Developing your app with ClientAce

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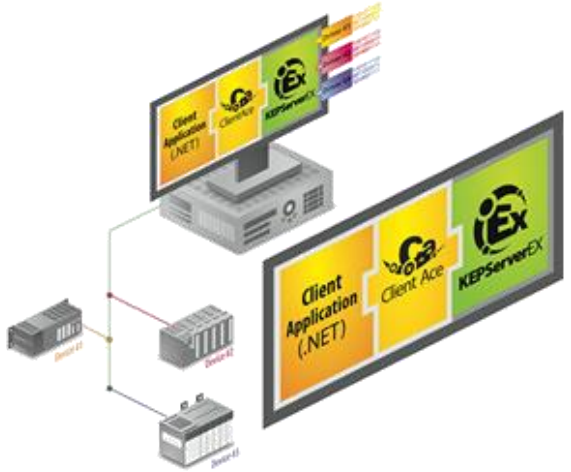
Kepware TECHNOLOGIES

What is ClientAce?

- OPC client development toolkit for Visual Studio
- Using C# or VB .NET, develop:
  - OPC DA clients
  - OPC UA clients
  - OPC XML-DA clients

- **Competing Products:**
  - Any OPC SDK
  - Open Source Codes



Your application in .NET → ClientAce Installed → Add in the OPC junctions → Your Application can now talk OPC

System & Application Requirements

- Same system requirements as Visual Studio
- Minimum of C# language pack
- .NET 4.0 for Visual Studio 2010 or 2012 <- ClientAce 4.0
  - OPC DA 2.0, 2.05a, and 3.0
  - OPC UA (data access information model only)
  - OPC XML-DA
- .NET 3.5 and below for Visual Studio 2008 <- ClientAce 3.5
  - OPC DA 2.0, 2.05a, and 3.0

The application must be:

- Written in C# or VB .NET
- Target the .NET 4.0 Framework or below
- Be an EXE
- Target x86 CPUs

Visual Studio	OPC UA	OPC DA	OPC XML-DA	IDE Integration	.NET Framework
2013	✔	✔	✔	✔	4.0/4.5
2012	✔	✔	✔	✔	4.0/4.5
2010	✔	✔	✔	✔	4.0/4.5
2008	✘	✔	✘	✔	3.5
2005	✘	✔	✘	✘	2.0
2003	✘	✔	✘	✘	2.0

Features in Client Ace

- ClientAce DA Junction
  - Requires no detailed knowledge of the OPC DA interfaces.
  - Completely manages the connection handling procedure for one or multiple OPC servers.
  - Supports conversion of the OPC DA interface data into .NET data types.

- ClientAce .NET API
  - Simplifies the OPC DA interface to major functions.
  - Requires no detailed knowledge of the OPC DA interfaces.
  - Supports different OPC base technologies (such as COM & DCOM).
  - Covers the connection handling to one OPC Server.
  - Supports conversion of the OPC DA interface data into .NET data types.
  - Has fast and simple search for OPC local and remote COM Servers.
  - Has high-performing and optimized Client/Server communications by using kernel functionality implemented in C++.

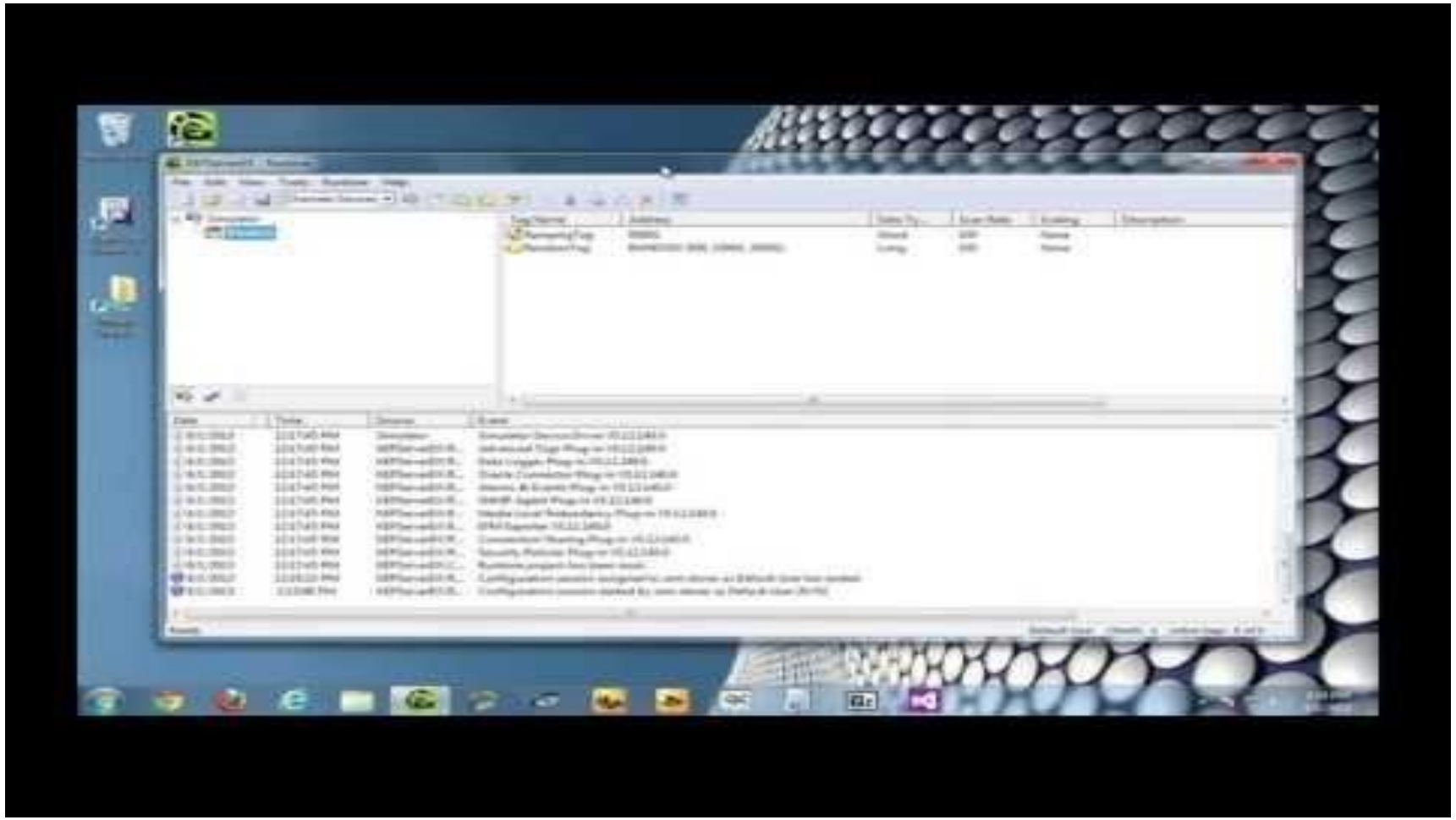
ClientAce 4.0

- Develop OPC UA clients
- Develop OPC XML-DA clients
- Support for .NET 4.0 development in VS 2010 and 2012

ClientAce 3.5 to 4.0 Upgrades

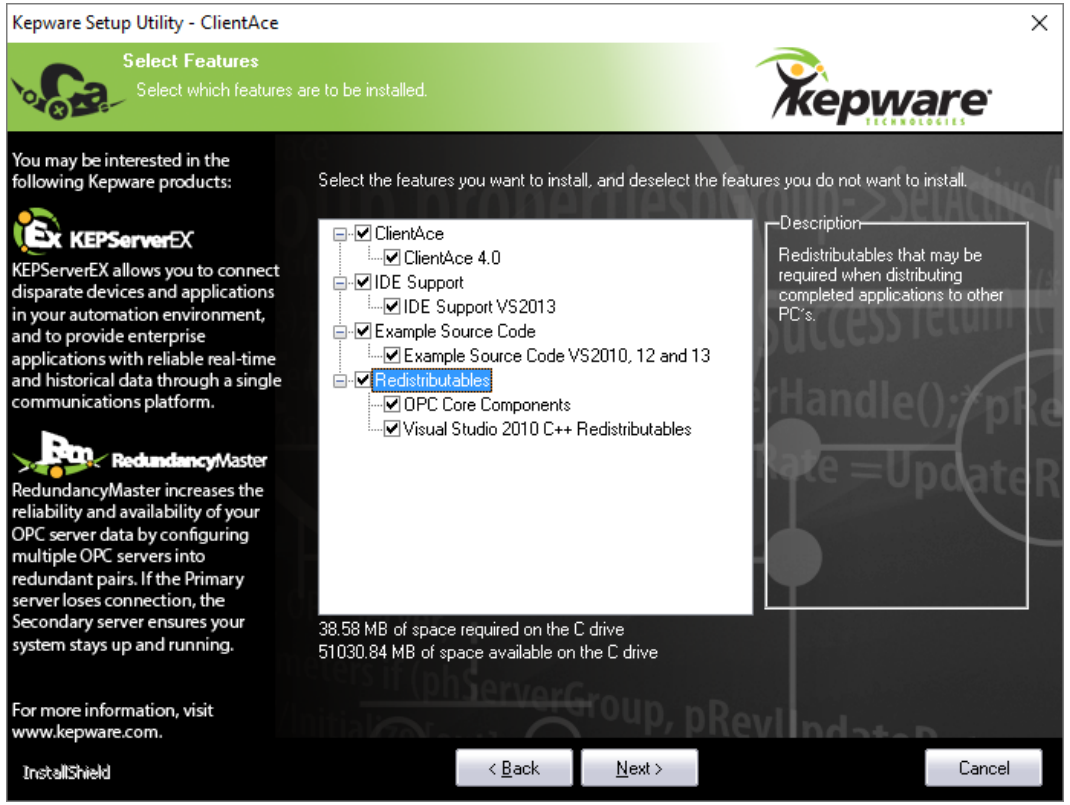
- Knowledge Base article about upgrading
- .NET 4.0 Framework and Visual Studio 2010 or 2012 required
- Shut down Visual Studio, Install ClientAce 4.0 and then register the new license
- Delete the old ClientAce DLL files from the Bin folder
- Open Visual Studio, remove the old references and add the new library references
- **Build | Clean Solution**
- If the application is using OPC DA, nothing has in 4.0 changed to impact the project

