OPC UA new possibilities

Features and some facts

DNA OPC UA Server & Client

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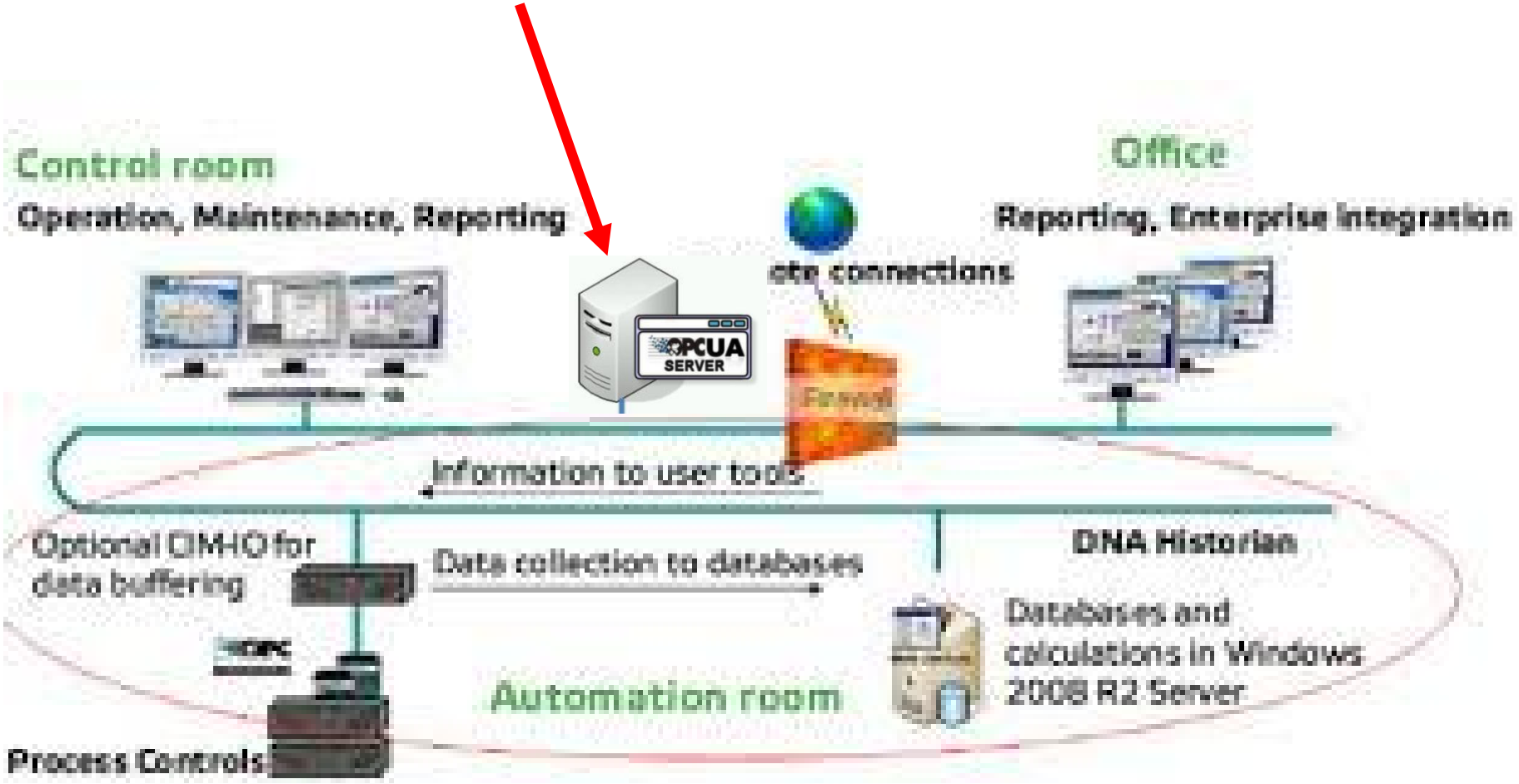
DNA OPC UA Server Overview



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DNA OPC UA Components & licenses

- Components
  - DNA OPC UA Server software
    - DNA-OPCUA-Server
    - DNA-OPCUA-Client
    - DNA-OPCUA-AutoConfig
    - DNA-OPCUA-Discovery
  - Diagnostic templates: Server, Session, Subscription
- Licenses:
  - Start
  - Capacity
    - UaVariables (subscription based)
  - Features (on/off):
    - Historical Access (HA)
    - Alarms & Events (AE)

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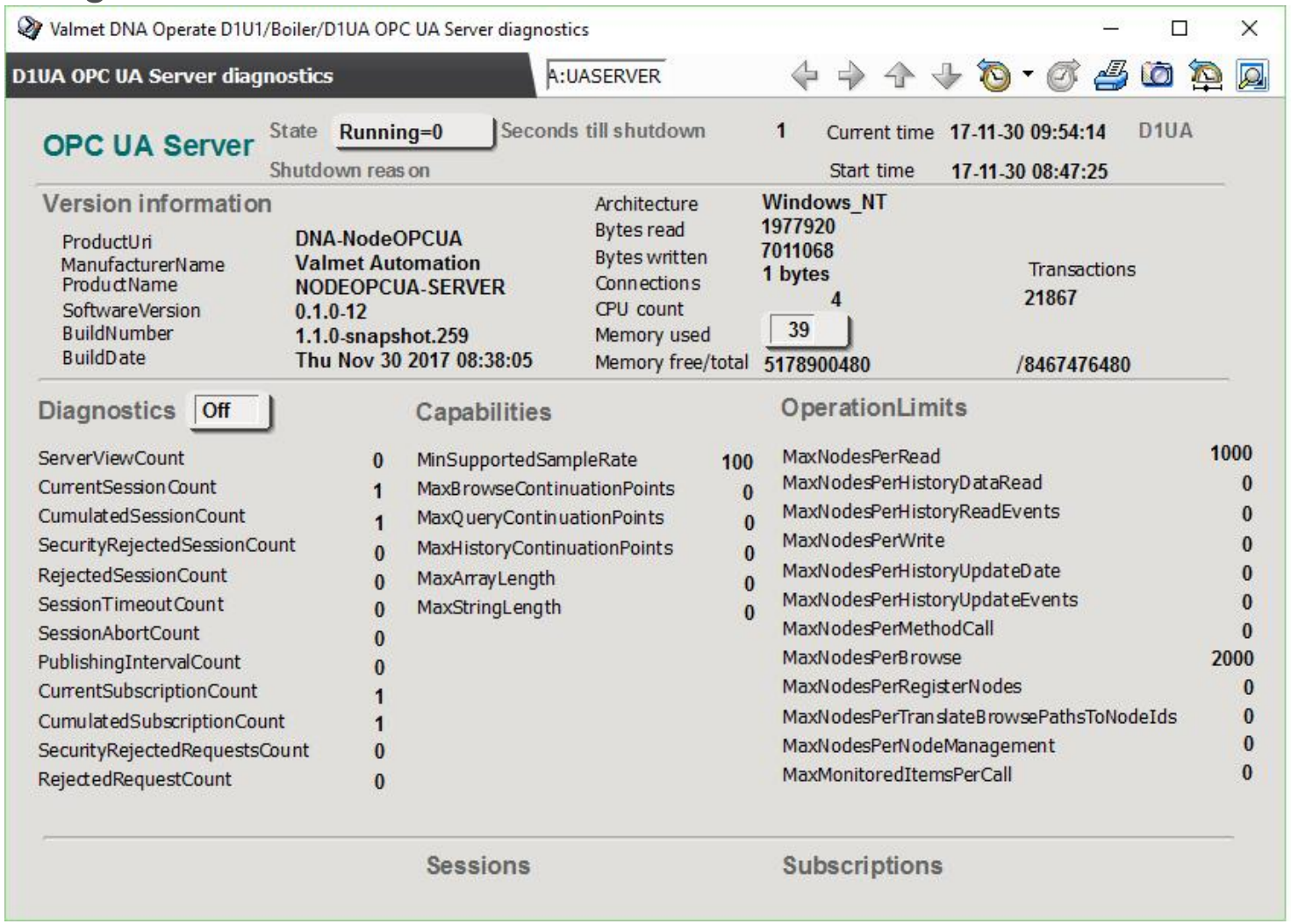
DNA OPC UA Server

- Provides full Valmet DNA address space:
  - Configuration can be done manually (node + type + DNA tag)
  - Automatic scan will lookup and create all ports into OPC UA Server
- Security can be configured:
  - User & passwd
  - Certificates
- UA Expert used to test & show server address space, views and call server methods (execute them)

