-Tools provides the high level architectural dataflow diagram for this reference toolset.
3) The reference toolset functions as an aggregator for the telemetry data from PowerEdge Servers and can store the data as timeseries metric data points in the supported big databases. While the reference docker compose files are tested with analytics and visualization tools like Kibana and Grafana, detailed dashboards on specific application use cases are out of scope. Please refer the documentation for Kibana or Grafana to come up with your preferred dashboards.
4) The toolset is designed with flexibility and scalability as a goal. Inter-process communication leverages the ActiveMQ message bus.
   Flexibility - Major functionalities like remote source (iDRAC) discovery, credentials management for authorization, and telemetry report processing are abstracted as separate standalone applications. All IPC are through the message bus. Provided the IPC message interface structure is maintained, applications can be easily replaced or extended to suite the environments these applications are targeted to use. One or more ingest applications can be run to perform metrics ingestion into one or more database of choice.
   Scalability - Additional endpoints of iDRACs can be supported by adding more containers as it is needed to support the additional processing and data load in the environment.
5) The reference toolset can be also run standalone. Please refer section 3.3 for setup instructions.

3 Setting up the Elasticsearch data ingestion pipeline

3.1 Prerequisites

* Go - https://golang.org/

The docker compose file was tested with go1.15.6 linux/amd64. But technically any recent version should be just fine.

* ActiveMQ

apache-activemq-5.16.0 - https://activemq.apache.org/components/classic/download/

* Elastic Search (https://www.digitalocean.com/community/tutorials/how-to-install-elasticsearch-logstash-and-kibana-elastic-stack-on-ubuntu-20-04)

* Kibana (https://www.digitalocean.com/community/tutorials/how-to-install-elasticsearch-logstash-and-kibana-elastic-stack-on-ubuntu-20-04)

3.2 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

elastic-docker-pipeline-reference-unenc.yml – starts elasticsearch, kibana and ingest applications as docker containers. Docker compose configuration is not enabled to be secure or persistent and is required to be modified to suit the needs of deployment environment.

Update config.ini

Update the config.ini file with following details

- IP and credentials of idracs

```
athena@athena-PowerEdge-R640:~/toolset/telemetryservice$ docker-compose -f docker-compose-files/elastic-docker-pipeline-reference-unenc.yml up -d
Creating network "telemetryservice_elastic" with driver "bridge"
Creating es02     ... done
Creating activemq ... done
Creating es01     ... done
Creating es03     ... done
Creating telemetryservice_authapp_1           ... done
Creating telemetryservice_discapp_1           ... done
Creating telemetryservice_redfishreadapp_1    ... done
Creating telemetryservice_elasticsearchpump_1 ... done
Creating kib01                                ... done
athena@athena-PowerEdge-R640:~/toolset/telemetryservice$ docker-compose -f docker-compose-files/elastic-docker-pipeline-reference-unenc.yml ps
                Name                              Command                  State
Ports
```

```
---------------------------------------------------------------------------------------
--------------------
activemq                               /bin/bash -c bin/activemq  ...   Up
61616/tcp, 8161/tcp
es01                                   /tini -- /usr/local/bin/do ...   Up (healthy)
9200/tcp, 9300/tcp
es02                                   /tini -- /usr/local/bin/do ...   Up
9200/tcp, 9300/tcp
es03                                   /tini -- /usr/local/bin/do ...   Up
9200/tcp, 9300/tcp
kib01                                  /usr/local/bin/dumb-init - ...   Up
5601/tcp
telemetryservice_authapp_1             go run cmd/simpleauth/simp ...   Up
telemetryservice_discapp_1             go run cmd/simpledisc/simp ...   Up
telemetryservice_elasticsearchpump_1   go run cmd/elkpump/elkpump ...   Up
telemetryservice_redfishreadapp_1      go run cmd/redfishread/red ...   Up


athena@athena-PowerEdge-R640:~/toolset/telemetryservice$ docker network ls
NETWORK ID          NAME                          DRIVER              SCOPE
1e4f95d0f3ea        bridge                        bridge              local
4d6d8dcd18da        host                          host                local
13626d259a09        none                          null                local
65b45432b28a        telemetryservice_elastic      bridge              local
athena@athena-PowerEdge-R640:~/toolset/telemetryservice$ docker network inspect
telemetryservice_elastic
[
    {
        "Name": "telemetryservice_elastic",
        "Id": "65b45432b28ae269b1645bf69487104d2626a5a4d0dabcb864945840a1ecda88",
        "Created": "2021-01-26T12:19:57.518320389-06:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.24.0.0/16",
                    "Gateway": "172.24.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "1c424cb2e8447b207d024618c01df2e96b9852f64c343438bb4341abf26a7958": {
                "Name": "kib01",
                "EndpointID":
"1aa125fd85499968611538a043cbe0f0c090eb7475b563c21321301f075d4452",
                "MacAddress": "02:42:ac:18:00:0a",
                "IPv4Address": "172.24.0.10/16",
                "IPv6Address": ""
            },
            "41a93d84ecedebb18917d6c79595513283d073acc8e7a1c7ca384603a9dc4dce": {
                "Name": "es02",
                "EndpointID":
"8edcde63093c4909399d16ab0ca587bd3c5ce26d50ef7f4fe09d113ad9f362eb",
                "MacAddress": "02:42:ac:18:00:04",
                "IPv4Address": "172.24.0.4/16",
                "IPv6Address": ""
            },
            "9165d7f79373a7d81cab1c69b6cb5bc2834c985c4e7aa92c065a39d536c4d9ee": {
                "Name": "telemetryservice_discapp_1",
                "EndpointID":
"ad3ab006a39838492322f3f6ff206ed355cfed9160f8a5324e9441075bf8f0c3",
                "MacAddress": "02:42:ac:18:00:06",
                "IPv4Address": "172.24.0.6/16",
                "IPv6Address": ""
            },
            "9bec504349ecef3614f1c46fc1298bd67d3c6b8d44ee2faa81aa081b553f234a": {
                "Name": "es01",
                "EndpointID":
"2c037932e8d5045096ad2b46db6942c4137f491c9306ee3544953a5259bf94c7",
                "MacAddress": "02:42:ac:18:00:02",
                "IPv4Address": "172.24.0.2/16",
                "IPv6Address": ""
            },
            "9cc5b47550b4d120708a03d297b48067a2264e5405b9556d4e61e9a01b40abd6": {
                "Name": "activemq",
                "EndpointID":
"beac9436d295c8f7f9ed7f064f186f3b951e670320a0c8d60ff8eca0b756b33a",
                "MacAddress": "02:42:ac:18:00:05",
                "IPv4Address": "172.24.0.5/16",
                "IPv6Address": ""
            },
            "af05c1e0723e96e739d1b77f1d2315b753b253f2077cb4bb6ce066d3dff23d91": {
                "Name": "es03",
                "EndpointID":
"8ab71852c078d08189857533088312 4ccea7286c890c010b3f787b8b16f7b1a1",
                "MacAddress": "02:42:ac:18:00:03",
                "IPv4Address": "172.24.0.3/16",
                "IPv6Address": ""
            },
            "c8e516347112661f5ee6aaa8ffada24a423d391c6b857b860e528fa74924c60f": {
                "Name": "telemetryservice_redfishreadapp_1",
                "EndpointID":
"50ce7731f6a47da663b41e4f4e7c9d40ca45891d3c18e8b31f56cb3469eb5547",
                "MacAddress": "02:42:ac:18:00:08",
                "IPv4Address": "172.24.0.8/16",
                "IPv6Address": ""
            },
            "c90deb7e01413c2fbc3fa84baf30355c7fd9b1c9c4b8849df2bf482abdb093ea": {
                "Name": "telemetryservice_authapp_1",
                "EndpointID":
"56ff39f4ab33048a218dcbeb57cf24b7a58c7d74f4456e0b4522274889437eac",
                "MacAddress": "02:42:ac:18:00:09",
                "IPv4Address": "172.24.0.9/16",
                "IPv6Address": ""
            },
            "e3a129b8dcaf292729e35b76823b4989d54cf8678b45262454fe39f48ea6c143": {
                "Name": "telemetryservice_elasticsearchpump_1",
                "EndpointID":
"38944a460acf430a2533d3e67b39a4d86f69b1f6acb0ab6735cf2b72449ae4c2",
                "MacAddress": "02:42:ac:18:00:07",
                "IPv4Address": "172.24.0.7/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "elastic",
            "com.docker.compose.project": "telemetryservice",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

Note that Kibana IP in this case is 172.24.0.10

3.3 Instructions to run the pipeline as standalone applications

Update config.ini

Update the config.ini file with following details

- Stomp host names (activemq host name)
- IP and credentials of idracs
-

Setup:

Once you have Go installed you should be able to build each of the command binaries. Please replace <go> with the absolute path of the go binary if the installed binary is not in the default execution path.

* <go> build .\cmd\simpledisc\simpledisc.go

* <go> build .\cmd\simpleauth\simpleauth.go

* <go> build .\cmd\redfishread\redfishread.go

* <go> build .\cmd\elkpump\elkpump-basic.go

Now get ActiveMQ running, the default config is fine

* cd to the directory you unpacked or installed ActiveMQ to

* bin\activemq start

Now start the other daemons in any order (I tend to start from the bottom up, but shouldn't matter)

* simpledisc

* simpleauth

* redfishread

* elkpump-basic

3.4 Data Model and Applications

To configure the data source and visualization dashboards please access Kibana homepage in the browser (http://172.24.0.10:5601)

1) Select Stack Management from the Management section of the tools menu.
2) Index named – 'poweredge_telemetry_metrics' is shown under the Data -> Index Management tab. Our pipeline uses a custom application (elkpump) instead of a standard logstash plugin to stash the data in to elasticsearch lucene database. Application is storing the telemetry metrics under the 'poweredge_telemetry_metrics' index.

   Indexes can be also retrieved through command line queries from the DevTools console view.

   GET /_cat/indices?v=true

