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- Contact for any questions/updates/support on using the demo and extending it.

Prerequisites

- Windows 10 or later (Built using Windows SDK Version: **10.0.26100**)
    - Download from the following link: https://developer.microsoft.com/en-us/windows/downloads/windows-sdk/
- Download **Visual Studio 2022 Redistributable** (Platform Toolset: Visual Studio 2022 (v143) for x64)
- https://learn.microsoft.com/en-us/cpp/windows/latest-supported-vc-redist?view=msvc-170
- Download and install any OPC UA Client.
    - **Example**: https://www.unified-automation.com/downloads/opc-ua-clients.html

Installation of Application Files

- Download and copy the following files in the **same directory (Installation Directory)**.
    - opcua_ijt_demo_application.exe
    - Opc.Ua.AMB.NodeSet2.xml
    - Opc.Ua.Di.NodeSet2.xml
    - Opc.Ua.Ijt.Base.NodeSet2.xml
    - Opc.Ua.Ijt.Tightening.NodeSet2.xml
    - Opc.Ua.Machinery.NodeSet2.xml
    - Opc.Ua.Machinery.Result.NodeSet2.xml
    - Opc.Ua.NodeSet2.xml
    - Opc.Ua.Ijt.Tightening.Server.xml

Information

- This OPC UA Server Simulator exposes Assets, Results, Events, and Commands as per the following Companion Specifications:
    - https://reference.opcfoundation.org/IJT/Base/v100/docs/
    - https://reference.opcfoundation.org/IJT/Tightening/v200/docs/

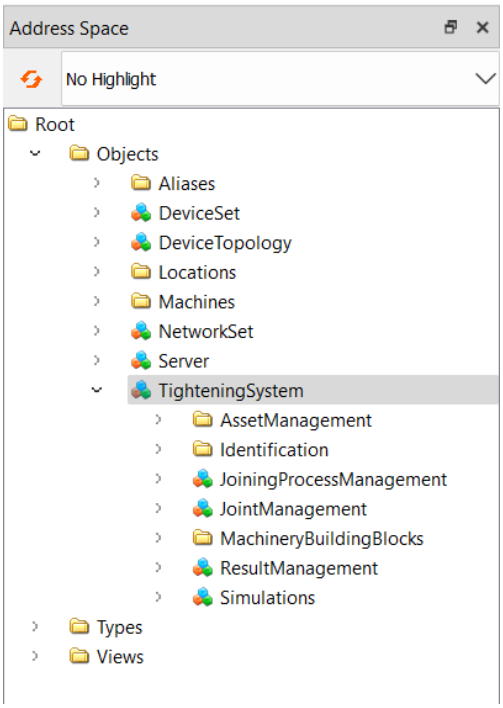
Running the application

- Ensure that the user has **Read/Write access** to the **Installation Directory**.
- Launch the binary file (**opcua_ijt_demo_application.exe**).
    - Run as Administrator or at least with **Read/Write** access.
- The **EndpointUrl** of the OPC UA Server is:
    - **opc.tcp://localhost:40451** or
    - **opc.tcp://YourComputerName:40451**.

Access data from OPC UA Client

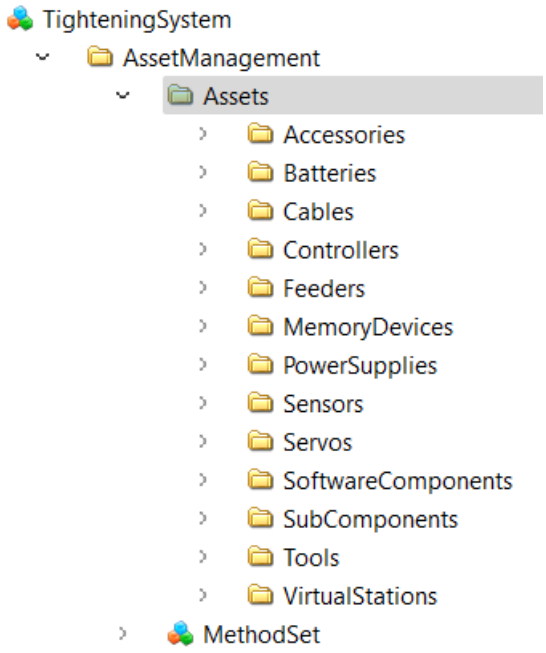
- Launch the OPC UA Client and connect to the given **EndpointUrl**.
- It will show the primary entry point: **TighteningSystem.**
- **All** the **Nodes** shown below are as per the **Companion Specification.**
- The **Simulations** node is the Application Node.