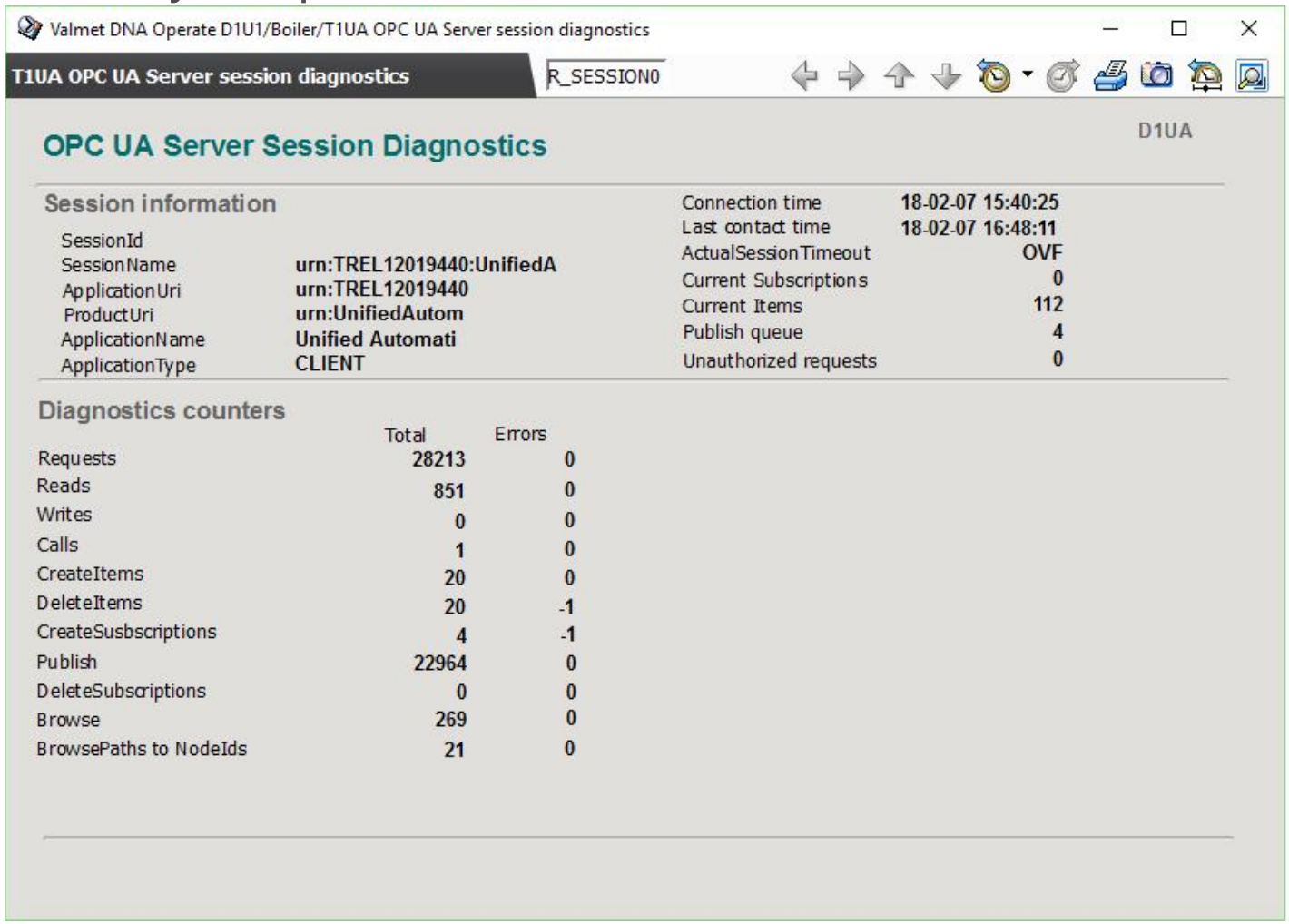
DNA OPC UA Server – Server Diagnostics

Integrated into Valmet DNA, can be used with other OPC UA Servers



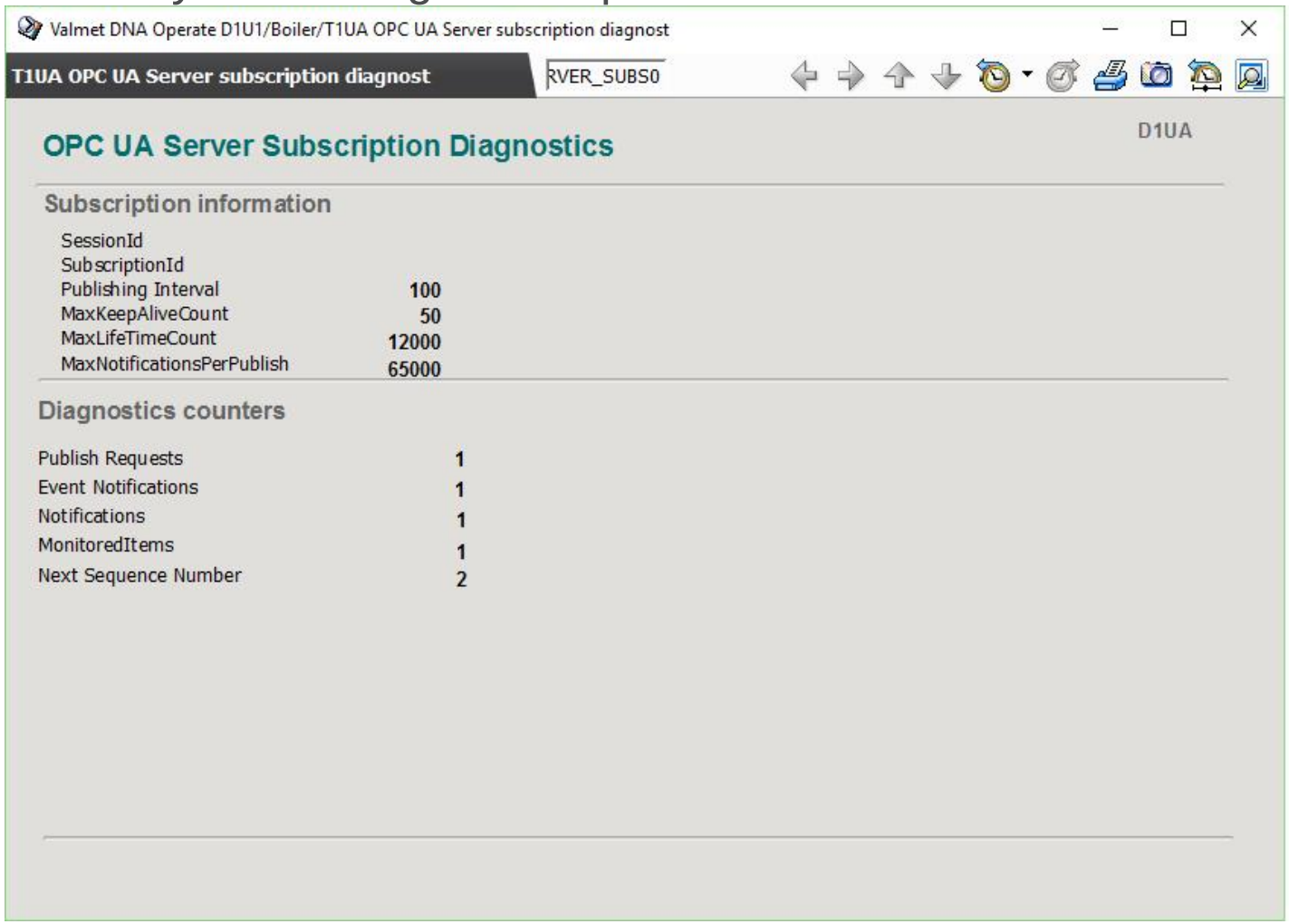
DNA OPC UA Server – Session Diagnostics

As many as open sessions



DNA OPC UA Server – Subscription Diagnost.

As many as running subscriptions



OPC UA DNA objects

Timestamp from DNA (UTC time)

- Basic types
  - ana -> Float + Quality
  - bin -> Uns16 + Quality
  - ints > Int16 + Quality
  - intl -> INt32 + Quality
  - binev -> Uns16 + SourceTimestamp + Quality (timestamp from the IO-channel)
- Function blocks supported
  - Am, bin, mtrX, mgvX, pid, etc.
- Table types supported
  - 1 / 2 / 3 dimensions
  - QCS profile data & Condition monitoring vibration data
- Diagnostic types
  - Dhart, dpbus, etc.

