

NOVEMBER 2022

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# Harnessing the power of the Sequential Data Store and the Assets Store in AVEVA™ Data Hub

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**AVEVA**

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# Agenda

Introduction

AVEVA Data Hub – Real time sensors data

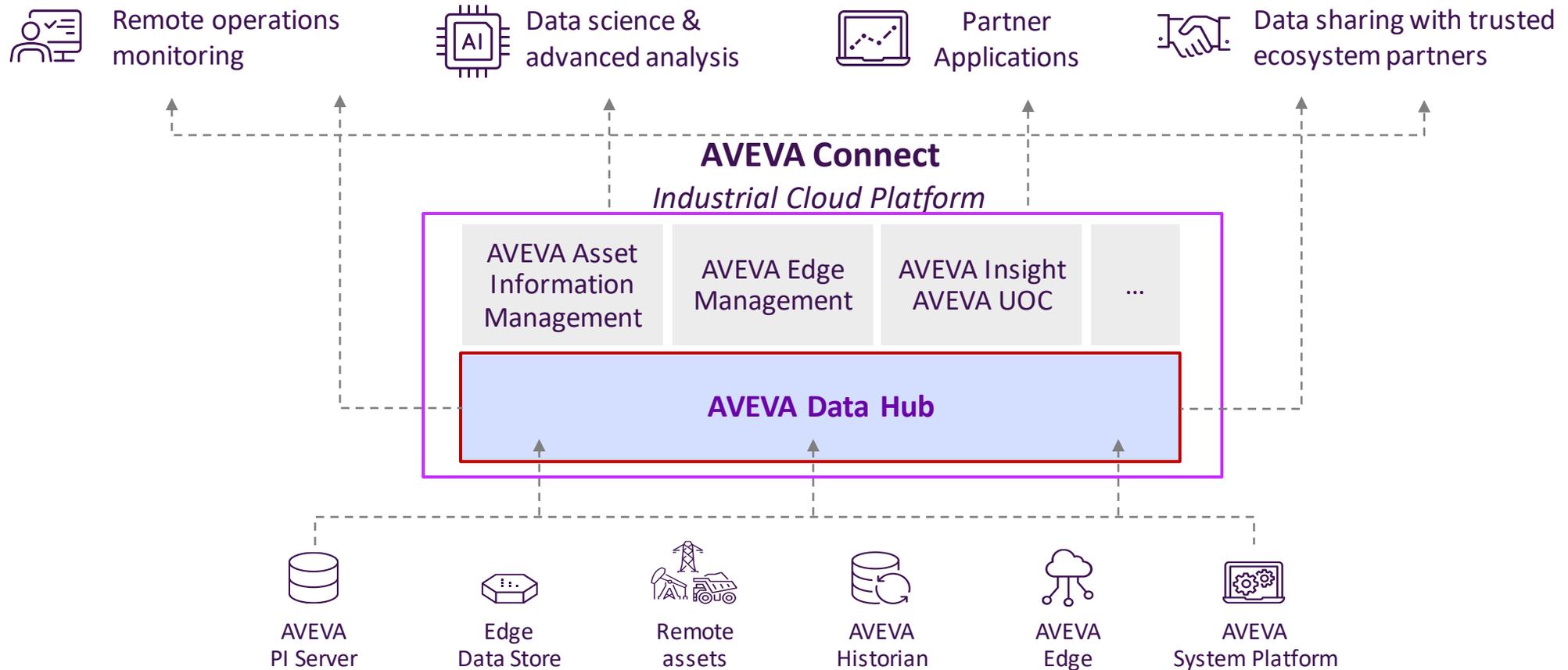
AVEVA Data Hub – Assets and Contextualization

End-to-end, real-life scenario and demo

Conclusion

# The Power of AVEVA™ Connect

AVEVA Connect enables a hybrid data architecture through cloud offerings





# AVEVA Data Hub – Common features

## High Availability/Resiliency

- Guaranteed 99.9% uptime

## Global Deployment

- North Europe
- West US
- West Australia

## Disaster Recovery Plan

- Recovery Point Objective – 24 hours
- Recovery Time Objective – 24 hours

## Zero maintenance

- Managed by AVEVA

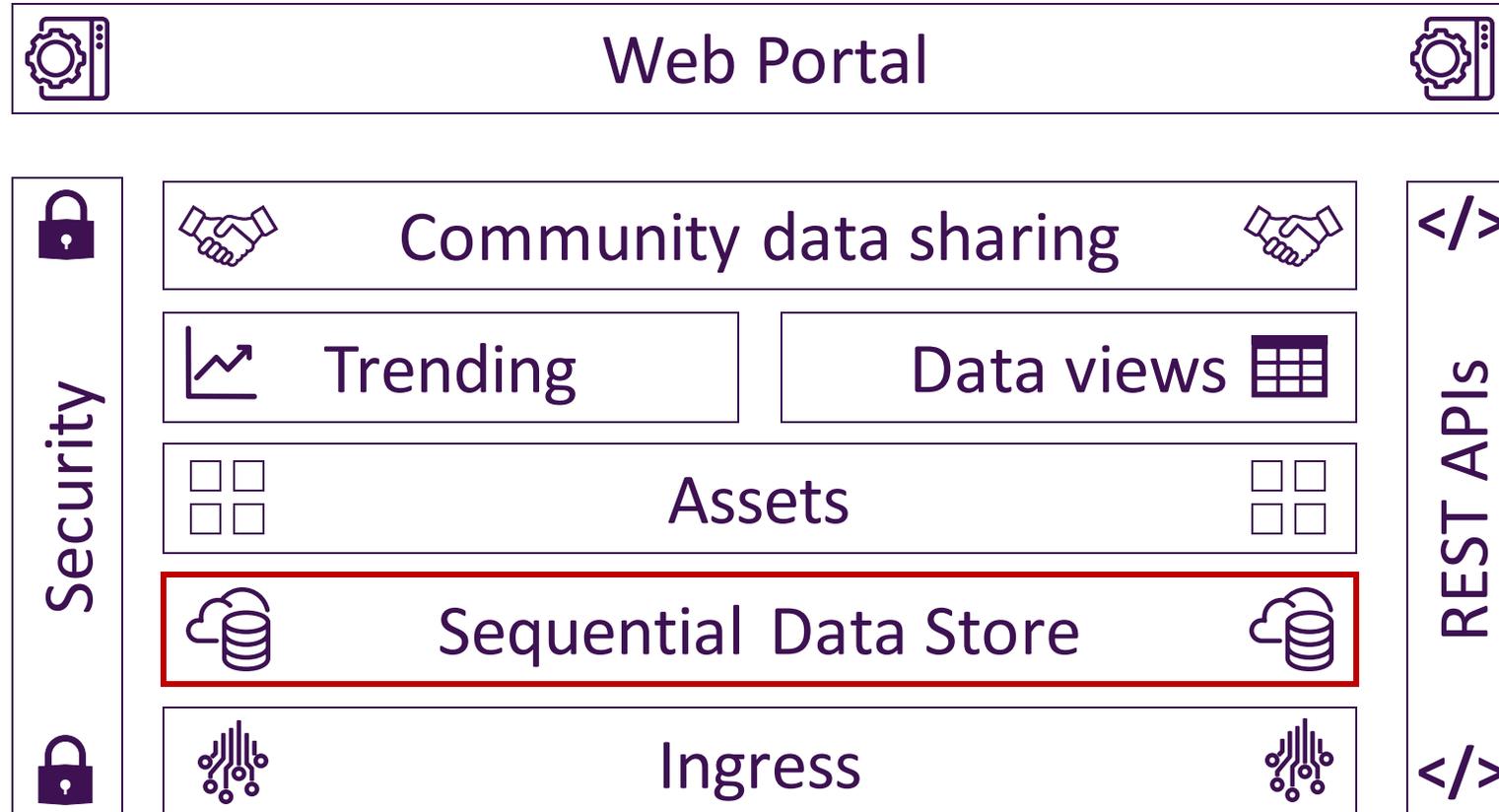
## License Elasticity

- Scale as you go, up and down

## Accessibility

- Modern REST APIs
- Secure by design

# AVEVA Data Hub Capabilities



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# What is AVEVA Data Hub Sequential Data Store (SDS)?



