

# Integration Objects'

## OPC Simulation Tools

**OPC Server Simulators**  
2.0 Rev.4

### **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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# 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 assumes 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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|   | Online:<br><a href="http://www.integrationobjects.com">www.integrationobjects.com</a>                          |

# GETTING STARTED

## 1. Pre-Installation Considerations

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.



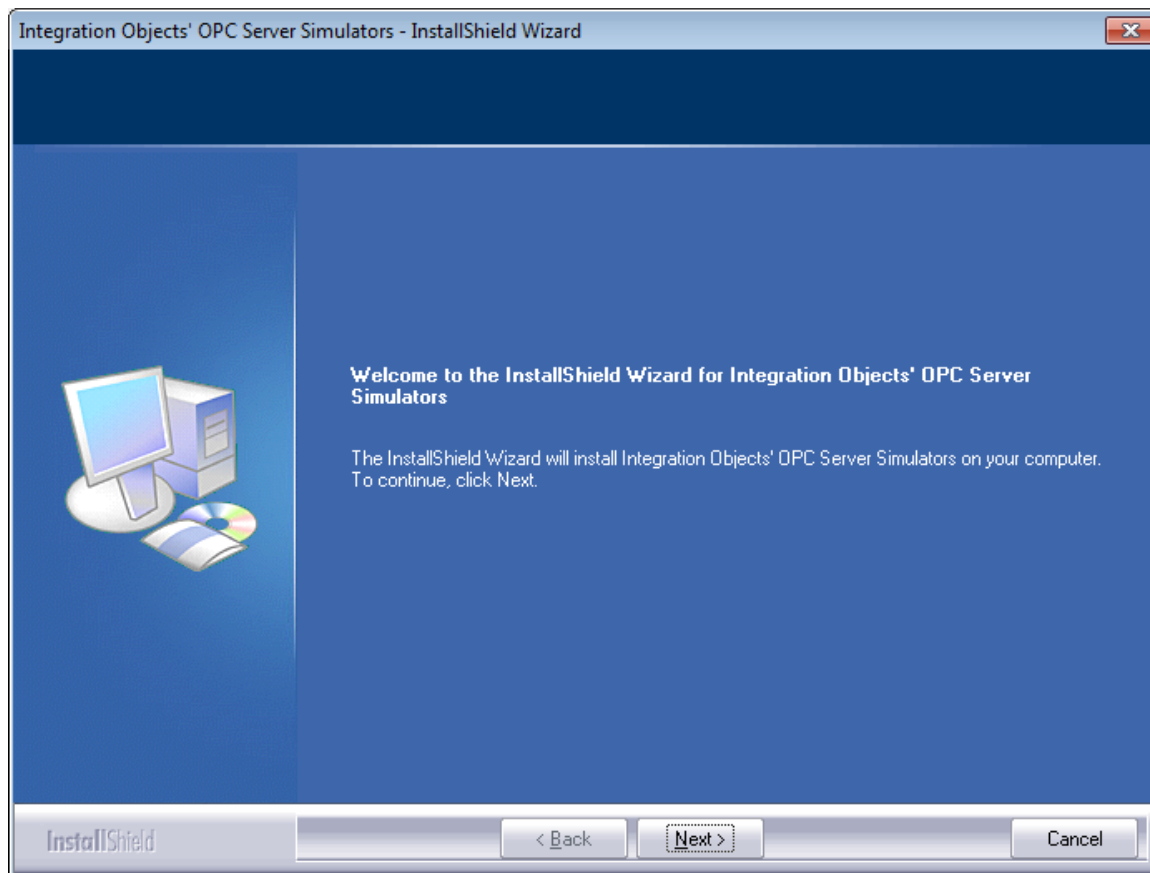
**Make sure that there is no firewall or antivirus blocking the application.**

