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LabVIEW OPC UA

Hans-Petter Halvorsen

Contents

- What is OPC and OPC UA?
  - Short Introduction
- OPC UA Examples in LabVIEW
  - OPC UA Server
  - OPC UA Clients (Write/Read)

Software – LabVIEW 2017 or newer

You need the following Software:

- LabVIEW
- LabVIEW OPC UA Toolkit

Note! The **LabVIEW OPC UA Toolkit** contains the OPC UA API that was formerly part of the LabVIEW Datalogging and Supervisory Control (DSC) Module and the LabVIEW Real-Time Module.
From the 2017 release, the LabVIEW OPC UA Toolkit becomes a standalone product. The LabVIEW DSC Module and the LabVIEW Real-Time Module no longer contain the OPC UA API

All LabVIEW Software can be downloaded from: www.ni.com/download

Example

Write Data to OPC UA Server

Read Data from OPC UA Server

LabVIEW Application #1

LabVIEW Application #2

In this Example LabVIEW Application #1, #2 and #3 are on the same computer. Normally they are located on different computers or devices in a Network.

LabVIEW Application #3

What is OPC UA?

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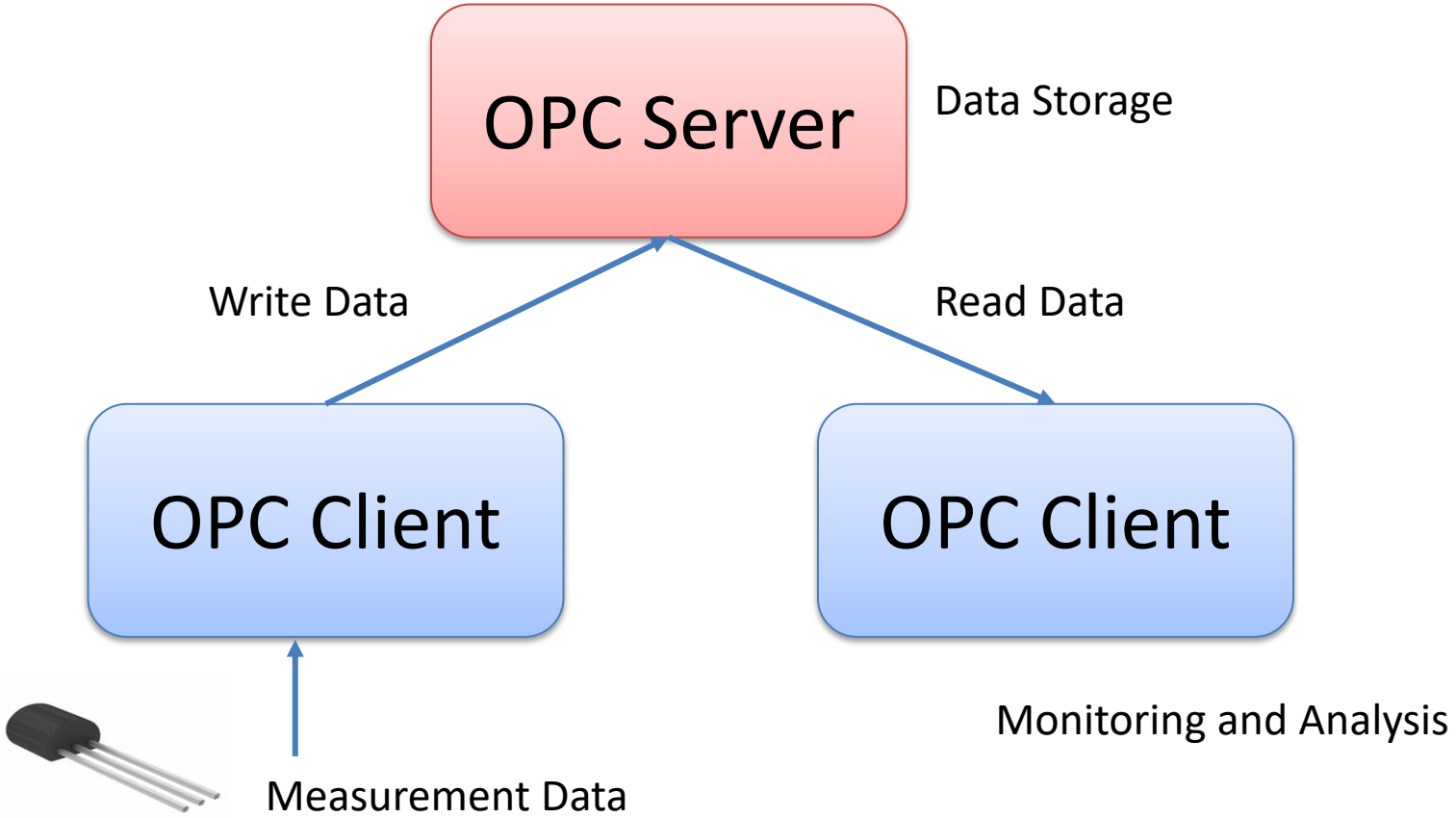
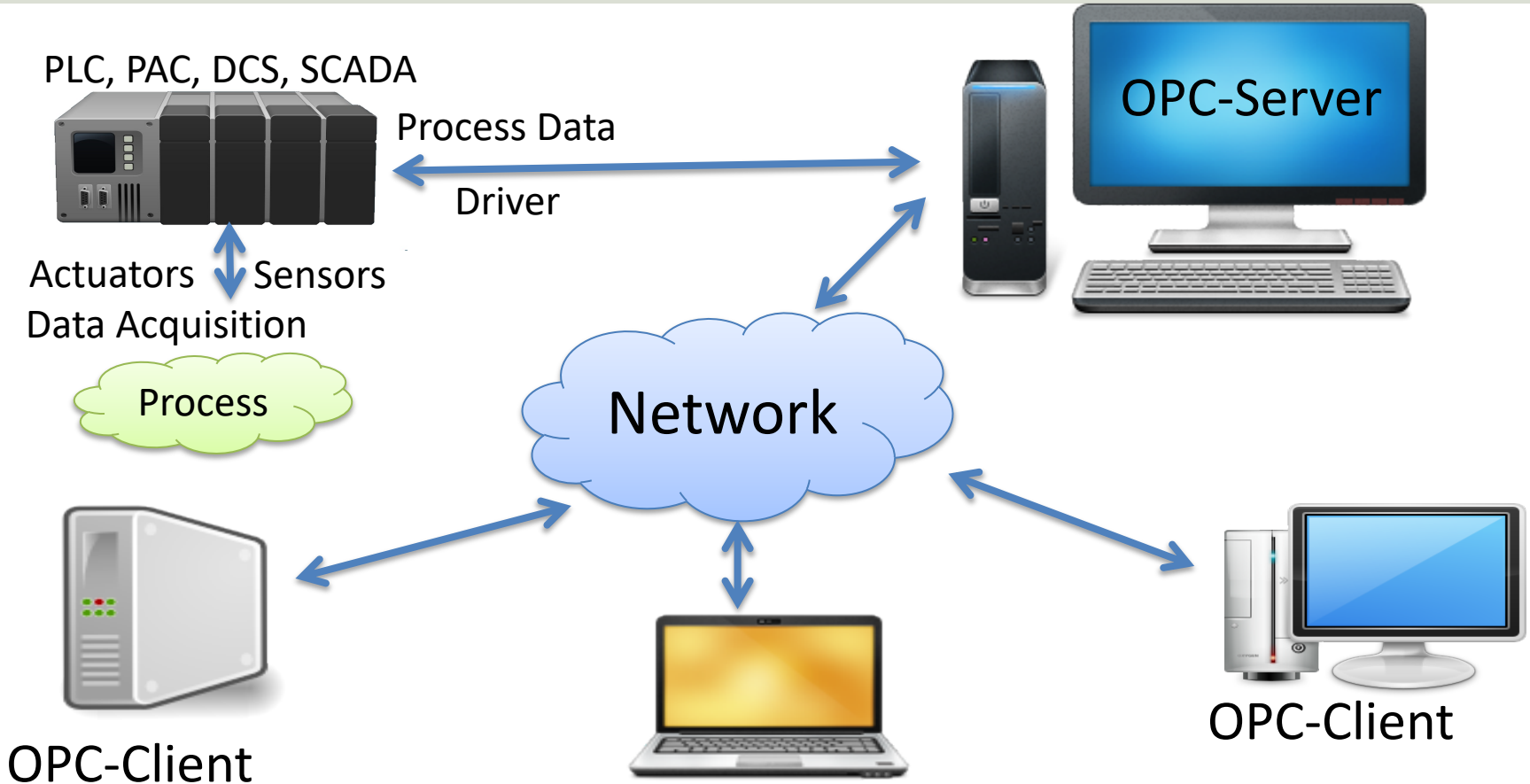
What is OPC?

