

Open Platform Communications Unified Architecture **OPCUA**

(released in 2008)

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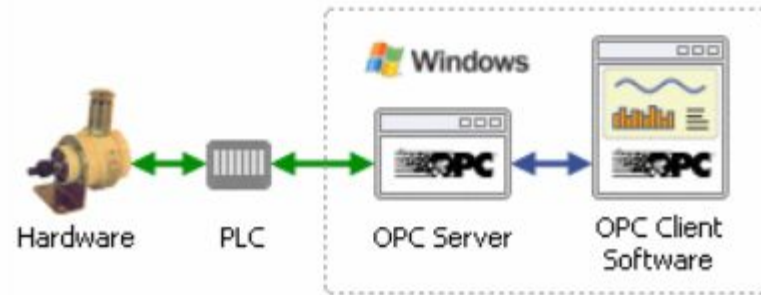
OPC UA information modeling framework turns data into information and transport of machine-to-machine data and interfaces and the semantics of data

OPC UA standardizes industrial connectivity and ensures interoperability between products from different manufacturers

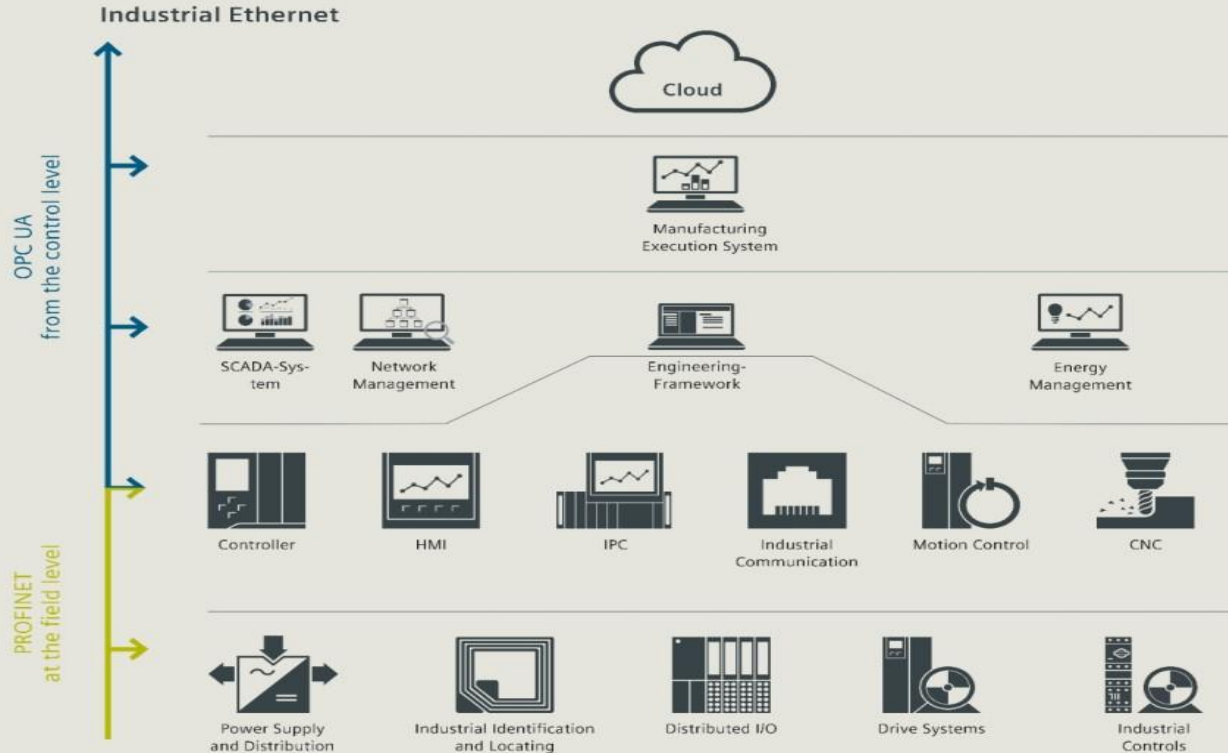




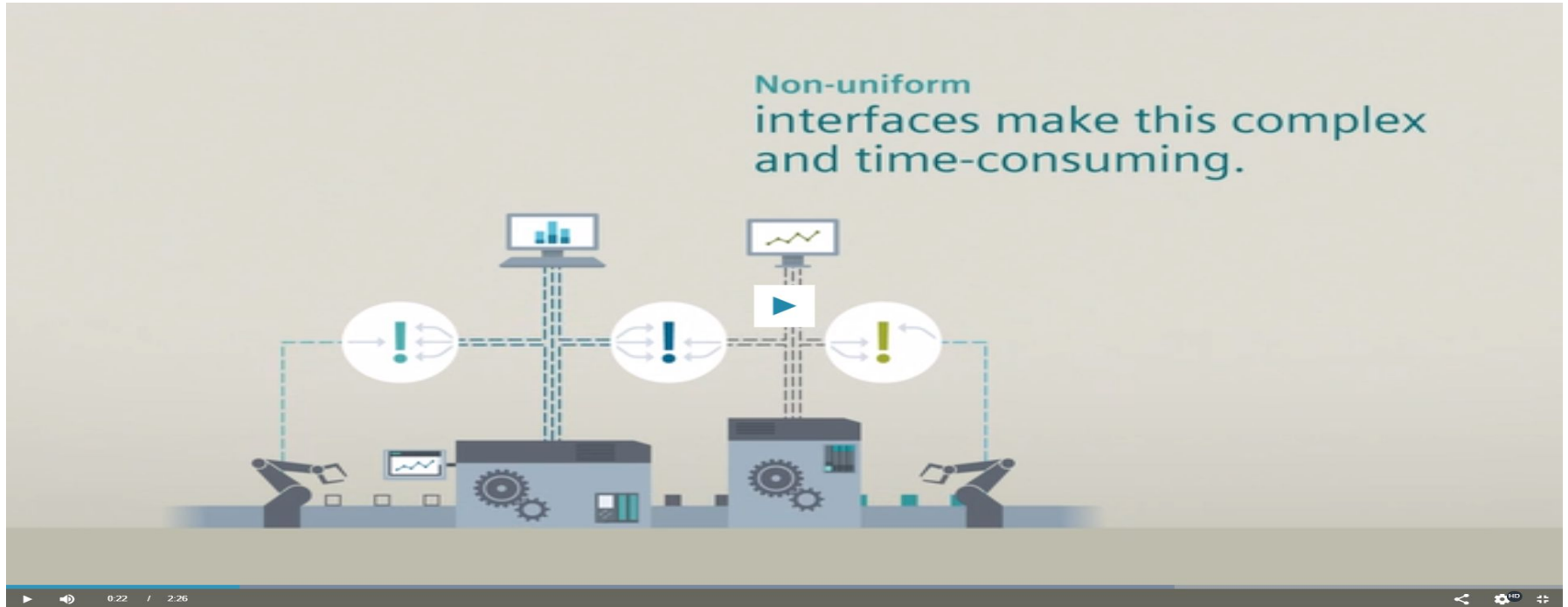
OPCUA Process



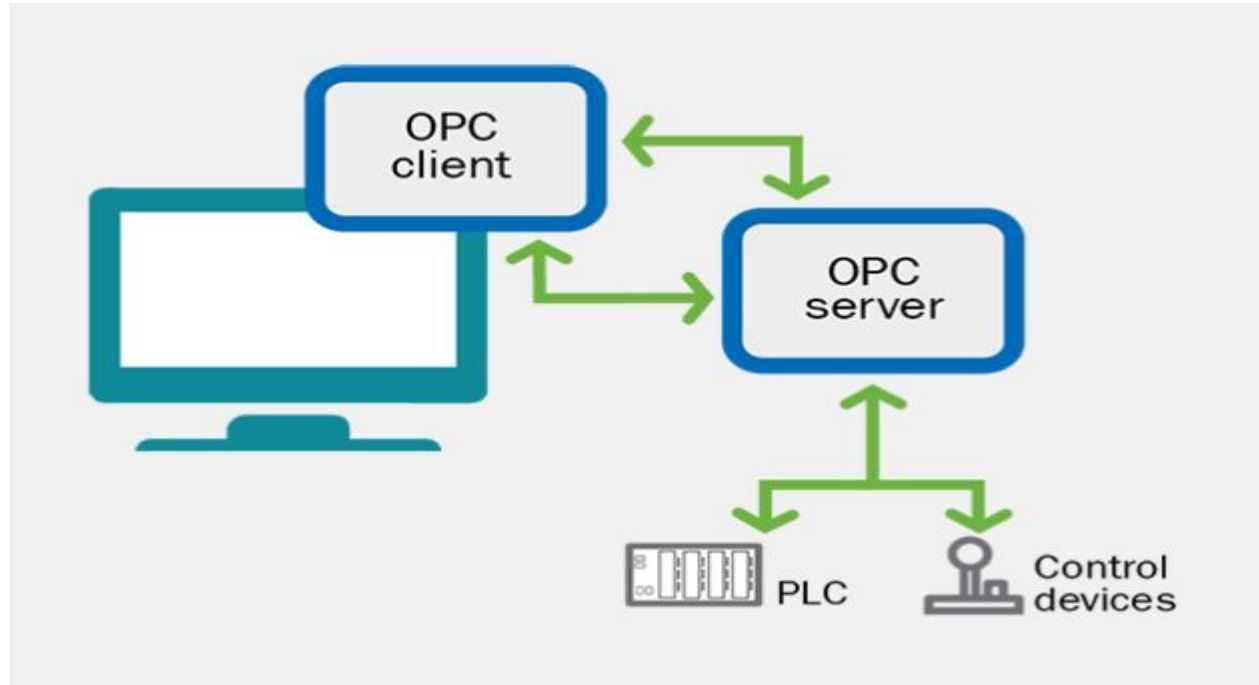
OPC UA provides a very flexible and adaptable mechanism for moving data between enterprise-type systems and the kinds of controls, monitoring devices and sensors that interact with real world data



A Robust Set of Services –OPC UA provides a full suite of services for eventing, alarming, reading, writing, discovery and more.

