

Integration Objects' Free OPC UA Explorer Tool

OPC UA Client Version 1.4 Rev.0

USER GUIDE

OPC Compatibility

OPC Unified Architecture 1.02



Integration Objects' OPC UA Client User's Guide Version 1.4 Rev.0 Published January 2019

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PREFACE

ABOUT THIS USER GUIDE

This user guide:

- Describes the main features of the OPC UA Client,
- Lists the system requirements for installing and running the OPC UA Client solution,
- And explains how to run, configure, and use the OPC UA Client application.

TARGET AUDIENCE

This document is intended for any potential users of Integration Objects' OPC UA Client. Basic knowledge of OPC UA (Unified Architecture) specifications is assumed.

DOCUMENT CONVENTIONS

Convention	Description
Monospaced type	Indicates a file reference
Bold	Click/selection action required
	Information to be noted

CUSTOMER SUPPORT SERVICES

Phone	Email
Americas:	Support:
+1 713 609 9208	customerservice@integrationobjects.com
Europe-Africa-Middle East	Sales:
+216 71 195 360	sales@integrationobjects.com
	Online:
	www.integrationobjects.com



GETTING STARTED

1. Overview

Integration Objects' OPC UA Client is a free client tool that supports all the main OPC Unified Architecture (UA) information models: Data Access, Alarms & Conditions, and Historical Access.

This OPC UA Client has the capability to:

- Discover local and remote OPC UA servers,
- Establish secure communication channels,
- Browse the address space of any OPC UA compliant server,
- Monitor real-time data and alarms & conditions,
- Explore and update history data.

As security is the main feature of OPC Unified Architecture standard, our OPC UA Client generates its self-signed Application Instance Certificate to provide application level security and to establish secure connections with OPC UA servers.

2. Pre-Installation Considerations

In order to properly run the OPC UA Client, install these software components on the target system:

- .NET Framework version 4.6 or higher.
- The OPC UA Discovery Server, which lists the OPC UA endpoints available on a given computer.

3. Operating System Compatibility

The OPC UA Client supports the following operating systems:

- Windows 10
- Windows 8
- Windows Seven
- Windows Server 2016
- Windows Server 2012
- Windows Server 2008

4. Installing

To install the OPC UA Client, follow the steps below:

a. Double-click on the **Integration Objects' OPC UA Client installation package**. The installation welcome dialog box will appear.





Figure 1: Installation Welcome Dialog Box

b. Click the Next button. The license agreement will be displayed.



Figure 2: License Agreement Dialog Box

c. After reading the license agreement and accepting all its terms, click the **Next** button. The customer information dialog box will appear.



Integration Objects' OPC UA Clier	t - InstallShield Wizard	×
Customer Information Please enter your information.		
	Please enter your name and the name of the company for which you work.	
	User Name: OPC UA Client User Company Name: Integration Objects	
InstallShield	< <u>B</u> ack <u>N</u> ext > Canc	el

Figure 3: Customer Information Dialog Box

d. Add the user name and the company name and then click the **Next** button. The dialog box for choosing the destination folder will be displayed.



Figure 4: Choose Destination Folder Dialog Box



e. Click the **Next** button to continue with the chosen installation path, or the **Browse** button to select a different destination folder. The installation dialog box will then appear.



Figure 5: Installation Dialog Box

f. Click the **Install** button to start installation.

The setup will, then, copy the necessary files to the target folder, create shortcut icon to launch the OPC UA Client from the start menu and the desktop, and make an un-installation entry in the Add/Remove Programs in the Control Panel.

The Installation Complete dialog box will then be displayed.



Integration Objects' OPC UA Clier	t - InstallShield Wizard
	InstallShield Wizard Complete
	Integration Objects' OPC UA Client has been successfully installed on your computer.
	Press Finish button to exit this installation.
InstallShield	< Back Finish Cancel

Figure 6: Installation Completed Dialog Box

5. Starting-up

The OPC UA Client can be started manually from the OPC UA Client's shortcut in the start menu. To do so, click on Start → Programs → Integration Objects → OPC UA Client → OPC UA Client



Figure 7: Starting the OPC UA Client

6. Removing the OPC UA Client

To uninstall the OPC UA Client, follow the steps below:

1. Click the **Uninstall** shortcut icon available in the start menu, as illustrated below.



Figure 8: Uninstall Shortcut in the Start Menu

The following dialog box will appear:



Figure 9: OPC UA Client Uninstall Confirmation

- 2. Click the **Yes** button to start the uninstallation.
- 3. The wizard will then take you through the removal steps. At the end, click **Finish** when the un-installation is complete.





Figure 10: Windows 10 Startup Menu Uninstall Shortcut

The OPC UA Client can also be manually removed as follows:

- 1. Go to the **Control Panel**.
- 2. Click Add/Remove Programs.

3. In the Add/Remove Programs dialog screen, select Integration Objects' OPC UA Client.

4. Click Change/Remove then OK.



USING OPC UA CLIENT

In this section, you will find an overview of the OPC UA Client user interface as well as the required steps to use the application.

1. User Interface Overview

The OPC UA Client user interface allows you to manage multiple sessions, to monitor data, events and alarms, and to explorer historical data.