Client Ace 4.0 Webinar



Preparing your Environment

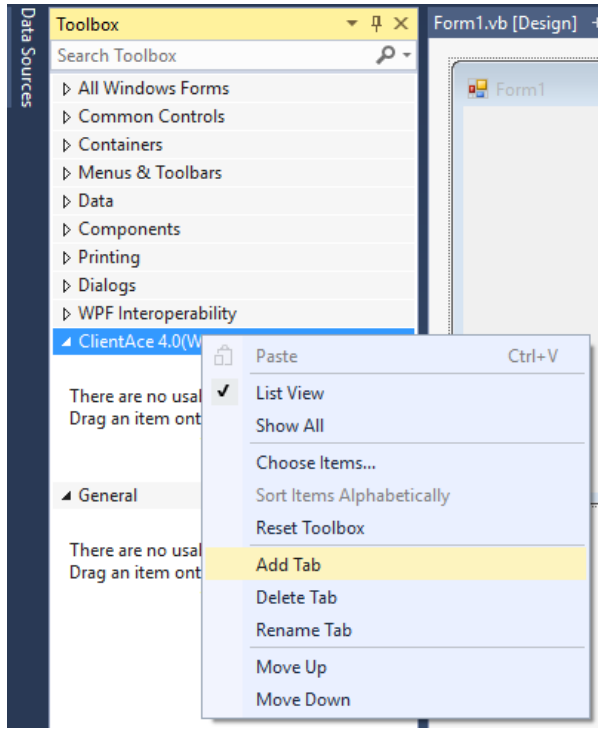
- Download and install the visual studio of your choice:
  - Latest:
    - https://www.visualstudio.com/downloads/
  - 2013:
    - https://my.visualstudio.com/Downloads?q=2013
- ClientAce and Visual Studio 2015
  - https://www.kepware.com/en-us/products/clientace/documents/using-clientace-in-visual-studio-2015/
- Version of Visual Studio that they are running
  - The installer detects any VS Studio from 2013 to 2010
  - 2015 requires a pre-installation of 2013 to detect properly

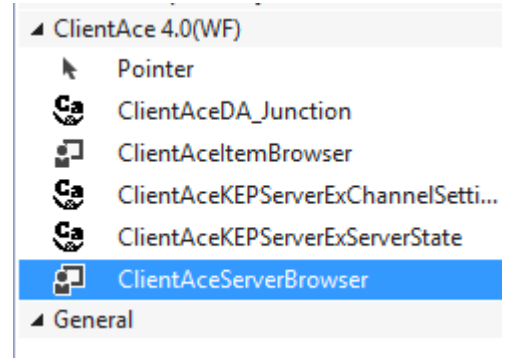


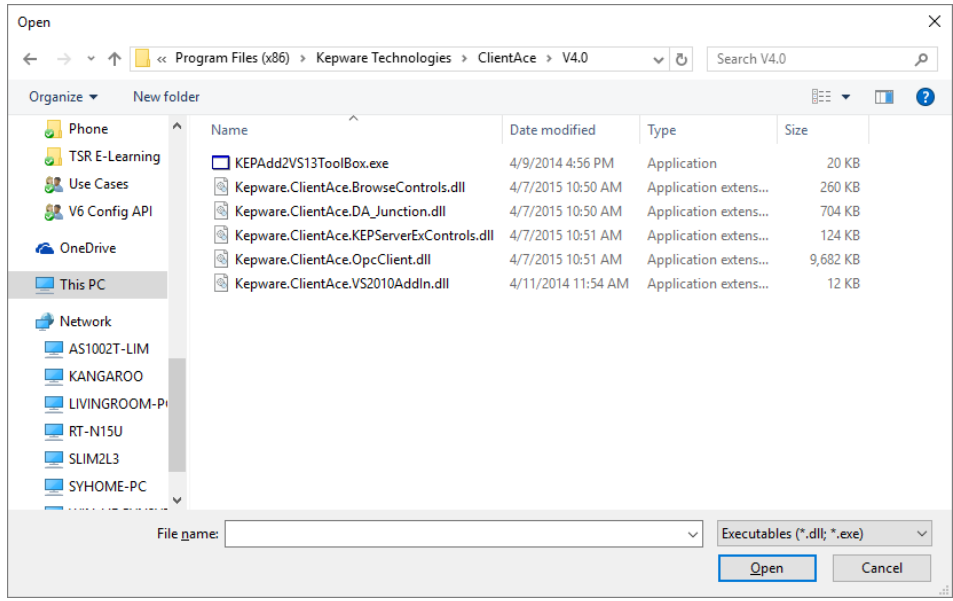
Redistributables are required IF there were no OPC Servers installed before

Adding back the Toolbox in 2015

- Ctrl + Alt + X
- Pin the toolbox
- Right click > Add Tab
- Name it :
  - “ClientAce 4.0(WF)”
- Right click the Tab you created
- Click Choose Items
- Click Browse
- Go to your installation folder and select:
  - Kepware.ClientAce.BrowseControls.dll
  - Kepware.ClientAce.DAJunction.dll
  - Kepware.ClientAce.KEPServerEXControlls.dll



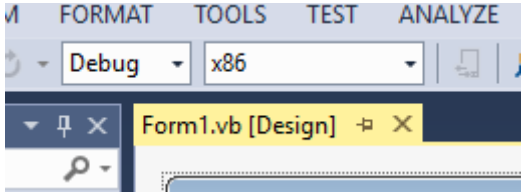


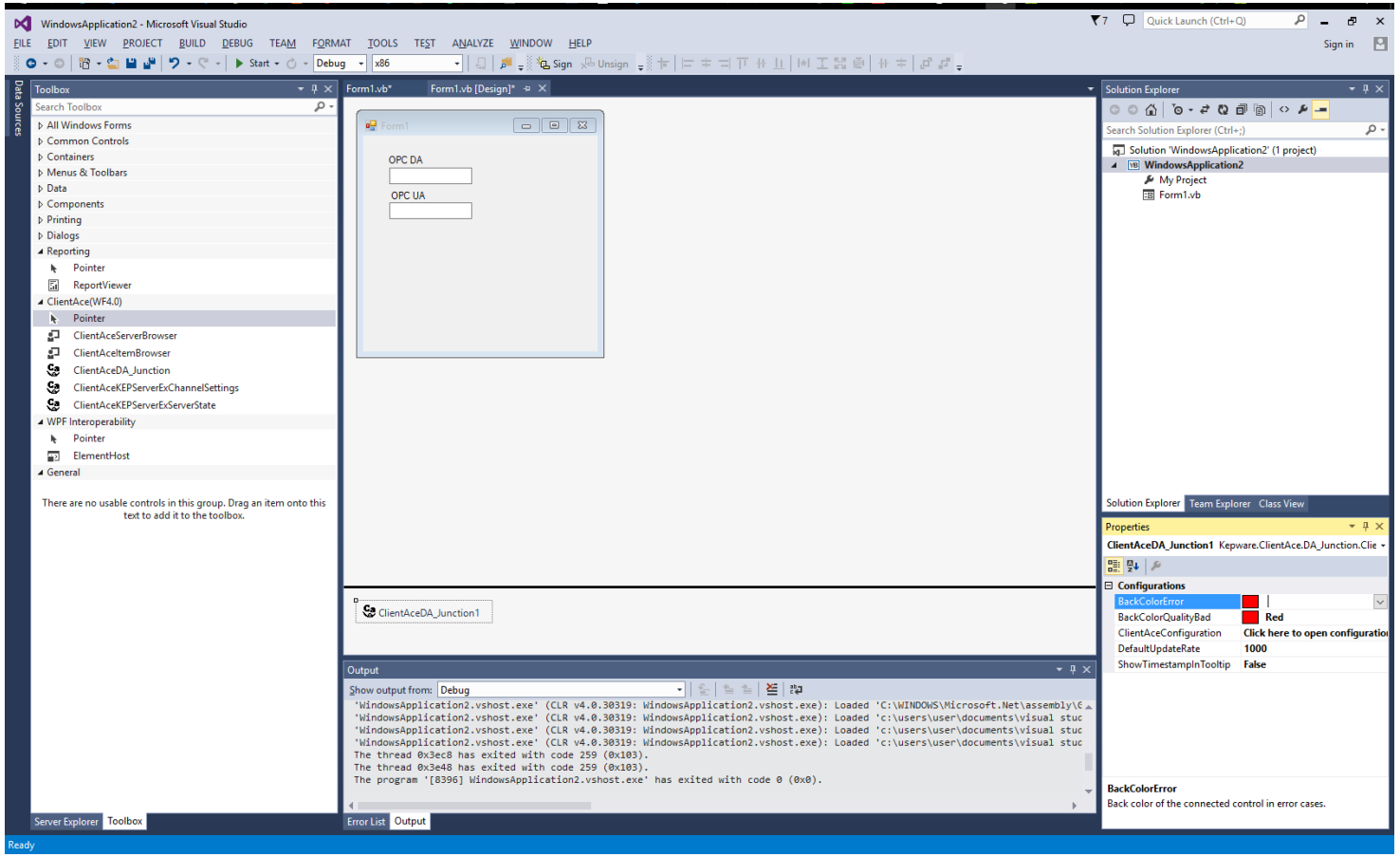


C:\Program Files (x86)\Kepware Technologies\ClientAce\V4.0

Set up the Visual Studio 2013

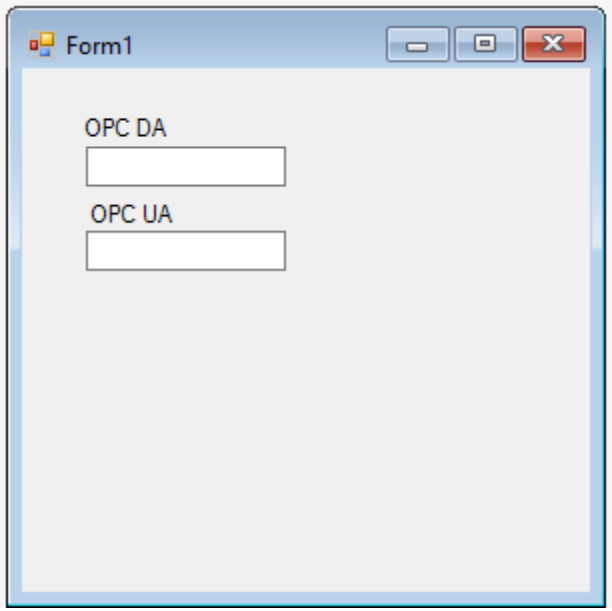
- Start a new project
- Select new windows application
  - Optional: Pin the Toolbox
- Target the server to x86





