FUSION FOR ENERGY

MARTe2 Users Meeting

Interfacing with MARTe2: OPC UA

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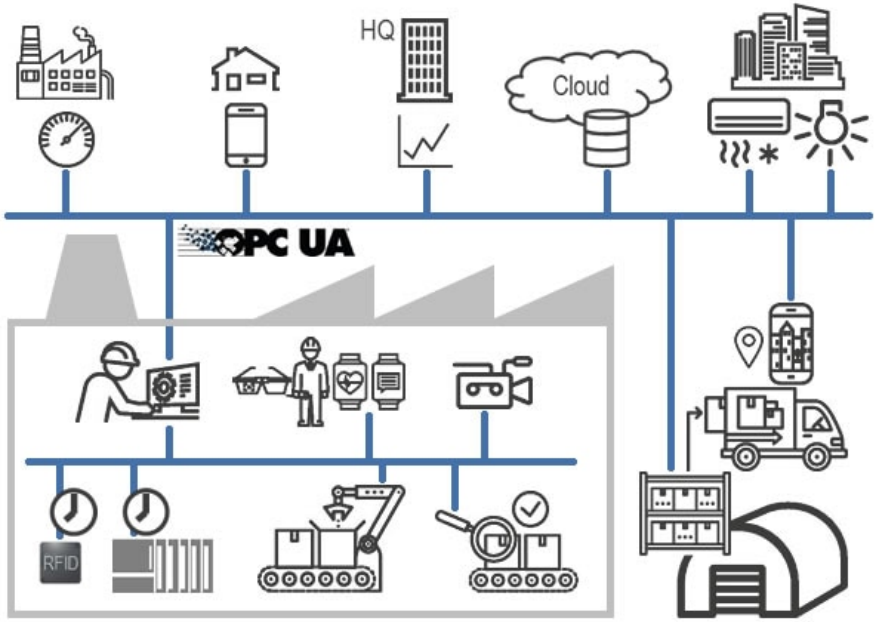
OPC Unified Architecture

OPC Unified Architecture is a *platform independent service-oriented architecture* for communication and information modelling in industrial automation.

- Open International Standard IEC 62541
- Vertical Communication
- Robust security
- Comprehensive Information model



OPC UA – Why?

Using OPC UA

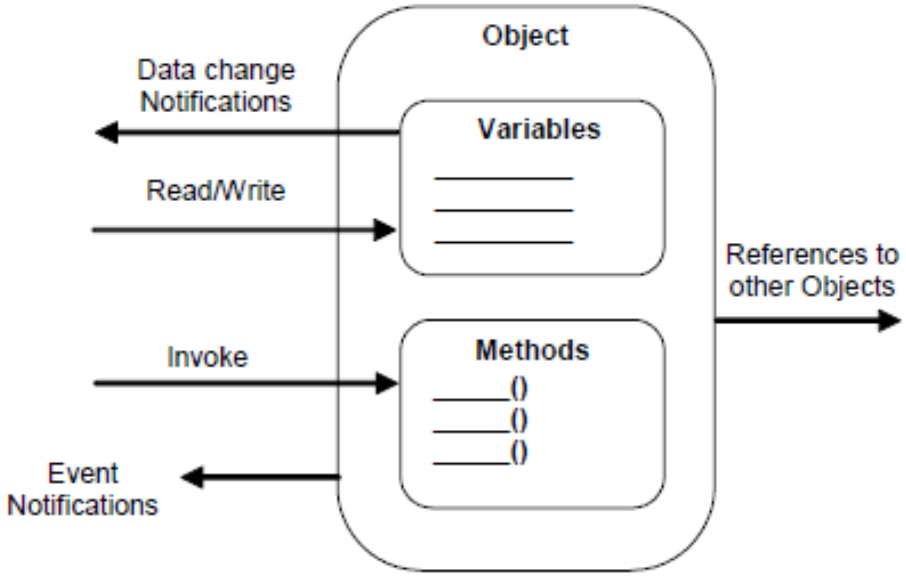
- Freely available and implementable under GPL 2.0 license
- Cross platform
- Service Oriented: OPC UA comprises a set of 37 standard services
- Inherent complexity: the specification consists of 1250 pages in 14 documents
- There are over 35 collaborations with the OPC Foundation