		_			Integration Objects' O	PC UA Client					- a x
Home		1									
	11 11 1	2		0							
🔙 💼 💽 💽	Y 🦏 🔛	110 F. 100 1		n i							
New Open Save Save	Connect Disconnect Settings	UA seconds merb	About Denne nemove	Certificate Manager							
File	Session Conf	ipuration Help	Default Configuration	Certificate							
Sessions	Data View History View	Event View									
E- Sessions	Display Name	Node Id	Value	Data Type	Server Timestamp	Source Timestamp	Status Code	Subscription	Session	Attribute	Value
G Session0	Random Boolean	ns=2;s=1 Dynamic?Rando.	False	Boolean	10/2/2018 11:57:33 AM	10/2/2018 11:57:33 AM	Good	Subscription0	Session 1	Nodeld	ns=2;s=1:Dynamic?Random.Int3
- Subscription0 4	Random.Int3	ns=2;s=1:Dynamic?Rando.	. 24	he64 4	10/2/2018 11:57:33 AM	10/2/2018 11:57:33 AM	Good	Subscription0	Session 1	NodeClass	Variable
Et Session1	Random String	ns=2;s=1:Dynamic?Rando.	Smart Manufacturing	String	10/2/2018 11:58:09 AM	10/2/2018 11:58:09 AM	Good	Subscription()	Session 1	BrowseName	2:Random.Int3
Subscription1	Random Unt 1	ns=2;s=1:Dynamic?Rando.	. 32	Ulrt 16	10/2/2018 11:58:09 AM	10/2/2018 11:58:09 AM	Good	Subscription0	Session 1	DisplayName	Random.Int3
	Random Ukt2	ns=2:s=1:Dynamic?Rando.	145	Uint32	10/2/2018 11:58:09 AM	10/2/2018 11:58:09 AM	Good	Subscription0	Session 1	Description	
	Random.Uint3	ns+2;s=1:Dynamic?Rando.	. 58	Uint64	10/2/2018 11:58:09 AM	10/2/2018 11:58:09 AM	Good	Subscription0	Session 1	WriteMask	0 6
	Random Byte	ns=2;s=1:Dynamic?Rando.	. 5	Byte	10/2/2018 11:58:09 AM	10/2/2018 11:58:09 AM	Good	Subscription0	Session 1	UserWriteMask	0
Address Space	Writable Boolean	ns=2;s=1:Static?Witable	True	Boolean	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription()	Session 1	Value	36
Forward	Wittable Int1	ns=2;s=1:Static?Wittable.I	105	Int16	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription0	Session 1	DataType	Int64
1	Witable.int2	ns=2;s=1:Static?Witable.I	67	Int32	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription0	Session 1	ValueRank	Scalar
B- Session0 Root	 Wrtable Int3 	ns+2;s+1:Static?Writable.J	42	Int64	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription0	Session 1	ArrayDimensions	
Gr 😝 Objects 3	Witable String	ns-2/s-1 Static?Wittable	www.integrationobjects.com	String	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription()	Session 1	AccessLevel	Readable
B- Server	Wittable Unt 1	ns=2;s=1:Static?Witable	5	Uint 16	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription0	Session 1	UserAccessLevel	Readable
Er Ø ServerArray	Witable Unt2	ns-2;s-1:Static?Wittable	258	Ulrt32	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription()	Session 1	MinimumSamplingInterval	Continuous
ServerStatus	Writable.Unt3	ns=2:s=1:Static?Witable	32	Uint64	10/2/2018 11:57:16 AM	10/2/2018 11:57:16 AM	Good	Subscription0	Session 1	Historizing	False
E ServiceLevel	ServerProfileArray	i=2269	(null)		10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription 1	Session 1		
and Auditing	LocaleIdArray	i+2271	(en-US)	String[]	10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription 1	Session 1		
🗟 🧳 EstimatedReturnTim	e MinSupportedSampleRate	i=2272	0	Double	10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription 1	Session 1		
🕀 😝 ServerCapabilities	MaxBrowseContinuation P	1-2735	10	Ulrt 16	10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription 1	Session 1		
🗄 💕 ServerDiagnostics	MaxQueryContinuationPol	i#2735	10	Uint16	10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription1	Session 1		
VendorServerinfo	MaxHistoryContinuationPol	1+2737	100	Uint 16	10/2/2018 11:58:05 AM	10/2/2018 11:57:30 AM	Good	Subscription1	Session 1		
Re Servernedundancy	NamespaceUri	i=15183	http://opcfoundation.org/	String	10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription0	Session0		
- C GetMonitoredItems	NamespaceVersion	i=15184	1.03	String	10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session0		
(⊕- ()) ResendData	NamespacePublicationDate	i-15185	2016-04-15	String	10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session0	- 0	
- O SetSubscriptionDura	ble IsNamespaceSubset	i=15186	False	Boolean	10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session0		
RequestServerState	Chr StaticNodeldTypes	1-15187	(null)		10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session0		
B ServerConfiguration	StaticNumericNodeldPange	i=15188	(null)		10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session()		
DA Desamis	Static StringNodeldPattern	1+15189	(rul)		10/2/2018 11:58:37 AM	10/2/2018 11:58:37 AM	Good	Subscription()	Session0		
Rendom Roulean	ServerDiagnosticeSummary	1-2275	trul)		10/2/2018 11 58 54 AM	10/1/2018 3:46:46 PM	BadOutOfService	Subscription()	Session0		
Random Int3	ServerViewCount	1=2276	(null)		10/2/2018 11:58:54 AM	10/1/2018 3:46:46 PM	BadOutOfService	Subscription0	Session0		
iti- 🛷 Random String	Current SessionCount	1+2277	(null)		10/2/2018 11:58:54 AM	10/1/2018 3:46:46 PM	BadOutOfService	Subscription0	Session0	- 6	
4 I) Com I do al Constant	1-7278	6-m		10/2/2018 11 59 54 14	10/1/2018 2 46 AC PM	Build antigeneting	C. Bandetine D	Section	-	
× 14 🗑				5							3
Message Type	Timestamp	Messa	ge								
[Control]	2018/10/02 115854	Create	Monitored Items succeeded.	Count = 17							
[Control]	2018/10/02 115837	Create	Monitored Items succeeded.	Count = 7							
[Control]	2018/10/02 11:58:23	Anew	subscription with the followi	ng properties: [Display Na	ime: Subscription0, Publishi	ing Interval: 1000, Keep Aliv	e Count: 10, Lifetime Coi	unt: 1000, Max Notificatio	ns Per Publish: 0, Priority: 2	55, PublishingEnabled: True] was successf	ully created.
12.Messager											