Create the windows form

- Drag a text from the toolbox to the form
- Drag a label from the toolbox to the form
- Rename the label as OPC DA
- Rename the label as OPC UA

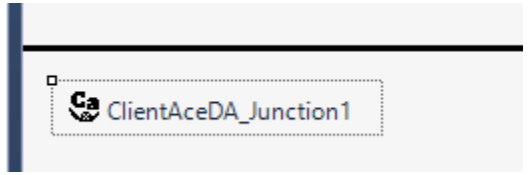


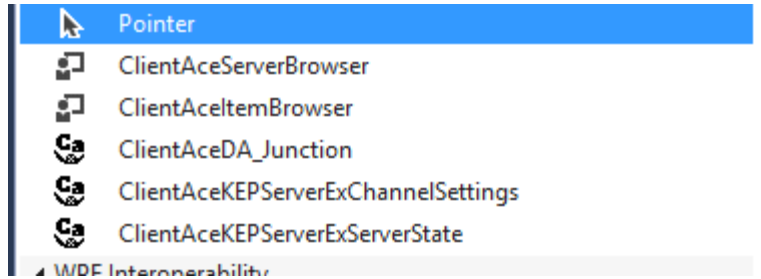
Development with ClientAce : DA Junction Part I : OPC DA

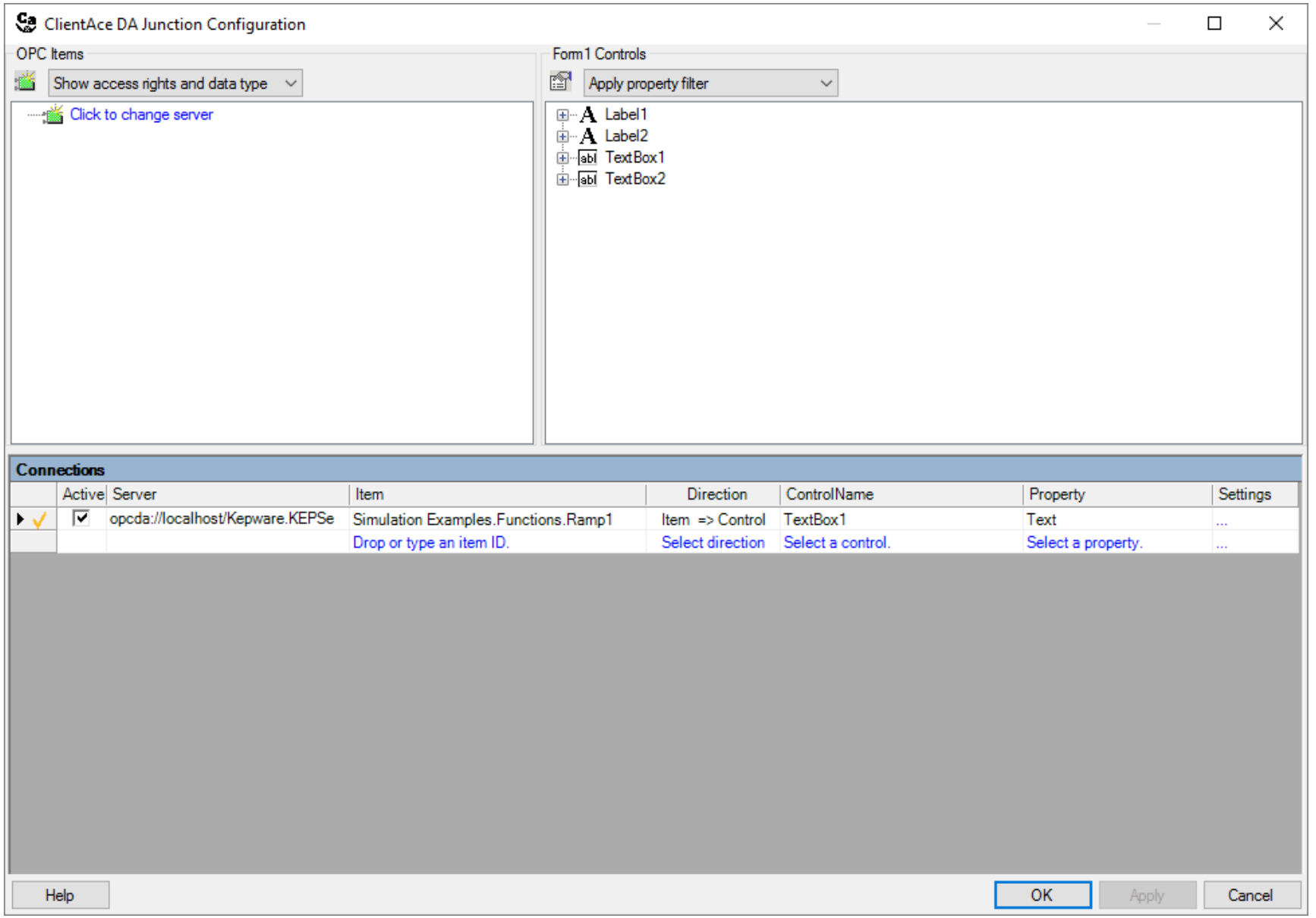
Drag and drop the "DA Junction" onto a form for fixed item connections

- GUI for adding OPC UA and OPC DA client functionality
- Automatic management of server connections and tag subscriptions
- Automatic reconnect, automatic recreation of item references

