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Building HMI and IIoT solutions with Linux devices

AVEVA Edge, IoT View (Linux)

Scott A Kortier – Product Manager, Operations Control



AVEVA



Scott A Kortier

Product Manager – operations control

AVEVA

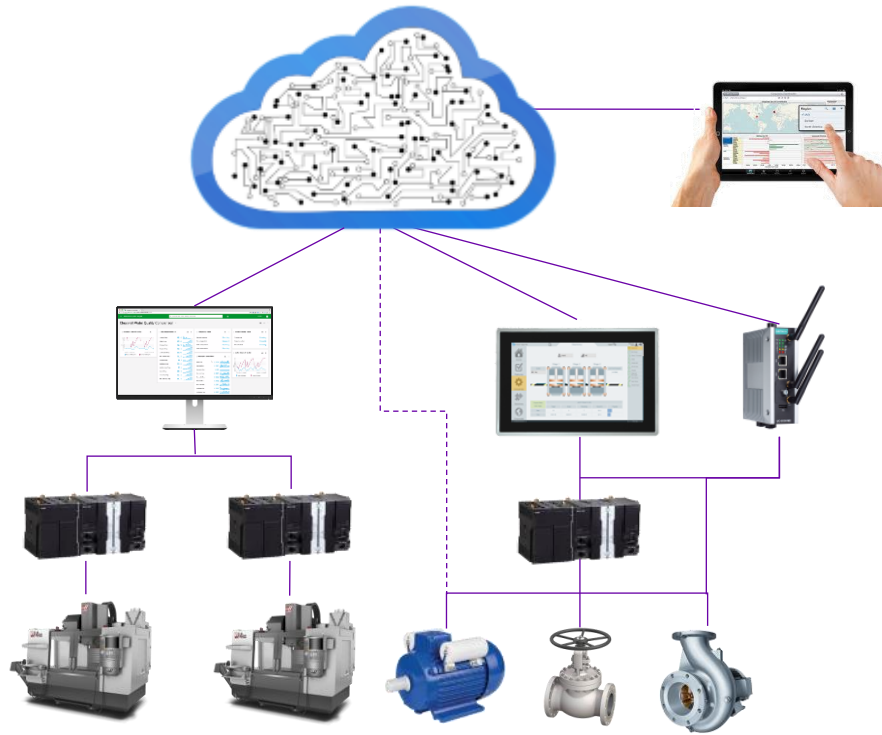
scott.kortier@aveva.com

Industrial Internet of Things (IIoT) / Industry 4.0

AVEVA Edge as an IoT Gateway and/or HMI/SCADA node

CLOUD

Premises



Cloud Analytics and Mobile Access



analytics, consolidation, artificial intelligence (AI), machine learning (ML), remote management/deployment, remote notifications and monitoring

Edge devices



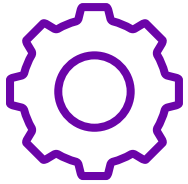
data acquisition, data manipulation (aggregations, filtering, contextualization, normalization), link with the cloud, local maintenance, local operation

Instrumentation and Controllers



operational real-time control, raw data measurements

World-leading Linux HMI



Challenge

- Many geographically disperse, low end “edge” devices needed to collect, filter, and historize data



Solution

- AVEVA Edge IoT View (Linux) used to communicate, filter and log data




Benefits

- Small Footprint, lower cost hardware
- 18 native drivers on Linux
 - Communicate to any required device
- OPC UA included supporting global standards
- Python scripting for filtering
- Keep required data, Local, SQL, Historian, Insight

