NOVEMBER 2022

How (not) to Fail at Collecting Data

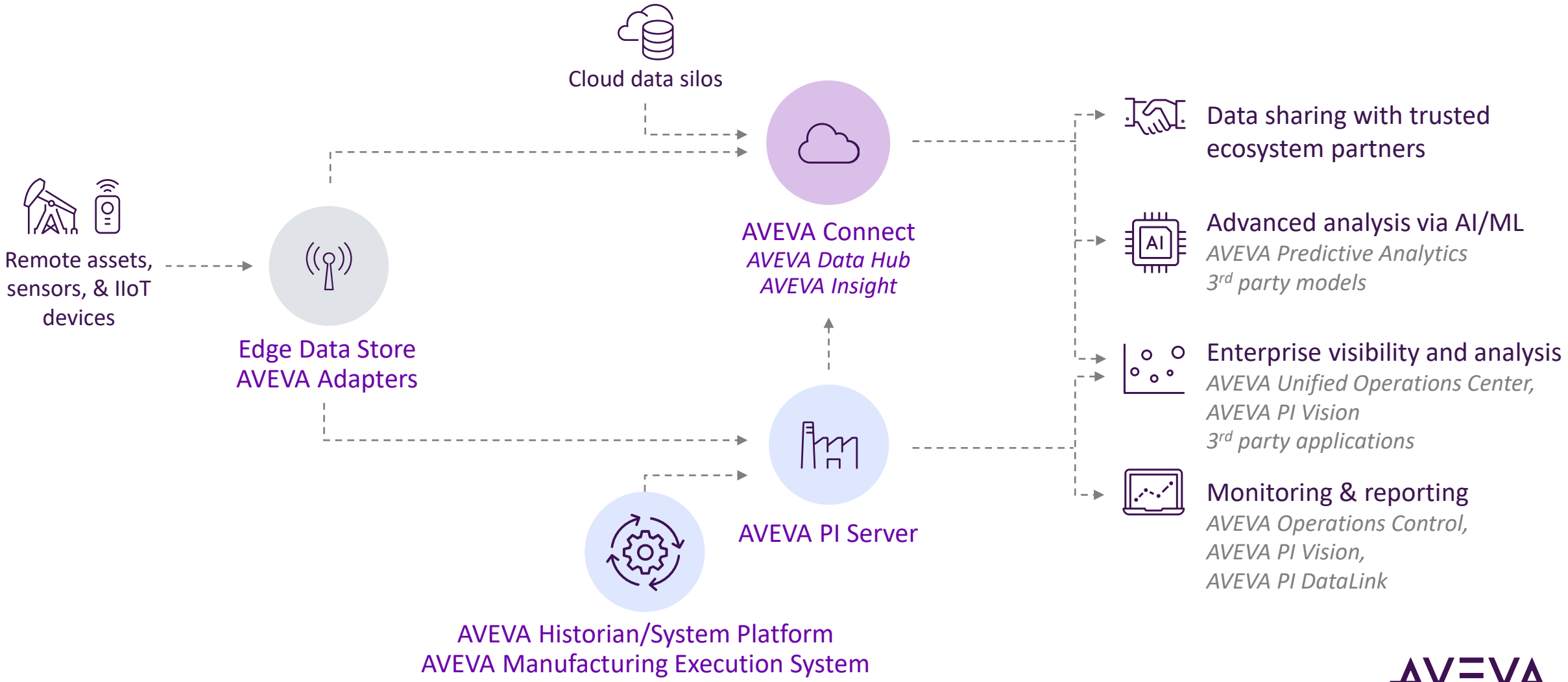
An Adapter Failover Installation and Configuration Deep Dive

Ellery Murdock

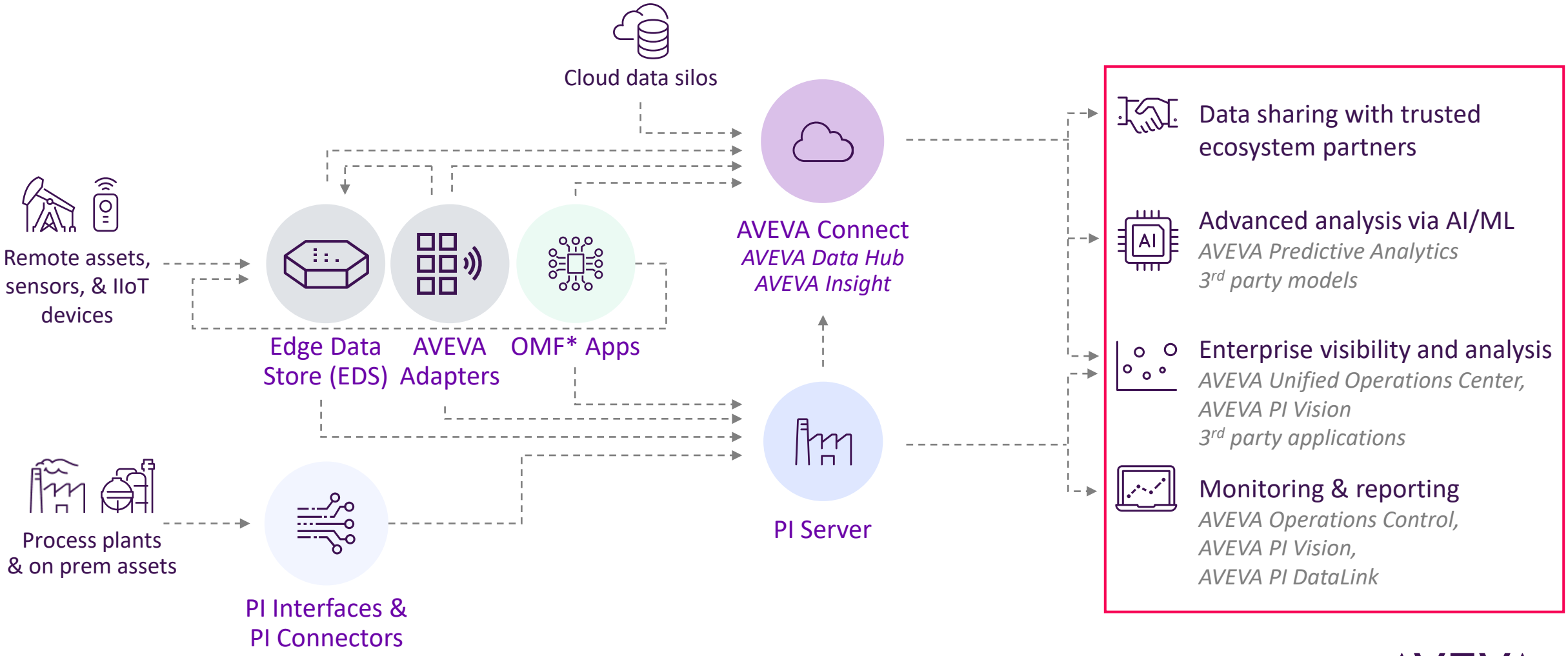
Jane Matheson

No matter where your operational data resides, AVEVA has the technologies available to collect and store that data

Bridging engineering, operations, and business domains



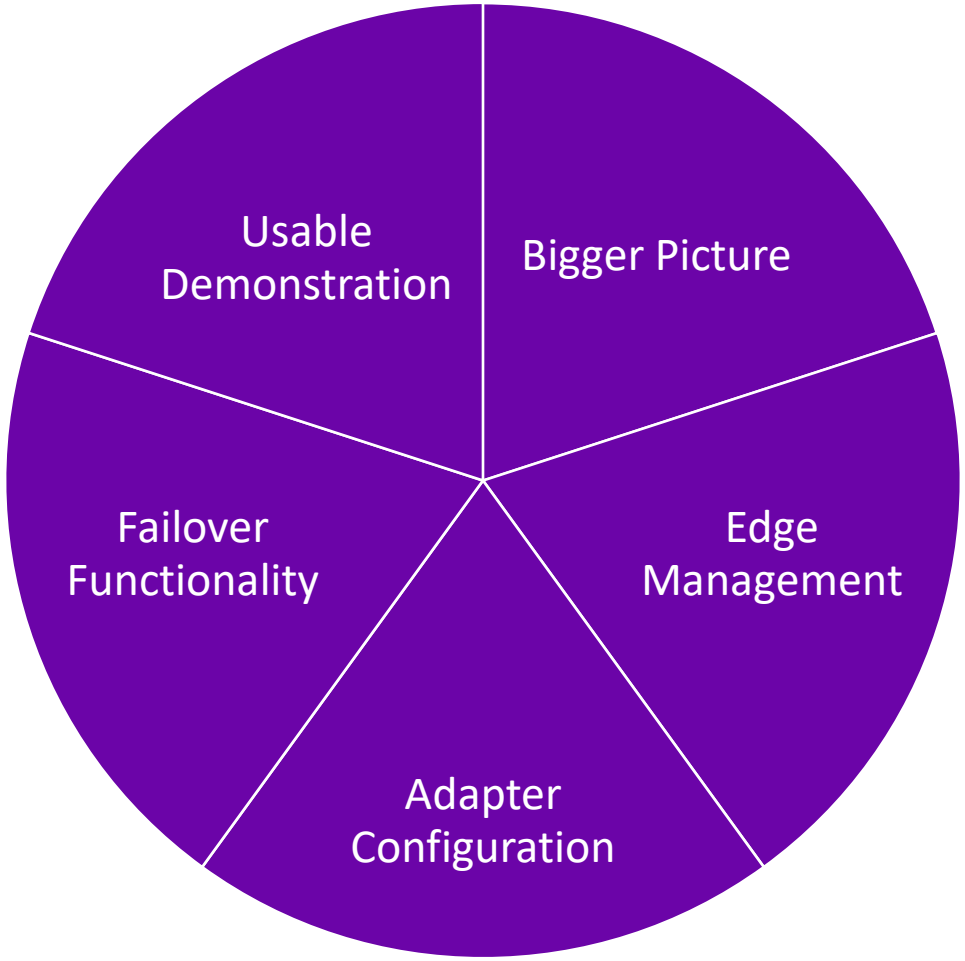
PI Adapters extended real-time connectivity to remote assets and increased the variety, velocity and volume of data



* Open Message Format

Presentation Goals

What will we discuss?

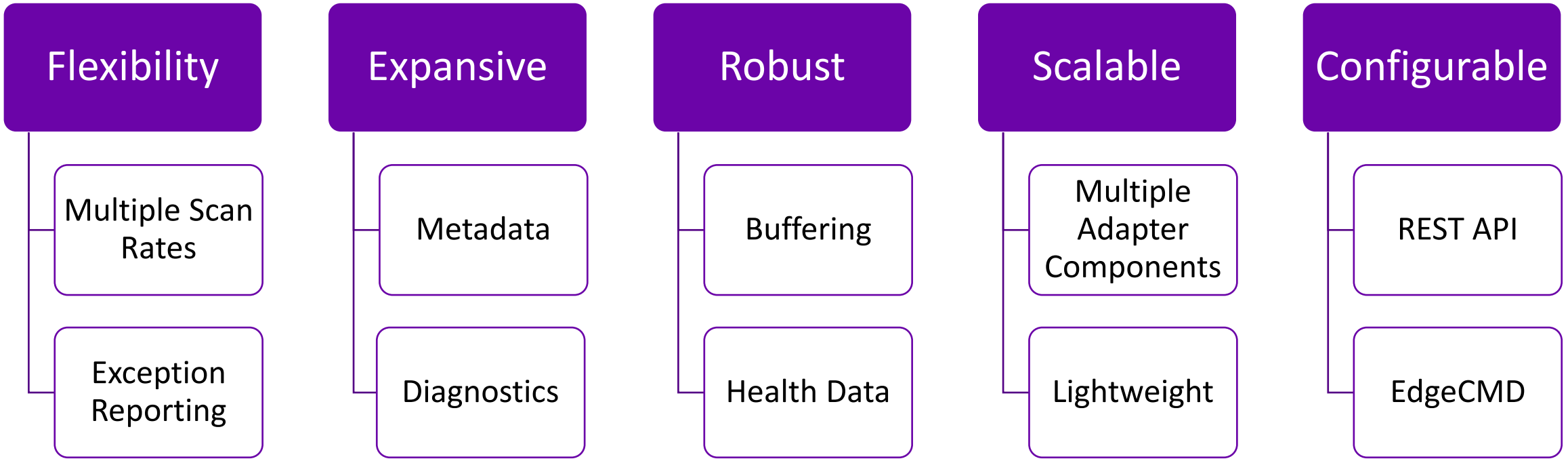


Data Collection on the Edge and Beyond

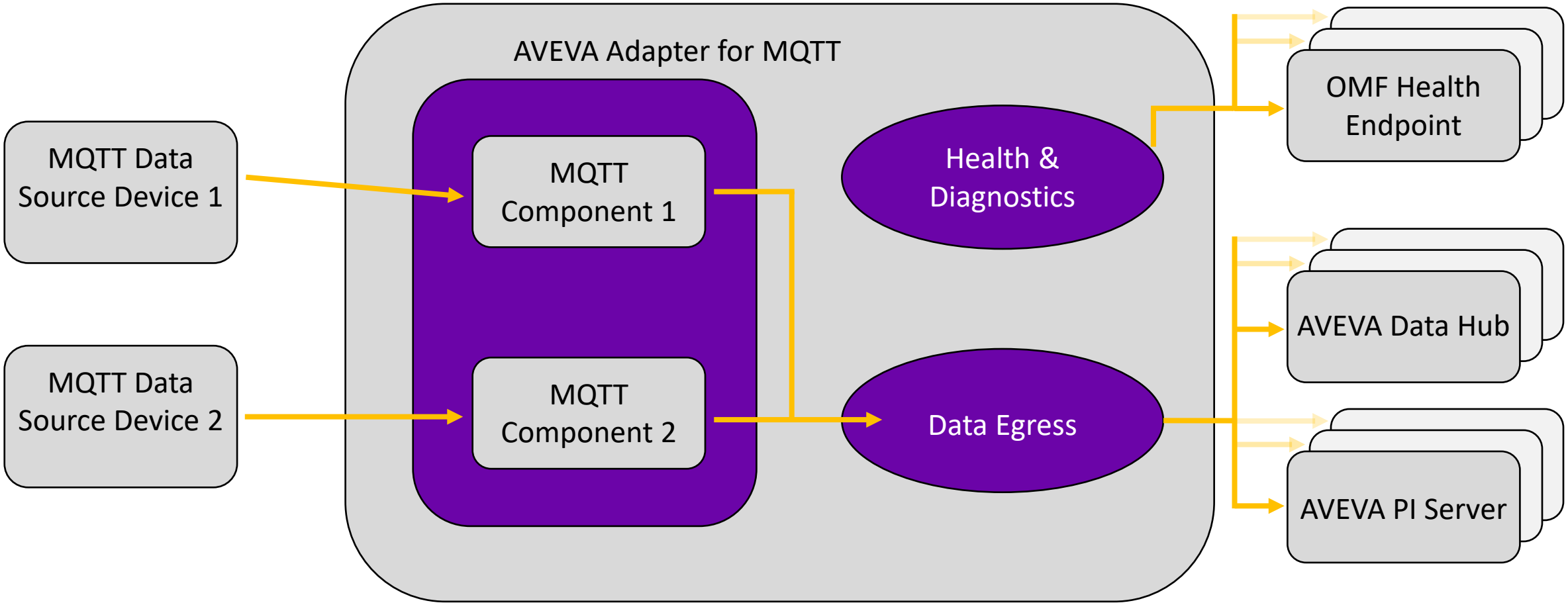
AVEVA Adapters

- Windows and Linux device interoperability
- Scalable architecture
- Connectivity to:
    - Edge Data Store
    - AVEVA PI Server
    - AVEVA Data Hub

Robust Features that enable consistent data collection



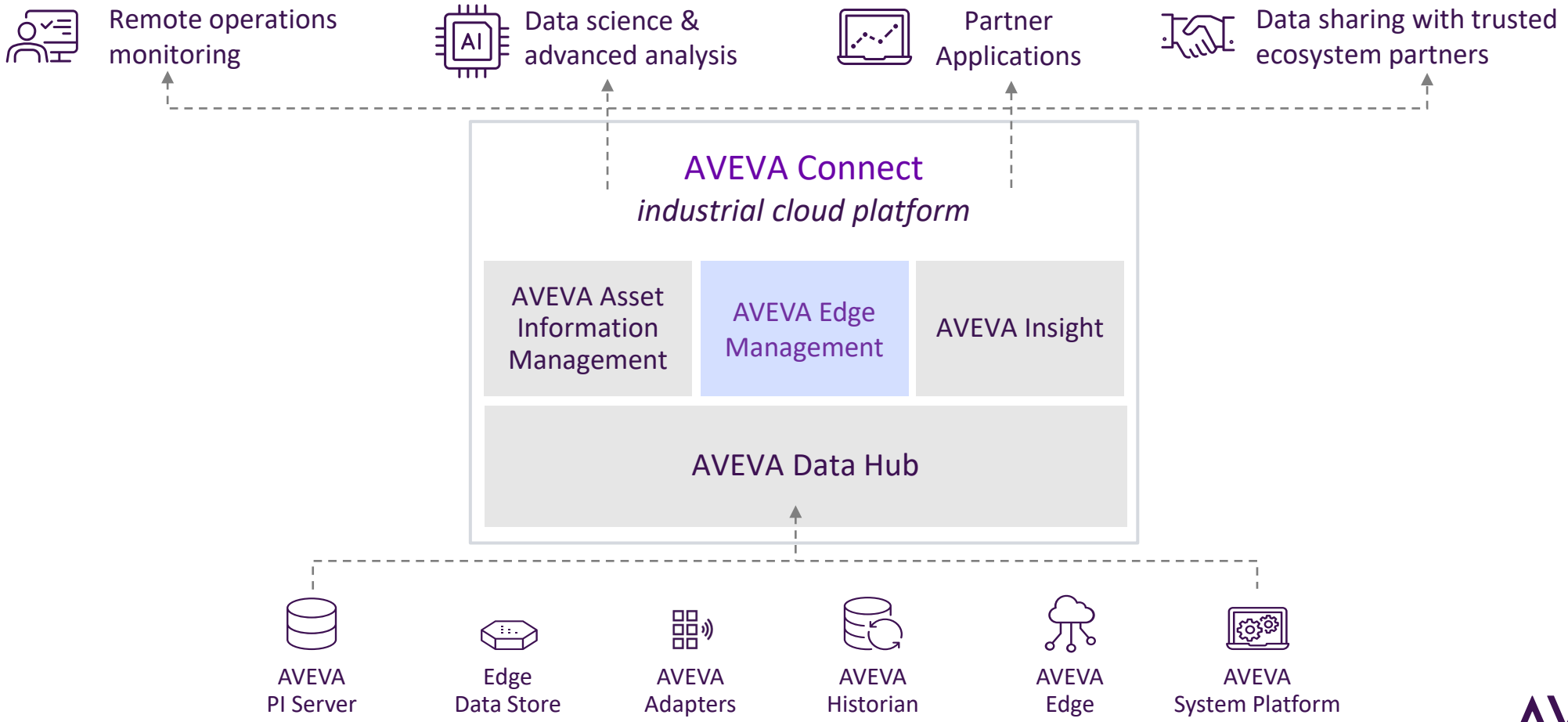
Example Architecture of an Adapter for MQTT



Expanding to the Edge

AVEVA Edge Management provides remote management for AVEVA software modules running on edge devices

AVEVA Connect enables a hybrid data architecture through cloud offerings



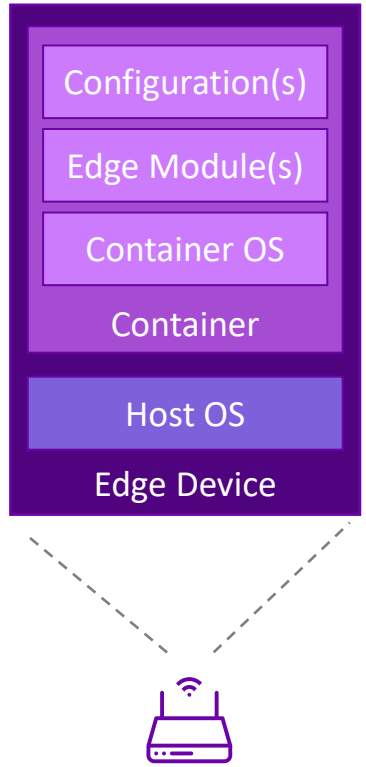
Remotely deploy and manage EDS & AVEVA Adapters