```
health status index                           uuid                  pri  rep
docs.count docs.deleted store.size pri.store.size
green  open   poweredge_telemetry_metrics     Fn0wnfrDTJqyb-9DuLns7A   1   1
116      1557849    206.9mb        102.7mb
green  open   .apm-custom-link                2uLRNhg4TFigKVfz36p1Kg   1   1
0            0       416b            208b
green  open   .kibana_task_manager_1          1S5B2z7_QyGAJbr_YXAWNQ   1   1
5         5559        1mb        544.4kb
green  open   .apm-agent-configuration        0noOBC1MRhee2PeCZJ5X1Q   1   1
0            0       416b            208b
green  open   .kibana-event-log-7.10.1-000001 gyCgu-ZoSv-DppxsmkThEQ   1   1
1            0     11.2kb          5.6kb
green  open   .async-search                   j5VuQCQqTHyaf3OHJB3mTA   1   1
0            0    541.6kb        269.2kb
green  open   .kibana_1                       bWwS4bQHS_yVcb67AfN5wg   1   1
52           11      4.3mb          2.1mb
```

   GET /poweredge_telemetry_metrics/_settings

```
{
  "poweredge_telemetry_metrics" : {
    "settings" : {
      "index" : {
        "routing" : {
          "allocation" : {
            "include" : {
              "_tier_preference" : "data_content"
            }
          }
        },
        "number_of_shards" : "1",
        "provided_name" : "poweredge_telemetry_metrics",
        "creation_date" : "1611685233721",
        "number_of_replicas" : "1",
        "uuid" : "Fn0wnfrDTJqyb-9DuLns7A",
        "version" : {
          "created" : "7100199"
        }
      }
    }
  }
}
```

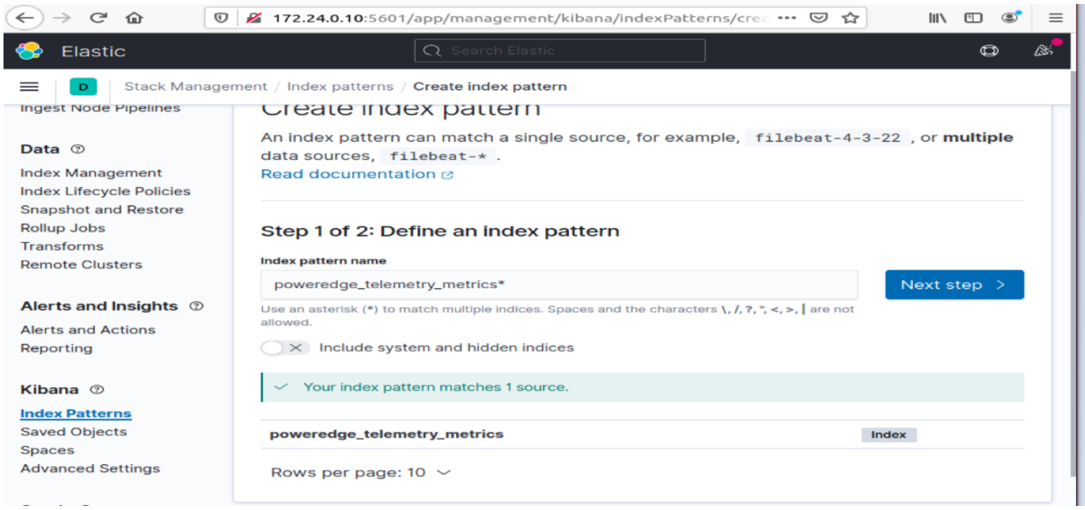
The data model for the data available in this index can be viewed from the index listing in the kibana console or through command line method from DevTools console

GET /poweredge_telemetry_metrics/_mapping

