

Integration Objects'

OPC Simulation Tools

OPC Server Simulators Full Edition
2.1 Rev.1

USER GUIDE

OPC Compatibility

OPC Data Access 2.05a

OPC Data Access 3.00

Historical Data Access 1.10

Historical Data Access 1.20

OPC Alarms & Events 1.02

OPC Alarms & Events 1.10

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TABLE OF CONTENTS

PREFACE	5
About This User Guide	5
Related Documents	5
Customer Support Services	5
GETTING STARTED.....	6
1. Pre-Installation Considerations	6
2. Installing OPC Server Simulators Full Edition	6
3. Starting-up	13
4. Removing OPC Server Simulators Full Edition	14
ADVANCED OPC DA HDA SERVER SIMULATOR.....	15
1. Overview.....	15
2. Server Features	15
3. Simulation Files	16
4. Server Registration	19
OPC A&E SERVER SIMULATOR	20
1. Overview.....	20
2. Server Features	20
3. Simulation File	21
4. Alarms Generation Frequency	22
5. Server Registration	22

TABLE OF FIGURES

Figure 1: Installation Welcome Dialog	7
Figure 2: License Agreement Dialog.....	8
Figure 3: Customer Information Dialog	9
Figure 4: Choose Destination Folder Dialog	10
Figure 5: Installation Dialog Box	11
Figure 6: Installation Dialog	12
Figure 7: Installation Completed Dialog	13
Figure 8: Starting the OPC Simulators.....	13
Figure 9: Start Menu – Uninstaller Shortcut	14
Figure 10: Windows 10 Startup Menu - Uninstall Shortcut.....	14
Figure 11: Advanced OPC DA HDA Server Simulator Main Window	15
Figure 12: Server menu.....	16
Figure 13: Address Space File	17
Figure 14: Value Space File	18
Figure 15: Register Server	19
Figure 16: OPC A&E Simulator Main Interface	20
Figure 17: OPC A&E Simulator CSV file.....	21
Figure 18: Application Settings	22

PREFACE

ABOUT THIS USER GUIDE

This guide presents Integration Objects' OPC Server Simulators:

- .Advanced OPC DA/HDA Server Simulator.
- OPC A&E Server Simulator.

It requires background knowledge of OPC Data Access, Historical Data Access, Alarms and Events specifications.

RELATED DOCUMENTS

As you use this user guide, you may also find useful the following specifications:

- OPC Common Definitions and Interfaces 1.0.
- OPC Data Access Custom Interface Standard 1.0a, 2.04, 2.05 & 3.0.
- OPC Historical Data Access Standard 1.1 & 1.2.
- OPC Alarms and Events Standards 1.02 & 1.10.

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GETTING STARTED

1. Installation Pre-requisites

In order to properly run the OPC Server Simulators, the following software components need to be installed on the target system:

- The **OPC core components 3.00** which consists of all shared OPC modules including the DCOM proxy/stub libraries, the OPC Server Enumerator, .NET wrappers, etc.
- .NET Framework version 2.0 or higher.



Make sure that there is no firewall or antivirus blocking the application.

2. Installing OPC Server Simulators Full Edition

To install the OPC Server Simulators:

1. Double-click on the **Integration Objects' OPC Server Simulators installation package**. Make sure to run the installation program using an administrator account.

The installation welcome dialog box will appear.