- A standard that defines the communication of data between devices from different manufactures
- Requires an OPC server that communicates with the OPC clients
- OPC allows “plug-and-play”, gives benefits as reduces installation time and the opportunity to choose products from different manufactures
- Different standards: “Real-time” data (OPC DA), Historical data (OPC HDA), Alarm & Event data (OPC AE), etc.

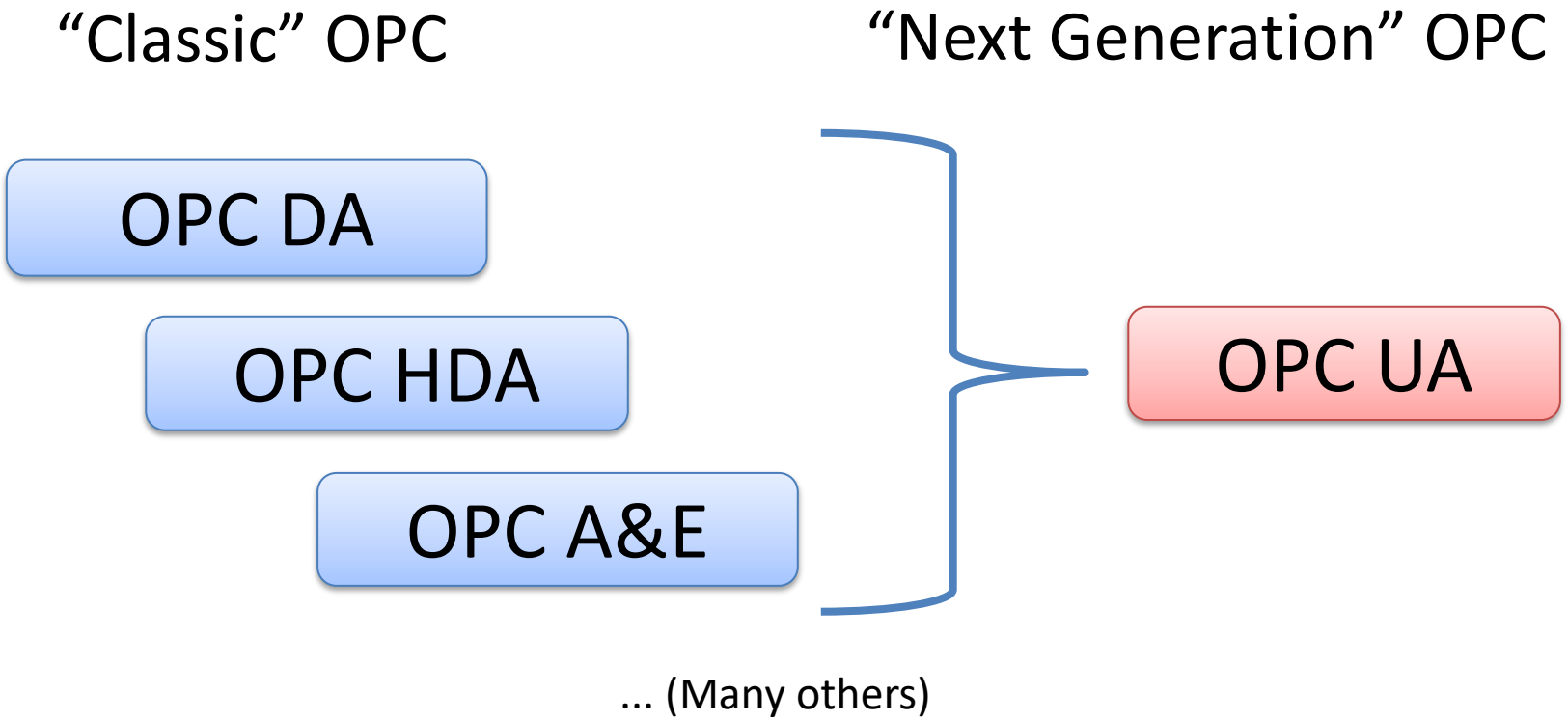
OPC Server and Client(s)



Typical OPC Scenario



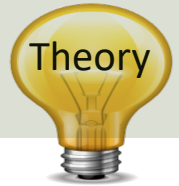
OPC Specifications



OPC UA

- UA – Unified Architecture
- The Next Generation OPC
- Cross Platform. “Classic“ OPC works only for Windows
- Based on Modern Software/Network Architecture (No DCOM problems!)
- It makes it easier to transmit and receive data in a modern data network/Internet

Next Generation OPC



COM/DCOM

OPC Classic

OPC DA

OPC HDA

OPC A&E

Specifications

Windows only

Next Generation OPC

XML, HTTP, SOAP

OPC UA

Cross-platform

Windows, Linux, Mac, Embedded, VxWorks

All specifications collected in one (DA, HDA, A&E)

Protocols: “UA Binary” or “UA XML”

OPC DA Server

OPC HDA Server

OPC A&E Server

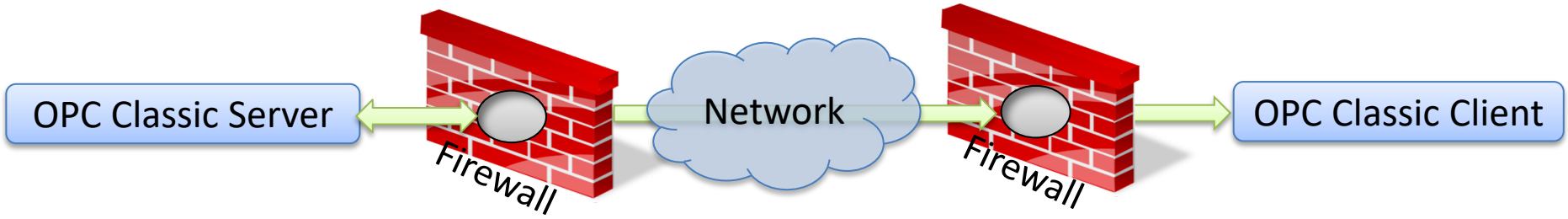
OPC Client (DCOM)

Simpler!!

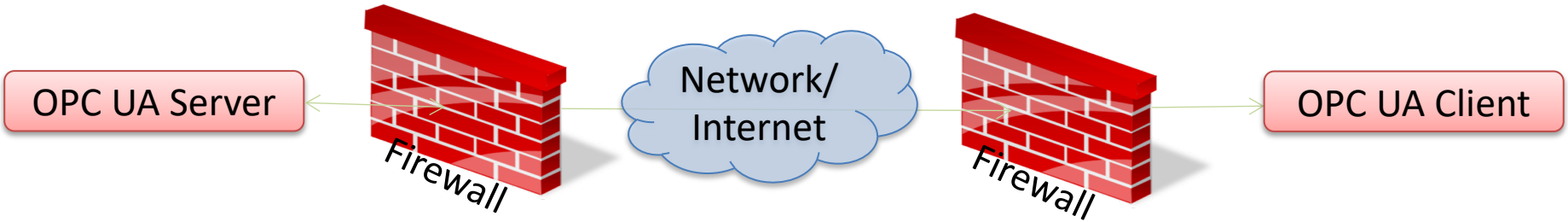
OPC UA Server

OPC UA Client

Next Generation OPC

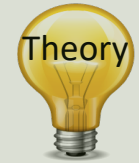


To open DCOM through firewalls demanded a large hole in the firewall!
Impossible to route over Internet!