## 2. Installing OPC Server Simulators

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

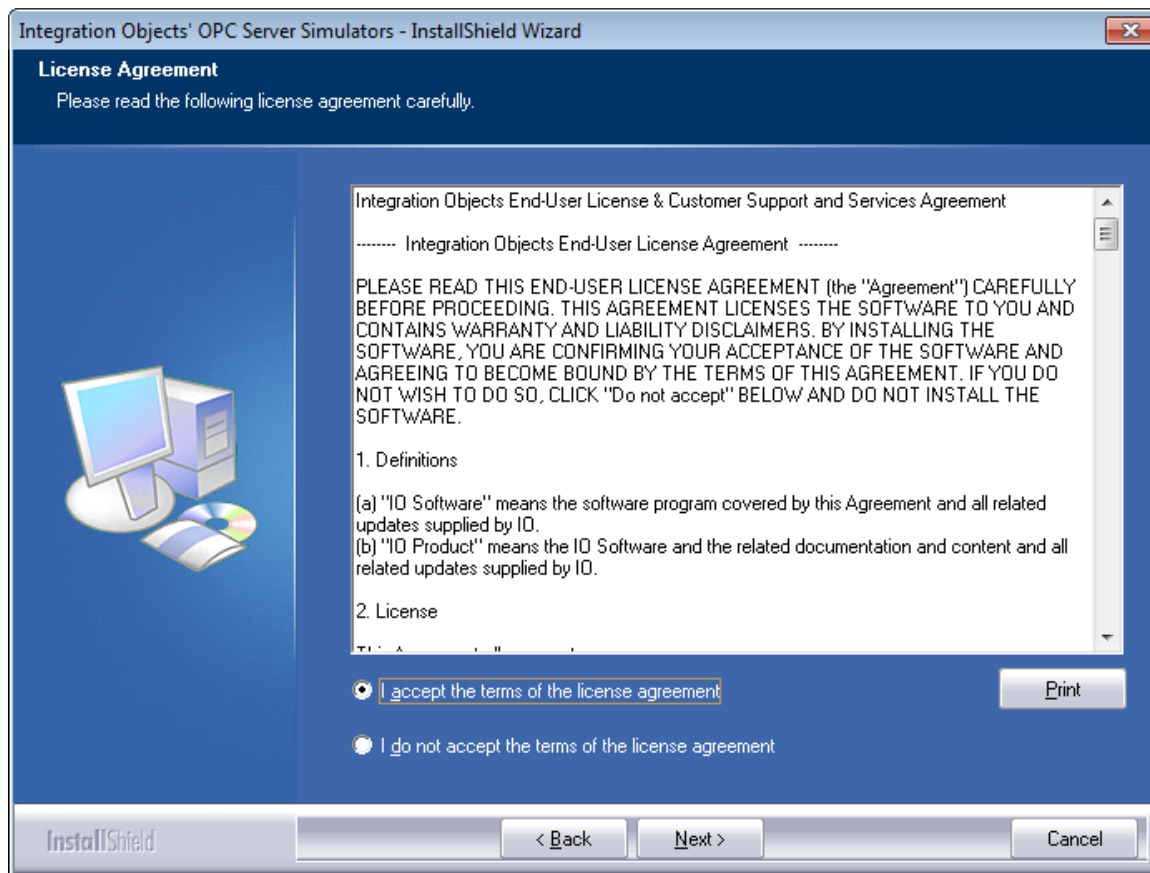
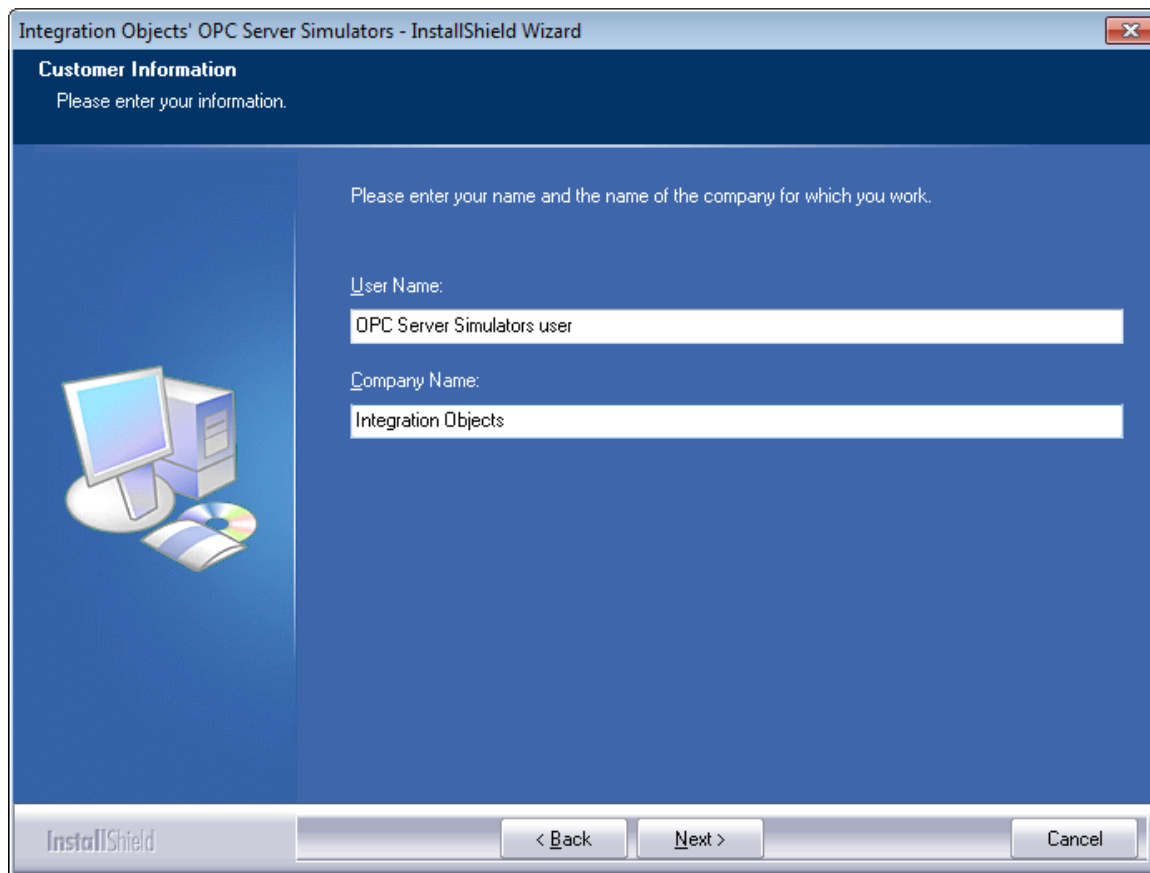