Figure 11: OPC UA Client Main View

There are five parts in the main user interface, as highlighted above:

- Home Menu Bar (1): This part contains the file item bar, the session management, the configuration item bar, the help item bar, the default configuration item bar and the certificate item bar.
- OPC UA Sessions List (2): Tree browser displaying the created sessions within the connected OPC UA servers and its related subscriptions.
- Server Address Space (3): Tree browser displaying the address space of the selected endpoint.
- OPC UA Data Viewer (4): This part contains Data View, History View and Event View.
- Log messages Browser (5): This part displays log messages. The most recent messages are displayed at the top of the messages list.
- Node Details Table (6): shows the attributes of the selected node and their values.





The Node Details Table is configurable. It can be hidden by unchecking the node details grid parameter in the settings as shown in the figure below:

😵 Settings				-	x
Log Settings	Appearance	Address Space			•
Appearance					
Theme:		Windows7Blue	•		
Layout		Reset Views			
🗷 Node D	etails Grid				
	ОК	Cancel			

Figure 12: Hide the Node Details Grid

2. Save/Load Configuration



Figure 13: File Item Bar

Using the File item bar, you can:

- New Create a new project by clicking the New button.
- **Open** Open an existing configuration by clicking **Open** and selecting the appropriate ".ouc" configuration file.
- Save / Save As Save your current configuration by clicking Save / Save As.



3. Define/Remove Configuration



Figure 14: Default Configuration Item Bar

Using the Default Configuration item bar, you can:

- Click the **Define** button to define the default configuration to be loaded automatically at the application start-up. It will prompt a file dialog screen. Select your saved configuration and then click the **OK** button.
- To remove the default configuration, click the **Remove** button.

4. UA Settings

The OPC UA Client comes with default settings for the UA parameters. These settings can be easily edited using the **UA Settings** dialog presented below.

😵 UA Settings	х
Client Configuration	
Default Session Timeout (ms)	60000
Min Subscription Lifetime (ms)	60000 ≑
Transport Quotas	
Operation Timeout (ms)	120000 🗘
Max String Length	1048576 ≑
Max Byte String Length	4194304 🚔
Max Array Length	65535 ≑
Max Message Size	4194304 ≑
Max Buffer Size	65535 🖨
Channel Lifetime (ms)	300000
Security Token Lifetime (ms)	3600000 🖨
Reconnection Configuration	
🛛 🗹 Enable Automatic Reconnect	tion
Check Communication Every (s)	: 30 🔹
Apply	Cancel

Figure 15: UA Settings Dialog Screen



The default client and transport parameters are listed in the table below:

Setting	Default Value			
Default Session Timeout	Session The default timeout for new sessions (in milliseconds).			
Min Subscription Lifetime	60000			
Operation Timeout	The default timeout in milliseconds for operations.	120000		
Max String Length	The maximum length for a string value in any message.	1048576		
Max Byte String Length	The maximum length for a byte string value in any message.	4194304		
Max Array Length	The maximum length for any array in a message. Note that some protocols do not distinguish between bytes and arrays. In these cases the binding will choose the larger of MaxByteStringLength or MaxArrayLength.	65535		
Max Message Size	The maximum size of any message.	4194304		
Max Buffer Size	The maximum buffer size. This value controls how big a block of memory the transport layer allocates. Setting this value to a large value will reduce performance and use a lot of RAM.	65535		
Channel Lifetime	The lifetime of a SecureChannel in milliseconds. This specifies how long the server will keep a broken channel around while waiting for a client to reconnect. Not used by HTTP or .NET TCP bindings.	300000		
Security Token Lifetime	3600000			

Table 1: UA Parameters



For the reconnection configuration, you can check the **Enable Automatic Reconnection** box and configure the period separating two reconnection attempts.

5. Connect to an OPC UA Server

To connect to an OPC UA server, select **Connect** button available in the Home menu bar and the following dialog screen will appear:

So Connection Settings	X
- Session Information	
Session Name Session0	
Server Information	
Endpoint Url http://DEV21-PC:51211/	UA/SampleServer Discover
Transport Protocol	- Message Encoding
 Http 	Binary
◎ Opc.tcp	© Xml
○ Https	Ŭ
Security Mode	Security Policy
None	None
(6) Sign	Basic128RSA15
Sign Encrypt	Basic256
Congrigue generative	Basic256Sha256
User Authentication Mode	
Anonymous	Name 🔘 Certificate
User Name	
Password	
Apply	Cancel

Figure 16: Connection Settings Dialog Screen

All the settings presented in this dialog screen are required to open a channel and to establish a session with the selected OPC UA server.

1. Endpoint settings

The user can either type the server URL or select it from the URL list discovered by the OPC UA Client. Our OPC UA Client supports https and opc.tcp transport protocols and detects which of them to use from the specified endpoint URL.

2. Security settings

The user should also select a Security Mode and Security Policy so that the OPC UA Client opens a secure channel with the selected endpoint. Only security settings supported by the chosen UA server will be enabled.



There are three different Security Modes available:

- None: the channel is not secured.
- Sign: the message is signed with the associated Private Key of the Application Instance Certificate of the OPC UA Client application.
- Sign & Encrypt: the message is also encrypted with the Public Key of the server's Application Instance Certificate.

There are three security policies supported which determine the algorithm for signing and encrypting:

- None: an algorithm suite that does not provide any security settings.
- Basic128RSA15: an algorithm suite that uses RSA15 as the key wrap algorithm and 128-bit Basic as the message encryption algorithm.
- Basic256: an algorithm suite that uses 256-bit Basic as the message encryption algorithm.
- Basic256Sha256: An algorithm suite that uses SHA256 for the signature digest and 256-bit Basic as the message encryption algorithm.