# The Specificity of Sequential / Time series Databases



Evenly Spaced



Variably Spaced



Out of Order



Variable Size



Variable "Quality"

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# Sequential Data Store – Design Improvements

Lossless compression

Timestamping

- Resolution to nanoseconds
- Native support for future (and pre-1970) timestamps

Unity Of Measurements (UOMs)

Context information

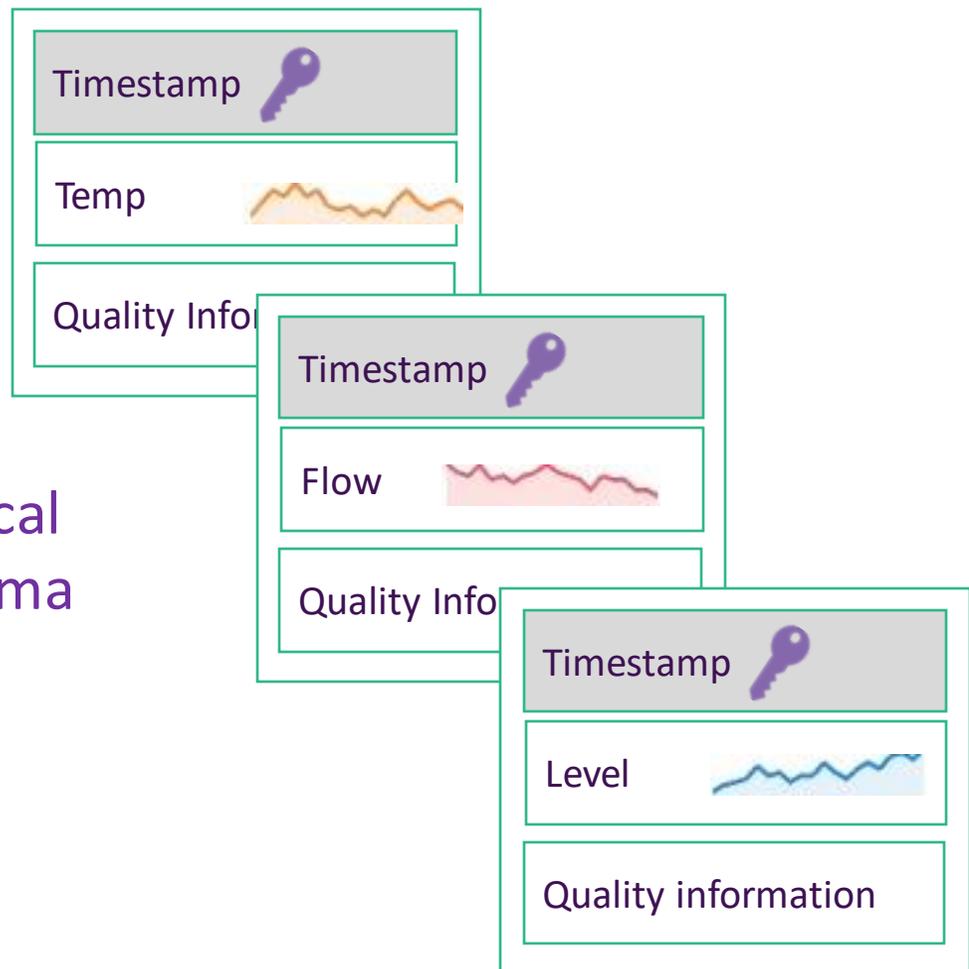
- Stream Tag – free text
- Stream Metadata – Key:Value Pairs
- Stream metadata rules

Complex, custom Stream Types

Secondary and compound indices

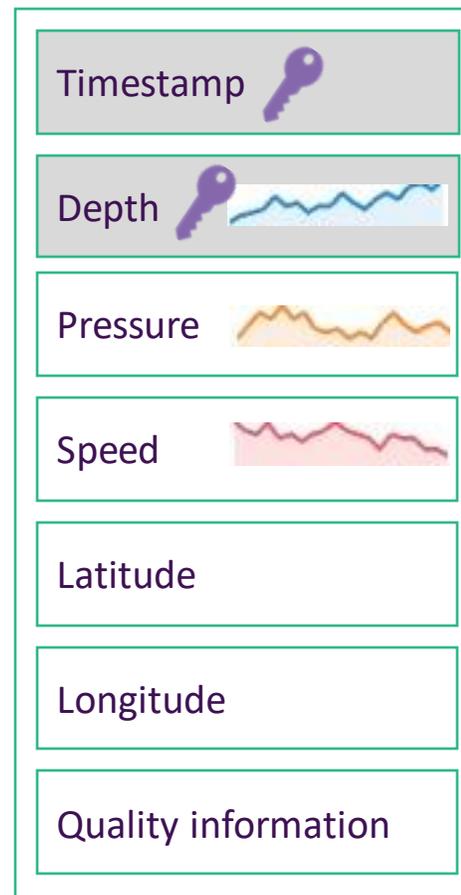
# Flexible Sequential Data Store that keeps related data together

Typical  
Schema



POINTS/TAGS PROPERTIES

SDS  
Schema



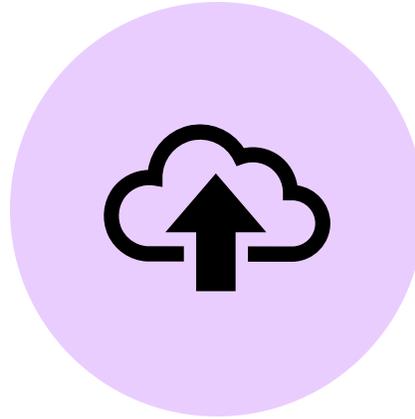
STREAM PROPERTIES

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# Most Common Sequential Data Store Stream Types



PI TO AVEVA DATA HUB



AVEVA PI ADAPTERS



AVEVA SYSTEM PLATFORM  
2023

# Streaming data - demo

- SDS types
  - PI type
  - Weather Station type
- SDS Stream
  - Stream examples
  - Stream Tags
  - Stream [Key:Value] pairs
- Stream Metadata rule

**PI Float32**

Types are read only and cannot be edited.

<b>Id</b>	<b>Name</b>	
PI-Float32	PI Float32	
<b>Description</b>	<b>Base Type</b>	
Represents a PI Data Archive float32 point type.		
<b>Properties (7)</b>		
<b>Key Id</b>	<b>Name</b>	<b>Type</b>
<input checked="" type="checkbox"/> Timestamp	Timestamp	DateTime
<input type="checkbox"/> Value	Value	NullableSingle
<input type="checkbox"/> IsQuestionable	IsQuestionable	Boolean
<input type="checkbox"/> IsSubstituted	IsSubstituted	Boolean
<input type="checkbox"/> IsAnnotated	IsAnnotated	Boolean
<input type="checkbox"/> SystemStateCode	SystemStateCode	NullableInt32
<input type="checkbox"/> DigitalStateName	DigitalStateName	String

# Streaming data - demo

- SDS types
  - PI type
  - Weather Station type
- SDS Stream
  - Stream examples
  - Stream Tags
  - Stream [Key:Value] pairs
- Stream Metadata rule

### WeatherData

Types are read only and cannot be edited.