Figure 2: License Agreement Dialog

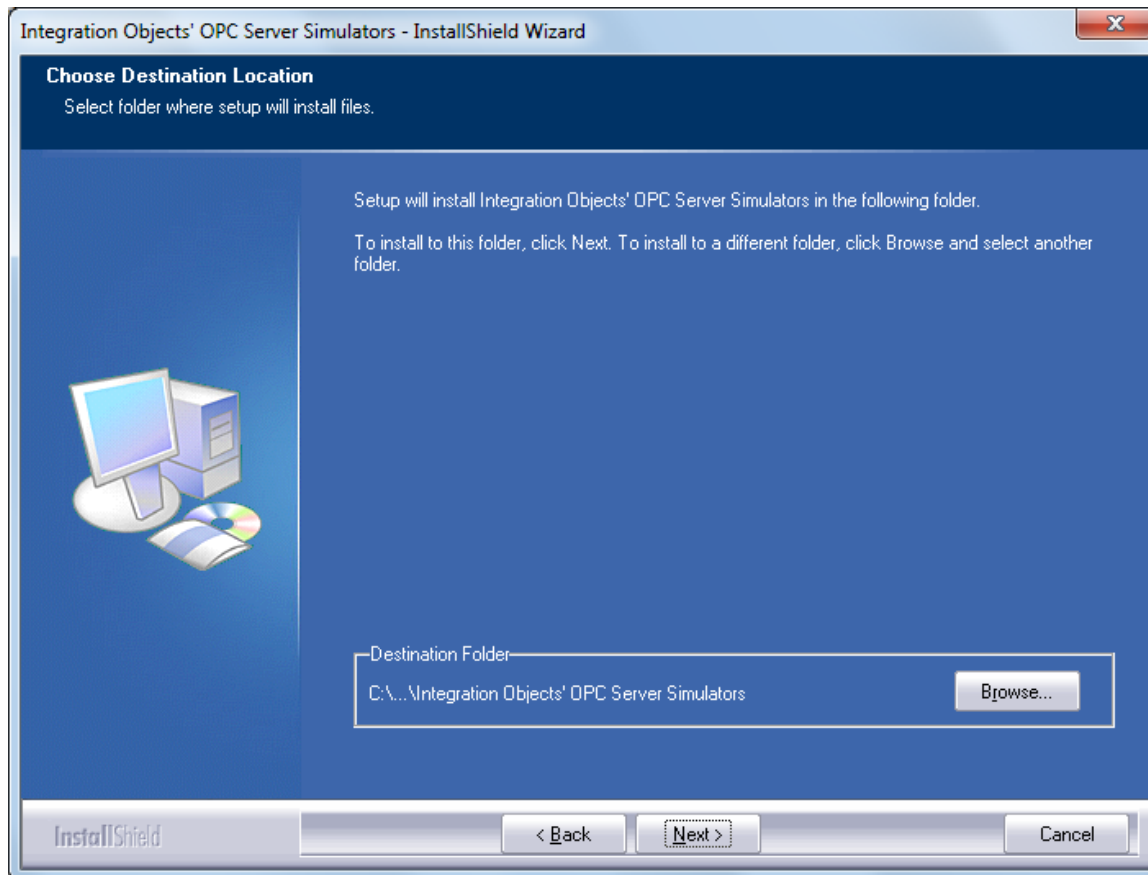
3. After reading the license agreement, select the first option and click on the **Next** button. By proceeding, you are accepting all