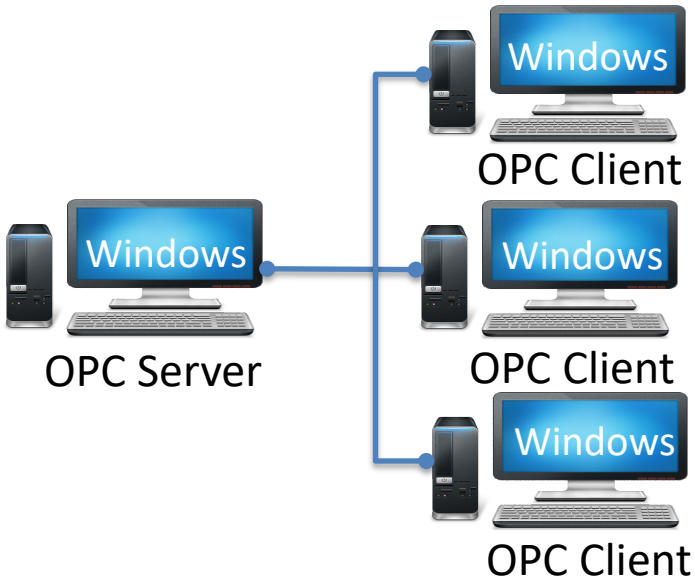


No hole in firewall (UA XML) or just a simple needle stick (UA Binary) is necessary
Easy to route over Internet!

Classic OPC vs. OPC UA

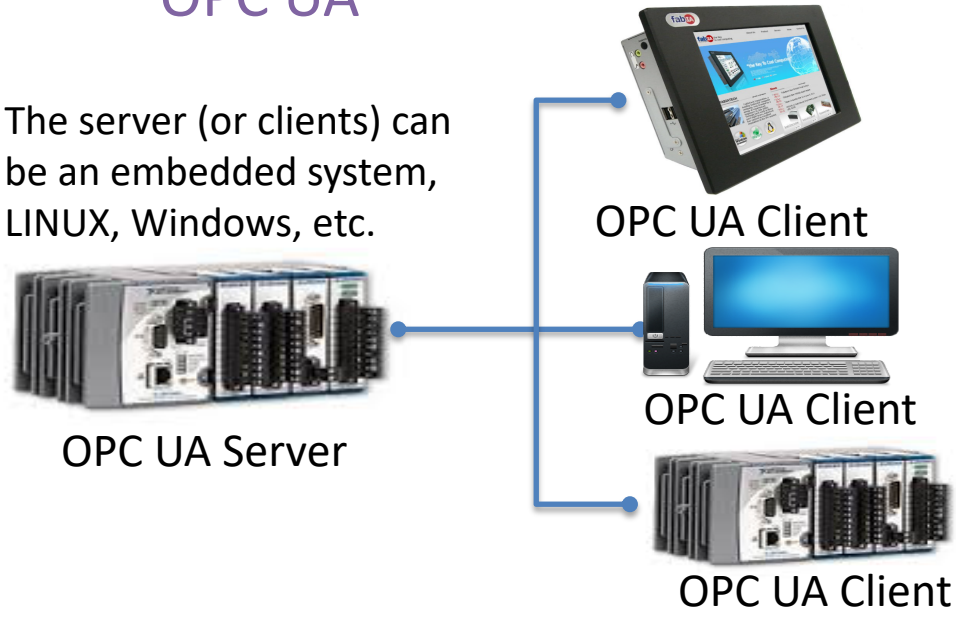


Classic OPC (DCOM)



OPC UA

The server (or clients) can be an embedded system, LINUX, Windows, etc.



Classic OPC requires a Microsoft Windows operating system to implement COM/DCOM server functionality. By utilizing SOA and Web Services, OPC UA is a platform-independent system that eliminates the previous dependency on a Windows operating system. By utilizing SOAP/XML over HTTP, OPC UA can deploy on a variety of embedded systems regardless of whether the system is a general purpose operating system, such as Windows, or a deterministic real-time operating system.