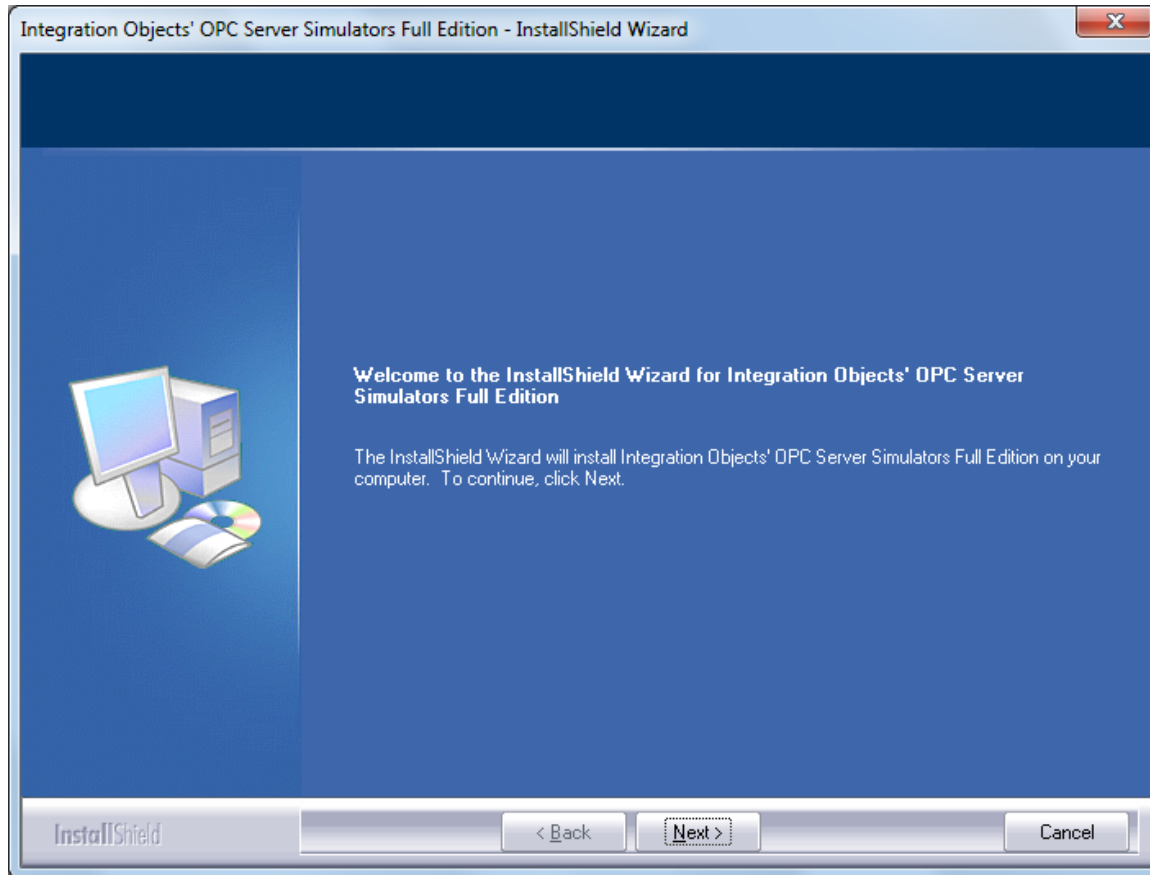


Figure 1: Installation Welcome Dialog

2. Click the **Next** button. The license agreement will be displayed.

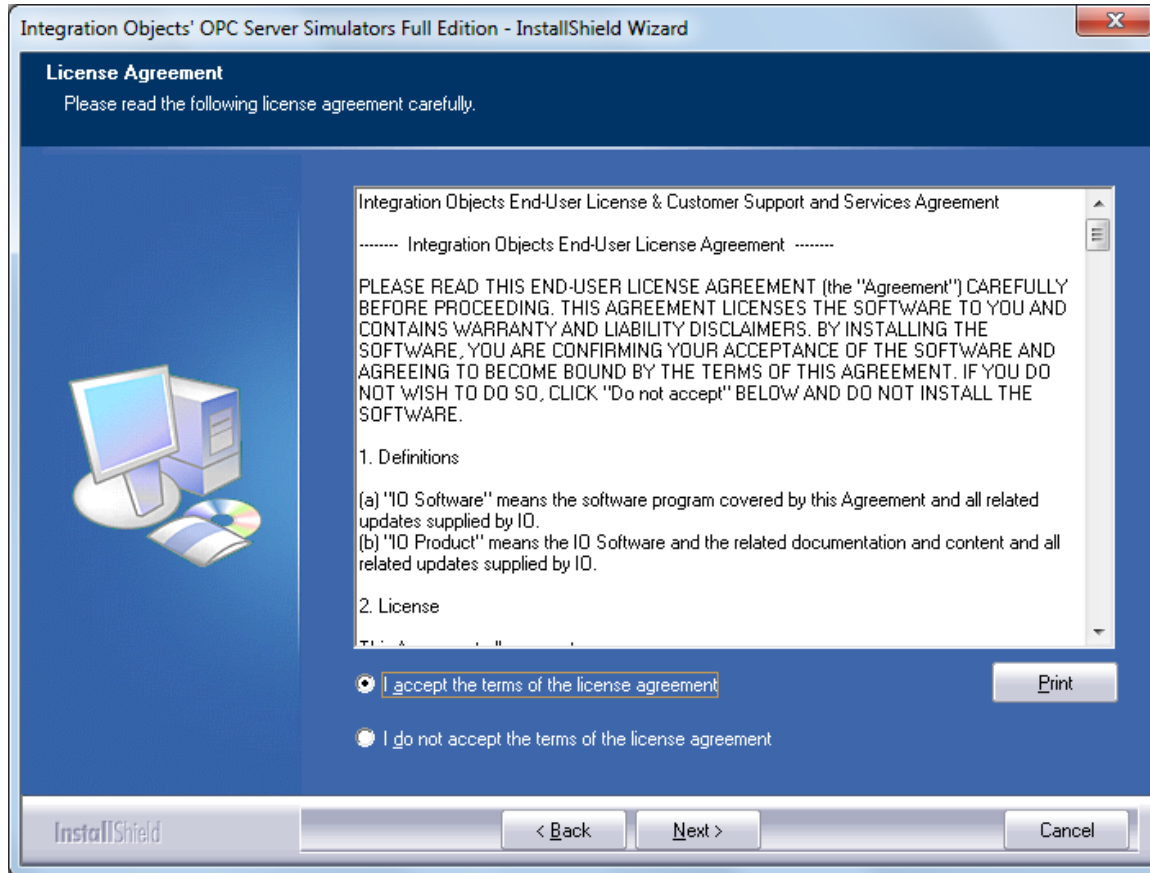


Figure 2: License Agreement Dialog

3. After reading the license agreement, select the first option and click on the **Next** button. By proceeding, you are accepting all of the license agreement terms. Otherwise, you can cancel the installation. The customer information dialog will then appear.