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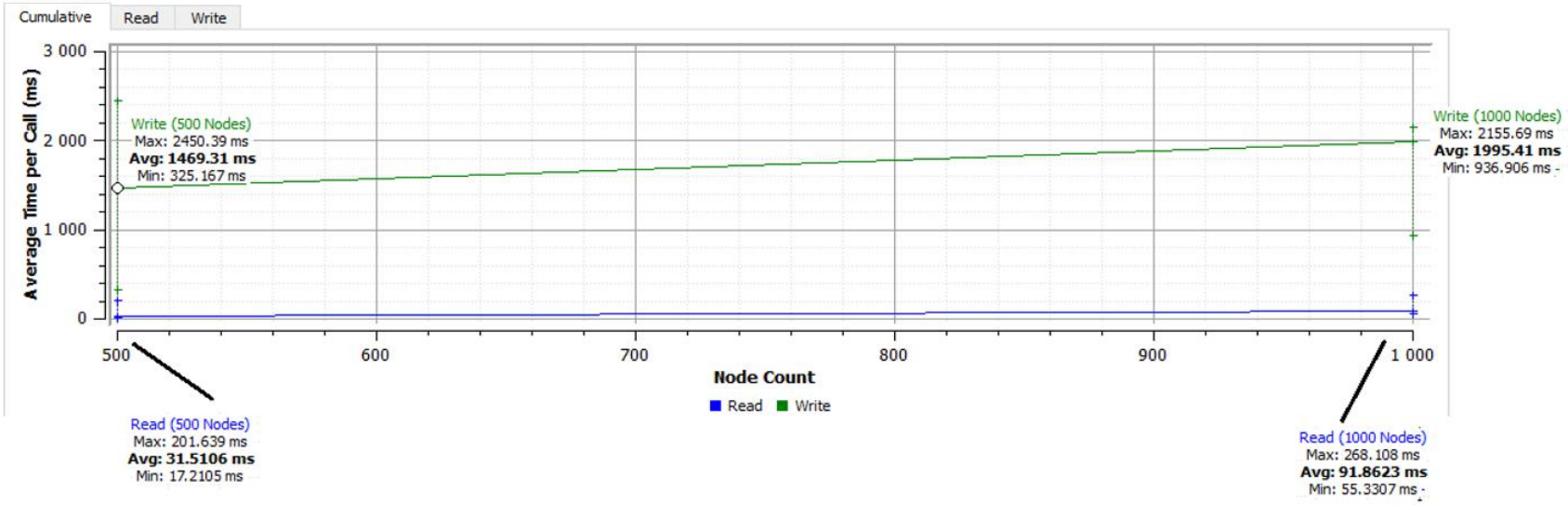
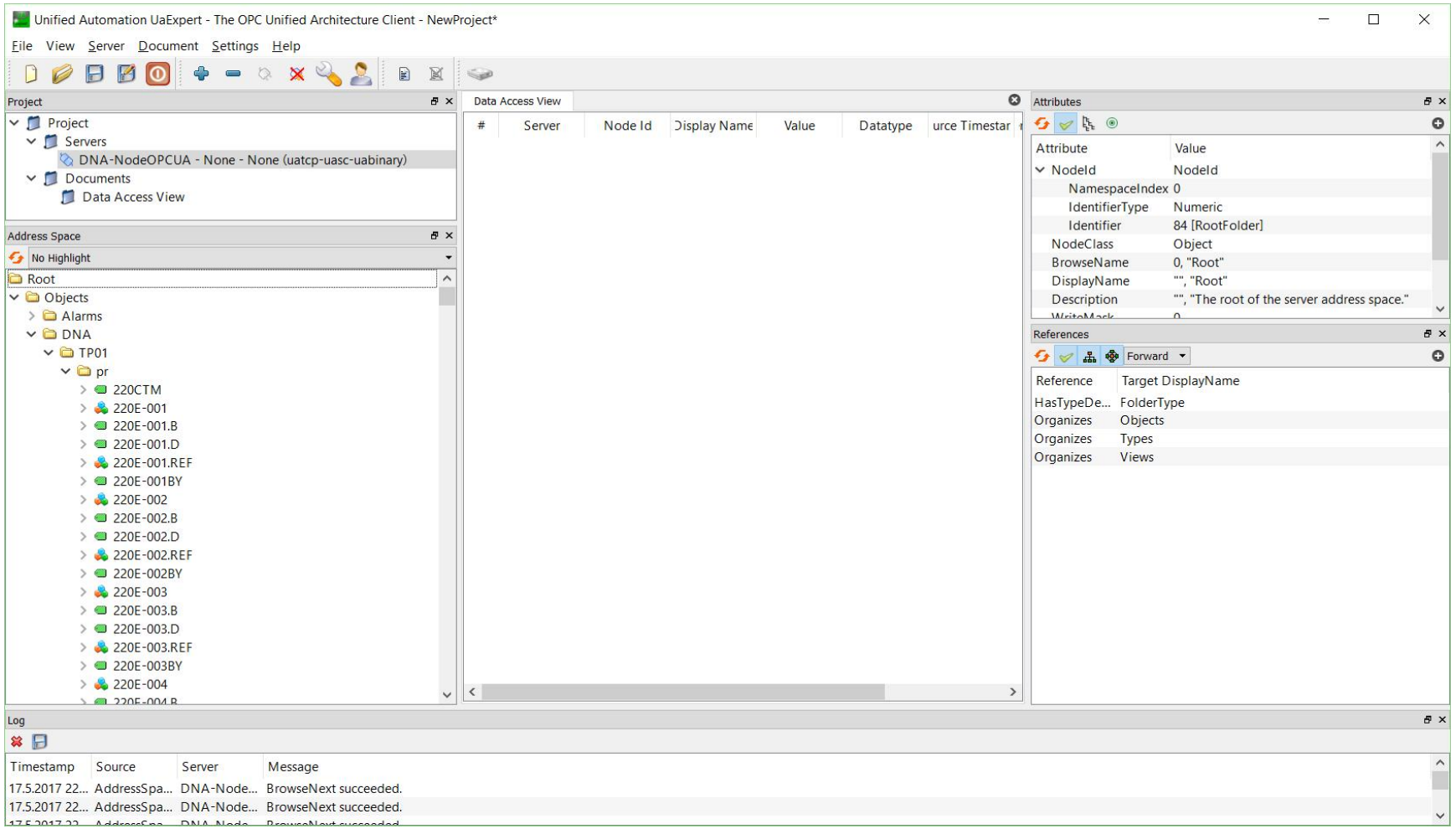
DNA OPC UA Performance

Read blue 1000 items ~100ms, write green 1000 items ~2000ms



OPC UA Address space

DNA folders: pr, di, sn, li etc. available (note: AP01 node before pr)



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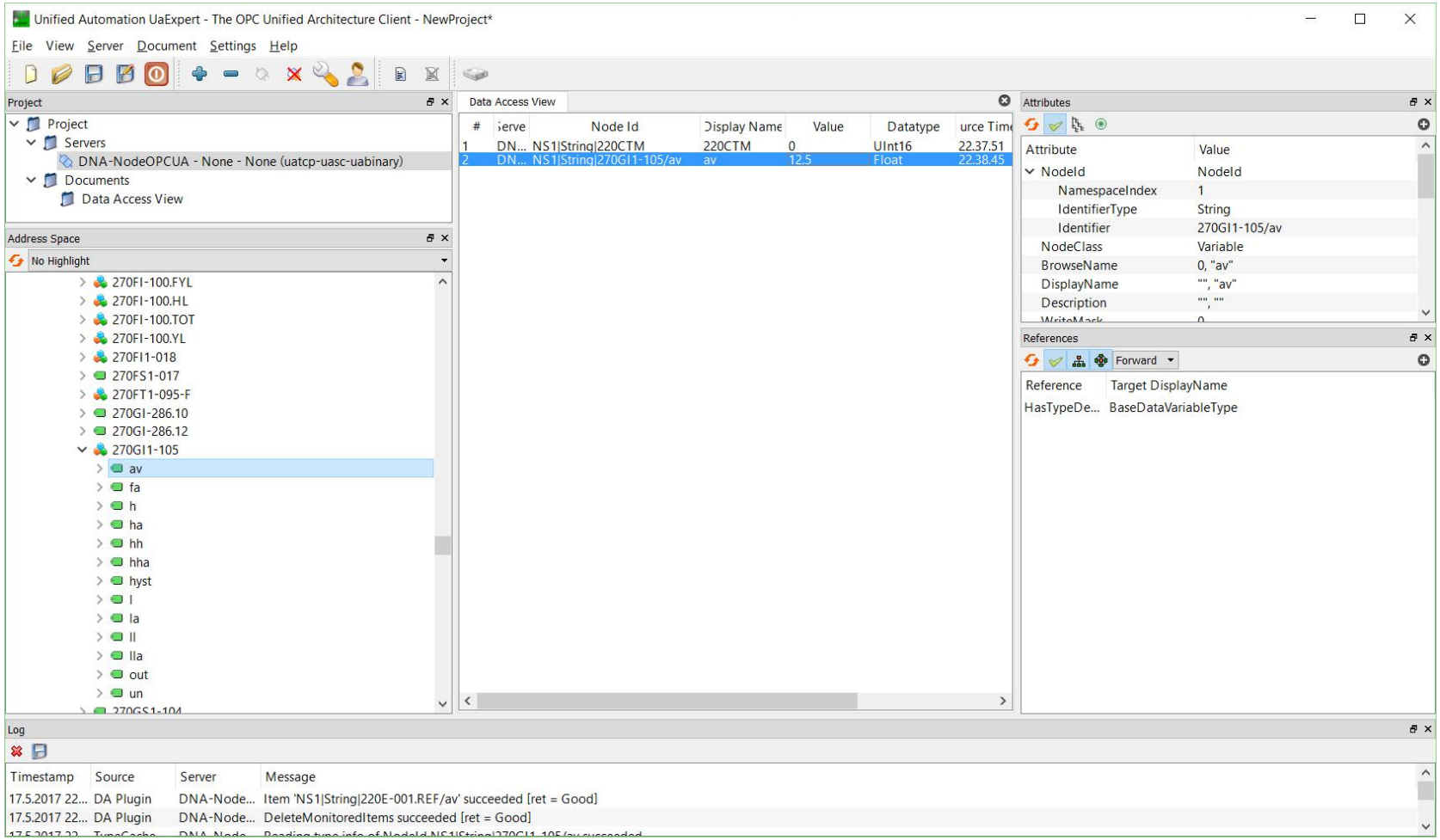
OPC UA Address space