<b>Id</b>	<b>Name</b>
WeatherData-v1	WeatherData
<b>Description</b>	<b>Base Type</b>

**Properties (21)**

Key Id	Name	Type	UOM
<input checked="" type="checkbox"/> TimeStamp	TimeStamp	DateTime	
<input type="checkbox"/> WindDirection	WindDirection	Double	degree
<input type="checkbox"/> WindSpeed	WindSpeed	Double	mile per hour
<input type="checkbox"/> WindGust	WindGust	Double	mile per hour
<input type="checkbox"/> MaxDailyGust	MaxDailyGust	Double	mile per hour
<input type="checkbox"/> Temperature	Temperature	Double	degree Fahrenheit
<input type="checkbox"/> HourlyRain	HourlyRain	Double	inch
<input type="checkbox"/> DailyRain	DailyRain	Double	inch

# Streaming data - demo

- SDS type
  - PI type
  - Weather Station type
- SDS Stream
  - Stream examples
  - Stream Tags
  - Stream [Key:Value] pairs
- Stream Metadata rule



# Streaming data - demo

- SDS type
  - PI type
  - Weather Station type
- SDS Stream
  - Stream examples
  - Stream Tags
  - Stream [Key:Value] pairs
- Stream Metadata rule

The screenshot shows a web interface for "Scottsdale Weather Station". It has three tabs: "Details", "Metadata and Tags" (which is active), and "Sharing". Under "Stream Tags", there are three tags: "Chad", "Demo", and "Weather". Below that is a "Stream Metadata" section with a table:

Metadata	Value	
City	Cave Creek	i
Country	US	i
State	Arizona	i

# Streaming data - demo

- SDS type
  - PI type
  - Weather Station type
- SDS Stream
  - Stream examples
  - Stream Tags
  - Stream [Key:Value] pairs
- Stream Metadata rule

The screenshot displays a configuration window for a metadata rule. At the top, a header bar shows a green checkmark and the text "{Location} Weather Station". Below this, the text "Berkeley Weather Station" is displayed with a blue minus sign above "Berkeley" and a blue plus sign above "Weather". Underneath, there are two rows of configuration options:

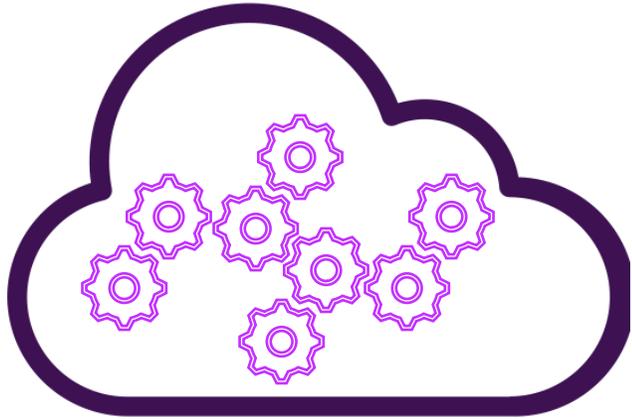
"Berkeley"	Metadata	Location
"Weather Station"	String Literal	

The "Metadata" dropdown is selected, and the "Location" text is entered in the adjacent input field. An information icon (i) is visible to the right of the input field.

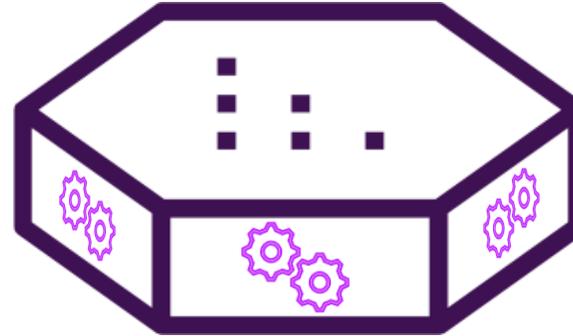
# Common technology and developer platform

Sequential Data Store – Edge to Cloud

## AVEVA Data Hub



## AVEVA Edge Data Store



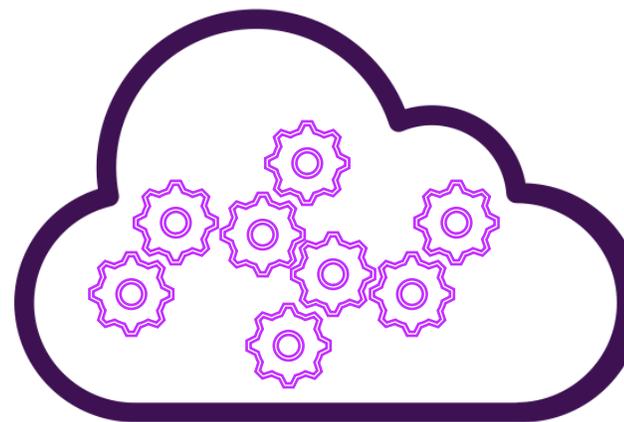
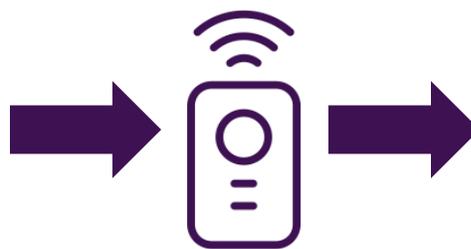
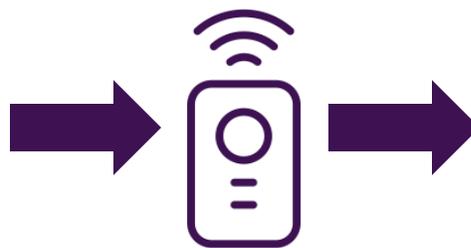
Common data storage technology