3. Authentication settings

On the session establishment step, it is required to choose the user authentication mode. There are three options available:

- Anonymous: user identity is not set.
- Username and Password: the user is identified by a User Name/Password combination.
- Certificate: the user is identified by an X509 certificate.

When the server URL, the security options, the user authentication mode and the session name are set, the connection to the server can be established by clicking the **Apply** button.

6. Disconnect from an OPC UA Server

To remove an OPC UA Server, you can either select a session from the Sessions tree view and click **Disconnect** button available in the menu bar or right click the session node and select **Remove Session** from the displayed menu. The session will be then terminated, and the selected session node and its related address space will be consequently removed from the Address Space tree view.



Figure 17: Disconnect Server

7. Manage Certificate

Using the Certificates Management, you can:

• List the certificates: this option displays the list of the trusted, the rejected and the OPC UA Client certificates. Users can trust a rejected certificate by right clicking on it



and selecting Trust as shown in the figure below. They can also reject a trusted certificate.

- Import certificate: this option allows users to select a certificate and add it to the list of the trusted ones.
- Remove certificate: this option allows users to remove the selected certificates from the trusted or rejected list.
- Open certificate folder: this option allows the user to open the folder containing the certificate.

📯 Certificate Manager	_ = ×
Manage Certificates	
Status	Certificate Path
Trusted	$\label{eq:c:ProgramData} C: \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
Own Certificate	C:\ProgramData\Integration Objects\CertificateStores\UA Client\TrustedCertificates\certs\Integrat
Trusted	C:\ProgramData\Integration Objects\CartificateStores\UA Client\TrustedCertificates\certs\UA De Reject
•	Import Remove Certificate Folder

Figure 18: Disconnect Server

8. Manage Sessions

You can connect to different local and remote OPC UA servers by clicking the **Connect** button available in the Home menu bar or by right clicking on the Sessions root node and selecting **Add Session** as shown below.



Figure 19: The Sessions Context Menu

You can also remove all the added sessions by selecting **Remove All Sessions** from the Sessions context menu or only remove the selected session by selecting **Remove Session** from the Session context menu as shown in the figure below.





Figure 20: The Session Context Menu

The user can also close and activate the session. When selecting **Close Session**, the session will only be suspended for a period of time as shown in the figure below, thus the user can either activate the session or remove it.

The activation of the session can be invoked even if the session is not closed to republish the subscriptions.

Sessions	Data View History Vie	ew Event View							
E- Sessions	Display Name	Node Id	Value	Data Type	Server Timestamp	Source Timestamp	Status Code	Subscription	Session
Activate Session	n.Boolean	ns=2;s=1:Dynamic?Random	True	Boolean	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session 0
Close Session	n.Int3	ns=2;s=1:Dynamic?Random.I	47	Int64	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session 0
Remove Session	n.String	ns=2;s=1:Dynamic?Random	Industrial Telecommunications	String	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session0
Subs 2 Edit Session	n.Uint1	ns=2:s=1:Dynamic?Random	18	Uint 16	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session 0
	n.Uint2	ns=2:s=1:Dynamic?Random	24	Uint32	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session0
Create subscription	n.Uint3	ns=2;s=1:Dynamic?Random	3	Uint64	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session 0
Remove All Subscript	ons manual.Byte	ns=2;s=1:Dynamic?Random	1	Byte	10/2/2018 5:22:06 PM	10/2/2018 5:22:06 PM	Communication Error	Subscription0	Session0
	Writable Boolean	ns=2;s=1:Static?Wittable.Boo	True	Boolean	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
Idress Space	Writable.Int1	ns=2;s=1:Static?Writable.Int1	105	Int16	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
orward 💌	Writable.int2	ns=2;s=1:Static?Witable.Int2	67	Int32	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
	Writable.Int3	ns=2;s=1:Static?Writable.Int3	42	Int64	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session 0
	Writable String	ns=2:s=1:Static?Writable.String	www.integrationobjects.com	String	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription()	Session0
	Writable.Uint1	ns=2;s=1:Static?Writable.Uint1	5	Ulint16	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription()	Session 0
	Writable.Uint2	ns=2;s=1:Static?Writable.Uint2	258	Ulht32	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
	Writable.Uint3	ns=2;s=1:Static?Wittable.Uint3	32	Uint64	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
	Writable Byte	ns=2;s=1:Static?Wittable.Byte	3	Byte	10/2/2018 5:20:50 PM	10/2/2018 5:20:50 PM	Communication Error	Subscription0	Session0
	BooleanValue	ns=3j=10216	False	Boolean	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	SByteValue	ns=3j=10217	20	SByte	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	ByteValue	ns=3)=10218	215	Byte	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	Int16Value	ne=3j=10219	19260	Int16	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	Ulnt16Value	ns=3j=10220	848	Uint16	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	Int32Value	ns=3j=10221	1200762809	Int32	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	UInt32Value	ns=3.i=10222	3860454840	Ulnt32	10/2/2018 5:21:48 PM	10/2/2018 5:21:16 PM	Good	Subscription0	Session 1
	Int CAValue	na-2i-10222	0051203047040000330	Let C.4	10/2/2010 E-21-40 DM	10/2/2010 5-21-10 DM	Good	C description 0	Cassion 1

Figure 21: Close Session

While the session is activated, the user can change the user identity with which he created the session by selecting **Change User Identity** and the following dialog screen will be prompted:

While the session is activated, the user can edit the session configuration with which he created it by changing the message encoding, the security mode, the security policy and the user authentication mode. The following dialog screen will be prompt when selecting **Edit Session**.