- Double click the DA junction below your windows form

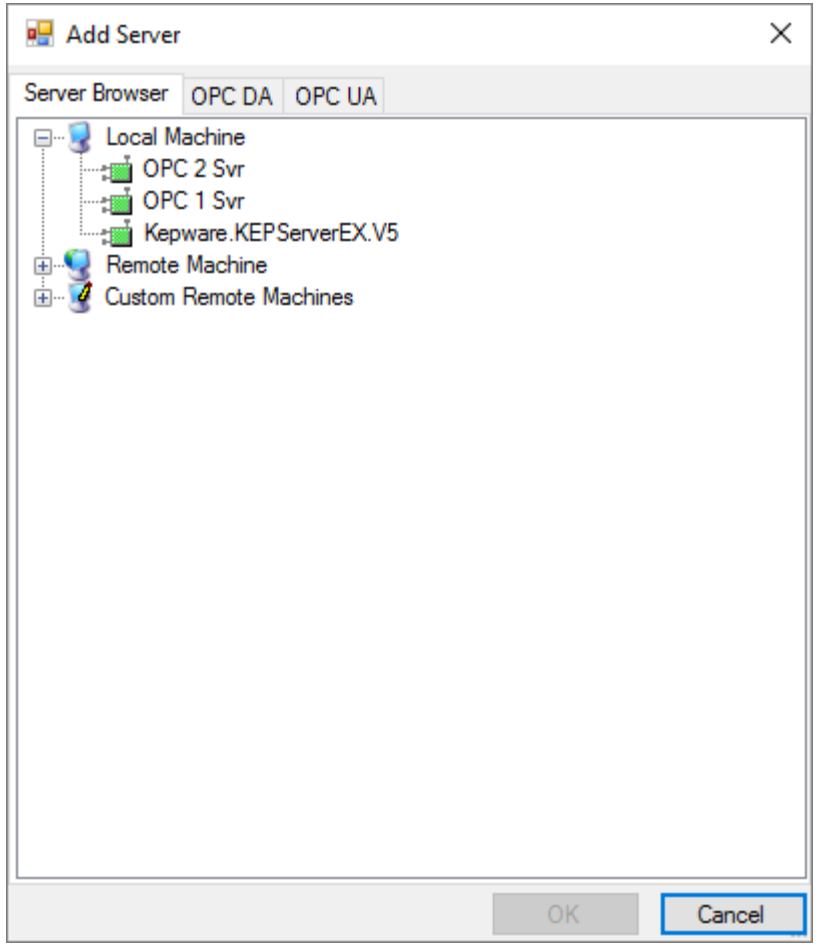


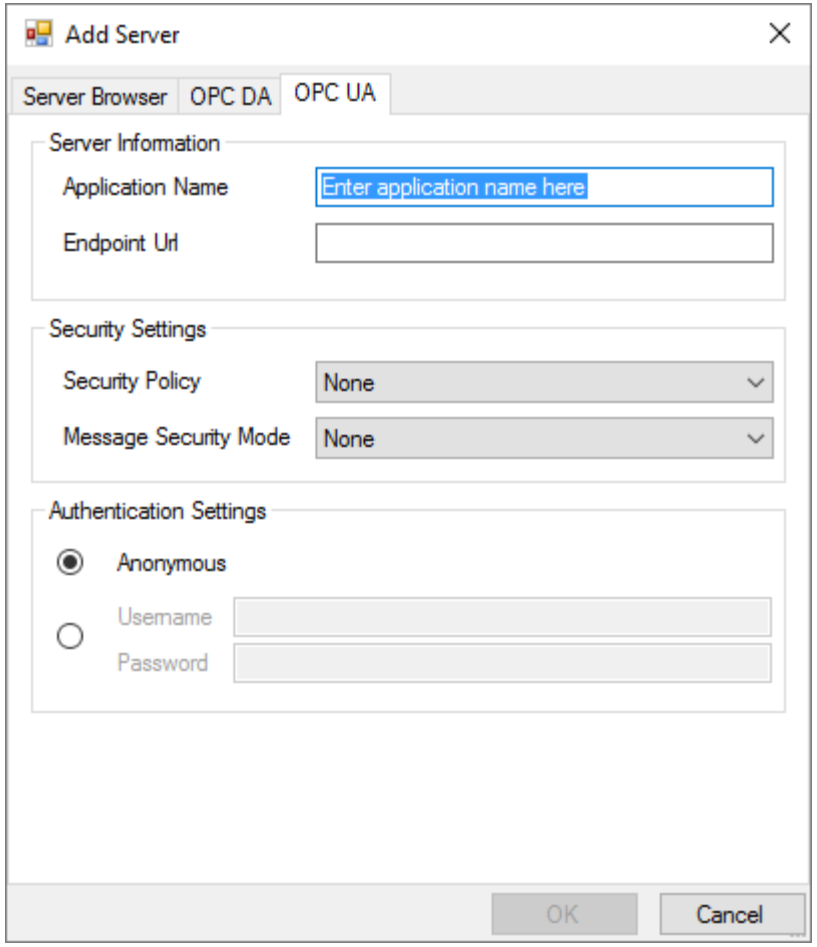


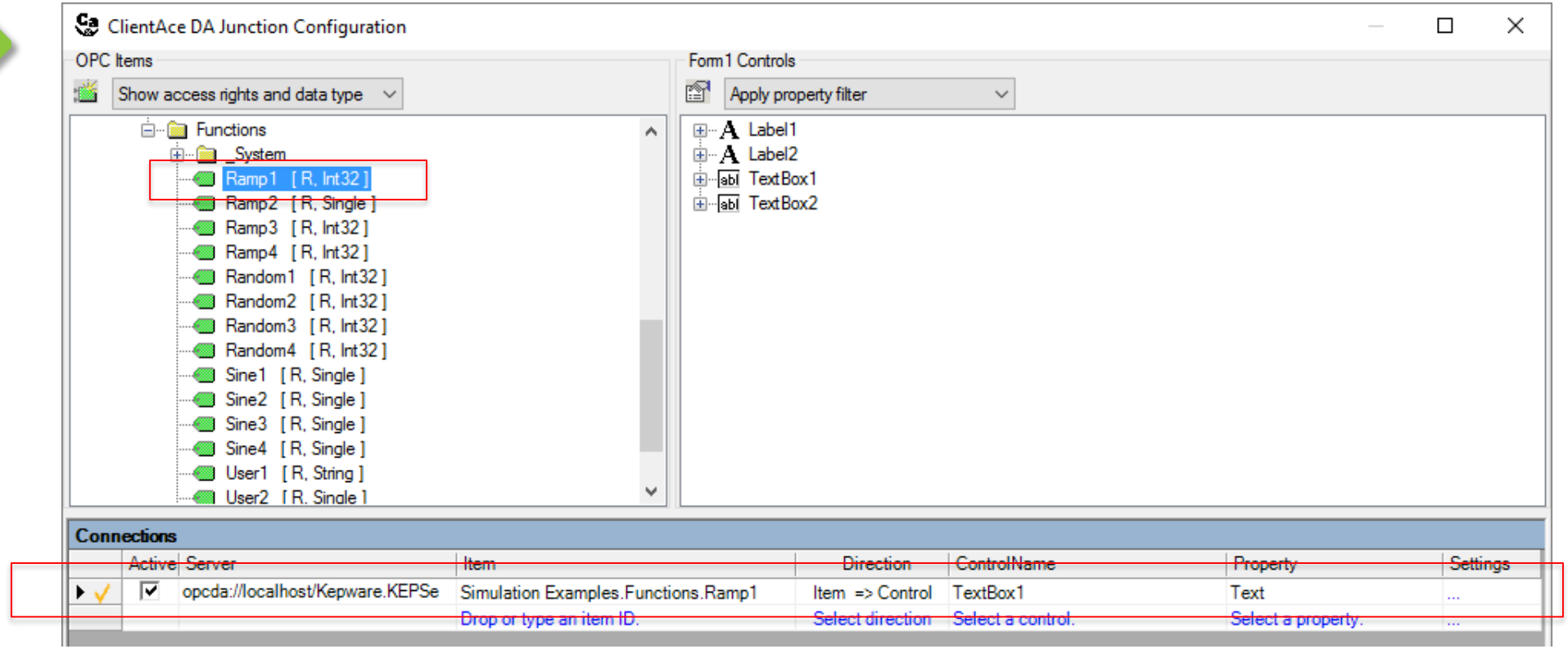

ClientAce DA Junction Configuration
OPC Items
Show access rights and data type
Click to change server
Form1 Controls
Apply property filter
Label1
Label2
TextBox1
TextBox2
Connections
Active
Server
Item
Direction
ControlName
Property
Settings
opcda://localhost/Kepware.KEPSe
Simulation Examples.Functions.Ramp1
Item => Control
TextBox1
Text
Drop or type an item ID.
Select direction
Select a control.
Select a property.
Help
OK
Apply
Cancel