AVEVA Connect
industrial cloud platform

Asset Information Management | **Edge Management** | Insight

AVEVA Data Hub

- Reduce TCO with centralized device, software, and configuration management
- Improve visibility to device, software, and connection health
- Easy to use, no code solution
- Push button deployment of software modules
- Standardize applications in disparate remote locations



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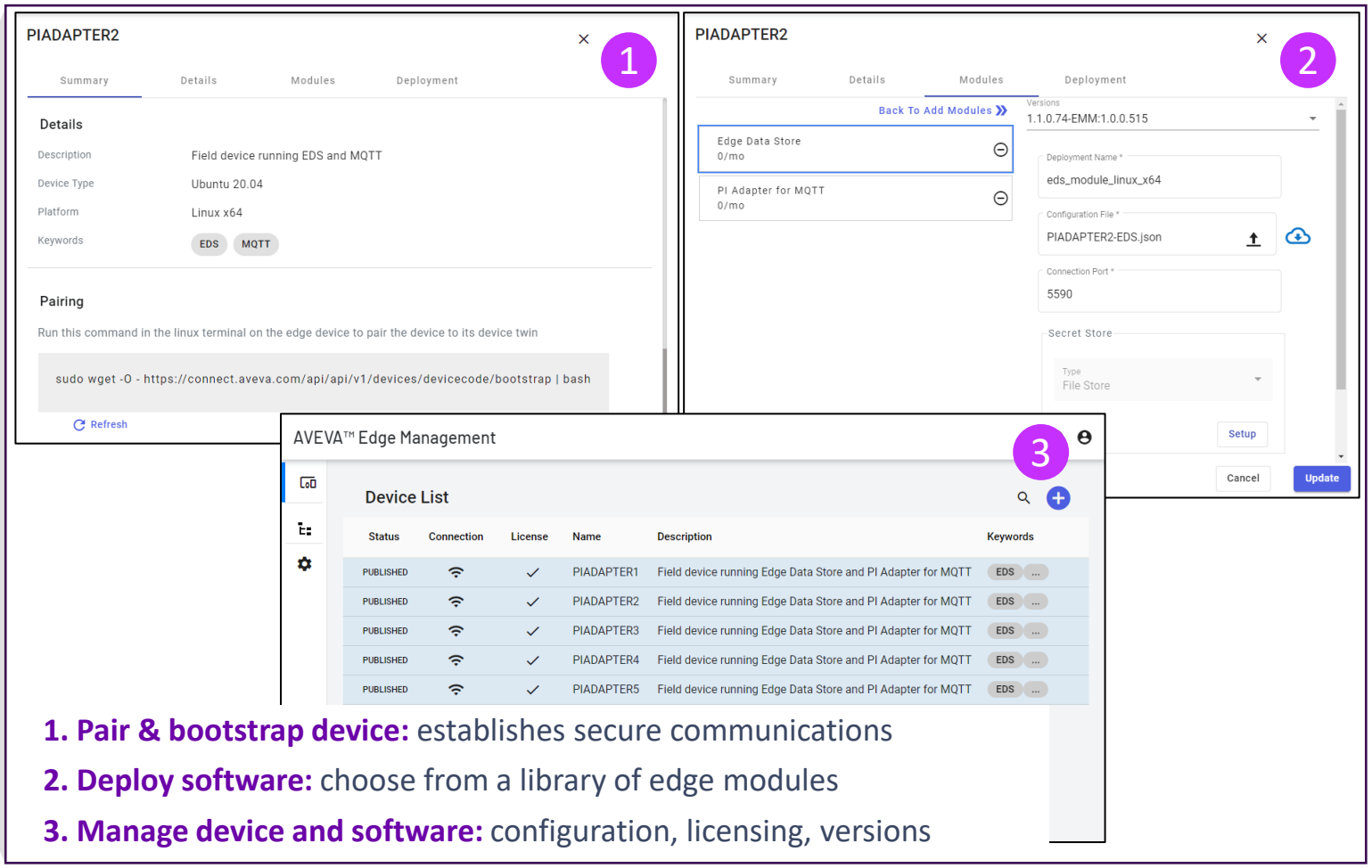
AVEVA Data Hub



1. Pair & bootstrap device: establishes secure communications

2. Deploy software: choose from a library of edge modules

3. Manage device and software: configuration, licensing, versions

How does Adapter Failover work?

Enabling Failover for Continuous Data Collection

How does the Client Failover Service work?

Location

- AVEVA Data Hub Microservice
- Installable on-premises (Windows)

Modes

- Cold
- Warm
- Hot

Features

- Administrative capabilities
- Multiple failover groups
- OMF Health

AVEVA

Supporting Different Failover Modes for All Scenarios

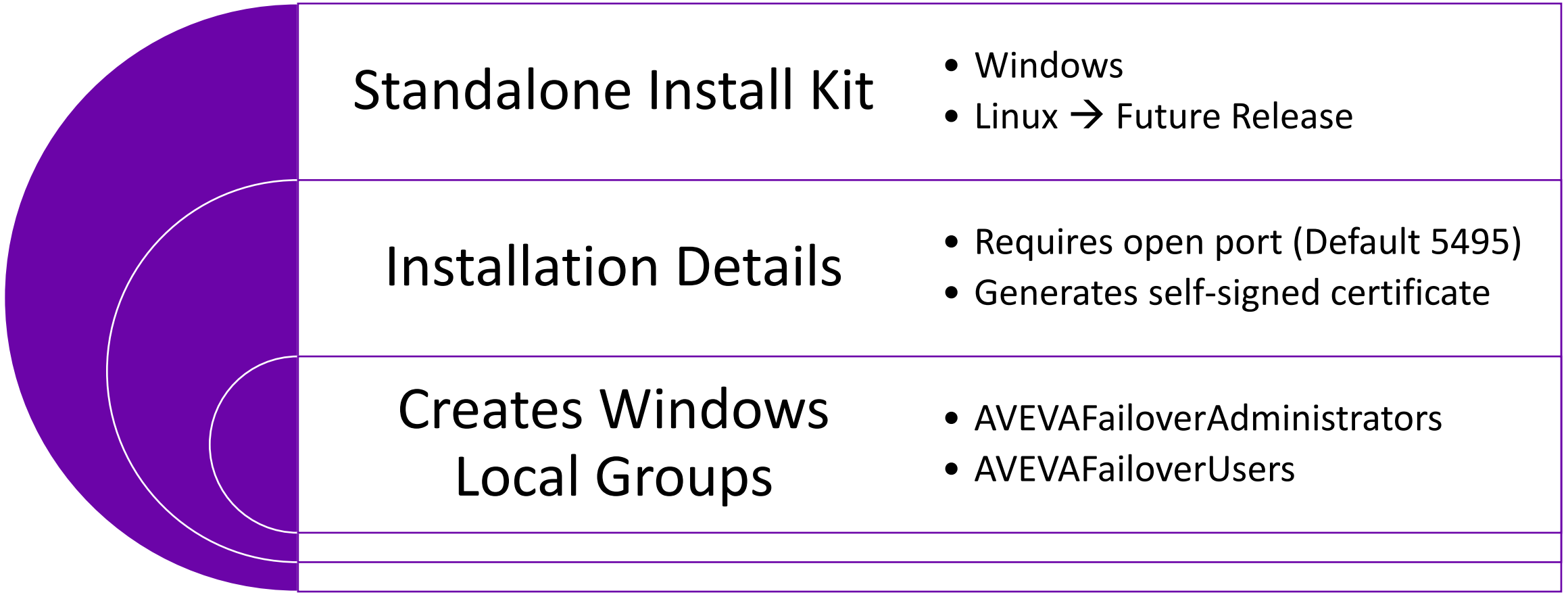
Which mode is right for you?

Number of Adapters:	Cold	Warm	Hot
Running	1	2	2
Connected to Data Source	1	2	2
Collecting Data	1	1	2
Buffering	0	0	1

AVEVA

Installing the Client Failover Service

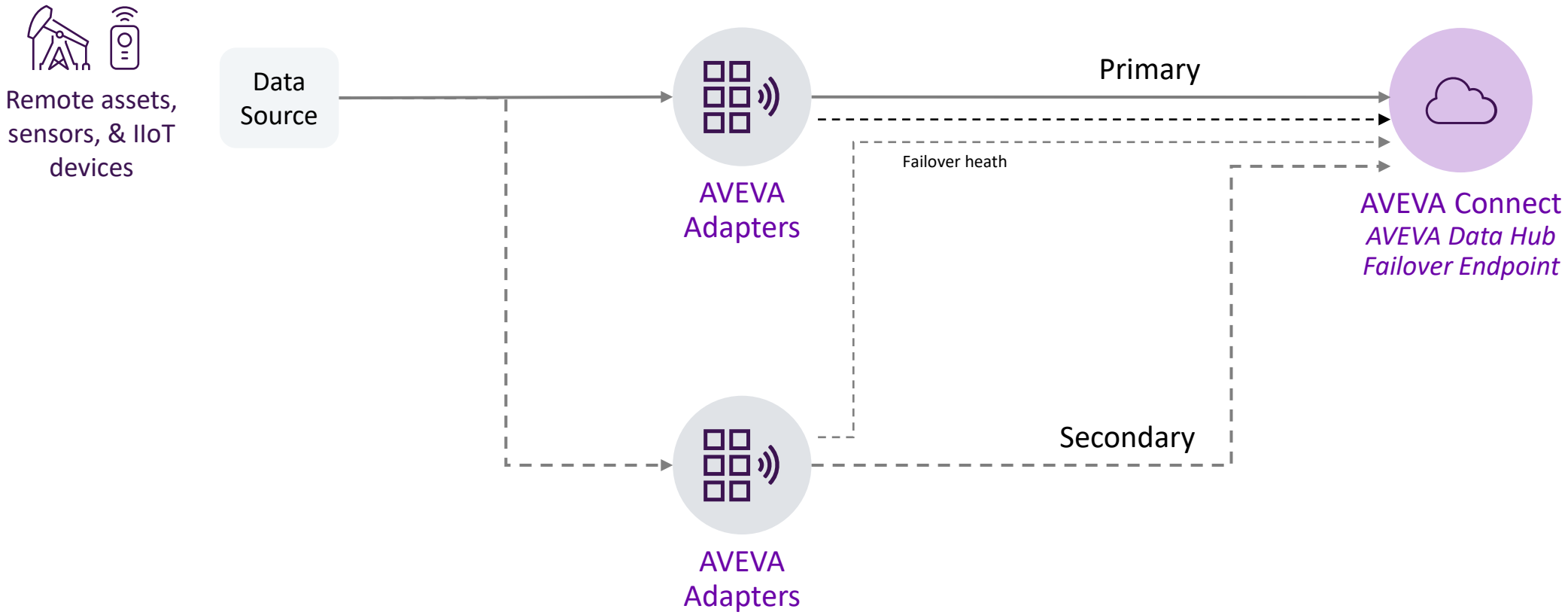
What are the requirements for an on-premises installation?



AVEVA Adapter Failover: Cloud

In Lighthouse!

Client-side failover



Failover modes:

- Hot
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AVEVA Adapter Failover: On-Premises

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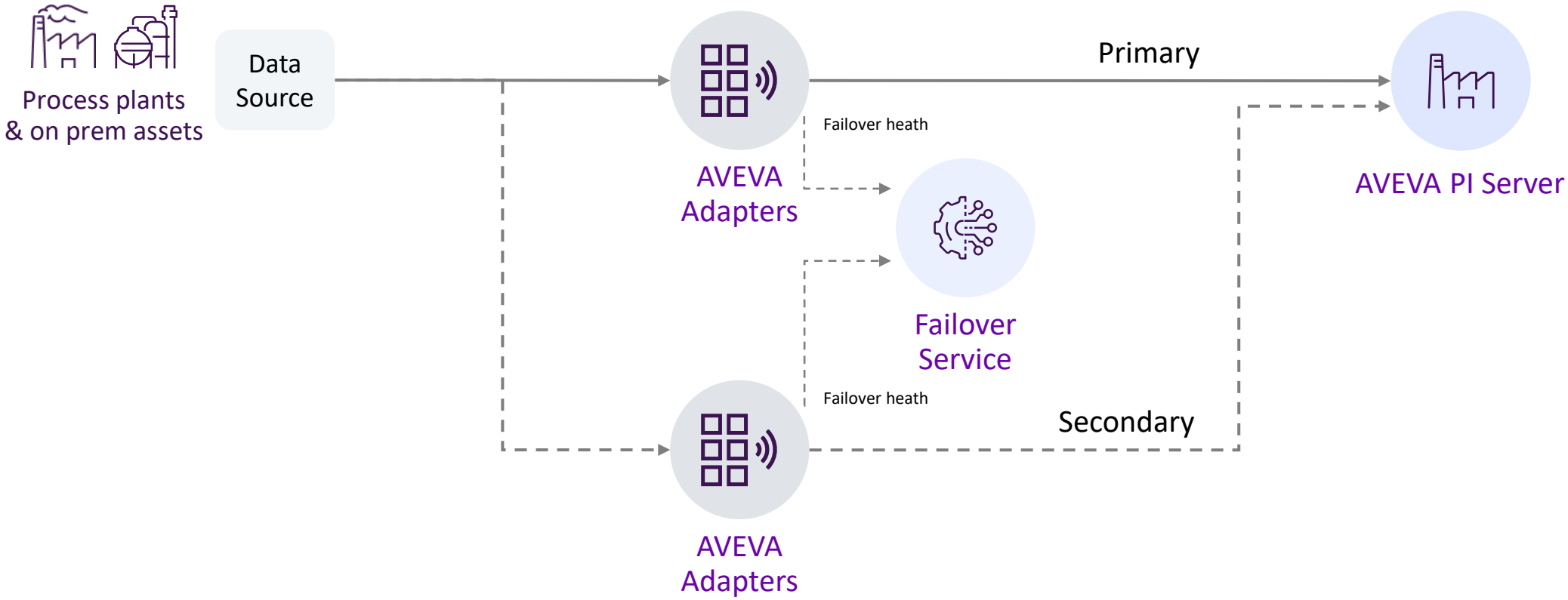

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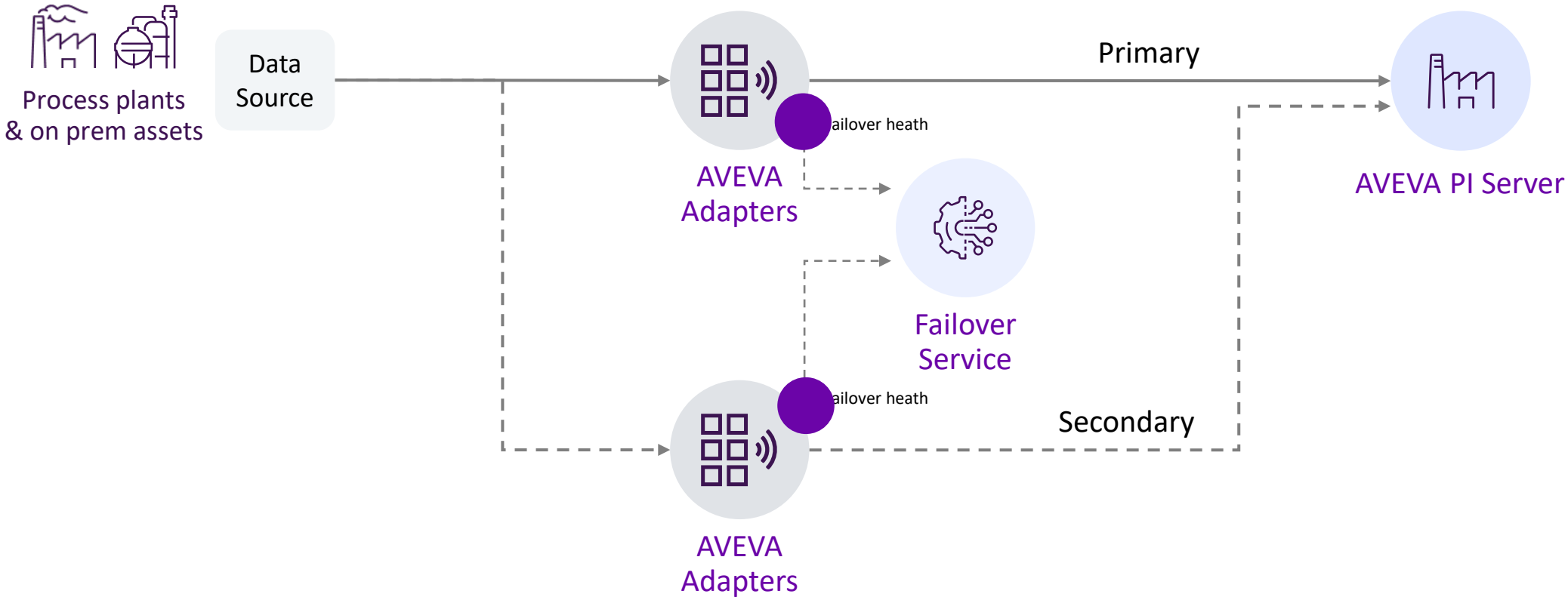

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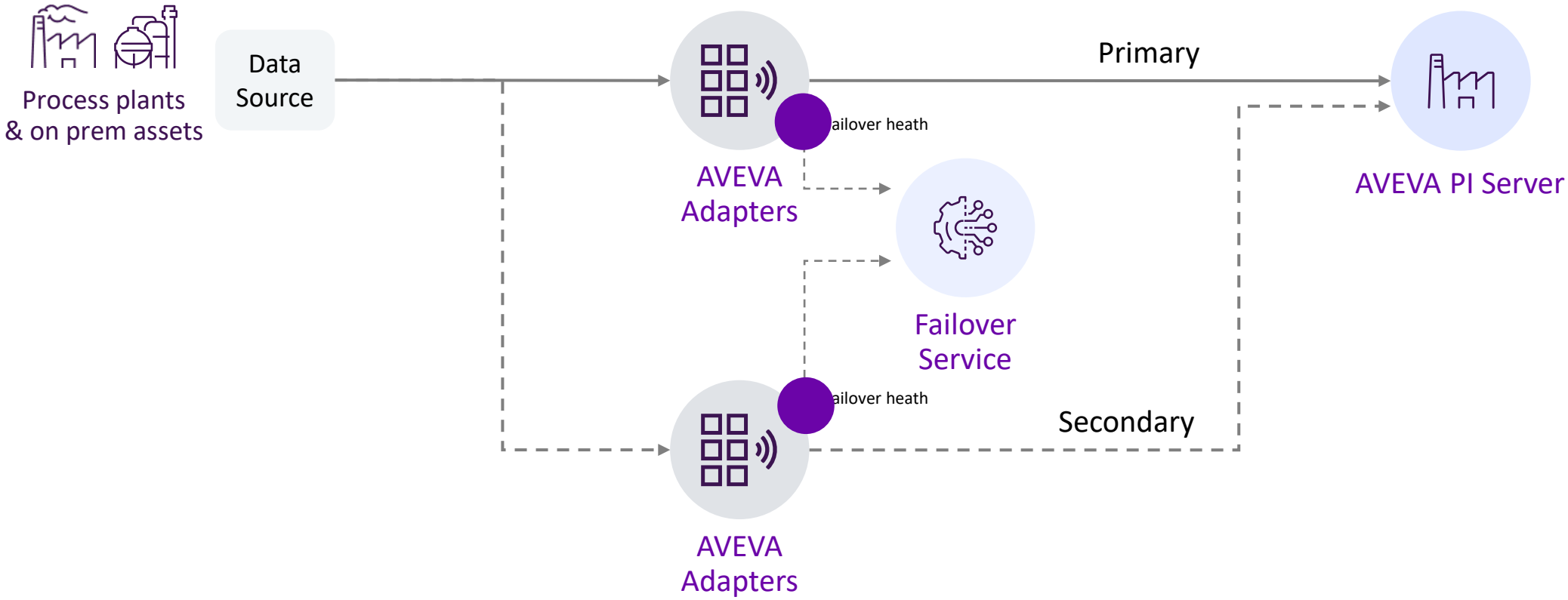