Tightening System Entry Point - AddressSpace View

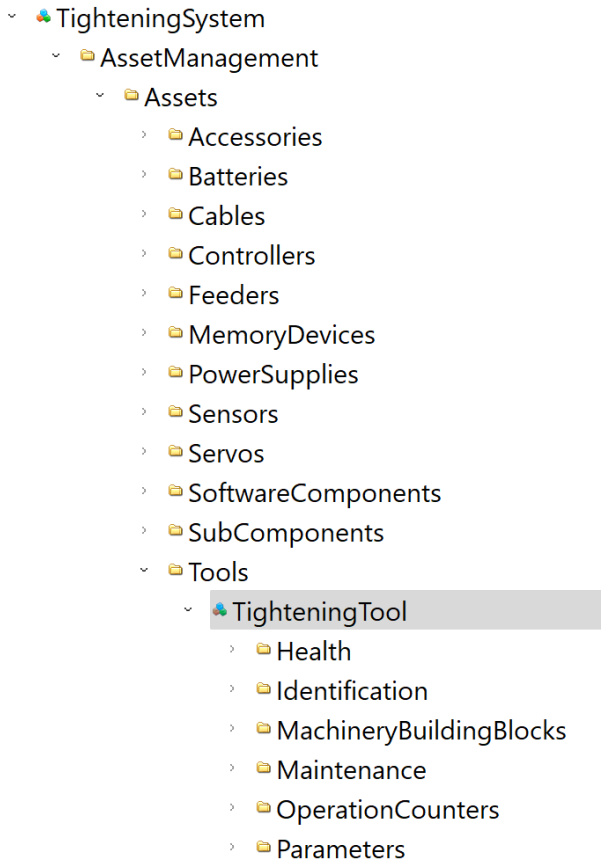


Asset Simulation

Browse the respective Asset Nodes from the address space and subscribe/read the respective data.

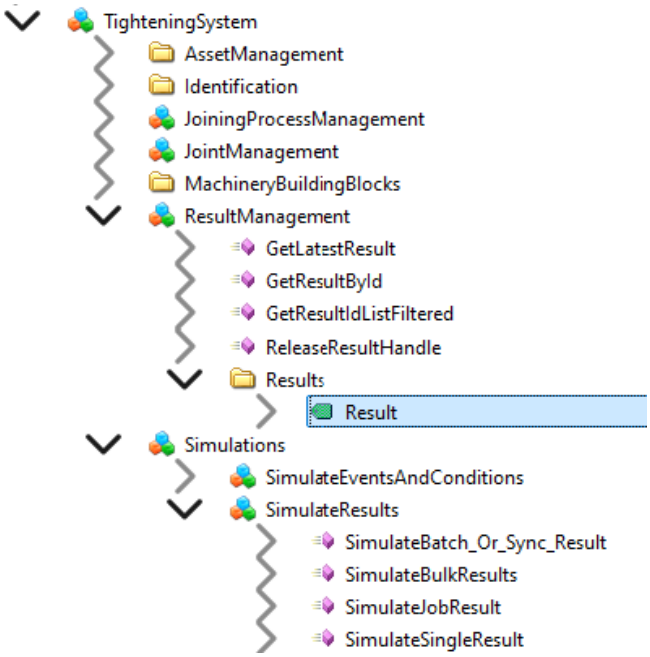


Example Asset Address Space View



Result Simulation

- **Result Access Options:**
  - Subscribe to the **Result variable** shown below.
  - Subscribe to **events** by subscribing to the **Server** node in the Event View.
- **Simulation Options**
  - Use the following **three methods** to simulate different types of **Results**. A new **Result** is generated upon the execution of the following **methods**.
    - SimulateBatch_or_Sync_Result
    - SimulateJobResult
    - SimulateSingleResult
    - SimulateBulkResults
  - The simulated data is similar to the examples defined in the Annexure sections of the Companion Specification.



- To generate a new Result, execute the **SimulateSingleResult method** shown above.
- The outcome can be visualized in the **Data Access View** or **Event View** if the respective **Result variable or Event is subscribed.**