🕹 Edit Session	X
- Session Information	
Session Name Session0	
- Server Information	
	52/UA /0 1 0
	io2/UA/SampleServer
Transport Protocol	Message Encoding
Opc.tcp	Binary
limited Https	(6) Xml
Security Mode	
None	None
© Sign	Basic 128 RSA 15
Sign Encrypt	Basic256
© sign_andipt	Basic256Sha256
User Authentication Mode	
Anonymous OUse	rName © Certificate
User Name	
Password	
Apply	Cancel

Figure 22: Edit User Authentication Mode

9. Manage Subscriptions

The user can add a new subscription to a specified session either by:

- Right clicking on the session node and selecting Create Subscription
- Or after choosing the monitored items to add to (this option will be detailed in section 12 and 14).

The user can also remove all the subscriptions of a selected session or remove only a selected subscription as shown in the figure below.





Figure 23: The Subscription Context Menu

The default subscription parameters are listed in the table below:

Setting	Description	Default Value
Publishing Interval	This interval defines the cyclic rate that the subscription is being requested to return notifications to the client. This interval is expressed in milliseconds.	1000 ms
Keep Alive Count	This setting defines the number of consecutive publishing cycles in which there have been no notifications to report to the client. When the maximum keep-alive count is reached, a Publish request is de-queued and used to return a keep alive message. This keep-alive message informs the client that the subscription is still active.	10
Lifetime Count	When the publishing timer has expired this number of times without a publish request being available to send a notification message, then the subscription shall be deleted by the server.	1000
Max Notifications per Publish	The maximum number of notifications that the client wishes to receive in a single Publish response. A value of zero indicates that there is no limit.	0
Priority	This setting indicates the relative priority of the subscription. When more than one Subscription needs to send notifications, the server should de- queue a publish request to the subscription with the highest priority number. For subscriptions with equal priority the server should de-queue Publish requests in a round-robin fashion.	255
Publishing Enabled	A Boolean parameter with the following values: -TRUE: publishing is enabled for the subscription. -FALSE: publishing is disabled for the subscription.	True

Table 2: Subscription Parameters

These parameters can be edited if required by selecting Set Subscription Properties from



Set Subscription Properties	_ X
Subscription Name Subscription0	
- Subscription Parameters	
Publishing Interval (ms)	1000
Keep Alive Count	10 📮
Lifetime Count	1000 📮
Max Notifications per Publish	0
Priority	255 ≑
Publishing Enabled	
ОК	Cancel

the subscription context menu and the following dialog screen will be displayed:

Figure 24: Set Subscription Properties

10. Browse OPC UA Server Address Space

To browse the address space of a server, select its related session from the Sessions tree view and a set of objects and related information that the selected server makes available to the client will be displayed in the AddressSpace tree view.

The model for these Objects is defined by the OPC UA Object Model and the elements of this model are represented in the address space as nodes. Each node is assigned to a node class.

OPC UA defines eight node classes as illustrated in the figure below:

Object	Variable	Method	View
ObjectType	Variable Type	ReferenceType	DataType



Objects and their components are represented in the AddressSpace as a set of Nodes described by Attributes and interconnected by References.



The user can choose the reference type to browse the address space of the OPC UA server by right clicking the session root node and selecting **Browse Options** as shown in the figure below:

⊡Session0 Root	
🕀 🌍 🚠 🛛 Browse Options	
🖅 📦 Types	
🗄 🖙 📦 Views	

Figure 26: The Root Context Menu

The following dialog screen will be displayed:

Browse Options		x
Reference Type	>HierarchicalReferences	-
	References > NonHierarchicalReferences > HasModellingRule > HasEncoding > HasEncoding > HasDescription > GeneratesEvent > ToState > ToState > HasCause > HasEffect > HasEtfect > HasTueSubStateMachine > AlwaysGeneratesEvent > AlwaysGeneratesEvent	
	> HasFalseSubState > HasCondition	
	> HasChild > HasProperty > HasProperty > HasComponent > HasOrderedComponent > HasHistoricalConfiguration > HasSubtype > Organizes > HasEventSource	

Figure 27 : Browse Options Dialog Screen

By default, the reference type is set to HierarchicalReferences.

In some cases, the OPC UA Server address space may contain duplicated nodes. To avoid displaying a duplicated address space, the user can set the **Suppress Duplicated References** parameter to true as shown in the figure below:





Settings			_	x
Log Settings /	Appearance	Address Space		•
- Address Space	,			
Suppress	Duplicated Re	ferences		
	OK			
	UK	Cancel		

Figure 28: Suppress Duplicated References

11. Show References and Attributes

To view the references and the attributes of a node in the address space of the OPC UA server, click on the **References and Attributes** context menu item as illustrated in the figure below:



The following dialog screen will be prompted:



🔲 Atti	ibutes and References				_ X			
Attributes			References					
	Attribute	Value	Refe	rences	Both			
•	NodeId	i=2256			boun			
	NodeClass	Variable		Reference	Target Display Name			
	BrowseName	ServerStatus	•	HasComponent	StartTime			
	DisplayName	ServerStatus		HasComponent	CurrentTime			
	Description	The current status of the server.		HasComponent	State			
	WriteMask	0	4	HasComponent	BuildInfo			
	UserWriteMask	0		HasComponent	SecondsTillShutdown			
	Value	{4/6/2016 1:54:10 PM 4/6/2016 4		HasComponent	ShutdownReason			
	DataType	ServerStatusDataType	4	HasTypeDefinition	ServerStatusType			
	ValueRank	Scalar		HasComponent	Server			
	ArrayDimensions							
	AccessLevel	Readable						
	UserAccessLevel	Readable						
	MinimumSamplingInterval	1000						
	Historizing	False						

Figure 30: References and Attributes Dialog Screen

The attributes table shows the attributes of the selected node and their respective values and the references table shows the type of reference and the display name of the node that the reference points to.