http://www.ni.com/white-paper/13843/en/

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OPC UA in LabVIEW

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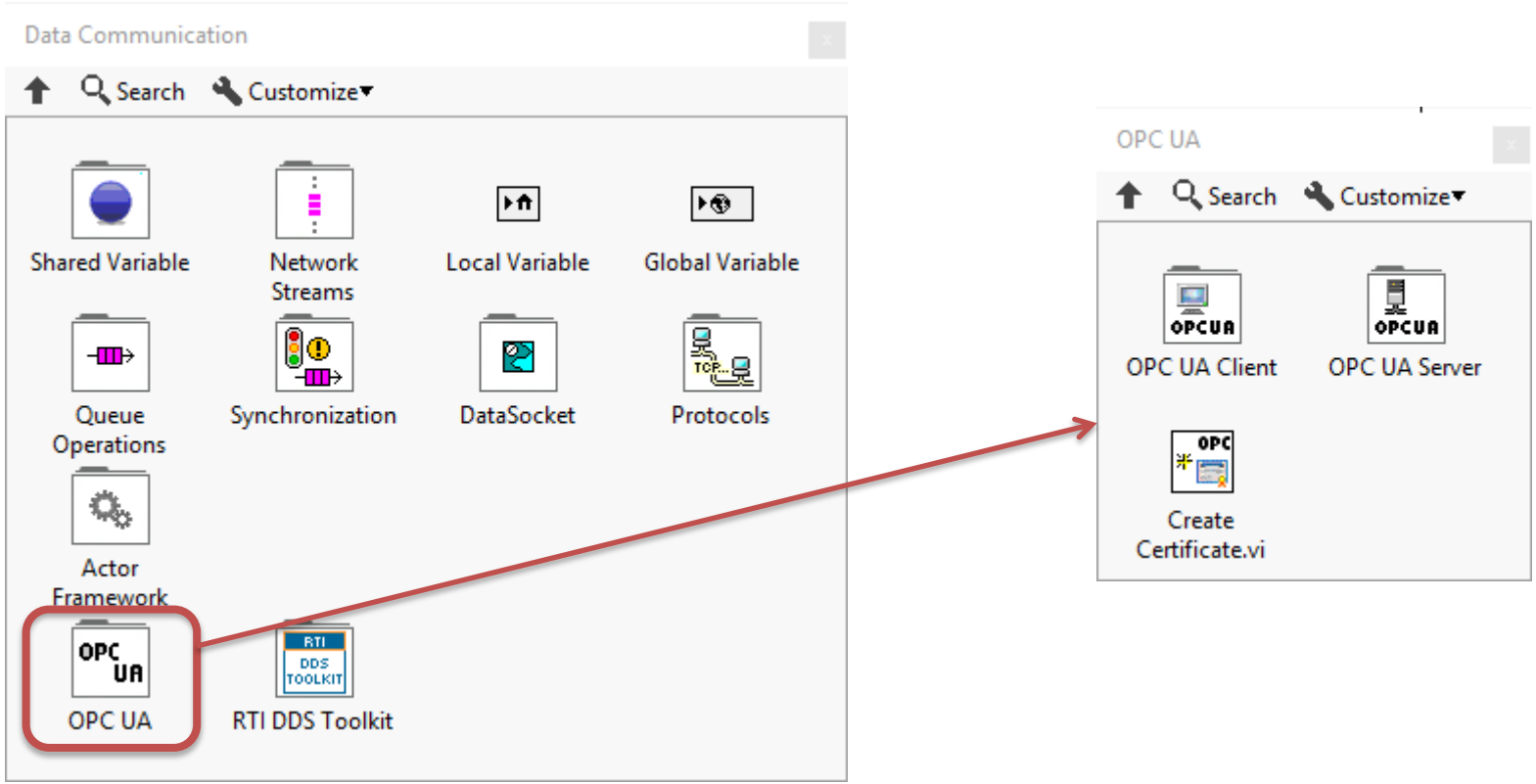
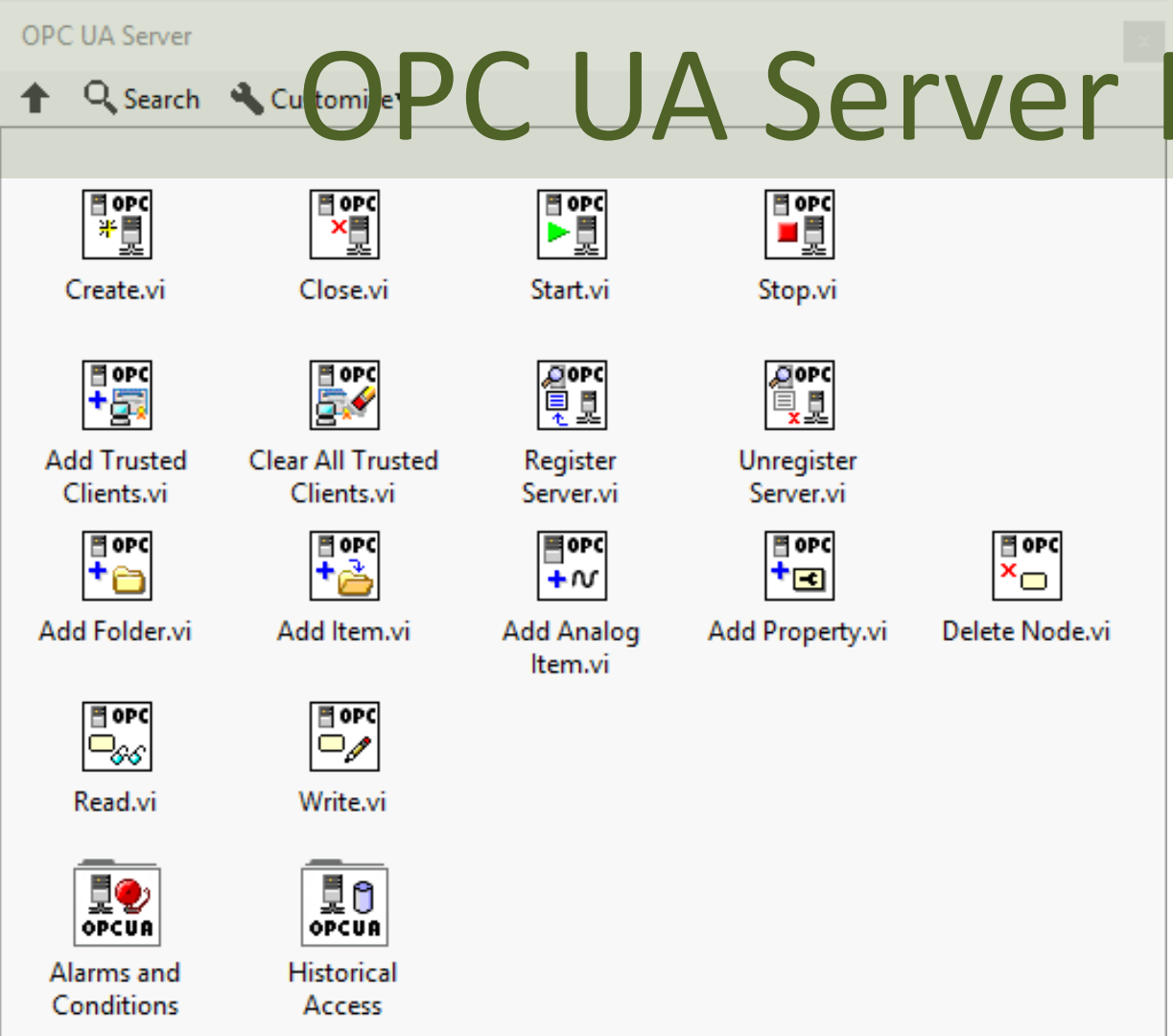
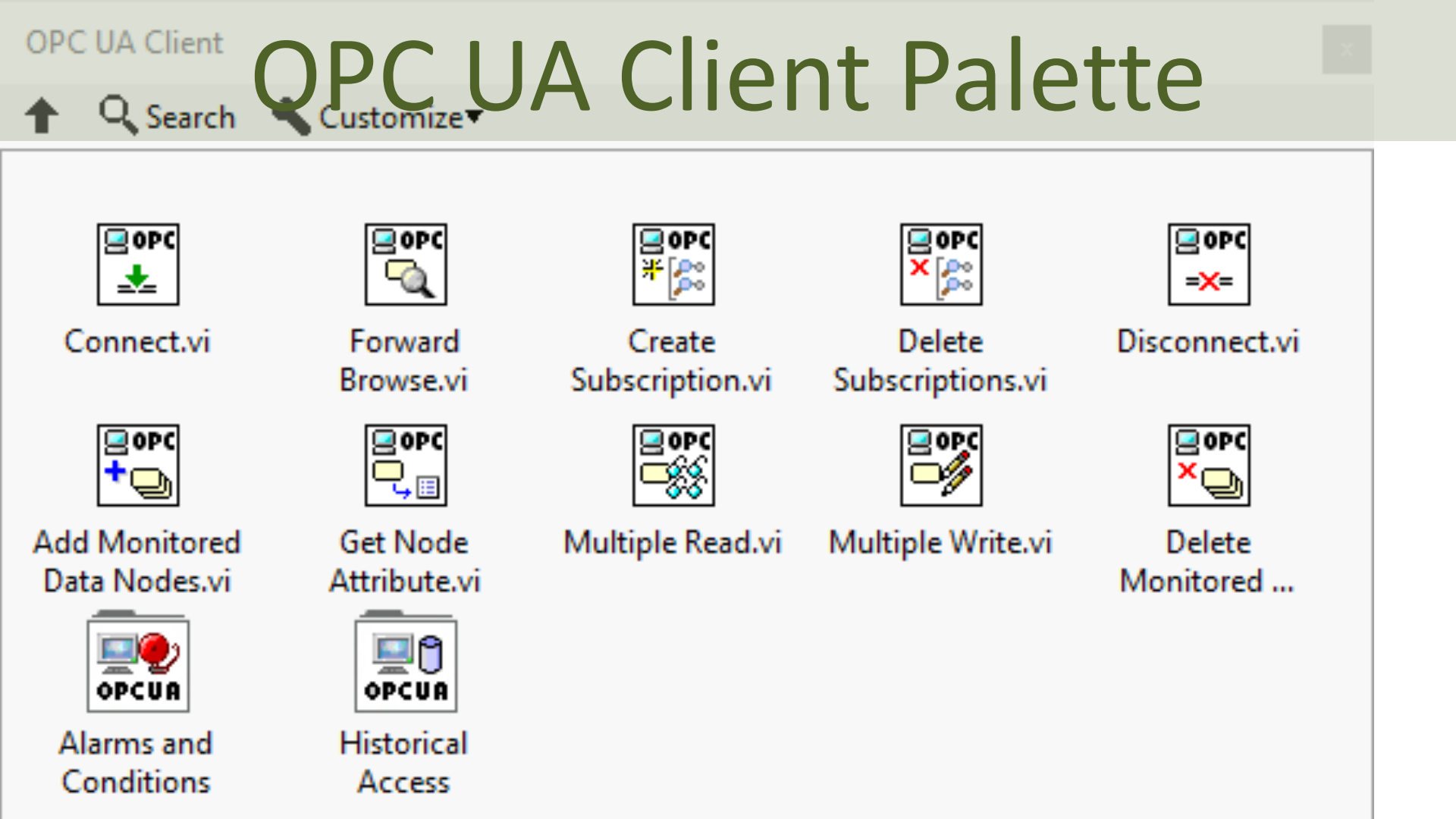
OPC UA Toolkit in LabVIEW