of the license agreement terms. Otherwise, you can cancel the installation. The customer information dialog will then appear.





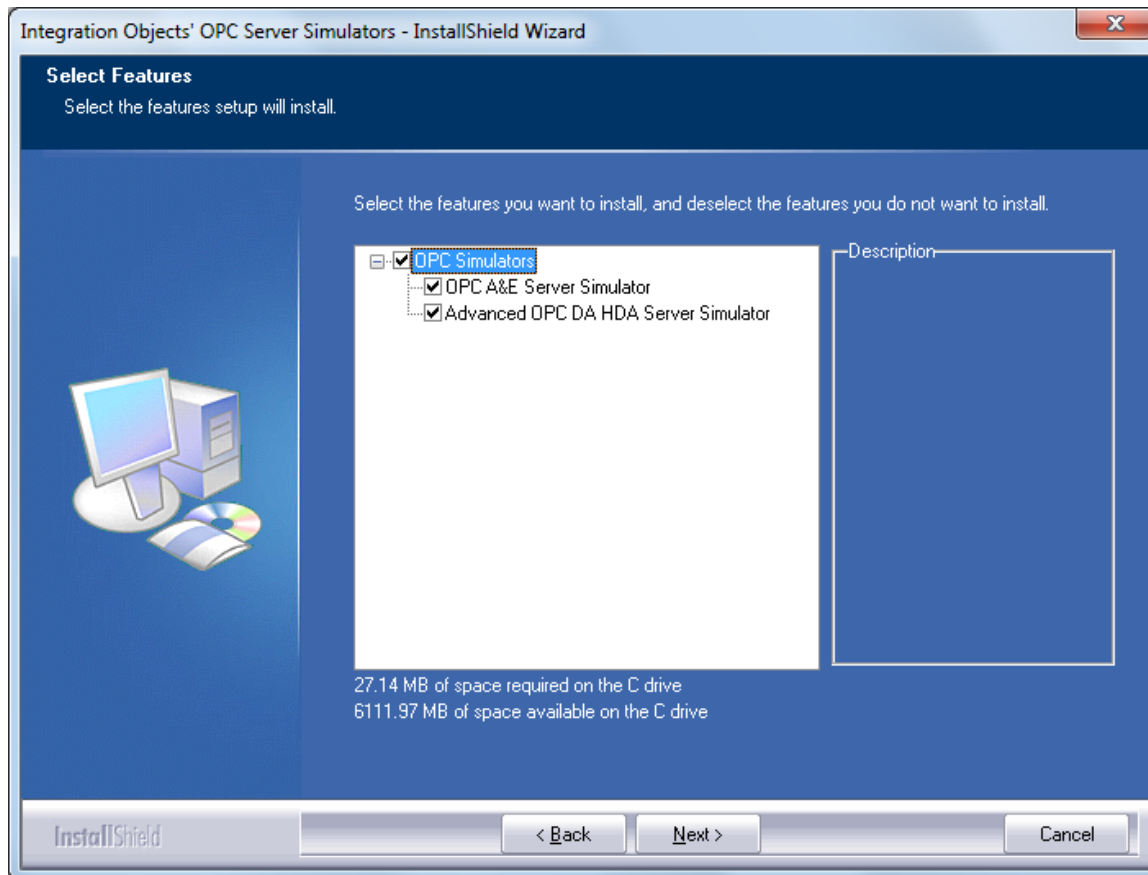
**Figure 3: Customer Information Dialog**