Interoperability

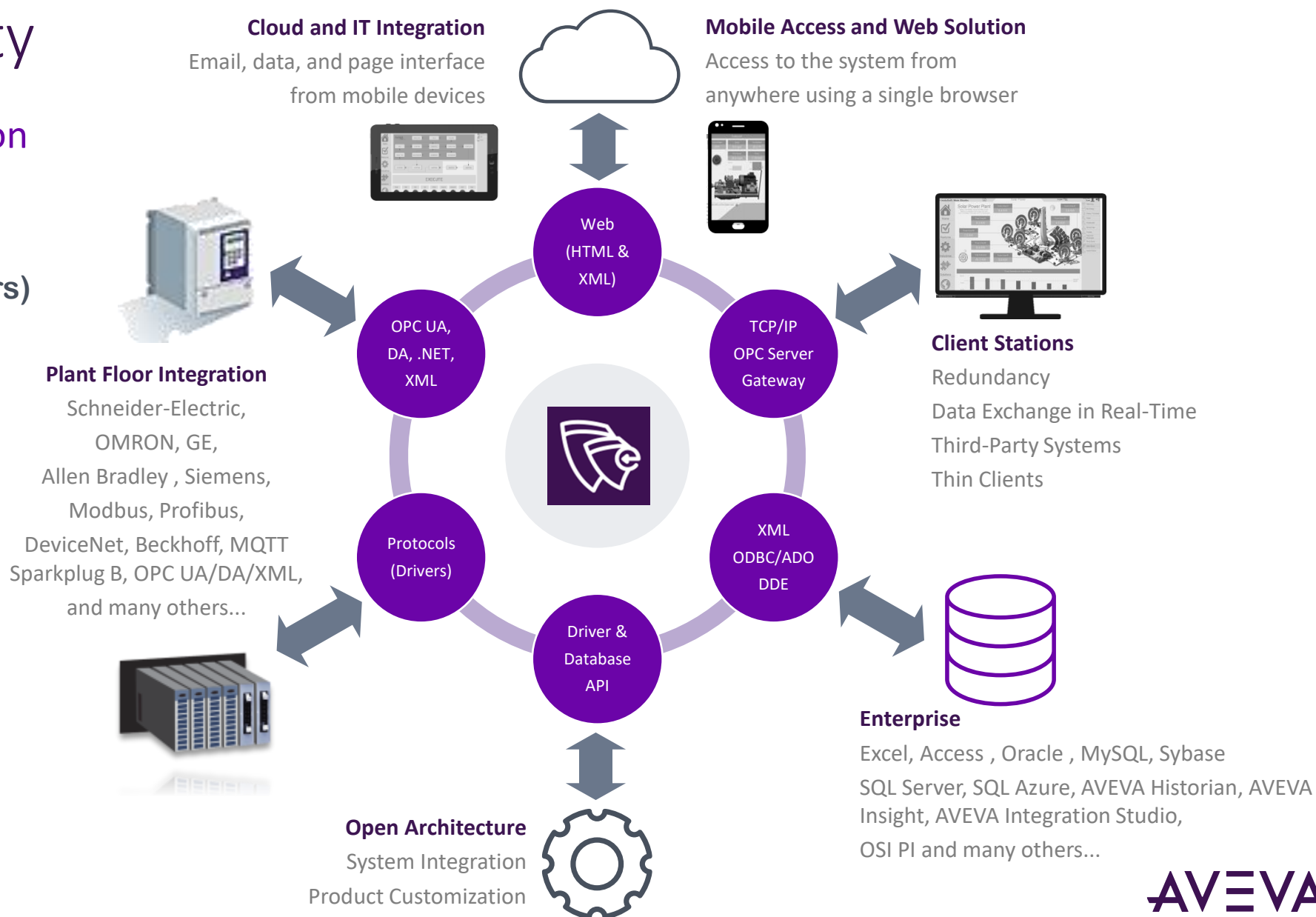
OT+IT native integration

 **Native built-in drivers (connectors)**

 **HTTP/HTTPS REST**

 **MQTT**.ORG

 **OPC UA**



What makes an HMI?

- **Hardware:**
 - General Industry: Proprietary, Windows, few Linux
 - IoT View: X64 (x86) or ARM based
- **Communications**
 - Drivers and OPC
- **Graphics**
 - Meters, graphs, buttons, lights, trends, alarms
- **Functional**
 - Scripting, Event, Logging (history)



Choosing the ideal AVEVA™ Edge runtime edition solution for your project

AVEVA Edge STUDIO is an integrated development environment (IDE), which allows you to design, develop, troubleshoot, and maintain SCADA/HMI/IoT applications running on premise edge and deploy them into different platforms (operating systems).