On top of the references table, there are two dropdown lists allowing the user to choose the references options as shown in the figure below:

Att	tributes and References					-	x	
Attribu	ites		R	eferences				
	Attribute	Value	Г	References	*	Forward	-	
•	NodeId	i=2253	H	> NonHierarchicalReferences		Forward		
	NodeClass	Object	L	> HasModellingRule		TBoth		F
	BrowseName	Server	P	> HasEncoding		N Inverse		
	DisplayName	Server	L	> HasDescription		ServerStatus		l
	Description		L	> HasTypeDefinition		ServiceLevel		l
	WriteMask	0		> FromState		Auditing		l
	UserWriteMask	0		> ToState		ServerCapabilities		I
	EventNotifier	Subscribe		> HasCause		ServerCapabilities		I
	ServerArray	System.String[]	4	> HasEffect		ServerDiagnostics	=	H.
	NamespaceArray	System.String[]	Г	> AlwaysGeneratesEvent		VendorServerInfo		l
	Servicel evel	255	E	> HasTrueSubState		ServerRedundancy		l
	Auditing	Ealco	E	> HasFalseSubState		Namespaces		l
	Additing	Taise	E	> HasCondition	=	GetMonitoredItems		l
			E	> HotElowTo		Data		
			E	> SignalTo		Boilers		l
			E	> HierarchicalReferences		ServerTure	-	Ē
				=> HasChild	F	ServerType		<u> </u>
				> Aggregates				
				> HasProperty				
				> HasOrderedCompon				
				> HasHistoricalConfigurat				
				> HasSubtype				
				> Organizes				
				> HasEventSource				
				> HasNotifier	-			

Figure 31: References Options



12. Read

To read the value of a node of Variable type, click on the **Read** context menu item as shown below:



The dialog box below will appear displaying the following information:

- The OPC UA server timestamp
- The source timestamp
- The status code
- The current value of the variable
- The value type

🗟 Read Variable Value	_	х
Server Timestamp	2016-04-07 09:46:44]
Source Timestamp	2016-04-07 09:46:44]
Status Code	Good]
Value	False]
Value Type	Boolean]
	ОК	

Figure 33: Read Variable Dialog Box





13. Write

To write a value to a variable node, first, you need to right click on the node and then select the **Write** context menu item as illustrated in the figure below.

IntegrationObjects.DAHDASimulatorC#2008.1(DA)								
🕀 😭 ServerStatus								
🗄 🗔 FolderType								
🛱 🏫 Simulation								
🕀 🔂 FolderType	🖶 📊 FolderType							
🕀 🏈 Tag.VT_11		_						
🕀 🎻 Tag.VT 🧮	References and Attributes							
🗄 🥜 Tag.VT 🔍	Read							
🗄 🥜 Tag.VT 🅜	Write							
🕀 🏈 Tag.VI 📷	History Update							
🖶 🏈 Tag.VT		-						

Figure 34: Write Variable Value

To complete the write operation, enter the new value to be written to the node and click the **OK** button to confirm as shown below:

🖉 Edit Numeric Val	x	
62880		÷
ОК	Cancel	

Figure 35: Edit Value

14. Call Method

To call a method, you need to right click on a method node from the server address space and select **Call Method** from the displayed menu as illustrated in the figure below.



A dialog box similar to the one below will be prompted.



Call Server.GetMonitored	dItems		x					
Input Parameters								
Name	Input Value	Туре	Description					
SubscriptionId	1	UInt32						
Output Parameters								
News	0.1-11/1	T	Description					
Name		lype	Description					
ServerHandles	{1 2 3 4 5}							
ClientHandles	{3 4 5 6 7}	UInt32[]						
Decult								
Kesult								
Method executed successfully								
	Call	Cancel						

Figure 37: Call GetMonitoredItems Method

In this dialog, you can set the input values and then click **Call**. The output values appear in the Output Value column and the Result text field shows whether the call succeeded or not.

The figure above illustrates the call of "GetMonitoredItems" method. This method is used to get information about the monitored items of a subscription.

Input parameter:

• SubscriptionId - identifier of the subscription.

Output parameters:

- ServerHandles (UInt32[]) array of ServerHandles for all MonitoredItems of the subscription identified by SubscriptionId.
- ClientHandles (UInt32[]) array of ClientHandles for all MonitoredItems of the subscription identified by SubscriptionId.

15. Monitor Real-Time Data

To monitor real-time data, the user needs to drag and drop the variable node or the list of variable nodes from the address space browser to the **Data View** grid view, and the following dialog screen will be prompted:



Subscription Settings	x
Existing Subscribtion Subscription Name Subscription4	
Subscription Parameters Publishing Interval (ms)	
Keep Alive Count	
Lifetime Count 1000 - Max Notifications per Publish 0 -	
Priority 255 -	
OK Cancel	

Figure 38: Subscription Settings

Using this dialog box, you can choose either an existing subscription if available or create a new subscription to receive data changes.

After clicking the **OK** button, a new line in the grid view will be added displaying the following information as illustrated in the figure below:

- Display Name
- Node ID
- Value
- Data Type
- Server Timestamp
- Source Timestamp
- Status Code
- Subscription
- Session