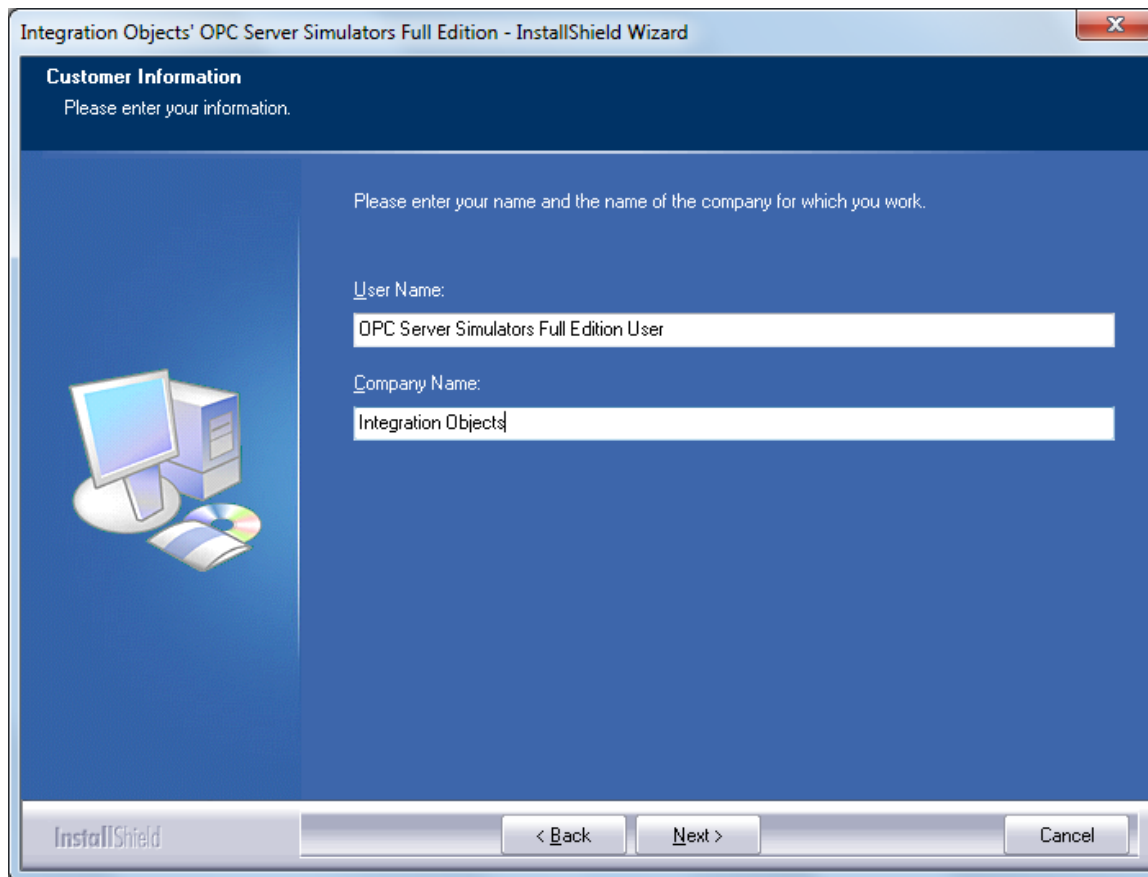


Figure 3: Customer Information Dialog

4. Enter the user name and the company name, then click the **Next** button. The dialog where you can choose the destination folder will be displayed.

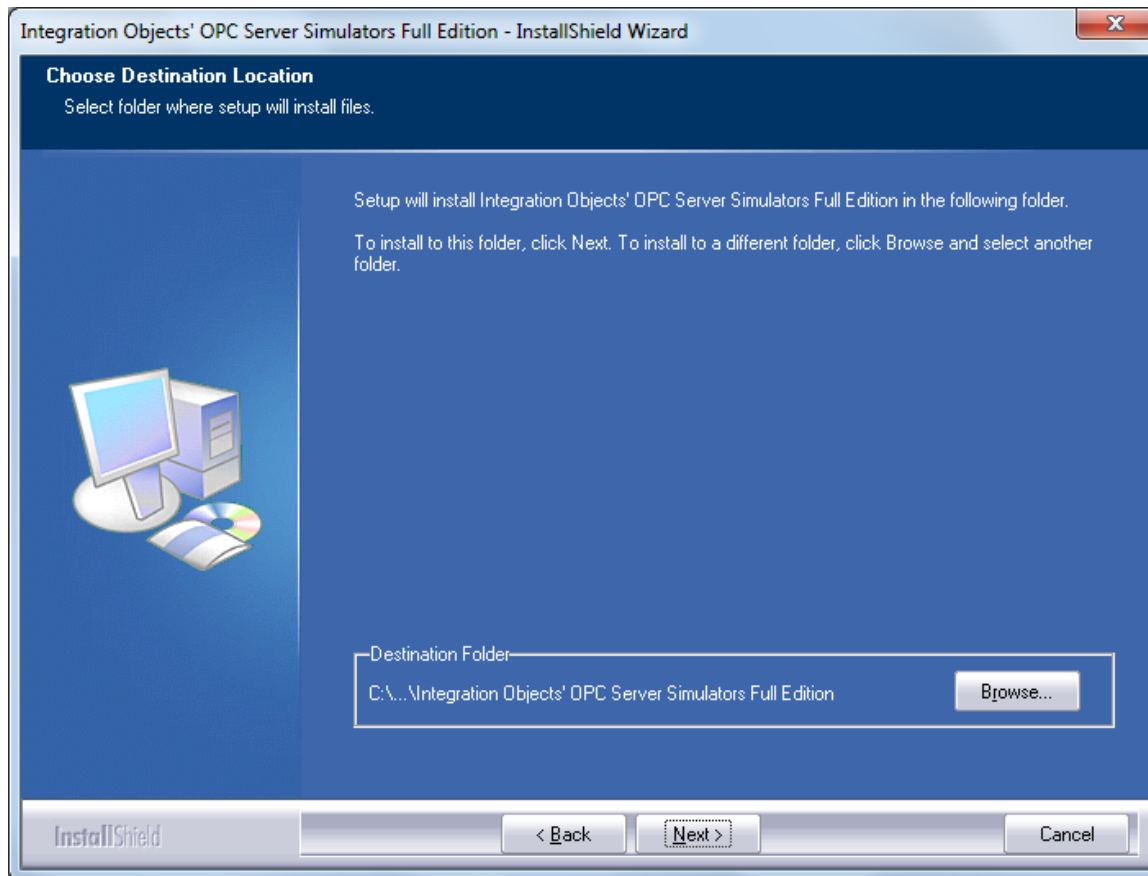


Figure 4: Choose Destination Folder Dialog

5. Click the **Next** button to continue the installation, or the **Browse** button to choose a different destination folder. The Select Features dialog box will then appear.