OPC UA Server Palette



OPC UA Client Palette



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OPC UA Server

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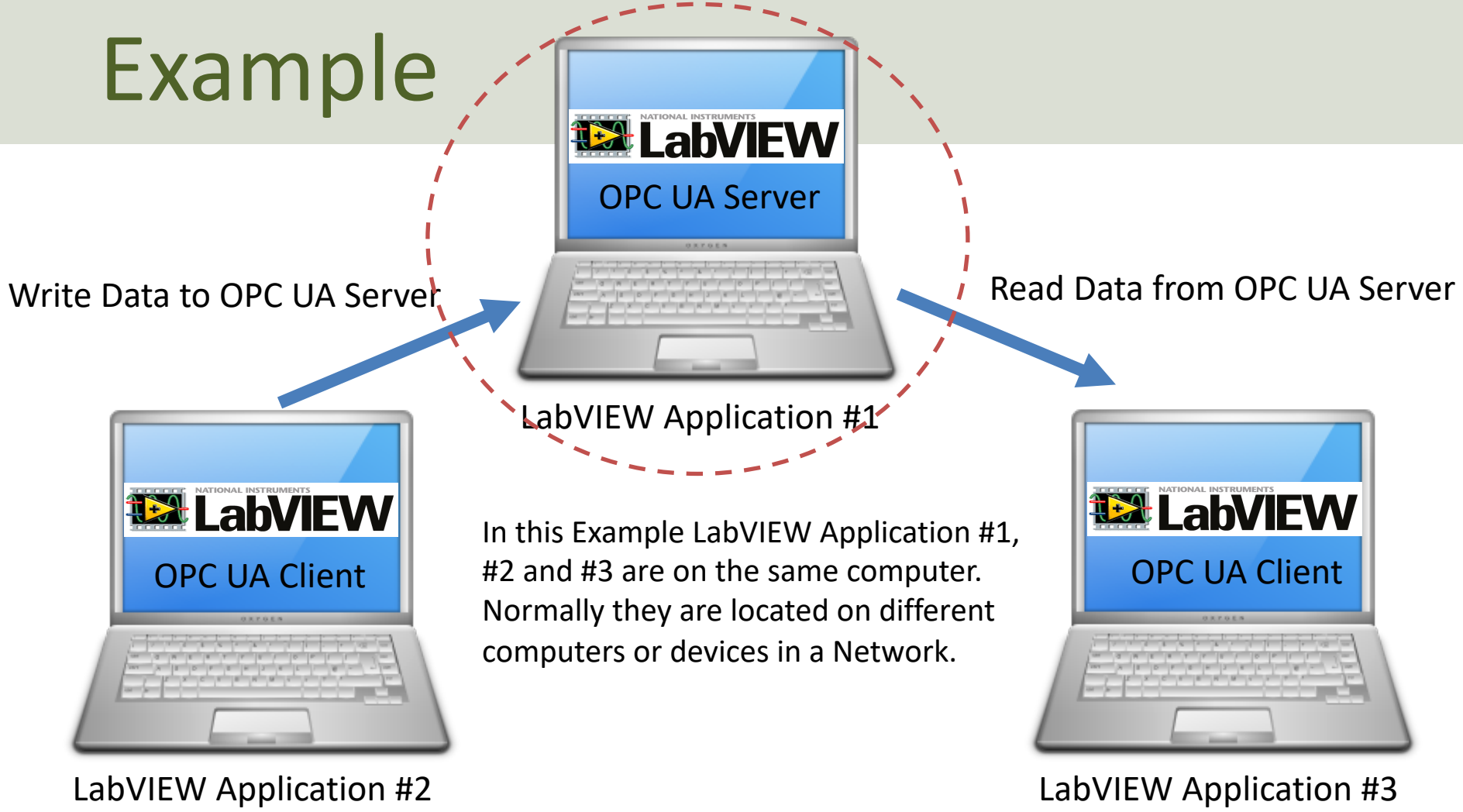
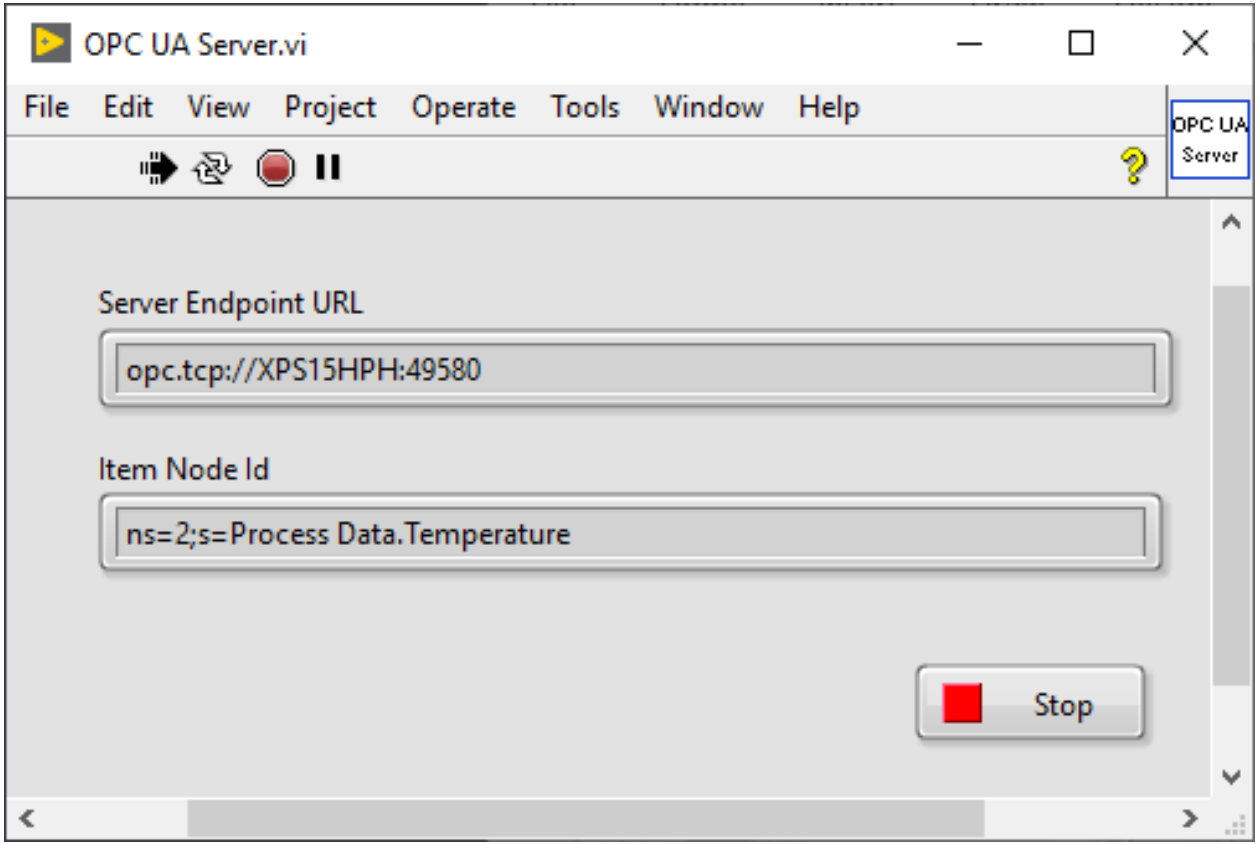
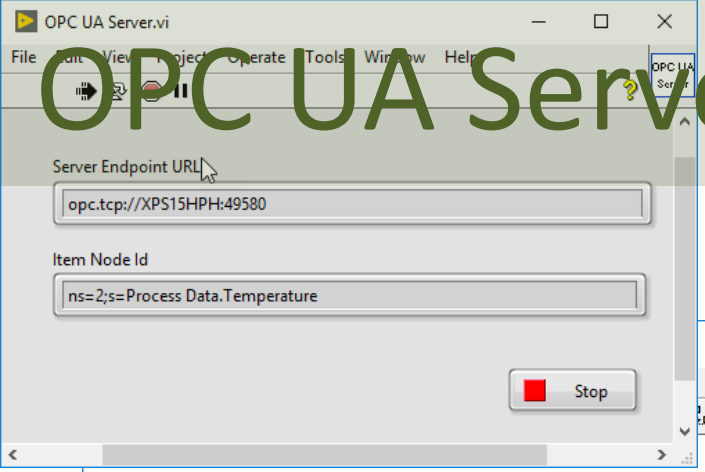
Example