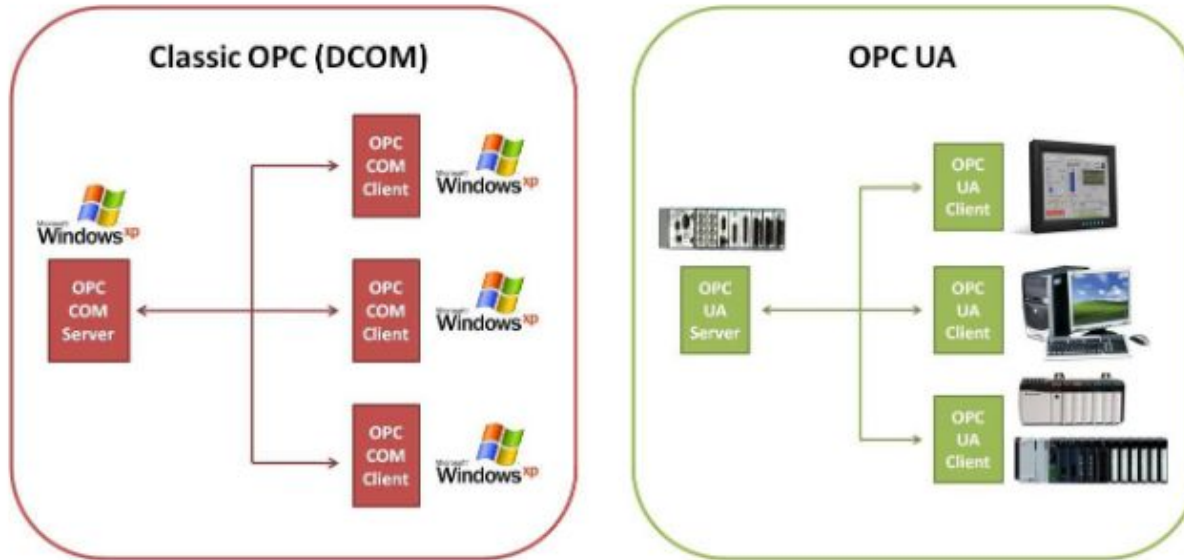


Internet Capability –OPC UA is fully capable of moving data over the Internet



available hardware platforms and operating systems:

- **Hardware platforms:** traditional PC hardware, cloud-based servers, PLCs, micro-controllers (ARM etc.)
- **Operating Systems:** Microsoft Windows, Apple OSX, Android, or any distribution of Linux, etc.



OPCUA client application:

In this application we can manage data that was sent by our codes(python codes) and watch streaming data .

Note: we could use different kind of free applications for OPCUA client and server.

In my project i used 'Prosys OPC UA Client' .

OPCUA Client Environment:

Prosops OPC UA Client Pro Beta

Help

FreeOpcUa Python Server +

Running opc.tcp://192.168.0.1:7000 -- urn:freeopcua:python:server

Search

- Objects
 - MyObject
 - Data_01
 - Data_02
 - Data_03
 - Data_04
 - Radarmodell0
 - Radarmodell1
 - Radarmodell3
 - Radarmodell4
 - id
 - majid1
 - myvar_unix_time
 - sample_number
 - time_uncertainty
 - unix_time_nsecs
- Types
- Views

stream data

Attributes and References

Attribute	Value
NodeId	ns=2;i=8
NodeClass	Variable
BrowseName	2:Data_01
DisplayName	Data_01
Description	Data_01
WriteMask	NONE (0)
UserWriteMask	NONE (0)
Value	Data_01=0.28141576051712036
Data Type	Int64
ValueRank	Scalar
ArrayDimensions	[]
AccessLevel	CurrentRead, CurrentWrite
UserAccessLevel	CurrentRead, CurrentWrite
MinimumSamplingInterval	0.0
Historizing	false

Filters Browse Direction Forward

ReferenceType	Target
HasTypeDefinition	BaseDataVariableType

Information and description of each data

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Objects

MyObject

- Data_01
- Data_02
- Data_03
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- Radarmodell0
- Radarmodell1
- Radarmodell3
- Radarmodell4
- id
- majid1
- myvar_unix_time
- sample_number
- time_uncertainty
- unix_time_nsecs

Server

- Types
- Views

Attributes and References

Data View X +

Subscription Enabled ☒ Publishing Interval (in milliseconds) 1.000 Subscription Settings...

#	NodeId	DisplayName	Value	DataType	SourceTimestamp	ServerTimestamp	StatusCode	MonitoringMode	Graph
0	ns=2;i=8	Data_01	Data_01=0.9710280895233154	Int64	25.07.2019 11:42:40.936	null	GOOD (0x00000000...)	Reporting	<input checked="" type="checkbox"/>

