

Matrikon[®] Data Broker Version 2.0



End User How-To Guide

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About this manual

SOFTWARE VERSION

Version: 2.0

DOCUMENT VERSION

Version: 1

Document revision history

Revision	Supported Release	Date	Description
1.0	2.0	17/06/2022	Initial Release



Scope

This How-to Guide focuses on specific end-user tasks for the Matrikon Data Broker (MDB) and provides illustrated instructions for carrying them out. These end-user tasks are the basic tasks associated with the features of MDB, and do not include external tasks required to install or configure additional components such as bridging applications, network traversal applications, or external information models. This document describes only those specific fields and functions required to carry out the described task.

MDB is a complex application that implements many of the functionalities defined in the OPC UA specification. Some of these require advanced knowledge of the UA specifications and the components described therein. For example, some tasks associated with information modeling and data mapping require knowledge of programming methods in addition to knowledge of the address space components described in the specification. They are therefore beyond the scope of this document.

This document is intended as a supplement to the User Manual rather than a replacement for it. For a full description of the functionality of MDB please refer to the User Manual

Related documents and resources

MDB User Manual

Intended audience

This document is intended primarily for MDB end-users, administrators, and anyone responsible for day-to-day use of MDB and the operation of the system in which it is installed.

It can also be used as a reference for any customer considering the purchase of MDB.



Admonishments



NOTE - This symbol indicates additional information that should be considered when using this product or feature of the product.



INFO - This symbol indicates additional information about the product or feature of the product that may be of interest to the user.



CAUTION – This symbol indicates that an incorrect action may result in an error or unintended or unwanted operation of the product or a feature of the product.



WARNING – This symbol indicates that care must be taken to avoid an incorrect action that may result serious system errors which can include catastrophic failure!



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Introduction

The Matrikon Data Broker (MDB) is a fully compliant OPC Unified Architecture (UA) application that supports both server and client functionality. Server aggregation, reverse connection, data modeling and mapping, and MQTT Publisher are all supported in MDB 2.0. These features include many configuration and control items required for proper operation. This requires logging into the MDB as an administrator (*admin*).

OPC UA Explorer is a fully compliant OPC UA client application which supports all the features implemented in MDB. UA Explorer is also designed as the configuration interface for MDB. All tasks involving the configuration of MDB features and functions are carried out through UA Explorer.

This being the case, the first task that must be carried out is to connect UA Explorer to MDB. Upon first login, the password for the admin account should be changed. These are the first two tasks described in this guide.

Connecting Matrikon OPC UA Explorer to MDB

USE CASE

The Matrikon OPC UA Explorer is a fully compliant OPC UA client application that is designed to act as the configuration utility for MDB. It can be used to connect to any OPC UA server application. In the context of this document UA Explorer provides access to all the features of MDB.

PROCEDURE

- 1. Open OPC UA Explorer.
- 2. On the Home page, click on the Add New Server tile.





NOTE – By default UA Explorer uses discovery to retrieve the server url. If the Local Discovery server (LDS) is not available UA Explorer will throw an error and no server is listed. If the LDS is available, the MDB endpoints are listed under Local Discovery. This procedure assumes that no LDS is available.

3. Select the Manual radio button in the Connect Server window and enter the url of the MDB instance using the syntax:

	Connect Server	
Connection Method:		
Discovery	Manual	Reverse Connect
URL opc.tcp:// <comput< td=""><td>ername>:<portnumber></portnumber></td><td>Search</td></comput<>	ername>: <portnumber></portnumber>	Search
> Local Discovery		

opc.tcp://<computername>:<portnumber>

- 4. Click on the Search button to retrieve the endpoints for this server.
- 5. Expand the list of endpoints under the MDB instance and select the required connection endpoint.



6. In the Authentication window, select the User Details radio button and fill in the required UserName and Password.

	Authentication	•
Anonymous	User Details	
UserName admin Password		

 a. For the first connection to a new installation of MDB, the default login is the admin account with a blank password. This will result in UA Explorer displaying a warning. For information on changing passwords in MDB, refer to the section How do I change the user password in MDB?



7. UA Explorer displays an active connection tile in the Active Sessions/Reverse Connections list.

Mat	rikon OPC UA Explorer	
ŵ ■	Home	
<u>⊞</u> ಔЪ	New Connections & Configuration	
e e	+	ŝ
_ _	Add New Server	Configure Matrikon Data Broker
660	Active Sessions/Reverse Connections	
	Matrikon Data Broker - MDBN × Matrikon Data Broker - MDBNC Sign & Encrypt Basic256Sha256 ② Connected	

Changing the user password in MDB

USE CASE

MDB comes preconfigured with no passwords for any of the users. When logging in for the first time, users receive a message recommending changing the password. To accomplish this task, it is necessary to access the User Management tab in the MDB configuration tab.

PROCEDURE

- 1. Connect UA Explorer to MDB.
- 2. Click on the Configure MDB icon on the left edge of the display.

B Mate	Vatrikon OPC UA Explorer									
۵	Home									
	New Connections & Configuration									
<u>بې</u>		<u>5</u>								
ঞ	T	5 <u>0</u> 3								
<u>_</u>	Add New Server	Configure Matrikon Data Broker								
₿₽	Active Sessions/Reverse Connections									
卽	Matrikon Data Broker - MDBN $_{ imes}$									
	Matrikon Data Broker - MDBNC									
	Basic256Sha256									
	Connecteu									

3. In the User Management tab, click on the Change Password button for the account you wish to modify. In this example we are changing the *admin* account password.

Matr	Matrikon OPC UA Explorer									
<u> </u>	Matrikon Data Broker Configuration									
⊞ ఔ	:	Session Matrikon Data Broker - MDBNORTH55010 - Session - 1 Forge IoT Device Registration								
2 <u>2</u> 5										Server Settings
C+2		_								User Management
Ē			User Name		Description		Security Role	Password	Enabled	i
87		1	admin				Administrator	Change Password		
1		2	Anonymous				Guest	Change Password		
		3	guest				Guest	Change Password		
		4	operator				Operator	Change Password		

4. Enter and confirm the new password in the Change Password dialogue. Click on OK.

Change Password		
New Password	-	
(Clear	

5. Click on the Apply button to execute the requested change.

N	Matrikon Data Broker Configuration '							
s	Session Matrikon Data Broker - OPCSOUTH - Session - 1			Forge IoT Device Registra	ation 🧲			
	Server Settings							
				User Management		•		
	User Name		Description	Security Role	Password	Enabled		
ŀ	1 admin			Administrator	Change Password			
	Anonymous			Guest	Change Password			
	guest			Guest	Change Password			
4	4 operator			Operator	Change Password			
						Cancel Apply		
				FireBridge Reverse Connec	tions	•		

6. In UA Explorer, disconnect from MDB, then reconnect using the new password.

Connecting third-party clients to MDB

USE CASE

Although Matrikon's UA Explorer is the client application that is installed with MDB and acts as the configuration tool, it is not intended as an industrial solution. The client application that normally connects to MDB is usually the application that consumes the data, such as a DCS or an archive application.

PROCEDURE

Any client application connecting to MDB must execute the same process as UA Explorer, ensuring that each required field is correctly filled in. The specific actions and GUI items will vary from client to client, but the requirements remain the same. In this example we use the Unified Automation UA Expert as our client.