```
{
  "poweredge_telemetry_metrics" : {
    "mappings" : {
      "properties" : {
        "Context" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "ID" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "Label" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "System" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "Timestamp" : {
          "type" : "date"
        },
        "Value" : {
          "type" : "text",
          "fields" : {
            "keyword" : {
              "type" : "keyword",
              "ignore_above" : 256
            }
          }
        },
        "ValueFloat" : {
          "type" : "long"
        },
        "ValueInt" : {
          "type" : "long"
        }
      }
    }
  }
}
```

You can observe that metric values as sourced as int and float values are stored as long types in the elastic search and hence can be renamed as single value ValueAggregatable (TODO)

3) Create an index pattern for Kibana at index pattern tab.



Create index pattern

An index pattern can match a single source, for example, `filebeat-4-3-22` , or **multiple** data sources, `filebeat-*` .

Read documentation

Step 1 of 2: Define an index pattern

Index pattern name: poweredge_telemetry_metrics*

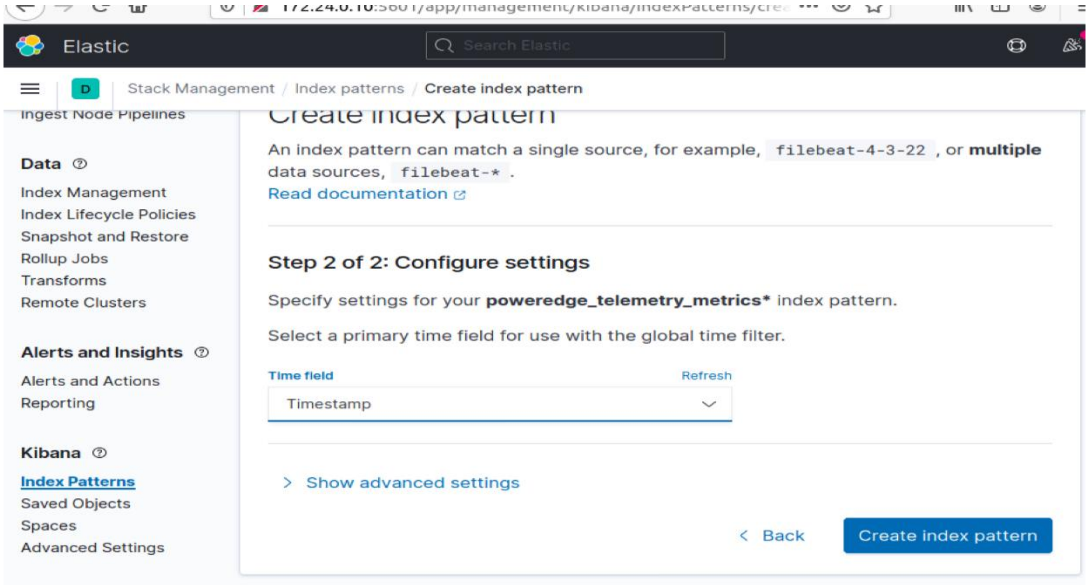
Use an asterisk (*) to match multiple indices. Spaces and the characters \, /, ?, ", <, >, | are not allowed.

Include system and hidden indices

✓ Your index pattern matches 1 source.

poweredge_telemetry_metrics

Rows per page: 10



Create index pattern

An index pattern can match a single source, for example, `filebeat-4-3-22` , or **multiple** data sources, `filebeat-*` .

Read documentation

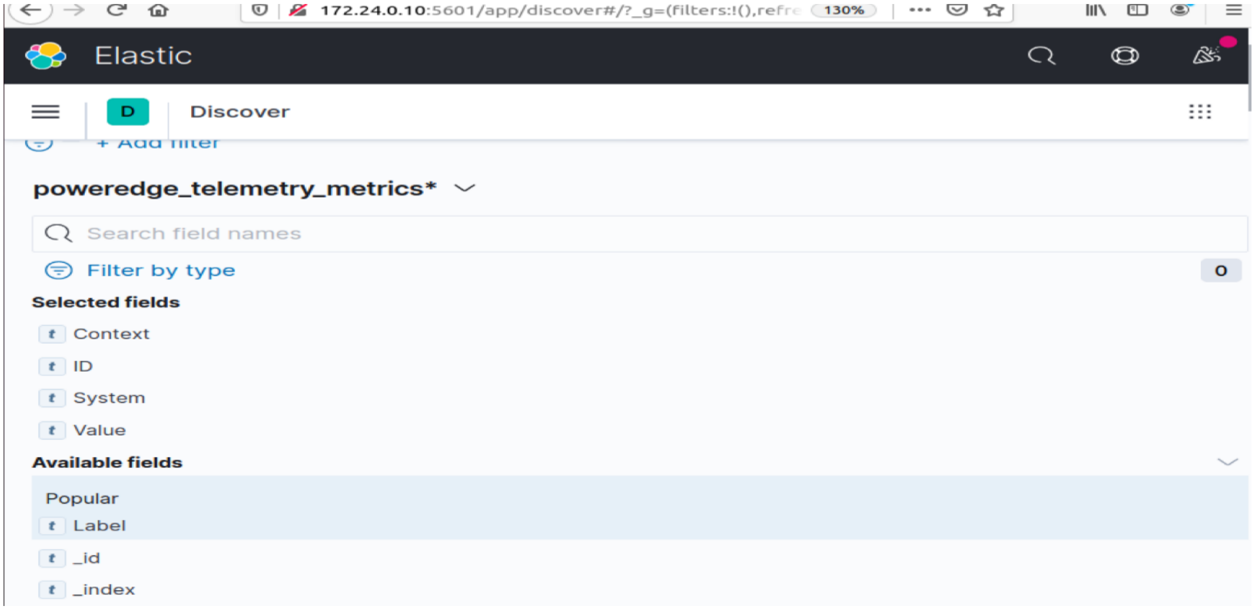
Step 2 of 2: Configure settings

Specify settings for your **poweredge_telemetry_metrics*** index pattern.

Select a primary time field for use with the global time filter.

Time field: Timestamp

4) Now from Discover tab, you can view the ingested data. You can also select the fields of interest and view the data in a tabular form with selected fields.



poweredge_telemetry_metrics*

Search field names

Filter by type 0