You can use the same development environment (AVEVA Edge STUDIO), on Windows, to create all projects and run each project with the runtime edition most suitable for the technical and commercial constraints of each platform: AVEVA Edge SCADA for SCADA projects running on Windows-based stations; AVEVA Edge Embedded HMI for full featured HMIs running on Industrial Panels with Windows IoT Enterprise LTSC/LTSC; and AVEVA Edge IoT View for IoT edge devices or local HMI solutions using Linux. This document is valid for AVEVA Edge 2023.

Platforms		AVEVA Edge Runtime Editions		
		SCADA	Embedded HMI	IoT View
Operating system	Windows Server 2022	Supported	Not supported	Not supported
	Windows Server 2019	Supported	Not supported	Not supported
	Windows Server 2016 ⁽¹⁾	Supported	Not supported	Not supported
	Windows 11	Supported	Not supported	Not supported
	Windows 10 ⁽²⁾	Supported	Not supported	Not supported
	Windows 10 IoT Enterprise (LTSC/LTSCB) ⁽²⁾	Supported	Supported	Not supported
	Linux (x86/arm) ⁽⁴⁾	Not supported	Not supported	Supported
System requirements	Minimum free storage memory needed	4GB	128MB	75MB
	Minimum free RAM memory needed	1GB	64MB	32MB

