iDRAC Telemetry Reference Tools Setup Instructions (DRAFT)

This technical document describes instructions to setup Telemetry Reference Tools.

Dell Server Engineering
January 2021

Authors

Server Telemetry Team

Server Software Solutions Group

Revisions

Date	Description
January 2021	Add ELK stack setup instructions and details.
March 2021	Add Influx DB stack setup instructions.
April 2021	Add Timescale stack setup instructions.
April 2021	Add Prometheus DB stack setup instructions.
June 2021	Updated to reflect recent improvements in the aggregator applications

Table of contents

1 Prerequisite - Setting up Servers with Telemetry Enabled and Reports Configured

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.

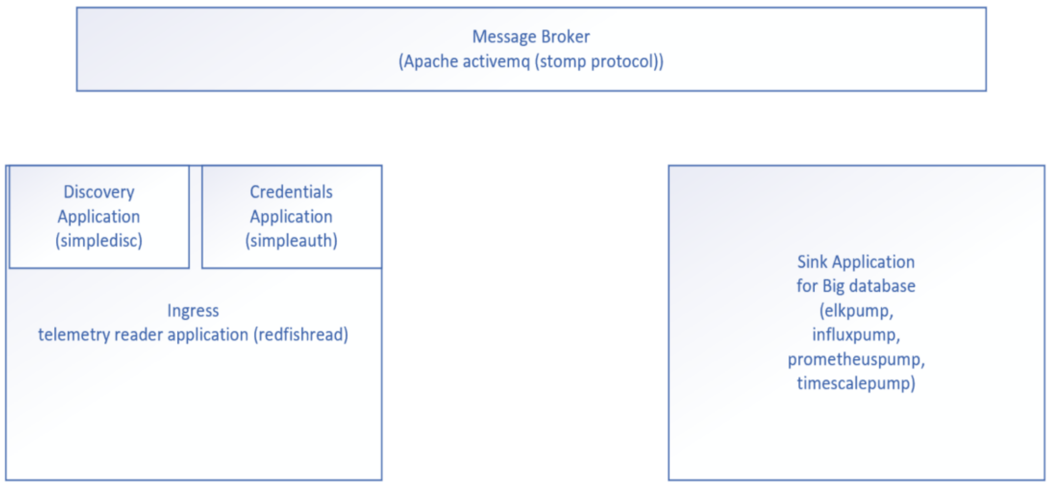
   Scalability - Additional endpoints of iDRACs can be supported by adding more containers as it is needed to support the additional processing and data load in the environment.

5) The reference toolset can be run as docker containers or standalone.

3 Toolset Architecture and Setting up the data ingestion pipeline

3.1 Software Components

Toolset has following logical blocks


Message Broker
(Apache activemq (stomp protocol))
Discovery Application (simpledisc)
Credentials Application (simpleauth)
Ingress
telemetry reader application (redfishread)
Sink Application for Big database (elkpump, influxpump, prometheuspump, timescalepump)

idrac-telemetry-receiver (iDRAC-Telemetry-Reference-Tools/cmd/ idrac-telemetry-receiver.sh)

redfishread application - Make SSE (Server Sent Event) connection with each discovered data sources(iDRACs) and forwards the telemetry report streams to sink applications through a shared message bus connection. iDRAC Telemetry reports are DMTF redfish compliant.

configgui applications - Graphical User Interface application to configure telemetry source services (iDRACs)

dbdiscauth applications - Database (mysql) based discovery and authentication functions

[Optional]simpleauth and simpledisc applications (Abstracts a file based (following the sample - config.ini) discovery and authentication functions

Sink Applications

Read the telemetry reports from message bus and ingest the report streams into specific analytical solution.

timescalepump - Ingest timeseries metrics into Elasticsearch database.

influxpump - Ingest timeseries metrics into InfluxDB database.

prometheuspump - Ingest timeseries metrics into Prometheus database.

timescalepump - Ingest timeseries metrics into TimeScale database.

Application reads and uses following environment variables. Please refer the docker compose files for further information.

MESSAGEBUS_HOST

MESSAGEBUS_PORT

CONFIGUI_HTTP_PORT

MYSQL_DATABASE

MYSQL_USER

MYSQL_PASSWORD

MYSQL_HOST

MYSQL_HOST_PORT

3.2 Instructions to run the pipeline as standalone applications

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.

idrac-telemetry-receiver components

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

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

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

* <go> build .\cmd\simpledisc\simpledisc.go (Optional for config.ini based discovery)

* <go> build .\cmd\simpleauth\simpleauth.go (Optional for config.ini based discovery)

Sink Applications

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

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

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

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

Now get ActiveMQ running, the default config is fine

* cd to the directory you unpacked or installed ActiveMQ to

* bin\activemq start

Update the config.ini file with following details

Stomp host names (activemq) and stomp port as configured in the local configuration file of activemq

Sample file:

```
[General]

StompHost=activemq

StompPort=61613
```

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

* simpledisc (config.ini based discovery)
* simpleauth (config.ini based authentication)
* redfishread
* dbdiscauth -> (mysql db based discovery and authentication)
* configui -> web UI with interface to update source services in mysql db
* elkpump-basic
* influxpump
* timescalepump
* prometheuspump

3.3 Instructions to run the pipeline as container applications

This is further explained in detail in section 4.

iDRAC-Telemetry-Reference-Tools/docker-compose-files/ has reference docker compose pipelines.

3.4 Instructions to configure source iDRACs

simpleauth and simpledisc applications allow file based discovery and auth.

Update the [Services] section of config.ini file with following details

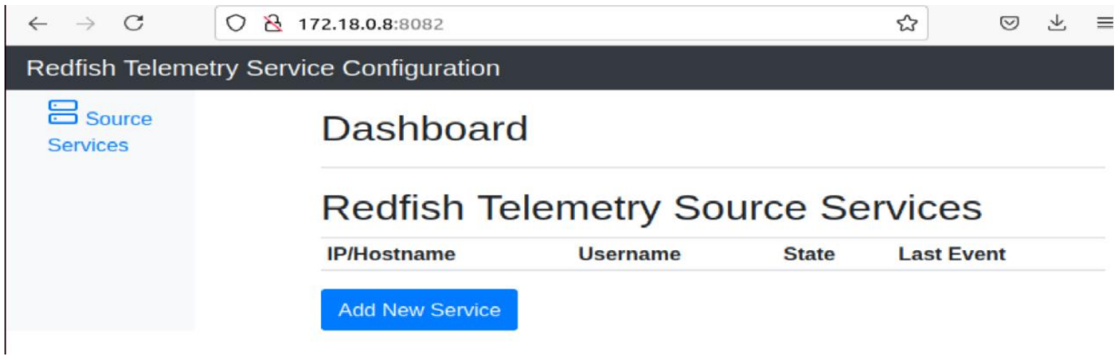
IP and credentials of iDRACs in the services section

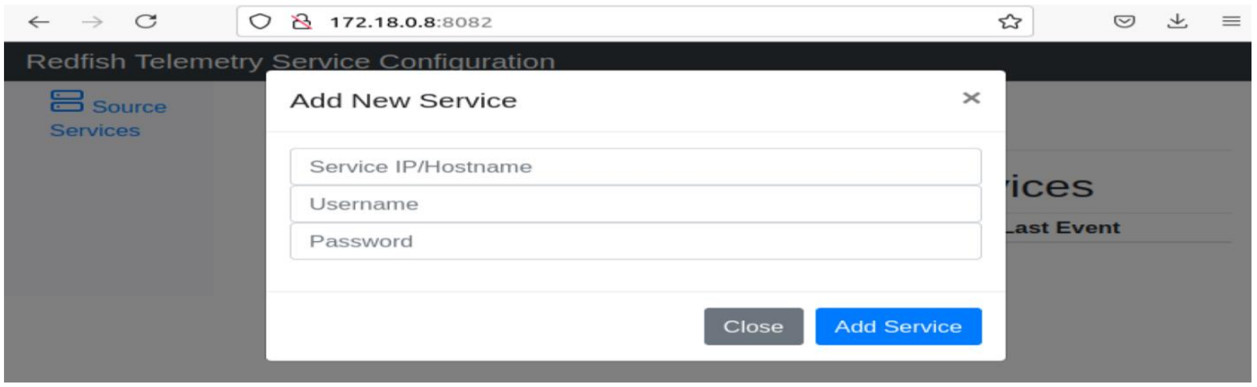
Sample file:

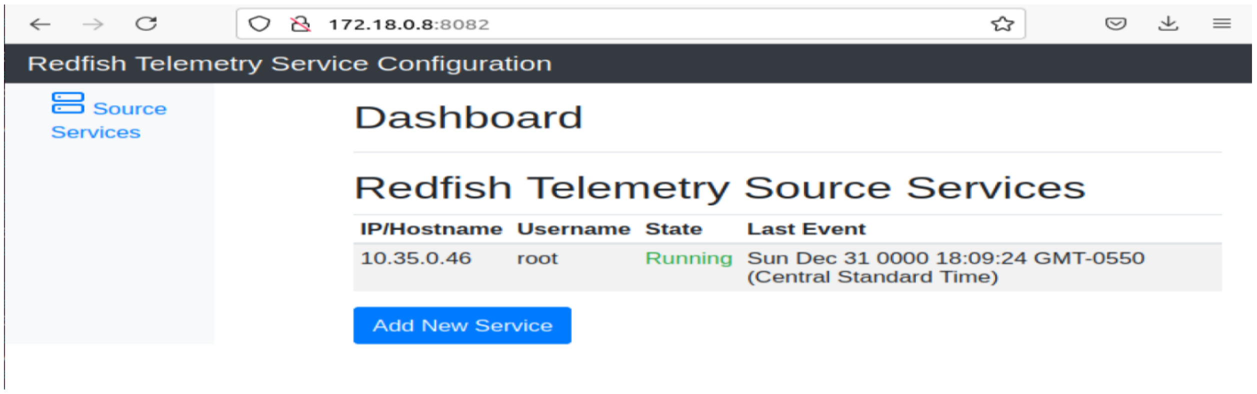
```
[Services]
Types=iDRAC,iDRAC,iDRAC
IPs=ip1,ip2,ip3

[ip1]
username=usr1
password=pwd1

[ip2]
username=usr2
password=pwd2
```

configui and dbdiscauth applications allow web user interface-based configuration. mysqldb credentials can be configured at docker compose files. Default configui http port is 8082 (`CONFIGUI_HTTP_PORT=8082` as in docker compose file).

Section 3.1 lists the configurable variables which can be enabled through environment variables. Please note and the webservice IP is the IP of the telemetry-receiver container (or local host if running in standalone mode).






172.18.0.8:8082
Redfish Telemetry Service Configuration
Source Services
Dashboard
Redfish Telemetry Source Services
Add New Service

IP/Hostname	Username	State	Last Event
10.35.0.46	root	Running	Sun Dec 31 0000 18:09:24 GMT-0550 (Central Standard Time)

4 Setting up the Elasticsearch data ingestion pipeline

If you want to use Docker Compose method to have a simpler setup then install Docker and Docker Compose and continue with Section 4.1.

If you are looking for full scale installation of components install Go, ActiveMQ, Elasticsearch and Kibana.

Please refer section 8 for installation instructions.

4.1 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.

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker-compose -f docker-compose-files/elastic-docker-pipeline-reference-unenc.yml up -d

```
Creating network "docker-compose-files_elastic" with driver "bridge"
Creating es03         ... done
Creating es01         ... done
Creating activemq ... done
Creating mysqldb      ... done
Creating es02     ... done
Creating es-ingester         ... done
Creating telemetry-receiver ... done
Creating kib01               ... done
```

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ 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
es-ingester          go run cmd/elkpump/elkpump ...   Up
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
mysqldb              docker-entrypoint.sh mysqld      Up             3306/tcp,
33060/tcp
telemetry-receiver   /bin/sh -c cmd/idrac-telem ...   Up
```

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker network ls

```
NETWORK ID      NAME                                       DRIVER     SCOPE
```

```
cf13f260922c   bridge                                      bridge    local
68c0c061256b   docker-compose-files_elastic                bridge    local
4d6d8dcd18da   host                                        host      local
```

athena@athena-PowerEdge-R640:~/dell-github/iDRAC-Telemetry-Reference-Tools$ docker network inspect docker-compose-files_elastic

```
[
    {
        "Name": "docker-compose-files_elastic",
        "Id":
"68c0c061256b219815c24fa19831f4aa4798afdbcf890a4d96573b779277b438",
        "Created": "2021-06-28T18:47:39.531696162-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.18.0.0/16",
                    "Gateway": "172.18.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {

"09bda51f74b39e27f29696507069222df5b564d2469aa561c1e8c540d6f17d34": {
                "Name": "kib01",
                "EndpointID":
"27cb8655a4e5bff093c4afa1c7793e4dd4673f66791d0cf0ed6b6e528e88c6e0",
                "MacAddress": "02:42:ac:12:00:09",
                "IPv4Address": "172.18.0.9/16",
                "IPv6Address": ""
            },

"1d4798bec3ef375d55b21fc357be6058fa958792c5fd9f3f4aff3a6eb21d4e35": {
                "Name": "es03",
                "EndpointID":
"cfae84364bc04d22313c9c1a4a4fe05a7e1ebd36ca23601e66cdeeb952541eda",
                "MacAddress": "02:42:ac:12:00:06",
                "IPv4Address": "172.18.0.6/16",
                "IPv6Address": ""
            },

"1dfc694c3134f91fd5de126b05fe1c3d2f52948972eebfabb74e8d11f07964a8": {
                "Name": "telemetry-receiver",
                "EndpointID":
```

```
"14adb73fb7a7a7fc9962b868d8bbf0917497b3db8062944b5f909adf3752e3f3",
                "MacAddress": "02:42:ac:12:00:08",
                "IPv4Address": "172.18.0.8/16",
                "IPv6Address": ""
            },

"479b719be237a8eaf936ab6956ed52a333e297a1733a6676ecd31f84a36628d7": {
                "Name": "es-ingester",
                "EndpointID":
"3e46d0b8ac5de1b07c6b26ad69e910a196cef5926f406dfdd7cc6380b1781613",
                "MacAddress": "02:42:ac:12:00:07",
                "IPv4Address": "172.18.0.7/16",
                "IPv6Address": ""
            },

"5682f834dc9bfb6f5cdcf1685af215841ac7acc99dc85be9c89f87f5623de53b": {
                "Name": "es01",
                "EndpointID":
"62613a3a0cc2a26777c36e19c77011c634f89bc213e7c41fed77862ab317c7dd",
                "MacAddress": "02:42:ac:12:00:04",
                "IPv4Address": "172.18.0.4/16",
                "IPv6Address": ""
            },

"6c6689a30687d50b12e25b0314441330a66acdb3f7a67f365933ac0a73a78ff1": {
                "Name": "mysqldb",
                "EndpointID":
"cc0e6f767ec3c77abfa9b91874a82a52a6144f437677d8dddb486c418b0dfaa7",
                "MacAddress": "02:42:ac:12:00:05",
                "IPv4Address": "172.18.0.5/16",
                "IPv6Address": ""
            },

"ad482ca9f43b76e5d01b95825547915fc9d6b21e62d02642749fb3a81da59f7c": {
                "Name": "activemq",
                "EndpointID":
"97e07fbdae9b60b27840c092e416325f4aad4ef3dd4efa7dfc6467a02e785722",
                "MacAddress": "02:42:ac:12:00:03",
                "IPv4Address": "172.18.0.3/16",
                "IPv6Address": ""
            },