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# Customer Examples

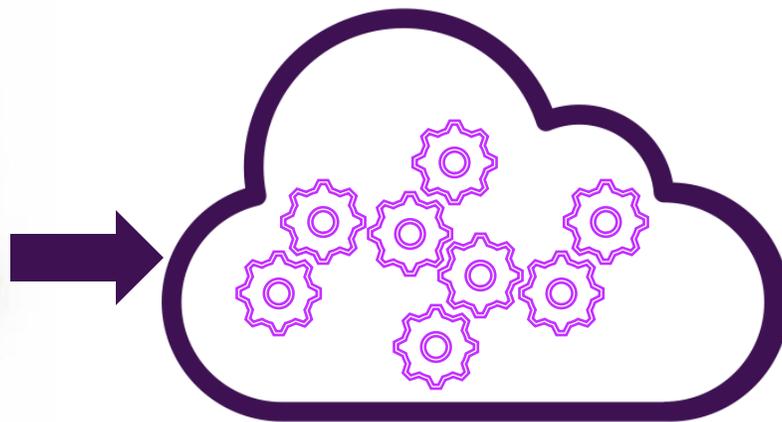


# Cobre Panama

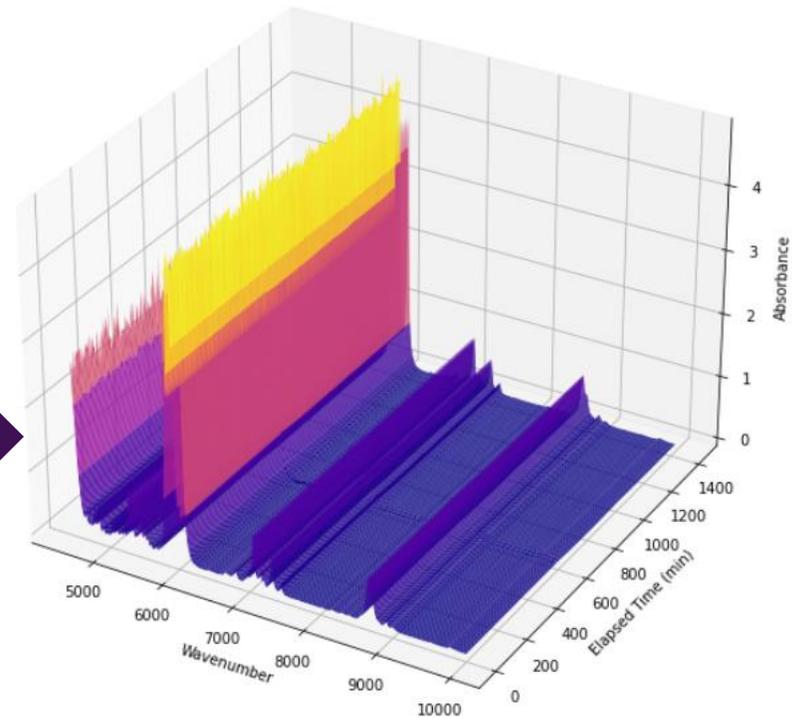


AVEVA Data Hub

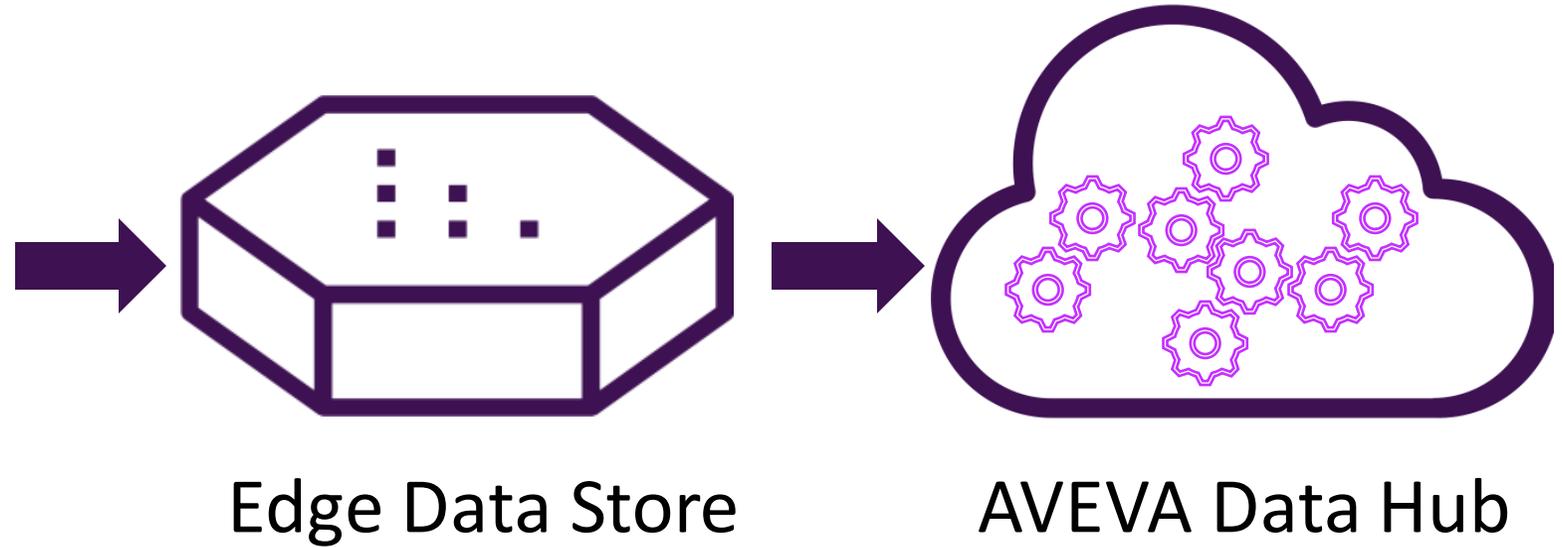
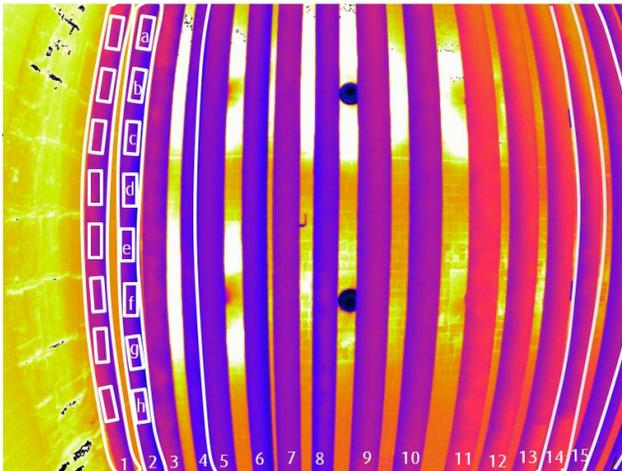
Lonza



AVEVA Data Hub



# Linde

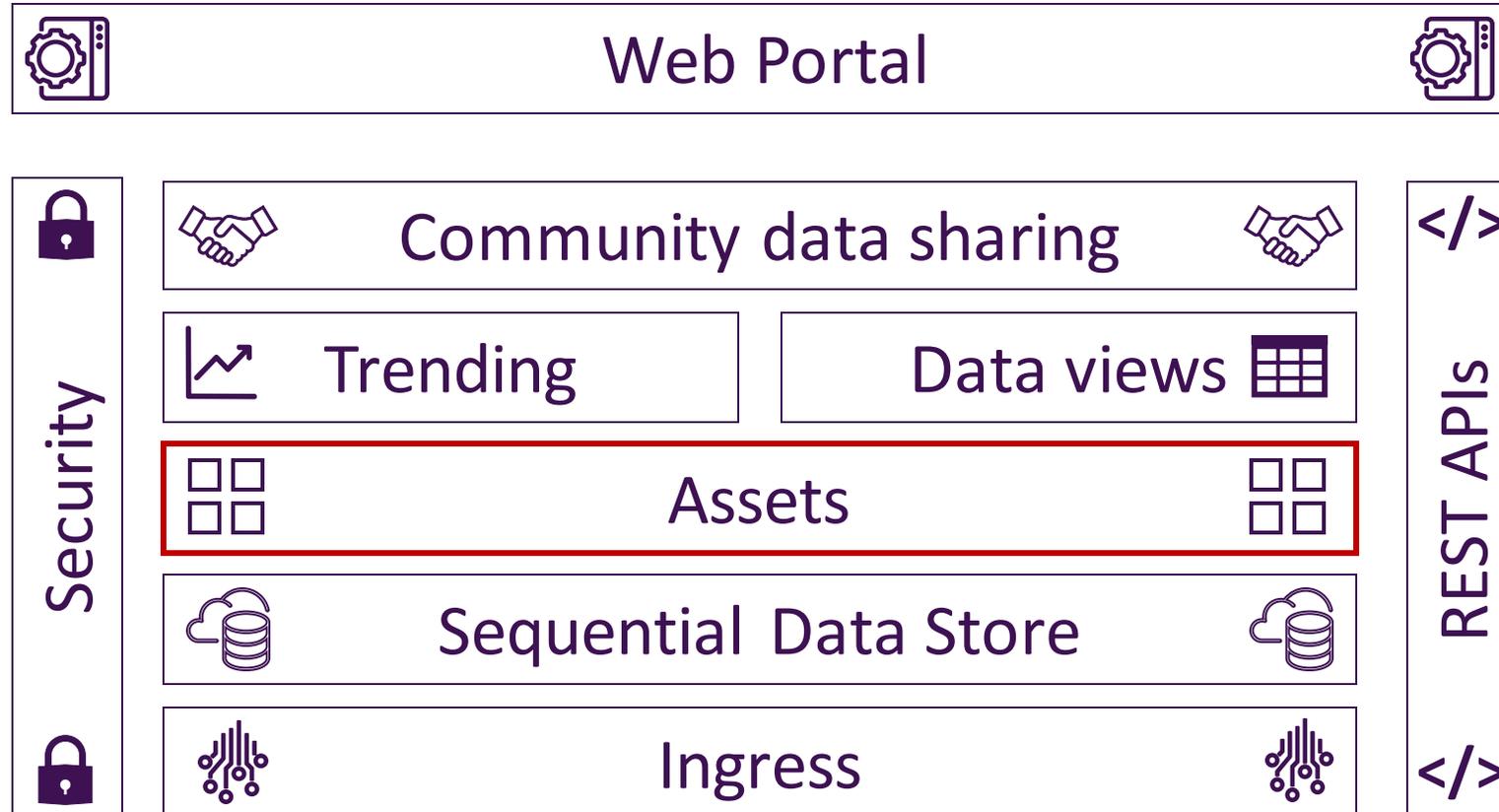


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# What is AVEVA Data Hub Assets Store?