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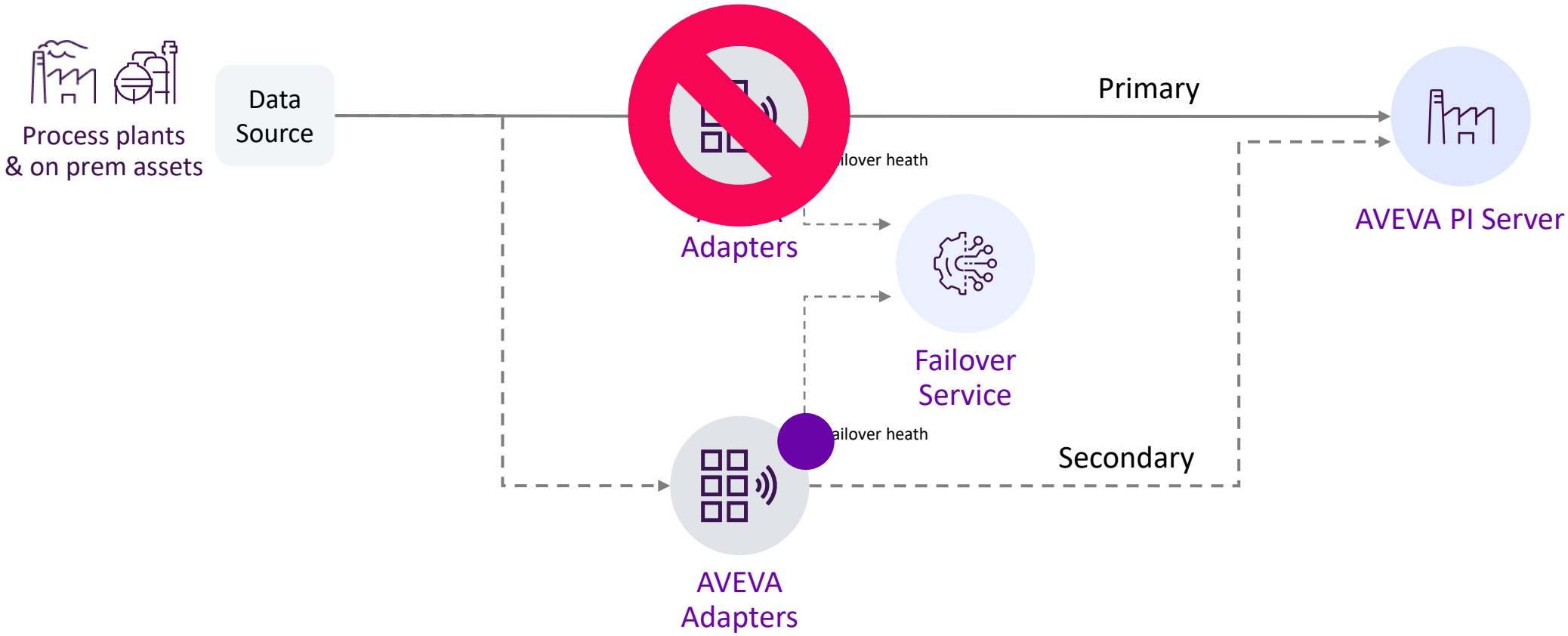

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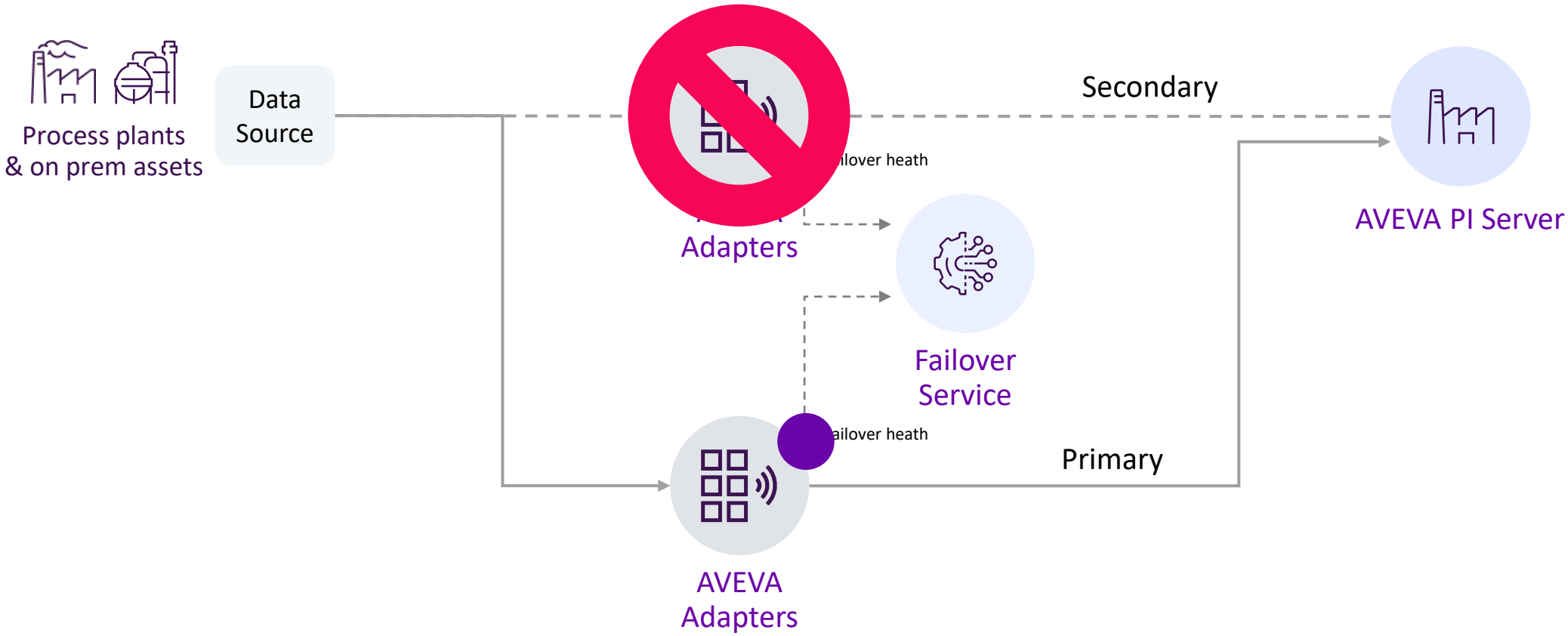

Failover modes:

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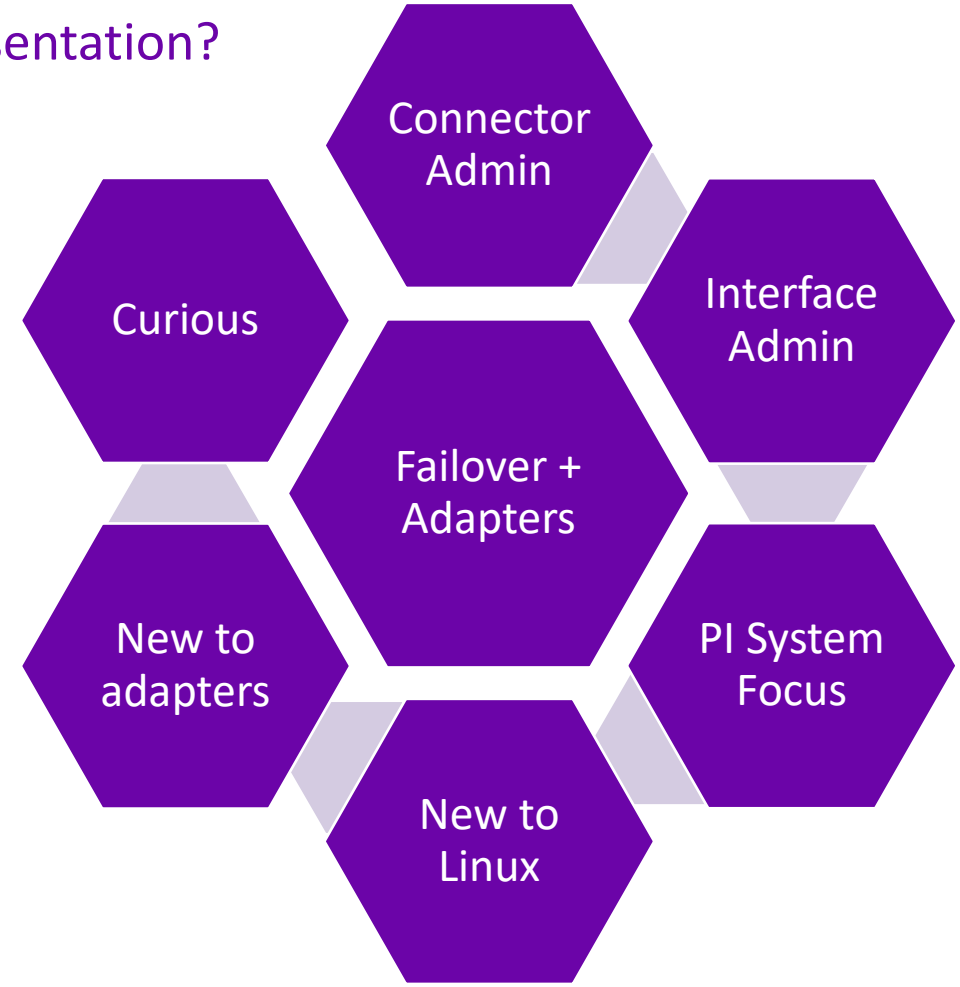
- Cold

How do we configure adapters to utilize failover?

Demonstration Audience

Who will benefit from this presentation?



Demonstration Goals

What do we want users to take away?

Install and configure the MQTT adapter

- Eight commands
- Lightweight linux machine

Showcase failover

- Simple configuration
- Demonstrate successful failover events

Realistic example

- Common failover scenario
- Repeatable at home

Demonstration Background

What is the current status of the adapter environment?

- Single adapter
- Configured and sending data
- No secondary adapter, Client Failover Service, etc

AVEVA

Utilizing Edge Command

How can one tool be used to configure each facet of an adapter?

- **edgecmd <*operation*> <*target*> –cid <*component*> <*arguments*>**

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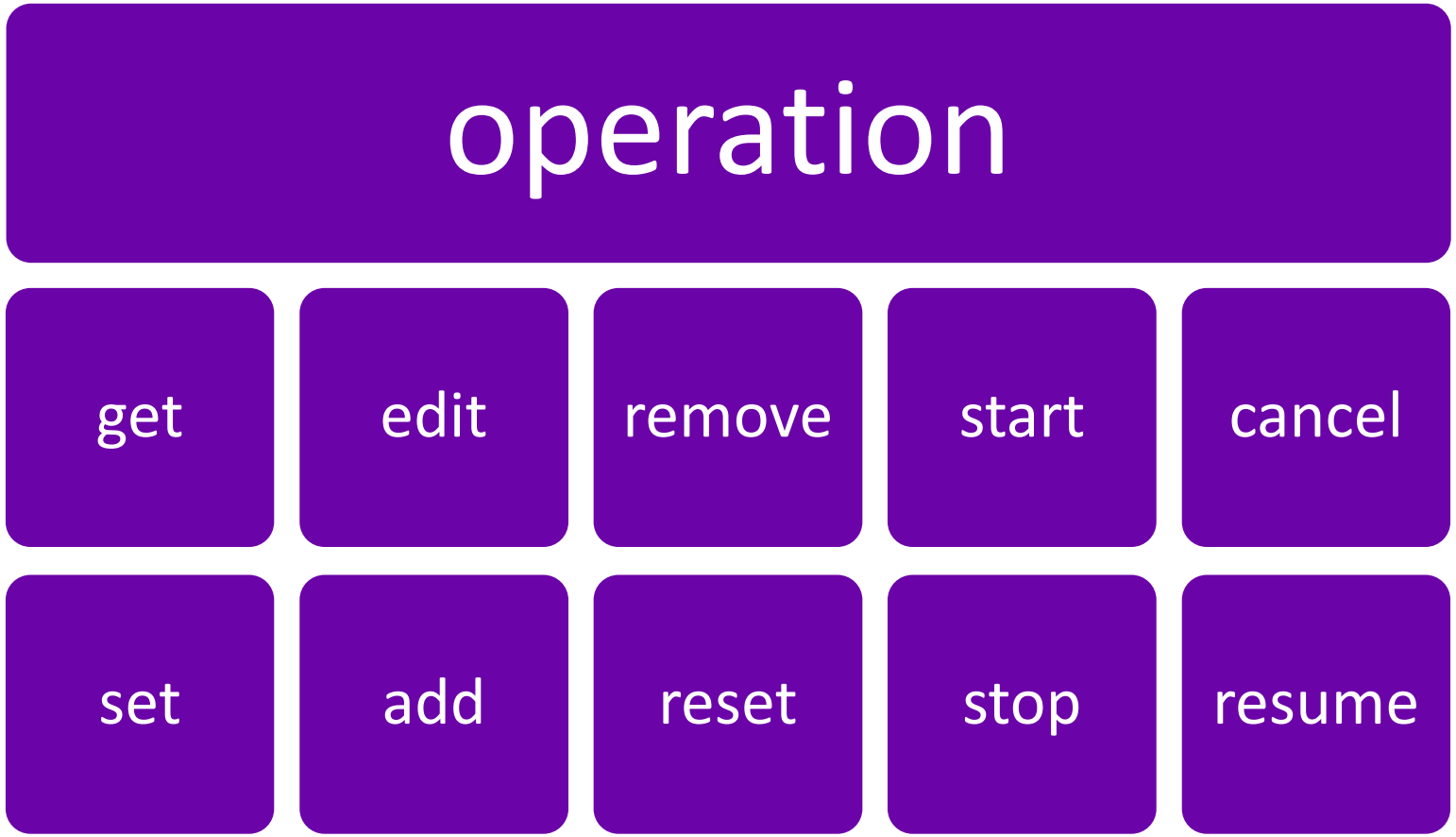

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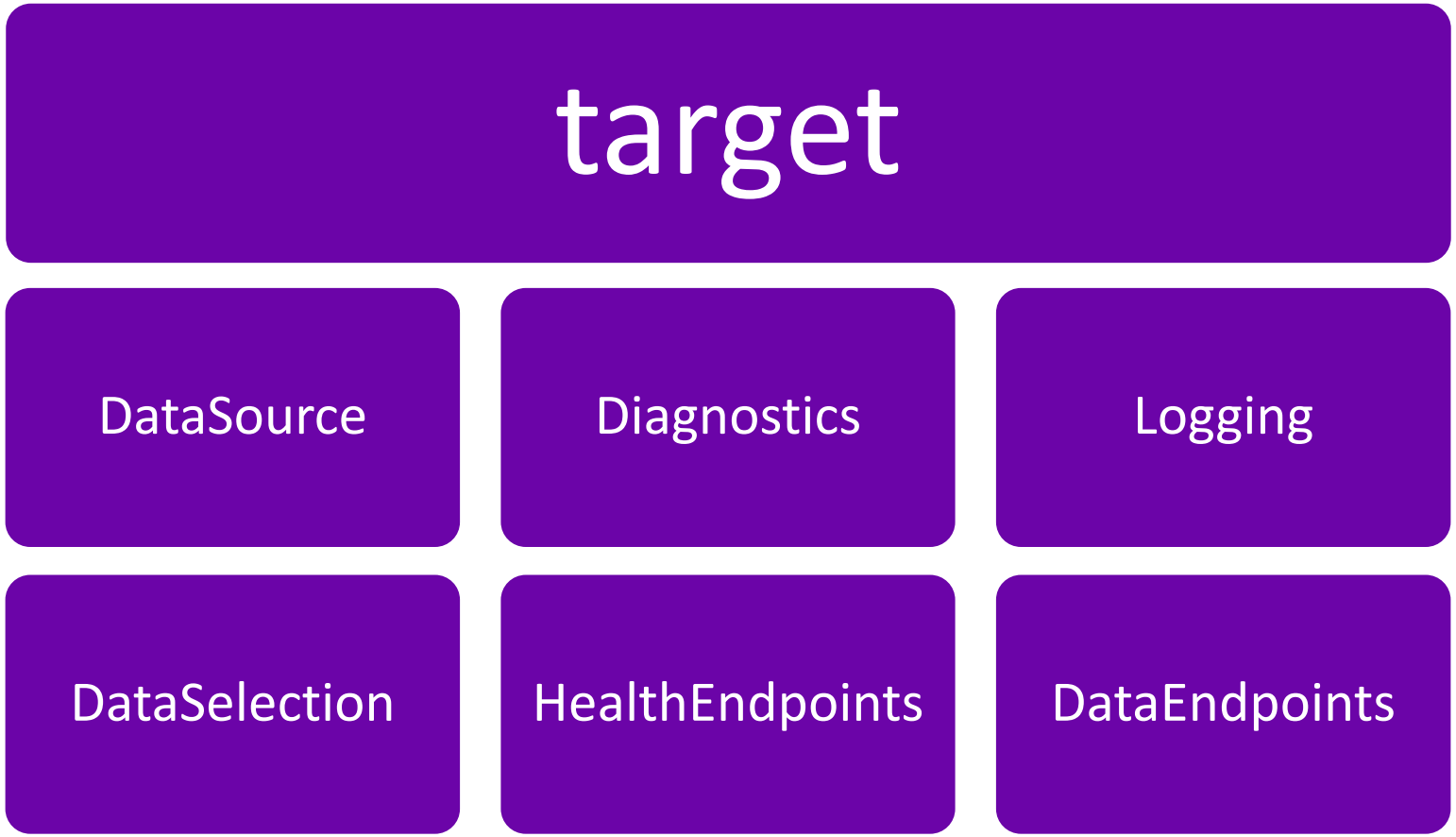

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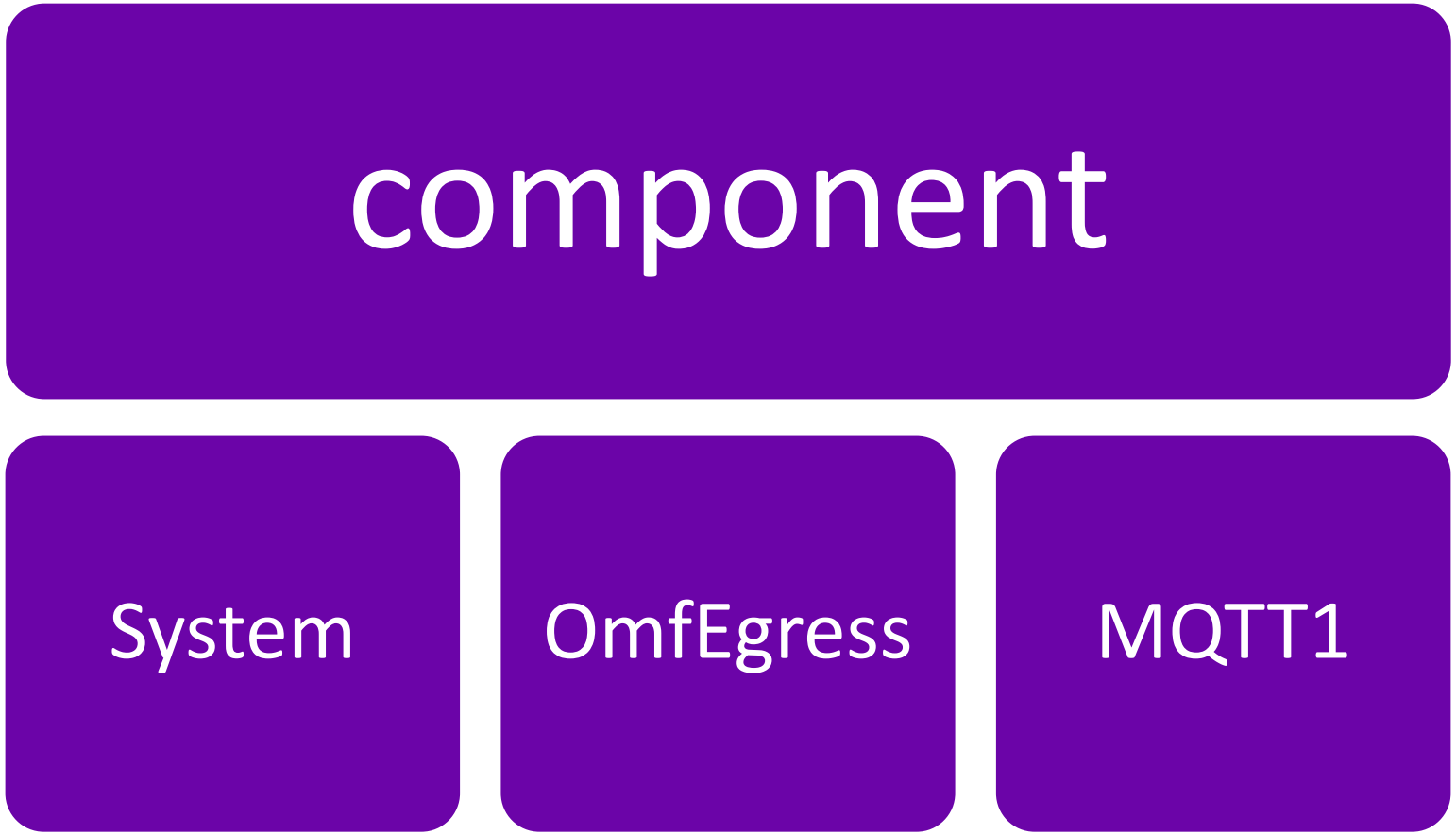

