

OPC UA Solution .NET Installation

Installation and Administration of .NET based OPC UA Applications





Document Control

Version	Date	Comment
3.0.0	29-JAN-2023	Initial version based on V3.0.0

Purpose and audience of document

This document describes how to deploy and administer OPC UA Applications from Technosoftware GmbH and applications build on either the OPC UA Client .NET, OPC UA Server .NET or OPC UA PubSub .NET. The target audience for this document are systems administrators.



Referenced OPC Documents

Documents
Online versions of OPC UA specifications and information models. The OPC UA Online Reference is available at: https://reference.opcfoundation.org
OPC Unified Architecture Textbook, written by Wolfgang Mahnke, Stefan-Helmut Leitner and Matthias Damm: http://www.amazon.com/OPC-Unified-Architecture-Wolfgang-Mahnke/dp/3540688986/ref=sr_1_1?ie=UTF8&s=books&qid=1209506074&sr=8-1



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1 Installation .NET

The OPC UA Client & Server .NET can be used not only on Windows but also on Linux and macOS. The Solutions includes a client and server application targeting .NET 7.01 or .NET 6.0. To be able to use them you need to install .NET Core on your system. For backward compatibility we also provide .NET 4.8, .NET 4.7.2, and .NET 4.6.2 support.

The OPC UA PubSub NET offers a fast and easy access to the OPC Unified Architecture (UA) functionality described in [Part 14 of the OPC UA Specification](#), also known as OPC UA PubSub. The OPC UA PubSub communication model defines an OPC UA Publish/Subscribe pattern instead of the client/server pattern defined by the services in [Part 4 of the OPC UA Specification](#).

Please follow instructions in this [article](#) to setup the dotnet command line environment for your platform. As of today, .NET 7.0 or .NET 6.0 is required. The article describes the installation of .NET 7.0.102 for Windows, Linux and macOS. This version also works with the OPC UA Client and Server Solutions we provide in the GitHub repositories at <https://github.com/technosoftware-gmbh/opcua-solution-net-samples> and <https://github.com/technosoftware-gmbh/opcua-solution-net>.

Please follow at least the sections.

- [Intro](#)
- [Download and Install](#)

to install the .NET SDK. You find the different .NET versions also at <https://dotnet.microsoft.com/en-us/download/dotnet>.

How to build and use the example applications provided is explained in the documents.

- [OPC UA Client Development with .NET](#)
- [OPC UA Server Development with .NET](#)
- [OPC UA PubSub Development with .NET](#)



2 Installation OPC UA Solution .NET Samples

For starting with OPC UA Development you can download the **OPC UA Solution .NET Samples** from:

OPC UA Solution .NET Samples

The OPC UA Solution .NET offers a fast and easy access to the OPC UA Client & Server technology. Develop OPC compliant UA Clients and Servers with C# targeting .NET7.0 or .NET 6.0. For backward compatibility we also provide .NET 4.8, .NET 4.7.2, and .NET 4.6.2 assemblies.

You can download it from <https://github.com/technosoftware-gmbh/opcua-solution-net-samples>.

This GitHub repository is automatically built with the following environments:

- a. Linux Ubuntu 22.04
 - .NET 6.0.404 and .NET 7.0.101
 - Mono 6.12
 - MS Build 17.4.0
- b. Mac OS X 11
 - .NET 6.0.404 and .NET 7.0.101
 - Mono 6.12
 - MS Build 17.4.0
- c. Windows Server 202
 - .NET 6.0.404 and .NET 7.0.101
 - MS Build 17.4.0

2.1 Directory Structure

The repository contains the following basic directory layout:

- **bin/**
 - **modelcompiler/**
Executable of OPC Foundation Model compiler
- **documentation/**
Additional documentation like:
 - **OPC_UA_Solution_NET_Installation_Guide.pdf**
Installation of development and run-time system
 - **OPC_UA_Solution_NET_Introduction.pdf**
Introduction in Developing OPC UA Clients and OPC UA Servers with C# / VB.NET
 - **OPC_UA_Client_Development_with_NET.pdf**
Tutorial for Developing OPC UA Clients with C# for of .NET 7.0 and .NET 6.0
 - **OPC_UA_Server_Development_with_NET.pdf**
Tutorial for Developing OPC UA Servers with C# for of .NET 7.0 and .NET 6.0
 - **OPC_UA_PubSub_Development_with_NET.pdf**
Tutorial for Developing OPC UA Servers with C# for of .NET 7.0 and .NET 6.0
- **examples/**
Sample applications
- **licenses/**
Licenses applying
- **schema/**
XSD files like the UAModelDesign.xsd used for the Model Designer.
- **Workshop/**
OPC UA Workshop content as PDF



2.2 DLLs used by applications.

The solution consists of the following main components.

- **Technosoftware.UaCore.dll**
- **Technosoftware.UaBindings.Https.dll**
- **Technosoftware.UaConfiguration.dll**

These two DLLs are used by all applications using the solution. In addition, one or several of the following DLL's might be required:

- **Technosoftware.UaClient.dll**
Client Applications require this DLL.
- **Technosoftware.UaServer.dll**
Server Applications require this DLL.
- **Technosoftware.UaPubSub.dll**
PubSub Applications require this DLL.

Depending on which features server applications uses you also need to use one of the following DLLs:

- **Technosoftware.UaBaseServer.dll**
Server Applications using the original features from V2.x require this DLL.
- **Technosoftware.UaStandardServer.dll**
Advanced server Applications with more than one node manager require this DLL.