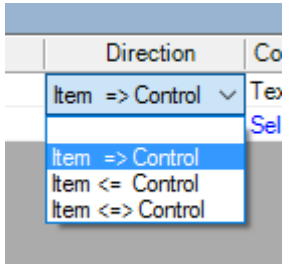
GUI Driven

- Click “Click to change the server
- Option for both OPC DA and OPC UA









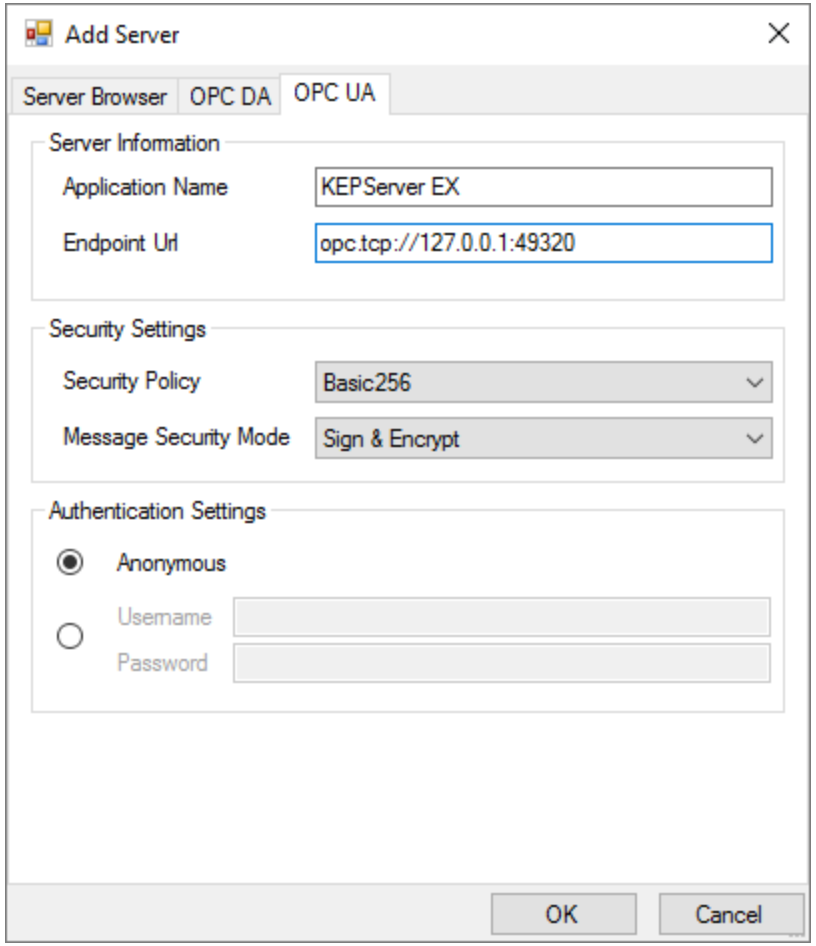
Item -> Control
- Read only

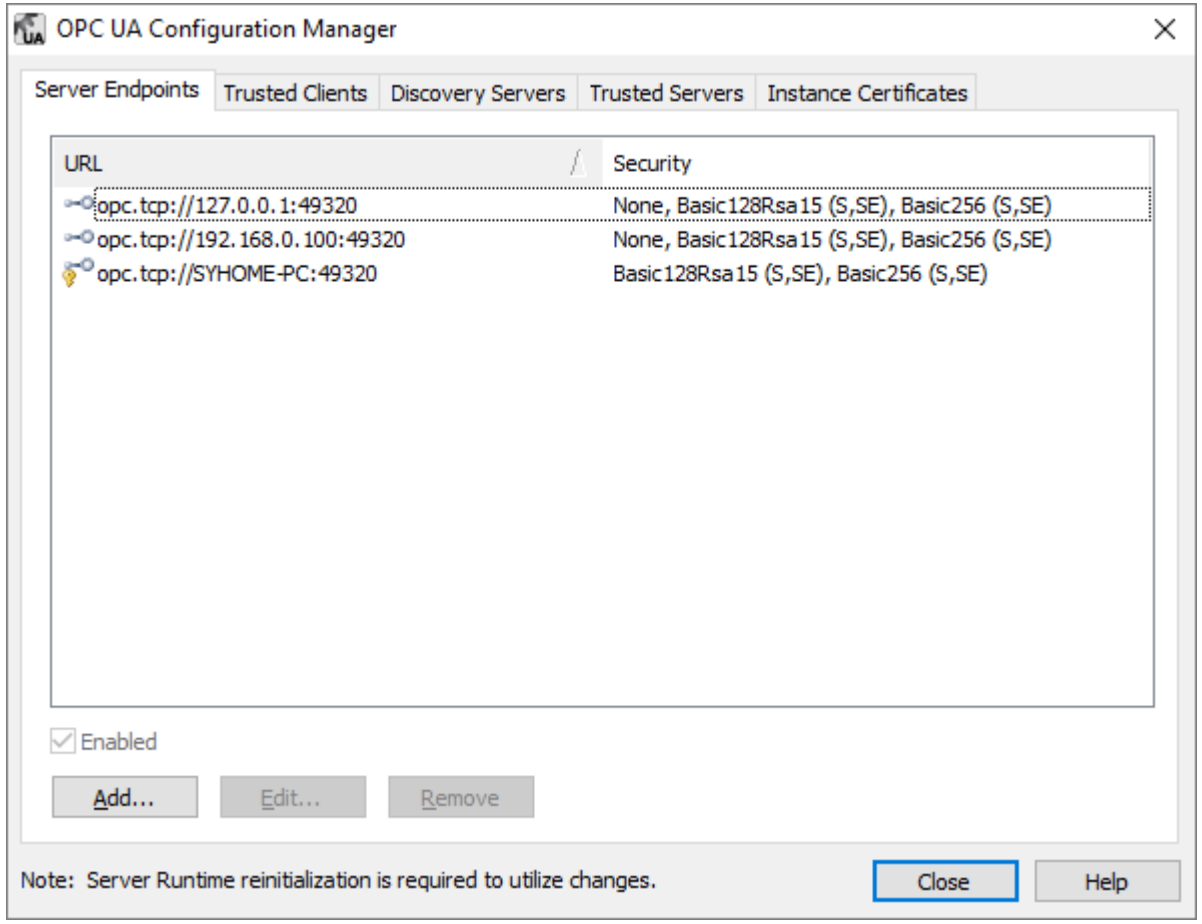
Item <- Control
- Write only

Item <-> Control
- Read/Write

- Map the item to the control by clicking them

DA Junction for OPC UA

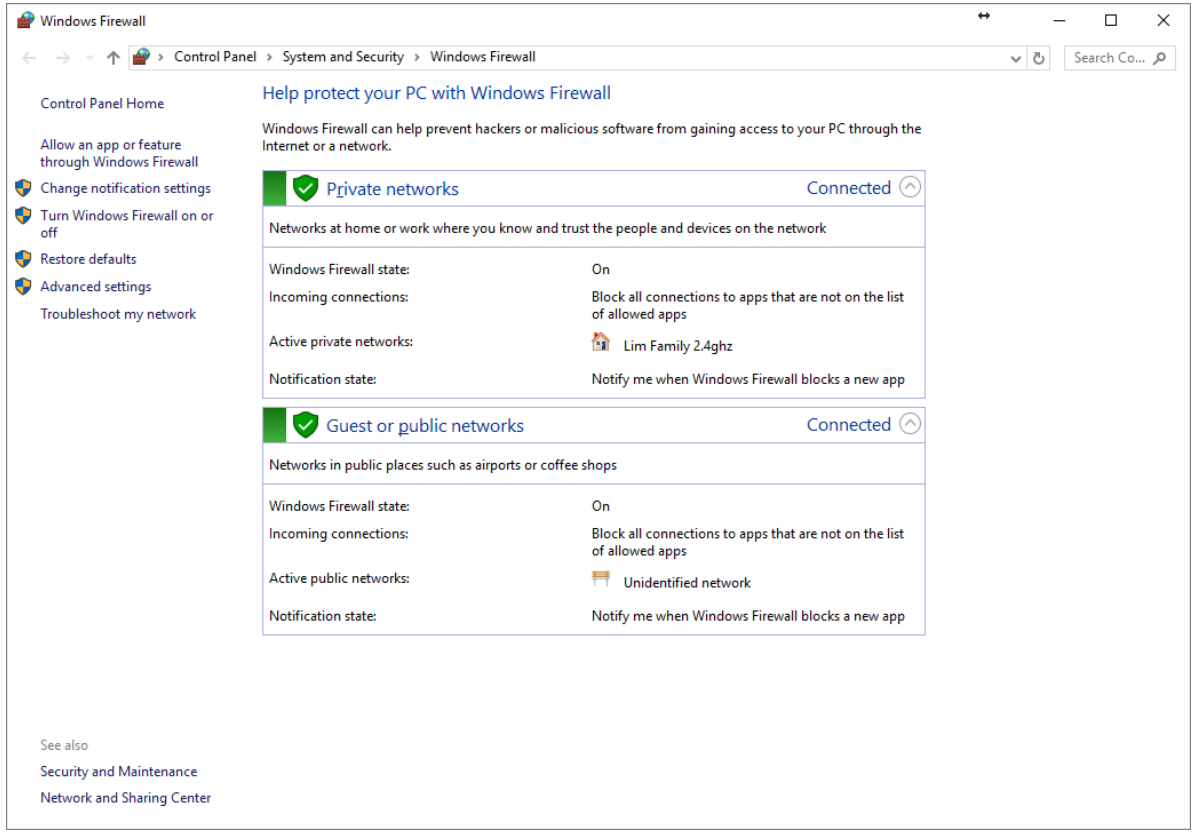




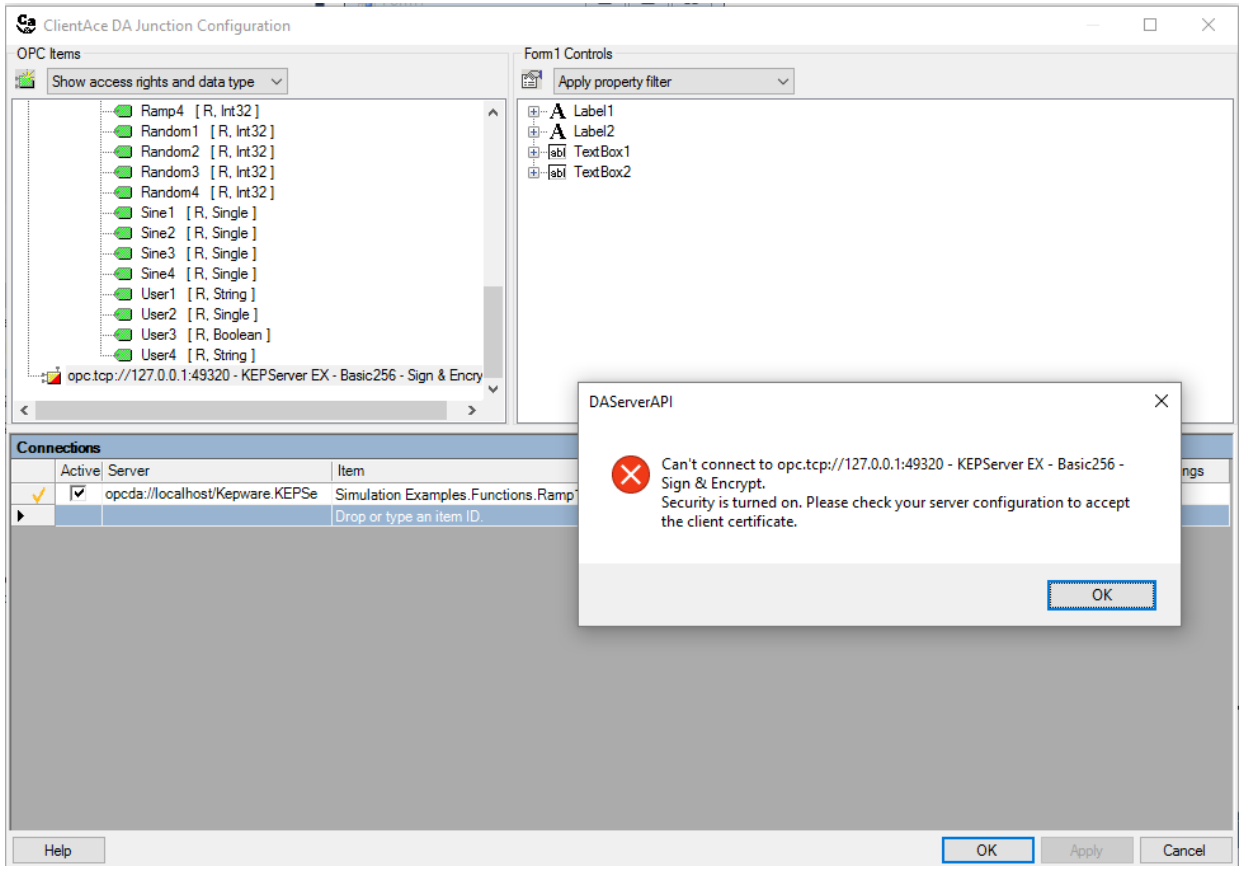
Development with ClientAce : DA Junction Part I I : OPC UA