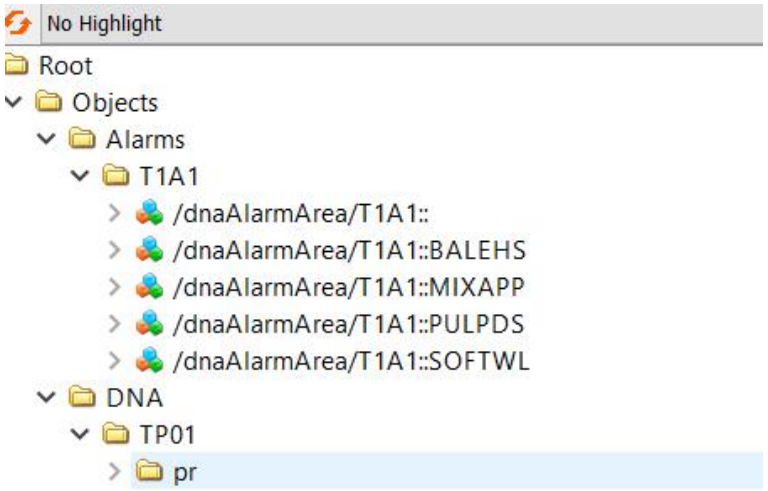
DNA direct access port **pr:270GI1-105** type **am** member **av**



DNA Alarms

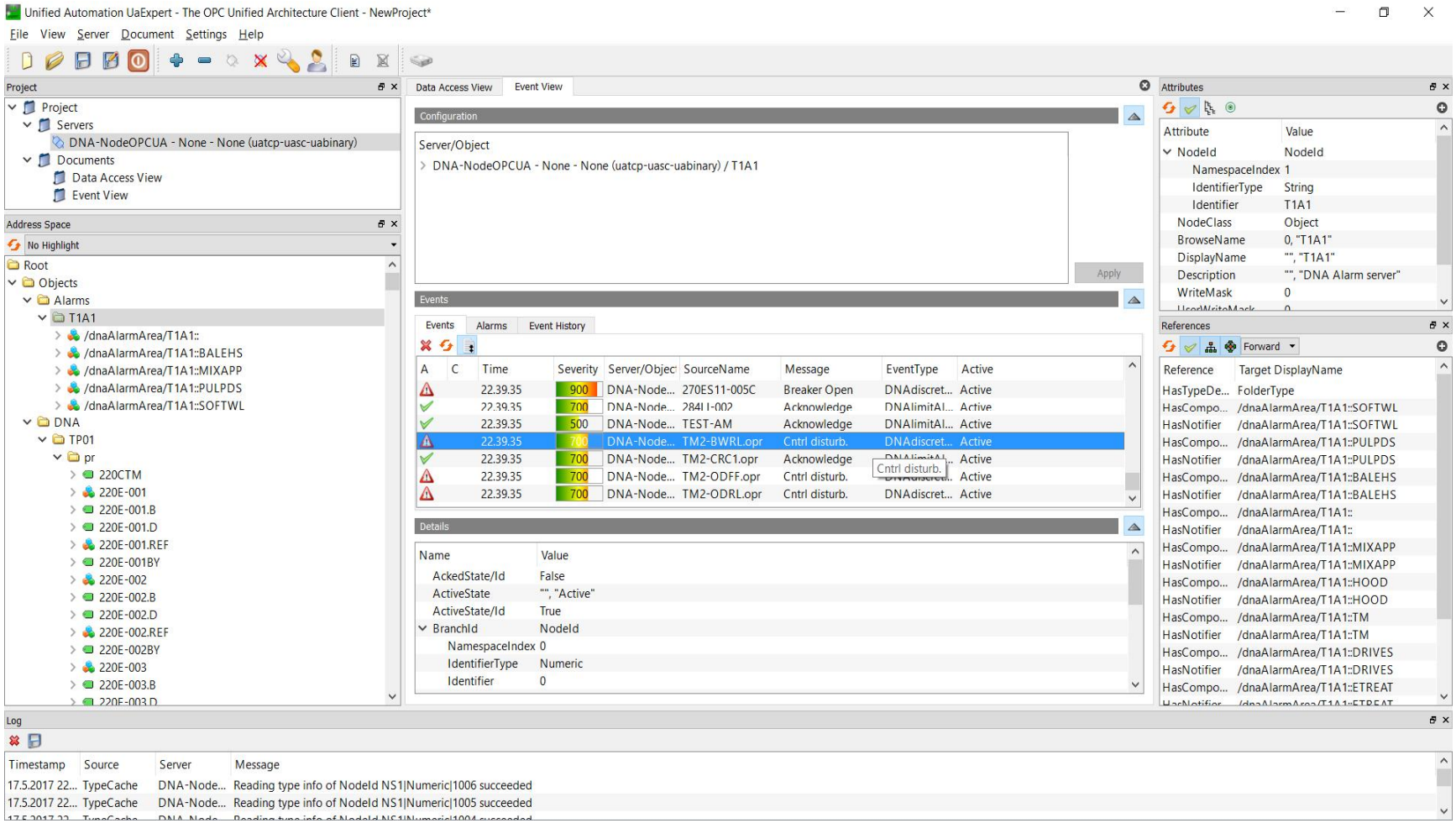
- Automatic DNA ALS -> OPC UA event mapping
- DNAalarmLimit
- DNAdiscreteAlarm

- State synchronized
- Alarm can be “acknowledged” by OPC UA client
- Alarms are in alarm hierarchy
- Timestamp from DNA



DNA Alarms

Controller pid control disturbance



DNA – OPC UA Client

DNA OPC UA Client

Communicate with 3rd party OPC UA Server

- Configuration:
  - OPC UA Server variable address + type
  - DNA tag + type
- Read -> Write
- Parameters for tuning communication and logging in client_cpu.json

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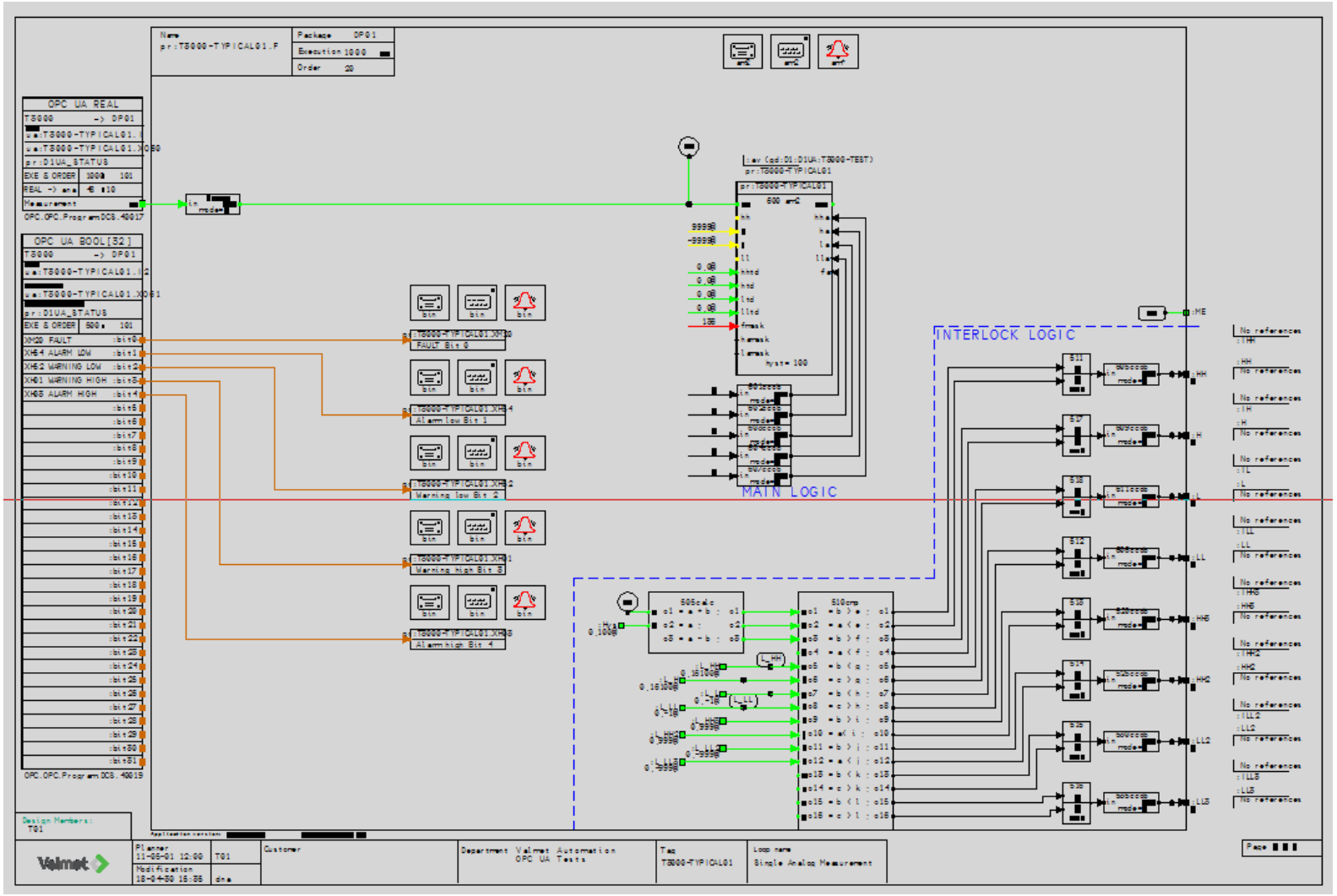
DNA OPC UA Client