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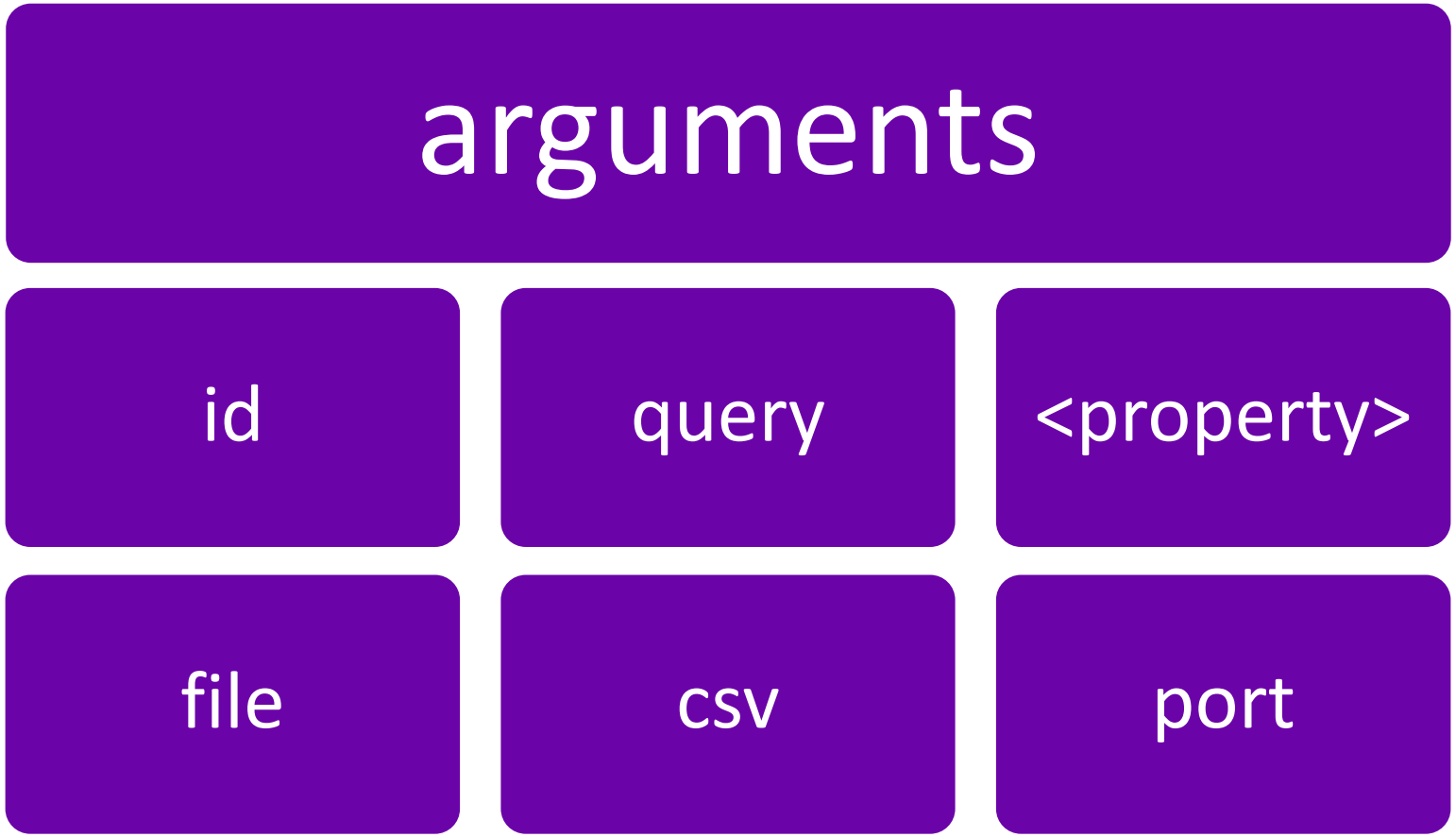

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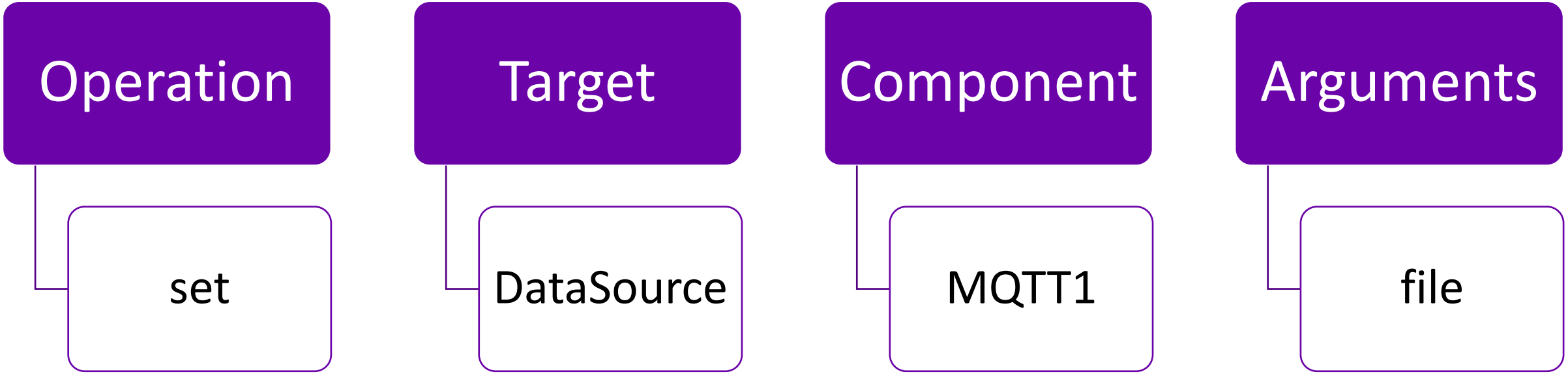

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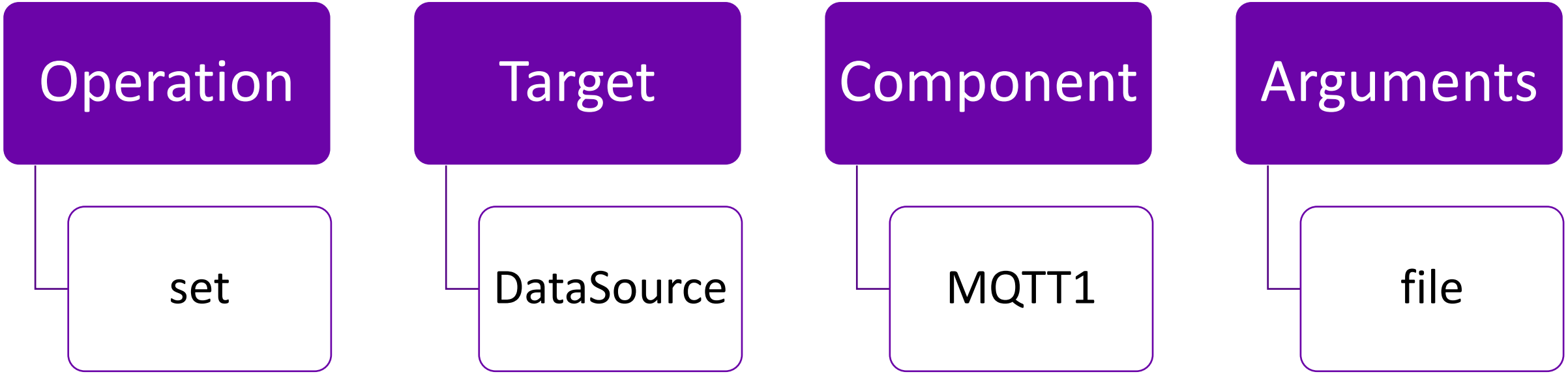

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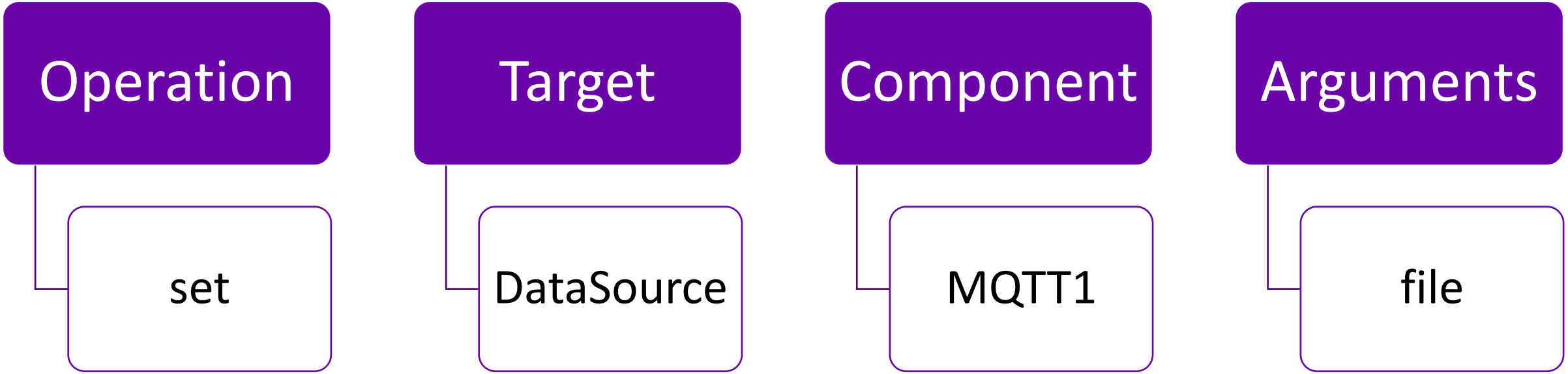

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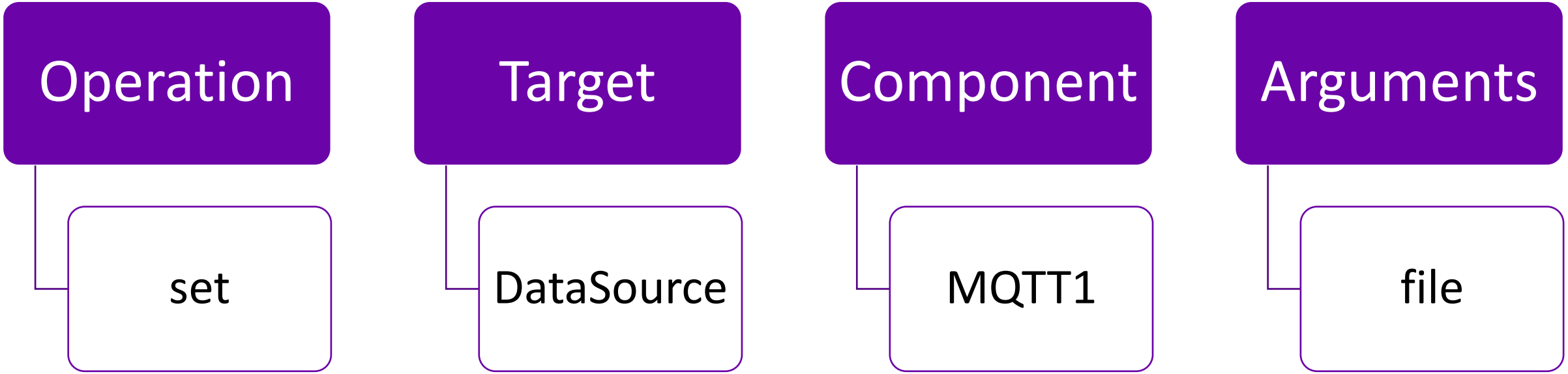

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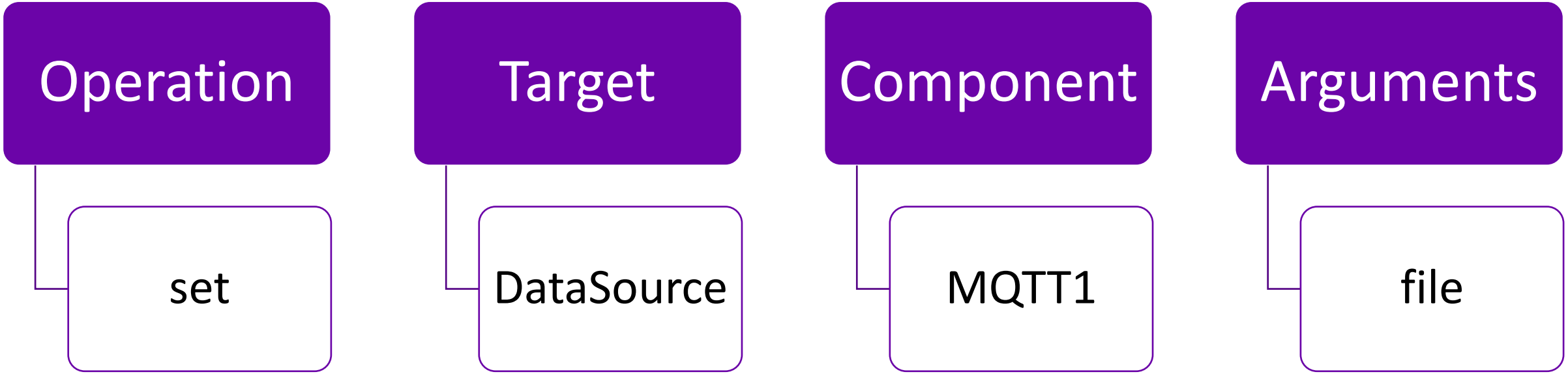

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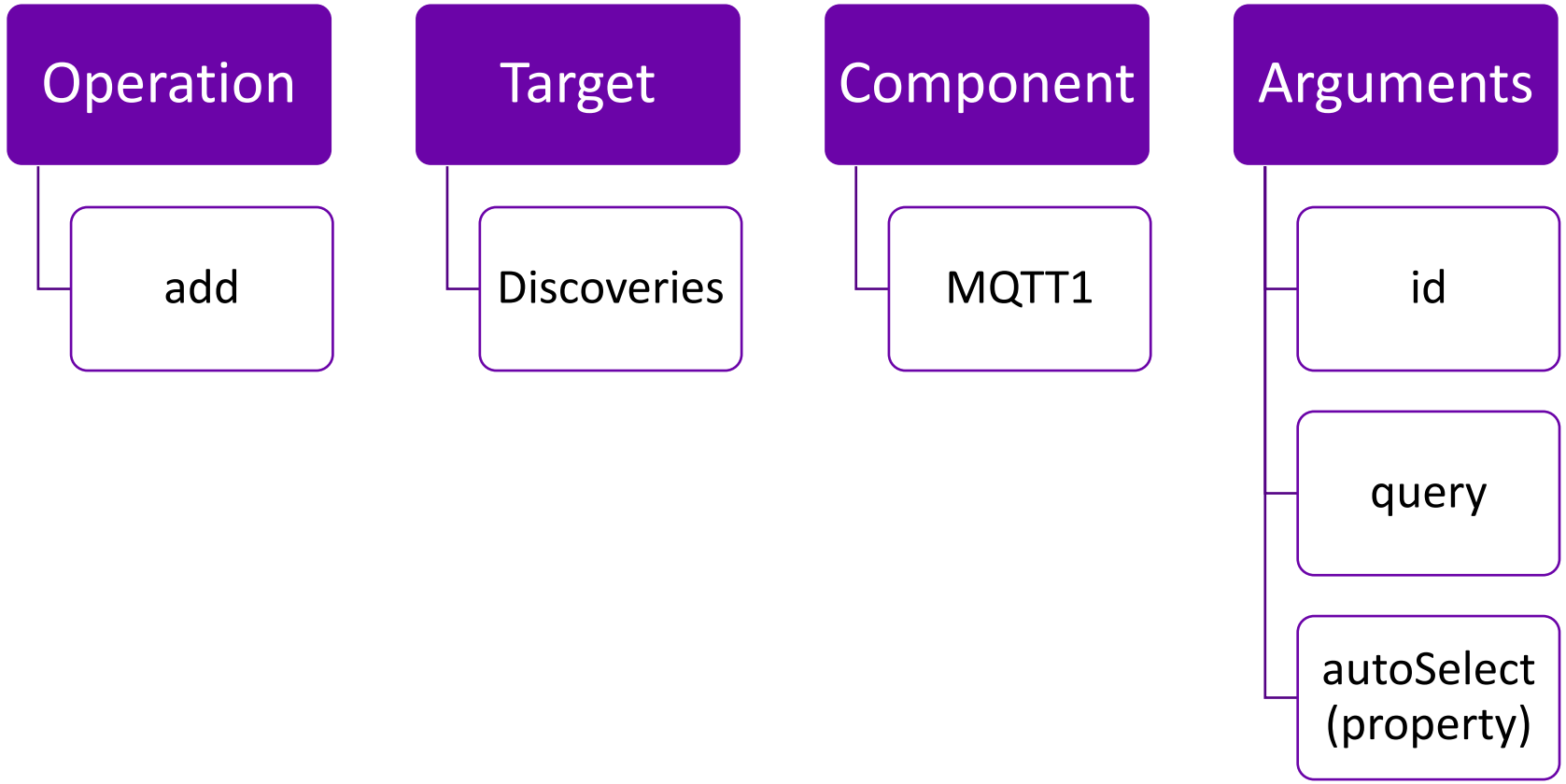

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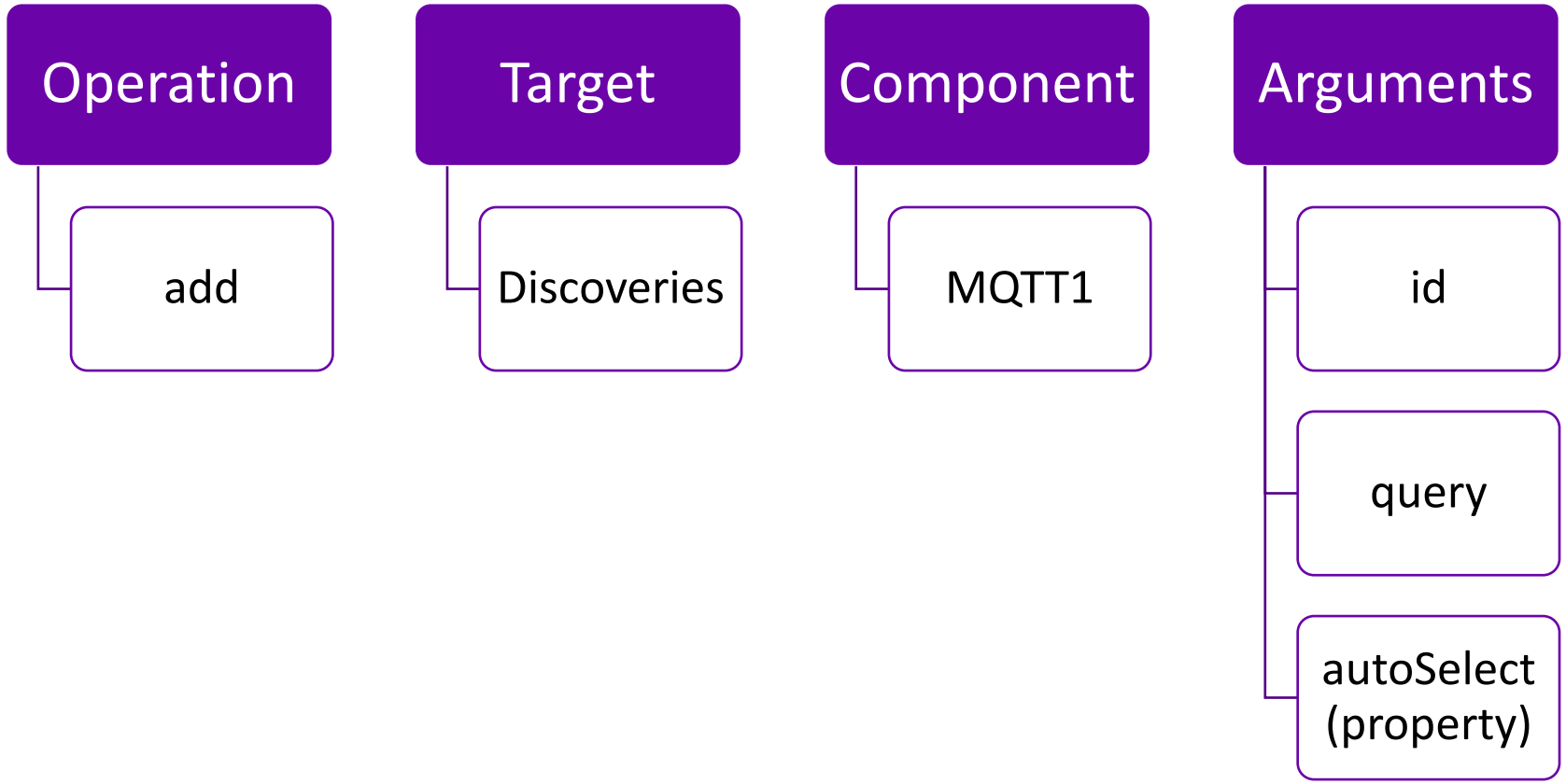