Data View	History View	Event View 👻								
Display Nam	e	Node Id	Value	Data Type	Server Timestamp	Source Timestamp	Status Code	Subscription	Session	
Int1		ns=2;s=Dynamic/Int1	17	Int32	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription0	Session0	
Int2		ns=2;s=Dynamic/Int2	65	Int64	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription0	Session0	
Int3		ns=2;s=Dynamic/Int3	36	String	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription0	Session0	
Ulnt1		ns=2;s=Dynamic/UInt1	44512	UInt16	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription0	Session0	
UInt2		ns=2;s=Dynamic/UInt2	2810188310	UInt32	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription0	Session0	
UInt3		ns=2;s=Dynamic/UInt3	10967740682877486908	UInt64	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription 1	Session0	
String1		ns=2;s=Dynamic/String1	System Integration	String	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription 1	Session0	
Byte1		ns=2;s=Dynamic/Byte1	27	Byte	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription 1	Session0	
Boolean		ns=2;s=Dynamic/Boolean	True	Boolean	03/10/2018 15:26:50.625	03/10/2018 15:26:50.625	Good	Subscription 1	Session0	
Int1		ns=2;s=Static/Int1	-16406	Int16	03/10/2018 14:39:42.874	03/10/2018 14:39:42.874	Good	Subscription0	Session1	
Int2		ns=2;s=Static/Int2	1866990214	Int32	03/10/2018 14:39:42.876	03/10/2018 14:39:42.876	Good	Subscription0	Session 1	
Int3		ns=2;s=Static/Int3	6819221709950500880	Int64	03/10/2018 14:39:42.876	03/10/2018 14:39:42.876	Good	Subscription0	Session 1	
Uint1		ns=2;s=Static/UInt1	39711	Uint16	03/10/2018 14:39:42.876	03/10/2018 14:39:42.876	Good	Subscription0	Session 1	
UInt2		ns=2;s=Static/UInt2	400632959	UInt32	03/10/2018 14:39:42.877	03/10/2018 14:39:42.877	Good	Subscription0	Session 1	
UInt3		ns=2;s=Static/UInt3	14081728898387341416	UInt64	03/10/2018 14:39:42.877	03/10/2018 14:39:42.877	Good	Subscription0	Session 1	
String1		ns=2;s=Static/String1	www.integrationobjects.com	String	03/10/2018 14:39:42.877	03/10/2018 14:39:42.877	Good	Subscription0	Session 1	

Figure 39: Data View

16. Explore History Data

To explore history data, variable nodes that have history data need to be dragged and dropped to the **History View** so that a new tab with the node display name will be created.

The user can choose between Read Raw, Read Processed, Read Modified and Read at Time. The figure below illustrates the read raw action:

Data View	History View	Event View						•
Int1 ×								•
Node Path	Session0 R	loot;Objects;Historical Da	ta;Dynamic;Int1					
Read Type	e R	ław 💌	Start Time	04/10/2018	0:35:43	▼ ms	0 🌲	
Aggregate	Ir	nterpolative 💌	End Time	04/10/2018	0:36:43	▼ ms	999 🌲	
Processin	g Interval (ms)	1000 🌲	Max Values Returned	10 🜲	ОК			
	-							
Index	Time		Value		Quality			History Info
[0]	04/10/2018 10:3	35:43.201	11		Good			00
[1]	04/10/2018 10:3	35:44.202	12		Good			00
[2]	04/10/2018 10:3	5:45.203	13		Good			00
[3]	04/10/2018 10:3	35:46.203	14		Good			00
[4]	04/10/2018 10:3	5:47.205	15		Good			00
[5]	04/10/2018 10:3	5:48.205	16		Good			00
[6]	04/10/2018 10:3	5:49.205	17		Good			00
[7]	04/10/2018 10:3	5:50.206	18		Good			00
[8]	04/10/2018 10:3	5:51.207	19		Good			00
[9]	04/10/2018 10:3	5:52.207	20		Good			00

Figure 40: Read Raw

The Processing Interval, the Start Time, the End Time and the Max Values Returned parameters are configurable using the fields available at the top of the grid view. The figure below is an example of read processed data (read the average value):



Data View History View Event View										
Int1 ×						-				
Node Pat	h Section()	Root Objects Historical	Data:Dunamic:let1							
110001100	Session of hour collects, historical bala, bynamic, itik i									
Read Type Processed Start Time 04/10/2018 10:50:39 ms 0										
Accrecel		Average	 End Time 	04/10/2018 10:55:39	• ms 999 🜩					
Aggregat	c	Interpolative								
Processing Interval (ms) Average Max Values Returned 0 CK										
	-	Count		0.5						
Index	lime	Maximum	alue	Quality	History Info					
[57]	04/10/2018 10	Minimum Total		Good	01					
[58]	04/10/2018 10	.Jz.JJ.000		Good	01					
[59]	04/10/2018 10	0:52:37.000	15	Good	01					
[60]	04/10/2018 10	0:52:39.000	17	Good	01					
[61]	04/10/2018 10	0:52:41.000	19	Good	01					
[62]	04/10/2018 10	0:52:43.000	11	Good	01					
[63]	04/10/2018 10	0:52:45.000	13	Good	01					
[64]	04/10/2018 10	0:52:47.000	15	Good	01					
[65]	04/10/2018 10	0:52:49.000	17	Good	01					
[66]	04/10/2018 10	0:52:51.000	19	Good	01					
[67]	04/10/2018 10	0:52:53.000	11	Good	01	=				
[68]	04/10/2018 10	0:52:55.000	13	Good	01					

Figure 41: Read Processed

17. Update History Data

To update history data, you need to right click on a variable node that has a history write access and select **History Update**.

The History Update menu includes five entries, as illustrated in the figure below:



Figure 42: Update History Data

a. Insert, Replace, Insert/Replace

These three update functions are defined as follows:

- Insert: this function inserts values and qualities at the specified timestamps. If a value exists at the specified timestamp, the new value will not be inserted.
- Replace: this function replaces the values and qualities at the specified timestamps. If no value exists at the specified timestamp, the new value will not be inserted.
- InsertReplace: this function inserts or replaces values and qualities for the specified timestamps. If the item has a value at the specified timestamp, the new value and



quality will replace the old one. If there is no value at that timestamp, the function will insert the new data.

These three functions have similar graphical configuration interface where the user must provide the value, value type, timestamp, and quality.