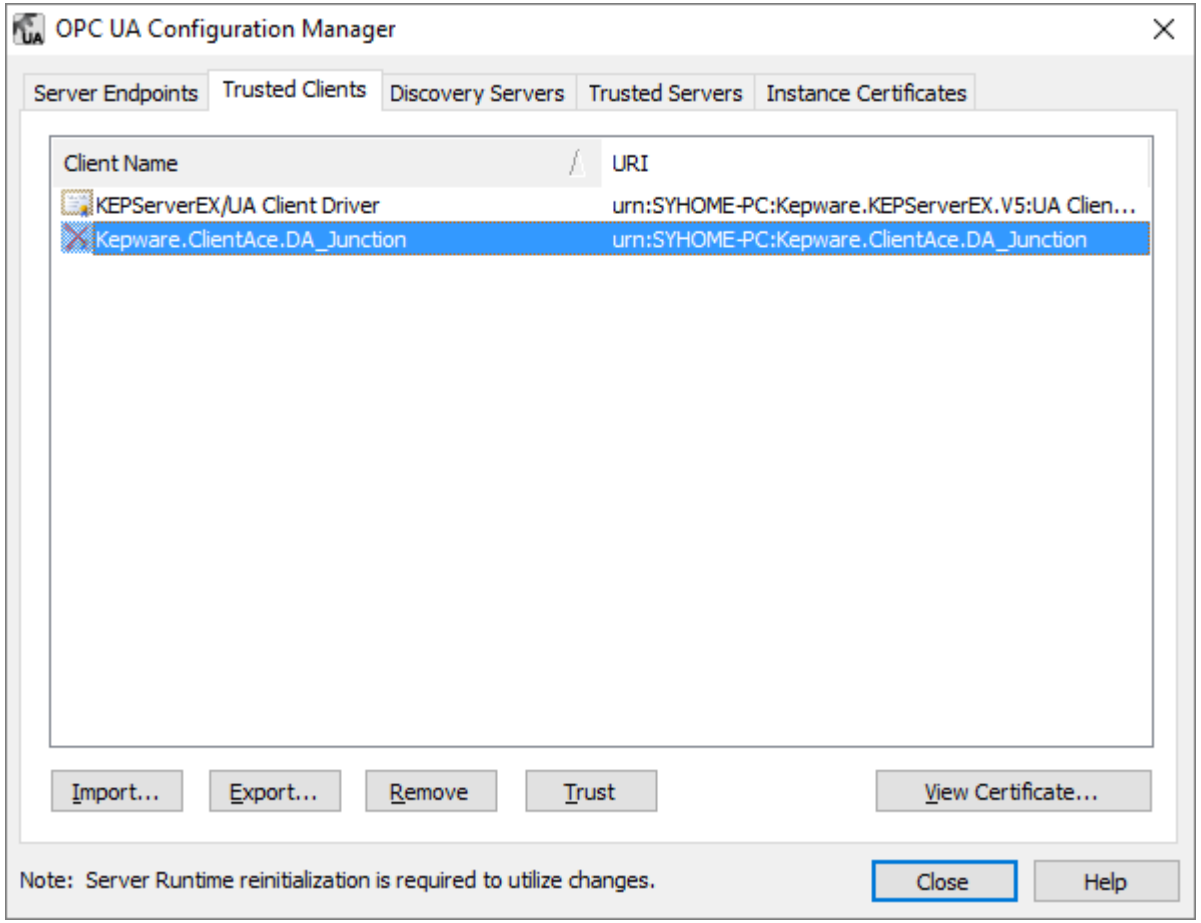
Please open your firewall for the end point required.