"ae1c000231123e8dac35987a66ecdb12f6cf8e083ed9fe8aaf3553fb30c63781": {
                "Name": "es02",
                "EndpointID":
"f8702fe2ae7d584850708f21c435b1f26db1fd02925f2fd144f88bf47faab638",
                "MacAddress": "02:42:ac:12:00:02",
                "IPv4Address": "172.18.0.2/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "elastic",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
```

```
                }
        }
]
```

Note that Kibana IP in this case is 172.18.0.9, telemetry receiver IP is 172.18.0.8.

Please follow the instructions in section 3.4 to add source iDRAC telemetry services.

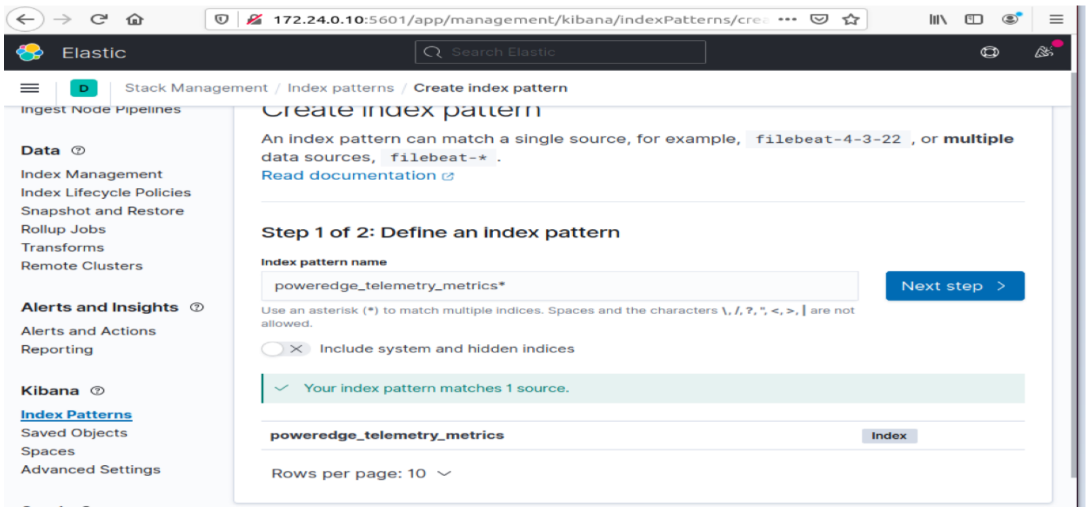
4.2 Data Model and Applications

To configure the data source and visualization dashboards please access Kibana homepage in the browser (http://172.18.0.9:5601)

1) Select Stack Management from the Management section of the tools menu.

   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.

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



172.24.0.10:5601/app/management/kibana/indexPatterns/cre

Stack Management / Index patterns / Create index pattern

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*

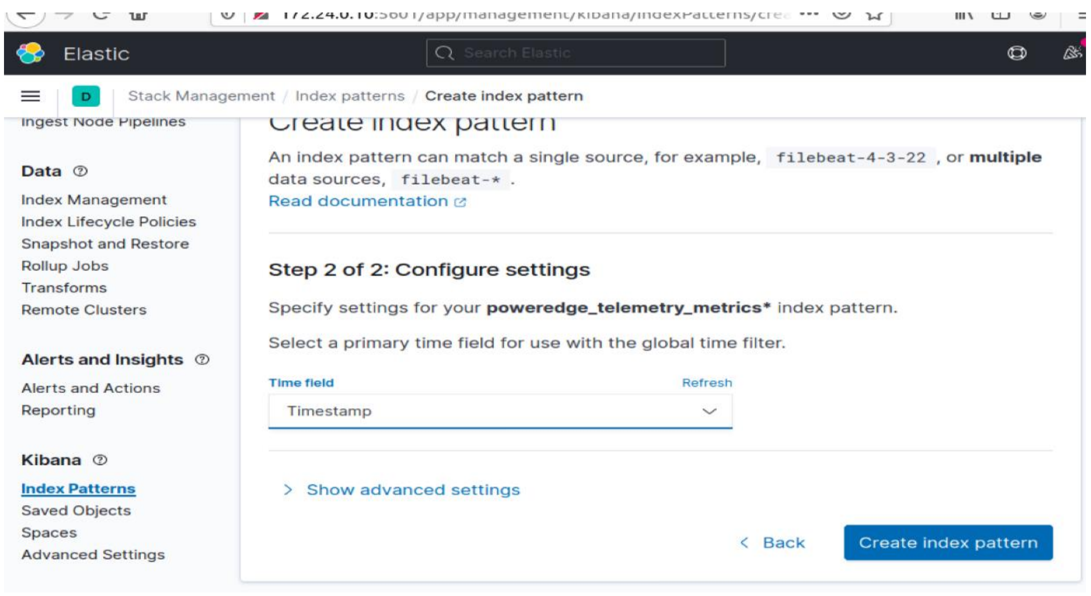
Use an asterisk (*) to match multiple indices. Spaces and the characters \, /, ?, ", <, >, | are not allowed.

Include system and hidden indices

Your index pattern matches 1 source.

poweredge_telemetry_metrics	Index

Rows per page: 10



Elastic

Stack Management / Index patterns / Create index pattern

Ingest Node Pipelines

Data

Index Management
Index Lifecycle Policies
Snapshot and Restore
Rollup Jobs
Transforms
Remote Clusters

Alerts and Insights

Alerts and Actions
Reporting

Kibana

Index Patterns
Saved Objects
Spaces
Advanced Settings

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.

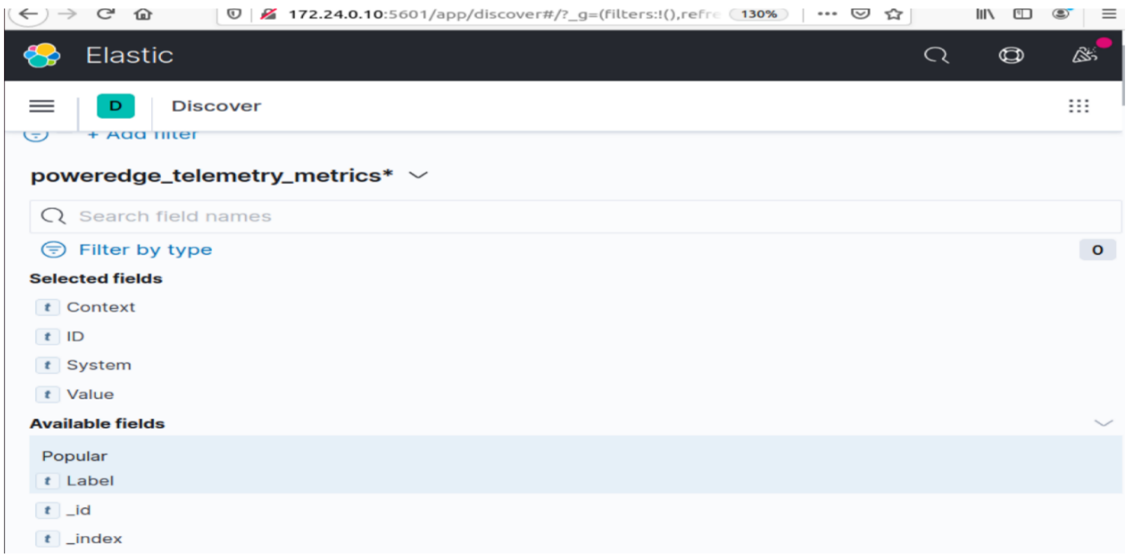
Time field — Refresh

Timestamp

Show advanced settings