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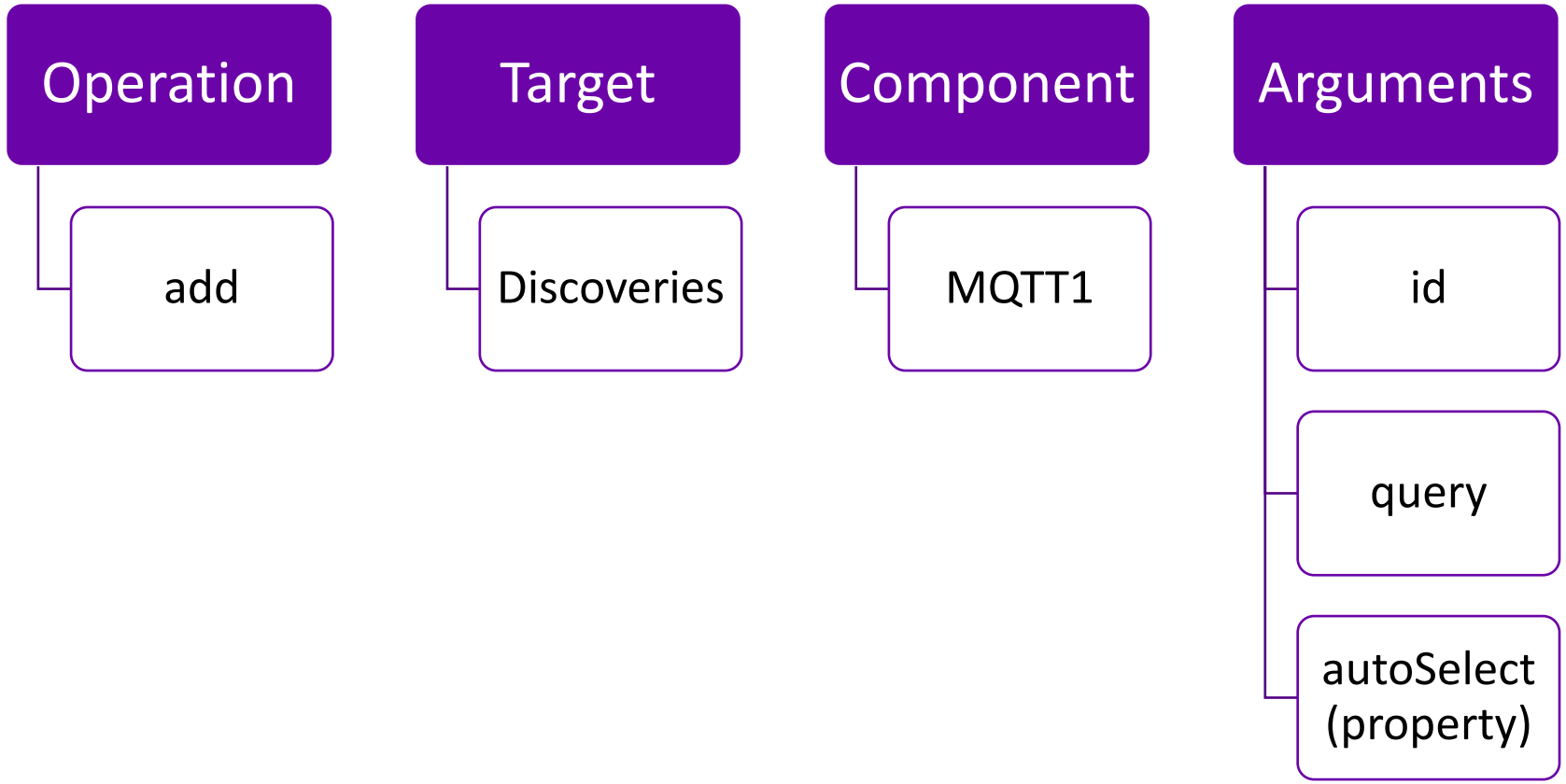

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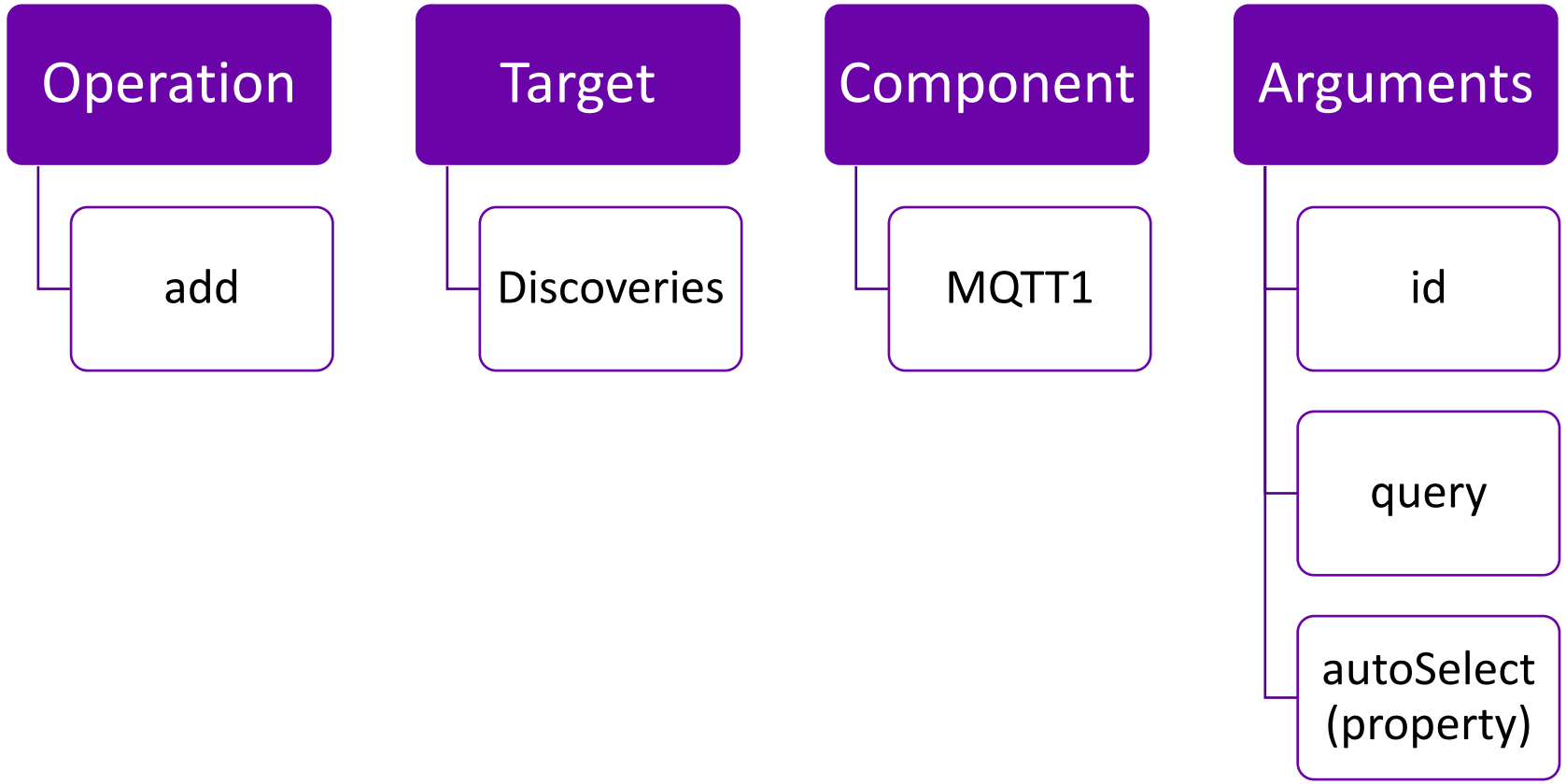

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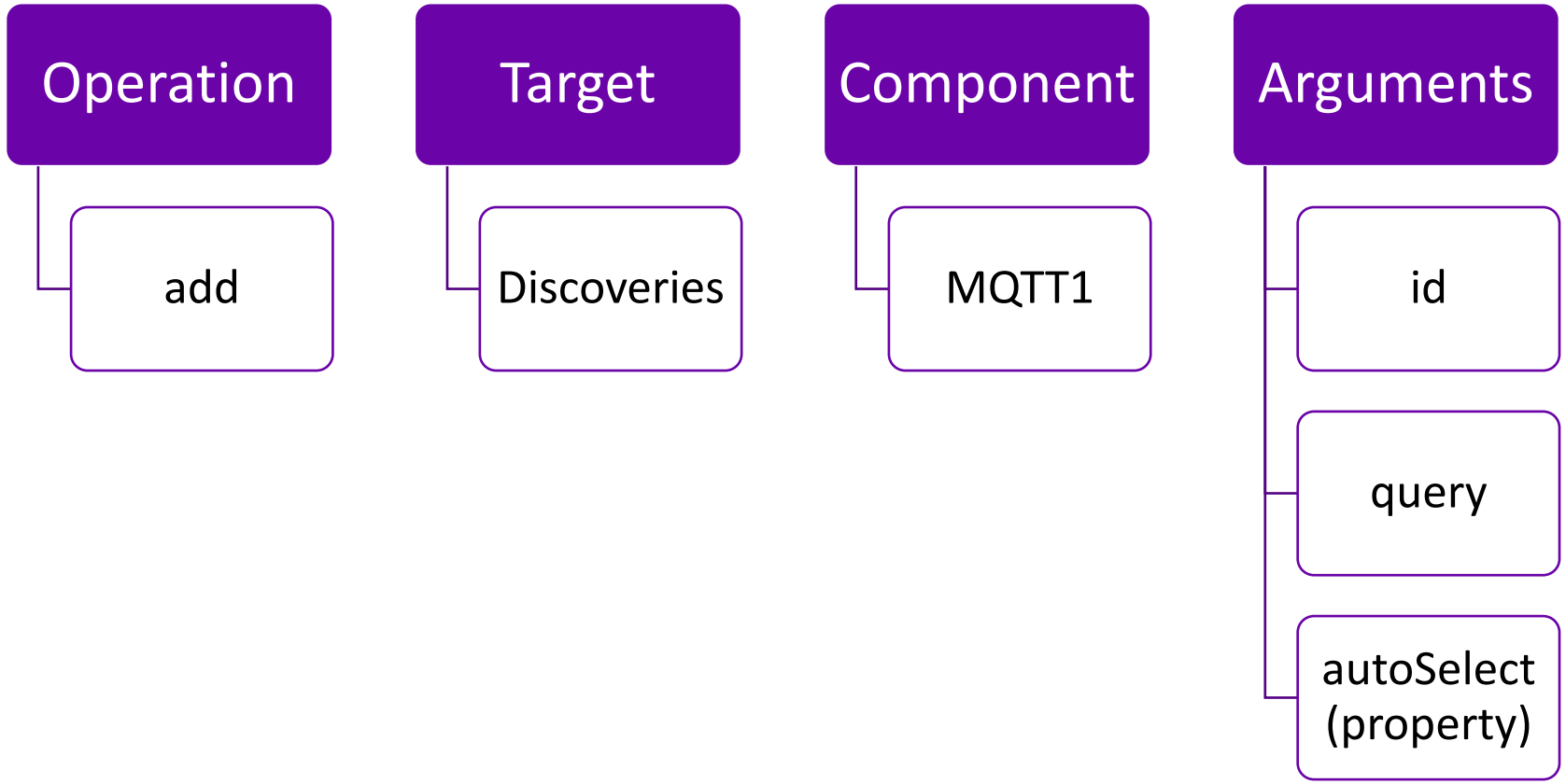
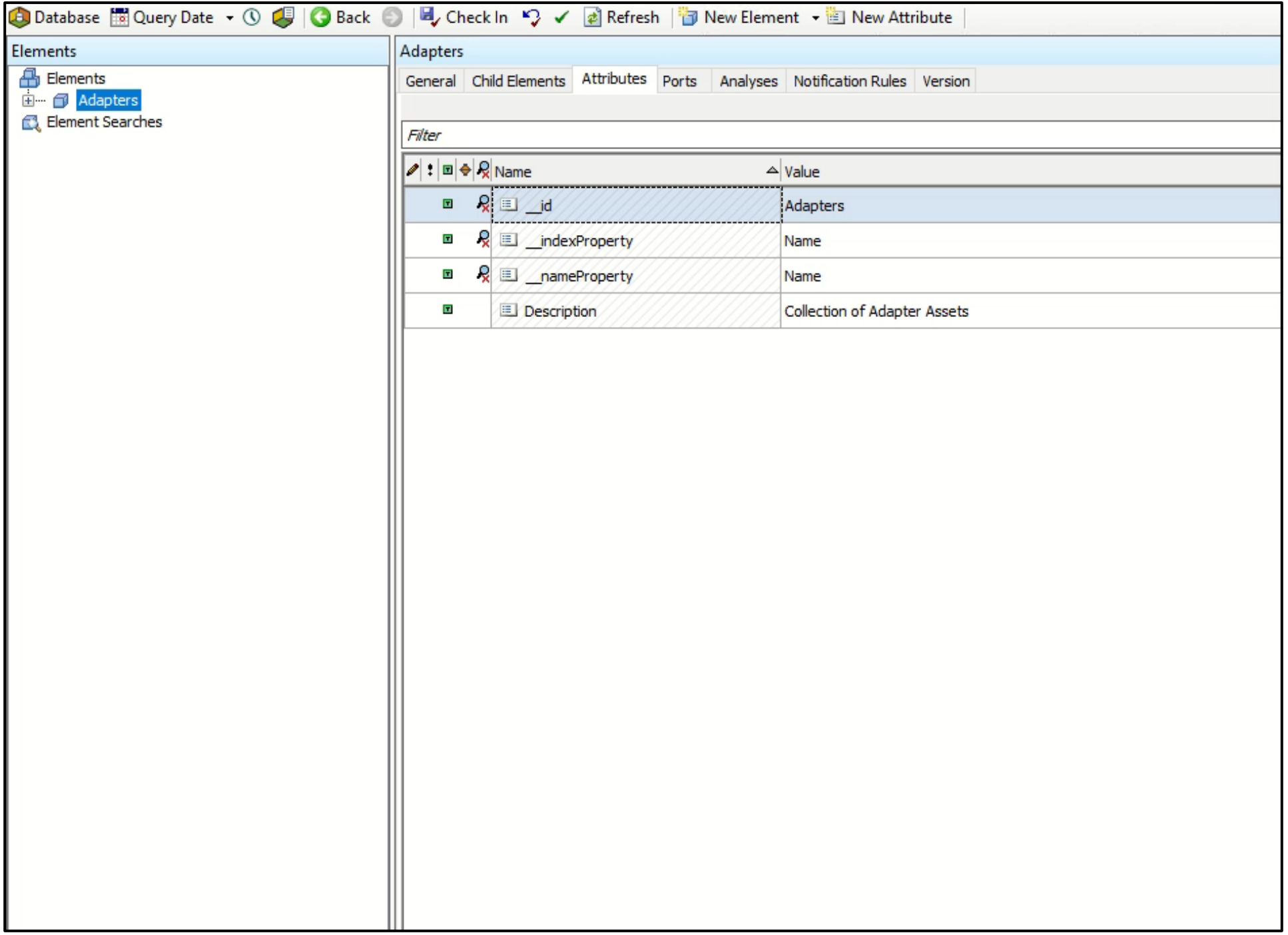



demoserver/PIVision/#/Displays/2/PrimaryDataPoint-AdapterMachine
PI Vision
Admin
PI Web API
ClientFailover
AVEVA™ PI Vision™
New Display
DEMOSERVER\Administrator
PrimaryDataPoint-AdapterMachine
100
80
60
40
20
0
-20
-40
-60
-80
-100
MQTT1.generic/Performance/Boiler.$.BoilerSin
39.026
10/4/2022 5:37:05 PM
5m
10/4/2022 5:42:05 PM
10/4/2022 5:37:05 PM
5m
Now
10/4/2022 5:42:05 PM


Database
Query Date
Back
Check In
Refresh
New Element
New Attribute
Elements
Elements
Adapters
Element Searches
Adapters
General
Child Elements
Attributes
Ports
Analyses
Notification Rules
Version
Filter
Name
Value
__id
Adapters
__indexProperty
Name
__nameProperty
Name
Description
Collection of Adapter Assets

Windows Installation

- edgecmd add components –type MQTT –id MQTT1
- edgecmd start –cid MQTT1
- edgecmd set DataSource –cid MQTT1 –file DataSource.json
- edgecmd add discoveries -cid MQTT1 -id discovery1 -query "Topics=generic/random1" -autoSelect true
- edgecmd get discoveries -cid MQTT1 -id discovery1
- edgecmd set DataEndpoints –cid OmfEgress –file Egress.json
- edgecmd set ClientFailover –cid System –file Failover.json
- edgecmd set HealthEndpoints –cid System –file Health.json

- remove configuration files when completed!

Demonstration Goals

What do we want users to take away?

Install and configure the MQTT adapter

- Eight commands
- Lightweight linux machine

Showcase failover

- Simple configuration
- Demonstrate successful failover events

Realistic example

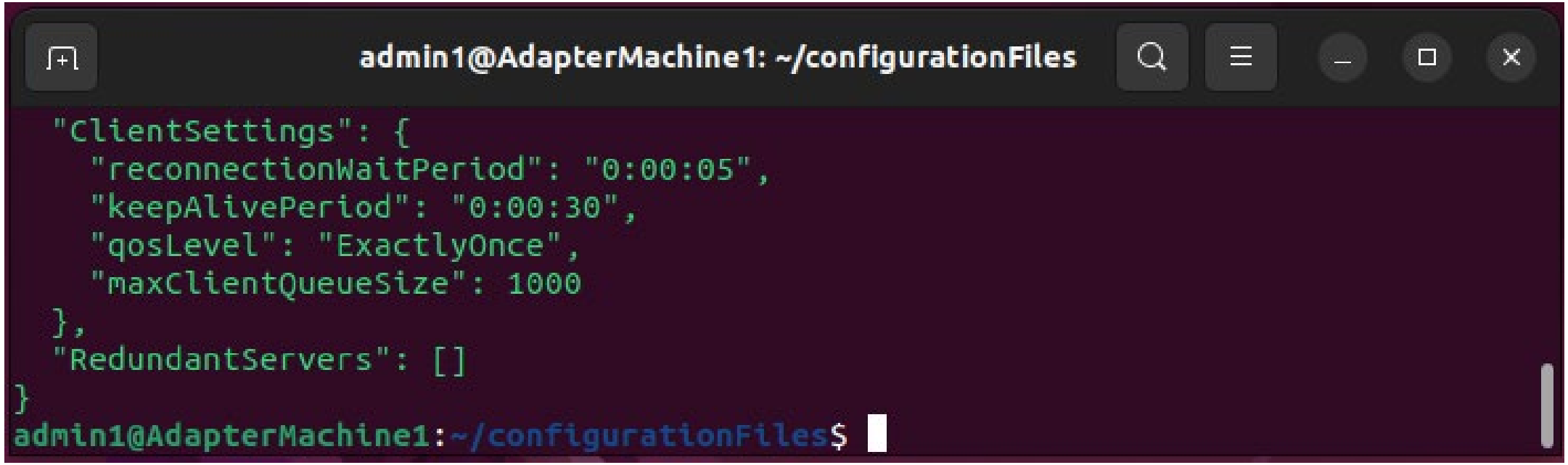
- Common failover scenario
- Repeatable at home

Additional Notes and Configuration Options

Data Source Server Failover

Access redundant MQTT data sources when the primary data source is unreachable

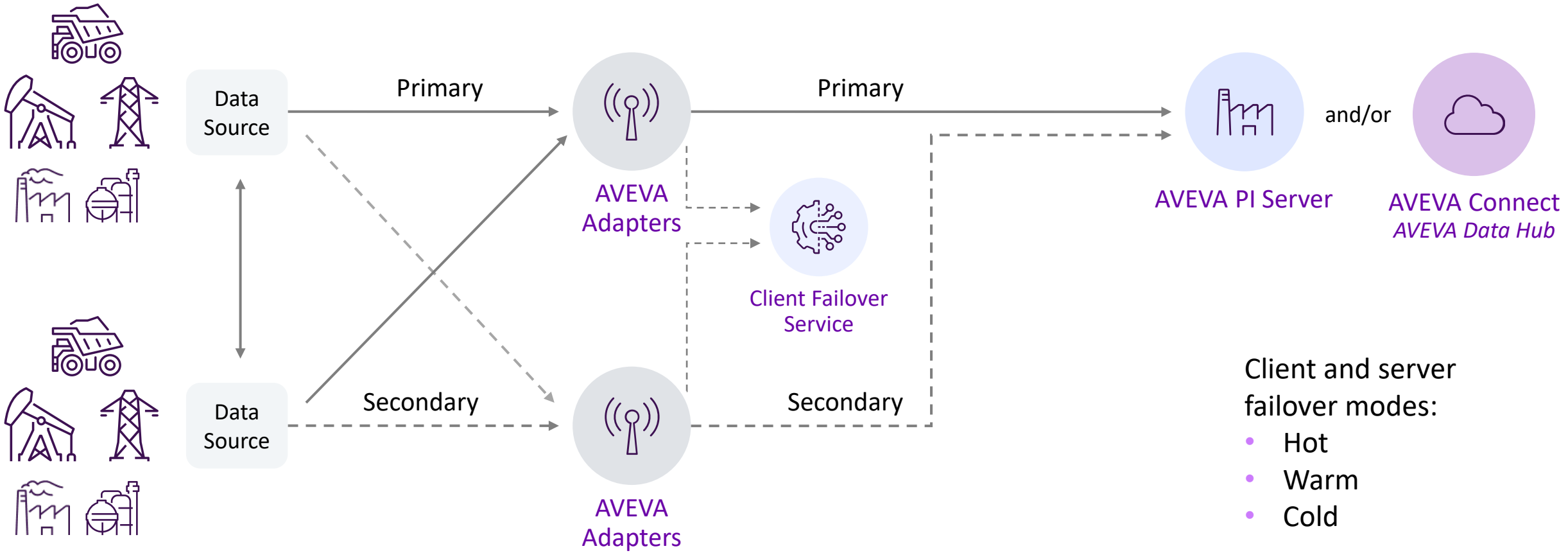
- Specify additional MQTT data sources in the MQTT Component
  - RedundantServers[]
- Available for OPC UA, MQTT Generic, and MQTT Sparkplug adapters



In Lighthouse!