# AVEVA Data Hub Capabilities



# Assets provide context to data streams

- Static metadata
  - (Region: North America, Wind farm: Big Buffalo Wind Farm, Asset Type: GE Wind Turbine, Manufacturer: Truvalle, Model: T95-2MW, ...)
- Stream reference properties
  - (Active power, expected power, operating state, etc.)
- Asset status
  - (stream property values mapped to status: good, warning, bad)

GE Wind Turbine		
A wind turbine!		
Metadata	Properties	Status
Metadata	Value	UOM
Altitude	1,000	m
Gearbox Serial Number	4800000-0000-0	
Latitude	44.563149	°
Longitude		

GE Wind Turbine	
A wind turbine!	
Metadata	Status
Property	UOM
EAFF MTD	
Revenue - Weekly	
Energy Production - Hourly	
Wind Speed - 10 min rolling avg	
Revenue - Monthly	

# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules

AE04 

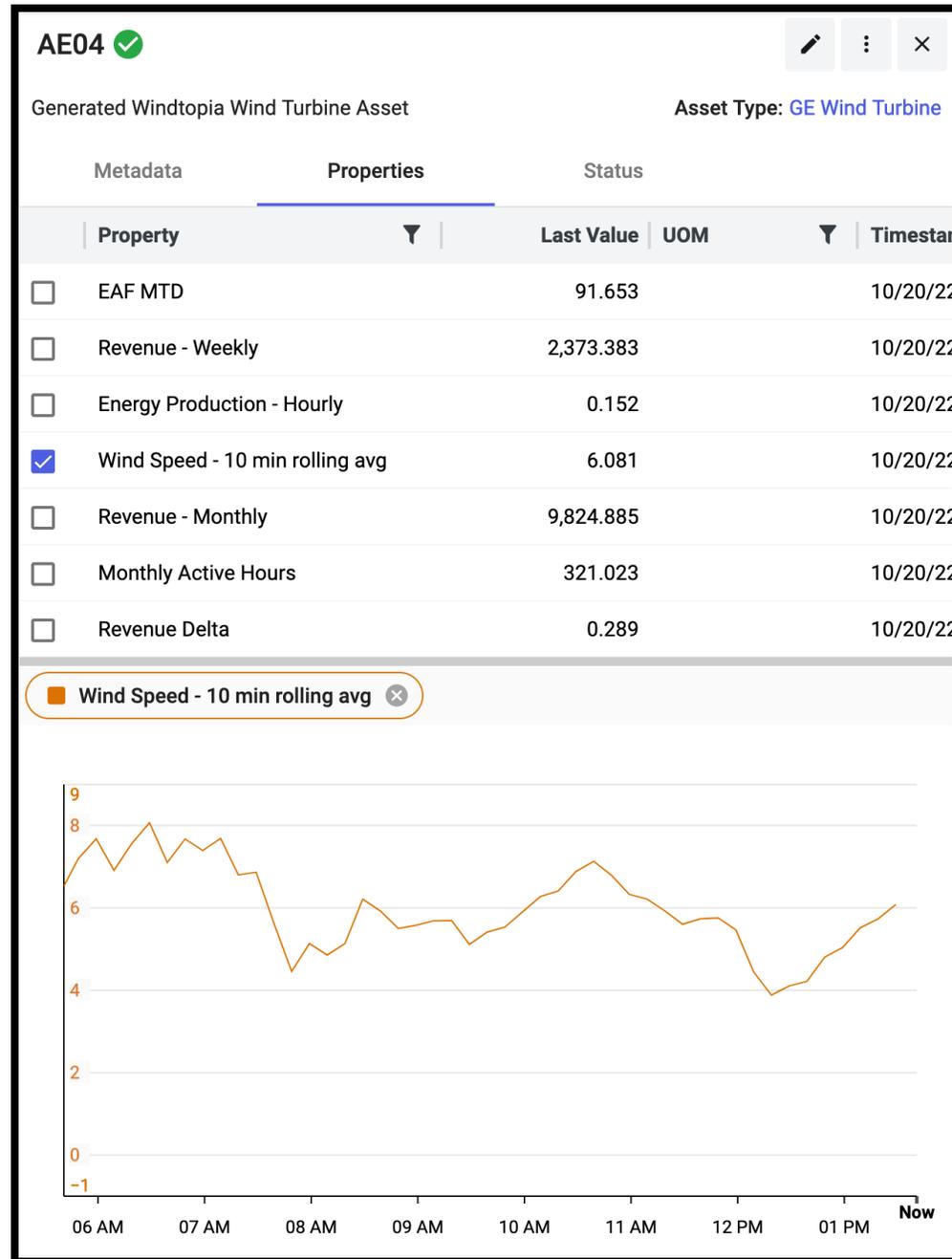
Generated Windtopia Wind Turbine Asset Asset Type: [GE Wind Turbine](#)

Metadata Properties Status

Metadata	Value	UOM
Altitude	1,000	m
Gearbox Serial Number	4800000-0000-0	
Latitude	44.546569	°
Longitude	-109.240934	°
Manufacturer	Truvalle	
Model	T95-2MW	
Overheating delta limit	8	°C
Power Rated	1,500	kW
Region	NA	
Serial Number	M000000	
Turbine Count	1	
Type	Wind Turbine	
Wind Farm	Big Buffalo Wind Farm	

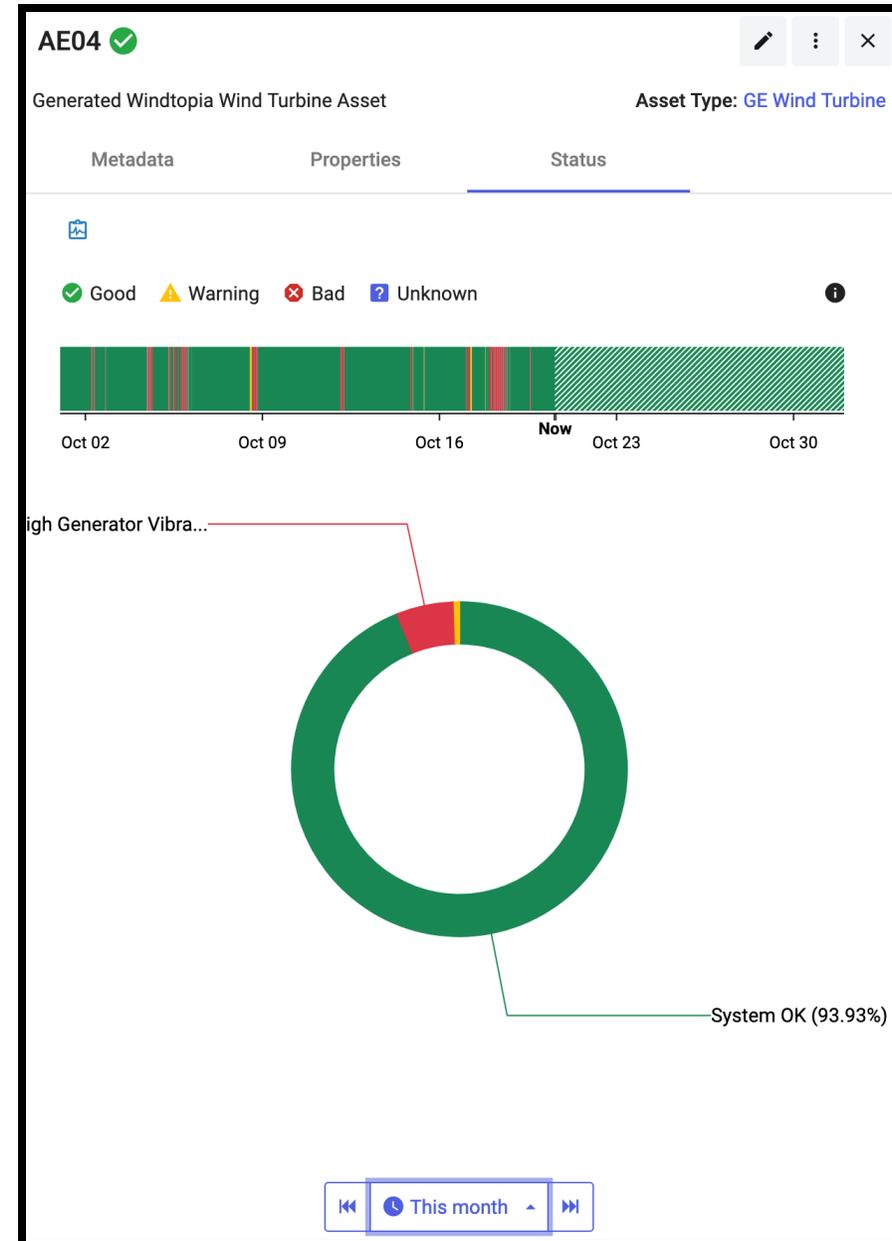
# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules



# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules



# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules

**AE04** ✓

Generated Windtopia Wind Turbine Asset Asset Type: [GE Wind Turbine](#)

Metadata Properties **Status**

Legend: ✓ Good ⚠ Warning ✗ Bad ? Unknown

Timeline: Oct 16, Now, Oct 23, Oct 30

Donut Chart: System OK (93.93%)

### Property Configuration

Auto Stop Reason | Value 📄

### Value Mappings

Value	Status
System OK	✓
Gear Box Vibration	✗
Pitch Motor	⚠
High Gear Box Vibration	✗
High Generator Vibration	✗

Navigation: ⏪ This month ⏩

# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules

### GE Wind Turbine Cancel

Asset Type

Id

Description

Metadata **Properties** Status

#### Stream Type References

<input type="text" value="EAF MTD"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Revenue - Weekly"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Energy Production - Hourly"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Wind Speed - 10 min rolling avg"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Revenue - Monthly"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Monthly Active Hours"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Revenue Delta"/>	<input type="button" value="🗑"/>	▼
<input type="text" value="Energy Production - Previous Day"/>	<input type="button" value="🗑"/>	▼

# Data Hub Assets - demo

- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Asset types
- Searching for Assets
- Asset rules

The screenshot displays the 'Assets' section of a software interface. At the top, there is a search bar labeled 'Search for Assets' with a magnifying glass icon. Below the search bar, a blue button with a funnel icon is visible. The main area is divided into two columns. The left column, titled 'Filter facets', contains several sections: 'Status' with checkboxes for 'Good' (green checkmark), 'Warning' (yellow triangle), 'Bad' (red X), and 'Unknown' (blue question mark); 'Asset Type' with a dropdown arrow; and three more dropdown menus labeled '\_\_\_ParentId' and '\_\_\_ParentName'. Below these are checkboxes for various asset types: 'Devices', 'Building', 'Big Buffalo Wind Farm', 'Black Mesa Wind Farm', 'Black Wolf Wind Farm', 'AC Units', 'SLTC Energy', 'Windtopia' (which is checked), 'Heating', and 'Floor\_1'. At the bottom of the filter facets are two buttons: 'Clear All' and 'Show More'. The right column shows two asset cards: 'Big Buffalo Wind Farm' and 'Black Mesa Wind Farm'. A tab labeled 'Windtopia' with a close icon is positioned above these cards.

# Data Hub Assets - demo

- Asset types
- Assets
  - Metadata
  - Properties
  - Trend
  - Status
- Searching for Assets
- Asset rules

Stream Name

SL.Pump.1.ActivePower

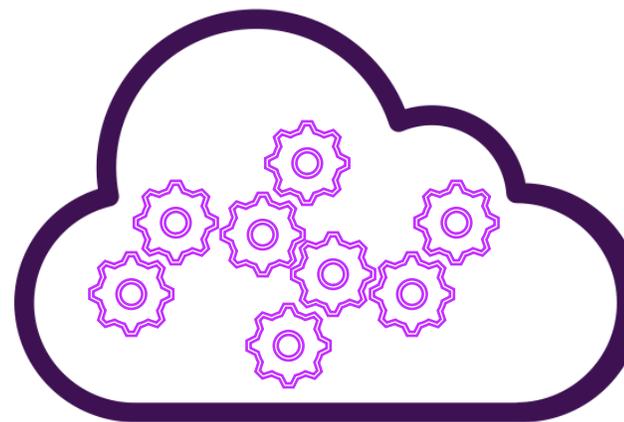
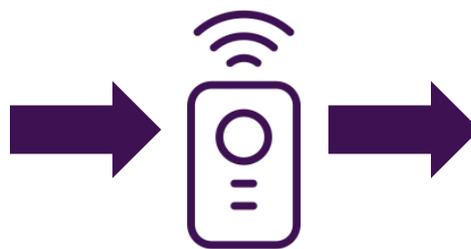
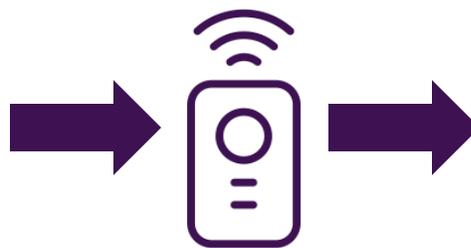
1. Match <b>letters preceding the delimiter "."</b>	{Site} - SL
2. Match <b>the delimiter "."</b>	
3. Match <b>letters preceding the delimiter "."</b>	{Equipment} - Pump
4. Match <b>the delimiter "."</b>	
5. Match <b>numbers preceding the delimiter "."</b>	{Id} - 1
6. Match <b>the delimiter "."</b>	
7. Match <b>the next group of letters</b>	{Measurement} - ActivePower

---

# Customer Examples

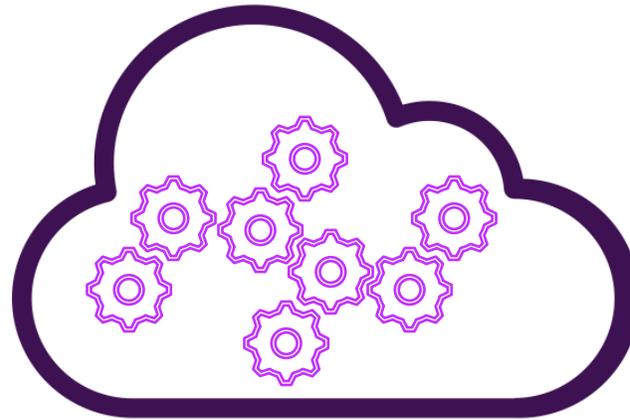


# Cobre Panama

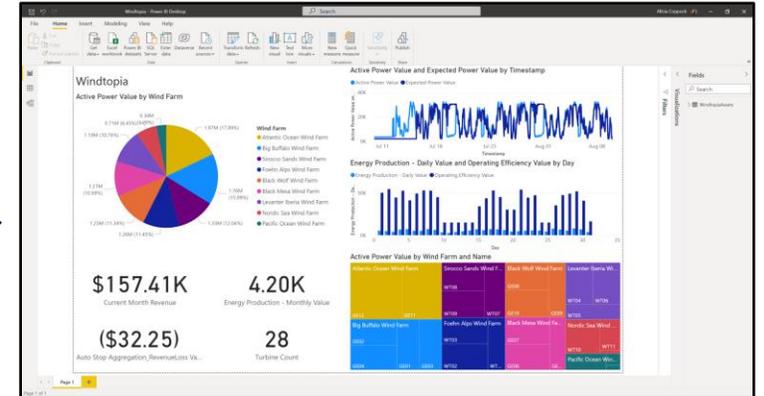


AVEVA Data Hub

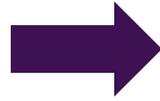
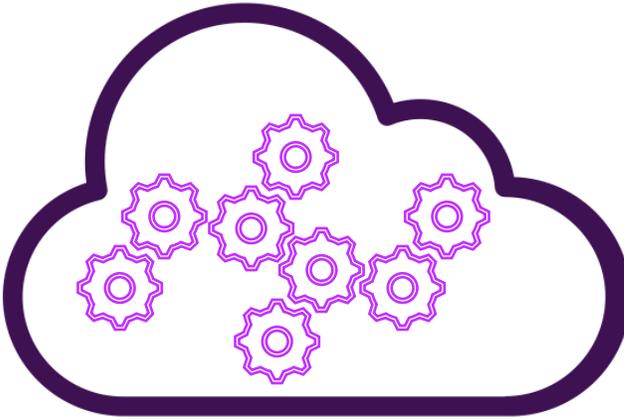
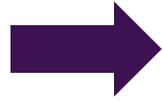
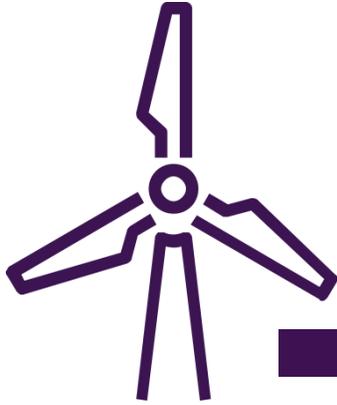
# California Water Service