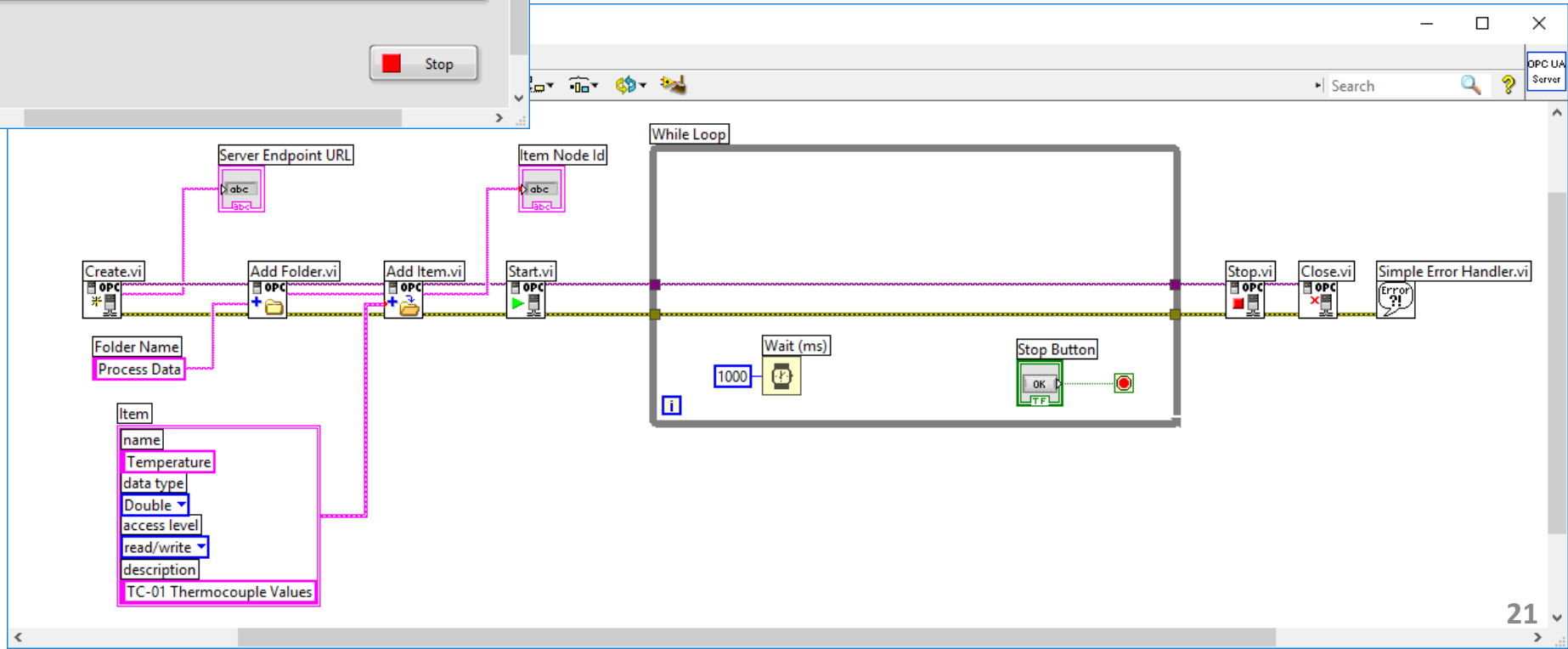

NATIONAL INSTRUMENTS
LabVIEW
OPC UA Server
Write Data to OPC UA Server
Read Data from OPC UA Server
LabVIEW Application #1
NATIONAL INSTRUMENTS
LabVIEW
OPC UA Client
In this Example LabVIEW Application #1, #2 and #3 are on the same computer. Normally they are located on different computers or devices in a Network.
NATIONAL INSTRUMENTS
LabVIEW
OPC UA Client
LabVIEW Application #2
LabVIEW Application #3

OPC UA Server Example in LabVIEW



OPC UA Server Example in LabVIEW





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OPC UA Clients

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OPC UA Client Write

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Example

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Read Data from OPC UA Server

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LabVIEW Application #2

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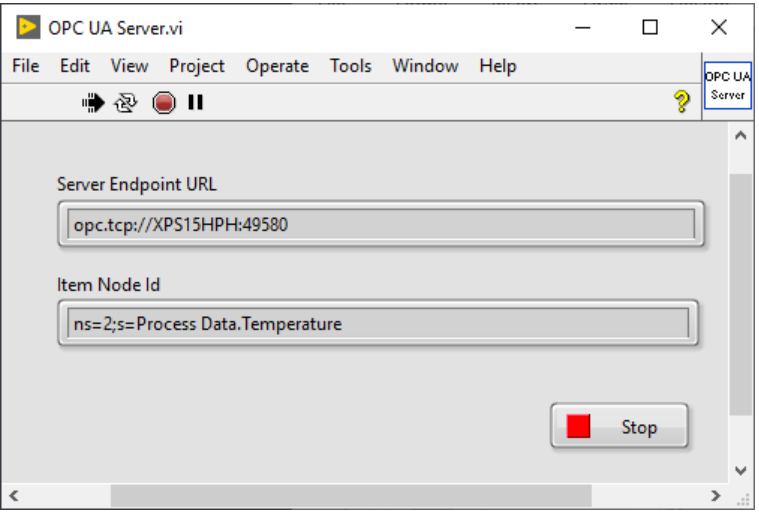
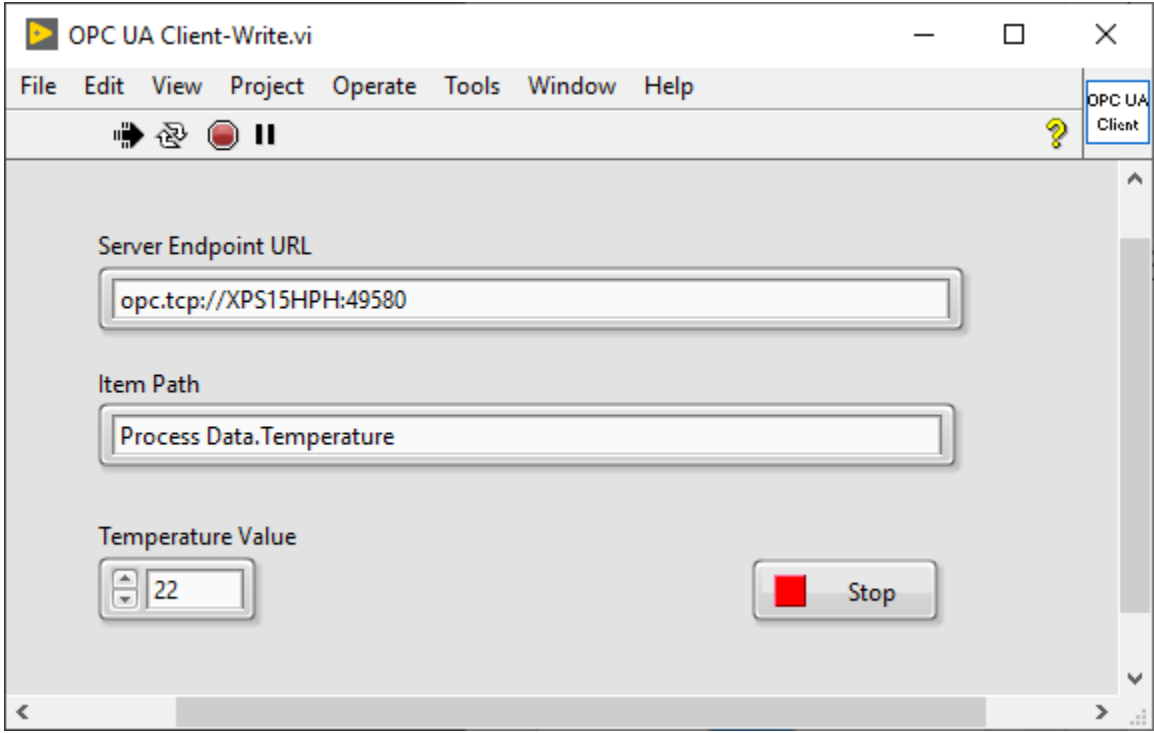
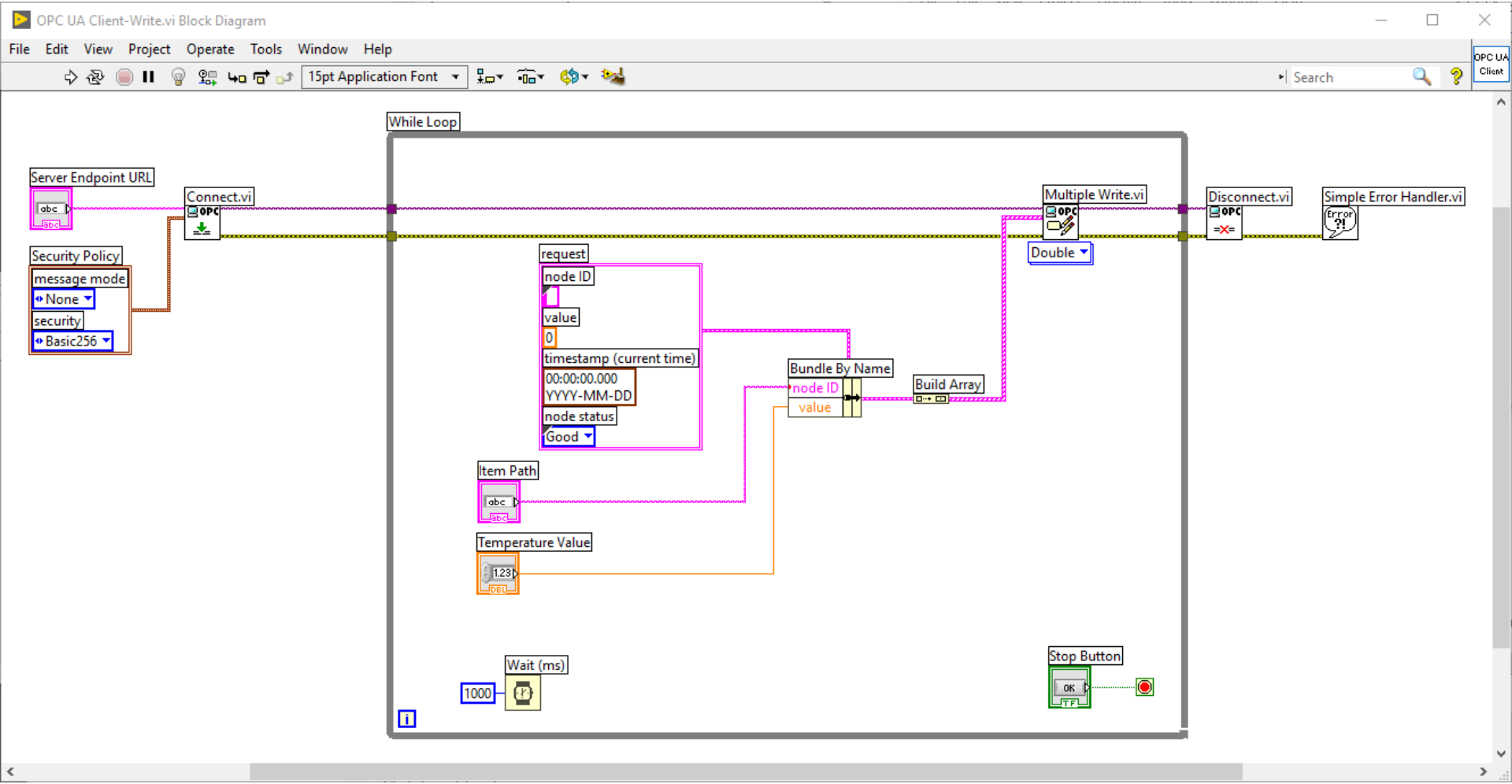
LabVIEW Application #3