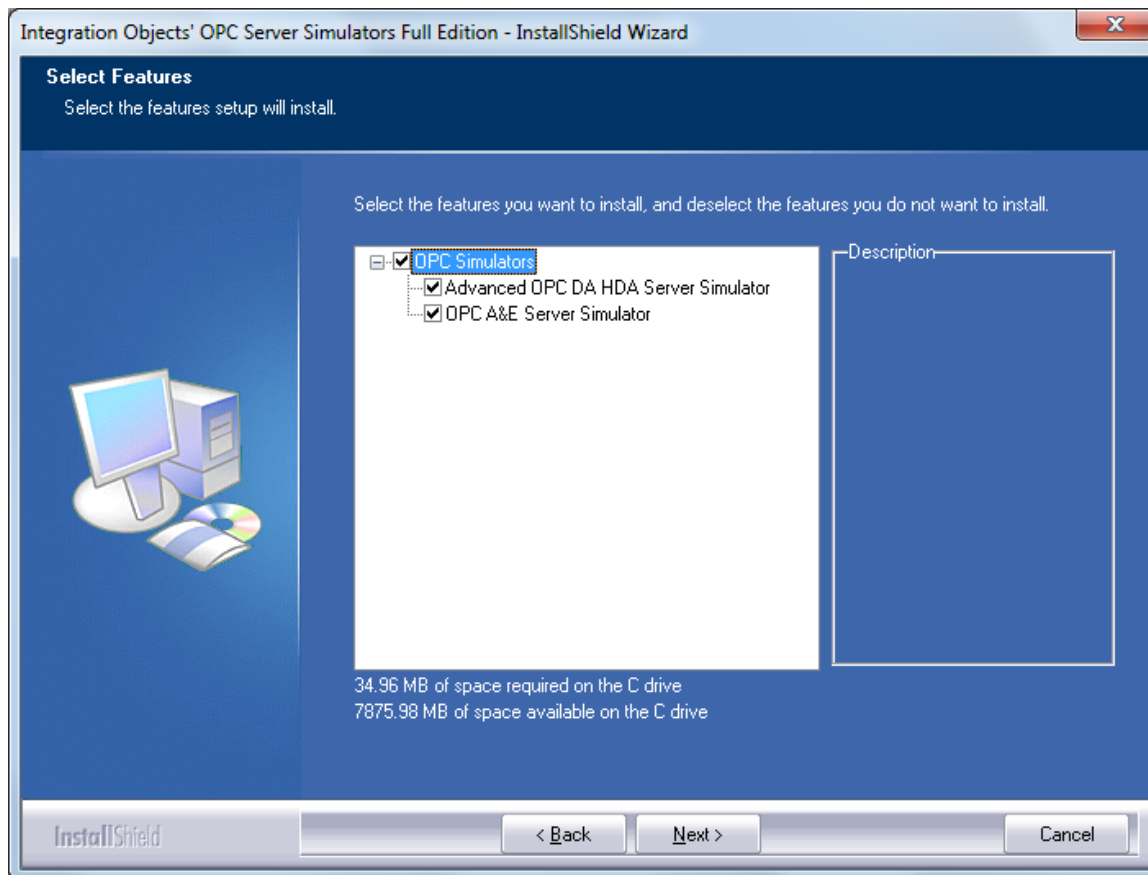


Figure 5: Installation Dialog Box

6. Select the features that you want to install and then click **Next**. The Installation dialog will be prompted.

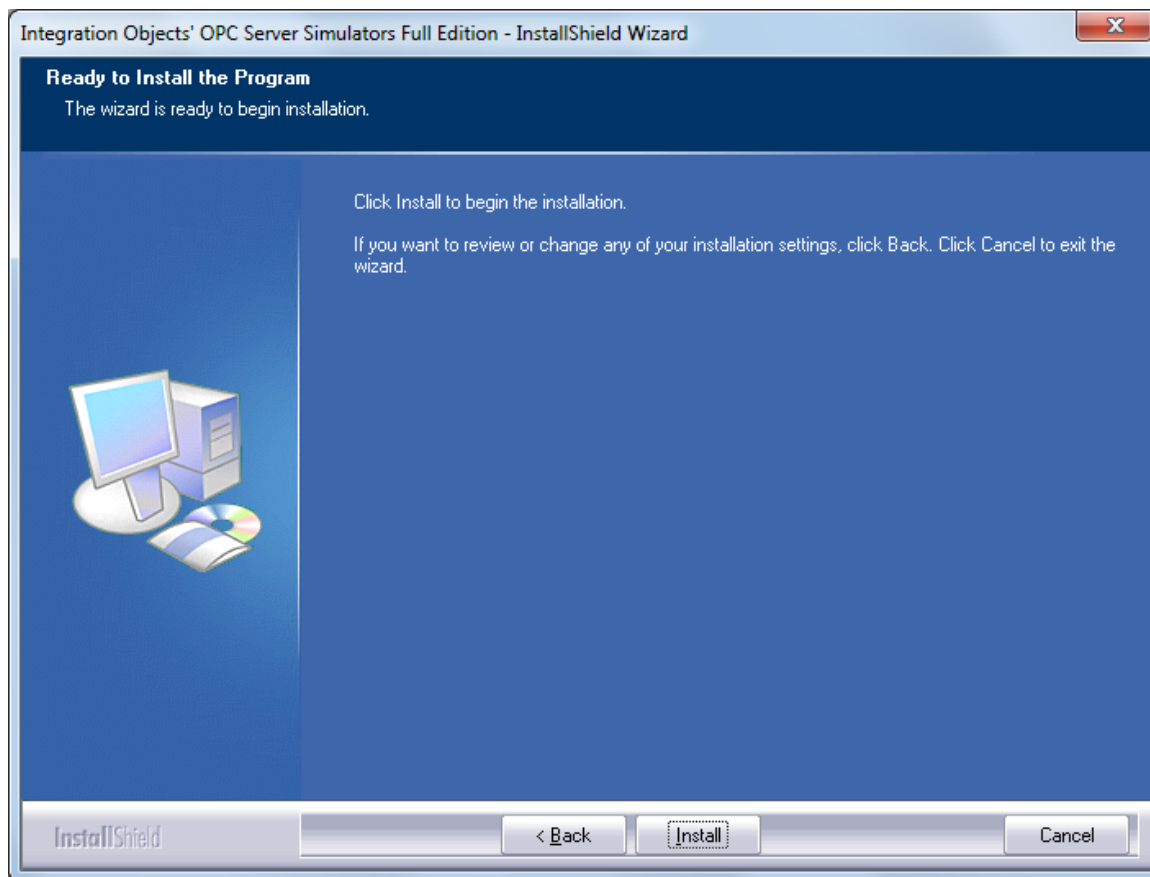


Figure 6: Installation Dialog

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

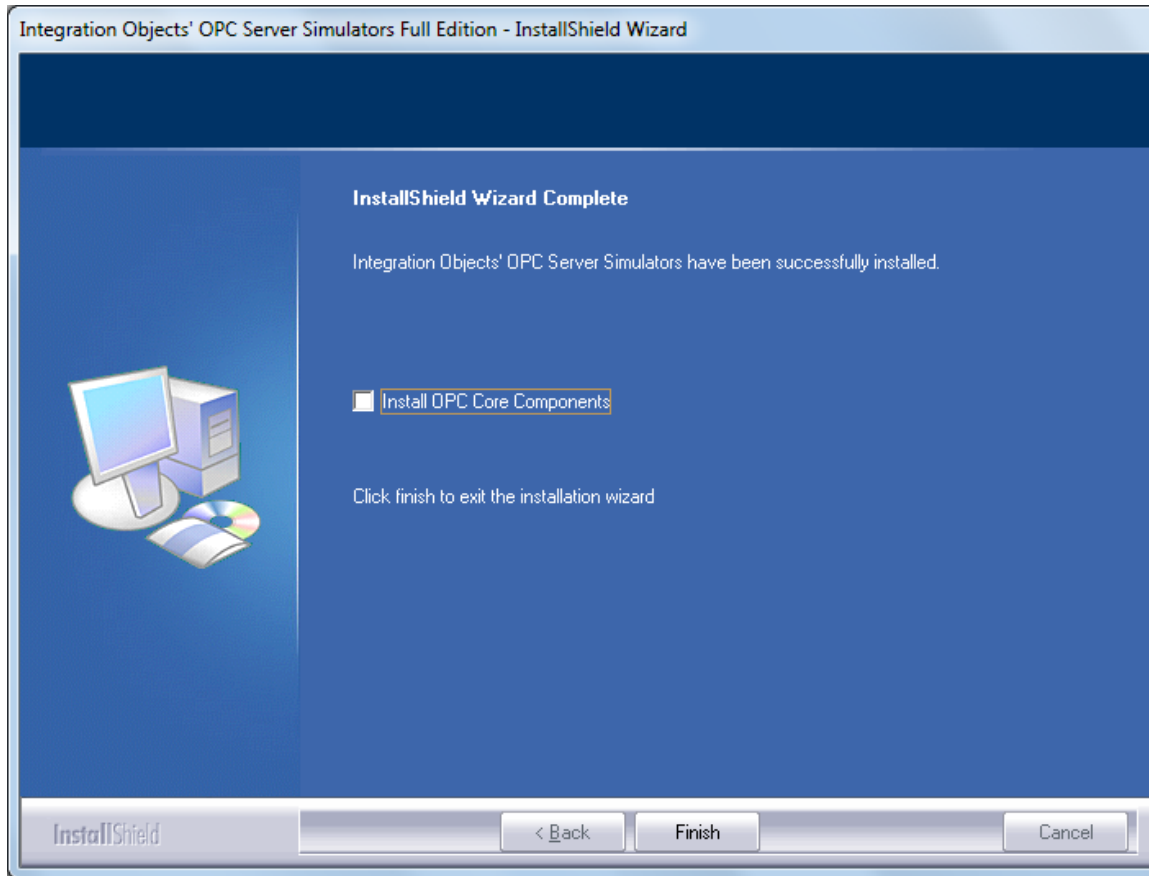


Figure 7: Installation Completed Dialog

8. Click the **finish** button.

3. Starting-up

You can start manually the simulation servers from the start menu shortcut.

To do so, click on Start → Programs → Integration Objects → OPC Server Simulators Full Edition.

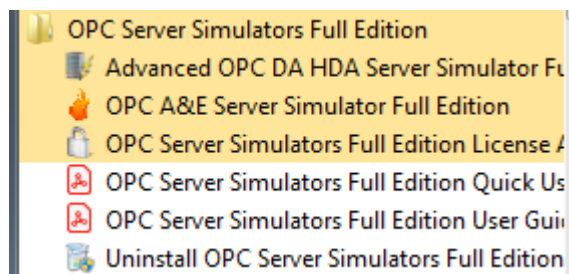


Figure 8: Starting the OPC Simulators

4. Removing OPC Server Simulators Full Edition

You can remove the OPC Server Simulators Full Edition from your machine by selecting the “**Uninstall OPC Server Simulators Full Edition**” shortcut from the start menu.