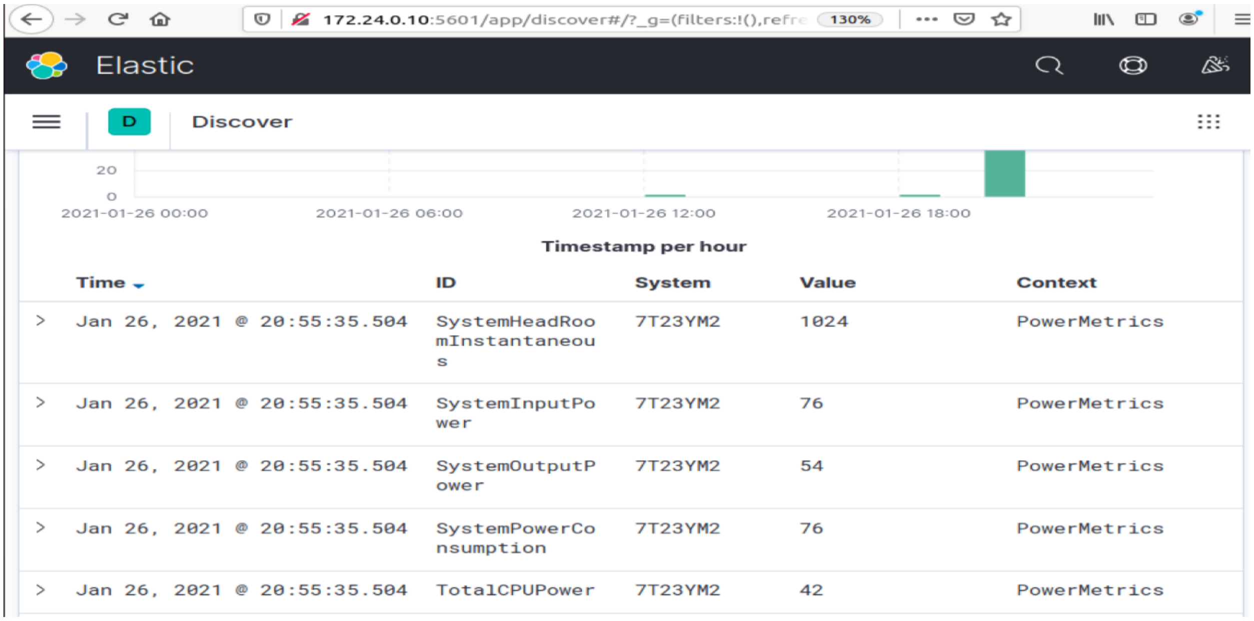
Selected fields

- t Context
- t ID
- t System
- t Value

Available fields

Popular

- t Label
- t _id
- t _index

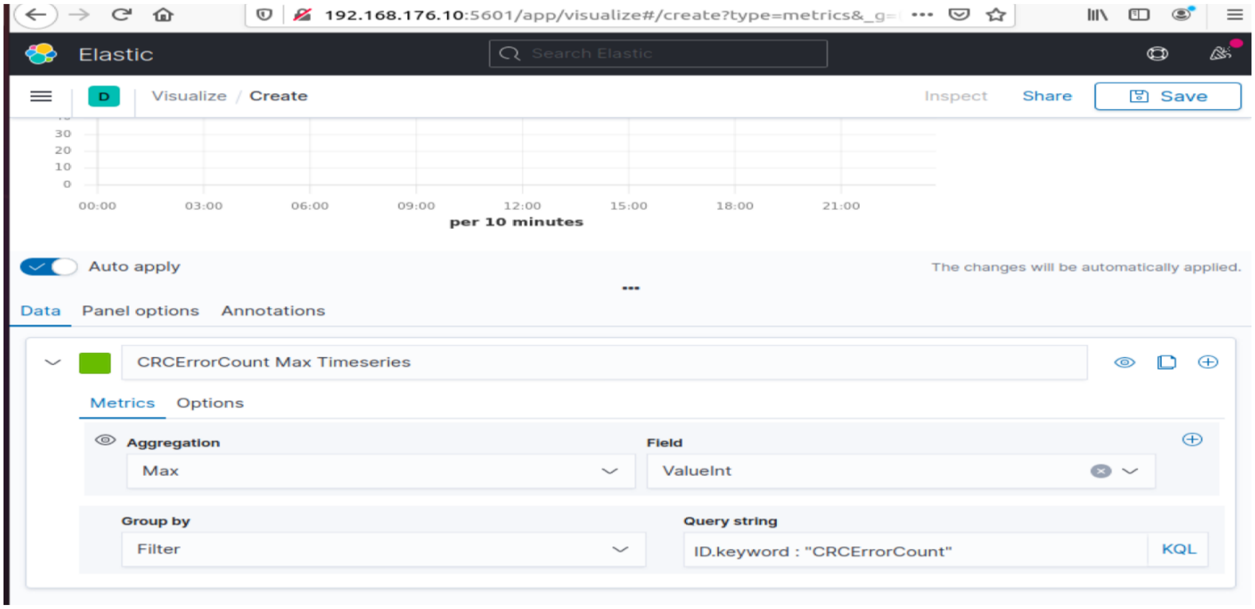


	Time	ID	System	Value	Context
>	Jan 26, 2021 @ 20:55:35.504	SystemHeadRoomInstantaneous	7T23YM2	1024	PowerMetrics
>	Jan 26, 2021 @ 20:55:35.504	SystemInputPower	7T23YM2	76	PowerMetrics
>	Jan 26, 2021 @ 20:55:35.504	SystemOutputPower	7T23YM2	54	PowerMetrics
>	Jan 26, 2021 @ 20:55:35.504	SystemPowerConsumption	7T23YM2	76	PowerMetrics
>	Jan 26, 2021 @ 20:55:35.504	TotalCPUPower	7T23YM2	42	PowerMetrics

Save the discover search for future reference from visualization and dashboards.

5) Now we can create charts for the dashboard with aggregable fields in data mapping. Please note that text values are indexed to be efficiently searchable in elastic search. And aggregatable values (non text) can be used to configure relevant visualizations.

A timeseries label is configured as Max aggregation on CRCErrorCount below.



192.168.176.10:5601/app/visualize#/create?type=metrics&_g=

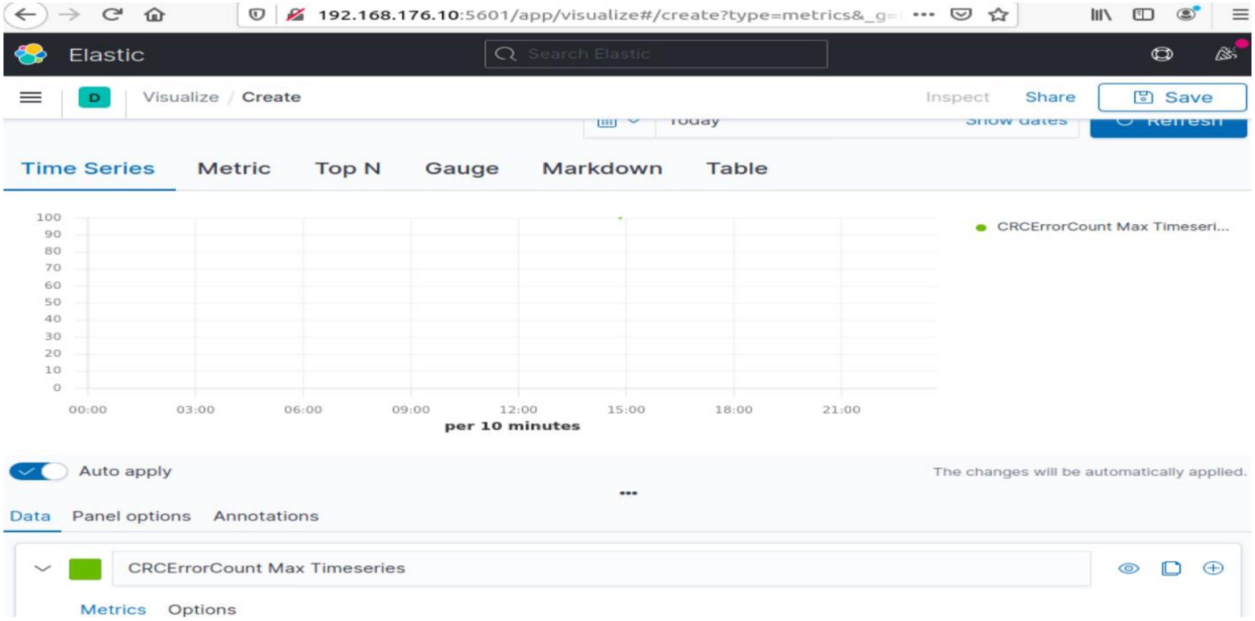
CRCErrorCount Max Timeseries

Aggregation: Max

Field: ValueInt

Group by: Filter

Query string: ID.keyword : "CRCErrorCount"



192.168.176.10:5601/app/visualize#/create?type=metrics&_g=

CRCErrorCount Max Timeseries

Kibana provides a wide variety of visualization techniques (licensed version has more variety and ML aggregates) and more charts can be created through trials and experimentations.

4 Setting up the InfluxDB data ingestion pipeline

4.1 Prerequisites

* Go - https://golang.org/

I had go version go version go1.15.6 linux/amd64. But technically any recent version should be just fine.

* ActiveMQ

Download version apache-activemq-5.16.0 from https://activemq.apache.org/components/classic/download/

* InfluxDB

https://docs.influxdata.com/influxdb/v1.6/introduction/installation/

4.2 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

influx-docker-pipeline-reference-unenc.yml

Update config.ini

Update the config.ini file with following details

- IP and credentials of idracs