Back | Create index pattern

3) 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.



172.24.0.10:5601/app/discover#/?_g=(filters:!(),refr

Elastic

Discover

+ Add filter

poweredge_telemetry_metrics*

Search field names

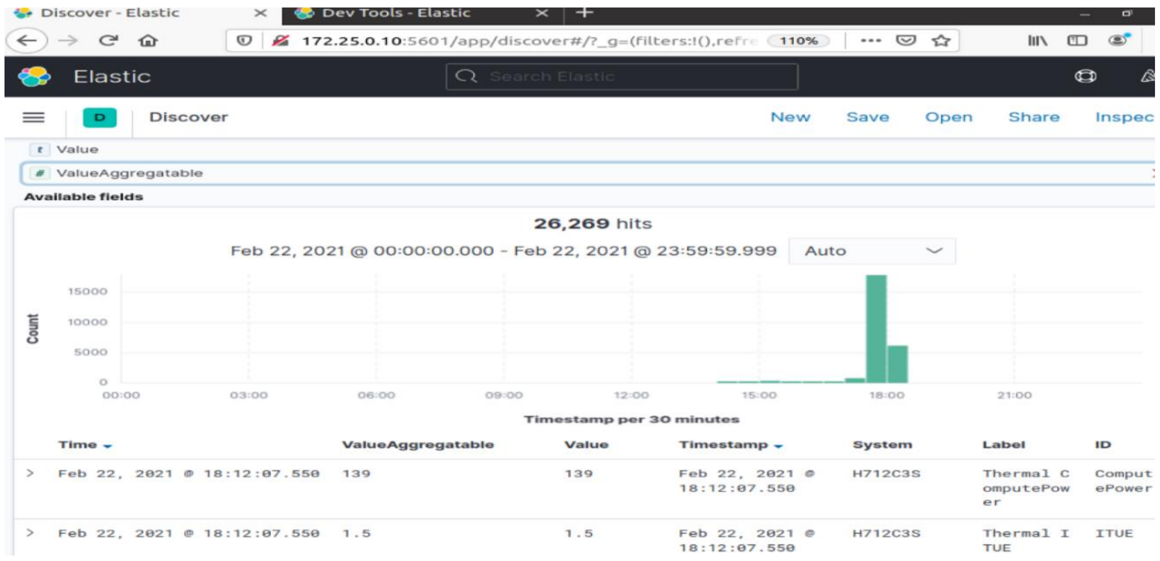
Filter by type 0

Selected fields

Context
ID
System
Value

Available fields

Popular
Label
_id
_index

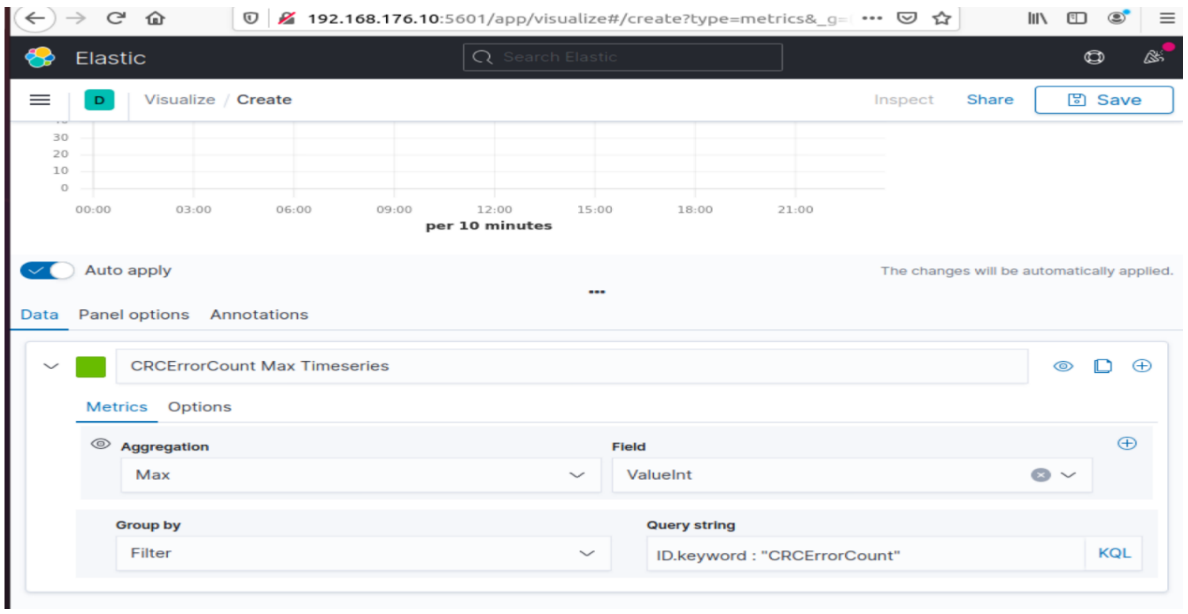


Time	ValueAggregatable	Value	Timestamp	System	Label	ID
Feb 22, 2021 @ 18:12:07.550	139	139	Feb 22, 2021 @ 18:12:07.550	H712C3S	Thermal ComputePower	ComputePower
Feb 22, 2021 @ 18:12:07.550	1.5	1.5	Feb 22, 2021 @ 18:12:07.550	H712C3S	Thermal ITUE	ITUE

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

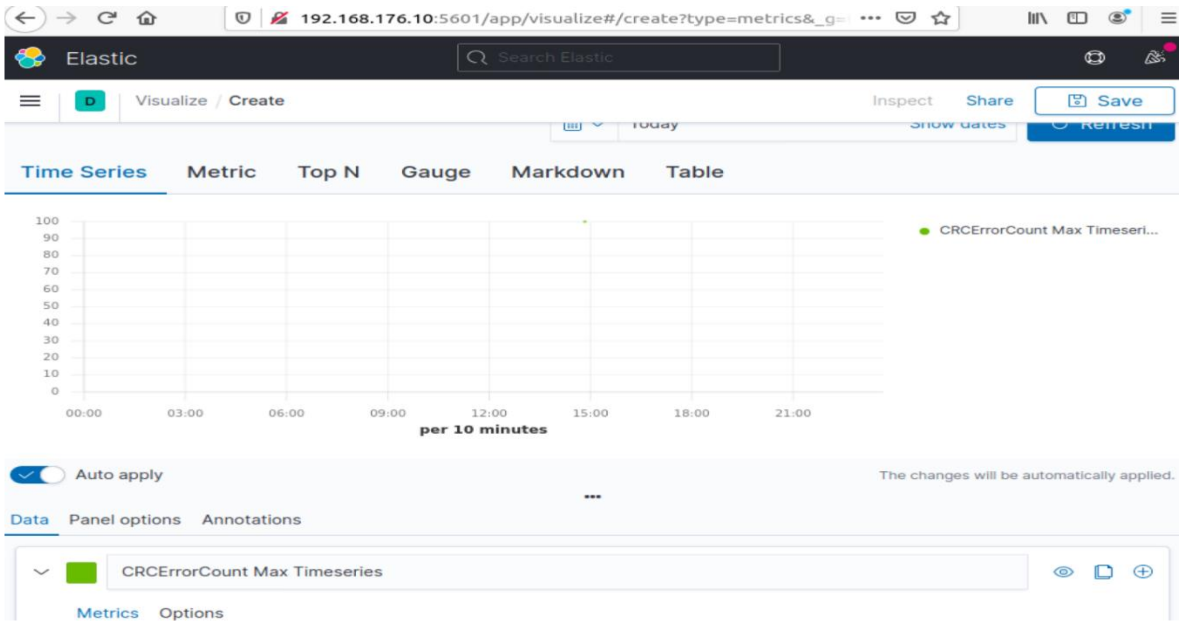
4) Now we can create charts for the dashboard with aggregable fields in data mapping. Please note that text values are indexed to be efficiently searchable in elastic search. And aggregatable values (non text) can be used to configure relevant visualizations.

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



CRCErrorCount Max Timeseries

Aggregation: Max
Field: ValueInt
Group by: Filter
Query string: ID.keyword : "CRCErrorCount" KQL



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.

5 Setting up the Influxdb data ingestion pipeline

If you want to use Docker Compose method to have a simpler setup then install Docker and Docker Compose and continue with Section 5.1.

If you are looking for full scale installation of components install Go, ActiveMQ and InfluxDB.

Please refer section 8 for installation instructions.

5.1 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

influx-docker-pipeline-reference-unenc.yml – starts influx, grarana 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.

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker-compose -f docker-compose-files/influx-docker-pipeline-reference-unenc.yml up -d