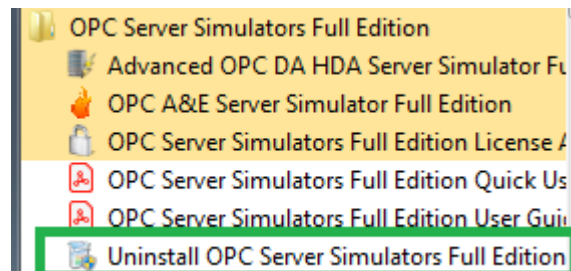


Figure 9: Start Menu – Uninstaller Shortcut

OPC Server Simulators can also be removed manually as follows:

1. Click **Start**.
2. Click **Settings**.
3. Click **Control Panel**.
4. Click **Add/Remove Programs**.
5. In Add/Remove Programs dialog screen select “**Integration Objects' OPC Server Simulators Full Edition**”.
6. Click **Change/Remove** then **OK**.



If you are using Windows 10, Windows Server 2012 or Windows Server 2016 operating systems, the uninstaller needs to be run from the start menu as illustrated below.

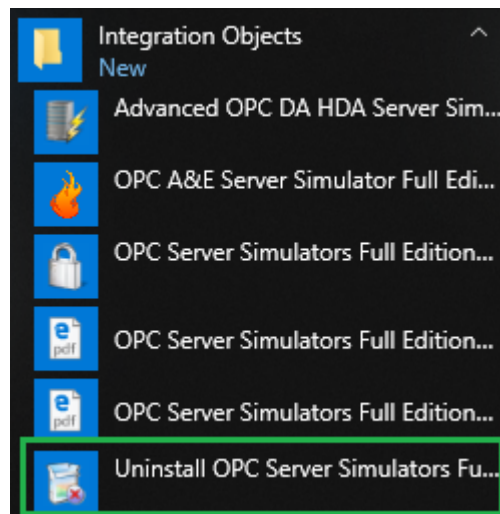


Figure 10: Windows 10 Startup Menu - Uninstall Shortcut

ADVANCED OPC DA HDA SERVER SIMULATOR

1. Overview

The advanced OPC DA HDA server simulator simulates real-time data for a configurable set of tags and values, used for testing purposes.

The simulated data is then stored in an in-memory data history cache enabling the simulator to respond to historical data read requests from OPC HDA client applications.

To configure the tags and data values, the simulator uses simulation CSV files. This tool can be very useful for simulation based on history playback.

In the following sections, we describe the main features of this advanced simulator that help users to initiate their application server and perform their tests.

2. Server Features

The main window of the advanced simulator is illustrated in the figure below:

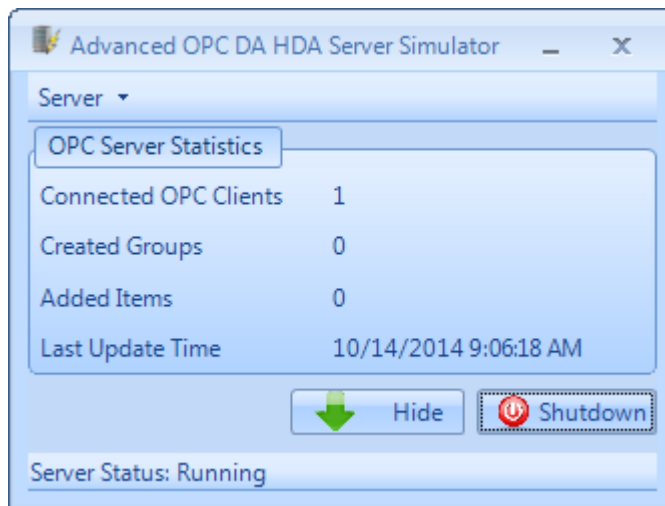


Figure 11: Advanced OPC DA HDA Server Simulator Main Window

General OPC server information:

- Connected OPC clients.
- Created groups.

- Added items.
- Last update time.
- Server status.

Server menu

This menu contains 4 items as shown in the following screenshot:

- Click on "**Reload Address Space**" to reload the address space defined in the CSV files.
- Click on "**Registration**" to Register/Unregister your server.
- Click on "**About**" to view details about Integration Objects' Customer's Website, Sales and Support.
- Click on "**Exit**" to request all connected clients to disconnect and close the server.

Note that the register and unregister options require to run the simulator using an administrator account in order to be executed successfully.

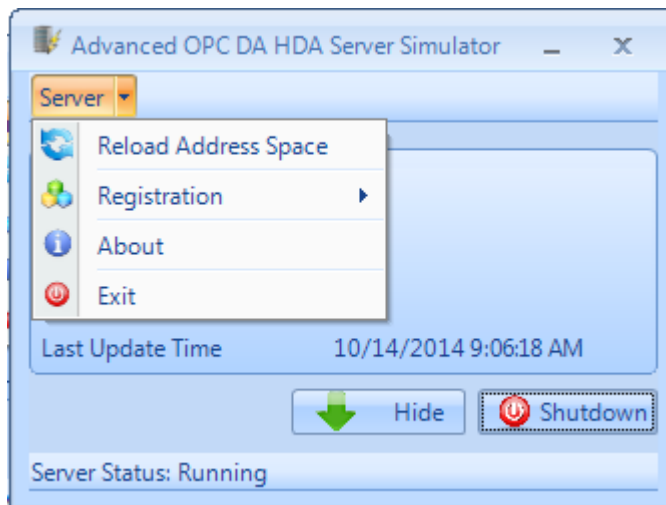


Figure 12: Server menu

3. Simulation Files

The server uses 2 CSV simulation files:

- "**AddressSpace.csv**" used to build the address space of the OPC Server.
- "**ValueSpace.csv**" used to simulate the data values of the OPC items.