```
athena@athena-PowerEdge-R640~/toolset/telemetryservice:docker-compose  -f  docker-compose-
files/influx-docker-pipeline-reference-unenc.yml up -d
Creating network "docker-compose-files_influxpipeline" with driver "bridge"
Creating influx                                ... done
Creating activemq01 ... done
Creating docker-compose-files_redfishreadapp_1 ... done
Creating docker-compose-files_influxpump_1     ... done
Creating docker-compose-files_discapp_1        ... done
Creating docker-compose-files_authapp_1        ... done
Creating grafana                               ... done
```

```
athena@athena-PowerEdge-R640~/toolset/telemetryservice:docker-compose  -f  docker-compose-
files/influx-docker-pipeline-reference-unenc.yml ps
               Name                                     Command                           State
Ports
```

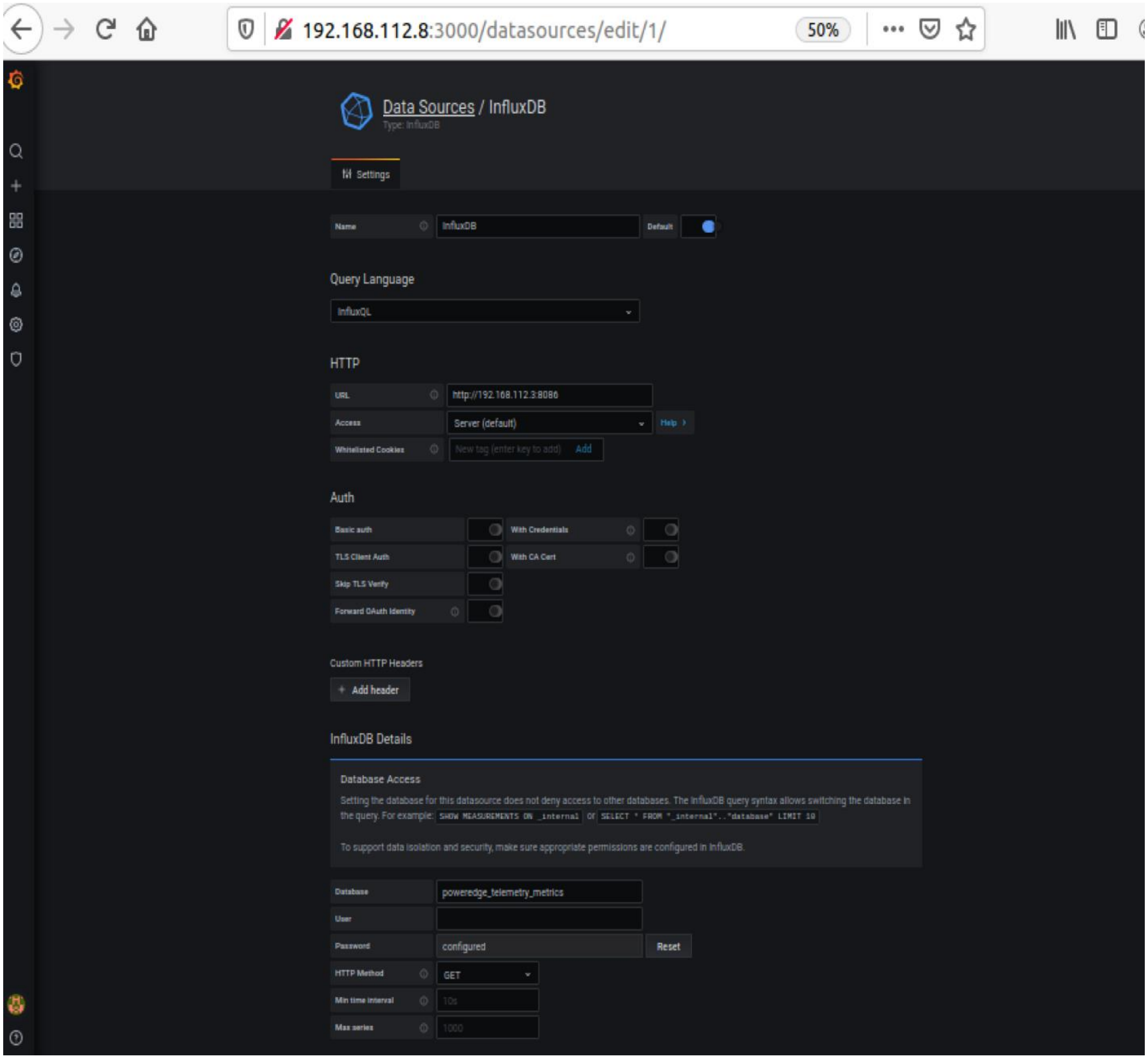
```
-------------------------------------------------------------------------------------
-------------------
activemq01                                   /bin/bash -c bin/activemq   ...    Up
61616/tcp, 8161/tcp
docker-compose-files_authapp_1       go run cmd/simpleauth/simp ...   Up
docker-compose-files_discapp_1       go run cmd/simpledisc/simp ...   Up
docker-compose-files_influxpump_1    go run cmd/influxpump/infl ...   Up
docker-compose-                      go run cmd/redfishread/red ...   Up
files_redfishreadapp_1
grafana                         /run.sh                       Up           3000/tcp
influx                               /entrypoint.sh influxd           Up (healthy)
8086/tcp