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



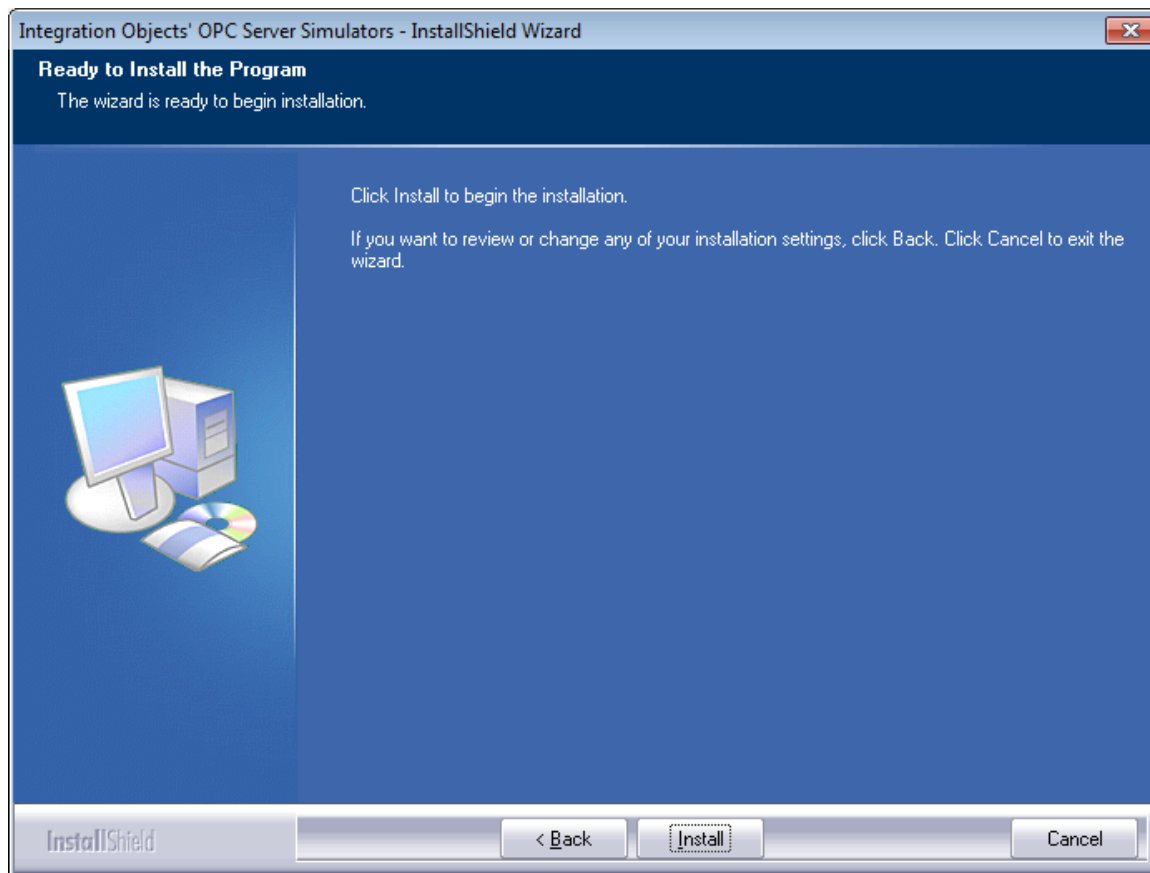
**Figure 4: Choose Destination Folder Dialog**

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.