Configuration file example

- ReadName1 Type1 WriteName2 Type2
- // Server CurrentTime
- ns=0;i=2258 UtcTime ua:D1UA-STATUS.TIME binev // Watchdog if client if not updated do set fail bits
- // Typical 01, Single Analog Measurement
- ns=2;s="OPC.OPC.Program.DCS.40017" Float ua:T3000-TYPICAL01.XQ60 ana // Value
- ns=2;s="OPC.OPC.Program.DCS.40019" Boolean[16] ua:T3000-TYPICAL01.XQ61 bin_5 // Status
- // End of example

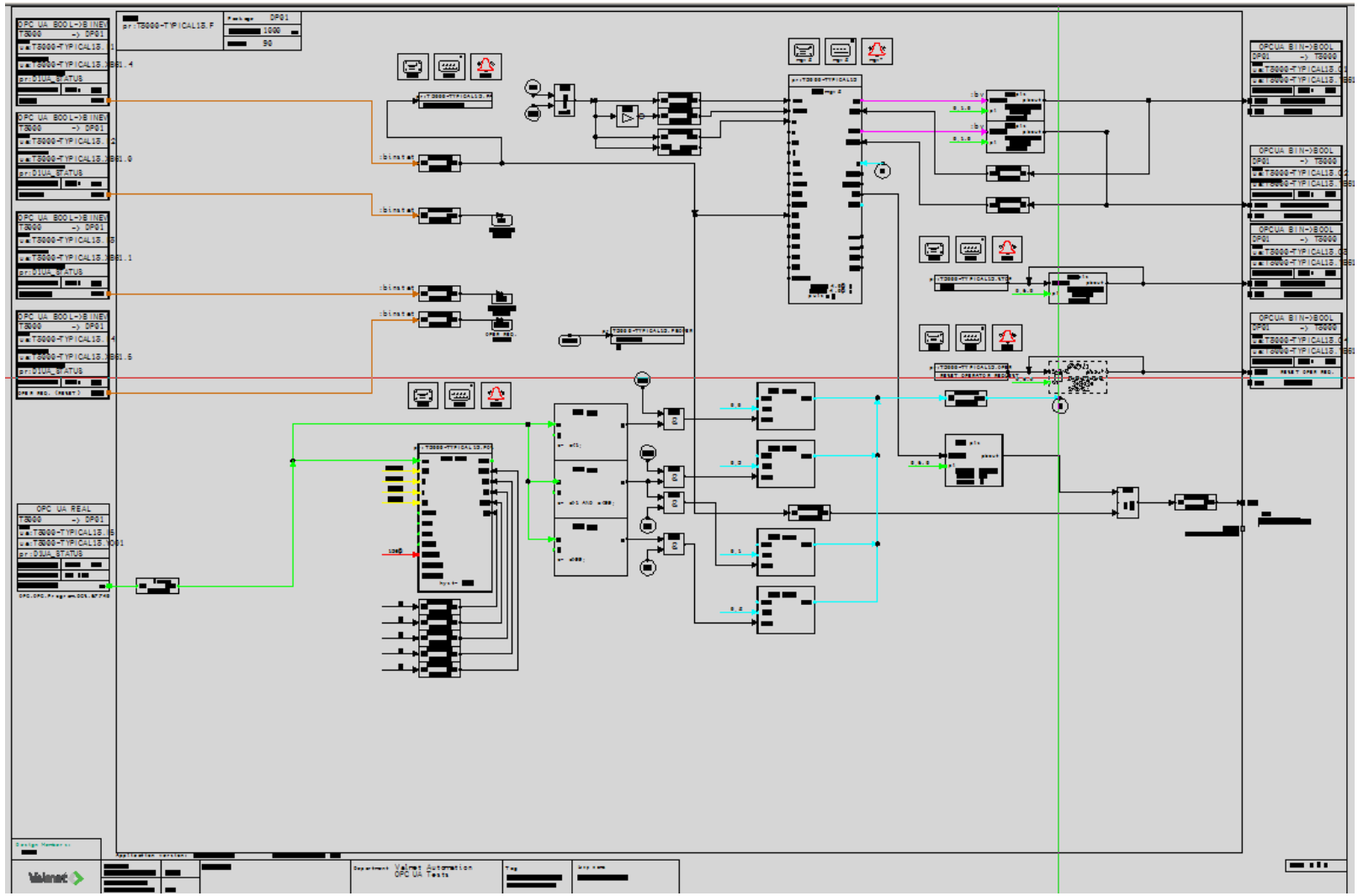
DNA OPC UA Client – DNA application

FbCAD with OPC UA IO-symbols: Analog measurement



DNA OPC UA Client – DNA application

FbCAD with OPC UA IO-symbols: Valve actuator



DNA OPC UA – Siemens T3000 typicals

- Tested at Erlangen with Siemens
- Siemens 18 typicals <-> FbCAD templates
- Demonstrated functionality to Stora Enso Maxau

DNA – OPC UA Server
Advanced features

OPC UA will provide more functionality

NOTE: Features are not yet available – not fully tested

- OPC UA can be extended and used dynamically
- Some features are not supported by all frameworks
  - Will cause some interoperability issues
  - But these can be solved
- Views:
  - Hierarchy to organize objects in multiple ways
  - Does not actually use much more memory
  - Reference (pointer) used for variables
- Methods:
  - Server can execute functions (not widely used)

NEXT: Some practical examples

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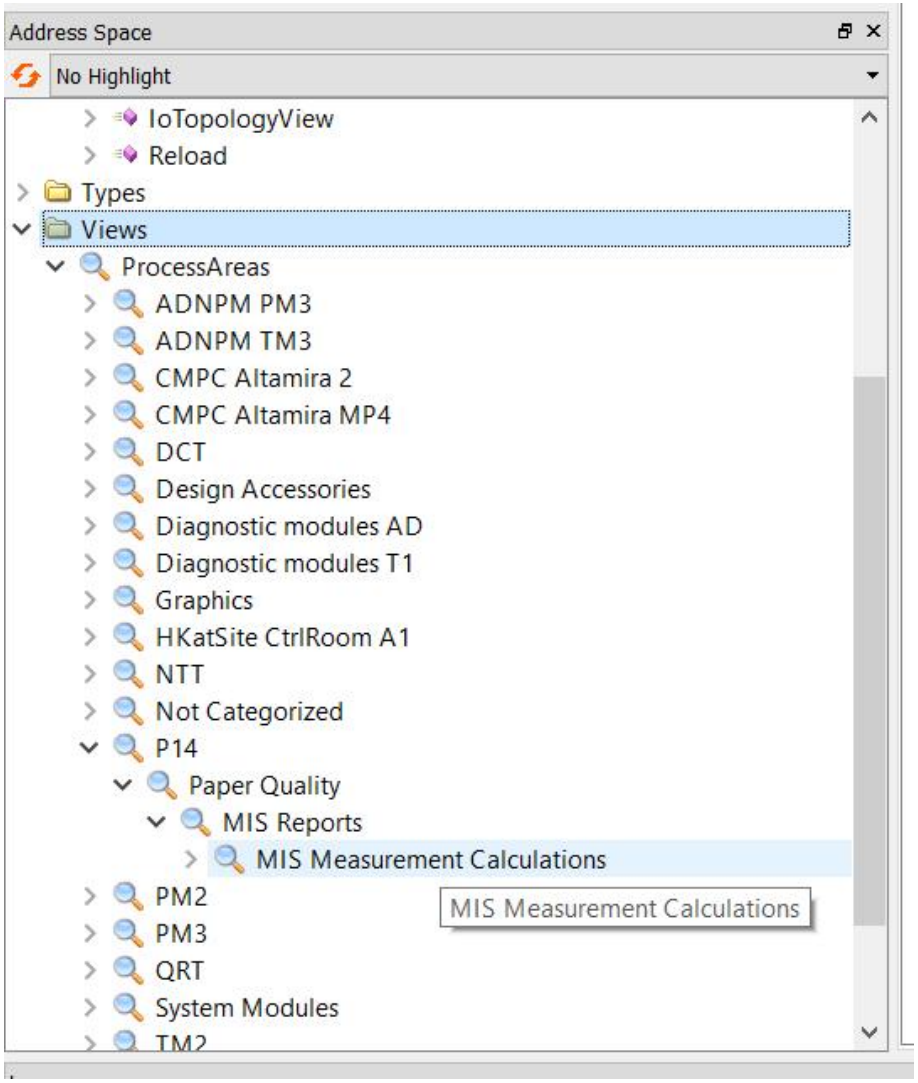
Views