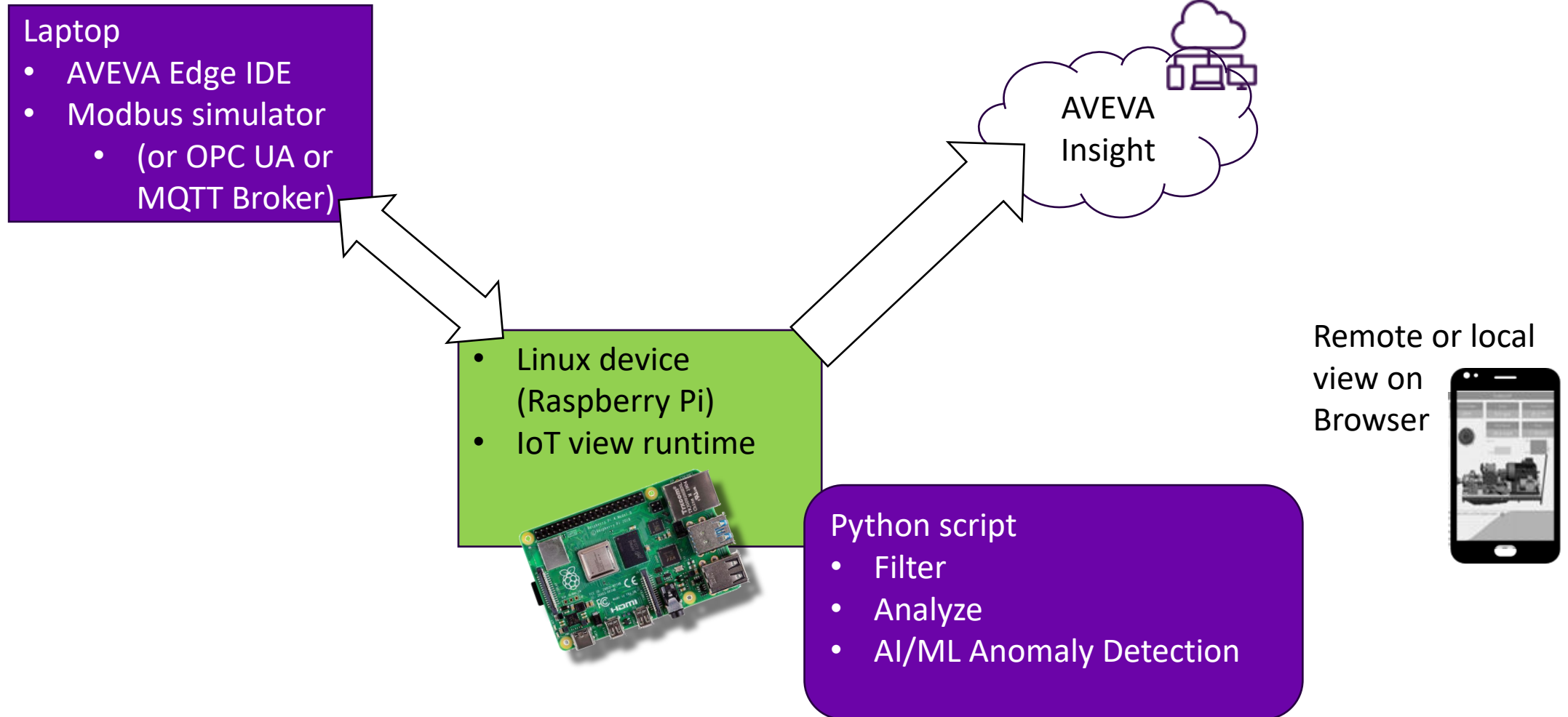


What makes an IIoT device?

The data you need, where you need it

- At the “Edge”, close to where the data is generated
- Reduce latency, improve network traffic
- Raw data acquisition, without normalizing
- Data manipulation (aggregations, filtering, contextualization, normalization)
- Data Historization (with store-and-forward)
 - Local (Disconnected)
 - SQL Database
 - Historian (On Prem or Insight)

IIoT solution – collect data and historize for “actionable insights”



Steps to build a Linux-based HMI

1. Install and configure

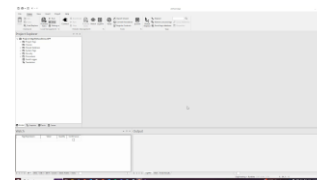
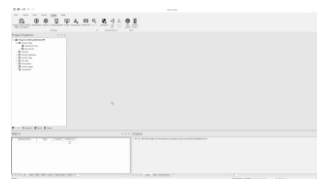
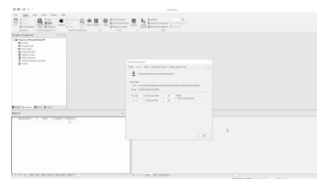
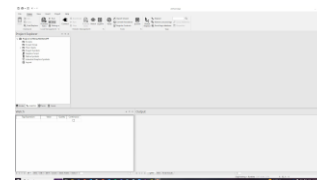
1. Install IoT View on Device (follow documentation)
2. Configure Project
3. Configure Tags
4. Configure Graphics
5. Communications Modbus (but could be MQTT or OPC UA)
6. Download and test (Quick Check)

2. Configure Logging

1. Local Logging (HST/CSV)
2. Configure Insight
3. Download, Run (Quick Check)

3. Add Python script

4. Download, Run



1.1 Copy
"RemoteAgent"

1.1 IoT View
System Files

1. 3-6 Configure
Tags, Graphics,
Communication

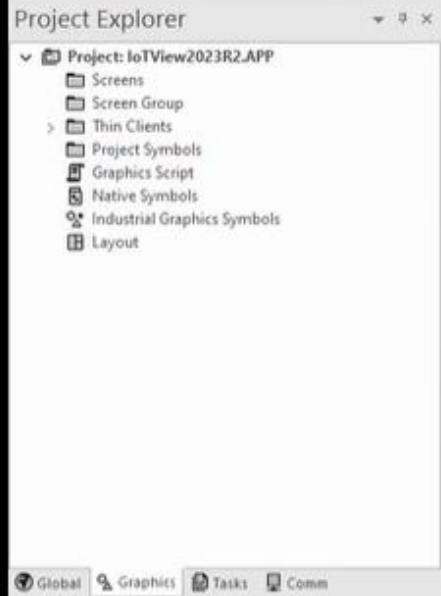
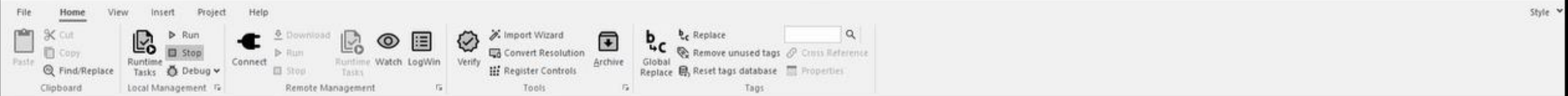
2. 1-3 Configure
Logging