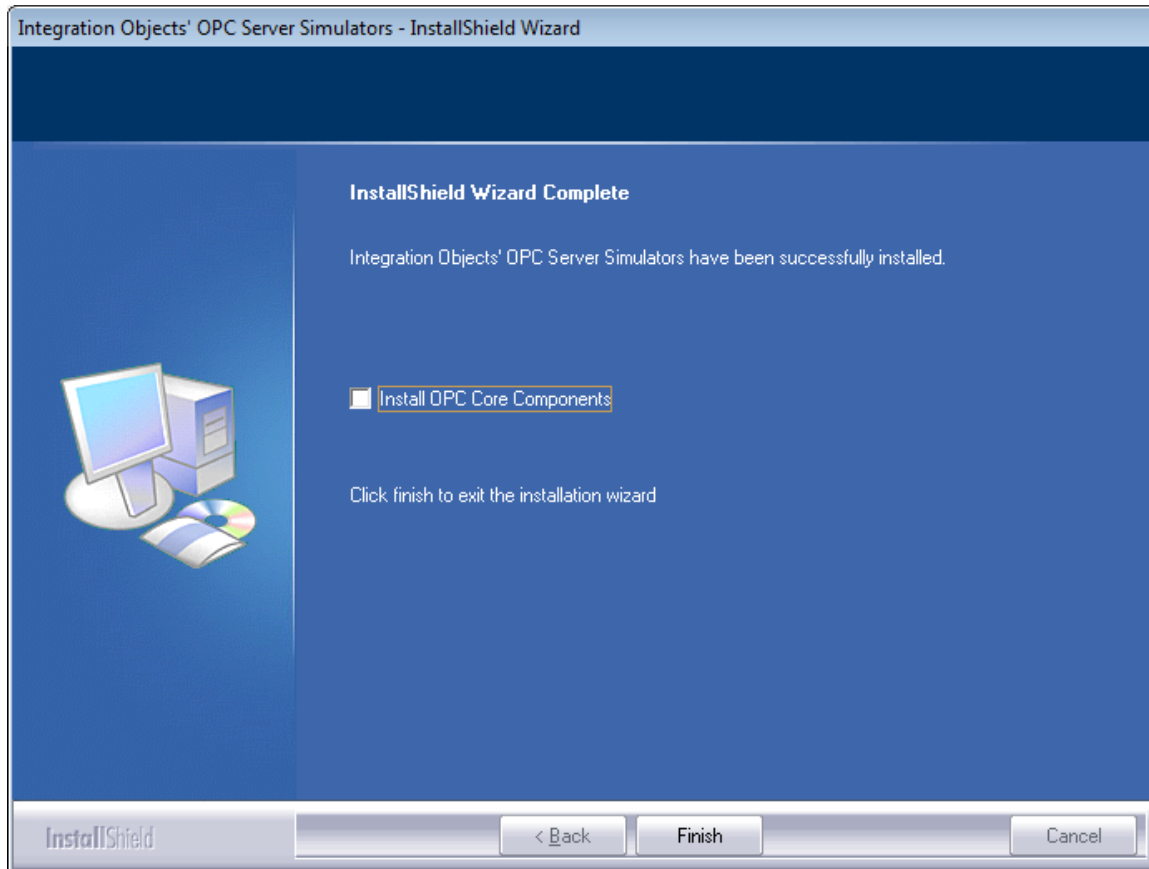
**Figure 5: Installation Dialog Box**

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.