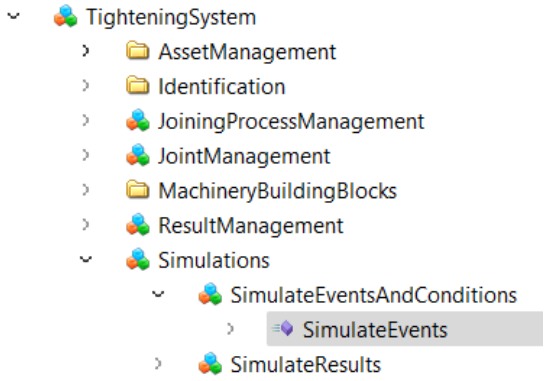
Example Result Data Access View

#	Display Name	Value	Datatype
1	Result	Double click to display value	ExtensionObject
2	ResultContent	Double click to display value	Variant
3	ResultMetaData	Double click to display value	ExtensionObject
4	AssemblyType	1	Byte
5	AssociatedEntities	Double click to display value	ExtensionObject
6	Classification	1	Byte
7	CreationTime	2024-04-29T12:08:28.103Z	DateTime
8	Description	"en", "SINGLE TIGHTENING RESULT"	LocalizedText
9	InterventionType	0	Byte
10	IsGeneratedOffline	false	Boolean
11	IsPartial	false	Boolean
12	IsSimulated	true	Boolean
13	JoiningTechnology	"en", "Tightening"	LocalizedText
14	Name	Single Result	String
15	OperationMode	2	Byte
16	ProcessingTimes	Double click to display value	ExtensionObject

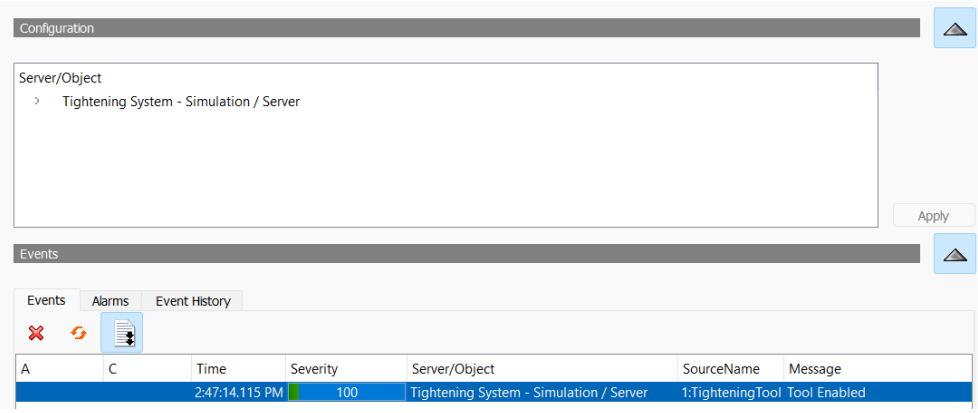
Event Simulation

Only a few events are added to the simulator. Execute the **SimulateEvents method** as shown below to generate a few types of events.

Note: Additional types of events will be added to the simulator in the future. The **content** of the Events would be similar to any type of event from a joining system.



Example Events View

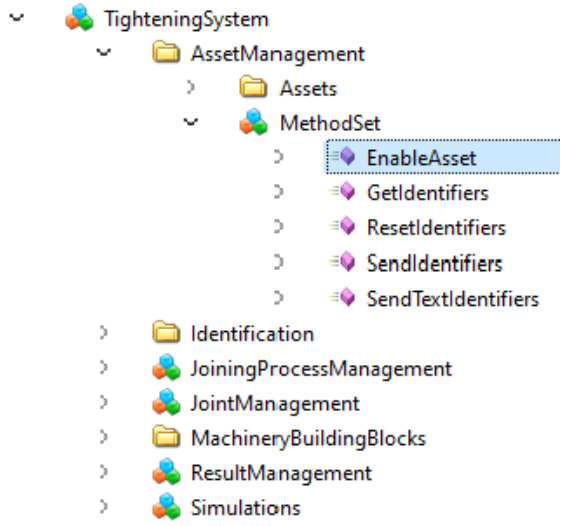


3:JoiningSystemEventContent/3:AssociatedEntities		Array of ExtensionObject
[0]		EntityDataType
	Name	ProductInstanceUri
	Description	ProductInstanceUri of the Asset
	EntityId	www.atlascopco.com/wsqp082020
	EntityOriginId	Null
	IsExternal	True
	EntityType	4
3:JoiningSystemEventContent/3:EventCode		0
3:JoiningSystemEventContent/3:EventText		"en", "Tool Enabled"
3:JoiningSystemEventContent/3:JoiningTechnology		"en", "Tightening"
3:JoiningSystemEventContent/3:ReportedValues		Array of ExtensionObject
ConditionClassId		NodeId
	NamespaceIndex	0
	IdentifierType	Numeric
	Identifier	11166 [SystemConditionClassType]
ConditionClassName		"en", "SystemConditionClassType"
ConditionSubClassId		Array of NodeId
[0]		NodeId
	NamespaceIndex	3
	IdentifierType	Numeric
	Identifier	1024
ConditionSubClassName		Array of LocalizedText
[0]		"en", "AssetEnabledConditionClassType"
EventId		len=1, 0x39

Command Simulation

An example simulation of **EnableAsset** is provided. It takes the input of the ProductInstanceUri of the Tool.

Few error cases can be simulated when the input argument is empty or invalid. A respective error is shown in the output arguments.



Example Command View