These DLLs are delivered via NuGet Packages:

- [Technosoftware.UaSolution.UaClient](#)
- [Technosoftware.UaSolution.UaServer](#)
- [Technosoftware.UaSolution.UaPubSub](#)
- [Technosoftware.UaSolution.UaBaseServer](#)
- [Technosoftware.UaSolution.UaStandardServer](#)

2.3 OPC UA Local Discovery Server

The Local Discovery Server (LDS) is a DiscoveryServer that maintains a list of all UA Servers and Gateways available on the host/PC that it runs on and is the UA equivalent to the OPC Classic OPCENUM interface.

An LDS is a service that runs in the background. UA Servers will periodically connect to the LDS and Register themselves as being available. This periodic activity means that the list of available UA servers is always current and means that a client can immediately connect to any of them (security permissions pending).

The OPC UA Local Discovery Server is an installation from the OPC Foundation and delivered as installation executable and as merge module. You can download it via

<https://opcfoundation.org/developer-tools/samples-and-tools-unified-architecture/local-discovery-server-lds/>



2.4 Test your installation with .NET 6.0 or .NET 7.0

The main OPC UA Solution can be found in the root of the repository and is named.

- TutorialSamples.sln

The solution contains several sample clients, as well as several sample server examples used by these clients.

2.4.1 Prerequisites

Once the **dotnet** command is available, navigate to the following folder:

/

and execute

```
dotnet restore TutorialSamples.sln
```

This command restores the tree of dependencies.

2.4.2 Start the server

1. Open a command prompt.
2. Navigate to the folder `examples/Simulation/SampleServer`.
3. To run the server sample type

```
dotnet run --no-restore --framework netcoreapp3.1 --project  
SampleCompany.SampleServer.csproj -a
```

- The server is now running and waiting for connections.
- The `-a` flag allows to auto accept unknown certificates and should only be used to simplify testing.

2.4.3 Start the client

1. Open a command prompt.
2. Navigate to the folder `examples/Simulation/SampleClient`.
3. To run the client sample type

```
dotnet run --no-restore --framework netcoreapp3.1 --project  
SampleCompany.SampleClient.csproj -a
```

- The client connects to the OPC UA console sample server running on the same host.
 - The `-a` flag allows to auto accept unknown certificates and should only be used to simplify testing.
4. If not using the `-a` auto accept option, on first connection, or after certificates were renewed, the server may have refused the client certificate. Check the server and client folder `%LocalApplicationData%/OPC Foundation/pki/rejected` for rejected certificates. To approve a certificate copy it to the `%LocalApplicationData%/OPC Foundation/pki/trusted`.



2.4.4 Check the output

If everything was done correctly the client should show the following lines:

```
SampleCompany .NET Core OPC UA Sample Client
Connecting...
Browse address space.
Reading nodes...
    Read Value = {24.08.2022 07:40:44 | 24.08.2022 07:49:04 | Running | Opc.Ua.BuildInfo | 0 | } ,
    StatusCode = Good
    Read Value = StartTime , StatusCode = Good
    Read Value = 24.08.2022 07:40:44 , StatusCode = Good
Read a single value from node ns=2;s=Scalar_Simulation_Number.
    Node ns=2;s=Scalar_Simulation_Number Value = 37848 StatusCode = Good.
Read multiple values from different nodes.
    Node ns=2;s=Scalar_Simulation_Number Value = 37848 StatusCode = Good.
    Node ns=2;s=Scalar_Static_Integer Value = 2142943445 StatusCode = Good.
    Node ns=2;s=Scalar_Static_Double Value = 1033833323429888 StatusCode = Good.
Read multiple values asynchronous.
Running...Press Ctrl-C to exit...
Status of Read of Node ns=2;s=Scalar_Simulation_Number is: 37848
Status of Read of Node ns=2;s=Scalar_Static_Integer is: 2142943445
Status of Read of Node ns=2;s=Scalar_Static_Double is: 1033833323429888
--- SIMULATE RECONNECT ---
--- RECONNECTED ---
```

You can abort the running application with Ctrl-C.



3 Installation OPC UA Solution .NET Source

OPC UA Solution .NET

For your reference we also provide the source Code of UaConfiguration, UaClient, UaServer, UaBaseServer and UaStandardServer, but the license mechanism is in UaCore, so you still need a valid license! You can download it from <https://github.com/technosoftware-gmbh/opcua-solution-net>.

This GitHub repository is automatically built and tested with the following environments:

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- e. Mac OS X 11
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- f. Windows Server 202
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 - **OPC_UA_PubSub_Development_with_NET.pdf**
Tutorial for Developing OPC UA Servers with C# for of .NET 7.0 and .NET 6.0
- **examples/**
Reference client and server applications. Also used for unit and compliance testing.
- **licenses/**
Licenses applying
- **schema/**
XSD files like the UAModelDesign.xsd used for the Model Designer.
- **src/**
Source of UaConfiguration, UaClient, UaServer, UaBaseServer and UaStandardServer.
- **Tests/**
Unit tests.

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Professionalism

Technosoftware GmbH is, measured by the number of employees, truly not a big company. However, when it comes to flexibility, service quality, and adherence to schedules and reliability, we are surely a great company which can compete against the so-called leaders in the industry. And this is THE crucial point for our customers.

Continuous progress

Lifelong learning and continuing education are, especially in the information technology, essential for future success. Concerning our customers, we will constantly be accepting new challenges and exceeding their requirements again and again. We will continue to do everything to fulfill the needs of our customers and to meet our own standards.

High Quality of Work

We reach this by a small, competent, and dynamic team of coworkers, which apart from the satisfaction of the customer; take care of a high quality of work. We concern the steps necessary for it together with consideration of the customers' requirements.

Support

We support you in all phases – consultation, direction of the project, analysis, architecture & design, implementation, test, and maintenance. You decide on the integration of our coworkers in your project, for an entire project or for selected phases.

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