Communication model

- Client – Server or Publish – Subscribe model
- Binary TCP or Web Service

Integral Information model

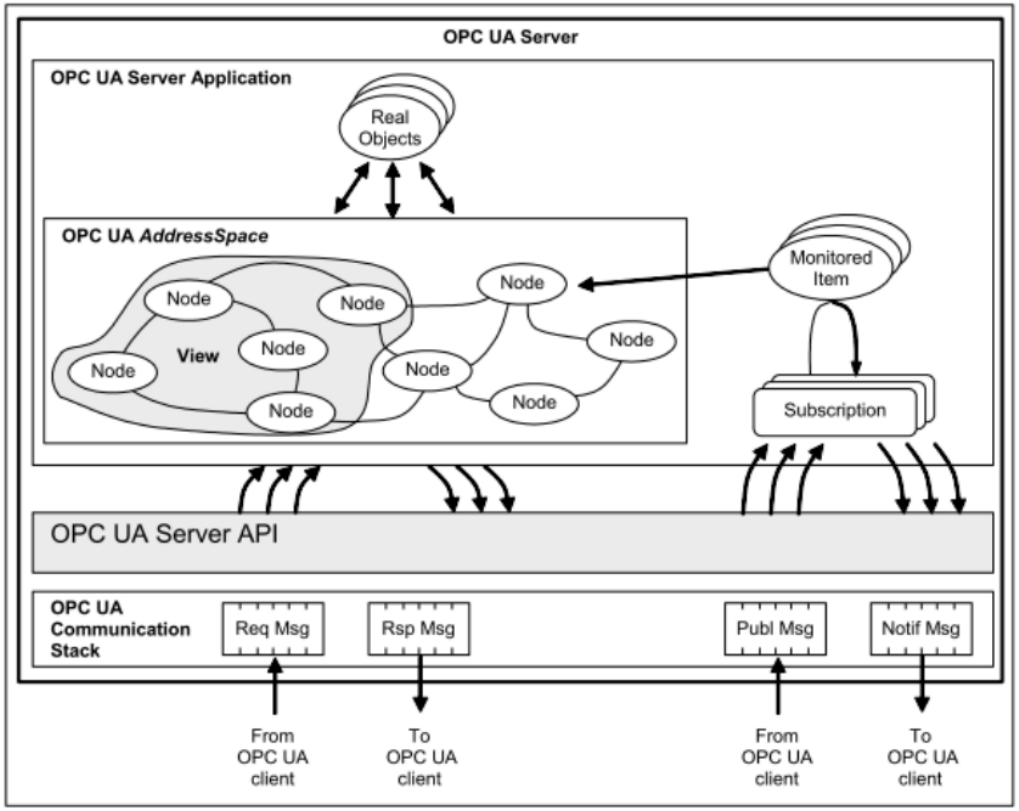
- Network based on nodes.
- Nodes can include any kind of meta information, and are similar to the objects in Object-oriented programming.
- Nodes can have attributes for data access, methods that can be called and triggered events.



OPC UA – Address Space

Database of variables

- **The set of objects and related information that the OPC UA server makes available to clients is its address space.**



MARTe2 – OPC UA: Library

Open62541: open source C implementation of OPC UA.

- Open source license (Mozilla Public License v2.0)
- Runs on Windows, Linux, QNX, Android and diverse embedded systems
- Written in C99 with architecture-specific plugins (POSIX, ...)
- Well supported: companies, universities, agencies

https://open62541.org/

MARTe2 – OPC UA: Components

Server – Client model

- OPC UA Server with Address Space builder => MARTe2 Interface
- OPC UA Clients for read/write data => MARTe2 DataSources

MARTe2 – OPC UA: Server Interface

OPCUAServer

```
+ServerTest = {
        Class = OPCUA::OPCUAServer
        Port = 4840
        CPUMask = 0x2
        AddressSpace = {
                TestVariable = {
                        Type = uint32
                }
                TestObject = {
                        Type = StructuredType
                }
        }
}
```

MARTe2 – OPC UA: DataSources

OPCUADSInput

```
+OPCUAIn = {
        Class = OPCUADataSource::OPCUADSInput
        Address = "opc.tcp://localhost.localdomain:4840"
        ReadMode = "Read"
        Synchronise = "yes"
        Signals = {
                SensorPackage1 = {
                        NamespaceIndex = 1
                        Path = TestObject.Set1.SensorPackage1
                        Type = SensorPackage
                        NumberOfElements = 1
                }
        }
}
```

MARTe2 – OPC UA: DataSources

OPCUADSOutput

```
+OPCUAOut = {
        Class = OPCUADataSource::OPCUADSOutput
        Address = "opc.tcp://localhost.localdomain:4840"
        Signals = {
                TestVariable = {
                        NamespaceIndex = 1
                        Path = TestVariable
                        Type = uint32
                        NumberOfElements = 1
                }
        }
}
```

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