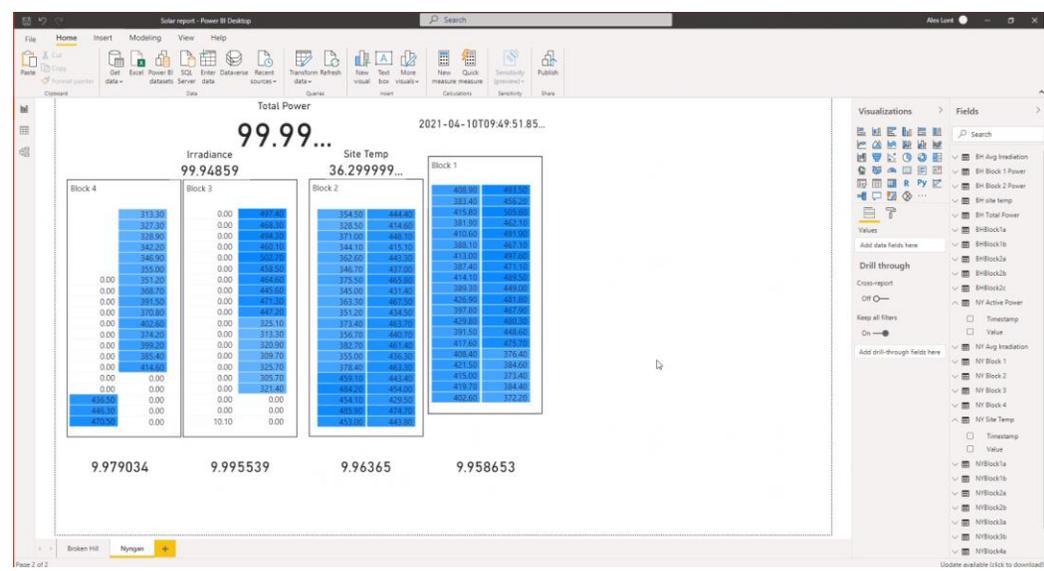
AVEVA Data Hub



AGL



AVEVA Data Hub



OSIsoft Cloud Services · Asset Explorer

AGL\_Prod ▾ Assets ▾

Search for Assets

+ Add Asset

Broken_Hill Broken_Hill	STWF_T001 STWF T001	STWF_T002 STWF T002	STWF_T003 STWF T003	STWF_T004 STWF T004	STWF_T005 STWF T005	STWF_T006 STWF T006
STWF_T007 STWF T007	STWF_T008 STWF T008	STWF_T009 STWF T009	STWF_T010 STWF T010	STWF_T011 STWF T011	STWF_T012 STWF T012	STWF_T013 STWF T013
STWF_T014 STWF T014	STWF_T015 STWF T015	STWF_T016 STWF T016	STWF_T017 STWF T017	STWF_T018 STWF T018	STWF_T019 STWF T019	STWF_T020 STWF T020
STWF_T021 STWF T021	STWF_T022 STWF T022	STWF_T023 STWF T023	STWF_T024 STWF T024	STWF_T025 STWF T025	STWF_T026 STWF T026	STWF_T027 STWF T027
STWF_T028 STWF T028	STWF_T029 STWF T029	STWF_T030 STWF T030	STWF_T031 STWF T031	STWF_T032 STWF T032	STWF_T033 STWF T033	STWF_T034 STWF T034
STWF_T035 STWF T035	STWF_T036 STWF T036	STWF_T037 STWF T037	STWF_T038 STWF T038	STWF_T039 STWF T039	STWF_T040 STWF T040	STWF_T041 STWF T041
STWF_T042 STWF T042	STWF_T043 STWF T043	STWF_T044 STWF T044	STWF_T045 STWF T045	STWF_T046 STWF T046	STWF_T047 STWF T047	STWF_T048 STWF T048
STWF_T049 STWF T049						

Showing 1 - 50 of 59

Items per page: 50

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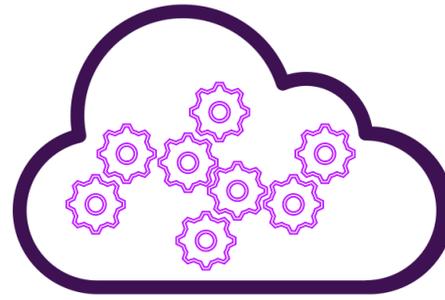
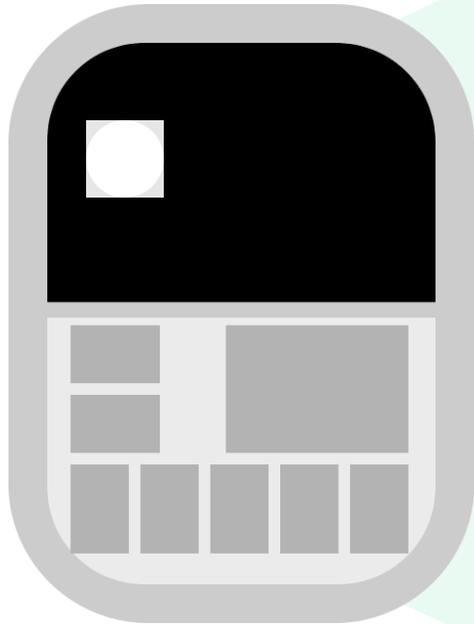
# Edge to Cloud – How to get the most out of SDS and assets

**AVEVA**

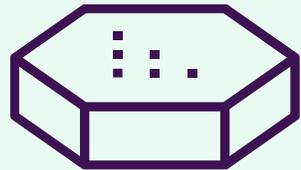
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# Our problem – Air quality monitoring



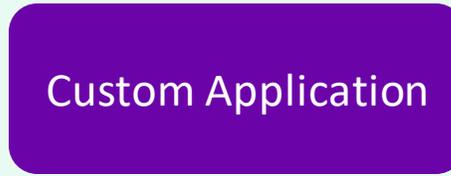


AVEVA Data Hub



Edge Data Store

OMF



Custom Application



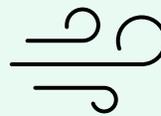
Temperature



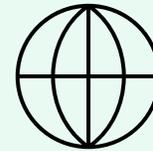
Humidity



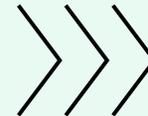
Lux



Air Quality

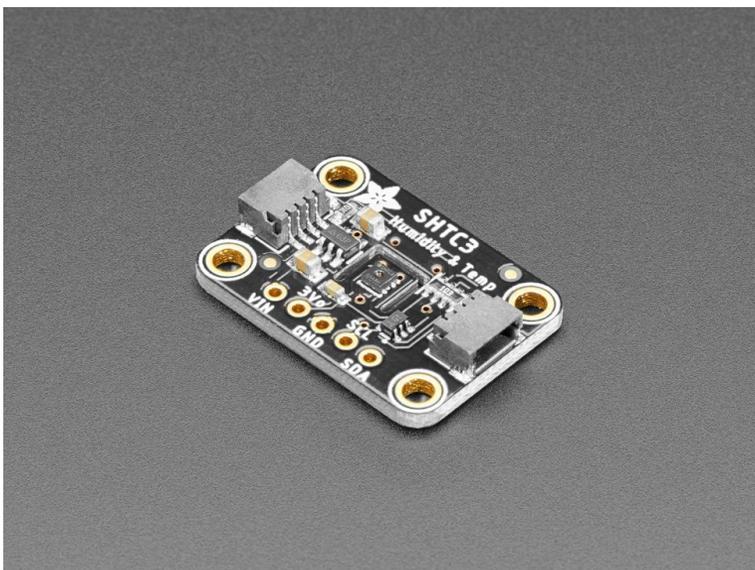


Atmospheric  
Pressure



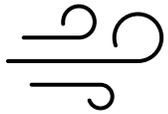
Motion

# Temperature and humidity



<b>Id</b>	SensorSHTC3	<b>Name</b>	Sensor SHTC3	
<b>Description</b>	A type for a relative humidity and temperature sensor		<b>Base Type</b>	
<b>Properties (3)</b>				
Key Id	Name	Type	UOM	
<input checked="" type="checkbox"/> Timestamp	Timestamp	DateTime		
<input type="checkbox"/> Temperature	Temperature	Double	°C	
<input type="checkbox"/> RelativeHumidity	RelativeHumidity	Double	%	