ProcessAreas (XML export from EAS)



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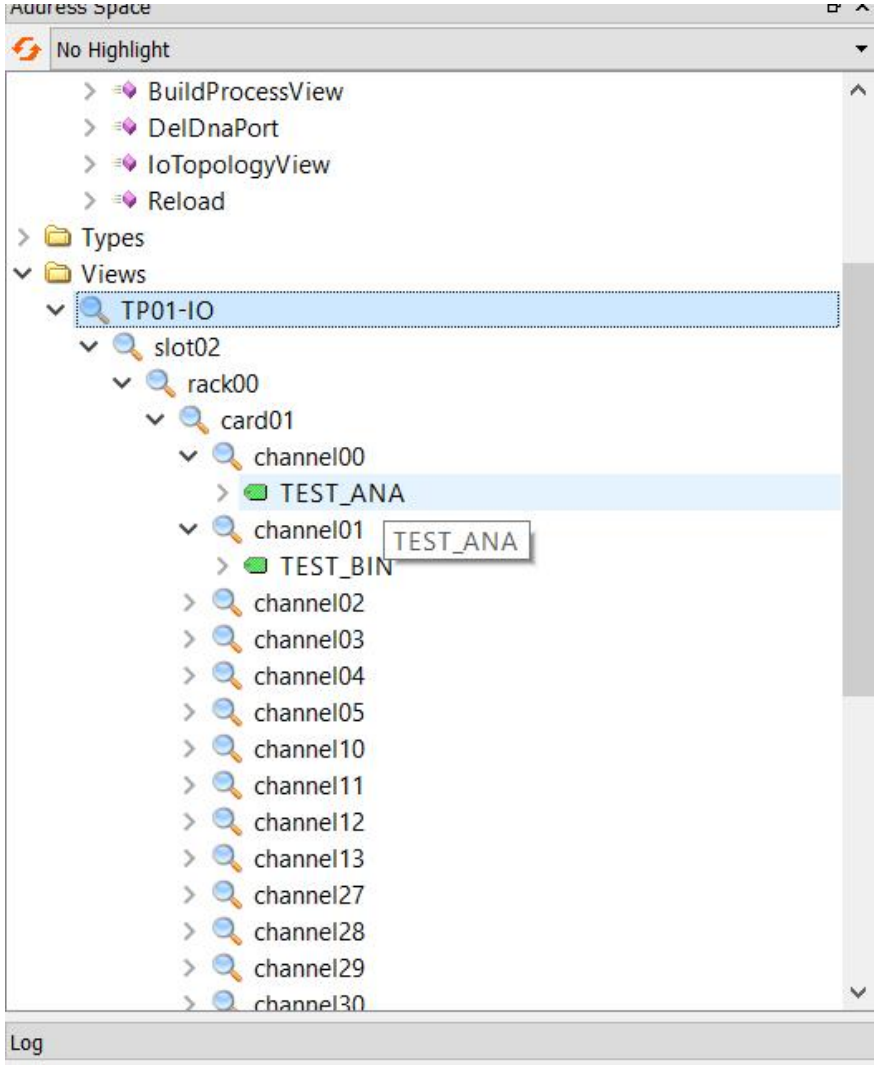
Views

IO-Topology (can be used for FDI)



IO-data can be read by BsGUI
or
BsTool from the DNA system

IoTopologyView command reads data from the file and populates view.

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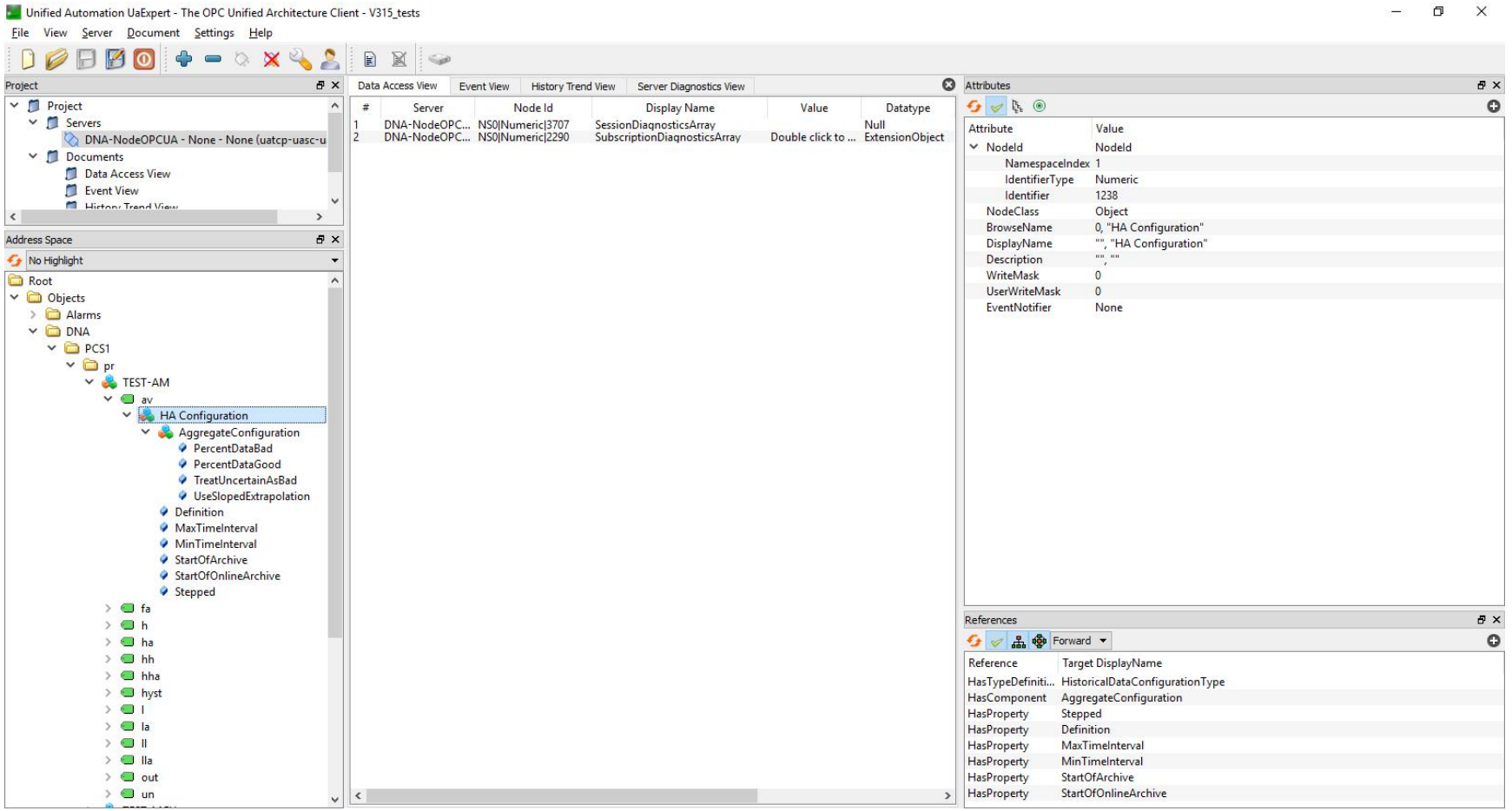
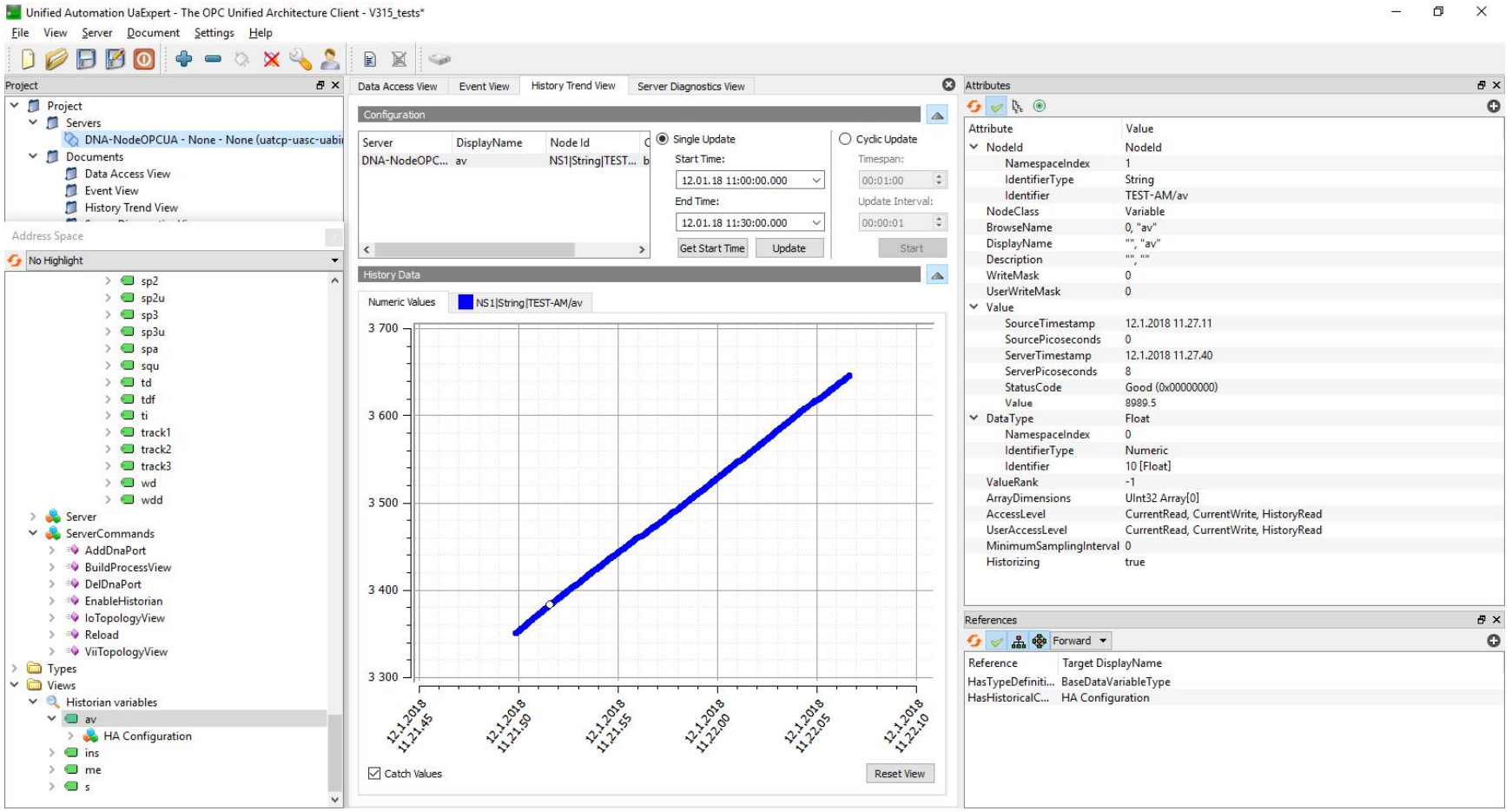
OPC UA Historian