AVEVA Adapter failover

Client-side and server-side failover for AVEVA PI Server and AVEVA Data Hub



Client and server failover modes:

- Hot
- Warm
- Cold

Benefits of Being an Administrator

Why put users in the ‘AVEVAFailoverAdministrators’ local group?

- Update service logging levels
- Health Endpoint administration
- Role Override

Configuration Alternatives

Use your favorite REST client!

EdgeCMD

- CMD line configuration utility
- Developed by AVEVA

cURL

- Windows and Linux CMD line
- Easily scriptable

Postman

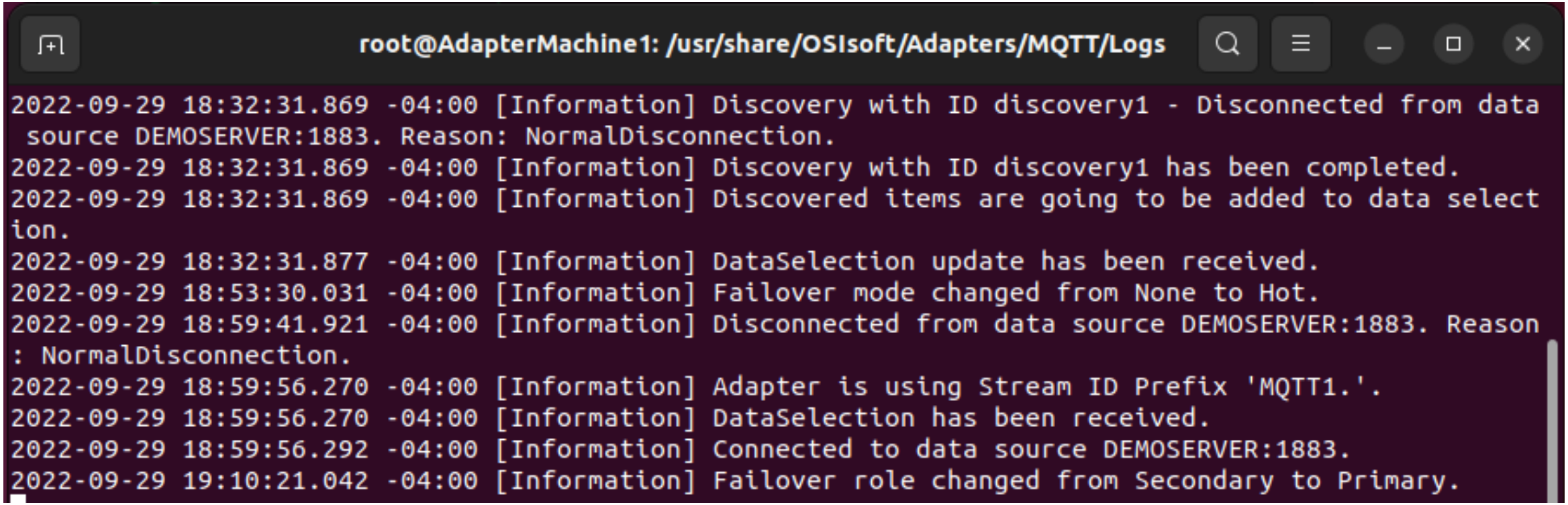
- Standalone application
- Save configuration collections

AVEVA

Looking through Adapter Logs

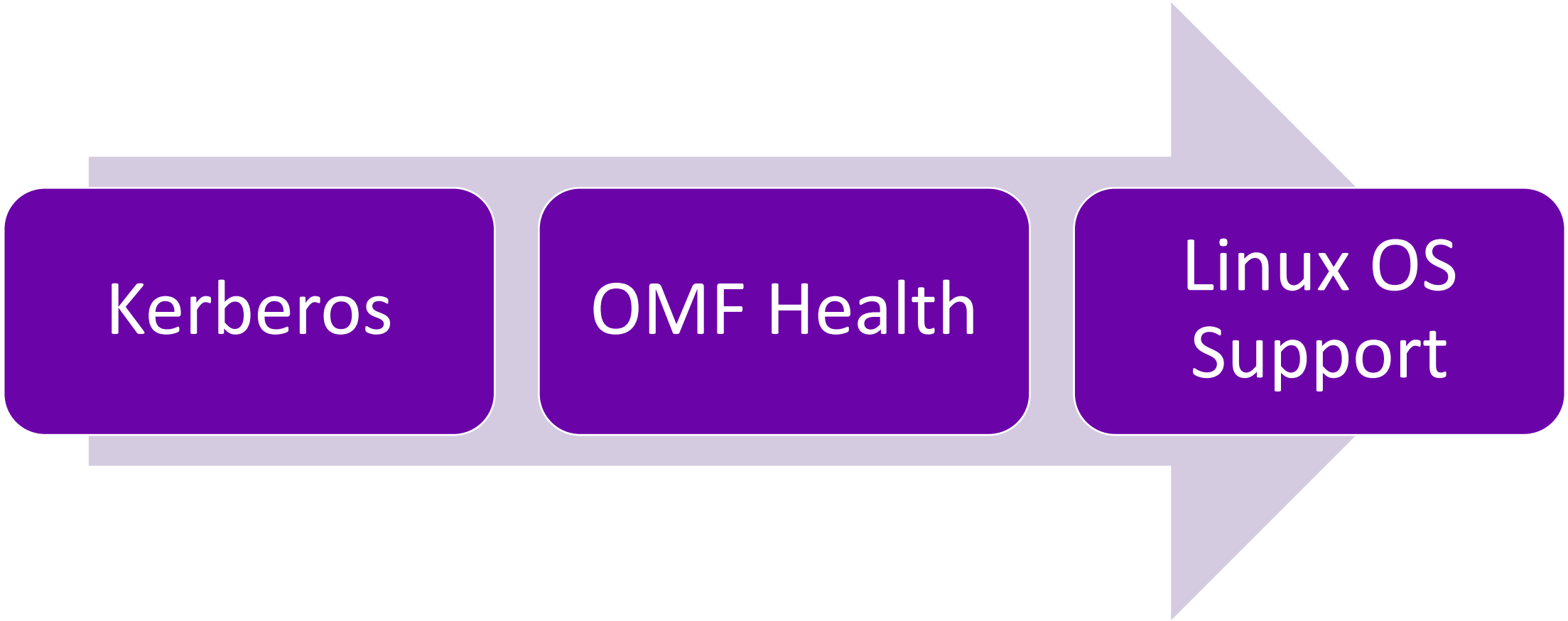
Where to look when you need more information!

- C:\ProgramData\OSIsoft\Adapters\MQTT\Logs
- /usr/share/OSIsoft/Adapters/MQTT/Logs (Sudo tail –f *logfile.txt)*



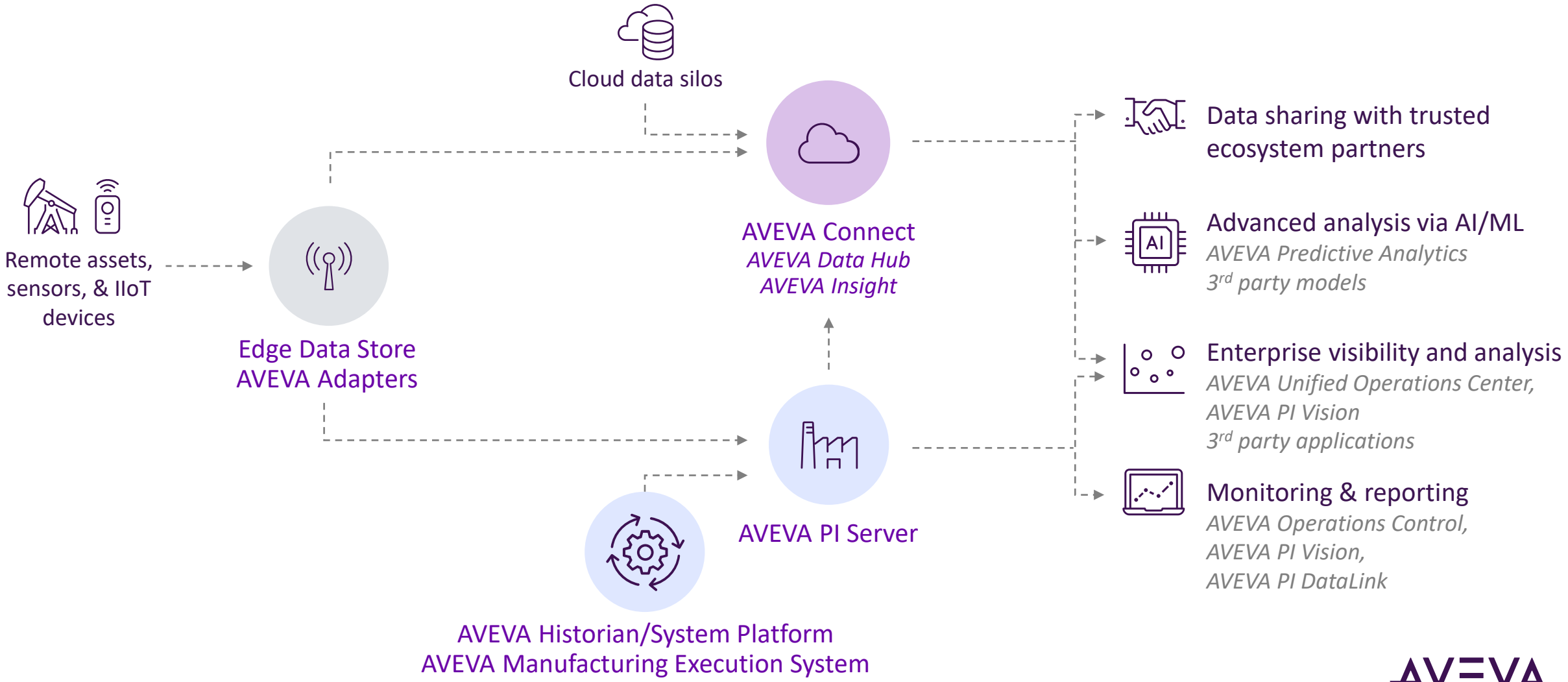
What is next?

Future enhancements for the on-premises Client Failover Service



Summary

Bridging engineering, operations, and business domains



Providing the Backbone for a Stable Data Infrastructure

Empowerment through extensive data collection

Various Protocols

Robust Connectivity

Edge-to-Cloud Coverage

Interoperability and Flexibility

Expanding Feature Set

Available AVEVA Adapters

OPC UA

Modbus TCP

DNP3

Azure Event Hubs

MQTT

Structured Data Files

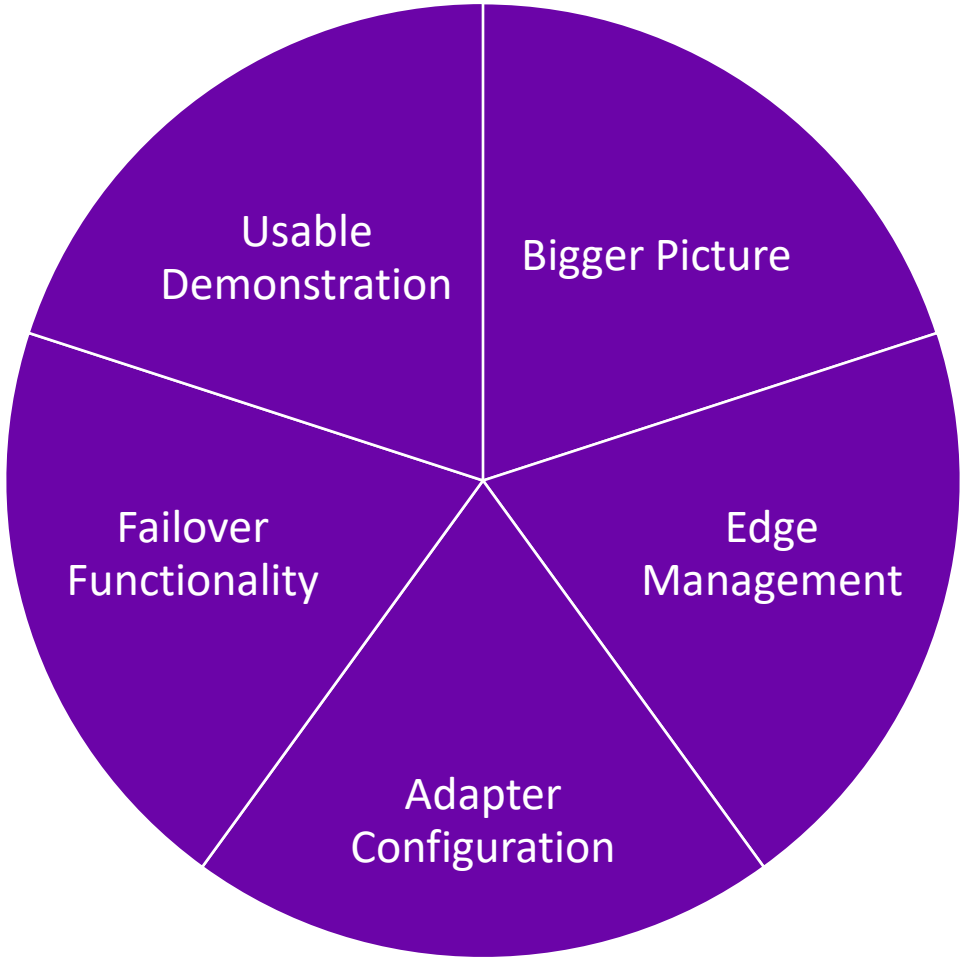
BACnet

RDBMS

AVEVA Historian 2023*

Presentation Goals

What will we discuss?



Ellery Murdock

Senior Technical Product Manager

- AVEVA
- William.Murdock@aveva.com

Jane Matheson

R&D Manager

- AVEVA
- jane.matheson@aveva.com

Questions?

Please wait for the microphone

State your name and company

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you

AVEVA

Individual Demo Steps

Installing the Client Failover Service

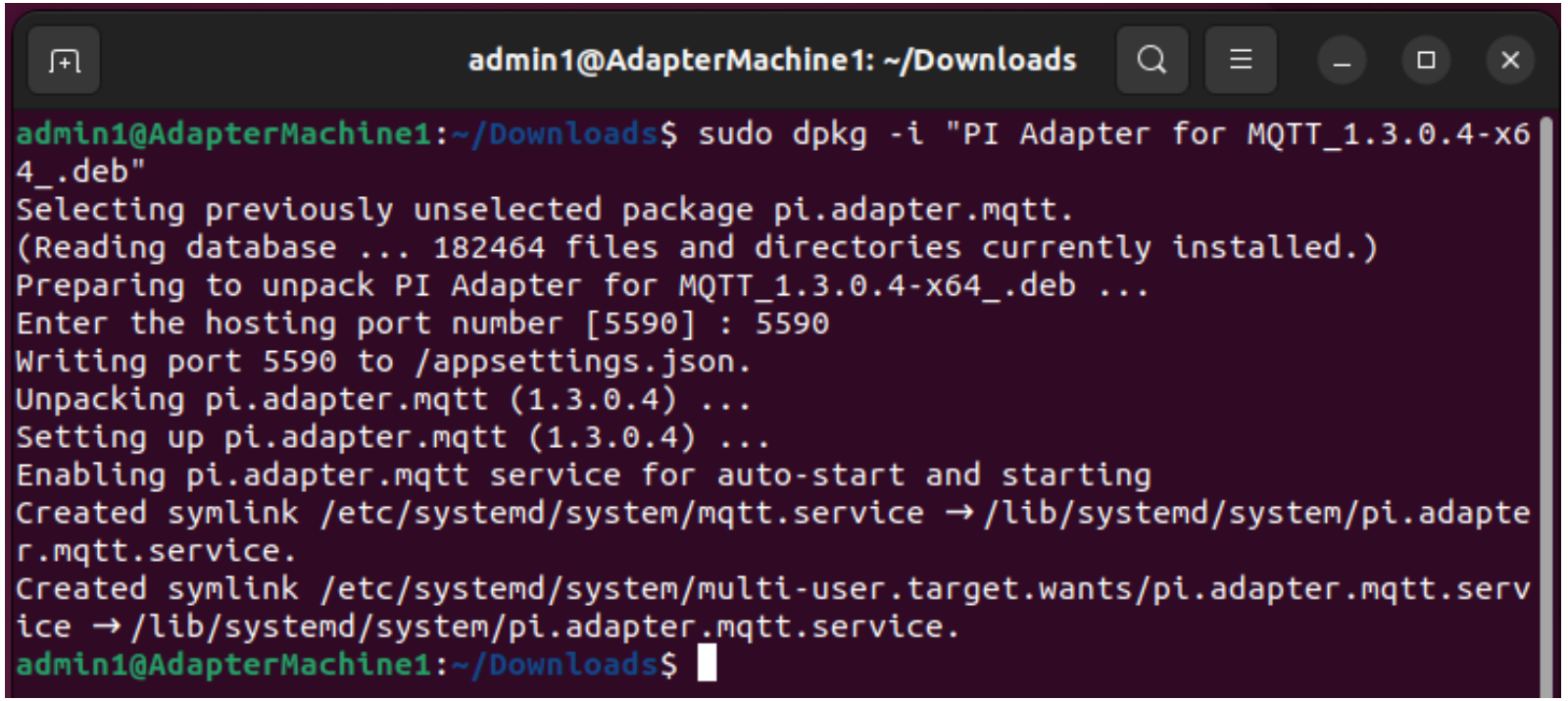
Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- Standalone installation kit
  - Windows OS
  - Linux → future release
- Requires open port (default 5495)
- Creates two Windows Local Groups
  - AVEVAFailoverAdministrators
  - AVEVAFailoverUsers
- Generates self-signed certificate