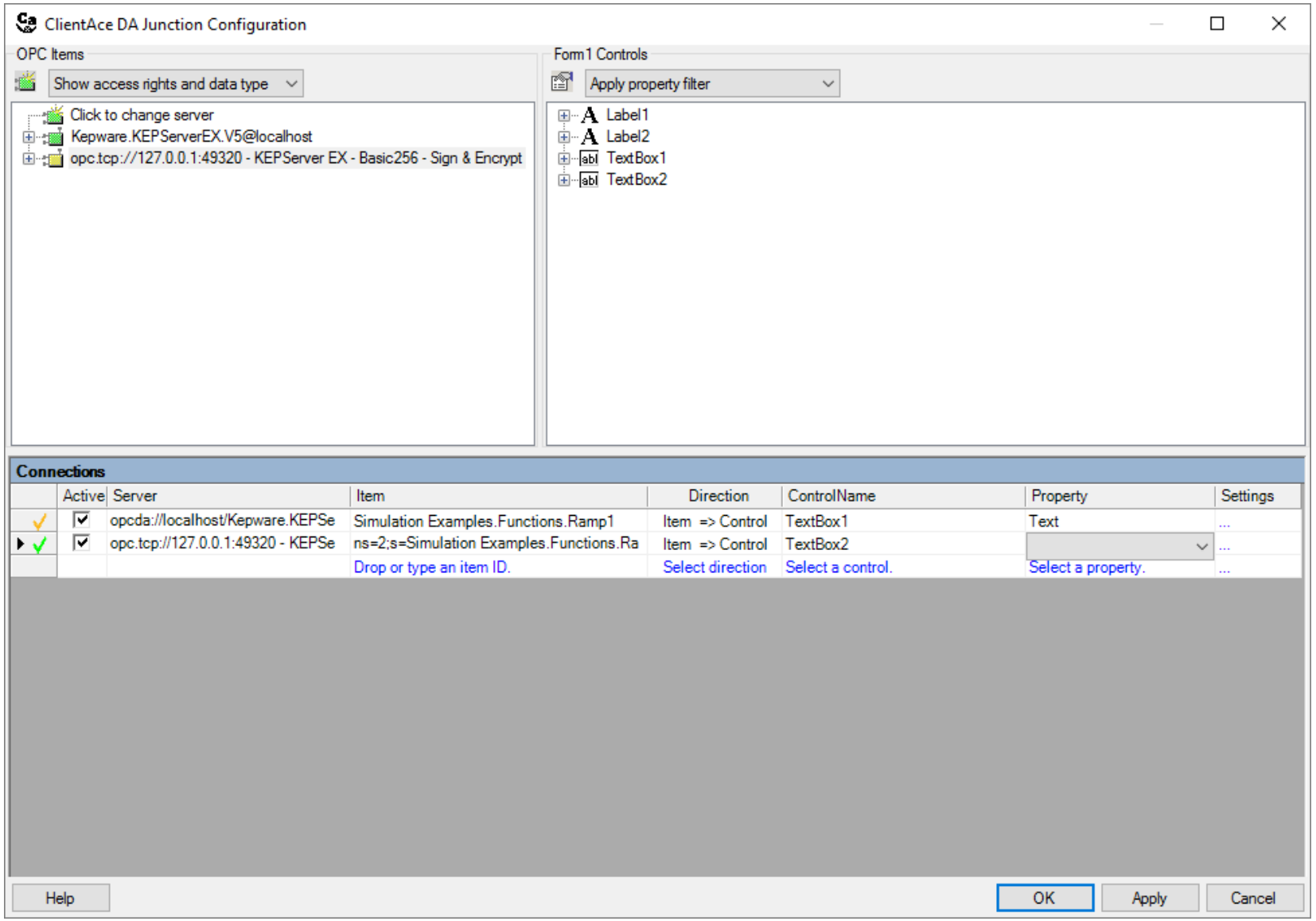
- Default: 49320

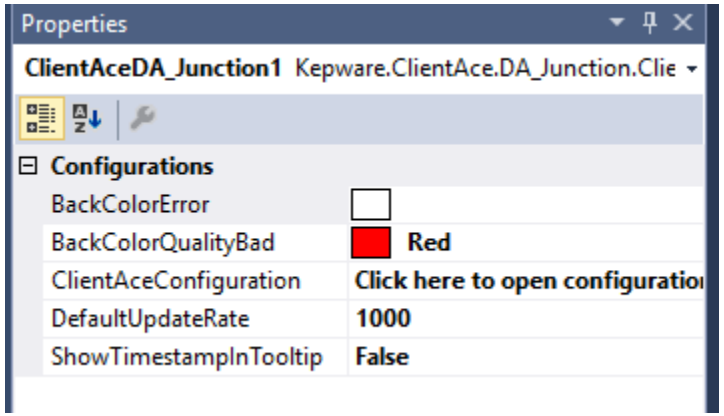


Certificate Exchange between OPC UA Client and Server

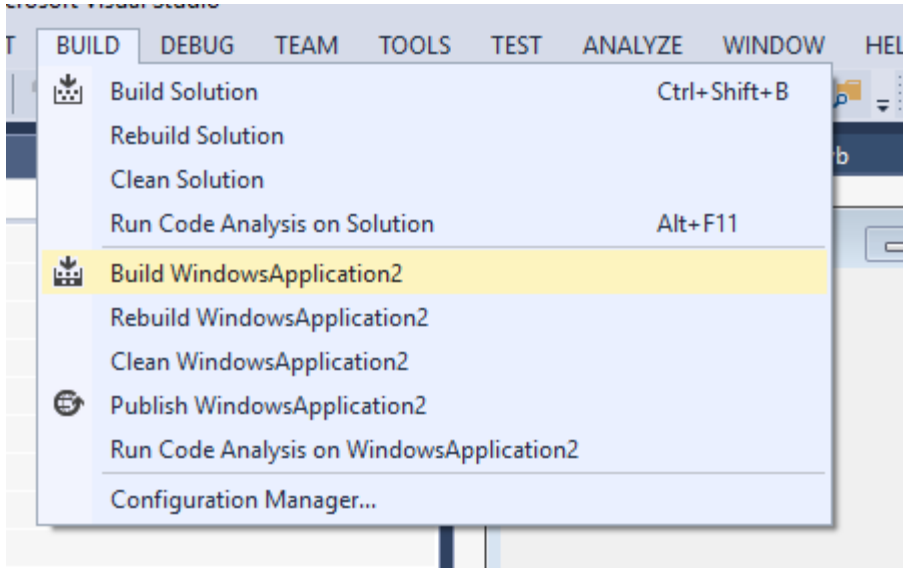


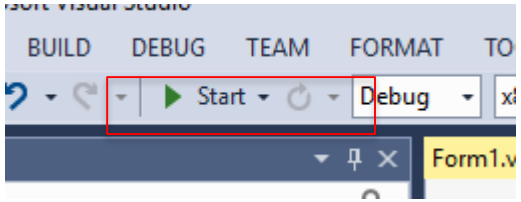


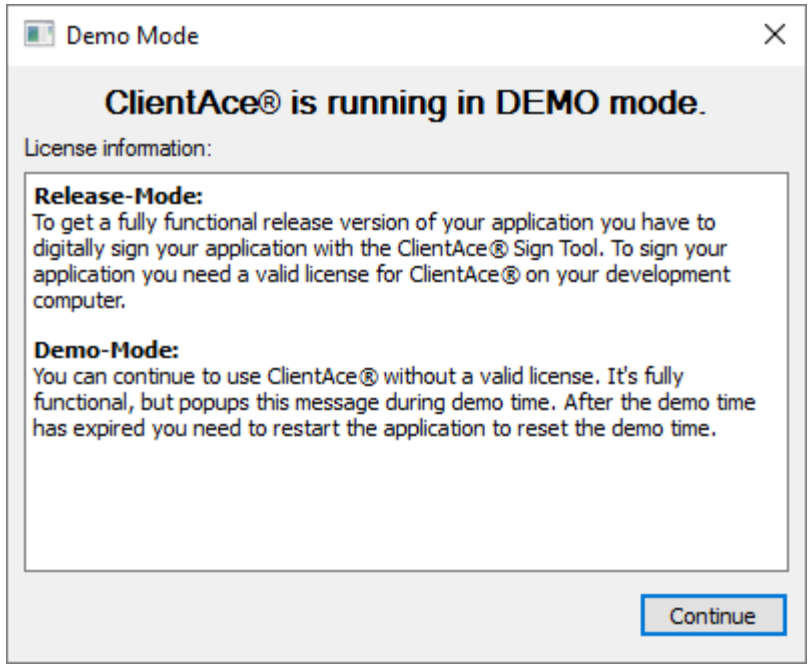

ClientAce DA Junction Configuration
OPC Items
Show access rights and data type
Click to change server
Kepware.KEPServerEX.V5@localhost
opc.tcp://127.0.0.1:49320 - KEPServer EX - Basic256 - Sign & Encrypt
Form1 Controls
Apply property filter
Label1
Label2
TextBox1
TextBox2
Connections
Active
Server
Item
Direction
ControlName
Property
Settings
opcda://localhost/Kepware.KEPSe
Simulation Examples.Functions.Ramp1
Item => Control
TextBox1
Text
opc.tcp://127.0.0.1:49320 - KEPSe
ns=2;s=Simulation Examples.Functions.Ra
Item => Control
TextBox2
Drop or type an item ID.
Select direction
Select a control.
Select a property.
Help
OK
Apply
Cancel


Properties
ClientAceDA_Junction1 Kepware.ClientAce.DA_Junction.Clie
Configurations
BackColorError
BackColorQualityBad
Red
ClientAceConfiguration
Click here to open configuratio
DefaultUpdateRate
1000
ShowTimestampInTooltip
False

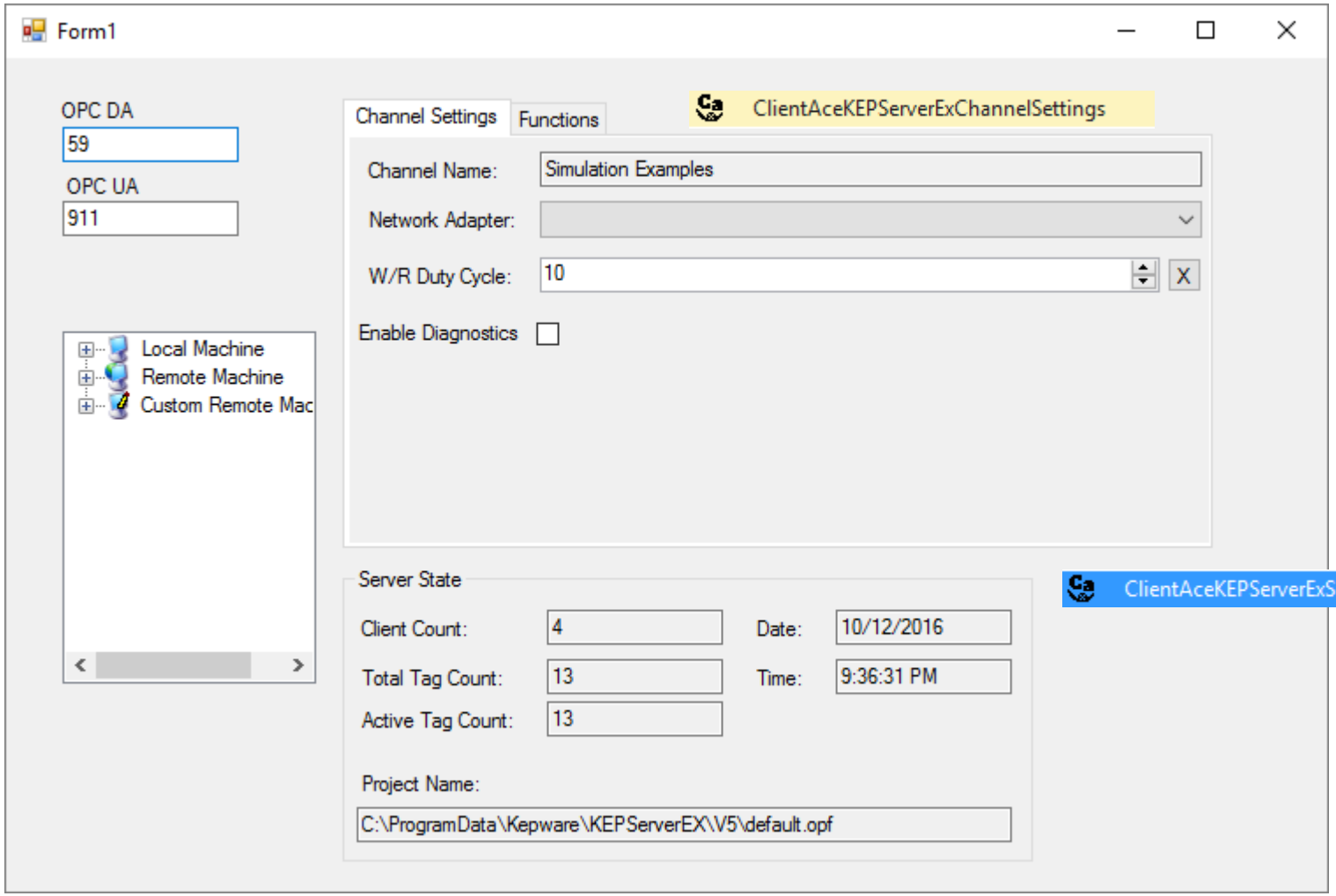
Compile and Run

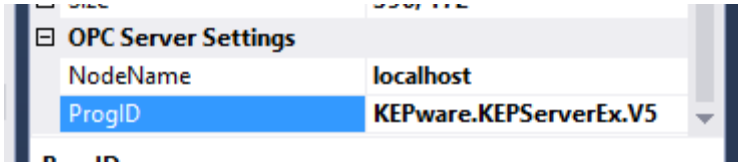






More Drag and Drop UI

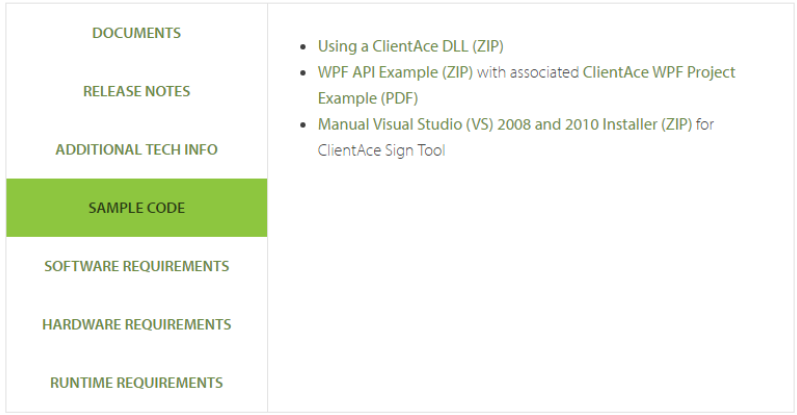




Development with ClientAce: .NET API

Use an optimized class library to create user-configurable item connections

- The only difference between coding different OPC protocols is the initial connection object
- All other commands are the same across protocols
- Includes tools for automated connection-handling to different OPC servers, including connection establishment, monitoring, and reconnection




```
[Visual Basic]
' Declare our Pki Certificate
Dim clientCertificate As Kepware.ClientAce.OpcCmn.PkiCertificate
' Create a new Pki Certificate with constructor
clientCertificate = New Kepware.ClientAce.OpcCmn.PkiCertificate( _
"OPCUA Sample Application:Kepware:OpcUaSampleApplication", _
        "127.0.0.1", _
        "", _
        31536000, _
        "CERT_TEST", _
        "Kepware Technologies", _
        "Development", _
        "Portland", _
        "Maine", _
        "United States", _
        1028)
' If a problem occurred we will receive a null certificate
if IsNothing(clientCertificate) Then
MsgBox("A problem occurred when attempting to create a certificate")
End If
```

```
[C#]
// Create a new Pki Certificate with constructor
PkiCertificate clientCert = new Kepware.ClientAce.OpcCmn.PkiCertificate(
"OPCUA Sample Application:Kepware:OpcUaSampleApplication",
        "127.0.0.1",
        "",
        31536000,
        "CERT_TEST",
        "Kepware Technologies",
        "Development",
        "Portland",
        "Maine",
        "United States",
        1028);
// If a problem occurred we will receive a null certificate
if (clientCert == null)
{
MessageBox.Show("A problem occurred when attempting to create a certificate");
}
```

Side Notes: DLLs

- A DLL is a library that contains code and data that can be used by more than one program at the same time. For example, in Windows operating systems, the Comdlg32 DLL performs common dialog box related functions. Therefore, each program can use the functionality that is contained in this DLL to implement an **Open** dialog box. This helps promote code reuse and efficient memory usage.