OPC UA Client Write Data





Using **OPC UA Toolkit** with LabVIEW 2017 or newer


OPC UA Client-Write.vi Block Diagram
File Edit View Project Operate Tools Window Help
15pt Application Font
Search
While Loop
Server Endpoint URL
Connect.vi
Security Policy
message mode
None
security
Basic256
request
node ID
value
0
timestamp (current time)
00:00:00.000
YYYY-MM-DD
node status
Good
Item Path
Temperature Value
Bundle By Name
node ID
value
Build Array
Multiple Write.vi
Double
Disconnect.vi
Simple Error Handler.vi
Wait (ms)
1000
Stop Button
OPC UA Client

OPC UA Client Read

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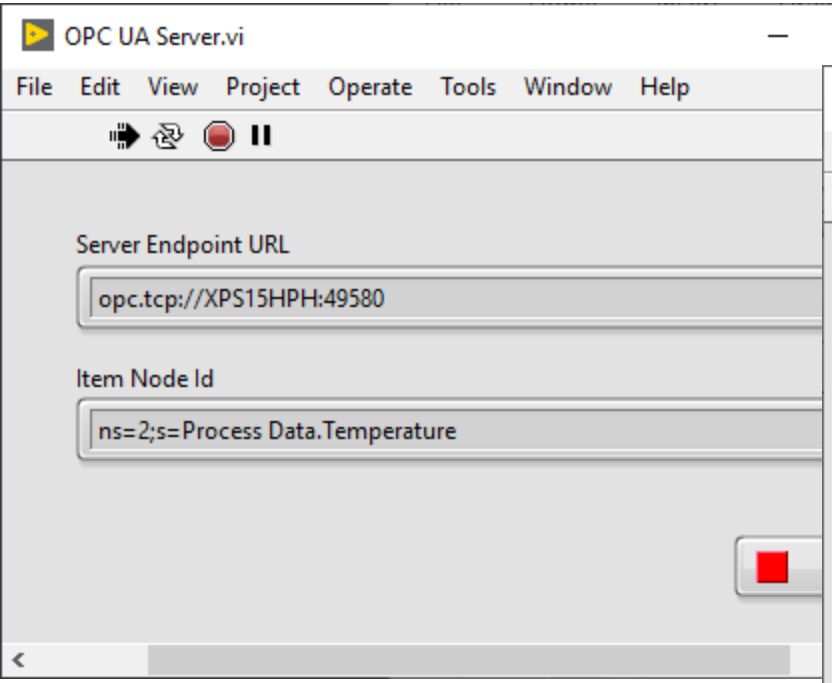
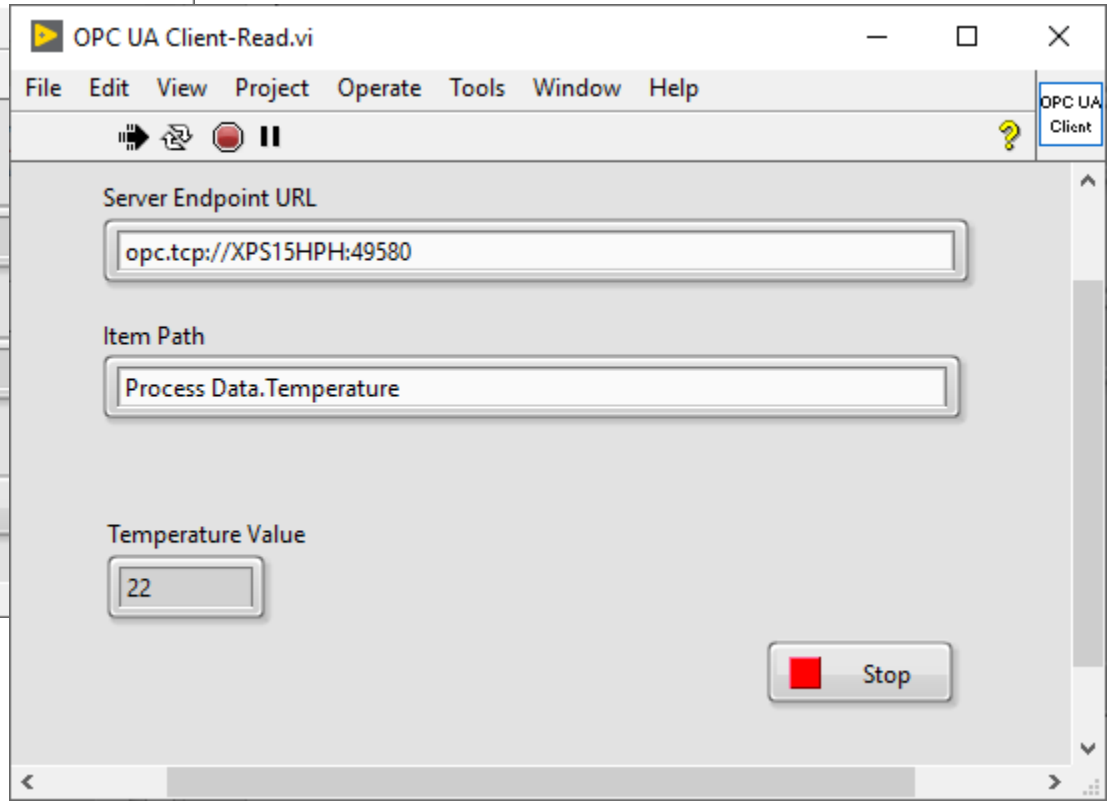
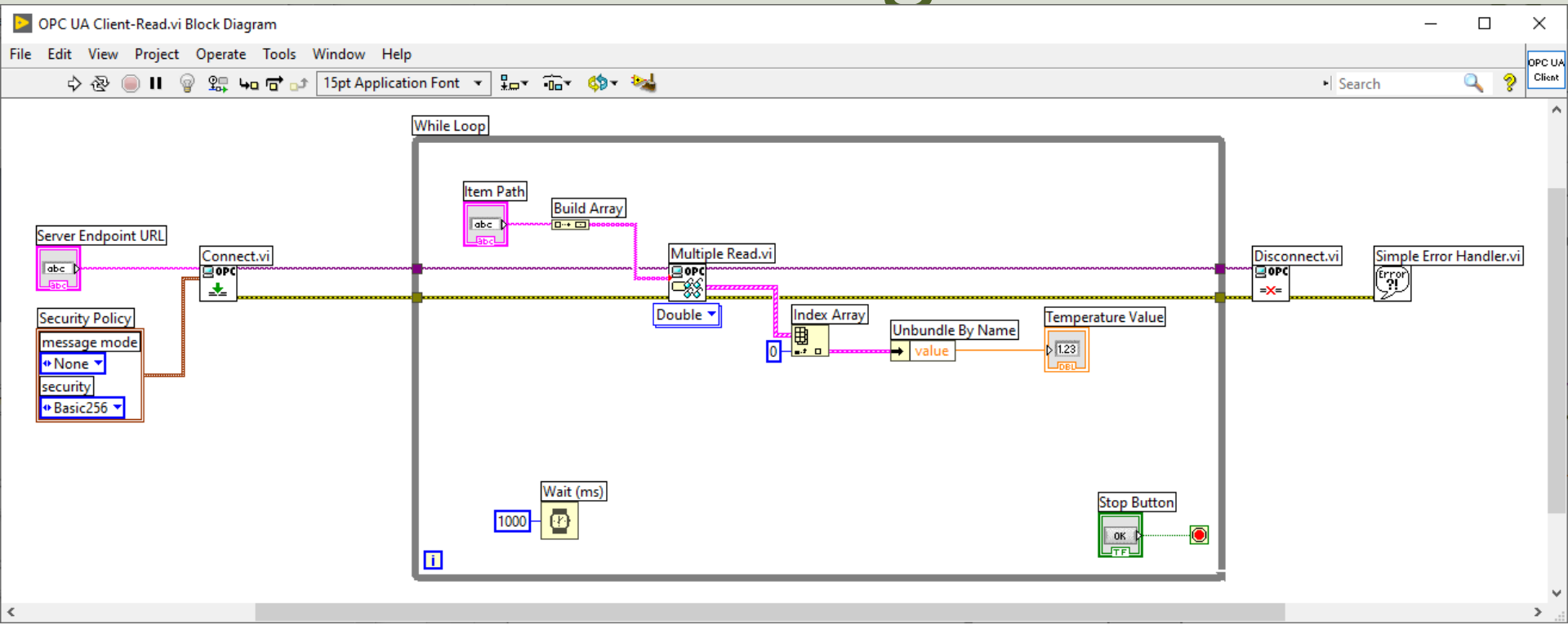
OPC UA Client Read Data