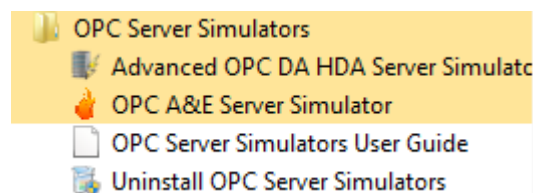
**Figure 7: Installation Completed Dialog**

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



**Figure 8: Starting the OPC Simulators**

## 4. Removing OPC Server Simulators

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

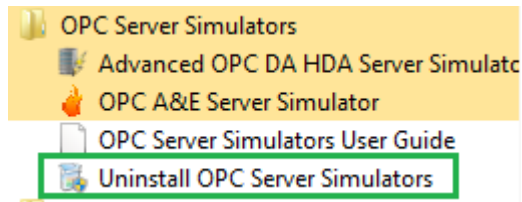


Figure 9: Start Menu – Uninstaller Shortcut

This simulation servers 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**”.
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.

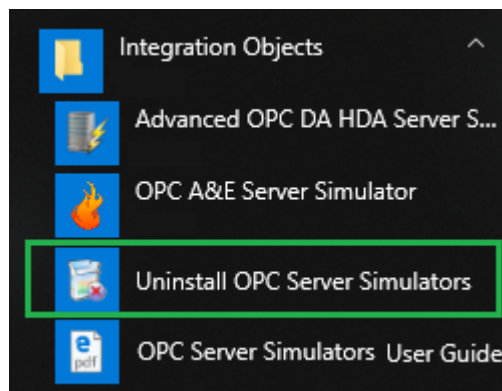


Figure 10: Windows 10 Startup Menu - Uninstall Shortcut

# 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:

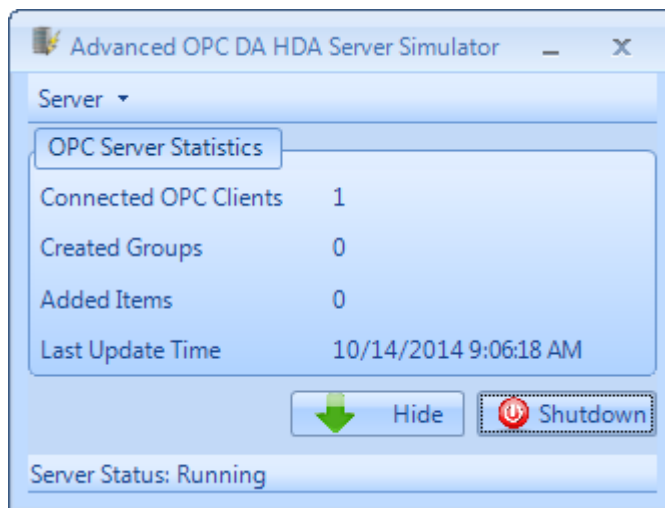


Figure 11: Advanced OPC DA HDA Server Simulator Main Window

### 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" then "Register" to register the OPC Server.
- Click on "Registration" then "Unregister" to remove OPC server entries from the Windows registry.
- 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 to be executed successfully.

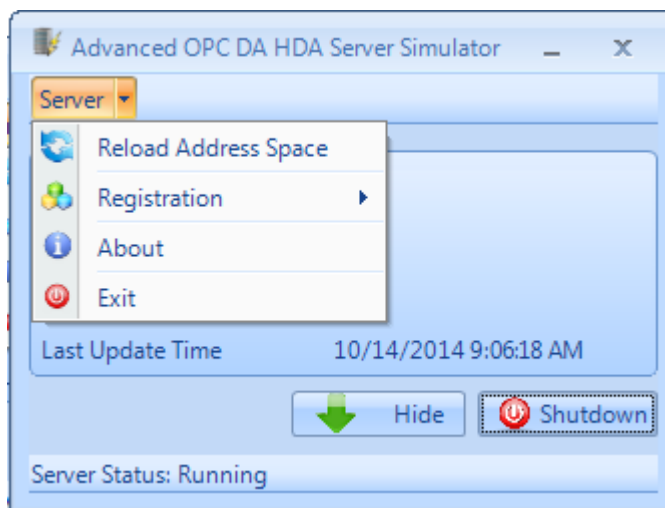


Figure 12: Server menu

## 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.
  - Or 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.**