athena@athena-PowerEdge-R640~/toolset/telemetryservice:~/telemetry-opensource-
home/telemetry-reference-tools$ docker inspect docker-compose-files_influxpipeline
[
    {
        "Name": "docker-compose-files_influxpipeline",
        "Id": "2ccf9680801448d0c77d9aa1a856423b355786104d50498ec765943fa5af38a7",
        "Created": "2021-04-06T20:08:14.182802852-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "192.168.112.0/20",
                    "Gateway": "192.168.112.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "0310d0dd408eaca6c4b0d1bb72f4c550701a4aa107b82d564b6a0779fa0646e3": {
                "Name": "docker-compose-files_discapp_1",
                "EndpointID":
"916a794cc535c808a87638e4d67d8c040037935002f940b6fbba4653035bc329",
                "MacAddress": "02:42:c0:a8:70:04",
                "IPv4Address": "192.168.112.4/20",
                "IPv6Address": ""
            },
            "8b72452e97aabd671d293d4cfd2f1f37ba199549fc6b2365e4ab01db84da411e": {
                "Name": "activemq01",
                "EndpointID":
"ba4a99299ce4e3b574a462b4cee234966823a2c3a379f97928977966956c52d2",
                "MacAddress": "02:42:c0:a8:70:02",
                "IPv4Address": "192.168.112.2/20",
                "IPv6Address": ""
            },
            "97f6bf1266699b931ac72e30a2977cb34768cd3bce4a1893c7db26b18212b933": {
                "Name": "grafana",
                "EndpointID":
"09b1e0643d5ebcfaebce3c8ecccc2561f74c42c34e472ec65ae0cfeef2491ce7",
                "MacAddress": "02:42:c0:a8:70:08",
                "IPv4Address": "192.168.112.8/20",
                "IPv6Address": ""
            },
            "ae717d5417f668fb66c65d2f018317453c0500d1914713e8d7416277025eaf67": {
                "Name": "influx",
                "EndpointID":
"ef92c87ea5fe8ec3d79602c023f1f12b8428027ce63bd61ce90fd724500c3b57",
                "MacAddress": "02:42:c0:a8:70:03",
                "IPv4Address": "192.168.112.3/20",
                "IPv6Address": ""
            },
            "c5e17d59615b066ba5e163e7671fe857c1fdc0a2135463feb960c50391dc273f": {
                "Name": "docker-compose-files_authapp_1",
                "EndpointID":
"f4eaed22c293817c0ecd25a6801928ab01f76549197834124c898505397f630b",
                "MacAddress": "02:42:c0:a8:70:07",
                "IPv4Address": "192.168.112.7/20",
                "IPv6Address": ""
            },
            "d2778be129bbfb27b540fd453bcc6b4f9ecb0e0ec29e632410f20649ecdccfd1": {
                "Name": "docker-compose-files_redfishreadapp_1",
                "EndpointID":
"7485dbc9aba901efaf1df8a872d08bea5c6301c15640f5b66719ece7c2c1a1e5",
                "MacAddress": "02:42:c0:a8:70:06",
                "IPv4Address": "192.168.112.6/20",
                "IPv6Address": ""
            },
            "e32198358d06a16a92aedbf1c7a8b38558b3742bed6f4951712af776bef0f554": {
                "Name": "docker-compose-files_influxpump_1",
                "EndpointID":
"c98192ccfba25a3ec46c74708f372a2befbbe3a20ea4571cae9367a00f33480c",
                "MacAddress": "02:42:c0:a8:70:05",
                "IPv4Address": "192.168.112.5/20",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "influxpipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

4.3 Data Model and Applications

To configure the data source and visualization dashboards please access Kibana homepage in the browser (http://192.168.112.8:3000)

InfluxDB data source can be added from Add data source option and once the data source is added dashboards and alerts can be created for the specific use case of interest.



Data Sources / InfluxDB

Type: InfluxDB

Name InfluxDB Default

Query Language

InfluxQL

HTTP

URL http://192.168.112.3:8086

Access Server (default) Help ›

Whitelisted Cookies New tag (enter key to add) Add

Auth

Basic auth With Credentials

TLS Client Auth With CA Cert

Skip TLS Verify

Forward OAuth Identity

Custom HTTP Headers

InfluxDB Details

Database Access

Setting the database for this datasource does not deny access to other databases. The InfluxDB query syntax allows switching the database in the query. For example: `SHOW MEASUREMENTS ON _internal` or `SELECT * FROM "_internal".."database" LIMIT 10`

To support data isolation and security, make sure appropriate permissions are configured in InfluxDB.

Database poweredge_telemetry_metrics

User

Password configured Reset

HTTP Method GET

Min time interval 10s

Max series 1000

5 Setting up the Timescale data ingestion pipeline

5.1 Prerequisites

* Go - https://golang.org/

I had go version go version go1.15.6 linux/amd64. But technically any recent version should be just fine.

* ActiveMQ

Download version apache-activemq-5.16.0 from https://activemq.apache.org/components/classic/download/

* TimescaleDB 2.0

(https://docs.timescale.com/latest/getting-started/installation)

Follow through out to setup the memory and WAL parameter tunings.