- 1. Open UaExpert.
- 2. Click on the Add item from the Server dropdown menu



3. Fill out the connection details under the "Advanced" tab within the "Add Server" window:

Mdd Server		?	×
Configuration Name Matrikon	Data Broker - MDB2		
Discovery Advanced			
Server Information			
Endpoint Url	c.tcp://DESKTOP-PKK7FOQ.lo	cal.:44444	
Security Settings			
Security Policy	Aes256Sha256RsaPss	•	2
Message Security Mode	Sign & Encrypt	•	3
Authentication Settings			
O Anonymous			
Username 4	Admin	Store Store	
Password 5	••••		
Certificate			
Private Key			
Session Settings			
Session Name	P-PKK7FOQ:UnifiedAutomation	:UaExpert	
Connect Automatically			
	6 ок	Canc	el

- 1) Endpoint URL
- 2) Security Policy
- 3) Message Security Mode
- 4) User Name
- 5) Password
- 6) Click on OK.

4. There are a number of commands for connecting to this new server, including rightclicking the server and selecting "Connect", or as shown here, clicking on the "connect button in the button bar.



5. If this is the first attempt to connect to the MDB, a "Bad Security" error may occur due to untrusted certificates. If this happens, the Certificate Validation dialog opens automatically.

Certificate Validation					?	×
The certificate of serve	er 'Mati	ikon Data Broker - MDB20'	was validated suc	cessfully.		
Good						
Certificate Chain						
Name		Trust Status				
🛕 Matrikon FLEX Di	spatch	Trusted				
Certificate Details						
Cel uncate Details						
Subject	Matui	an ELEV Disectols				<u>^</u>
Organization	Iviatri	Kon FLEX Dispatch				
Organization						
Locality						
State						
Country						
DomainComponent	DESK					
Issuer	DESK					
Common Name	Matri	kon FLEX Dispatch				
Organization						
OrganizationUnit						
Locality						
State						
Country						
DomainComponent	DESK	TOP-PKK7FOQ				
Validity						
Valid From	Fri M	ay 27 11:02:17 2022				
Valid To	Wed	May 26 11:02:17 2027				
Info	20.40	DED				
Serial Number	3D48	DED NADE6				
Signature Algorithm	RSA-	049 L:+)				
Thumhnrint (SHA1)	E0616	2040 DIL) 92D2D627E2R96A0057C06AE	7202154 46667			
	15010	05050057E5000A0557C50Ar	TODE TO AREET		-	<u> </u>
				Trust Server	Certific	ate
Accept the server certificat	te tempo	rarily for this session	2	Continue	Cano	el

- 6. To accept the MDBs certificate with UA Expert
- 1) Click Trust Server Certificate
- 2) Click Continue
- 7. To accept the UA Expert certificate with MDB, refer to the section "How do I accept application instance certificates in MDB?"
- 8. The "Address Space" window now displays the MDB address space.



Connecting MDB to OPC UA servers

USE CASE

OPC UA client and server functionalities are more easily integrated into a single application than was the case in OPC Classic. MDB is specifically designed and developed with this integration in mind. The Federator feature allows MDB to connect to other OPC sources such as OPC UA servers. MDB thus becomes the gathering point; a single application where all data from an extended system can be represented within a single address space.

PROCEDURE



NOTE - Errors may occur in this procedure if the target OPC UA server has not accepted the MDB application instance certificate. Before starting, ensure the MDB certificate has been added to the UA server's trusted certificate list, and is not in the rejected certificate list.

- 1. Connect UA Explorer to MDB using the *admin* account.
- 2. Click the Data Broker Configuration button.



3. Expand the Federator Data Sources panel.

B Matri	ikon OPC UA Ex	plorer								
<u>命</u>	Matrikon	Data Broker Configura	tion							
	Session	Session Matrikon Data Broker - MDBNORTH55020 - Session - 1 Terrier Forge IoT Device Registration								
2 <u>0</u> 3		Server Settings								
G					User Manage	ment				
لڇتا					FireBridge Reverse (Connections				
හි					Federator Data	Sources				
2	UA DataSou	UA DataSource OPCUA server +								
	Data Sou	гсе Туре	Data Sou e Name	Connection Point		Connection Status	Configure			
	1 Simulate	dDataSourceType	SimulatedData	Not Available			٢	Ŵ		

- 4. Select UA DataSource from the drop-down menu and enter a name for the connection.
- 5. Click the **'+'** to add the connection. The new connection appears in the list of Data Sources
- 6. Click on the Configure button for the new connection.

			Federator Data	Sources		
	UA DataSource	-	+			
	Data Source Type	Data Source Name	Connection Point	Connection Status	Configure	
	1 UAClientDataSourceType	OPCUA server	opc.tcp://ua-server-hostname-or-ip:port/	BadNotConnected	٢	Ŵ
l	2 SimulatedDataSourceType	SimulatedData	Not Available		÷	Ŵ

7. Select the Manual radio button to connect directly to the data source.

B Matrikon Data E	roker UA Data Source Configuration		_		×
UA Data Source Name: OPCUA	e server	Connection Status : BadNotConnected			
Connections	Advanced Settings				
Discovery	Manual	Reverse Connect Data Source with Remote UA Server			
Server Url	pc.tcp://opcnorth:62541/Quickstarts/ReferenceServer		Find	I Servers	

- 8. Enter the Server Url and click on the Find Servers button.
- 9. Expand the OPC Server and choose a connection method.

me: OPCUA server	Connection Status : BadNotConnected
Discovery Manual	Reverse Connect Data Source with Remote UA Server
Server Url opc.tcp://opcnorth:62541/Quickstarts/ReferenceServer	Find Servers
Astrikon Data Broker UA Data Source Configuration Data Source me : OPCUA server Innections Advanced Settings Discovery Manual Server Url opc.tcp://opcnorth:62541/Quickstarts/ReferenceServer End Points Quickstart Reference Server Quickstart Reference Server Basic128Rsa15 - Sign & Encrypt Basic256 - Sign None - None Basic256 - Sign Basic2565 - Sign Basic256 - Sign Basic2565 - Sign Basic2565 - Sign Basic2565 - Sign Basic2565 - Sign Basic2565 - Sign Basic2565 - Sign & Encrypt Basic2565ha256 - Sign Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt Basic128Rsa15 - Sign & Encrypt	Reverse Connect
 Opc.tcp://opcnorth:62541/Quickstarts/ReferenceServer Quickstart Reference Server Basic128Rsa15 - Sign & Encrypt Basic226 - Sign 	Listening TCP Port 0 🔹 Server Uri urn:
None - None	Connection Point
 Basic128Rsa15 - Sign Basic256 - Sign & Encrypt Basic256Sha256 - Sign Basic256Sha256 - Sign & Encrypt Basic256Sha256 - Sign & Encrypt 	Endpoint Url opc.tcp://opcnorth:62541/Quickstarts/ReferenceServer Security Policy None Security Mode None
	User Token Anonymous
lemote Server's Application URI: Jrn:opcnorth:UA:Quickstarts:ReferenceServer	UserName username User Details Password

- 10. Select the User Token type based on the requirements of the server.
- 11. Click on the Enable checkbox to ensure it is checked and click Apply.
- 12. Before the data source can be accessed, MDB must complete all federation tasks. This is indicated in the configuration dialog when the message **Connected** is displayed.