```
Creating network "docker-compose-files_influxpipeline" with driver
"bridge"
Creating activemq ... done
Creating mysqldb          ... done
Creating influx           ... done
Creating influx-ingester    ... done
Creating telemetry-receiver ... done
Creating grafana            ... done
```

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker-compose -f docker-compose-files/influx-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
influx               /entrypoint.sh influxd           Up (healthy)
8086/tcp
influx-ingester      go run cmd/influxpump/infl ...   Up
mysqldb              docker-entrypoint.sh mysqld      Up
3306/tcp, 33060/tcp
telemetry-receiver   /bin/sh -c cmd/idrac-telem ...   Up
```
athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker network ls

```
NETWORK ID     NAME                                        DRIVER    SCOPE
cf13f260922c   bridge                                      bridge    local
```

```
68c0c061256b   docker-compose-files_influxpipeline      bridge    local
4d6d8dcd18da   host                                     host      local
```

athena@athena-PowerEdge-R640:~/dell-github/iDRAC-Telemetry-Reference-Tools$ docker network inspect docker-compose-files_influxpipeline

```
[
    {
        "Name": "docker-compose-files_influxpipeline",
        "Id":
"cc77b13c8b66a2a144fceed7ba17fd2a2c7a602d7b8ec728c94d31d76c573d64",
        "Created": "2021-06-28T19:23:42.185811712-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.19.0.0/16",
                    "Gateway": "172.19.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {

"397561a6b42a6b3fff83a3c14e5500c50b191a00895b5f65d86babfa448366f7": {
                "Name": "grafana",
                "EndpointID":
"e70beb2a5cf4b8147347096989b0bee16be2336dd0f325788783675272456a24",
                "MacAddress": "02:42:ac:13:00:07",
                "IPv4Address": "172.19.0.7/16",
                "IPv6Address": ""
            },

"3ba867902937dca49aa33284e65ea224f271415e427e0889e2758cafcf4c33c9": {
                "Name": "influx",
                "EndpointID":
"9336cb536e2579de99dbf73c75247bd165eaaf5399bb63c2bfaaa2d3f1e31d7c",
                "MacAddress": "02:42:ac:13:00:04",
                "IPv4Address": "172.19.0.4/16",
                "IPv6Address": ""
            },

"52ce84932b6df72f8a174401cd15557af3b86a880617f93d5a935fe86764728d": {
                "Name": "mysqldb",
                "EndpointID":
"c796b605b8c7ae03ea5c0fa16b328f8be07617301cea8093fb3dce0b92883377",
                "MacAddress": "02:42:ac:13:00:03",
                "IPv4Address": "172.19.0.3/16",
                "IPv6Address": ""
            },

"7508dc510394709ab334bfbb501bd0a29b588298785186365ac44787be98a60e": {
                "Name": "activemq",
                "EndpointID":
"7a19cb16156e605e3034541ff2fd12e5bc849632e6cabf26b957a7a308c764de",
                "MacAddress": "02:42:ac:13:00:02",
                "IPv4Address": "172.19.0.2/16",
                "IPv6Address": ""
            },

"96c633454f19f52324970d562c8e36b21e0474afb0ea8194b258c8298b176f41": {
                "Name": "telemetry-receiver",
                "EndpointID":
"9309cd520ab3c8f17a37bc1c68f773dd03de4e521c3e3cb5111f284734979230",
                "MacAddress": "02:42:ac:13:00:06",
                "IPv4Address": "172.19.0.6/16",
                "IPv6Address": ""
            },

"eff7679a19274cb662f5693c2cd211f06ccf5cfb3126b59b8b24203cbd0add60": {
                "Name": "influx-ingester",
                "EndpointID":
"2bfef225098634f5ad5348a070f4562ae0b85f264611f8ec317585e258005c4d",
                "MacAddress": "02:42:ac:13:00:05",
                "IPv4Address": "172.19.0.5/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "influxpipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

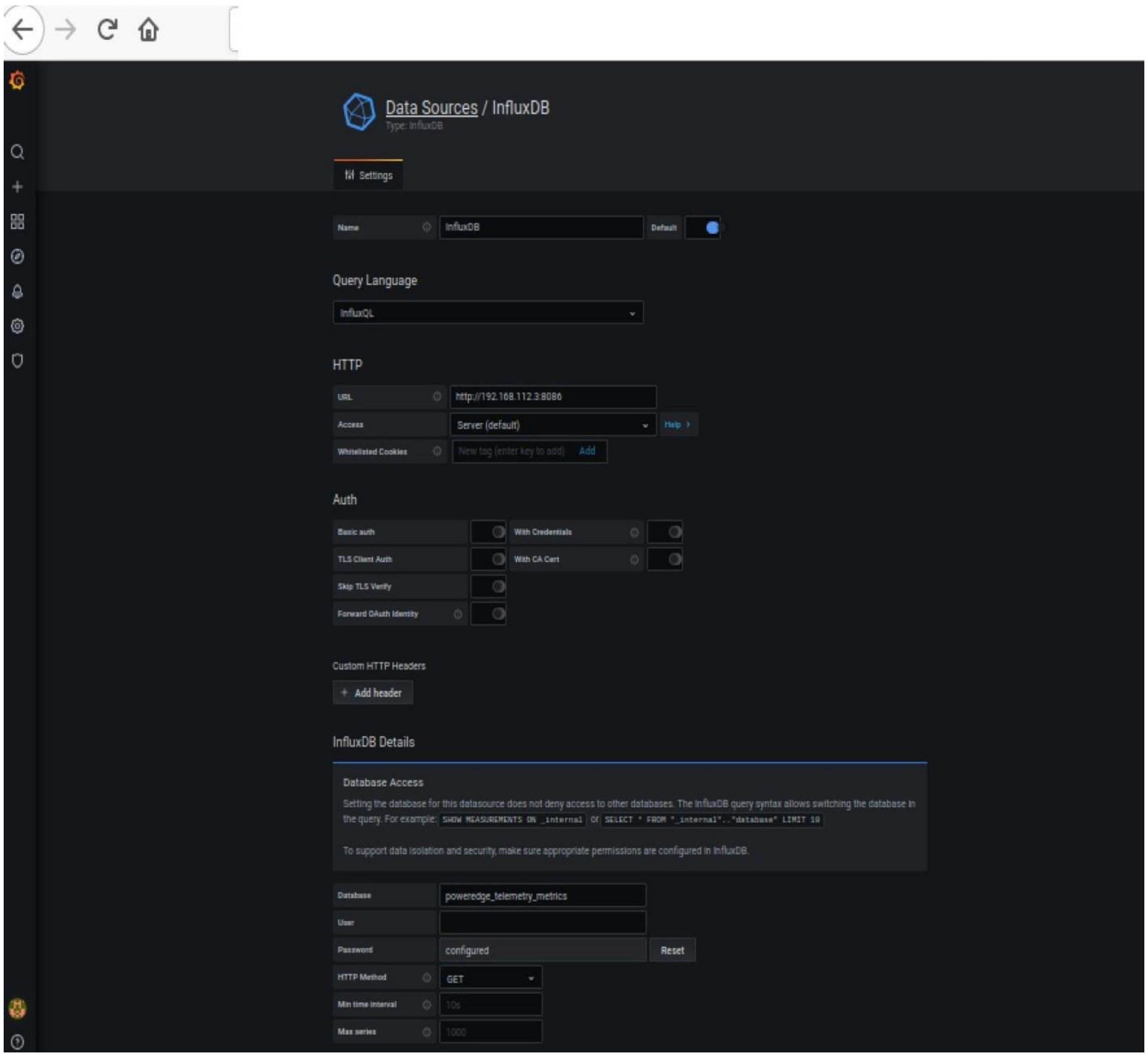
Note that Grafana IP in this case is 172.19.0.7, telemetry receiver IP is 172.19.0.6.

Please follow the instructions in section 3.4 to add source iDRAC telemetry services.

5.2 Data Model and Applications

To configure the data source and visualization dashboards please access Grafana homepage in the browser (http://172.19.0.7:3000)

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

Settings

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

+ Add header

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

6 Setting up the Timescale data ingestion pipeline

If you want to use Docker Compose method to have a simpler setup then install Docker and Docker Compose and continue with Section 6.1.

If you are looking for full scale installation of components install Go, ActiveMQ and TimescaleDB 2.0.

Please refer section 8 for installation instructions.

6.1 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

timescale-docker-pipeline-reference-unenc.yml – starts timescale/postgres, grarana 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.

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker-compose -f docker-compose-files/timescale-docker-pipeline-reference-unenc.yml up -d

