Building Apps & Solutions with AVEVA's Industrial Cloud Platform

Ecosystem Track – Geek Talk for Developers

Laurent Garrigues, Lourenço Teodoro
• AVEVA Connect – Infrastructure
• Types of Application
• Types & Scope of Integration
• AVEVA Data Hub – Data Services
• AVEVA Data Hub – Developer’s Tools
• Wrap-up
AVEVA Connect Infrastructure
AVEVA’s cloud platform and customer portal

Advantages of moving to cloud:

✓ Faster time to Availability
✓ Lower dependency on IT
✓ Scalability
✓ Flexibility
✓ Move from CapEx to OpEx
✓ Always the latest and greatest features
✓ One single source of truth and one platform to allow collaboration
✓ Opportunity to connect and collaborate with partners/ the ecosystem on one single platform
Our strategic roadmap:
Accelerate value creation from AVEVA and partner applications with a neutral industrial platform

Partner apps
AVEVA apps
Your apps

Connect platform services
• Data services
• Visualization
• Modeling & Analytics
• ... & more to come

CONNECT Industrial Intelligence-as-a-Service
Taking advantage of AVEVA Data Hub **today** sets up success for the future.
Different Types of Applications & Solutions
What does the **app** do and how is the **app** used?

**Data**
- my data
  - internal
  - multiple accounts
- someone else's data
  - one account

**Scope**
- read only
- full CRUD

**Behavior**
- interactive
  - Connect AuthN
  - my own AuthN
- service
  - continuous
  - on-demand
AVEVA Connect Authentication

connect.aveva.com
AVEVA Connect Authentication

OpenID Connect (OIDC)

• OIDC is an interoperable authentication protocol.

• Through federation, it allows authenticating users without receiving or storing the user credentials.

• AVEVA Connect is its own Identity Provider (IdP) that can federate with customers’ Identity Providers.

• Custom applications can leverage AVEVA Connect IdP. User credentials are never exposed to applications, which receive access tokens to allow access to data services.

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Type 1 – Authorization Code Flow (with PKCE – Proof Key of Code Exchange)

Native Apps and Web Apps

• Solution for applications that need to Authenticate and make calls On Behalf of a User.

• User credentials are never shared with the application, instead they only get an access token.

• The client application use AVEVA Connect credentials to sign in.
Type 2 – Client Credentials

Machine to Machine connection

• Solution for applications that running background, such as AI or analytic tools.

• You can create client credentials and assign them to specific / dedicated Roles.

• With Role assignment you can limit the resources exposed.

• Client Credentials are part of the OIDC Standard and created in ADH.
Demo 1 – Custom Application for Datahub Customers

• Angular (source: angular.io)

Angular is a development platform, built on TypeScript. As a platform, Angular includes:

• A component-based framework for building scalable web applications

• A collection of well-integrated libraries that cover a wide variety of features, including routing, forms management, client-server communication, and more

• A suite of developer tools to help you develop, build, test, and update your code

• Just an example

• Open platform based on security standards can work with any web Framework

• Other examples would be React, Vue, Blazor, and more...
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<th>Stream</th>
<th>Last Update</th>
<th>Last Count</th>
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Different Types & Scope of Integration with AVEVA Data Hub
Three main Integration Categories

Internal
Industrial Operator

External
Industrial Operator
Partner

External via Communities
Industrial Operator
Partner
Demo 2 – Service Provider using Grafana

- Grafana is a multi-platform open source analytics and interactive visualization web application. It provides charts, graphs, and alerts for the web when connected to supported data sources.