3. Python Script
(optional)

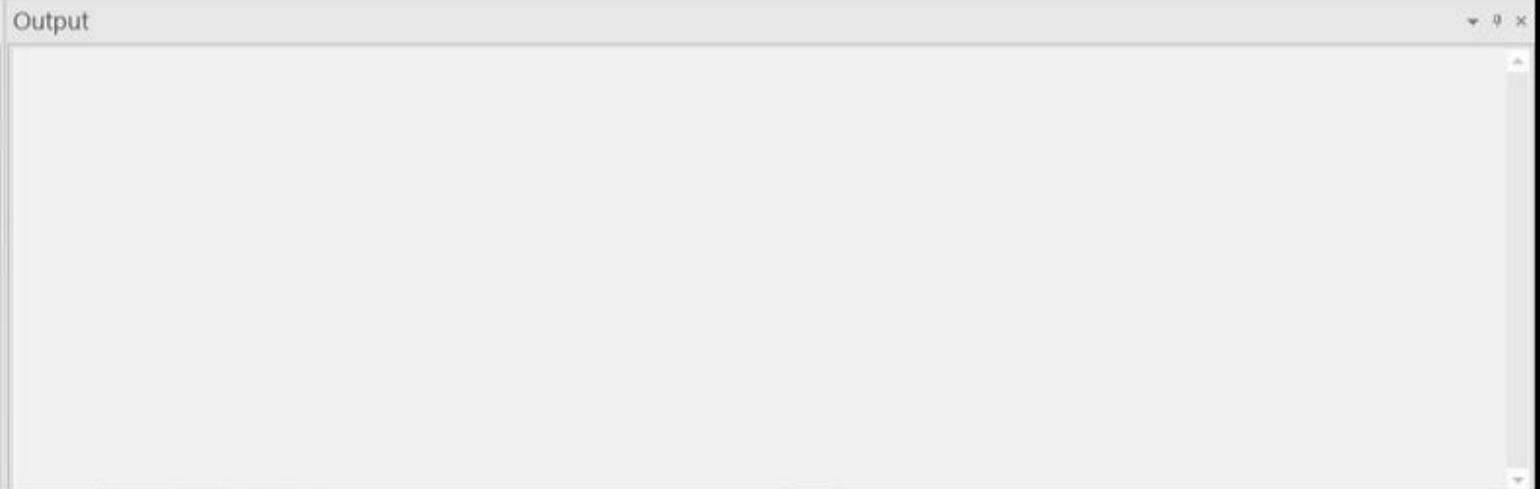


Linux Device





Tag/Expression	Value	Quality	Continuous
			<input type="checkbox"/>



File Home View Insert Project Help



Project Explorer

- Project: IoTView2023R2.APP
 - Screens
 - Screen Group
 - Thin Clients
 - Project Symbols
 - Graphics Script
 - Native Symbols
 - Industrial Graphics Symbols
 - Layout

Global Graphics Tasks Comm

Watch

Tag/Expression	Value	Quality	Continuous
			<input type="checkbox"/>

Remote Management

Target Project Import Embedded License Remote Agent Users

Download the project to the target station

Project Path

Local: I:\VA Solutions Limited\Documents\AVEVA Edge 2023 Projects\IoTView2023R2\

Target: \\home\kor\iotview\project

Download... Only newer files Run Status: Project was stopped

Send File... Keep user files Stop

Close

DB 1 DB 2 DB 3 DB 4 Locals Stack Frame Tasks F 4

LogWin XRef Find Results

Engineering - Runtime - CAP_NUM_SCR1 X: 82, Y: 0

Tag count: 0

Target System (AVEVA Edge 1.5K tags) Information Options Communication Viewer Preferences E-Mail/FTP Service

Settings Security System Web

Configure Log On Access level Thin Clients Mobile Access

Project Explorer

- Project: IoTView2023R2_APP
 - Project Tags
 - Datasheet View
 - Tag List (2)
 - Classes
 - Shared database
 - System Tags
 - Security
 - Procedures
 - Event Logger
 - Translation

Project Tags

	Name	ray S...	Type	Description	Scope	I-Value	I-Alarm	I-Historian	UA External Availability
	Filter text	Filter text	(All)	Filter text	(All)	(All)	(All)	(All)	(All)
1	Temperature	0	Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
2	RS	0	Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
*			Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
*			Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
*			Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
*			Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled
*			Integer		Server	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disabled

Global Graphics Tasks Comm

Watch

Tag/Expression	Value	Quality	Continuous
			<input type="checkbox"/>

Output

(ID: 16). Fill Effects might not be supported in projects running on specific Embedded device.