ame: OPCUA server		Connection Status : Good	
onnections Advance	d Settings		
Discovery	Manual	Reverse Connect Data Source with Remote UA Server	
Hostname / IP	on Data Broker UA Data Source Configuration ta Source OPCUA server ctions Advanced Settings scovery Manual tname / IP oints ote Server's Application URI:	Port Find 9	Servers
Matrikon Data Broker UA Data Source Configuration UA Data Source Name: OPCUA server Connections Advanced Settings Discovery Manual Reverse Connect Data Source with Remote UA Server Port End Points End Points Connection Point End Points Connection Point End Points Connection Point End Points Connection Point Endpoint Url Opc.tcp://opcnoth:62541/Quickstarts/ReferenceS Security Policy None Vaser Token Anonymous User Token User Details Password			
		Listening TCP Port 0	
		Server Uri urn:	
	a Source OPCUA server Advanced Settings scovery Manual name / IP oints te Server's Application URI: cnorth:UA:Quickstarts:ReferenceServer	Connection Point	
		Endpoint Url opc.tcp://opcnorth:62541/Quickstarts/ReferenceSen	/er
		Security Policy None	
Data Source e: OPCUA server nections Advanced Settings Discovery Manual ostname / IP d Points mote Server's Application URI: reprint: uspcnorth:UA:Quickstarts:ReferenceServer	Security Mode None		
	User Token		
	ata Source : OPCUA server ections Advanced Settings Discovery Manual stname / IP Points note Server's Application URI: opcnorth:UA:Quickstarts:ReferenceServer	Anonymous	
Remote Server's Applicati	Advanced Settings iscovery Manual tname / IP 'oints ote Server's Application URI: opcnorth:UA:Quickstarts:ReferenceServer	UserName username	
urn:opcnorth:UA:Quickstart	iscovery Manual iscovery Manual itname / IP P ?oints P ote Server's Application URI: P opcnorth:UA:Quickstarts:ReferenceServer P	User Details Password	

- 13. Collapse the Federator Data Sources tab, then expand it to refresh the Connection Status.
- 14. Browse the Federated data source in the Data View by clicking on the Data View icon.

۵	Home	
	New Connections & Configuration	
Ð	1	<u></u>
ନ	Ŧ	۶ <mark>۵</mark> ۶
_ _	Add New Server	Configure Matrikon Data Broker
87	Active Sessions/Reverse Connections	
₽	Matrikon Data Broker - MDB2 $^{ m i} imes$	
	Matrikon Data Broker - MDB20	
	Sign Basic128Rsa15	
	Connected	

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15. The address space of the newly added data source appears in the **DispatchConfiguration** folder.



Root > Objects > DispatchConfiguration > DataSources > YourDataSource >

- 16. The structure from this point differs from OPC server to OPC server. Expand the folders until the desired items are located.
- 17. Dragging the required tag(s) from the list in the Address Space to the Data View adds them to the MonitoredItemList for this server.

Accepting application instance certificates in MDB

USE CASE

OPC UA security relies on the exchange of application instance certificates to authenticate connecting components. This is normally handled by the certificate management components in your infrastructure. Even where these components are not available, it remains a requirement to accept the certificates before a connection can be established. Although this can be accomplished manually, UA Explorer and MDB support this functionality.

PROCEDURE

Manual certificate management

1. Navigate to certificate storage for rejected application instance certificates of your MDB instance.

C:\ProgramData\Matrikon\DataBroker\<yourMDBinstance>\pki\DefaultApplicationGroup\rejected\certs



2. Move the rejected certificate to the trusted application instance certificate storage.

C:\ProgramData\Matrikon\DataBroker\<yourMDBinstance>\pki\DefaultApplicationGroup\trusted\certs

3. MDB now trusts this certificate and this application.

Via UA Explorer

If the OPC UA server supports the certificate management methods defined in the UA specification, OPC Explorer can be used to manage the application instance certificates in the server's certificate store.

1. Open OPC UA Explorer and connect to MDB.

2. Click on the "Manage Certificate" icon on the left edge of the display.

	Home				
	New Connections & Configuration				
<u>بې</u>	1	<u>Å</u>			
ক	т	2,5			
Q	Add New Server	Configure Matrikon Data Broker			
899 1	Active Sessions/Reverse Connections				
1	Matrikon Data Broker - MDB2($ imes$				
	Matrikon Data Broker - MDB20				
	Sign Basic128Rsa15 👸				
	- Connected				

3. If UA Explorer is connected to multiple servers that support certificate management methods, you must elect the server (session) for which you wish to manage the certificates. This includes multiple instances of MDB

B Matri	ikon OPC UA Explorer		
ŵ	Certificate Management		
Ⅲ	Session Matrikon Data Broker - MDBNORTH55020 - Session - 1	-	Server Name : Matrikon Data Broker - MDBNORTH55020

4. Verify the status of the certificate by checking the Is Trusted? column in the Certificate Management panel. If a certificate is not trusted, select it by checking the checkbox in the left-most column.

B Matr	ikon	n OPC UA E	xplorer							
匬	C	Certificate Management								
⊞ ∰	rikon O Ce Sess 1 1 2 3 4 5	ession Mat	rikon Data Broker - MDBNORTH55020 - Session - 1 Server	Name : Matrikon Data Broker	- MDBNORTH55020					
ଜ	1	Select	Certificate Name	Issued To	Valid From	Valid Until	Is Trusted?			
ā	Attrikon O Ce Sess 1 1 2 3 4 5	1	Matrikon FLEX Dispatch [156E9D8BFC6E03E61C2F64D0DBBC8B65358315E7]	Matrikon FLEX Dispatch	2022-6-2 21:49:22	2027-6-1 21:49:22	Yes			
		2	Matrikon FLEX Dispatch [6758AE013420F184ED5DB003FA4F81FA12CA4ECF]	Matrikon FLEX Dispatch	2022-6-2 21:49:22	2027-6-1 21:49:22	Yes			
<u>₽</u>	1	3	Matrikon OPC UA Explorer [9B208FD20C949AE38DA4815903358EED827ABF33]	Matrikon OPC UA Explorer	2022-6-2 21:57:12	2027-6-1 21:57:12	Yes			
<u> </u>	4	4	UA Local Discovery Server [5D4A60E477B2AC3FBE4ED5DCFFCCB43D3742B3D5]	UA Local Discovery Server	2022-6-2 21:24:41	2025-6-1 21:24:41	Yes			
		5	UA Sample Client [090D6CA9099233AAF2F5CC19B40CBBBEAED0DDA8]	UA Sample Client	2022-6-2 23:16:39	2023-6-2 23:16:39	Yes			

- 5. Click on the Accept button to move the certificate to the trusted certificate store.
- 6. MDB now trusts this certificate and this application.

Creating reverse connections across firewalls

USE CASE

OPC servers are often installed on platforms within a high security zone, where unsolicited incoming messages are restricted by firewalls and other security mechanisms. For OPC Classic applications this required the complex configuration of multiple applications to allow communication between the client and server. The reverse connect functionality of OPC UA allows the OPC UA server in the high security zone to initiate the connection and communication. This outgoing message is not restricted by the firewall and the client application can respond without violating firewall protocols.



The FireBridge feature in MDB allows configuration of a reverse connection to an OPC UA client application. Ideally, the client application is enabled to invoke this service, and the server application supports the functionality. This instruction assumes that the original applications do not support this functionality, and that due to firewall restrictions the client cannot connect directly to the server. MDB acts as both client and server for this example, and UA Explorer is the configuration tool.

PROCEDURE

Configure the Client side by adding a data source to MDB

1. On the client side, connect Matrikon OPC UA Explorer to MDB as the admin user.

2. Click the Configure Matrikon Data Broker button.

Mat	rikon OPC UA Explorer	
ŵ	Home	
	New Connections & Configuration	
(<u>)</u>	1	<u>.</u>
ନ	T	223
_	Add New Server	Configure Matrikon Data Broker
8	Active Sessions/Reverse Connections	
目	Matrikon Data Broker - MDBN	
	Matrixon Data Droker - MDDN X	

3. Expand the Federator Data Sources panel.

		_	Federator Data Sources
UA DataSource	<connection name=""></connection>	+	

- 4. Ensure UA DataSource is selected from the dropdown menu and enter a name for this data source.
- 5. Click the '+' button to add this data source.
- 6. Click the Configure icon on the newly created data source to open the UA Data Source Configuration dialog.

Data Source Type	Data Source Name	Connection Point	Connection Status	Configure	
UAClientDataSourceType	<connection name=""></connection>	opc.tcp://ua-server-hostname-or-ip:port/	BadNotConnected	0	Ŵ

ame: <conne< th=""><th>ction name></th><th></th><th></th><th>Connection Status</th><th>: BadNo</th><th>tConnected</th><th></th><th></th><th></th></conne<>	ction name>			Connection Status	: BadNo	tConnected			
onnections	Advanced Setting	S							
Discovery		Manual	1.	Reverse Connect Data	Source with R	emote UA Server			
Matrikon Data Broker UA Data Source Configuration VA Data Source Name: <connection name=""> Connection Status: BadNotConnected Connections Advanced Settings Discovery Manual Port Find Points 2 Listening TCP Port Server Uri Urn: Connection Point Client Url opertop//us-server-hostname-or-ip:port/optional-path Security Policy Basic2565ha256 v Security Mode SignAndEncrypt v User Token Anonymous Valer Name User Details Password</connection>									
Connections Advanced Settings Discovery Manual Hostname / IP End Points Reverse Connect Security Point Connection Point Cient Uri opc.tcp://ua-serve Security Mode SignAndEncrypt User Token									
			2	Listening TCP Port	55001	* *			
				Server Uri	um:				
				Connection Point					
				Client Url	opc.tcp://ua	-server-hostname-or-ip:por	rt/optional-	path	
				Security Policy	Basic256Sha	256 💌			
				Security Mode	SignAndEnc	rypt 💌			
				User Token					
				Anonymous					
Matrikon Data Broker UA Data Source Configuration UA Data Source Name : < connection name> Connections Advanced Settings Discovery Manual Port End Points Reverse Connect Server Uri Urri: Connection Point Client Uri Opc.tcp2/ Security Policy Basicose Security Mode Sign.And User Token Anonymous Remote Server's Application URI: User Details Passwon	UserName								
			4	User Details	Password				

7. In the MDB UA Data Source Configuration dialogue Connections tab:

- 1) Select the Reverse Connect Data Source with Remote UA Server radio button option.
- 2) Enter the TCP port that this MDB node will use to listen for the reverse connection invitation from the server.

There is no need to enter the Server Uri, leave as-is.

- 3) Select the required Security Policy and Security Mode.
- 4) Set the User Token credentials as required by the server.
- 5) Ensure Enable is selected.
- 8. Click on the Apply button.
- 9. Note the message displayed at the bottom of the window "...Waiting for reverse connection..."

Configuring : [Waiting for reverse connection. Make sure external server initiates connection].	Enable Reset Cancel Apply
---	---------------------------

Configure the Server side

10. On the server side, connect UA Explorer to MDB as the *admin* user.

11. Click the Configure Matrikon Data Broker button

Matrikon OPC UA Explorer					
ŵ	Home				
	New Connections & Configuration				
÷		<u>.</u>			
ନ	T	272			
_	Add New Server	Configure Matrikon Data Broker			
\mathbf{a}					
672	Active Sessions/Reverse Connections				
₽ ₽	Active Sessions/Reverse Connections Matrikon Data Broker - MDBN ×				

- 12. Expand the FireBridge Reverse Connections panel.
- 13. Configure the Reverse Connection Destination as follows:

м	Matrikon Data Broker Configuration										
Se	ession	Matrikon Data Br	oker - MDBNORTH55020 - Sessior	1-1	Forge IoT Devi	ice Registration)				
	Server Settings										
							User Management				
						FireB	ridge Reverse Connecti	ons			
Re	everse Connect I	Destinations -	+ 🕕								
	FireBridge Nar	ne	Client Endpoint Url		Reconnect Delay(ms)	Is Connected	Lost Connection Count	Enable			
1	ReverseConne	ction_1	opc.tcp://opcsouth:55000	2	5000	false	0 3		Cancel	Apply	⑪

- 1) Click the '**+**' button.
- 2) Double-click the existing Client Endpoint Url to edit. The client endpoint is the listening port previously configured

opc.tcp://<client-host name or IP>:<listening port>

- 3) Ensure Enable is selected.
- 14. Click the Apply. Button.
- 15. On the server-side, verify that the MDB Reverse Connection status indicates that the Is Connected status is true.

N	Matrikon Data Broker Configuration									
Se	Atrikon Data Broker - MDBNORTH55020 - Session - 1									
						Server Settings				
						User Management				
					FireB	ridge Reverse Connecti	ons			
R	everse Connect	Destinations =	F							
	FireBridge Na	ne	Client Endpoint Url	Reconnect Delay(ms)	Is Connected	Lost Connection Count	Enable			
1	ReverseConne	ction_1	opc.tcp://opcsouth:55000	5000	true	28	\checkmark	Cancel	Apply	Ŵ

16. On the client-side, verify that the Connection Status of the Federated Data Source is Good.

Matrikon Data Broker Configuration									
Session	Matrikon Data Broker -	- MDBSOUTH55010 - Session - 1	<u> </u>	Forge IoT Device Registration					
						Server Settings			
					L	Jser Management			
					FireBrid	lge Reverse Connections			
					Fed	lerator Data Sources			
UA DataSource		<u>-</u>		+					
Data Source	Гуре	Data Source Name		Connection Point		Connection Status	G	onfigure	
1 UAClientData	SourceType	MDBNorth		opc.tcp://OPCNORTH:55020		Good		٢	Ŵ
2 SimulatedDa	taSourceType	SimulatedData		Not Available				٢	Ŵ

17. Connection issues at this point are likely caused by certificate errors. This can be verified by checking the log file for error messages. If certificate errors are indicated in the log, refer to the section on accepting application instance certificates.

Access the data from the OPC UA server

18. Click on the Data View icon to access this address space through MDB.

Mat	Matrikon OPC UA Explorer					
ŵ	Home					
	New Connections & Configuration					
£]}		<u>~~</u>				
ନ	Т	272				
<u>_</u>	Add New Server	Configure Matrikon Data Broker				
₿₽	Active Sessions/Reverse Connections					
₽	Matrikon Data Broker - MDBN $_{ imes}$					
	Matrikon Data Broker - MDBNC Sign & Encrypt					
	Basic256Sha256 😳 Connected					

19. The client-side MDB now supports a server-initiated connection to the server-side MDB, which has been configured to connect to the remote OPC UA server. The address space for this remote server appears in the DispatchConfiguration folder in the client-side MDB address space.

Address Space							
✓ Matrikon Data Broker - MDBSOUTH55010 - Session - 1	✓ Matrikon Data Broker - MDBSOUTH55010 - Session - 1						
	Ð	٩					
✓ ☐ Root							
Objects							
🗁 Server							
🗁 Aliases							
🗁 DataManagementConfiguration							
✓							
✓ ☐ DataSources							
🗁 SimulatedData							
> 🗁 MDBNorth							
🔗 ListAllAdapters							
🗁 ServerConfiguration							
🗁 DispatchDiagnostics							
🗁 Types							
C Views							

20. The navigation of the remote server address space from this point can be treated as if the user were browsing it locally.

Importing information models into MDB

USE CASE

Information models are used to provide a virtual definition of a real-world hardware, software, or business asset object. The information models used in OPC UA are based on the Companion Specifications developed by the OPC Foundation in cooperation with its members and partners. In addition to the definition of the model, the Companion Specifications include a *NodeSetFile* that includes the definitions of all types within the model.

Importing the NodeSet file is the first step in configuring MDB to connect to a data source defined by the Companion Specification.

PROCEDURE

1. Ensure that all files required to represent the information model are accessible to the instance of MDB.



NOTE - The *nodesetfile* must be in ASCII format for import into MDB. UTF8 files will cause MDB to throw an error.

2. Using OPC UA Explorer, connect to MDB and click on the Data Modeling icon in the left menu bar.

B Matri	kon OPC UA Explorer		
ŵ	Home		
	New Connections & Configuration		
<u>ت</u>		<u>Å</u>	
ନ	Т	255	
្ន្	Add New Server	Configure Matrikon Data Broker	
₿₽	Active Sessions/Reverse Connections		
₽	Matrikon Data Broker - MDBN $_{ imes}$		
	Matrikon Data Broker - MDBNC		
	Sign & Encrypt Basic128Rsa15		
	Connected		

3. Click on the Instance Management tab (1), followed by the Import button (2). This opens the Import or Validate Nodeset Files dialog.

	_	đ	×
Instance Management Data Mapping		÷	Э
			_
New Instance Import 2	Delete		

- 4. In the Import or Validate Nodeset Files dialogue, either
 - browse for the required files by clicking on the Browse Files button, or
 - drag and drop the required files from a separate window.

Import or Validate Nodeset Files	_		×
Drag and drop or use browse button	Bro	wse Files	\supset
List nodeset files in the order of depe	endencies		
Drag and Drop OPC UA Nodes	Set files h	iere.	
Only 10 XML files can be Imported or Va	lidated at o	once	
Cancel Import	Valida	ite Schema	



NOTE – A maximum of 10 .xml files can be imported in a single operation.

5. NodeSet files often contain dependencies, additional models that must also be imported to MDB. These dependent models are listed in the NodeSet file (see example below). MDB requires that all dependent models be imported, in the order listed in the NodeSet file. The NodeSet file is the last to be listed.

```
Models>

<Model ModelUri="http://opcfoundation.org/UA/Machinery/"

Version="1.02.0" PublicationDate="2022-05-01T00:002">

<RequiredModel ModelUri="http://opcfoundation.org/UA/"

Version="1.04.7" PublicationDate="2020-07-15T00:002" />

<RequiredModel ModelUri="http://opcfoundation.org/UA/DI/"

Version="1.02.2" PublicationDate="2020-06-02T00:002" />
```



CAUTION – All dependent models must be included in the import list, and the xml files must be structurally and syntactically correct. Any deviation from the correct order or errors in the files will result in an error during file validation or import.

6. Once all required files have been added, click on the Validate Schema button to ensure the files conform to the UA xml schema.

e	Import or Validate Nodeset Files − ×						
	D	rag and drop or use browse button Browse Files List nodeset files in the order of dependencies					
	â	C:/Users/OPCUser/Desktop/MDB 2.0/UA-Nodeset-1.04/DI/Opc.Ua					
	â	C:/Users/OPCUser/Desktop/MDB 2.0/Boiler.NodeSet2.xml					
(Cancel Import Validate Schema					

7. Click on the Import button. During the import, the xml files are checked for structure and syntax. Errors will be reported on-screen and will result in an unsuccessful import.

e	Import or Validate Nodeset Files − □ ×						
	D	rag and drop or use browse button Browse Files List nodeset files in the order of dependencies					
	â	C:/Users/OPCUser/Desktop/MDB 2.0/UA-Nodeset-1.04/DI/Opc.Ua					
	â	C:/Users/OPCUser/Desktop/MDB 2.0/Boiler.NodeSet2.xml					
(Cancel Import Validate Schema					

- 8. The successfully imported information model components can be viewed in the following locations.
 - Under Types in the Data Modeling page.
 - The imported NodeSet files are also listed in the *importednodesets* folder in the ProgramData directory.

C:\ProgramData\Matrikon\DataBroker\<YourInstanceName>\importednodesets

- In the address space of the MDB server, navigate to the ModelerConfig directory.
 - o Right-click on GetImportedNodeSetFileNames to view a list of the imported files, or
 - right-click on the GetImportedTypes to see a list of the imported types.

Address Space		
✓ Matrikon Data Broker - MDB201955010 - Session - 1		
	হ	5
	- El	223
✓ ➢ Root		^
✓ [□] Objects		
🗁 Server		
🗁 Aliases		
Y 🗁 DataManagementConfiguration		
🗁 LocalObjects		
MappedInstances		
➤ D ModelerConfig		
🔗 Disable		
🔗 Enable		
FileObjects		
🖌 🔗 GetImportedNodeSetFileNames		
OutputArguments		
🖌 🔗 GetImportedTypes		
OutputArguments		
🔗 GetMappedNodeInstanceInfo		
IsEnabled		
RemoveMappedNodeInstance		
 DispatchConfiguration 		
🗁 DataSources		
🔗 ListAllAdapters		U
<		>

Creating instances of a type

USE CASE

Creation of an instance of a type in the OPC UA server address space is a part of the data or information modeling process. This functionality requires that the server implement these services and the client be enabled to invoke these services. This step is required to create computable objects within the address space of the server. There is no logical limit to the number of instances that can be created, either in total or of a single type.

MDB supports this functionality, and this instruction describes the necessary steps to create an instance. This instruction assumes that the user is knowledgeable in OPC UA address space components and is aware of the required types and structure to be created.

PROCEDURE

1. Connect UA Explorer to MDB and select Data Modeling from the menu items on the left edge of the UA Explorer window.

B Matri	kon OPC UA Explorer					
ŵ	Home					
	New Connections & Configuration					
<u>بې</u>		<u>A</u>				
ନ	т	255				
_ _	Add New Server	Configure Matrikon Data Broker				
₿₽	Active Sessions/Reverse Connections					
	Matrikon Data Broker - MDBN X Matrikon Data Broker - MDBNC Sign & Encrypt Basic128Rsa15 Connected					

2. Select the OPC UA server whose address space you wish to manage from the drop-down in the upper-left corner of the UA Explorer display.

Data Modeling		
Session	Matrikon Data Broker - MDB201955010 - Session - 1	<u>-</u>

3. Click on the Instance Management tab in the upper-right corner of the UA Explorer display. The Instance Details options are available by default.

Instance Management	Data Mapping	Ð

4. To create a new instance at a specific location in the address space, right-click on the node you wish to create the new instance in and select Create New Instance.

All Instances and Types			
In	stanc	es 🔺	
✓ ➢ LocalObjects ➢ myfolder	↔ + -	Rebrowse Create New Instance Delete Instance	

NOTE – At this time MDB supports creation of Instances within the local MDB only. This means that new instances of a type cannot be created within the address space of a Federated data sources.

5. In the Instance Details window the Parent Nodeld field is automatically populated with the name of the selected node.

Instance Details				
Instance Name				
Description	Optional			
Parent Nodeld	LocalObjects	+		

6. If you know the Type you wish to create an instance from, this can be done by rightclicking on the Type and selecting Create New Instance.



7. In the Instance Details window, the Type Definition Nodeld and Node Class fields are automatically populated based on the selected Type.

Instance Details		
Instance Name		
Description	Optional	
Parent Nodeld		+
Type Definition Nodeld	ServerType	+
ReferenceTypeNodeld		+
Node Class	Object ~	
Node Class	Object ~	

 At any time, clicking on the New Instance button clears all fields and allows manual entry of values for all fields. Clicking on the '+' beside a field presents a list of all possible items for that field.

Instance Management	Data Mapping	O
New Instance	ce Import	Delete

9. Once all fields have been filled out as required, click on the Apply button to commit all changes.

Mapping data in MDB

USE CASE

Data mapping allows a data item from a real-world data item to be connected directly to an instance of a node in the MDB address space. This provides context for the raw data from the device, based on the overall configuration of the server address space.

MDB supports the OPC UA functions for Information Modeling and Data Mapping. This includes extending the mapping function to transferring data from one real-world source item to a destination item in another real-world source.

There are four possible mappings available in MDB

- Instance as source to instance as destination
- Instance as source to data item as destination
- Data item as source to data item as destination
- Data item as source to instance as destination

Of these, only the highlighted mapping of data item to instance is included in the basic license of MDB. The others require a Data Management license.

This instruction includes the data item to data item and data item to instance mappings as these are the most common uses for this feature. The procedure for both use cases is essentially the same, differing only in the selection of the source and destination items.

PROCEDURE

1. Connect OPC UA Explorer to MDB.

Mat	rikon OPC UA Explorer	
仚	Home	
	New Connections & Configuration	
£]]}	1	<u>52</u>
ক্র	+	<u>د</u> يء
- <u>p</u>	Add New Server	Configure Matrikon Data Broker
		Matrixon Bata Broker
₿₽	Active Sessions/Reverse Connections	Matrixon Data Droker
& ₽ ₽	Active Sessions/Reverse Connections Matrikon Data Broker - MDBN ×	

2. Connect MDB to the OPC UA Server for the real-world data item using the Federator feature of MDB.

Matr	Matrikon OPC UA Explorer							
ŵ	Matrikon Data Broker Configuration							
<u> </u>	s	ession	Matrikon Data Broker - MD	BNORTH55010 - Session - 1	Forge IoT Device Registration			
5 <u>0</u> 3					Server Sett	ings		
ക	User Management							
Ē	FireBridge Reverse Connections							
87					Federator Data	Sources		
£	UA DataSource +							
		Data Source Ty	ype	Data Source Name	Connection Point	Connection Status	Configure	
		1 SimulatedData	aSourceType	SimulatedData	Not Available		٢	Ŵ
		2 UAClientData	SourceType	UACPP Server	opc.tcp://OPCNorth:48010	Good	٢	Ŵ

3. Select Data Modeling by clicking on the icon in the menu bar on the left edge of the UA Explorer window.

Mat A	rikon OPC UA Explorer	
۵	Home	
	New Connections & Configuration	
<u>بې</u>		<u>~</u>
ক	T	503
_ _	Add New Server	Configure Matrikon Data Broker
f	Active Sessions/Reverse Connections	
& ₽ ₽	Active Sessions/Reverse Connections Matrikon Data Broker - MDBN ×	

4. Select Data Mapping by clicking on the tile in the upper right-hand corner of the UA Explorer window.

Data Modeling					
Session	Matrikon Data Broker - MDBNORTH55010 - Session - 1	-	Instance Management	Data Mapping	0



NOTE – UA Explorer supports multiple connections including multiple instances of MDB. Ensure the correct session is selected from the drop-down list on the left side of the display, under the Data Modeling label.

5. Select the Data Mapping radio button.

Data Modeling	Data Modeling									
Session	Matrikon Data Broker - MDBNORTH55010 - Session - 1									
Data Mapping Dashb	oard 💿 Data Mapping									

6. Select the source item. Federated data sources appear under DispatchConfiguration in the browse tree.

Matri	ikon OPC UA Explorer												
	Data Modeling												
∰ \$\$	Session	Session Matrikon Data Broker - MDBNORTH55010 - Session - 1											
G	Data Mapping Data	ashboard 💿 Data Mapping		*1	Expand Tree Nodes to s								
	Source \land 🙈												
₽ ₽	Source Item	^	Type Definition	DataType	AccessLevel ^								
¥	 ➤ Root ➤ Objects → Server → Aliases → DataMana ▼ DispatchC × ⊕ DataSc ⊕ Sim ▼ ⊕ UA ⊕ Gui ⊕ 	gementConfiguration configuration pources mulatedData CCPP Server Session Reverse Connect DatasourceDiagnostics BrowseAndReadNonValueAttributesCacheTimeout	FolderType ServerType AliasNameCategoryType DataModellerConfigurationFolderType ConfigurationFolderType DataSourceFolderType SimulatedDataSourceType UACI:entDataSourceType FolderType FolderType DiagnosticsFolderType PropertyType	0:Duration	Current Read Curr								
		CacheManagementMode IsConnected IsDirty IsEnabled MaxReferencesForBrowsePerNode MonitoredItemProcessingLatency Name EndpointUrl RemoteServerApplicationURI TypesCached Data	PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType PropertyType FolderType	2:AddressSpaceCacheModeType 0:Boolean 0:Boolean 0:Ulnt32 0:Duration 0:String 0:String 0:String 0:String	Current Read Curr Current Read Current Read Current Read Cur Current Read Cur Current Read Cur Current Read Cur Current Read Current Read								
	<		••		>								

7. Select the destination item. When mapping to an instance of a type in the server address space, these appear under DataManagementConfiguration in the browse tree. When mapping to another Federated data source, these again appear under DispatchConfiguration in the destination browse tree.

Destination ^ 🖄				Мар	
Destination Item	Type Definition	DataType	AccessLevel		
✓ ➢ Root					
✓ ☐ Objects	FolderType				
🗁 Server	ServerType				
🗁 Aliases	AliasNameCategoryType				
➤	DataModellerConfigurationFolderType				
CocalObjects	FolderType				
✓	FolderType				
mystring	BaseDataVariableType	0:String	Current Read Current Write		
a myint	BaseDataVariableType	0:Int16	Current Read Current Write		
🗁 boiler1	BoilerType				
MappedInstances	FolderType				
🗁 ModelerConfig	DataModelerType				
> 🗁 DispatchConfiguration	ConfigurationFolderType				
DispatchDiagnostics	DiagnosticsFolderType				
🗁 DeviceSet	BaseObjectType				
NetworkSet	BaseObjectType				
DeviceTopology	BaseObjectType				
🗁 Boilers	FolderType				
🗁 Types	FolderType				
🗁 Views	FolderType				

8. Once you have selected the source and destination items, click on the Map button.

Destination ^ 🔦				Мар	
Destination Item	Type Definition	DataType	AccessLevel		
✓					
✓	FolderType				
🗁 Server	ServerType				
Aliases	AliasNameCategoryType				
♥ ☐ DataManagementConfiguration	DataModellerConfigurationFolderType				
LocalObjects	FolderType				
➤ D myfolder	FolderType				
mystring	BaseDataVariableType	0:String	Current Read Current Write		
a myint	BaseDataVariableType	0:Int16	Current Read Current Write		
🗁 boiler1	BoilerType				
MappedInstances	FolderType				
🗁 ModelerConfig	DataModelerType				
> DispatchConfiguration	ConfigurationFolderType				
DispatchDiagnostics	DiagnosticsFolderType				
🗁 DeviceSet	BaseObjectType				
NetworkSet	BaseObjectType				
DeviceTopology	BaseObjectType				
🗁 Boilers	FolderType				
🗁 Types	FolderType				
🗁 Views	FolderType				

- 9. The Mapping Preview window appears. Verify the item selections, ensuring that
 - the correct source and destination items have been selected,
 - the Type Definition of the source and destination items match, and
 - the DataType of the source and destination items match.

10. Once all items are verified, click on the Add to Queue button.

Mapping P	review					-		×
Mapping Insta	ance Name	Int16_my	int					
Source				Destination				
Source Item	Type Definition	DataType	AccessLevel	Destination Item	Type Definition	DataType	AccessL	.evel
Int16	BaseDataVariableType	0:Int16	Current Read	myint	BaseDataVariableType	0:Int16	Current	Read
<			>	<				2
			Cancel	Add to Queu	e			

11. Ensure the newly mapped items are displayed in the Mapping Summary.

Mapping Summary											
Select All	Map Instance Name	Source	Destination	Data Type	Access Level						
1	Int16_myint	Int16	myint	0:Int16	Current Read Curre						

12. Click on the checkbox to select the item(s), then click on the Commit button on the right side of the Mapping Summary panel.

N	lappin	g Summary					
	\checkmark	Select All	Map Instance Name	Source	Destination	Data Type	Access Level
1			Int16_myint	Int16	myint	0:Int16	Current Read Curre

13. Select the Data Mapping Dashboard to view all mapped items.



Installing an MDB container on a Linux platform

USE CASE

Unlike OPC Classic, OPC UA applications can be developed to run on Linux platforms. Although this can be done natively, it is often easier to employ Docker containers to run the UA applications in a Windows environment on a Linux platform. This instruction provides the details for creating this environment in the **Ubuntu 20.04** Linux release.

PROCEDURE

To prepare the system

- 1. Ensure the Linux installation has a connection to the internet.
- 2. Run the following commands prior to installation of the Matrikon Data Broker Docker container:

```
sudo apt-get update
sudo apt update && sudo apt upgrade -y
sudo apt install -y ca-certificates curl gnupg lsb-release
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --
dearmor -o /usr/share/keyrings/docker-archive-keyring.gpg
echo "deb [arch=$(dpkg --print-architecture) signed-
by=/usr/share/keyrings/docker-archive-keyring.gpg]
https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable" |
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null
```

sudo apt-get update

To install Docker

Following system preparation, run the following commands to install Docker:

```
sudo apt install docker-ce docker-ce-cli containerd.io -y
sudo usermod -aG docker sysadmin
newgrp docker
docker version
sudo systemctl status docker
```

To test the Docker installation

Run a simple built-in test to confirm Docker is working:

docker run hello-world

To install MDB

- 1. Copy the Matrikon Data Broker app image (.tgz file) to Linux.
- Load the app image into Docker: sudo docker load -i matrikondatabroker-rhelubi8-2.0.0.tgz

3. Create a temporary folder. Open New Terminal window then enter:

cd /tmp mkdir MDB

- 4. Close window
- 5. Go back to original terminal window and issue this command to create the Docker Container:

```
sudo docker create --network host --name MDBContainer --volume
/tmp/MDB/:/mnt/dispatch -e DATABROKER_NAME=MDB -e DATABROKER_PORT=52000
-e DATABROKER_SECURE=1 -e DATABROKER_LOG_TO_VOLUME=1
matrikondatabroker-rhelubi8:2.0.0
```



NOTE - MDBContainer is what the Docker Container will be named. MDB is what the DataBroker instance will be named. TCP Port 52000 will be the port that MDB is listening on. All these variables can be customised by the user to suit the installation.

To configure the firewall

1. Start the newly created Container:

sudo docker start MDBContainer

 Open the MDB TCP port in the firewall. In this example, this will be port 52000: sudo ufw allow 52000

Note that no reboot is required unless enabling or disabling firewall.

To test MDB

- 1. Locate the Linux IP address. This can be done by issuing the *ip* address command.
- 2. Test the connection with a test OPC UA Client like Matrikon OPC UA Explorer. There are two options here:
 - a. Test locally by installing Matrikon OPC UA Explorer on Linux
 - b. Test remotely by installing Matrikon OPC UA Explorer on a Microsoft Windows Operating System that is on the same network as the Linux installation.

The endpoint for MDB is opc.tcp://<IP where container is running>:<port>, in this example this is opc.tcp://10.0.0.1:52000

3. Connect with the username admin and a blank password. Expect a security error to be returned.

To accept the UA client certificate

 Return to Linux and locate the installation location: docker inspect <Container name> | grep volume in this example:

docker inspect MDBContainer | grep volume

- 2. Copy the location returned.
- 3. Elevate to interactive shell:

sudo -i

4. Change directory to the copied location:

cd <copied location>/pki/DefaultApplicationGroup/rejected/certs

5. Check the contents of the folder, there should be a certificate from the OPC UA Client present:

٦s

6. Move the file from this folder to the trusted folder:

mv <filename> <copied
location>/pki/DefaultApplicationGroup/trusted/certs

Note the space between filename and copied location in the above command

7. Exit from interactive mode (most important!):

exit

To confirm MDB installation

Return to the OPC UA Client and attempt the connection again. As the certificate has been trusted, this action will now succeed.

NOTES

Every time the Linux installation is rebooted, the Docker container will need to be started after the reboot has completed:

sudo docker start <Container name>

Stop Docker container:

sudo docker stop <Container name>

Restart Docker container:

```
sudo docker restart <Container name>
```

Publishing data from MDB to the cloud

USE CASE

Industrial Control Systems (ICSs) in the 21st Century increasingly make use of the latest technologies defined by and incorporated in IIoT and Industrie 4.0. This includes the use of cloud applications and storage capabilities. The MQTT Publisher adds this functionality to MDB, allowing any data collected by MDB to be pushed to the cloud using the MQTT protocol. The MQTT Publisher is a separate product package which must be co-installed with MDB

In this procedure, Microsoft Azure is acting as the MQTT broker. This requires that an Azure account be set up and that the credentials for this account are available to the user.

PROCEDURE

1. Connect OPC UA Explorer to both MDB and the MQTT Publisher.

Configure the connection to the OPC UA server

2. Click on the Manage MQTT Publisher Configuration icon in the menu on the left-hand edge of the UA Explorer window.

Matrikon OPC UA Explorer											
۵	Home										
	New Connections & Configuration	New Connections & Configuration									
÷	1	<u>6</u> 2									
ঞ	+	£ <u>3</u> 3									
<u>م</u>	Add New Server	Configure Matrikon Data Broker									
88	Active Sessions/Reverse Connections										
ี่ย	Matrikon Data Broker - North $~ imes$	MatrikonDataBrokerMQTTPub \times									
	Matrikon Data Broker - North -	MatrikonDataBrokerMQTTPubli									
	Sign Basic256 👸	Sign Basic256 🔊									
	Connected	Connected									

3. In the MQTT Publisher Configuration panel, select the OPCUA Client Connection tab and double click on the Flex Dispatch Connection.

M	MQTT Publisher Configuration											
	Session MatrikonDataBrokerMQTTPublisher - Session - 1											
	OPCUA Client C	Connection	Writer Group	Writer Datase	t MQTT Client Connection	Options						
	UA Serv	ver Name	UA Server C	onnection URL	Security Mode	Security Profile	User					
	1 Flex Dispatch S	Server	opc.tcp://loca	host:56000	Sign & Encrypt	Aes256_Sha256_RsaPss	Admin					

4. In the OPC UA Client Configuration window modify the following fields:

Opc UA Client Configuration		- 0	×
Discovery Manual			
Hostname / IP	Port	Find Servers	
End Points	Connection Point Endpoint Url opc:tcp:// ::57000 1 Security Policy Basic256 I Security Mode Sign I User Token Anonymous User Token User Token Security Mode Sign I User Token Anonymous Security Mode Sign I User Sign I User Name Anonymous Security Policy I Security Mode Sign I Security Mode Si		
Cancel	Save 4		

- Change the endpoint to reflect Matrikon Data Broker's endpoint. In this example, Data Broker is listening on port 57000. Ensure to use the endpoint containing the hostname and not localhost.
- 2) Set the security policy and mode.
- 3) Set the User Token type and enter username and password. In this example this is admin with no password.
- 4) Click Save
- 5. A confirmation message appears. This message is being reworded for the next version of MDB and MQTT Publisher.
 - a. Click Yes to restart the MQTT Publisher immediately and apply the configuration changes. Ensure MDB and the MQTT Publisher accept the new certificates (see step 10).
 - b. Click No to save changes to the configuration file only. Changes will then be applied at the next restart of MQTT Publisher.