- We have a sample (open-source) data source for Grafana. You can download and use it here: https://github.com/osisoft/sample-adh-grafana-nodejs

- The demo will show how a Partner can use Grafana to access community data from their customers
AVEVA Data Hub – Data Services
AVEVA Data Hub – Overview

Ingress
- REST APIs
- OMF Apps & Remote assets
- AVEVA Connect Visualization
- AVEVA Advanced Analytics
- AVEVA MES
- AVEVA System Platform
- Cloud apps & silos
- AVEVA PI Server
- AVEVA Historian
- Edge Data Store
- AVEVA Adapters

Security
- Remote monitoring
- Data science & AI/ML platforms
- 3rd party analytic tools
- Custom & partner applications
- Data sharing with business partners
- Reporting & Dashboards

Connected Community
- Web Portal
- PowerBI Connector
- Trending
- Data Views
- Reference Data
- Relationships
- Sequential
- Assets
- Events
- Ingress

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AVEVA Data Hub – Data Services Structure
Three Regions:
- US-West (uswe)
- EU-West (euno)
- AUS-East (auea)

GET .../Namespaces/namespaceId
GET .../Namespaces/namespaceId/AccessRights
GET .../Namespaces/namespaceId/AccessContro
AVEVA Data Hub – Sequential Data Store (SDS)

region.datahub.connect.aveva.com/api/version/Tenants/tenantID/Namespaces/namespaceId

GET .../Types/typeId

GET .../Streams/streamId/Data/First/
GET .../Streams/streamId/Data/Last/
GET .../Streams/streamId/Data/Sampled/
GET .../Streams/streamId/Data/Interpolated/
GET .../Streams/streamId/Data/Summaries/

GET .../Streams/streamId/Metadata/
GET .../Streams/streamId/Tags/

GET .../MetadataRule/ruleid
AVEVA Data Hub – Assets store

region.datahub.connect.aveva.com/api/version/Tenants/tenantID/Namespaces/namespaceid

GET …/AssetTypes/assettypeid

GET …/Assets/assetid/Data/… (same as Streams)

GET …/Assets/assetid/Status/

GET …/AssetRule/ruleid
GET .../DataViews/dataviewId

GET .../DataViews/dataviewId/Data/

GET .../DataViews/dataviewId/Data/Stored/

GET .../DataViews/dataviewId/Data/Interpolated/
GET .../communityId/summary

GET .../communityId/Tenants

GET .../communityId/Invitations

GET .../Search/Communities/communityId/Streams
Demo 3 – Parquet Format

• Why Parquet?
  • Parquet is column oriented format vs conventional CSV, which is row based
  • Queries specific column data requires less reads
  • Grouping the data by columns allows for higher compression rates
  • Converting conventional CSV to parquet lowers overcall cost and improves performance

Source: Demystifying the Parquet File Format | by Michael Berk | Towards Data Science
Sample SQL query: `SELECT * FROM cp.\'employee.json\' LIMIT 20`

Query type:  SQL  ○ Physical  ○ Logical

Query

```
1 SELECT * FROM dfs://mnt/c/tmp/data WHERE \'Ambient Temperature Maximum \'F\' \'> 60.229 LIMIT 20
```

I

Submit  Reset  □ Limit results to 1000 rows  Default schema: schema
AVEVA Data Hub – Developer’s Tools
AVEVA Data Hub – API Console

- Root/Tenant path
- API Versioning
- Auto-complete
  - Parameters fields
- Full CRUD
- Save to Favorites
- Response formatting
- Copy/download responses
AVEVA Data Hub – Code Samples

- Use case/service oriented
- In context of your tenant
- Multiple languages
  - C#, .Net Libraries
  - Python, Java, Angular, Node JS
- Github repo
AVEVA Data Hub – Online documentation

docs.aveva.com

- Get started section for ‘beginners’
- Full Developer guide
- Full API Reference guide
AVEVA Data Hub – ‘How To’ Videos

Software Services (aveva.com)

Technical Documentation

For process guides and answers to technical questions on AVEVA services, visit the documentation site:

SaaS.AVEVA.com
Wrap-Up
AVEVA Industrial Cloud Platform moving forward

1. EXPANDING AVEVA CONNECT & DATA HUB VALUE
2. SUPPORTING FROM EDGE TO COMMUNITY
3. BRIDGE ENGINEERING & OPERATIONS DIGITAL TWIN
4. EXPANDING THE ECOSYSTEM
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AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

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. The company is headquartered in Cambridge, UK.

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