# Air Quality



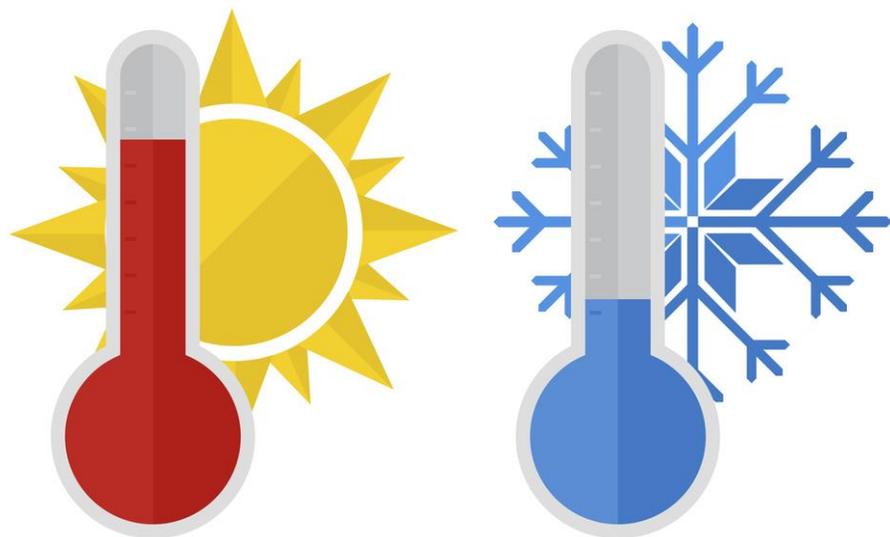
<b>Id</b>	<b>Name</b>
SensorPM25	Sensor PM25
<b>Description</b>	<b>Base Type</b>
A type for an air quality sensor	

## Properties (13)

Key Id	Name	Type	UOM
<input checked="" type="checkbox"/> Timestamp	Timestamp	DateTime	
<input type="checkbox"/> ParticleCount0.3	ParticleCount0.3	Int32	count
<input type="checkbox"/> ParticleCount0.5	ParticleCount0.5	Int32	count
<input type="checkbox"/> ParticleCount1.0	ParticleCount1.0	Int32	count
<input type="checkbox"/> ParticleCount2.5	ParticleCount2.5	Int32	count
<input type="checkbox"/> ParticleCount5.0	ParticleCount5.0	Int32	count
<input type="checkbox"/> ParticleCount10.0	ParticleCount10.0	Int32	count
<input type="checkbox"/> PM1.0S	PM1.0S	Int32	count
<input type="checkbox"/> PM1.0E	PM1.0E	Int32	count
<input type="checkbox"/> PM2.5S	PM2.5S	Int32	count
<input type="checkbox"/> PM2.5E	PM2.5E	Int32	count
<input type="checkbox"/> PM10S	PM10S	Int32	count
<input type="checkbox"/> PM10E	PM10E	Int32	count

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# Environment scoring analytic





Trash



thinclient\_drives



# Rolling it out



- Home
- Data Management
- Data Collection
- Visualization
- Analytics
- Security
- Developer Tools
- Support

Customize

### Latest Service Updates

**New code samples for Grafana and "Data Hub to PI"**  
 Sep 2, 2022, 3:19:33 PM  
 AVEVA is pleased to announce the release of two new code samples on GitHub! The first is a new Grafana plugin for Data Hub that uses the latest plugin framework and adds new features such as Grafana Alerting and the ability to use a user's OAuth token to authenticate against Data Hub. The second sample is a Data Hub to PI utility that can be used to transfer data from Data Hub to a PI Data Archive. This sample sends OMF messages to a PI Web API server to automatically create corresponding PI points and to replicate data in your PI Data Archive.

More involved samples demonstrating various aspects of Data Hub can be found on the main AVEVA Data Hub GitHub samples repository, and as always,

### Quick Links

- View API documentation
- Explore working code samples provided in multiple programming languages
- View service blog
- Manage Users And User Access For Your Organization
- Manage clients and secrets for securely accessing your data
- Experiment with the REST API console

### Yesterday's Resource Usage

Oct 16, 2022

Streams Stored	Streams Accessed	Shared Streams Accessed
57,767	42,378	0

### System Health

  
Ok

### PI to Data Hub Agents

10 Total Agents

7 Good	0 Warning	3 Bad	0 Stopped
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### Edge Systems

26 Total Systems

16 Good	6 Warning	4 Bad	0 Inactive
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# Learn more about AVEVA Connect & AVEVA Data Hub

## Industrial Cloud Platform @ AVEVA PI World 2022 – San Francisco

### Day 1: Industrial Cloud Platform

- [AVEVA](#): AVEVA Connect, Industrial Cloud Platform – Vision, roadmap, and starting your operations and engineering digital twin journey [14:00]
- [AVEVA](#): Power your secure industrial ecosystem of data, applications, and partners with AVEVA Data Hub connected communities [14:40]
- [AVEVA](#): Accelerate Your Time to Value with Analytics and Applications Fueled by AVEVA Data Hub [15:40]
- [AVEVA](#): On your marks, get set, Unleash your Operational Data in the Cloud! [16:20]
- [AVEVA](#): Aggregating Engineering Content, Data and Documents and Real-Time Data into a Common User Experience [17:00]

### Day 2: Customer Presentations

- [IGI](#): The International Group: Lityx, use AVEVA™ Data Hub to implement AI-based analytics, improving yields and generating millions in additional profit at a 20x ROI [10:55]
- [First Quantum Minerals](#): Mixed Mobile Machinery Fleet Streaming Data to AVEVA Data Hub at First Quantum Minerals [14:00]
- [Industrial Parts Depot](#): Real-Time Fleet Monitoring with OCS at Industrial Parts Depot [14:00]

### Day 3: Industrial Cloud Platform

- [AVEVA](#): Four Imperatives of a Trusted Information Infrastructure [10:45]
- [AVEVA](#): Deploy Edge Data Store and Adapters in minutes with AVEVA Edge Management [11:25]
- [AVEVA](#): Visualizing the Digital Twin, an Independent Service on the Industrial Cloud Platform [13:30]
- AVEVA: Uniting the connected community through secure and transparent industrial data sharing [14:25]
- [AVEVA](#): Harnessing the power of Sequential Data Store (Sds) and Assets for developers and partners [[this talk](#)]
- [AVEVA](#): Aggregating data with Data Hub asset rules and data views for analytics and applications [16:25]



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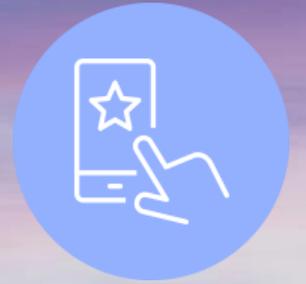
# Questions?

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State your name and company



# Please remember to...

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



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# AVEVA

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AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

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