Install the Adapter

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

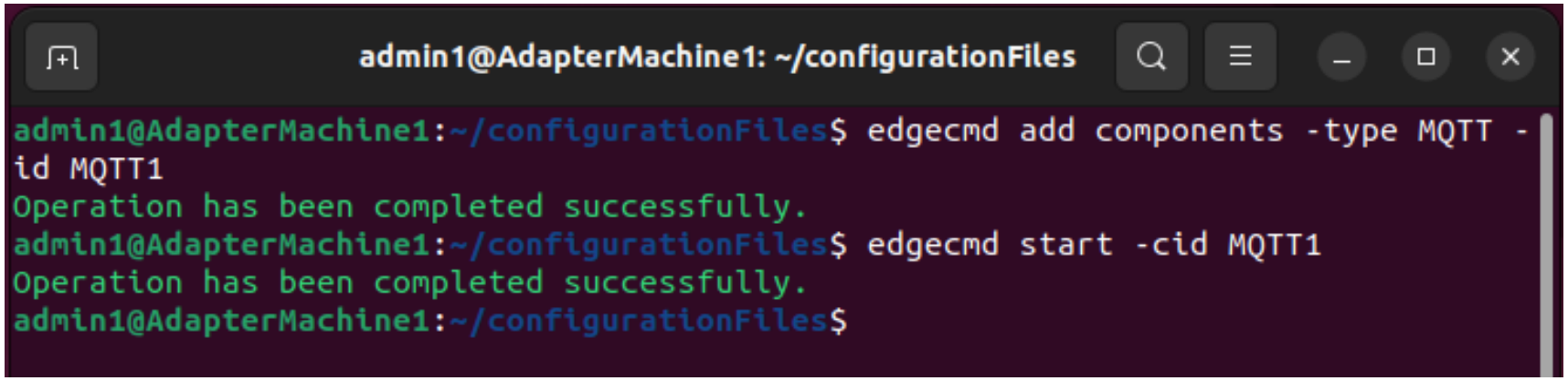
- Sudo dpkg -i “PI Adapter for MQTT_1.3.0.4-x64_.deb”
- Specify port number



Add and start an MQTT Component

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd add components –type MQTT –id MQTT1
- edgecmd start –cid MQTT1



Create and apply Data Source Configuration

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

DataSource.json:

```
{
    “HostNameOrIpAddress”: “DEMOSERVER”,
    “Port”: “1883”,
    “TLS”: “None”,
    “ClientId”: “AdapterMachine1”
}
```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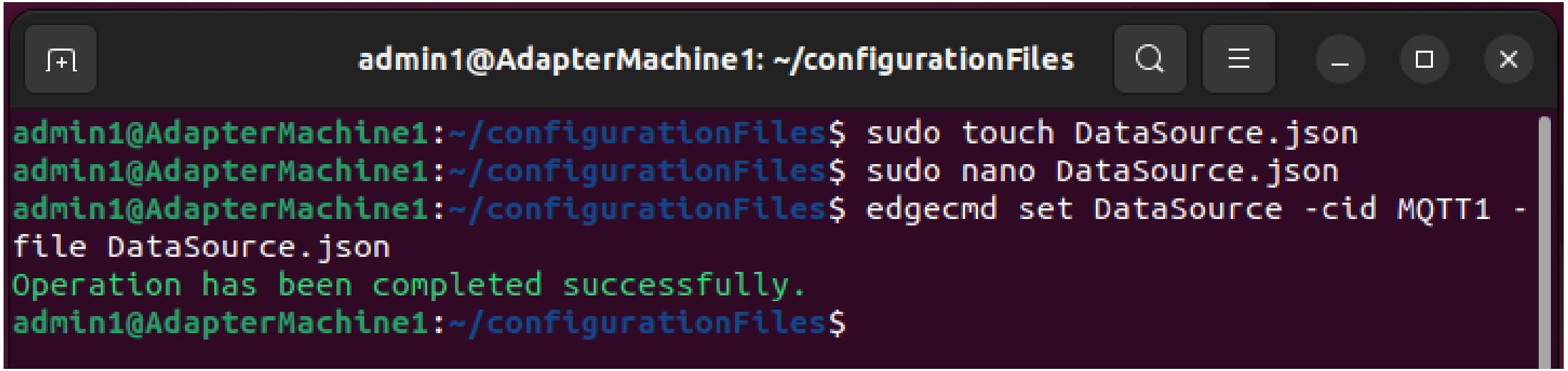
Create and apply Data Source Configuration

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

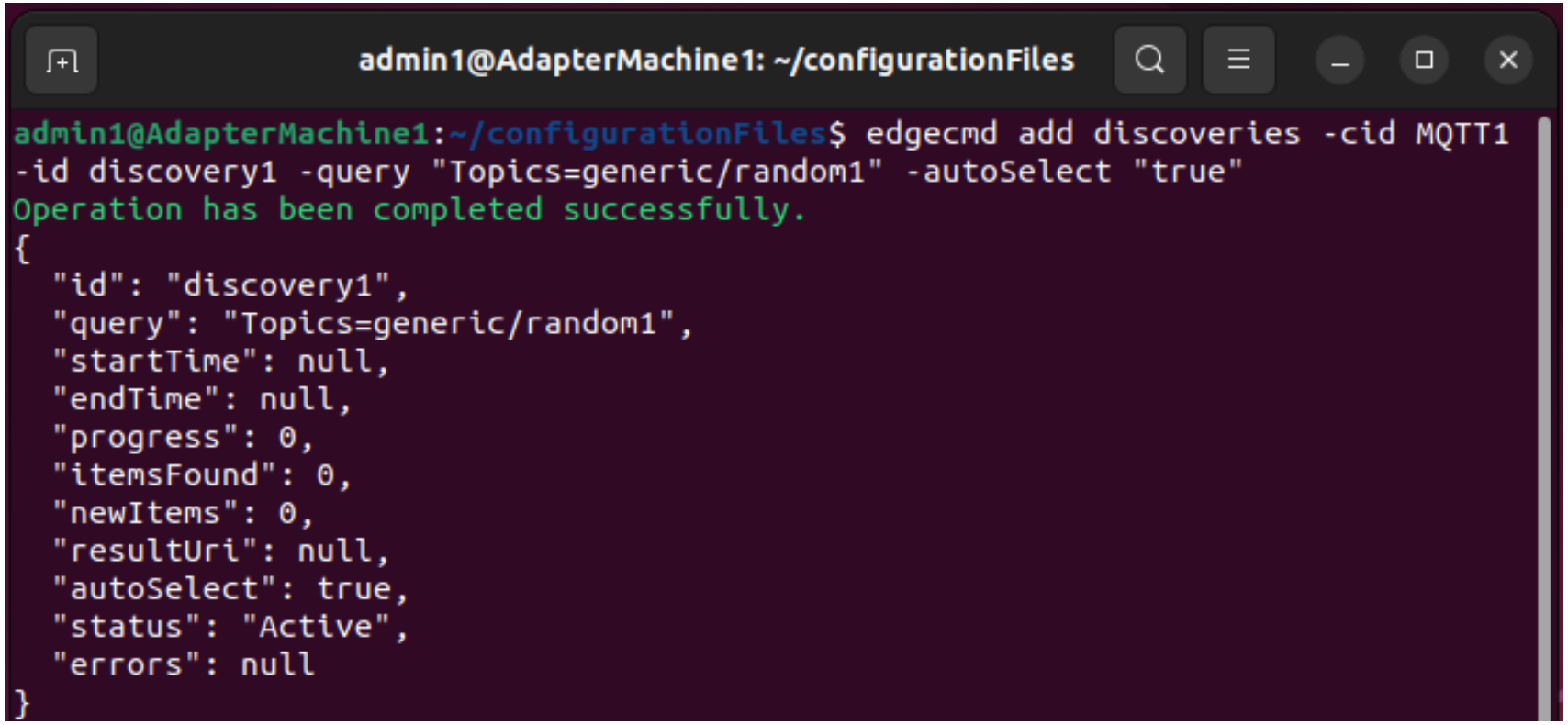
- Edgecmd set DataSource –cid MQTT1 –file DataSource.json



Create Discovery for MQTT Data Items

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd add discoveries -cid MQTT1 -id discovery1 -query "Topics=generic/random1" -autoSelect true



Run Discovery for MQTT Data Items

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd get discoveries -cid MQTT1 -id discovery1

```
admin1@AdapterMachine1:~/configurationFiles$ edgecmd get discoveries -cid MQTT1
-id discovery1
{
  "id": "discovery1",
  "query": "Topics=generic/random1",
  "startTime": "2022-09-29T18:31:30.4424561-04:00",
  "endTime": null,
  "progress": 1,
  "itemsFound": 16,
  "newItems": 0,
  "resultUri": null,
  "autoSelect": true,
  "status": "Active",
  "errors": null
}
admin1@AdapterMachine1:~/configurationFiles$
```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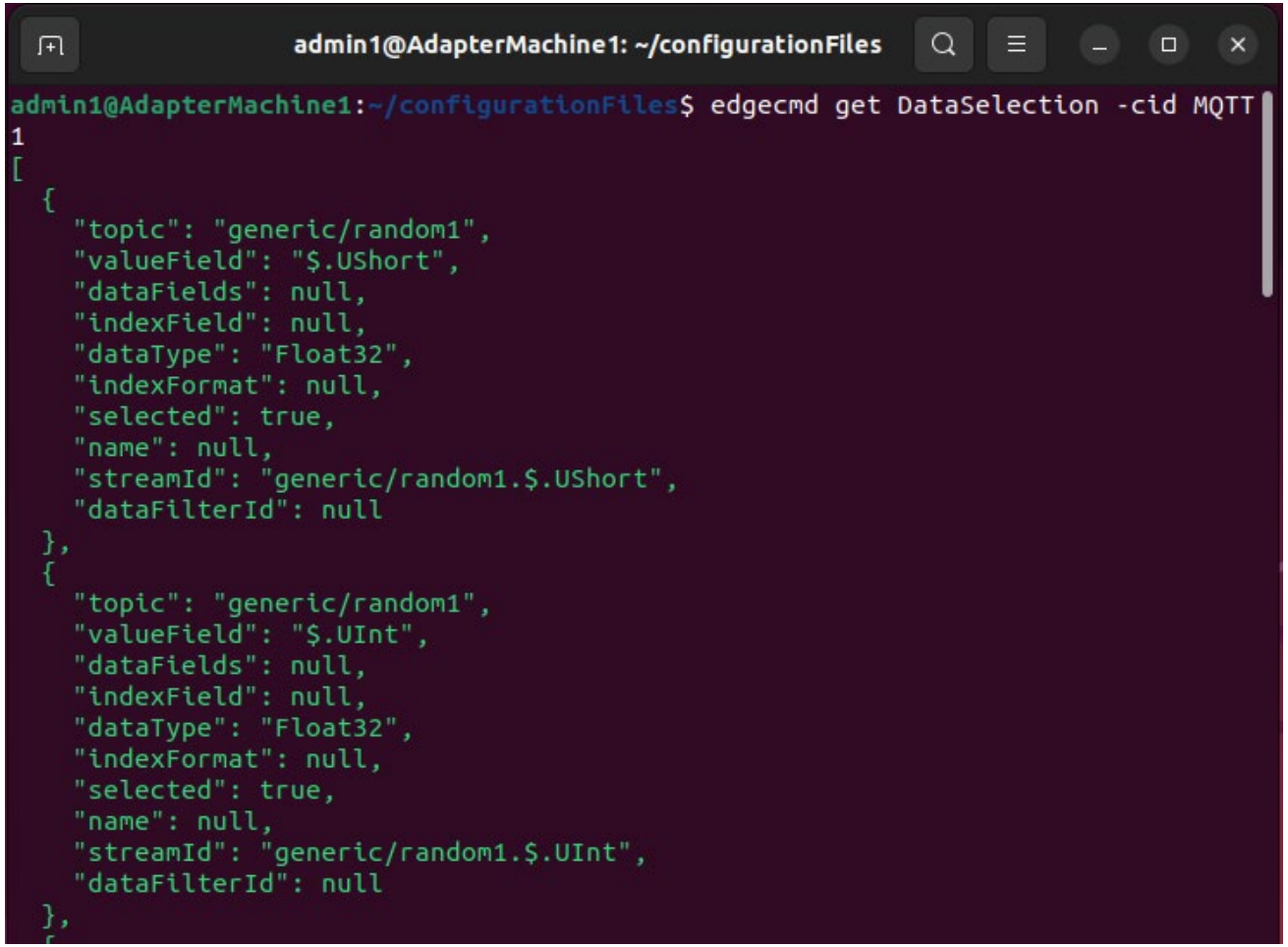
Check DataSelection Items

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd get DataSelection –cid MQTT1



Create and Apply OMF Egress Points

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

Egress.json:

```
[{
    “ID”: “PI Web API”,
    “Endpoint”: “https://demoserver:443/piwebapi/omf”,
    “UserName”: “administrator”,
    “Password”: “----”,
    “ValidateEndpointCertificate”: “false”
}]
```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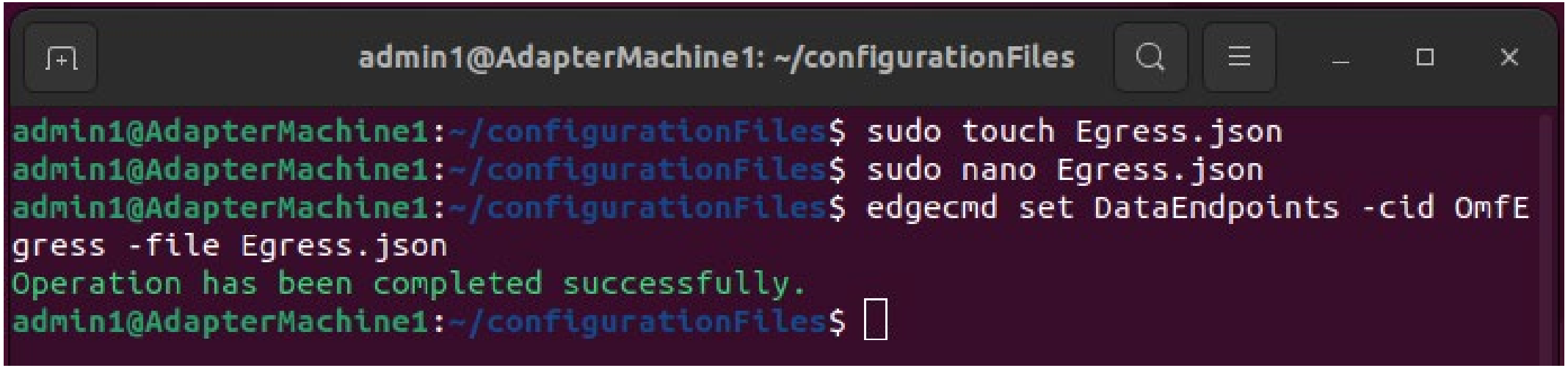
Create and Apply OMF Egress Points

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd set DataEndpoints –cid OmfEgress –file Egress.json



Create and Apply failover configuration

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

Failover.json:


```
{
    "FailoverGroupId": "AdapterDemoGroup",
    "Name": "Failover Group 1",
    "Description": "This demonstrates failover functionality",
    "FailoverTimeout": "0:00:20",
    "Mode": "Hot",
    "Endpoint": "https://demoserver:5495/api/v1/clientfailover",
    "UserName": "administrator",
    "Password": "-----",
    "ValidateEndpointCertificate": "false"
}
```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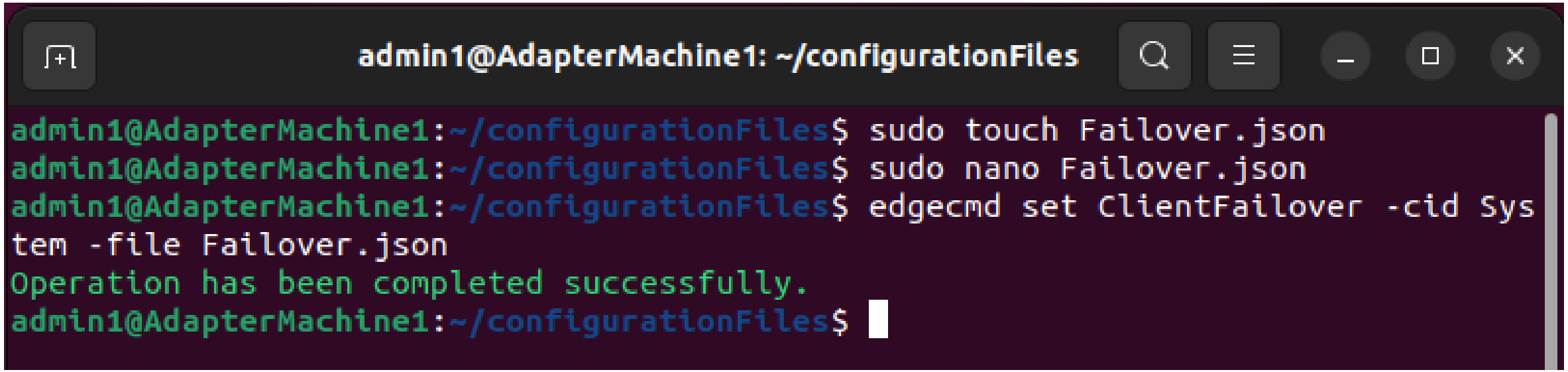
Create and Apply failover configuration

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

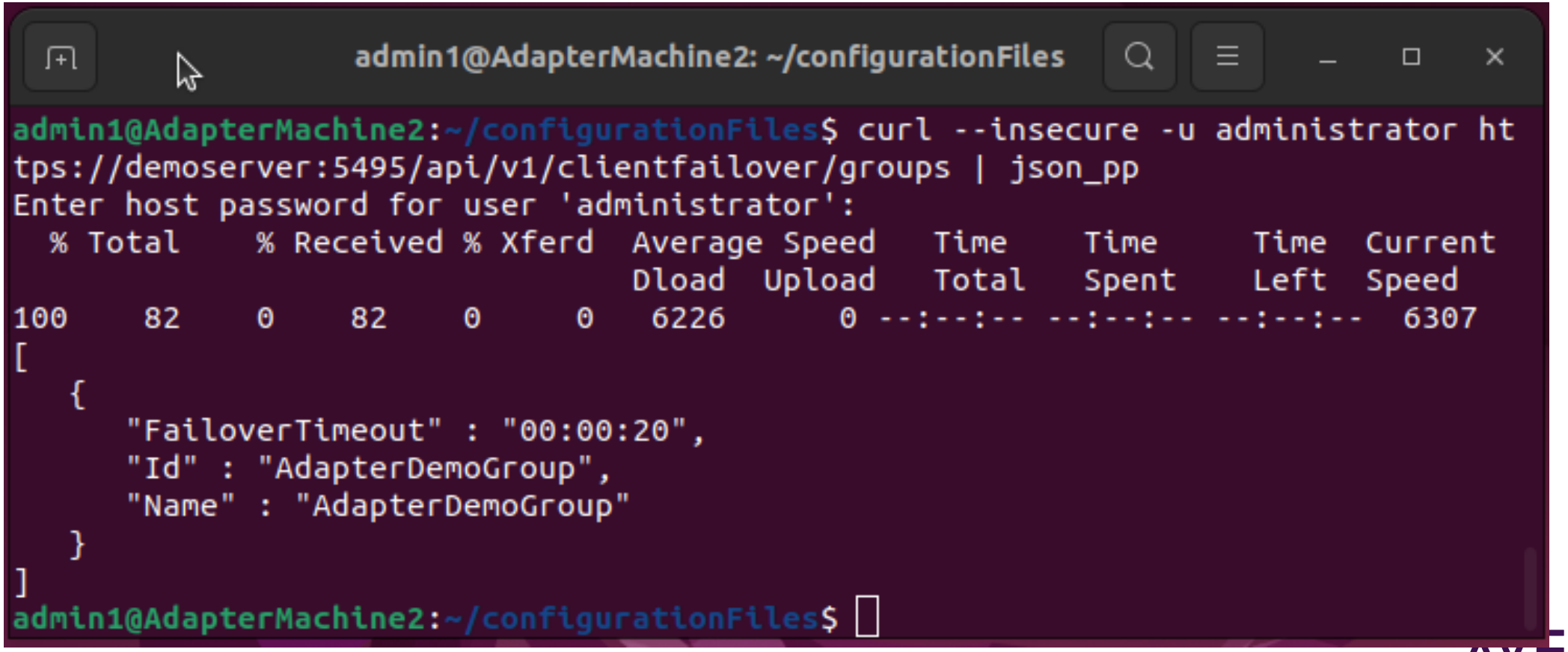
- edgecmd set ClientFailover –cid System –file Failover.json



Check Failover Status

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- Curl –u administrator https://demoserver:5495/api/v1/clientfailover/groups| json_pp