A great summary of timescale data model capabilities are outlined in the timescale online documentation - https://docs.timescale.com/latest/introduction/data-model

5.2 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

timescale-docker-pipeline-reference-unenc.yml

Update config.ini

Update the config.ini file with following details

- IP and credentials of idracs

Now start the container pipeline.

```
athena@athena-PowerEdge-R640:~/telemetry-reference-tools$ docker-compose -f docker-compose-files/timescale-docker-pipeline-reference-unenc.yml ps
       Name                      Command                State             Ports
-----------------------------------------------------------------------------------------
activemq              /bin/bash -c bin/activemq  ...   Up      61616/tcp, 8161/tcp
grafana               /run.sh                          Up      3000/tcp
telemetry-receiver    /bin/sh -c cmd/idrac-telem ...   Up
timescale             docker-entrypoint.sh postgres    Up      0.0.0.0:5432->5432/tcp
timescale-ingester    go run cmd/timescalepump/t ...   Up
```

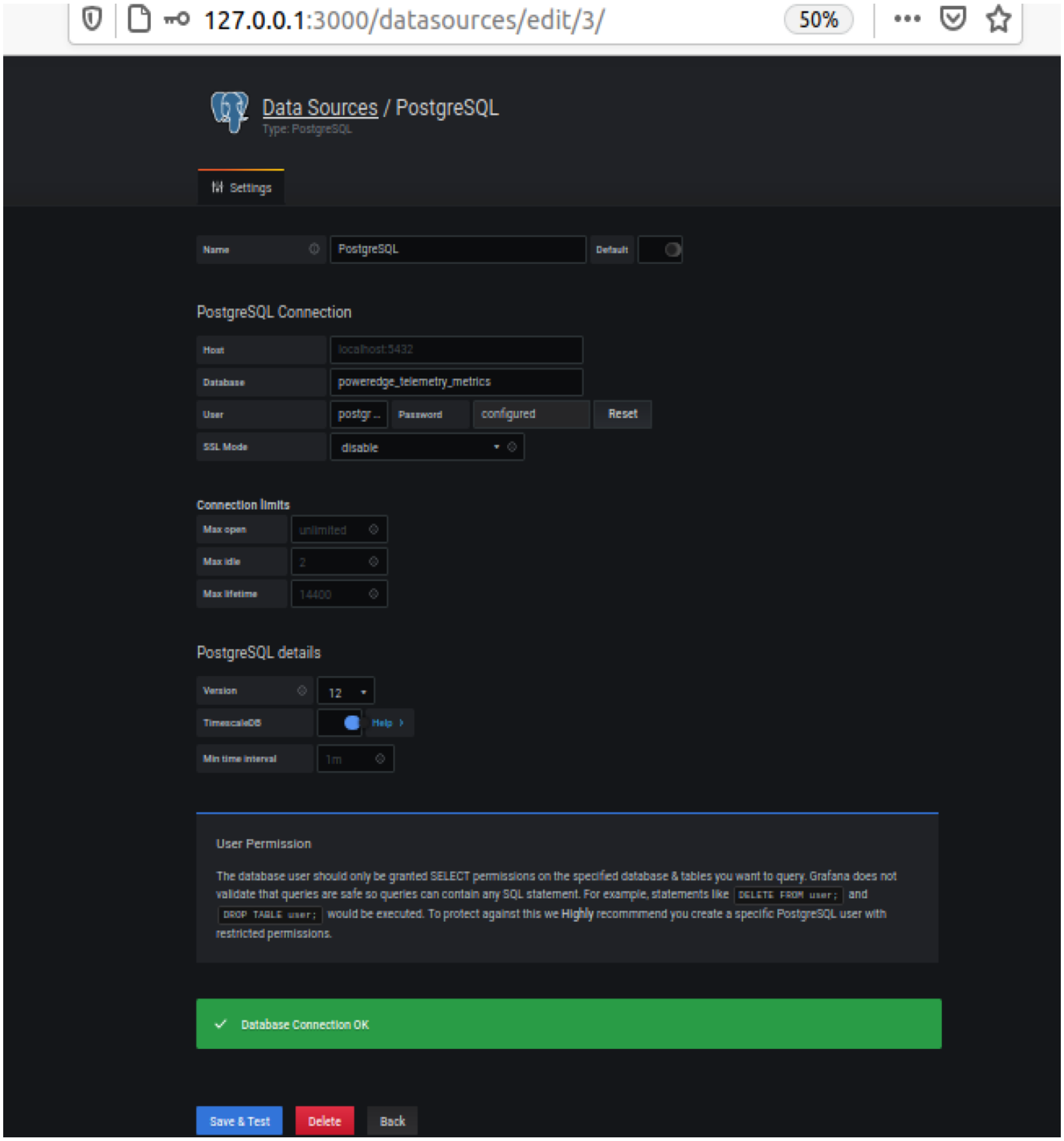
```
athena@athena-PowerEdge-R640:~/telemetry-reference-tools$  docker-compose  -f  docker-compose-files/timescale-docker-pipeline-reference-unenc.yml ps
       Name                         Command                State           Ports
-------------------------------------------------------------------------------------
activemq             /bin/bash -c bin/activemq  ...   Up      61616/tcp, 8161/tcp
grafana              /run.sh                          Up      3000/tcp
telemetry-receiver   /bin/sh -c cmd/idrac-telem ...   Up
timescale            docker-entrypoint.sh postgres    Up      0.0.0.0:5432->5432/tcp
timescale-ingester   go run cmd/timescalepump/t ...   Up
```