	A	B	C	D
1	TagName	DataType	AccessRights	Simulated
2	Random/Text	VT_BSTR	R	TRUE
3	Random/Date	VT_DATE	R	TRUE
4	Random/Boolean	VT_BOOL	R	TRUE
5	Random/Int1	VT_I1	R	TRUE
6	Random/UInt1	VT_UI1	R	TRUE
7	Random/Int2	VT_I2	R	TRUE
8	Random/UInt2	VT_UI2	R	TRUE
9	Random/Int4	VT_I4	R	TRUE
10	Random/UInt4	VT_UI4	R	TRUE

Figure 13: Address Space File

The "**AddressSpace.csv**" file is composed of the following fields:

- **Tag Name:** The name of the tag.
- **Tag type:** The OPC Server supports the following simple VARIANT data types:
 - VT_I1
 - VT_UI1
 - VT_I2
 - VT_UI2
 - VT_I4
 - VT_UI4
 - VT_R4
 - VT_R8
 - VT_DATE
 - VT_BSTR
 - VT_BOOL
- **Access Right:** The right access: R (read only access) or RW (read and write access).
- **Simulated:**
 - True if the values will be randomly generated or simulated using the "**ValueSpace.csv**" file.
 - False if the tag values will be static. Only an OPC client will be able to change the tag value.

The "**ValueSpace.csv**" file includes the data values and qualities to be simulated for the tags marked as "SIMULATED=TRUE" in the "**AddressSpace.csv**" file.

	A	B	C	D
1	Random/Real8		Writable/Boolean	
2	145	GOOD		0 GOOD
3	146	GOOD		1 GOOD
4	147	GOOD		1 GOOD
5	148	GOOD		1 GOOD
6	149	GOOD		0 GOOD
7	150	GOOD		1 GOOD

Figure 14: Value Space File

There are 2 columns for each tag in the “**ValueSpace.csv**” file:

- The first column starts with the name of the tag and then the data values.
- The second column starts with an empty row and then the value qualities.

In other words, the CSV format is as follows:

- The first line indicates the tag names. Each tag name cell should be followed by an empty cell.
- The data values and qualities should be specified starting from the second line. Each couple of columns relates to one tag and is organized as:
 - The first column lists the tag values.
 - The second column lists the quality of each value.

As previously indicated, the “**ValueSpace.csv**” file should include the data to be simulated for the tags marked as “SIMULATED=TRUE”. Note that you do not have to include all of them. You can include only the ones for which you have a specific data set to simulate.



For OPC HDA specification, you can configure the number of the data values kept in the server cache from the “SrvToolkit_CfgFile.ini” configuration file using the NUM_SIM_VALUES parameter. The maximum value is $24 \times 3600 = 86400$ values.



The simulated data values will be stored as historical data exposed to the OPC HDA client applications only when there is an OPC DA active connection to the simulator. This why the user needs to first connect the advanced simulator using an OPC DA client before using his OPC HDA client application.

4. Server Registration

This server is automatically registered during the installation. However, users can register it manually by following the steps below:

- Launch the server as administrator.
- Click on the server menu.
- Click on "**Registration**" then "**Register**" to register the OPC Server.
- Click on "**Registration**" then "**Unregister**" to remove OPC server entries from the Windows registry.

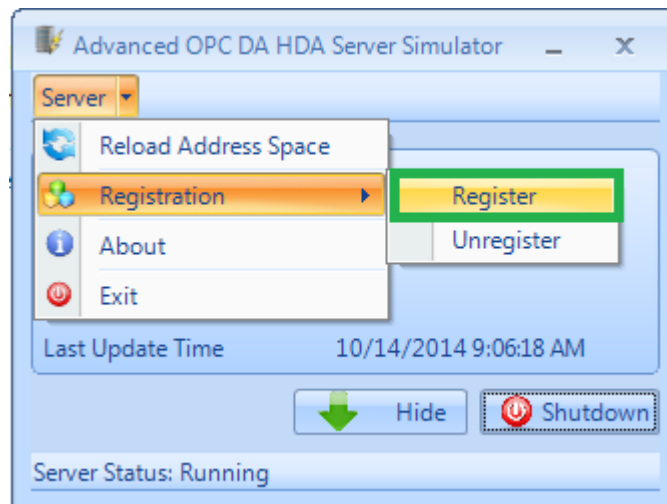


Figure 15: Server Registration

The progID of the advanced simulator is:

IntegrationObjects.AdvancedSimulatorFullEdition.1

OPC A&E SERVER SIMULATOR

1. Overview

The OPC A&E server simulates a predefined set of alarms in real-time, used for test purposes. This set of alarms is defined in a CSV file.

In this chapter, we describe the main features of the alarms simulator that help users initiate their application server.

2. Server Features

After running the simulator, the OPC AE server simulator graphical user interface will be launched.