Collects values in memory – no database (test version)



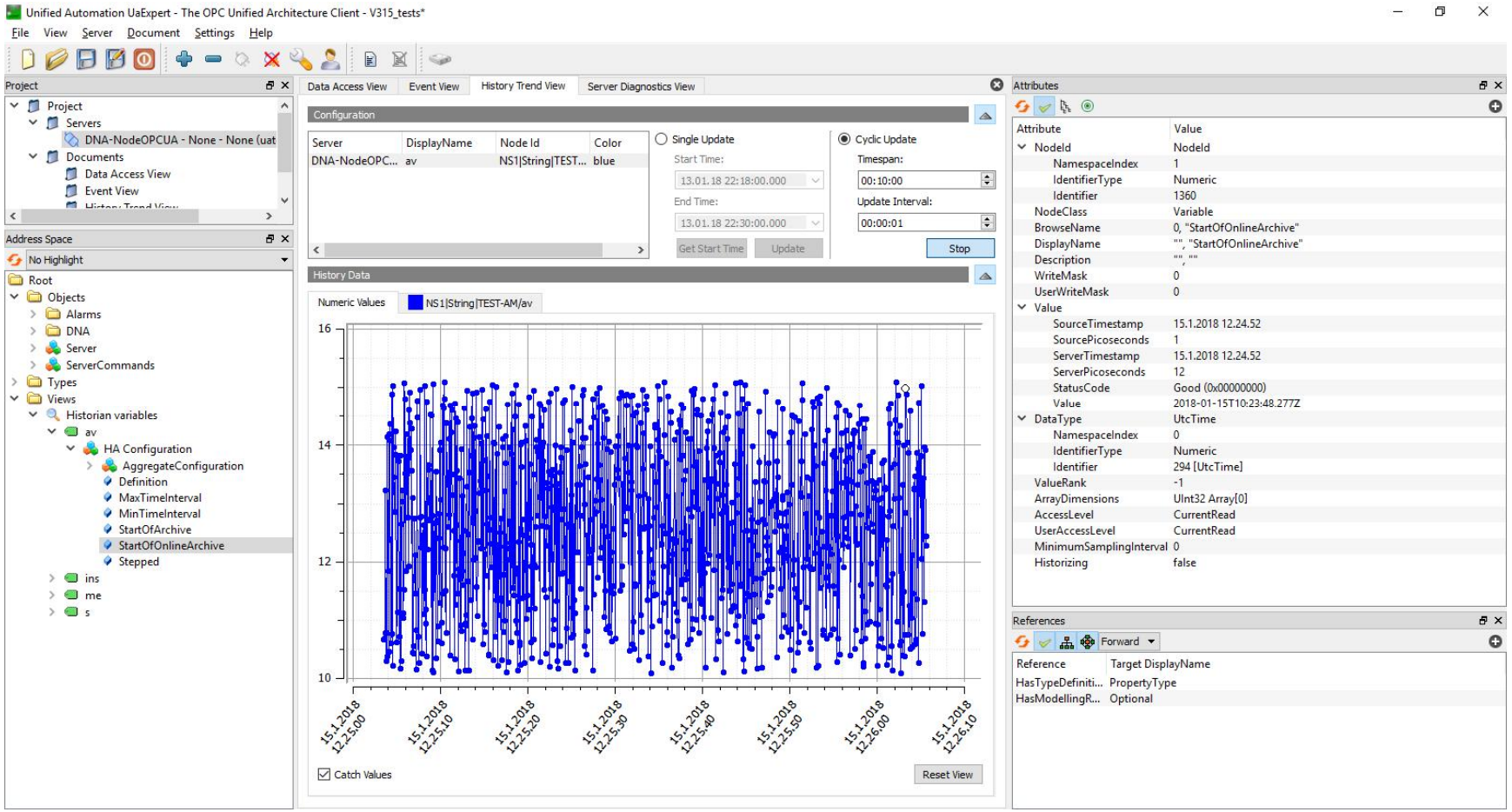
OPC UA Historian

Values can be accessed from Views – Historian variables



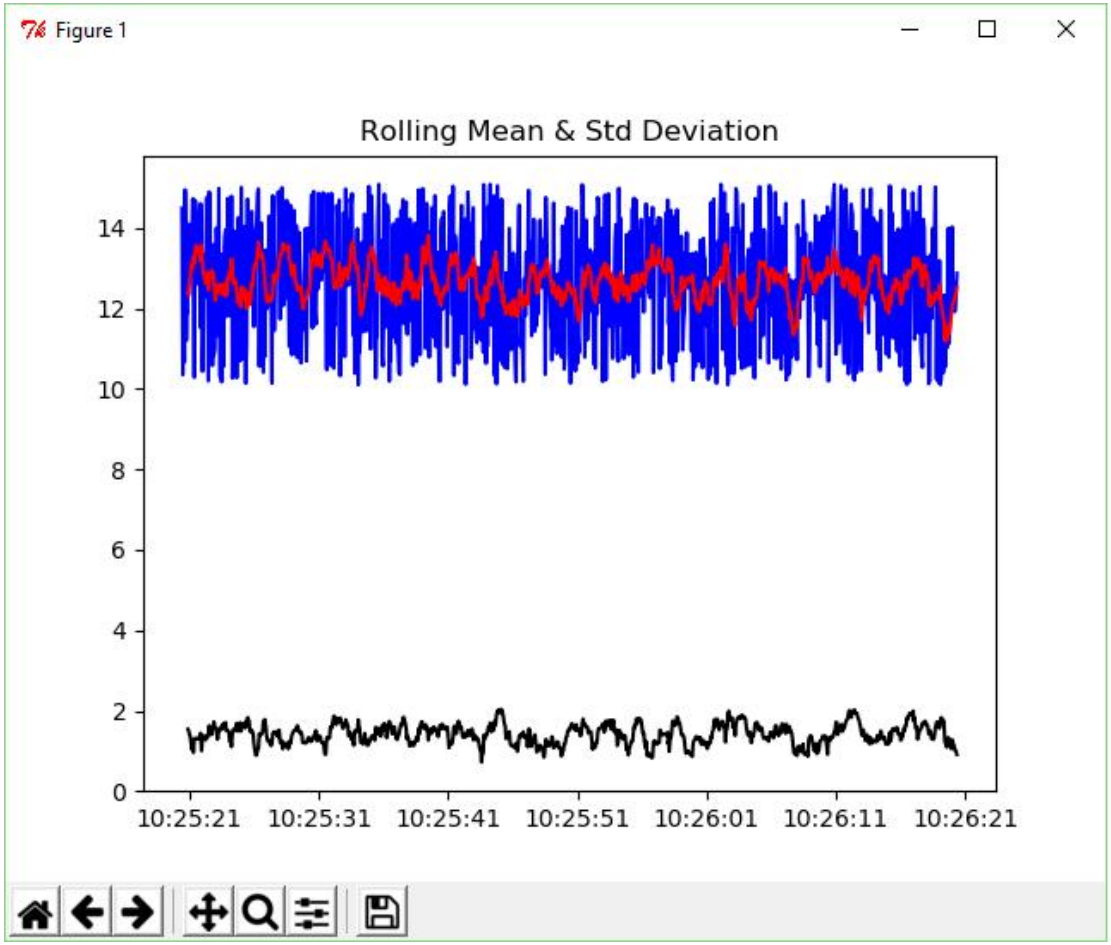
OPC UA & Machine Learning

Trend data



OPC UA & Python Machine Learning

Analysis from HA data -> Dataframe



df.rolling(window=10).mean() and std()