Inspect the docker network bridge to identify Grafana and timescale IPs.

```
athena@athena-PowerEdge-R640:~/telemetry-reference-tools$docker    inspect    docker-compose-files_timescalepipeline
[
    {
        "Name": "docker-compose-files_timescalepipeline",
        "Id": "c2da29f999c5b8112516b58637fad9c26d736c4c18e61d2c0dbe4a625bfa1d4f",
        "Created": "2021-04-23T21:01:36.314827133-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "192.168.96.0/20",
                    "Gateway": "192.168.96.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "469cd899f9fd140d5e4f39cfc453db487be9821424782c3b0349cd6c66124593": {
                "Name": "timescale-ingester",
                "EndpointID":
"63fb4eb14aa6c38efca0e0ec662e5f689f176c76725eefe19bc622ea5c2149ae",
                "MacAddress": "02:42:c0:a8:60:03",
                "IPv4Address": "192.168.96.3/20",
                "IPv6Address": ""
            },
            "483c9727ad412d904610d79a6e23e922ec7685b597eba040d170b29ed6397cf7": {
                "Name": "telemetry-receiver",
                "EndpointID":
"cf3cba76ef5e59840de6ef485bdea863addf1667b2d1149233d87d9eb5a1ebf4",
                "MacAddress": "02:42:c0:a8:60:05",
                "IPv4Address": "192.168.96.5/20",
                "IPv6Address": ""
            },
            "53786ea5122a03a0a39f9ed92f123eb2fdb38fc97130892819534db7465fb84d": {
                "Name": "timescale",
                "EndpointID":
"7f59bbb749bfcc1e3b65fea4212af0762e8c1defe59ddb075db10a086acc0597",
                "MacAddress": "02:42:c0:a8:60:06",
                "IPv4Address": "192.168.96.6/20",
                "IPv6Address": ""
            },
            "b3abc6a8de8704d79eed21bbec824d6992dfc288fcc70831aae9646084807d06": {
                "Name": "grafana",
                "EndpointID":
 "b60fd3acac4f7dac482d90b70ef799562e7a988f02b9ec899936620b4d601d8f",
                "MacAddress": "02:42:c0:a8:60:04",
                "IPv4Address": "192.168.96.4/20",
                "IPv6Address": ""
            },
            "fc5386c3c772ba39c6fbc8ff597fcb078fabd25cc3d7982fc71391ae07af1eb6": {
                "Name": "activemq",
                "EndpointID":
 "d7bac55140081540edbd315b97b63bd15b31ed4a04d736f91e33f7e5553ff6a9",
                "MacAddress": "02:42:c0:a8:60:02",
                "IPv4Address": "192.168.96.2/20",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "timescalepipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

5.3 Data Model and Applications

Postgres data source can be added from Add data source option and once the data source is added dashboards and alerts can be created for the specific use case of interest.



Data Sources / PostgreSQL

Type: PostgreSQL

Name: PostgreSQL Default

PostgreSQL Connection

Host: localhost:5432

Database: poweredge_telemetry_metrics

User: postgr ... Password: configured Reset

SSL Mode: disable

Connection limits

Max open: unlimited

Max idle: 2

Max lifetime: 14400

PostgreSQL details

Version: 12

TimescaleDB Help ›

Min time interval: 1m

User Permission

The database user should only be granted SELECT permissions on the specified database & tables you want to query. Grafana does not validate that queries are safe so queries can contain any SQL statement. For example, statements like `DELETE FROM user;` and `DROP TABLE user;` would be executed. To protect against this we Highly recommmend you create a specific PostgreSQL user with restricted permissions.

✓ Database Connection OK

6 Setting up the Prometheus data ingestion pipeline

6.1 Prerequisites

* Go - https://golang.org/

I had go version go version go1.15.6 linux/amd64. But technically any recent version should be just fine.

* ActiveMQ

Download version apache-activemq-5.16.0 from https://activemq.apache.org/components/classic/download/

* Prometheus

(https://prometheus.io/docs/prometheus/latest/installation)

6.2 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

prometheus-docker-pipeline-reference-unenc.yml

Update config.ini

Update the config.ini file with following details

- IP and credentials of idracs

Now start the container pipeline.

```
athena@athena-PowerEdge-R640:~/telemetry-reference-tools$ docker-compose -f docker-
compose-files/prometheus-docker-pipeline-reference-unenc.yml up -d
Creating network "docker-compose-files_prometheuspipeline" with driver "bridge"
Creating prometheus ... done
Creating activemq   ... done
Creating grafana             ... done
Creating prometheus-ingester ... done
Creating telemetry-receiver  ... done

athena@athena-PowerEdge-R640:~/telemetry-reference-tools$ docker-compose -f docker-
compose-files/prometheus-docker-pipeline-reference-unenc.yml ps
       Name                      Command               State          Ports
----------------------------------------------------------------------------------
activemq              /bin/bash -c bin/activemq  ...   Up      61616/tcp, 8161/tcp
grafana               /run.sh                          Up      3000/tcp
```

```
prometheus            /bin/prometheus --config.f ...   Up      9090/tcp
prometheus-ingester   go run cmd/prometheuspump/ ...   Up
telemetry-receiver    /bin/sh -c cmd/idrac-telem ...   Up
```

Inspect the docker network bridge to identify Grafana and prometheus IPs.

```
athena@athena-PowerEdge-R640:~/telemetry-reference-tools$  docker  inspect  docker-
compose-files_prometheuspipeline
[
    {
        "Name": "docker-compose-files_prometheuspipeline",
        "Id": "e9144e9472338b98087e6d6e6c8a5945ff7370e20e0f5e334880da33dd5f9930",
        "Created": "2021-04-23T17:33:35.414305251-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.28.0.0/16",
                    "Gateway": "172.28.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {
            "8d2cc2de178001c25946e49fbd50317d95b4a99fbe8feae3c7a865748b460055": {
                "Name": "prometheus",
                "EndpointID":
"d2f5111e4314225ba44d9ace616830be630a3764ce2aad0b35161b6f96781a40",
                "MacAddress": "02:42:ac:1c:00:02",
                "IPv4Address": "172.28.0.2/16",
                "IPv6Address": ""
            },
            "a7100c0d968f6caf2a7f00ca6d4877eba5f11ce067367db468ee4567116f2bc6": {
                "Name": "telemetry-receiver",
                "EndpointID":
"f9cc62809aaae0fe8d6a2451efdd688ba73035a6af6f65fc46a5e57d4252c29a",
                "MacAddress": "02:42:ac:1c:00:06",
                "IPv4Address": "172.28.0.6/16",
                "IPv6Address": ""
            },
            "c4552e8ef4b5f7bd3d3f3d5a1d96540acf7ce7f0371a4c1df5381fb6c6cbd51b": {
                "Name": "grafana",
                "EndpointID":
"1cab876399074483d66489cc54bbb53c95faa045788d8c60440325ae43b5d49a",
                "MacAddress": "02:42:ac:1c:00:03",
                "IPv4Address": "172.28.0.3/16",
                "IPv6Address": ""
            },
            "ca4aa1e0ee999d43e595ac89d6ac7822ceb5808e3ad39f77ee4facb39177d894": {
                "Name": "prometheus-ingester",
                "EndpointID":
"30373aa864763a1bcdeb6060bfb46641cd766ed2ae636ac7b0d49ad1b36418fd",
                "MacAddress": "02:42:ac:1c:00:05",
                "IPv4Address": "172.28.0.5/16",
                "IPv6Address": ""
            },
            "ec150b852dafae0647ccae33d84905526bb2aba5a15aa140e3be2d4d6233cfe4": {
                "Name": "activemq",
                "EndpointID":
"c36b86dea1bdc462d6c30fab88b56ce70a9862227b1182f500af94151f2da338",
                "MacAddress": "02:42:ac:1c:00:04",
                "IPv4Address": "172.28.0.4/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "prometheuspipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

6.3 Data Model and Applications

To configure the data source and visualization dashboards please access Grafana homepage in the browser (http://172.28.0.3:3000)

Prometheus data source (**`172.28.0.2:9090`**) can be added from Add data source option and once the data source is added dashboards and alerts can be created for the specific use case of interest.