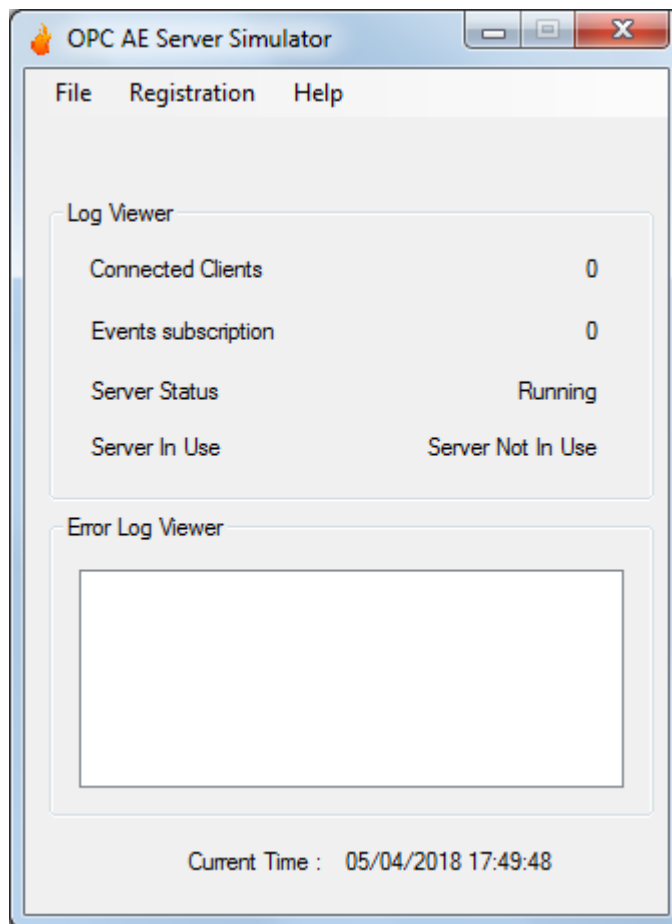


Figure 16: OPC A&E Simulator Main Interface

To register/unregister the OPC AE server simulator, you need to click on the registration menu item then one of the following menu buttons:

Register: register the OPC Server.

UnRegister: remove OPC server entries from the Windows registry.

Note that the register and unregister options require to run the simulator using an administrator account to be executed successfully.

3. Simulation File

With the server, you find a **CSV simulation file** used to demonstrate how the server can generate different event types.

An example of the content of this file is shown in the following figure:

	A	B	C	D	E	F	G	H
1	EventType	SourceName	AreaName	ConditionName	SubconditionName	ActiveState	Message	EventCategoryID
2	4	FIC1001	Boiler1:makeup1	PVLEVEL	HIHI	1	HIHI Alarm	
3	4	FIC1001	Boiler1:makeup1	PVLEVEL	HI	1	HI Alarm	
4	4	FIC1001	Boiler1:makeup1	PVLEVEL	HI	0	Condition Normal	
5	4	FIC1001	Boiler1:makeup1	PVLEVEL	LO	1	LO Alarm	
6	4	FIC1001	Boiler1:makeup1	PVLEVEL	LOLO	1	LOLO Alarm	
7	4	FIC1002	Boiler1:makeup2	DEVIATION	DEVIATION	1	Deviation Alarm	
8	4	FIC1002	Boiler1:makeup2	DEVIATION	DEVIATION	0	Condition Normal	
9	4	FIC1003	Water1:makeup3	PVLEVEL	HIHI	1	HIHI Alarm	
10	4	FIC1003	Water1:makeup3	PVLEVEL	HI	1	HI Alarm	
11	4	FIC1003	Water1:makeup3	PVLEVEL	HI	0	Condition Normal	
12	4	FIC1003	Water1:makeup3	PVLEVEL	LO	1	LO Alarm	
13	4	FIC1003	Water1:makeup3	PVLEVEL	LOLO	1	LOLO Alarm	
14	4	FIC1004	Water1:makeup4	DEVIATION	DEVIATION	1	Deviation Alarm	
15	4	FIC1004	Water1:makeup4	DEVIATION	DEVIATION	0	Condition Normal	
16	1	System_Event		NA	NA	0	Simple Event	
17	2	Tracking_EVENT		NA	NA	0	Setpoint changed Tracking Event	
18								

Figure 17: OPC A&E Simulator CSV file

This file is composed of the following fields:

- **EventType:** The type of the event to be generated. This field can contain one of these values:
 - 1 for simple event.
 - 2 for tracking event.
 - 4 for condition event.
- **SourceName:** The event source name to be generated.

- **AreaName:** The area name related to the event's source.
- **ConditionName:** The condition name related to the event to generate.
- **SubConditionName:** The current sub-condition name for multi-state conditions. For a single-state condition, this contains the condition name.
- **ActiveState:** The event state. This field can be 0 for inactive state and 1 for active.
- **Message:** A text describing the event to be generated.
- **EventCategoryID:** The event Category ID related to the event.
- **EventCategoryName:** The EventCategoryID associated name.
- **Severity:** A value between 1 and 1000 describing the severity level of the event being generated.
- **QualityValue:** The quality to be associated to the event such as 192 for GOOD.
- **AckRequired:** This flag indicates that the related condition requires acknowledgment of this event. It can be 0 (not required) or 1 (required).
- **ActorID:** It presents the actor ID for the event notification for tracking events.

4. Alarms Generation Frequency

The alarms generation frequency can be modified from the "ConfigOPCAEServerSDK.ini" configuration file. The parameter is called "Timer" and is expressed in milliseconds.

```
[ApplicationSetting]
Timer=2000
```

Figure 18: Application Settings

5. Server Registration

This server is automatically registered during the installation. However, users can manually register the server by running the OPC Server and using the Register button.

Thus, new entries are added to the Windows registry with
“**IntegrationObjects.OPCAEServer.SimulatorFullEdition.1**” as ProgID (server
name).

To remove server entries from the registry, click on the unregister button.
Note that the above actions require an administrator access to be executed
successfully.

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