Using **OPC UA Toolkit**
with LabVIEW 2017 or newer

Block Diagram



OPC UA in LabVIEW

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Read Data from OPC UA Server

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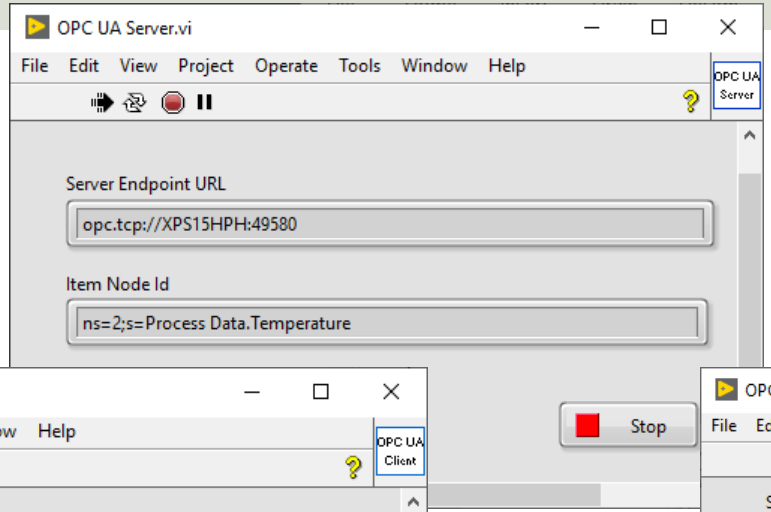
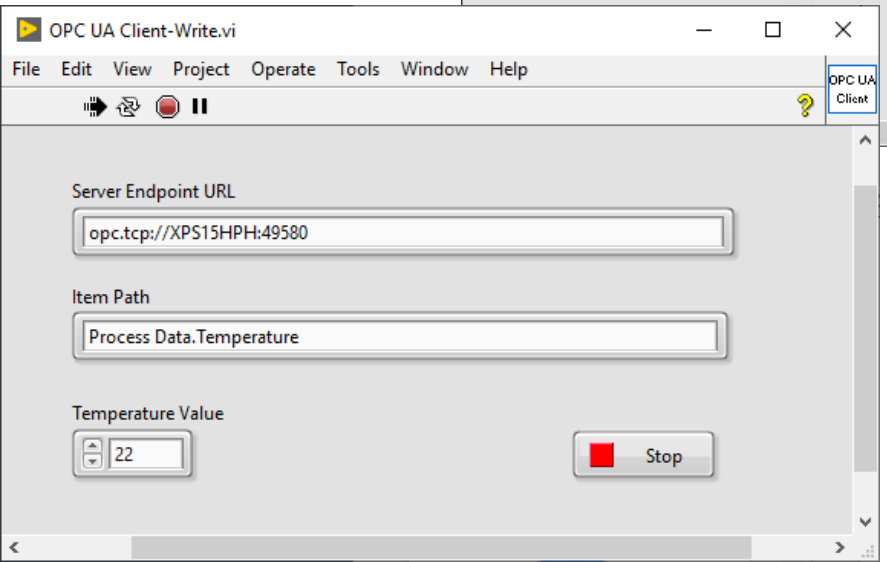
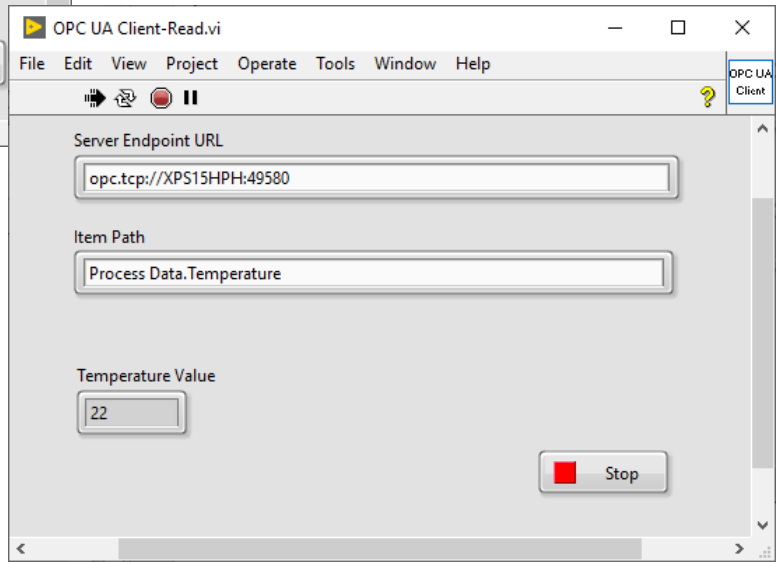
OPC UA in LabVIEW







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