History Ins	ertReplace			x						
Configure	Configure Data									
Value	Value 956									
Value Ty	pe Int32	•								
Timestar	mp 04/11/2016	17:30:00 👻	0 🌩 ms							
Quality	Uncertain									
			Add							
Added Dat	ta									
Value	Value Type	Timestamp	Quality							
484	Int32	11/04/2016 17:18:51.305	Good							
500	Int32	11/04/2016 17:17:00.000	Good							
	OK	Cancel								

Figure 43: History InsertReplace Dialog

b. Delete Raw

This function deletes the values, qualities, and timestamps for the specified time.

Delete Raw	x
Start Time	04/11/2016 15:56:59 🔽 0 💭 ms
End Time	04/11/2016 16:06:59 💌 0 🖨 ms
	OK Cancel

Figure 44: Delete Raw Dialog

c. Delete At Time

This function deletes the values and qualities in the historian for the specified timestamps.



Delete At Time	x
Configure Timestamp	
Timestamp 04/11/2016 16:17:19 💌 0 🛫 ms	Add
Timestamps To Delete	
Timestamp	
11/04/2016 16:16:28.000	
11/04/2016 16:17:19.000	
OK Cancel	

Figure 45: Delete At Time Dialog

18. Monitor Alarms and Conditions

To monitor alarms and events, the object node that should be an Event Notifier need to be dragged and dropped from the address space browser to the **Event View** grid view. Same as monitoring real-time data, a subscription should be created to receive Alarm and Condition notifications from the server.

After choosing the subscription, the event and alarm notifications will be added to the grid view displaying the following information as illustrated in the figure below:

- Node Display Name
- Event Type
- Source Name
- Time
- Message
- Severity
- Subscription Name
- Session Name



Data View	/ History	View Event View							•
AckReq	Node Display Name	Event Type	Source Name	Time	Message	Severity	Condition	Subscription Name	Session Name
Req	Server	Level	EventSources.Area2.Condition	3/2/2017 1:50:58 PM	Condition Active	100	SPLEVEL	Subscription0	Session2
	Server	Signal Change	EventSources.Area1.Simple2	3/2/2017 1:50:54 PM	False	800		Subscription0	Session2
	Server	Advanced Control	EventSources.Area1.Tracking	3/2/2017 1:50:59 PM	3489	600		Subscription0	Session2
	Server	Device Failure	EventSources.Area1.Simple	3/2/2017 1:50:59 PM	True	400		Subscription0	Session2
	Simulation	Program Transition	Simulation	3/2/2017 1:49:56 PM	The "":"Start" m	500		Subscription0	Session3
	Server	Injection Test Repor	HistoryEvents/Titan	3/2/2017 1:50:54 PM	An injection test	500		Subscription0	Session3
	Server	FluidLevelTestRep	HistoryEvents/Jupiter	3/2/2017 1:50:54 PM	A fluid level test r	500		Subscription0	Session3

Figure 46: Event View

The Vendor Specific Event Attributes can also be displayed, in the event grid view, with the same order defined by the server as shown in the figure below:

D	Data View History View Event View										
1	Message	Severity	Condition	Subscription Name	Session Name	Attr #0	Attr #1	Attr #2	Attr #3	Attr #4	Attr #5
4	Deviation Alarm	500	DEVIATION	Subscription0	Session0	(null)	(null)	(null)	(null)	(null)	(null)
Λ	LOLO Alam	300	PVLEVEL	Subscription0	Session0	357	358	359	360	361	362
4	Condition Normal	500	DEVIATION	Subscription0	Session0	(null)	(null)	(null)	(null)	(null)	(null)
4	Simple Event	1		Subscription0	Session0	(null)	(null)	(null)	(null)	(null)	(null)
4	Setpoint changed Tracking Event	1		Subscription0	Session0	(null)	(null)	(null)	(null)	(null)	(null)
Λ	LOLO Alarm	100	PVLEVEL	Subscription0	Session0	451	452	453	454	455	456

Figure 47: Event Attributes

The displayed attributes columns number can be modified using the config ini located in the installation folder. The related tag is called **ColumnCount** and is set to 20 by default as shown below.

📮 [FileLogConfiguration]						
AutoAppend=true						
BufferSize=100						
LogFileMaxSize=10						
MaximumFiles=0						
Level=Error						
LAutoSaveTimeOut=10						
📮 [Display]						
Style=Windows7Blue						
ColorStyle=Empty						
📮 [ConfigSetting]						
LDefaultConfigPath=						
[AddressSpaceConfiguration]						
<u>SuppressDuplicateRefer</u> ences=false						
📮 [EventAttributes]						
ColumnCount=20						
L						

Figure 48: Event Attributes Number Configuration

19. Acknowledge Alarms

To acknowledge the alarms, select one or many rows from the Event gridview then right click and select **Acknowledge Selected** as illustrated in the figure below.



Data V	ïew Hist	ory View	Event View							
AckRe	eq Display Name	Event	Туре	Source Name	Time	Message	Severity	Condition	Subscription Name	Session Name
Req	Server Level			EventSources.Area2.Condition	3/2/2017 1:44:59 PM	Condition Active	100	SPLEVEL	Subscription0	Session2
			EventSources.Area1.Simple2	3/2/2017 1:44:55 PM	False	800		Subscription0	Session2	
	Server	Advanc	ced Control	EventSources.Area1.Tracking	3/2/2017 1:44:55 PM	3416	600		Subscription0	Session2
	Server	Device	Failure	EventSources.Area1.Simple	3/2/2017 1:44:55 PM	False	400		Subscription0	Session2

Figure 49: Acknowledge Selected Alarms

If the acknowledge is required the **Acknowledge Alarms** dialog will prompted so that the user enters his comment.

Acknowledge Alarms				
Comment :				
	ОК	Cancel	.4	

Figure 50: Acknowledge Alarms Dialog



For additional information on this guide, questions or problems to report, please contact:

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