Check Failover Status

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- Curl –u administrator https://demoserver:5495/api/v1/clientfailover/groups/AdapterDemoGroup/ClientSessions | json_pp


```
[
   {
      "Heartbeat" : {
         "FailoverStatus" : 100,
         "HeartbeatTime" : "2022-09-30T17:07:44.42257Z",
         "LastDataProcessedTime" : "2022-09-30T15:36:56.3541028Z"
      },
      "Id" : "AdapterMachine2.MQTT",
      "Name" : "AdapterMachine2 MQTT",
      "Role" : "Secondary",
      "RoleOverride" : "Off"
   },
   {
      "Heartbeat" : {
         "FailoverStatus" : 100,
         "HeartbeatTime" : "2022-09-30T17:07:42.736952Z",
         "LastDataProcessedTime" : "2022-09-30T17:07:42.5268225Z"
      },
      "Id" : "AdapterMachine1.MQTT",
      "Name" : "AdapterMachine1 MQTT",
      "Role" : "Primary",
      "RoleOverride" : "Off"
   }
]
```

Configure Health endpoint

Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

Health.json

```
[{
    “Id”: “PI Web API Health | MQTT1 | AdapterMachine1”,
    “Endpoint”: “https://demoserver:443/piwebapi/omf”,
    “UserName”: “administrator”,
    “Password”: “------”,
    “ValidateEndpointCertificate”: “false”
}]
```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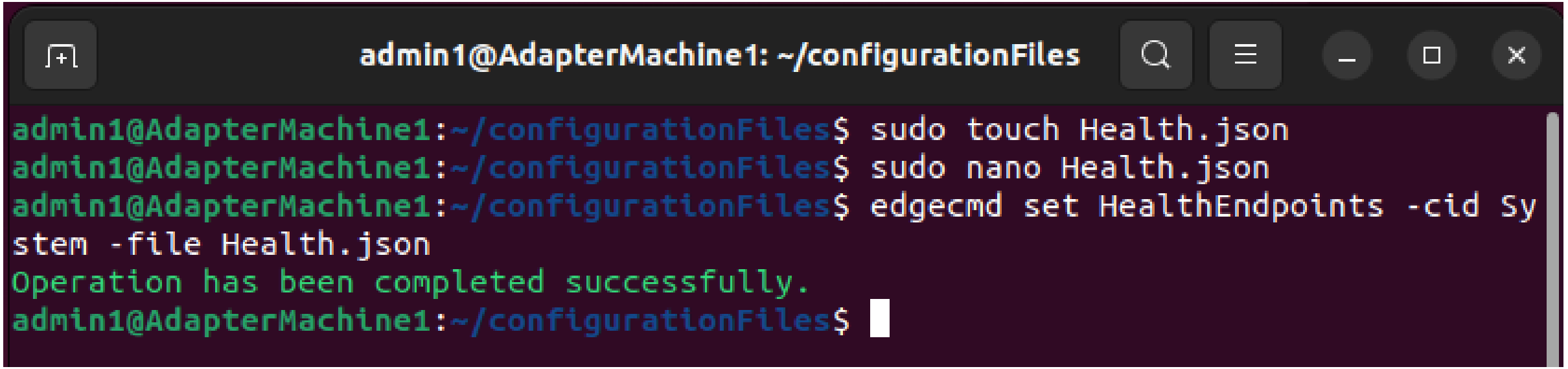
Configure Health endpoint

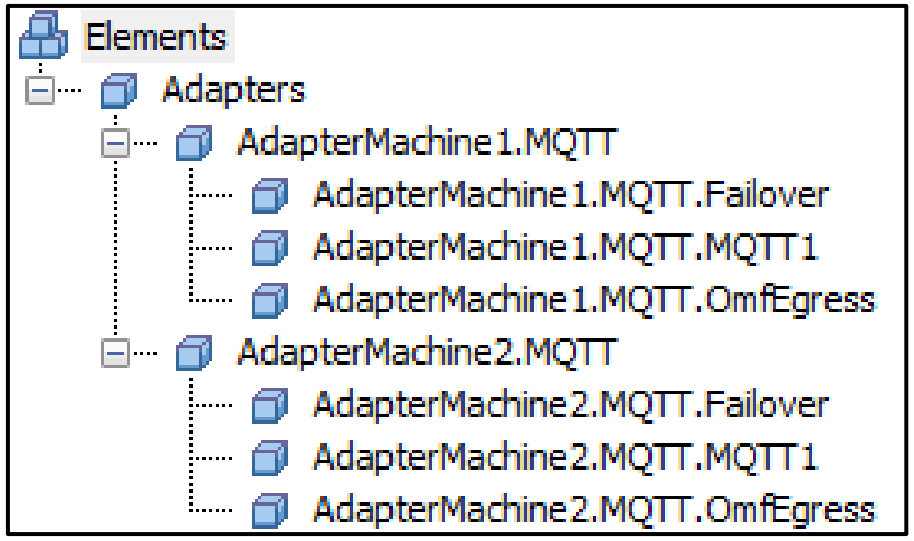
Installation | Data Source | Data Selection | OMF Egress | Failover | OMF Health

- edgecmd set HealthEndpoints –cid System –file Health.json



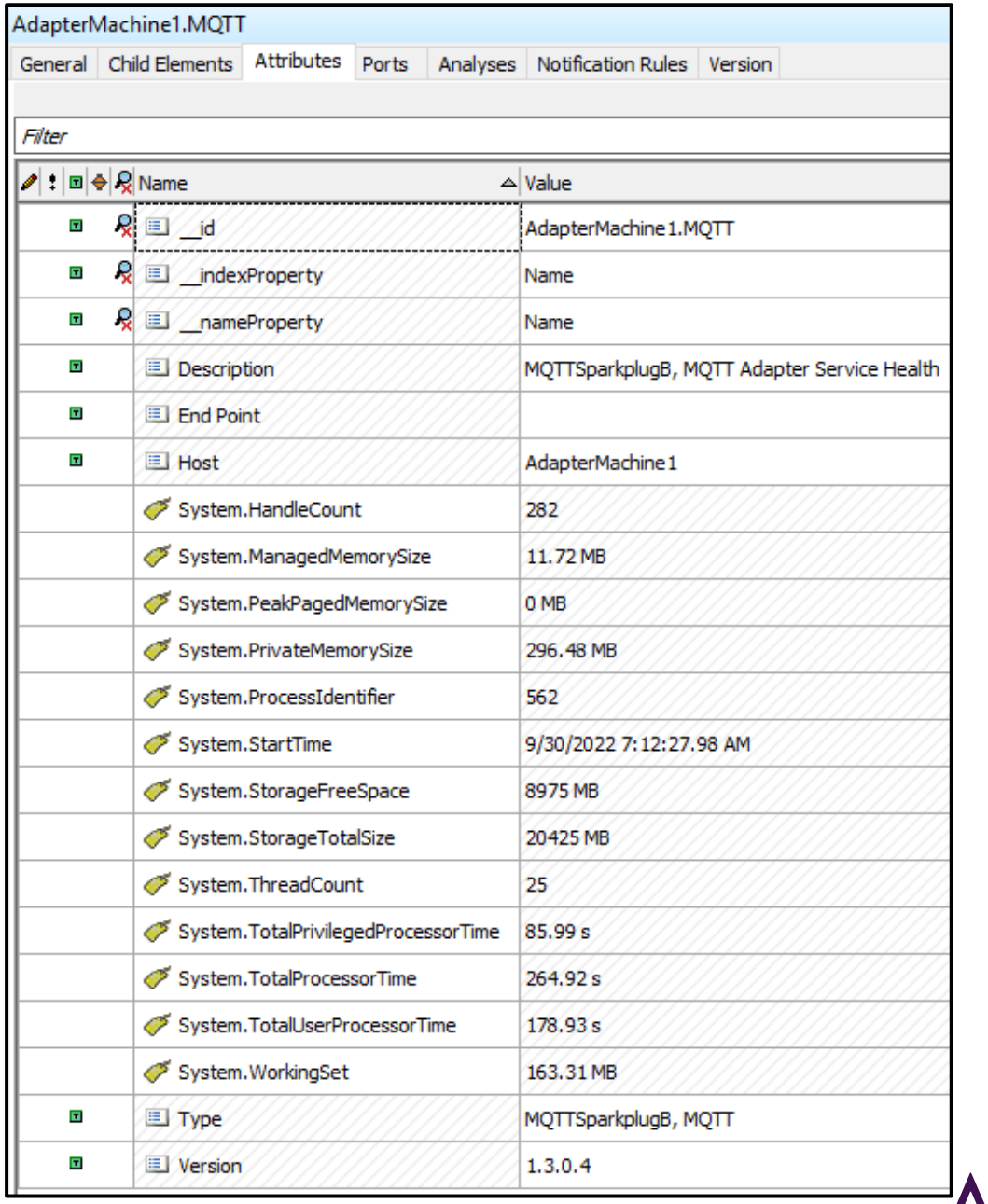
OMF Health Endpoint Element Hierarchy

Multiple elements created for each Adapter



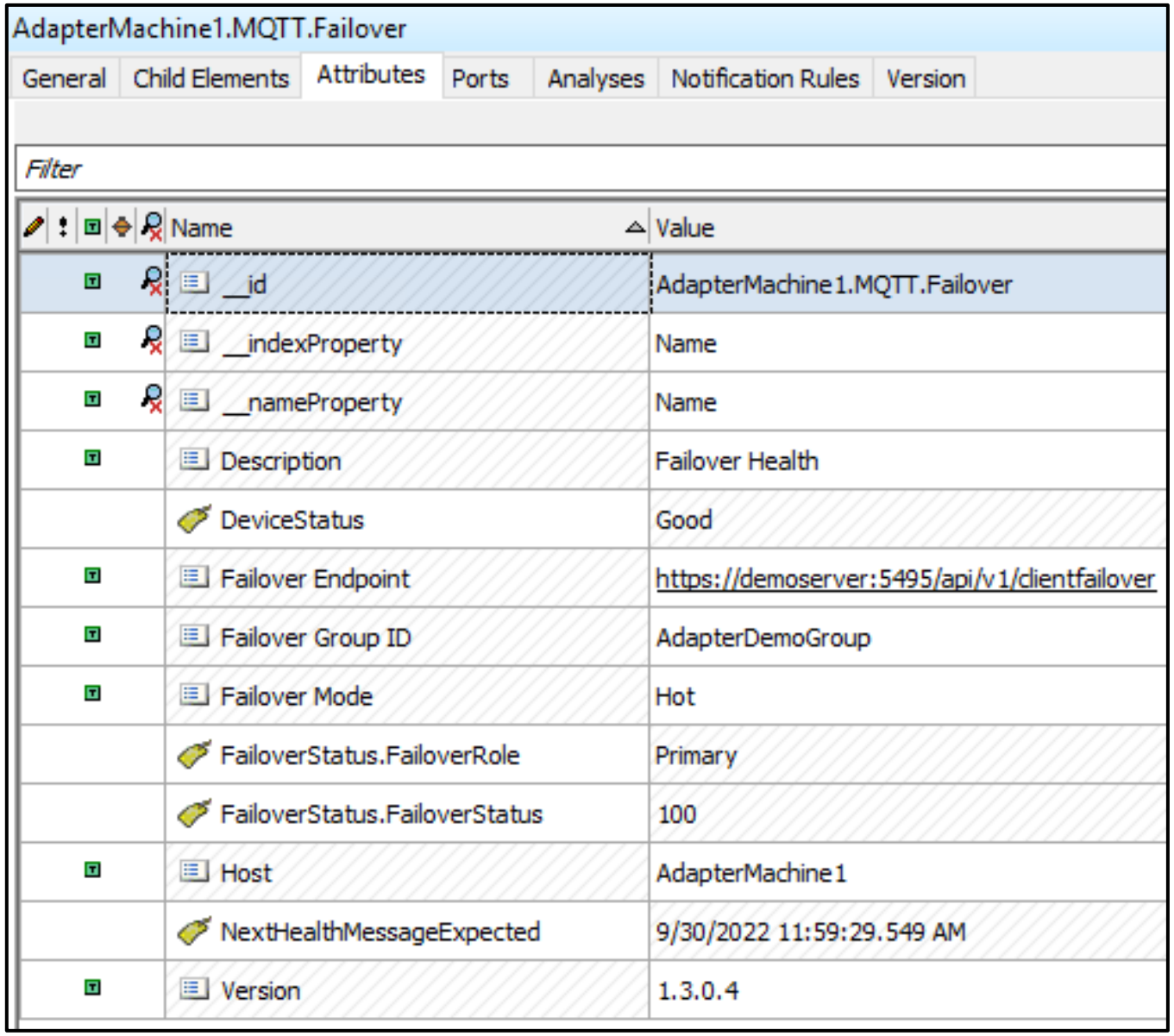
Adapter Machine and Type

AdapterMachine1.MQTT



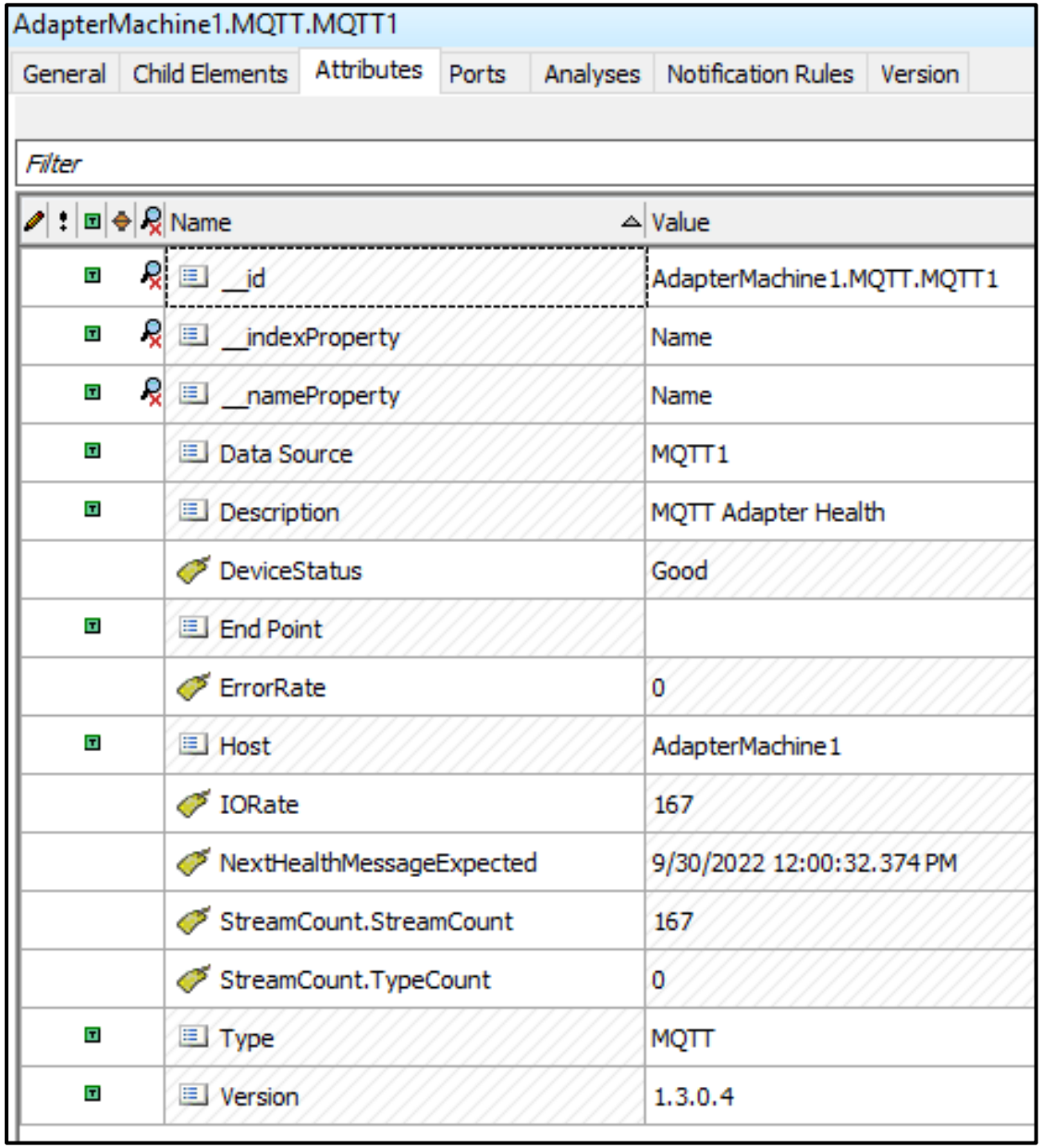
Failover Component

AdapterMachine1.MQTT.Failover



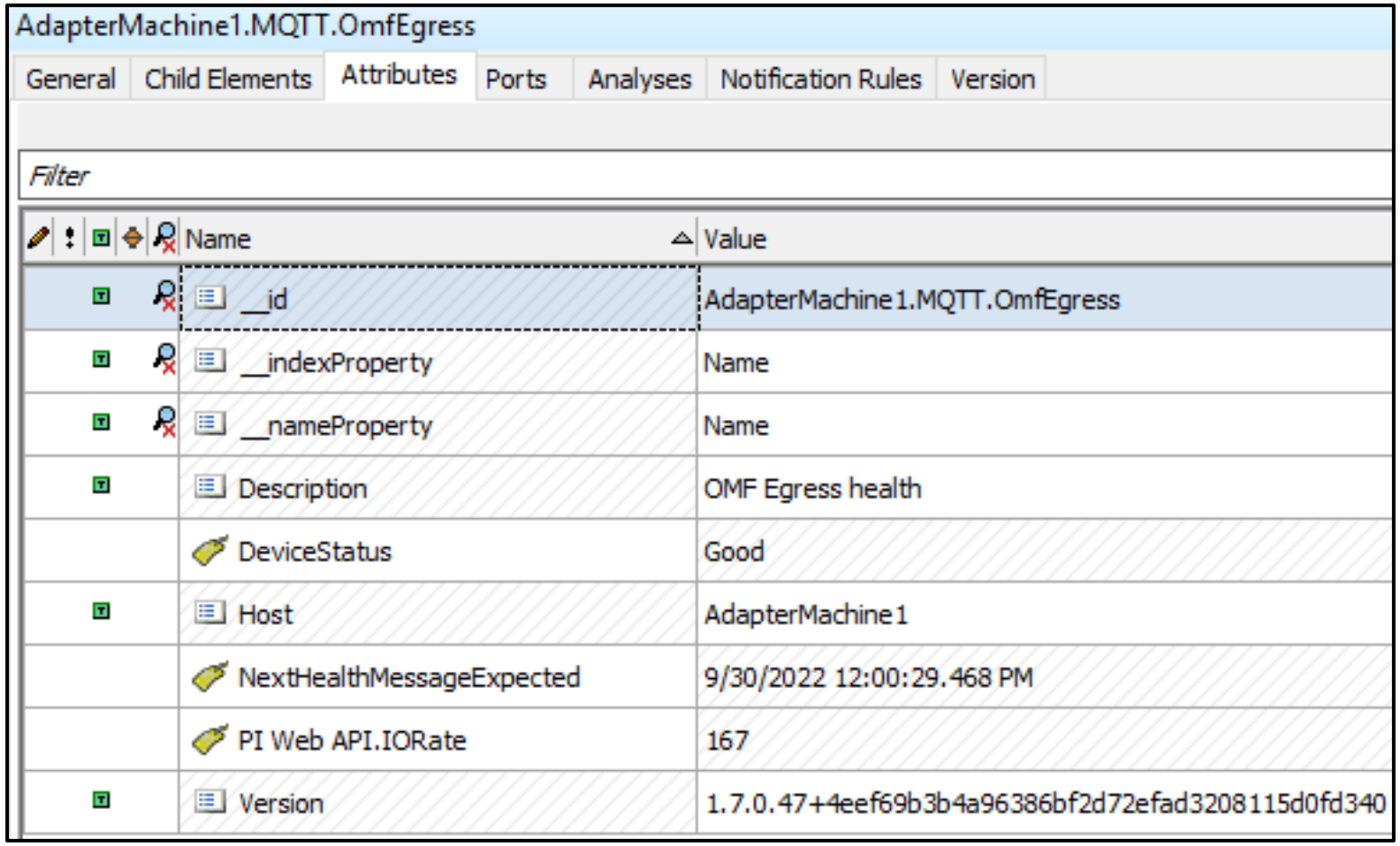
Individual MQTT Component

AdapterMachine1.MQTT.MQTT1



OMF Egress Component

AdapterMachine1.MQTT.OmfEgress



Helpful commands

- edgecmd set Logging –cid System –logLevel trace
- Curl example:
  - curl -d "@Failover.json" -H "Content-Type: application/json" -X PUT "http://localhost:5590/api/v1/configuration/System/ClientFailover"

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