AVEVA Edge - SCRIPT0001 [Language: Python]

File Home View Insert Project **Debug** Help

Debug Viewer
Debug Background Task

Run
Stop

Break Point
Continue
Break

Step Into
Step Over
Step Out

Debug Options
Local Management
Debug Tools

Project Explorer

Project: EdgePythonDemo.APP

- Alarms
- Trend Logger
- Recipes
- Reports
- Math
- Script
 - VBScript
 - Python
 - Startup Script
 - Scheduler
 - Database/ERP
 - Internet of Things

SCRIPT0001 [Language: Python]

Description:
CalcPi

Execution:
RunScript+1

```
1 # Number of iterations for accuracy
2 iterations = 10000
3
4 # Initialize variables
5 pi = 0
6 sign = 1
7
8 for i in range(iterations):
9     pi += sign * 4 / (2 * i + 1)
10    EdgeHMI.SetTagValue("test", pi)
11    EdgeHMI.SetTagValue("test2", i)
12    sign *= -1
13
14 # Store Pi to 10 digits
15 x = "{:.10f}".format(pi)
16
17 EdgeHMI.SetTagValue("test", x)
```

Global Graphics Tasks Comm

Watch

Tag/Expression	Value	Quality	Continuous
			<input type="checkbox"/>

Output

DB1 / DB2 / DB3 / DB4 / Locals / Stack Frame / Tasks

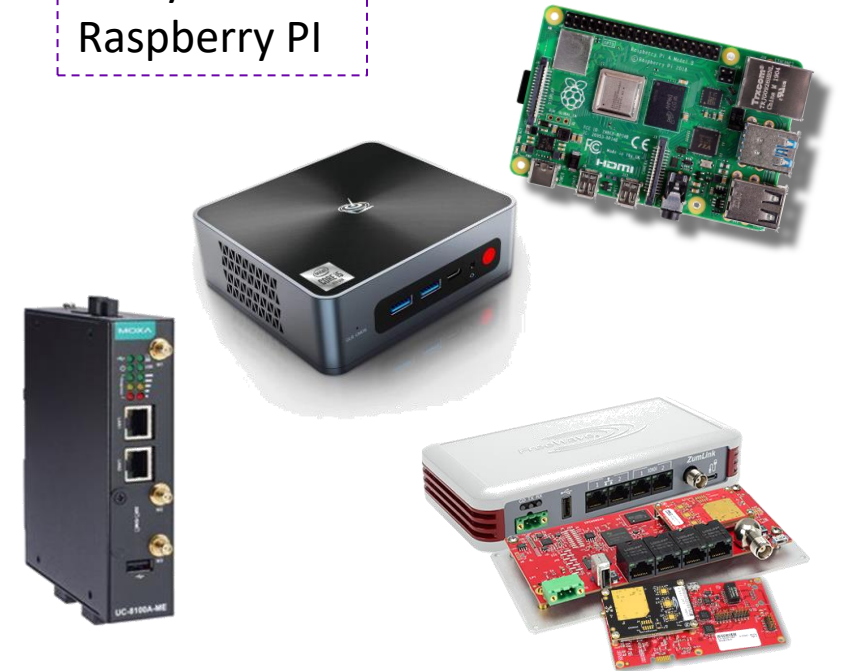
LogWin XRef Find Results

Ready Engineering + Runtime CAP NUM SCD X: 84 Y: 0 Tag count: 1

Summary

- Benefits, pain points
 - Use on geographically disperse systems, wind, O&G, utilities, infrastructure
 - Ideal solution coupled with low bandwidth connections
 - Ideal solution for low cost or horsepower devices
 - Can be “headless” (no display)
 - Use on Linux based networking devices for a “no additional HW cost” solution
 - Shadow Sensing or Parallel I/O
 - Monitor status without touching machine PLC
 - Regulatory reporting
- Solution for AVEVA products
 - Use AVEVA Edge IoT View to complement other products as a complete solution

Likely NOT a
Raspberry PI



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!

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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.

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