Show data for (seconds) 60 ☐ Own axis for every signal

Graph Data_01

Time	Value	StatusCode
25.07.2019 11:42:26.826	Data_01=0.2747882306575775	GOOD (0x00000000) --
25.07.2019 11:42:27.829	Data_01=0.9575470685958862	GOOD (0x00000000) --
25.07.2019 11:42:28.831	Data_01=0.759941577911377	GOOD (0x00000000) --
25.07.2019 11:42:29.824	Data_01=-0.13635072112083435	GOOD (0x00000000) --
25.07.2019 11:42:30.824	Data_01=-0.9072827696800232	GOOD (0x00000000) --
25.07.2019 11:42:31.829	Data_01=-0.8440632224082947	GOOD (0x00000000) --
25.07.2019 11:42:32.837	Data_01=-0.00481584295630455	GOOD (0x00000000) --
25.07.2019 11:42:33.936	Data_01=0.8890573382377625	GOOD (0x00000000) --
25.07.2019 11:42:34.835	Data_01=0.9112909436225891	GOOD (0x00000000) --
25.07.2019 11:42:35.935	Data_01=0.046294305473566055	GOOD (0x00000000) --
25.07.2019 11:42:36.934	Data_01=-0.8155558705329895	GOOD (0x00000000) --
25.07.2019 11:42:37.935	Data_01=-0.9275877475738525	GOOD (0x00000000) --
25.07.2019 11:42:38.935	Data_01=-0.18679971992969513	GOOD (0x00000000) --
25.07.2019 11:42:39.936	Data_01=0.7257310748100281	GOOD (0x00000000) --
25.07.2019 11:42:40.936	Data_01=0.9710280895233154	GOOD (0x00000000) --

Streaming our data

Meta data of data(Information Model)

```
33         <Reference ReferenceType="HasComponent">ns=1;i=6005</Reference>
34         <Reference ReferenceType="HasComponent">ns=1;i=6004</Reference>
35     </References>
36 </UAObject>
37 <UAVariable DataType="LocalizedText" NodeId="ns=1;i=6006" BrowseName="1:Data_01" AccessLevel="3">
38     <DisplayName>Data_01</DisplayName>
39     <References>
40         <Reference ReferenceType="HasProperty" IsForward="false">ns=1;i=5002</Reference>
41         <Reference ReferenceType="HasTypeDefinition">i=68</Reference>
42     </References>
43 </UAVariable>
44 <UAVariable DataType="Float" NodeId="ns=1;i=6007" BrowseName="1:Data_2" AccessLevel="3">
45     <DisplayName>Data_2</DisplayName>
46     <References>
47         <Reference ReferenceType="HasTypeDefinition">i=63</Reference>
48         <Reference ReferenceType="HasComponent" IsForward="false">ns=1;i=5002</Reference>
49     </References>
50 </UAVariable>
51 <UAVariable DataType="Float" NodeId="ns=1;i=6008" BrowseName="1:Data_3" AccessLevel="3">
52     <DisplayName>Data_3</DisplayName>
53     <References>
54         <Reference ReferenceType="HasTypeDefinition">i=63</Reference>
55         <Reference ReferenceType="HasComponent" IsForward="false">ns=1;i=5002</Reference>
56     </References>
57 </UAVariable>
58 <UAVariable DataType="Float" NodeId="ns=1;i=6009" BrowseName="1:Data_4" AccessLevel="3">
59     <DisplayName>Data_4</DisplayName>
60     <References>
61         <Reference ReferenceType="HasTypeDefinition">i=63</Reference>
62         <Reference ReferenceType="HasComponent" IsForward="false">ns=1;i=5002</Reference>
63     </References>
64 </UAVariable>
65 <UAVariable DataType="Int64" NodeId="ns=1;i=6001" BrowseName="1:id" AccessLevel="3">
66     <DisplayName>id</DisplayName>
67     <References>
68         <Reference ReferenceType="HasTypeDefinition">i=63</Reference>
69         <Reference ReferenceType="HasComponent" IsForward="false">ns=1;i=5002</Reference>
70     </References>
71     <Value>
72         <uax:Int64>0</uax:Int64>
73     </Value>
74 </UAVariable>
75 <UAVariable DataType="UtcTime" NodeId="ns=1;i=6003" BrowseName="1:myvar_unix_time" AccessLevel="3">
```

python libraries which we are working with them:

1- google protobuf:

For buffering and getting data on the internet

2-OPCUA client and server:

For communicating with opc application

3- Streamz and Holoviews:

for streaming data and plotting them

A sample of streaming plot:

