

DeviceXPlorer OPC Server - SQL Database Connectivity -



March 2024

DeviceXPlorer OPC Server has connectivity with SQL database via ODBC drivers as well as connectivity with other devices.

SCADA/MES



Analysis



Enterprise System



Cloud Service



DeviceXPlorer
OPC Server


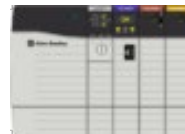


Event
(Lua Script)

Device-Specific
Protocol

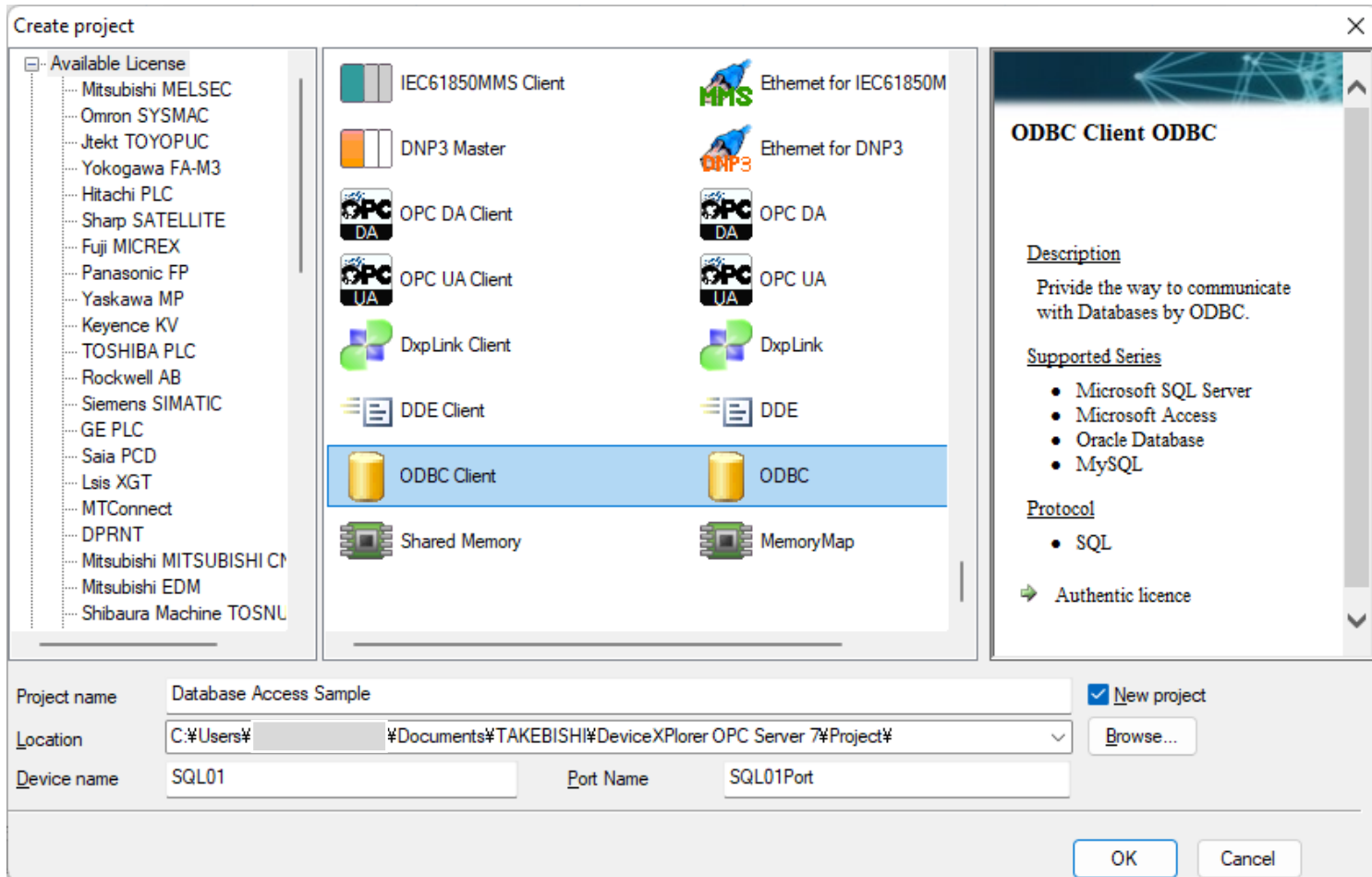


ODBC Driver

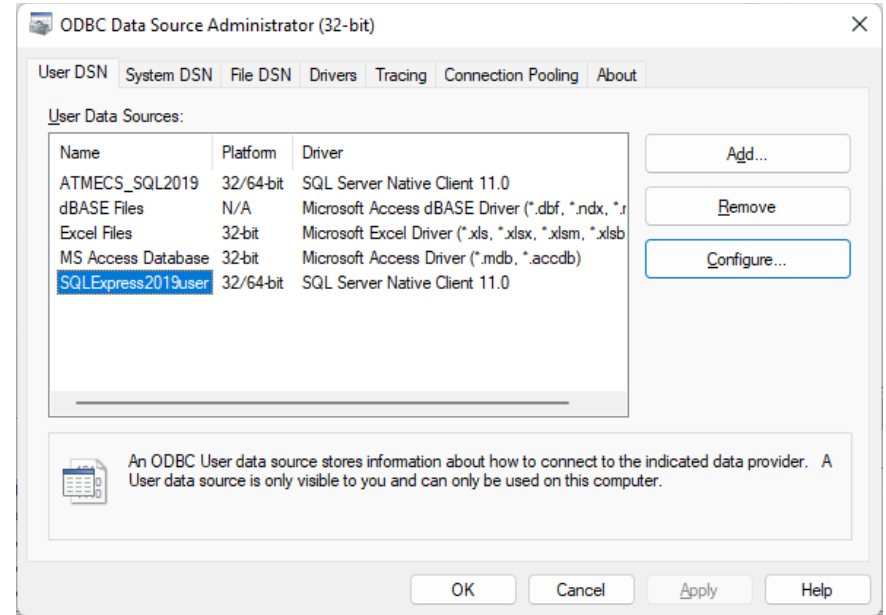
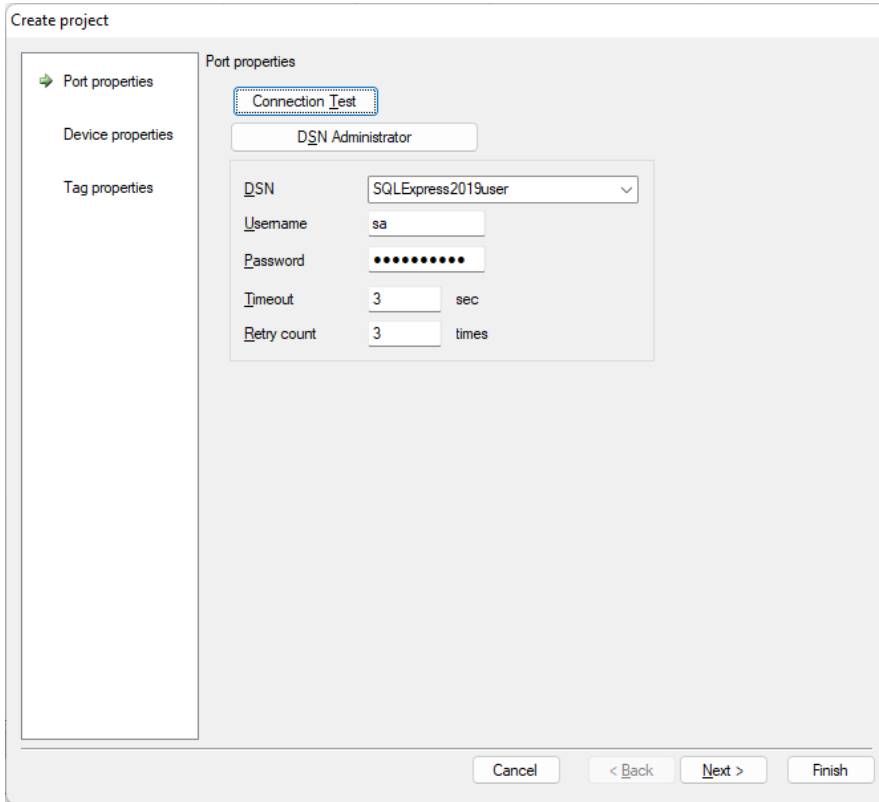


Timestamp	Column01	Column02	...
YYYYMMDD	123	123.456	...
YYYYMMDD	124	-198.221	...
:	125	0.0123	...
:	:	:	...

The ODBC client supports communication with the database via the ODBC driver.



ODBC Data Source Administrator is used for the ODBC driver settings. Please specify DSN for the target database.



Note that if the runtime is registered as a Windows program, the runtime will use the system DSN instead of User DSN.

Device is assigned to a table in the database.
You can use an existing table or create a new table.

Property [SQL01]

Device Option User authority

Connection Test

Table name / View name
dbo.DxpTable001

'SELECT' option statement
order by Timestamp DESC

Write Type READ ONLY UPDATE INSERT

UPDATE option statement

OK
Cancel
Apply

Table Generator

These settings relate to the external read process.

These settings relate to the external write process. In this case, INSERT statement will be used.

A new table can be created here.

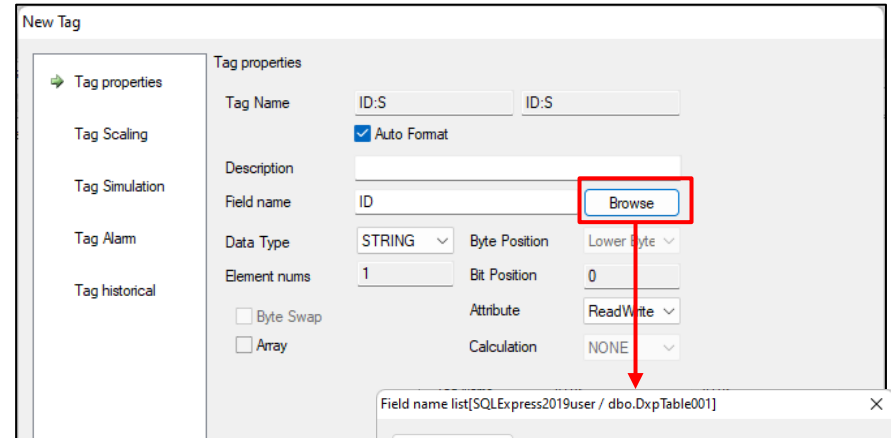
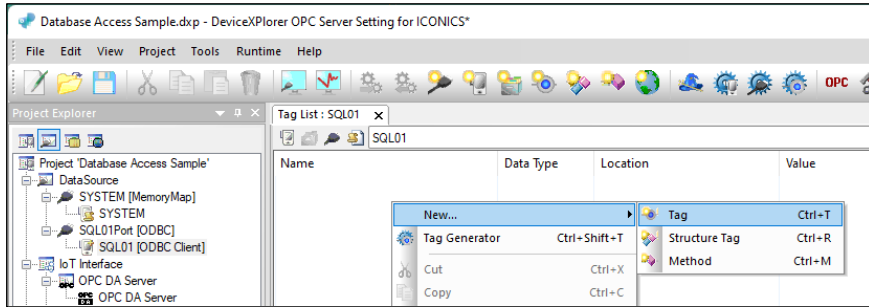
Create Table [SQLExpress2019User]

No.	Field name	Data Type	KEY Setti...	NULL
000	ID	int identity	<input checked="" type="checkbox"/> KEY	<input checked="" type="checkbox"/> Allow
001	Timestamp	datetime	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
002	IntTag001_Value	int	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
003	IntTag001_Quality	int	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
004	IntTag001_Timestamp	datetime	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
005	FloatTag001_Value	float	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
006	FloatTag001_Quality	int	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
007	FloatTag001_Timestan	datetime	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
008	StrTag001_Value	varchar(10)	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
009	StrTag001_Quality	int	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow
010	Strtag001_Timestamp	datetime	<input type="checkbox"/>	<input checked="" type="checkbox"/> Allow

Graph Tables

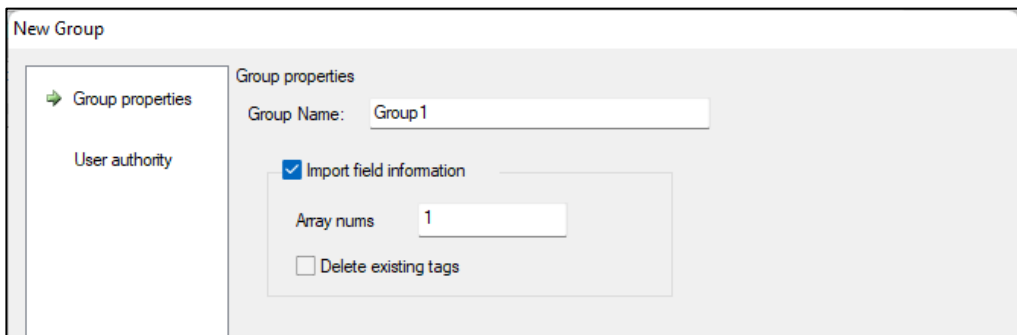
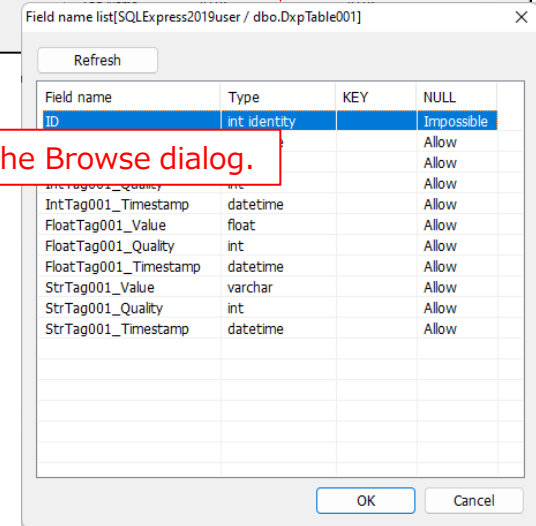
- dbo.DxpTable001
 - Columns
 - ID (PK, int, not null)
 - Timestamp (datetime, null)
 - IntTag001_Value (int, null)
 - IntTag001_Quality (int, null)
 - IntTag001_Timestamp (datetime, null)
 - FloatTag001_Value (float, null)
 - FloatTag001_Quality (int, null)
 - FloatTag001_Timestamp (datetime, null)
 - StrTag001_Value (text, null)
 - StrTag001_Quality (int, null)
 - StrTag001_Timestamp (datetime, null)
 - Keys

Each tag is assigned to a column in the table.
All columns can be imported at once in the group setting.



Simply select a column in the Browse dialog.

In the group setting, all fields can be imported at once.



Monitor (Read)

A SELECT statement is executed when each tag is monitored (read).

The screenshot displays the 'Database Access Sample.dxp - DeviceExplorer OPC Server Setting for ICONICS*' application. The main window is divided into several sections:

- Project Explorer:** Shows a tree view of the project structure, including 'DataSource', 'SYSTEM', 'Device1Port [Ethernet]', 'Device1 [Mitsubishi MELSEC]', 'SQL01Port [ODBC]', 'SQL01 [ODBC Client]', 'IoT Interface', 'OPC DA Server', 'OPC UA Server', and 'SuiteLink server'.
- Tag List:** A table titled 'Tag List: SQL01' showing the following data:

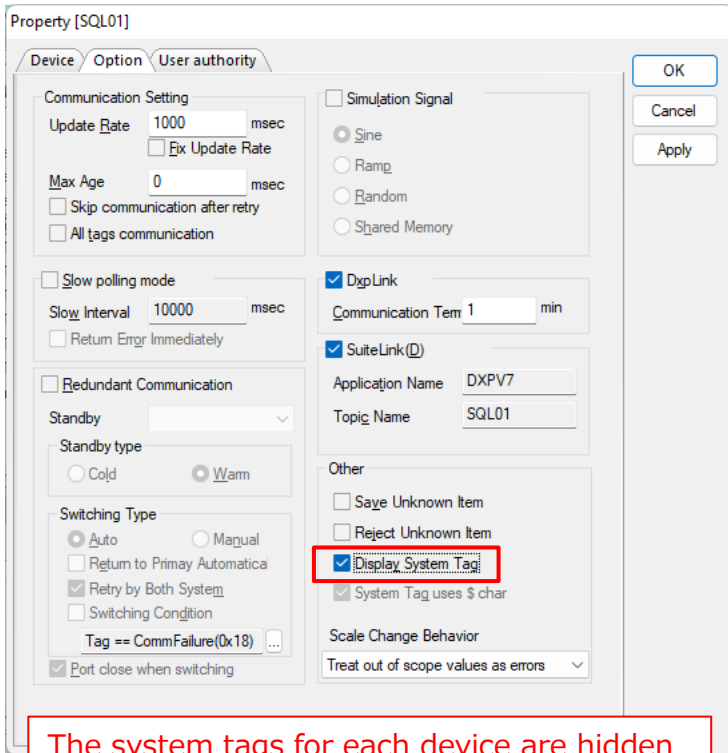
Name	Data Type	Location	Value	Quality	Timestamp
FloatTag001_Quality:S	String(1)	FloatTag001_Quality:S	192	Good (C0h)	3/20/2024 3:24:33 PM
FloatTag001_Timestamp:S	String(1)	FloatTag001_Timestamp:S	2024-03-20 15:19:29.000	Good (C0h)	3/20/2024 3:24:33 PM
FloatTag001_Value:S	String(1)	FloatTag001_Value:S	0.0	Good (C0h)	3/20/2024 3:24:33 PM
ID:S	String(1)	ID:S	1293	Good (C0h)	3/20/2024 3:24:33 PM
IntTag001_Quality:S	String(1)	IntTag001_Quality:S	192	Good (C0h)	3/20/2024 3:24:33 PM
IntTag001_Timestamp:S	String(1)	IntTag001_Timestamp:S	2024-03-20 15:19:29.000	Good (C0h)	3/20/2024 3:24:33 PM
IntTag001_Value:S	String(1)	IntTag001_Value:S	0	Good (C0h)	3/20/2024 3:24:33 PM
StrTag001_Quality:S	String(1)	StrTag001_Quality:S	192	Good (C0h)	3/20/2024 3:24:33 PM
StrTag001_Timestamp:S	String(1)	StrTag001_Timestamp:S	2024-03-20 15:19:29.000	Good (C0h)	3/20/2024 3:24:33 PM
StrTag001_Value:S	String(1)	StrTag001_Value:S	192	Good (C0h)	3/20/2024 3:24:33 PM
Timestamp:S	String(1)	Timestamp:S	2024-03-20 15:19:30.000	Good (C0h)	3/20/2024 3:24:33 PM

- Message Log:** A table showing runtime messages:

I..	No	Date	Time	Application	ITEM1	ITEM2	Message
05065	05065	2024/03/20	15:24:32.529	RUNTIME	DataSource	SQL01Port	Return SQL Message (00004): 192,2024-03-20 15:19:20.000,0.0,1290,192,2024-03-20 15:19:20.000,0,192,2024-03-20 15:19:20
05066	05066	2024/03/20	15:24:32.529	RUNTIME	DataSource	SQL01Port	:
05067	05067	2024/03/20	15:24:32.529	RUNTIME	DataSource	SQL01Port	Return 1260 line SQL Messages...
05068	05068	2024/03/20	15:24:32.529	RUNTIME	DataSource	SQL01Port	:

The status bar at the bottom indicates 'Ready', 'Monitor(1)', 'Watch(1)', and 'Tag Count 11[SQL01]'.

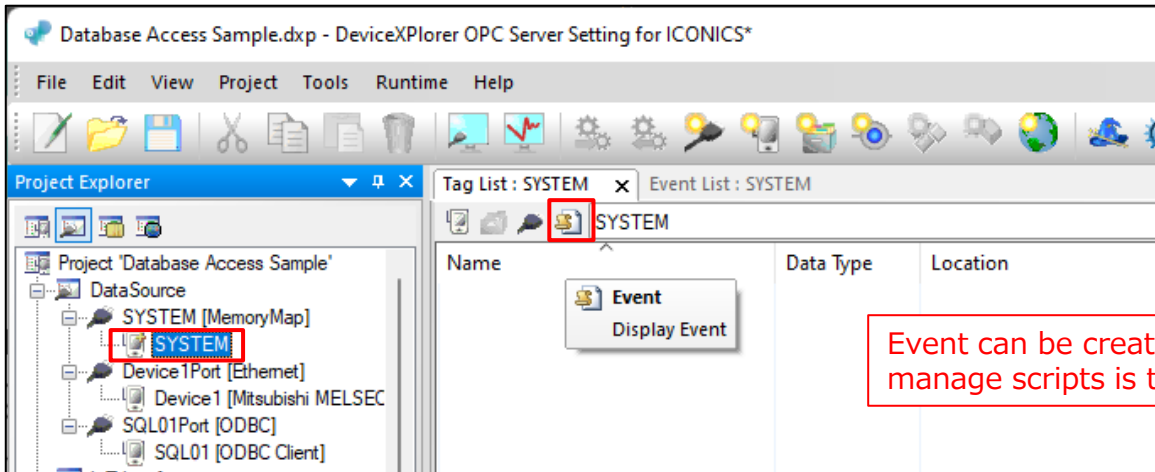
ODBC client devices have various system tags for externally updating settings or executing arbitrary commands.
For more information on system tags, see the User's Guide.



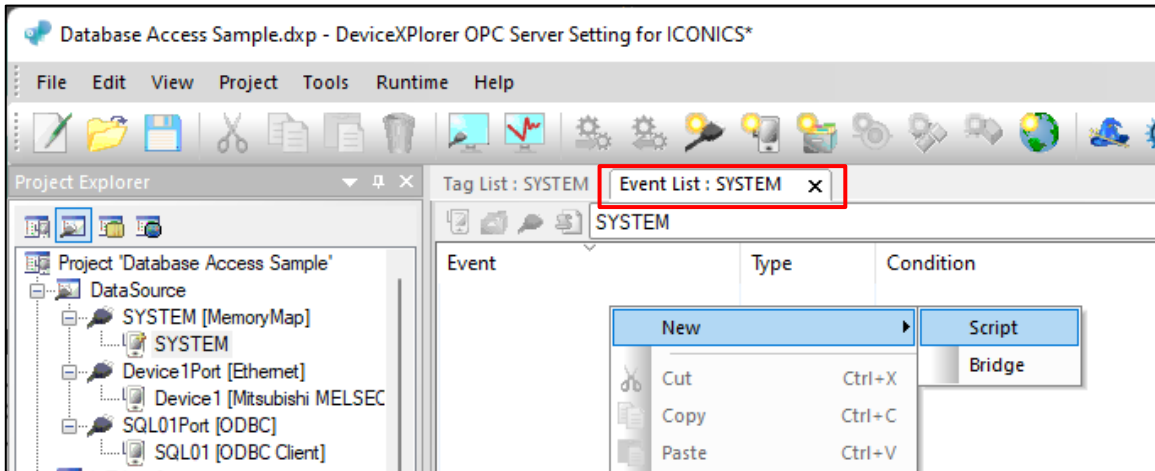
The system tags for each device are hidden by default. The display state can be changed in the device option.

Name	Data Type	Location	Value	Quality	Timestamp	Attribute
\$BitRWRange	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$BitWRange	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ConnectionTest	Bool	SystemTag	On	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$DeviceUpdateRate	ULong	SystemTag	1000	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$Elnapse	ULong	SystemTag	92	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ElnapseMax	ULong	SystemTag	694	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ElnapseMin	ULong	SystemTag	82	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ElnapseRate	ULong	SystemTag	18	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ErrorCounts	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$PortName	String(1)	SystemTag	SQL01Port	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$PrimaryStatus	Bool	SystemTag	On	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$ReadRange	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$ReceivedCounts	ULong	SystemTag	6890	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SecondaryStatus	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SendCounts	ULong	SystemTag	6890	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$Simulate	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SimulationType	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SlowpollingMode	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLExecute_Cmd	String(1)	SystemTag		Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLExecute_Comp	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLExecute_Reply	String(1)	SystemTag		Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLExecute_Req	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLExecute_Return	Long	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLOption_Select	String(1)	SystemTag	order by Timestamp DESC	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLOption_Update	String(1)	SystemTag		Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLRequest_Cmd	String(1)	SystemTag		Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLRequest_Comp	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLRequest_Reply	String(1)	SystemTag		Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLRequest_Req	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$SQLRequest_Return	Long	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$SQLWrite_Method	Long	SystemTag	2	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$Standby	Bool	SystemTag	Off	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$Status	Bool	SystemTag	On	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write
\$WordRWRange	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$WordWRange	ULong	SystemTag	0	Good (Coh)	3/20/2024 4:11:24 PM	ReadOnly
\$FloatTan001_QualityS	String(1)	FloatTan001_QualityS	102	Good (Coh)	3/20/2024 4:11:24 PM	Read/Write

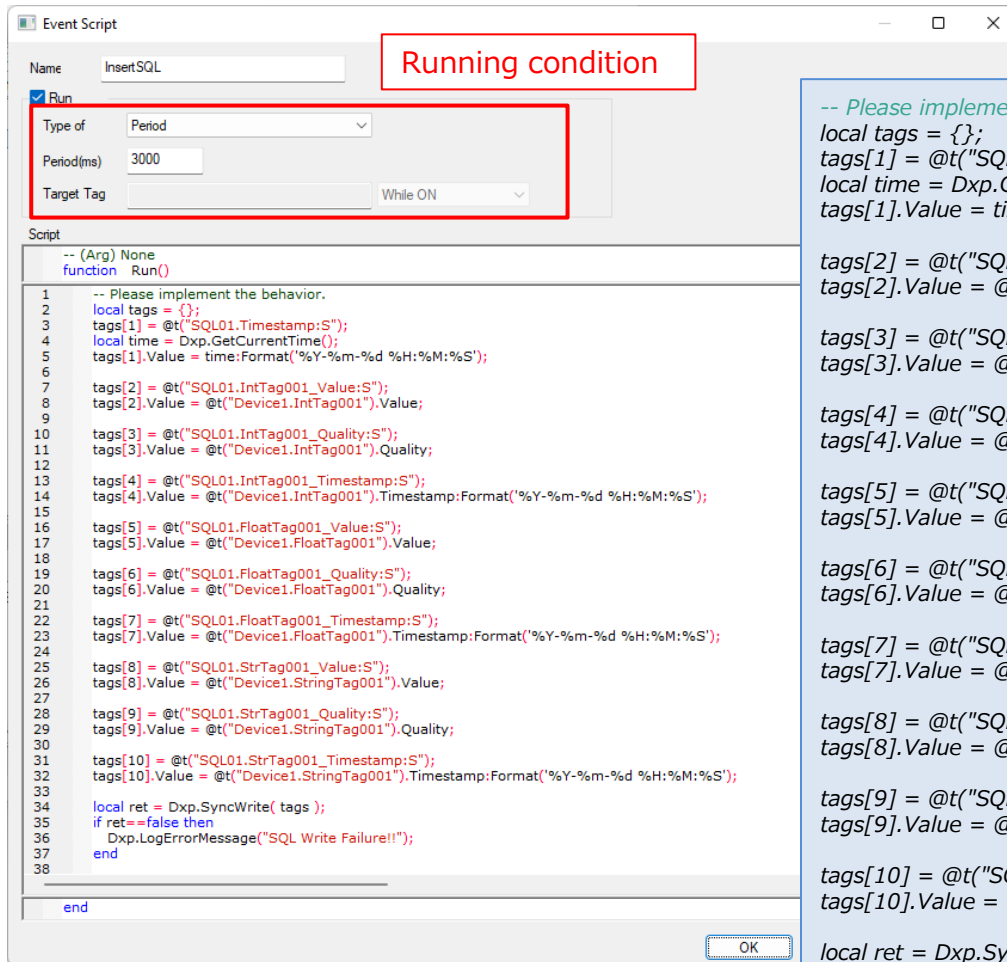
Data collection processes can be realized using Event function.
Event can be created on the device.
The custom logic can be written in the Lua scripting language.



Event can be created on any device, but the simplest way to manage scripts is to create events on **SYSTEM** device.



This is an example of periodic data collection for tags in another device (Device1).



For more information about the Lua script, see the User's Guide or the [Lua Reference \(Lua 5.1\)](#).

```
-- Please implement the behavior.
local tags = {};
tags[1] = @t("SQL01.Timestamp:S");
local time = Dxp.GetCurrentTime();
tags[1].Value = time:Format("%Y-%m-%d %H:%M:%S");

tags[2] = @t("SQL01.IntTag001_Value:S");
tags[2].Value = @t("Device1.IntTag001").Value;

tags[3] = @t("SQL01.IntTag001_Quality:S");
tags[3].Value = @t("Device1.IntTag001").Quality;

tags[4] = @t("SQL01.IntTag001_Timestamp:S");
tags[4].Value = @t("Device1.IntTag001").Timestamp:Format("%Y-%m-%d %H:%M:%S");

tags[5] = @t("SQL01.FloatTag001_Value:S");
tags[5].Value = @t("Device1.FloatTag001").Value;

tags[6] = @t("SQL01.FloatTag001_Quality:S");
tags[6].Value = @t("Device1.FloatTag001").Quality;

tags[7] = @t("SQL01.FloatTag001_Timestamp:S");
tags[7].Value = @t("Device1.FloatTag001").Timestamp:Format("%Y-%m-%d %H:%M:%S");

tags[8] = @t("SQL01.StrTag001_Value:S");
tags[8].Value = @t("Device1.StringTag001").Value;

tags[9] = @t("SQL01.StrTag001_Quality:S");
tags[9].Value = @t("Device1.StringTag001").Quality;

tags[10] = @t("SQL01.StrTag001_Timestamp:S");
tags[10].Value = @t("Device1.StringTag001").Timestamp:Format("%Y-%m-%d %H:%M:%S");

local ret = Dxp.SyncWrite( tags );
if ret==false then
    Dxp.LogErrorMessage("SQL Write Failure!!");
end
```

In this case, data from the tags of Device1 is inserted into the table every 3 seconds.

The screenshot displays the 'Database Access Sample.dxp - DeviceExplorer OPC Server Setting for ICONICS' window. The 'Project Explorer' on the left shows a tree view with 'Device1 [Mitsubishi MELSEC]' selected. The 'Tag List: SQL01' window in the center shows a table of tags. The 'Message' window at the bottom shows a log of system settings.

Name	Data Type	Location	Value	Quality	Timestamp
FloatTag001_Quality:S	String(1)	FloatTag001_Quality:S	192	Good (C0h)	3/20/2024 3:42:49 PM
FloatTag001_Timestamp:S	String(1)	FloatTag001_Timestamp:S	2024-03-20 15:42:47.000	Good (C0h)	3/20/2024 3:42:49 PM
FloatTag001_Value:S	String(1)	FloatTag001_Value:S	0.0	Good (C0h)	3/20/2024 3:42:49 PM
ID:S	String(1)	ID:S	1301	Good (C0h)	3/20/2024 3:42:49 PM
IntTag001_Quality:S	String(1)	IntTag001_Quality:S	192	Good (C0h)	3/20/2024 3:42:49 PM
IntTag001_Timestamp:S	String(1)	IntTag001_Timestamp:S	2024-03-20 15:42:47.000	Good (C0h)	3/20/2024 3:42:49 PM
IntTag001_Value:S	String(1)	IntTag001_Value:S	0	Good (C0h)	3/20/2024 3:42:49 PM
StrTag001_Quality:S	String(1)	StrTag001_Quality:S	192	Good (C0h)	3/20/2024 3:42:49 PM
StrTag001_Timestamp:S	String(1)	StrTag001_Timestamp:S	2024-03-20 15:42:47.000	Good (C0h)	3/20/2024 3:42:49 PM
StrTag001_Value:S	String(1)	StrTag001_Value:S		Good (C0h)	3/20/2024 3:42:49 PM
Timestamp:S	String(1)	Timestamp:S	2024-03-20 15:42:47.000	Good (C0h)	3/20/2024 3:42:49 PM

I..	No	Date	Time	Application	ITEM1	ITEM2	Message
20216	2024/03/20	15:42:26.662	SETTING	SYSTEM	-	Overwritten external system linkage [DxpLink Server].	
20217	2024/03/20	15:42:26.663	SETTING	SYSTEM	-	Overwritten external system linkage [SuiteLink].	
20218	2024/03/20	15:42:26.663	SETTING	SYSTEM	-	Overwritten external system linkage [OPC UA Server].	
20219	2024/03/20	15:42:26.664	SETTING	SYSTEM	-	Overwritten external system linkage [OPC DA Server].	