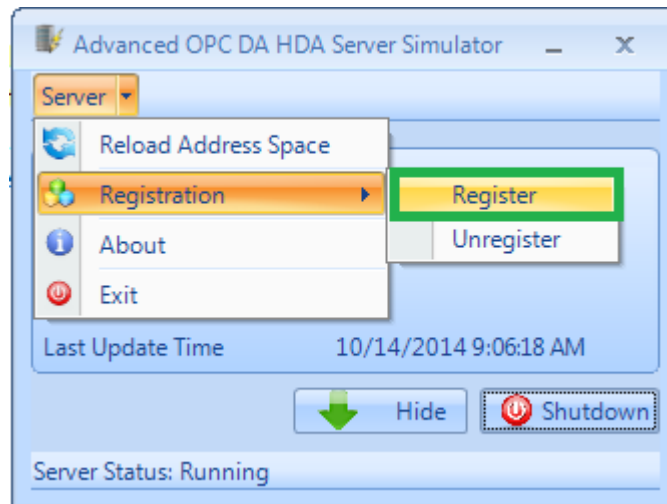


**The simulated data values will be stored as historical data exposed to the OPC HDA client applications only when there is an OPC DA active connection to the simulator. This why the user needs to first connect the advanced simulator using an OPC DA client before using his OPC HDA client application.**

## 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
- Select "Registration"
- Click "Register"



**Figure 15: Register Server**

The progID of the advanced simulator is "IntegrationObjects.AdvancedSimulator.1".

# OPC A&E SERVER SIMULATOR

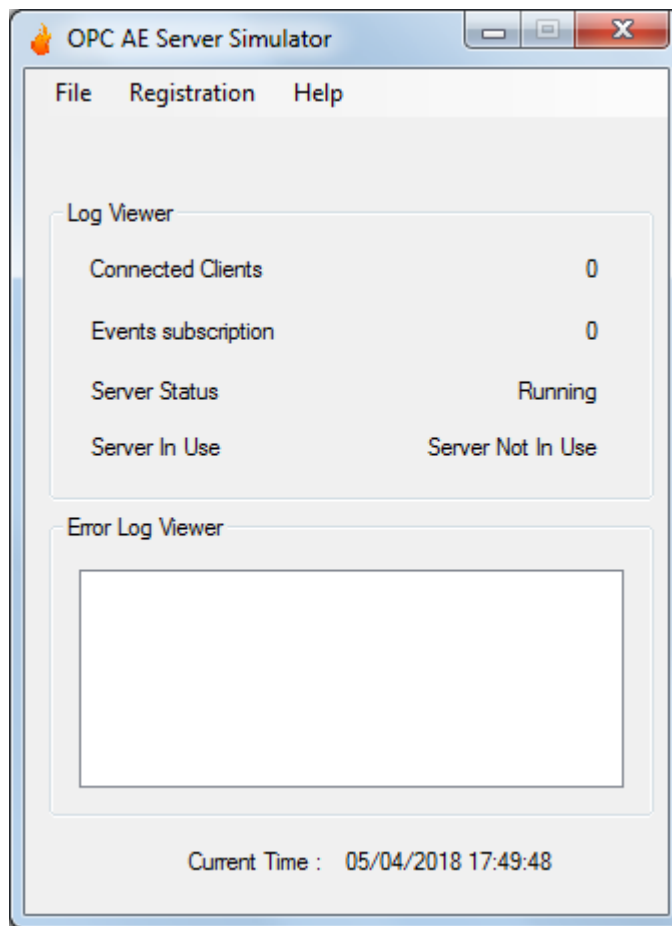
## 1. Overview

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. Server Registration

This server is automatically registered during the installation. However, users can manually register the server by executing one of the following line commands (**start menu → run**):

**“Simulator\_EXE\_Path” /regserver** or **“Simulator\_EXE\_Path” –regserver.**

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

To remove server entries from the registry, type one of the following line commands (**start menu → run**):

**“Simulator\_EXE\_Path” /unregserver”** or **“Simulator\_EXE\_Path” –unregserver.**

Note that the above commands require an administrator access to be executed successfully.

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

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