🕒 Mat	rikon OPC UA Explorer >	<
	Connection details saved successfully in the Config file. Press Yes, if you want to apply the changes immediately.After applying trust the MQTTPublisher certificate in UA Server. Press No, if user want to save the configuration only in the Config file.	
	Yes No]

Configure the connection to the cloud platform

6. Select the MQTT Client Connection tab.

🕒 Matri	ikon	0	PC	UA Explorer									
<u>分</u> Ⅲ	MQTT Publisher Configuration Session MatrikonDataBrokerMQTTPublisher - Session - 1												
∰													
<u>ع</u>			C	PCUA Client C	onnection	Writer Group	Writer Dataset		ent Connection	Options			
<u>۳</u>				MQTT Client Con	nection +	- 🖍 💼							
88				Na	me	B	roker	Cli	ent ID		Enabled		
			1	MQTT-Broker		127.0.0.1		MatrikonData	BrokerMQTTPu	false			
			2	Azure-IoT		hostname.iot-	hub.azure	deviceid		false			
			3	Forge-loT						false			

- 7. Double-click on the Azure-IoT item
- 8. Modify the fields as follows:

MQTT Publisher Configuration				
Session MatrikonDataBrokerMQTTPublisher - Session - 1				
OPCUA Client Conne	tion Writer Group Writer Dataset MQTT Client Connection	Options		
Connection Details		WriterGroup Details		
Connection Types	Azure loT Hub $$	Writer Group Names 6+ -		
Connection Name	Azure-IoT	WriterGroup01		
Enabled	Enabled Disabled			
MQTT Details				
Broker/Host Name	TestMatrikonHub.azure-devices.net 2			
Publisher Topic	devices/TestDevice/messages/events/ 3			
Client ID	TestDevice			
Primary Key	5	Note : All the fields in the screen are mandatory, unless stated otherwise.		
Publishing Types	OPC UA Pub-Sub v Max Message Size 2500 v			
Use TLS	• Enabled			
Use Compression	Enabled Disabled	Save 7 Cancel		

- 1) Set to Enabled
- 2) Copy the Hostname mentioned in the Azure IoT Hub Device configuration and paste it into Broker/Host Name.
- 3) Change the Publisher Topic to replace *deviceid* with the Device ID from Azure IoT Hub Device configuration, leaving the rest in-tact
- 4) Change the Client ID from *deviceid* to the Device ID from Azure IoT Hub Device configuration
- 5) Paste the Primary Key in from the Azure IoT Hub Device configuration
- 6) Enter the Writer Group name in the JSON file and click on the **'+'**.

- 7) Click Save
- 9. Click Apply on the right side of the window. Close Matrikon OPC UA Explorer.

Confirm certificate acceptance by MDB and MQTT Publisher

10. Navigate to the MQTT Publisher certificate store

C:\ProgramData\Matrikon\MDB-MQTTPublisher\pki

$ \square \square = $ certs						
File Home	Share	View				
← → 👻 🚹 C:\ProgramData\Matrikon\MDB-MQTTPublisher\pki\rejected\certs						
💻 This PC	^	Name	Date modified	Туре	Size	
3D Object	s	🔄 Matrikon FLEX Dispatch 7B6B677248EC0	5/23/2022 8:46 PM	Security Certificate		1 KB

11. Locate the Matrikon FLEX Dispatch certificate in the **\rejected\certs** folder and move it to the **\trusted\certs** folder.



- 12. Open Windows Services and restart the following:
 - Matrikon Data Broker <instance name>
 - Matrikon Data Broker MQTT Publisher

13. In the UA Explorer **Home** window, confirm both MQTT Publisher and Data Broker are reconnected (green). Select Manage Certificate.



14. In the Certificate Management panel;

Certificate Management					
Session N	Session Matrikon Data Broker - North - Session - 1 1 Server Name : Matrikon Data Broker - North				
Selec	ct Certificate Name	Issued To	Valid From	Valid Until	Is Trusted?
1 🗹 🙋	MatrikonFLEXUaPublisher [44F3C0B226B6F85FEC837755EA0C5BB7C4C682F6]	MatrikonFLEXUaPublisher	2022-5-22 1:11:41	2027-5-22 1:11:41	No
2	Matrikon OPC UA Explorer [30378520A15A4962A0C13F3FF3EA29BE30EE61B2]	Matrikon OPC UA Explorer	2021-11-24 17:10:40	2026-11-23 17:10:40	Yes

- 1) Select Matrikon Data Broker from the dropdown window
- 2) Select the certificate called MatrikonFLEXUaPublisher
- 15. Click on the Accept button. Note that the **Is Trusted?** status has changed to Yes. This indicates that MDB and the MQTT publisher are now communicating.

Certificate Management					
Session 1	Session Matrikon Data Broker - North - Session - 1 Server Name : Matrikon Data Broker - North				
Sele	t Certificate Name	Issued To	Valid From	Valid Until	Is Trusted?
1	MatrikonFLEXUaPublisher 44F3C0822686F85FEC837755EA0C5887C4C682F6	MatrikonFLEXUaPublisher	2022-5-22 1:11:41	2027-5-22 1:11:41	Yes
2	Matrikon OPC UA Explorer [J0378520A15A4962A0C13F3FF3EA298E30EE6182]	Matrikon OPC UA Explorer	2021-11-24 17:10:40	2026-11-23 17:10:40	Yes

Set up the MQTT Publisher configuration

- 16. Navigate to C:\ProgramData\Matrikon\MDB-MQTTPublisher\Config\writergroups
- 17. Open writergroups.json in a text editor.
- 18. Locate WriterGroup01 (the name of the Writer Group added to the JSON file in step 8).

19. Set the *PublishingInterval* (in milli seconds) as required. This is the rate MQTT Publisher will send data to the cloud. For example, if *PublishingInterval* is set to 30000, MQTT Publisher will send data to the cloud every 30 seconds, if data is available to be sent.



- 20. Locate DataSetWriter01.
- 21. Set the *PublishingType* to either **Scan** or **Subscription**. Scan means poll the data source for data regardless of whether the data has changed. Subscription means data will only be received if the value has changed in the data source.



22. Notice the DataSetName DataSet01.



- 23. Save the file and close.
- 24. Navigate to C:\Programdata\Matrikon\MDB-MQTTPublisher\Config\writerdatasets.
- 25. Open datasets.json in a text editor.
- 26. The DataSetMetaData part of the file defines the friendly names of the tags to be published to the cloud. Notice the hook to **DataSet01** as noted in Step 22. Set the name, Description, Text and DataType fields as required.

"DataSets": [
{ "Name", "DataSat01"
<pre>"Name": "DataSet01", "DataSetMetaData": { "Name": "DataSet01", "Description": { "Text": "" }, "Fields": [{ "Name": "DataSetId", "Description": { "Text": "" }, "BuiltInType": 12, "DataType": {</pre>
"Id": 12 }, "ValuePapk": -1
"DataSetFieldId": "69079547-0cf7-44ca-9e50-7724fc90d8e2"
}) {
<pre>"Name": "NS4 Numeric 1000", "Description": { "Text": "Boolean" }, "BuiltInType": 1, "DataType": {</pre>
"Id": 1 }, "ValueRank": -1, "DataSetFieldId": "bb69622d-3e2f-44bd-b25d-f3022db4ed65"

27. Navigate to the DataSetSource. The source of the DataSet is defined here. For example, NS4|Numeric|1000 as seen in step 26 is defined as having a source of id=1000 and NamespaceUri of urn:SimulatedData/SimulatedData:



28. Set the *SamplingInterval* in milliseconds. SamplingIntervalHint of -1 means the data source will be sampled at the same rate as defined in the PublishingInterval in Step 23.



- 29. Save and close the file once all required items have been configured.
- 30. Open Windows Services and restart Matrikon Data Broker MQTT Publisher
- 31. Depending on the settings and data generation at the source, data should be published to the cloud shortly after service restart.

For more information on Matrikon Data Broker

<u>Click here</u> to visit the product website.



Contact Matrikon

For more information on Matrikon products and services, visit our website at <u>www.matrikonopc.com</u>

For information on contacting a sales team representative in your region, <u>click here</u>.