```
Creating activemq  ... done
Creating mysqldb             ... done
Creating timescale           ... done
Creating grafana             ... done
Creating timescale-ingester ... done
Creating telemetry-receiver ... done
```

athena@athena-PowerEdge-R640:~ /iDRAC-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
mysqldb              docker-entrypoint.sh mysqld      Up
3306/tcp, 33060/tcp
telemetry-receiver   /bin/sh -c cmd/idrac-telem ...   Up
timescale            /bin/sh -c cmd/initialize_ ...   Up
timescale-ingester   go run cmd/timescalepump/t ...   Up
```

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker network ls

```
NETWORK ID     NAME                                    DRIVER    SCOPE
cf13f260922c   bridge                                  bridge    local
68c0c061256b   docker-compose-files_timescalepipeline  bridge    local
4d6d8dcd18da   host                                    host      local
```

athena@athena-PowerEdge-R640:~/dell-github/iDRAC-Telemetry-Reference-Tools$ docker network inspect docker-compose-files_timescalepipeline

```
[
    {
        "Name": "docker-compose-files_timescalepipeline",
        "Id":
"a451c1969bcd6a2dbf9892a63aeb9f5e7b47f204672c5dc0f50d09bf0a835fa0",
        "Created": "2021-05-14T19:16:58.162137338-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "192.168.192.0/20",
                    "Gateway": "192.168.192.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {

"008d03e7e66130c9883f2b58600fde5416040d2278336c73127a8128383bcad8": {
                "Name": "activemq",
                "EndpointID":
"5c34a46026eb58fb301936bf48bfd2adc3a9b94496a6df339d2d4132eeb4ff49",
                "MacAddress": "02:42:c0:a8:c0:04",
                "IPv4Address": "192.168.192.4/20",
                "IPv6Address": ""
            },
"1a44797f4ddd7f2a499f6aad59fa684d4c2c54472fd2a5b59c810761d14dd776": {
                "Name": "telemetry-receiver",
                "EndpointID":
"ca494fb40d6c3161a503f6c65f686a482e316e512ca97e5ebedcf2a9ac6eeffc",
                "MacAddress": "02:42:c0:a8:c0:07",
                "IPv4Address": "192.168.192.7/20",
                "IPv6Address": ""
            },
"2592245fa1a34f67266afec1027a152e4e9fe9cfd26dbb01a0ac184be62f4a54": {
                "Name": "timescale-ingester",
                "EndpointID":
"6c551b0d7f4b57a41c0004cedbc988296006cc3eb5c64c78d714f06586703bd3",
                "MacAddress": "02:42:c0:a8:c0:06",
                "IPv4Address": "192.168.192.6/20",
                "IPv6Address": ""
            },
"4b8ecc84f78f04625613d023c18cb7792527bc8d1d8d0975abb7cee6d86a76b3": {
                "Name": "grafana",
                "EndpointID":
"2075cbe6a00268c6f05a05c6d452b7520a720a9f86a3601d6d0967268f8c0200",
                "MacAddress": "02:42:c0:a8:c0:02",
                "IPv4Address": "192.168.192.2/20",
                "IPv6Address": ""
            },
"e3b908f848df5056d124d6cad6ccb3d39c7e324578874b72c250ef49d5d3c91e": {
```

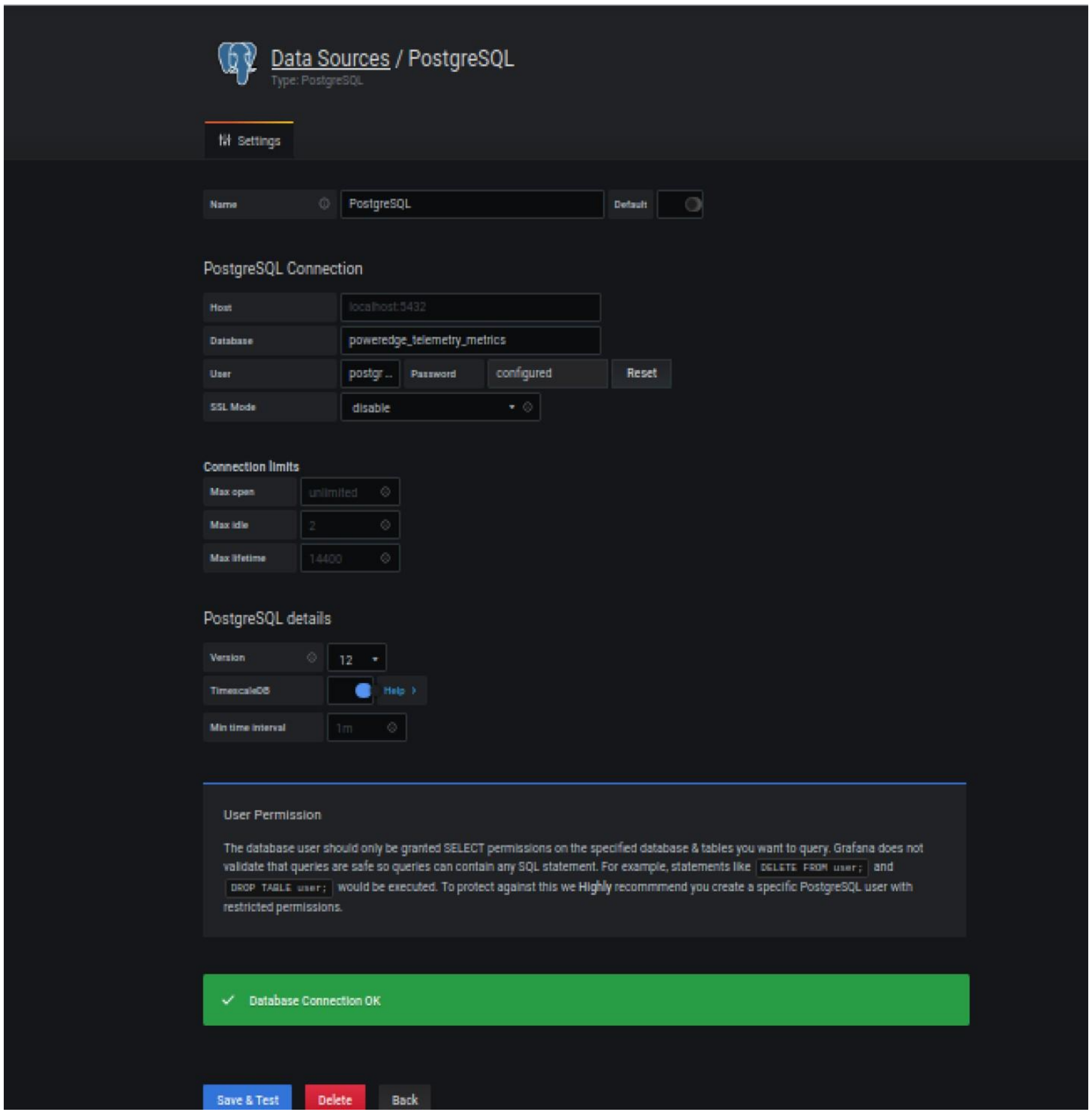
```
                "Name": "mysqldb",
                "EndpointID":
"37b0e49456ef8dd4d270c07de5d6cf6aa5d9331a285881a9b7359ec4def1cae3",
                "MacAddress": "02:42:c0:a8:c0:03",
                "IPv4Address": "192.168.192.3/20",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "timescalepipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

Note that Grafana IP in this case is 192.168.192.2, telemetry receiver IP is 192.168.192.7.

Please follow the instructions in section 3.4 to add source iDRAC telemetry services.

6.2 Data Model and Applications

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



Data Sources / PostgreSQL

Type: PostgreSQL

Settings

Name	PostgreSQL
Default	

PostgreSQL Connection

Host	localhost:5432
Database	poweredge_telemetry_metrics
User	postgr...
Password	configured
SSL Mode	disable

Connection limits

Max open	unlimited
Max idle	2
Max lifetime	14400

PostgreSQL details

Version	12
TimescaleDB	
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

7 Setting up the Prometheus data ingestion pipeline

If you want to use Docker Compose method to have a simpler setup then install Docker and Docker Compose and continue with Section 7.1.

If you are looking for full scale installation of components install Go, ActiveMQ and Prometheus.

Please refer section 8 for installation instructions.

7.1 Instructions to run the pipeline in docker compose

Included is a reference docker compose configuration file.

prometheus-docker-pipeline-reference-unenc.yml – starts prometheus, grarana 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.

athena@athena-PowerEdge-R640:~/iDRAC-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 activemq   ... done
Creating grafana             ... done
Creating prometheus          ... done
Creating mysqldb             ... done
Creating prometheus-ingester ... done
Creating telemetry-receiver  ... done
```