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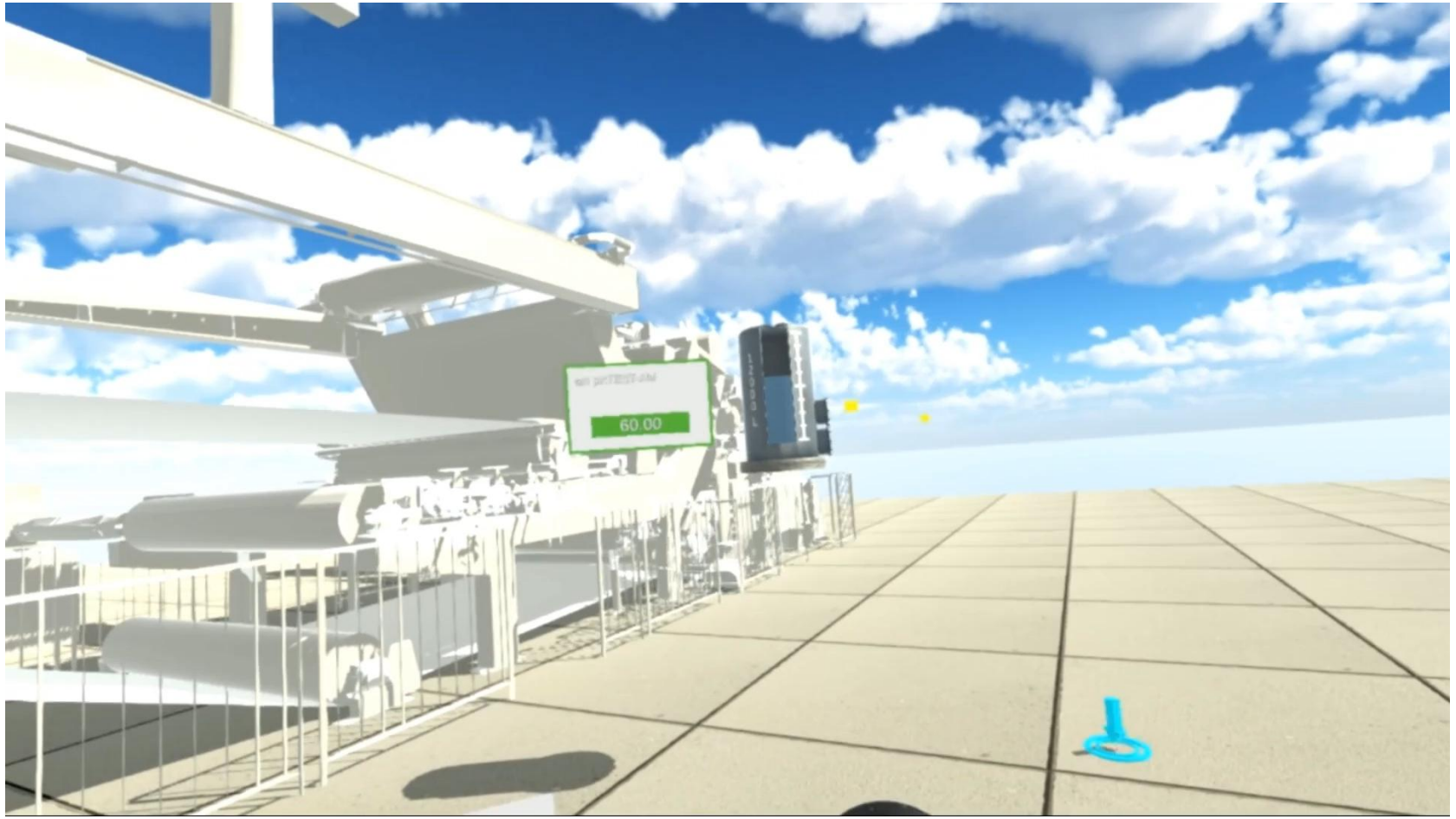
HoloMill – XR application
OPC UA based communication

MR HoloMill

Live values animated on domain objects like Tank, Pump etc.



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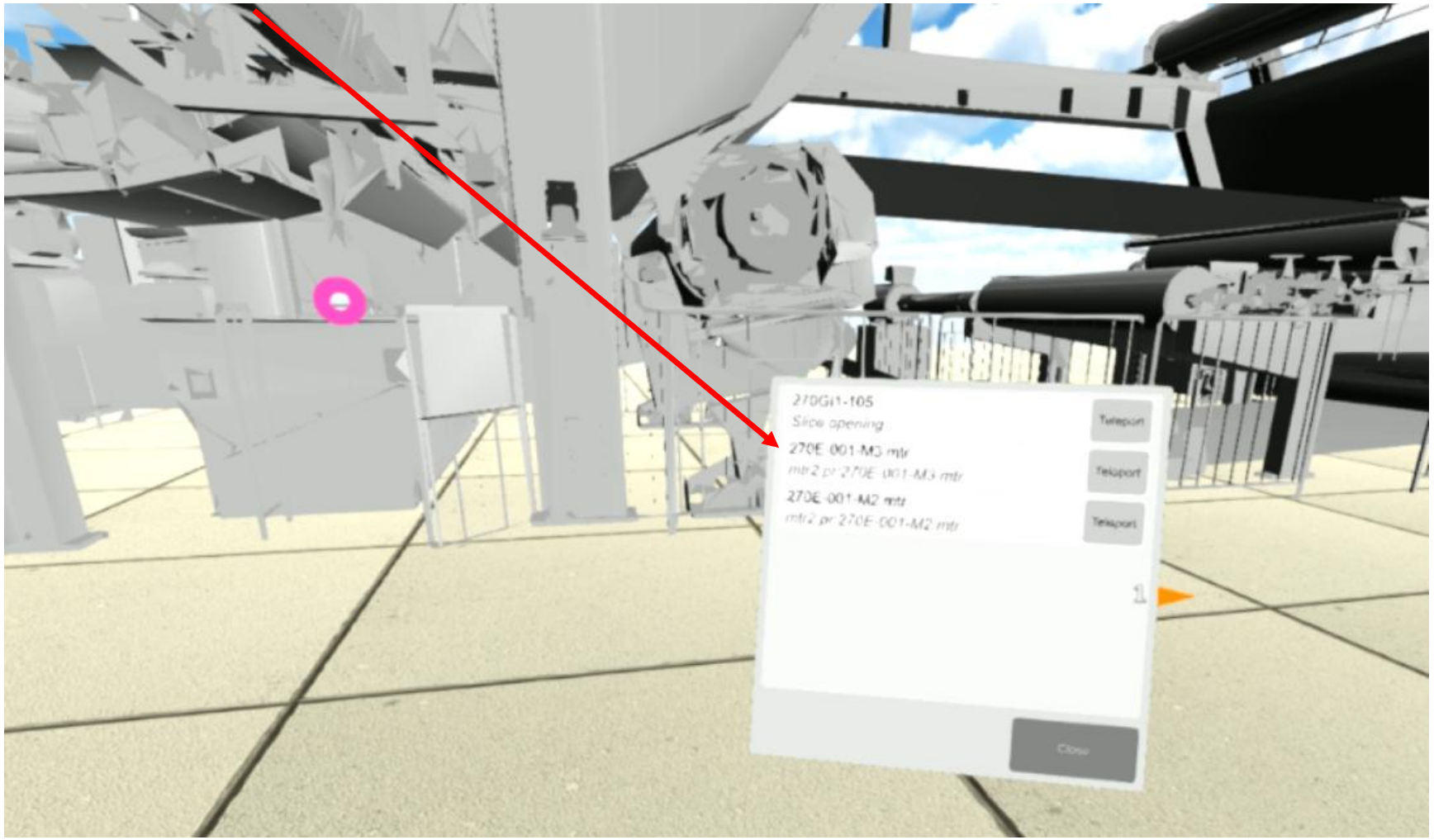
MR HoloMill – Teleport to active alarm location

Tag and description



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OPC UA - Vision

- OPC UA can be extended
- OPC UA usage grows fast
- More runtime behavior through Views and Methods
- Standardization will be needed even more:
  - To support different vendors & versions
  - Share use cases & agree formats

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FORWARD