athena@athena-PowerEdge-R640:~/iDRAC-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
mysqldb               docker-entrypoint.sh mysqld      Up
3306/tcp, 33060/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
```

athena@athena-PowerEdge-R640:~/iDRAC-Telemetry-Reference-Tools$ docker network ls

```
NETWORK ID     NAME                                     DRIVER    SCOPE
cf13f260922c   bridge                                   bridge    local
68c0c061256b   docker-compose-files_prometheuspipeline  bridge    local
4d6d8dcd18da   host                                     host      local
```

athena@athena-PowerEdge-R640:~/dell-github/iDRAC-Telemetry-Reference-Tools$ docker network inspect docker-compose-files_prometheuspipeline

```
[
    {
        "Name": "docker-compose-files_prometheuspipeline",
        "Id":
"6301419378a7e3da153899750ead81c8f4fbba4b3d971cf895b6ca0dd2fd2bf8",
        "Created": "2021-06-28T19:50:08.901957363-05:00",
        "Scope": "local",
        "Driver": "bridge",
        "EnableIPv6": false,
        "IPAM": {
            "Driver": "default",
            "Options": null,
            "Config": [
                {
                    "Subnet": "172.20.0.0/16",
                    "Gateway": "172.20.0.1"
                }
            ]
        },
        "Internal": false,
        "Attachable": true,
        "Ingress": false,
        "ConfigFrom": {
            "Network": ""
        },
        "ConfigOnly": false,
        "Containers": {

"05898f35d11de7ce5d02313640e08da7c63d36855e711f0793024f7691edaeec": {
                "Name": "activemq",
                "EndpointID":
"fb4fc668c6c7bf603f80e60f9eee213dfd06ed6842e28c08265ab682fc23c446",

                "MacAddress": "02:42:ac:14:00:03",

                "IPv4Address": "172.20.0.3/16",

                "IPv6Address": ""

            },

"17fe44e410a8f116820268274a49b4098223ab120476f0801d1d5694a7b37b5b": {

                "Name": "prometheus-ingester",

                "EndpointID":
"ae375f0ec45a7d28c8d4e490cb021add114db074312122f2aac0221baef1e141",

                "MacAddress": "02:42:ac:14:00:06",

                "IPv4Address": "172.20.0.6/16",

                "IPv6Address": ""

            },

"8bb5db8c19404c5da5100ebdc562de8345c9098e3cac7879c1c9707c415a8ec4": {

                "Name": "mysqldb",

                "EndpointID":
"6a48ca12fd82b861f399f6ec60a858c8472bb4a863b14df3a64d8582f75d9891",

                "MacAddress": "02:42:ac:14:00:05",

                "IPv4Address": "172.20.0.5/16",

                "IPv6Address": ""

            },

"dae51c68b9764e1fb6e53247b4c4c30e85096a21b2df9c546678d15bd3bec6e4": {

                "Name": "grafana",

                "EndpointID":
"68c4ab2b5094ee784c4bad06f44537ec9a0592ac0ac65d568069027c43090611",

                "MacAddress": "02:42:ac:14:00:02",

                "IPv4Address": "172.20.0.2/16",

                "IPv6Address": ""

            },

"db9a3bd4520efec037eaff5fb8b4df59d9a2c92388809c838f68d4a03e57ed68": {
```

```
                "Name": "prometheus",
                "EndpointID":
"c43e37a690dfeeb8ea81fb8e1525c7b2f4a66f96a9610625f2d29aaecdd24d72",
                "MacAddress": "02:42:ac:14:00:04",
                "IPv4Address": "172.20.0.4/16",
                "IPv6Address": ""
            },
"e74b37bd09a6392af2fafd2b670c6f47d35ec8c7bc681b9ce0b8f5d54959fcb8": {
                "Name": "telemetry-receiver",
                "EndpointID":
"438b85b2eeddca1b31f9de520de6f6c2027f8a4b02b2380431a33e5f46d18f27",
                "MacAddress": "02:42:ac:14:00:07",
                "IPv4Address": "172.20.0.7/16",
                "IPv6Address": ""
            }
        },
        "Options": {},
        "Labels": {
            "com.docker.compose.network": "prometheuspipeline",
            "com.docker.compose.project": "docker-compose-files",
            "com.docker.compose.version": "1.27.4"
        }
    }
]
```

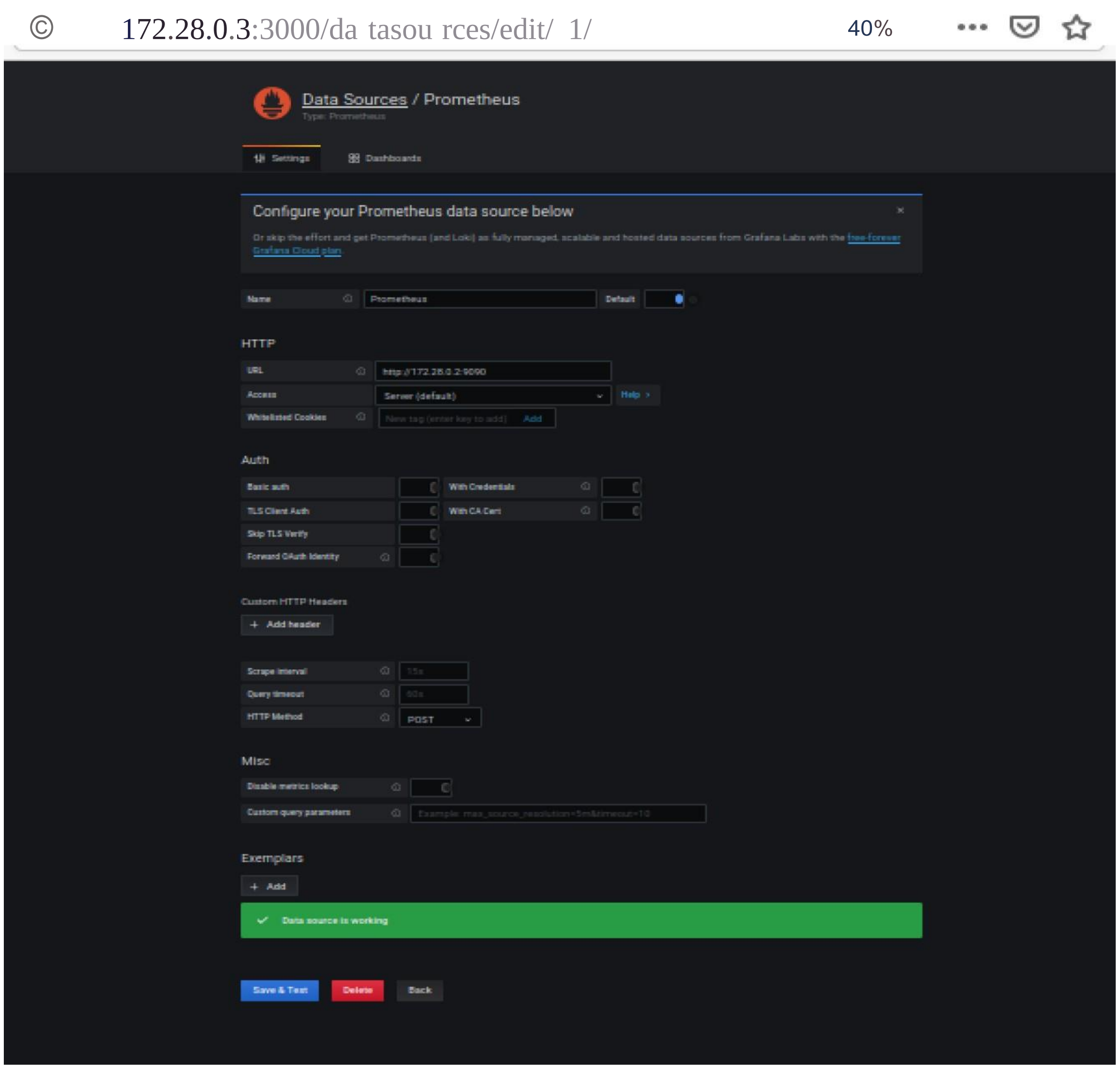
Note that Grafana IP in this case is 172.20.0.2, telemetry receiver IP is 172.20.0.7

Please follow the instructions in section 3.4 to add source iDRAC telemetry services.

7.2 Data Model and Applications

To configure the data source and visualization dashboards please access Grafana homepage in thebrowser (http://172.20.0.2:3000)

Prometheus data source (**172.20.0.4:9090**) 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.



172.28.0.3:3000/da tasou rces/edit/ 1/ 40%

Data Sources / Prometheus
Type: Prometheus

Settings Dashboards

Configure your Prometheus data source below

Or skip the effort and get Prometheus (and Loki) as fully managed, scalable and hosted data sources from Grafana Labs with the free-forever Grafana Cloud plan.

Name: Prometheus Default

HTTP

URL: http://172.28.0.2:9090
Access: Server (default)
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

Add header

Scrape interval: 15s
Query timeout: 60s
HTTP Method: POST

Misc

Disable metrics lookup
Custom query parameters: Example: max_source_resolution=5m&timeout=10

Exemplars

Add

✓ Data source is working

Save & Test Delete Back

8 Installation Instructions

How to Install Go

Step 1: Get the latest version of Go from official Go downloads page. Currently, latest stable version of Go is version 1.17.

```
$ sudo wget -c https://dl.google.com/go/go1.17.linux-amd64.tar.gz -O -
| sudo tar -xz -C /usr/local
```

Step 2: Adjust the Path Variable

```
$export PATH=$PATH:/usr/local/go/bin
```

Step 3: Load the new PATH environment variable into the current shell

```
$source ~/.profile
```

Step 4: Verify the Go Installation

```
$ go version
Output
go version go1.17 linux/amd64
```

How to Install and Configure Docker on Ubuntu 20.04

Step 1: Update and Upgrade APT

```
$ sudo apt update
$ sudo apt upgrade
```

Step 2: Download and Install Docker

```
$ sudo apt install docker.io
```

Step 3: Enable Docker

```
$ sudo systemctl enable –now docker
```

Step 4: Set User Privileges

You can replace $USER with the user account to which you want to give permissions

```
$ sudo usermod -aG docker $USER
```

Step 5: Check Docker Version

```
$ docker –version
```

Step 6: Check the status of Docker

```
$ systemctl status docker
```

Additional Information

To Disable docker

```
$ sudo systemctl disable –now docker
```

How to install Docker Compose on Ubuntu 20.04

Step 1: Upgrade and Update

```
$ sudo apt update
$ sudo apt upgrade
```

Step 2: Download the latest release of Docker-Compose

```
$ sudo curl -L
"https://github.com/docker/compose/releases/download/1.29.2/docker-
compose-$(uname -s)- $(uname -m)" -o /usr/local/bin/docker-compose
```

Step 3: Change the permissions of the binary to allow execution

```
$ sudo chmod +x /usr/local/bin/docker-compose
```

Step 4: Check Docker Compose Version

```
$ sudo docker-compose --version
```

How to Install ActiveMQ

Step 1: Update and Install java

```
$ sudo apt update
$ sudo apt upgrade
$ sudo apt-get install default-jre
```

Step 2: Check java version

```
$ java -version
```

Step 3: Install Apache ActiveMQ on Ubuntu 20.04

```
$cd /tmp
$wget http://archive.apache.org/dist/activemq/5.16.3/apache-activemq-5.16.3-bin.tar.gz
```

Extract the Downloaded Folder

```
$tar -xvzf apache-activemq-5.16.3-bin.tar.gz
$sudo mv apache-activemq-5.16.3 /opt/activemq

$sudo addgroup --quiet --system activemq
$sudo adduser --quiet --system --ingroup activemq --no-create-home --
disabled-password activemq
$sudo chown -R activemq:activemq /opt/activemq
```

Step 4. Create Apache ActiveMQ Systemd and save it

```
$sudo nano /etc/systemd/system/activemq.service

[Unit]
Description=Apache ActiveMQ
After=network.target
[Service]
Type=forking
User=activemq
Group=activemq

ExecStart=/opt/activemq/bin/activemq start
ExecStop=/opt/activemq/bin/activemq stop

[Install]
WantedBy=multi-user.target
```

After saving it, run the commands below to enable the service:

```
$sudo systemctl daemon-reload
$sudo systemctl start activemq
$sudo systemctl enable activemq
```

Step 5. Accessing Apache ActiveMQ

ActiveMQ will be available on HTTP port 8161 by default. Open any browser and navigate to `http://your-domain.com/8161/admin/` or `http://your-server-ip/8161/admin/` and you should be prompted for a username and password. Enter the default credentials admin/admin

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)

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

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 onlinedocumentation - https://docs.timescale.com/latest/introduction/data-model

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

For more information please refer to appendix section

9 Appendix

Go :- How to Install Go on Ubuntu 20.04 | Linuxize

Docker: - https://linuxhint.com/install_configure_docker_ubuntu/

Docker Compose :- How to Install Docker Compose on Ubuntu 20.04 {Step-by-Step Guide} (phoenixnap.com)

ActiveMQ :- https://idroot.us/install-apache-activemq-ubuntu-20-04/