- By using a DLL, a program can be modularized into separate components. For example, an accounting program may be sold by module. Each module can be loaded into the main program at run time if that module is installed. Because the modules are separate, the load time of the program is faster, and a module is only loaded when that functionality is requested.

```
// import function that adds two numbers function AddNumbers(a, b : Double): Double; StdCall; external 'Example.dll';
```

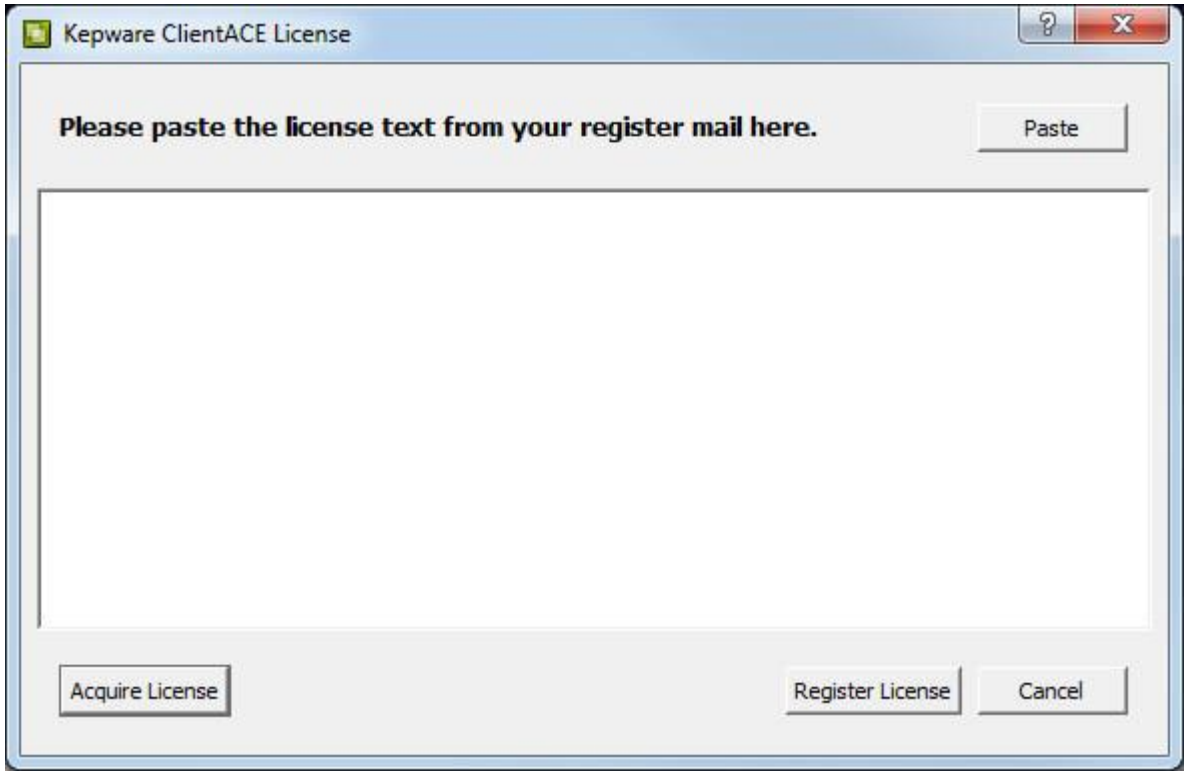
Licensing ClientAce

Deployment and Licensing

- The ClientAce toolkit is licensed after installation
- Applications developed with ClientAce can be "signed", or licensed, for unlimited runtime
- A license file is outputted to same directory as the EXE during the build (keep it here for deployment)
- Multiple ways to sign apps
  - Sign buttons in VS IDE
  - Standalone Sign app
  - Command line
  - Post-build event
- "Unsigned" applications run for a one hour demo period (whether ClientAce itself is licensed or not)

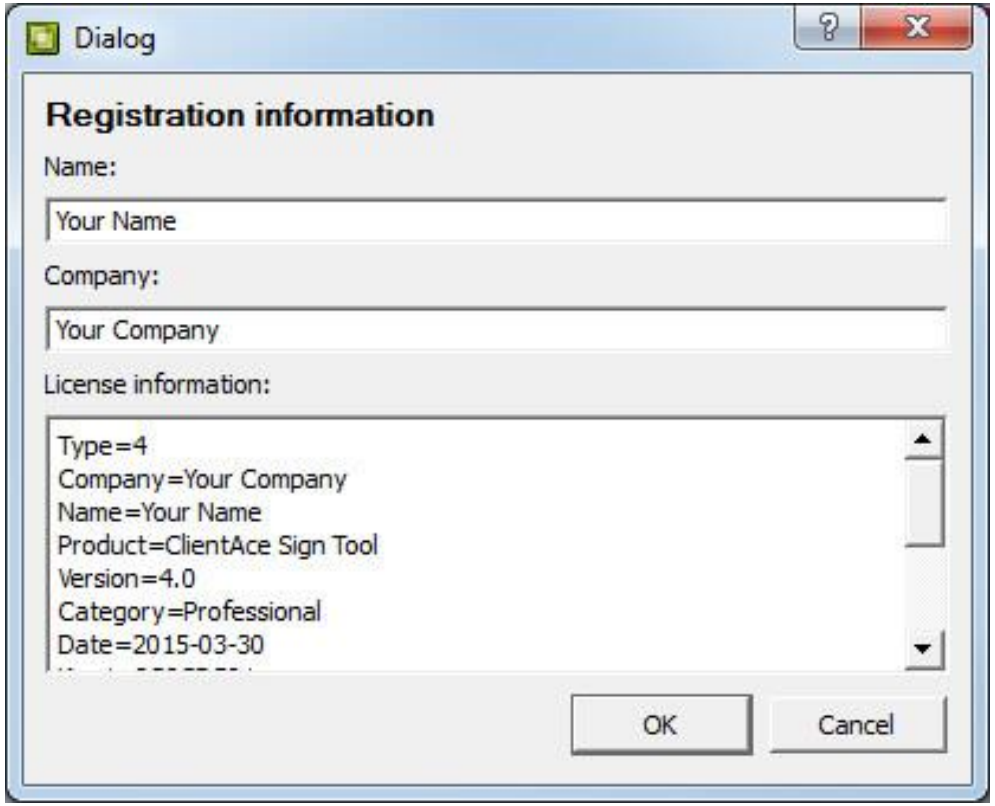
Activating Client Ace

- To start, click **Start** | **Programs** | **Kepware Products**. Then, click **ClientAce** and select **License ClientAce**.
- In **Kepware ClientACE License**, click **Acquire License**.



Activating Client Ace

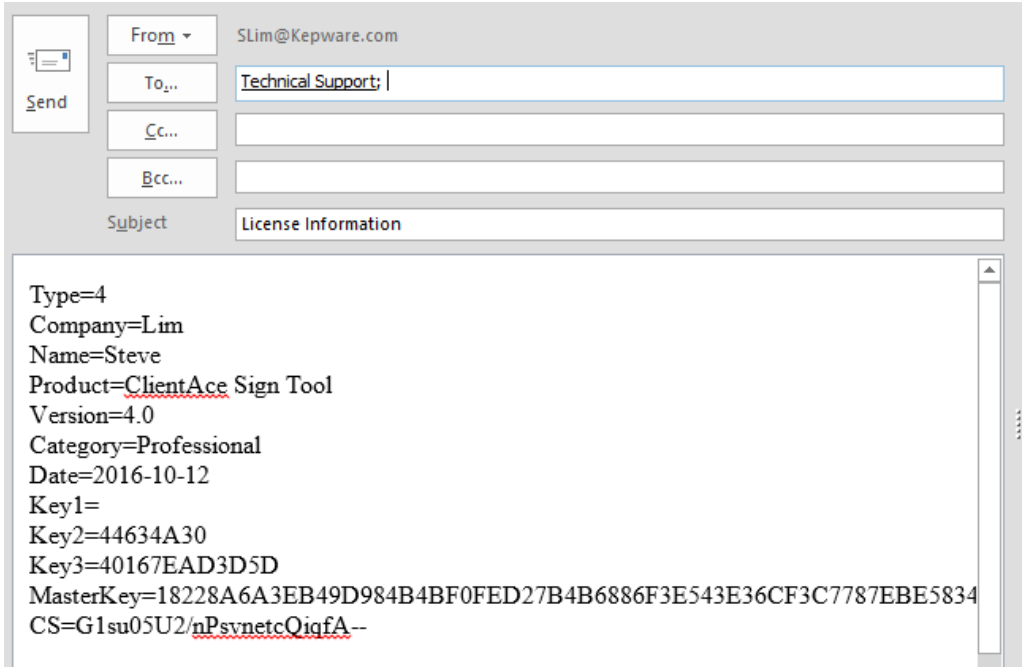
- In the **Registration Information** section, complete the **Name** and **Company** field s. The **License Information** field will be populated with the licensing information needed by Kepware.



Note: Please ensure that each line contains data. If information is missing from the “KEY1” line, re-run the License Utility by right-clicking on it and selecting **Run as Administrator**

Activating Client Ace

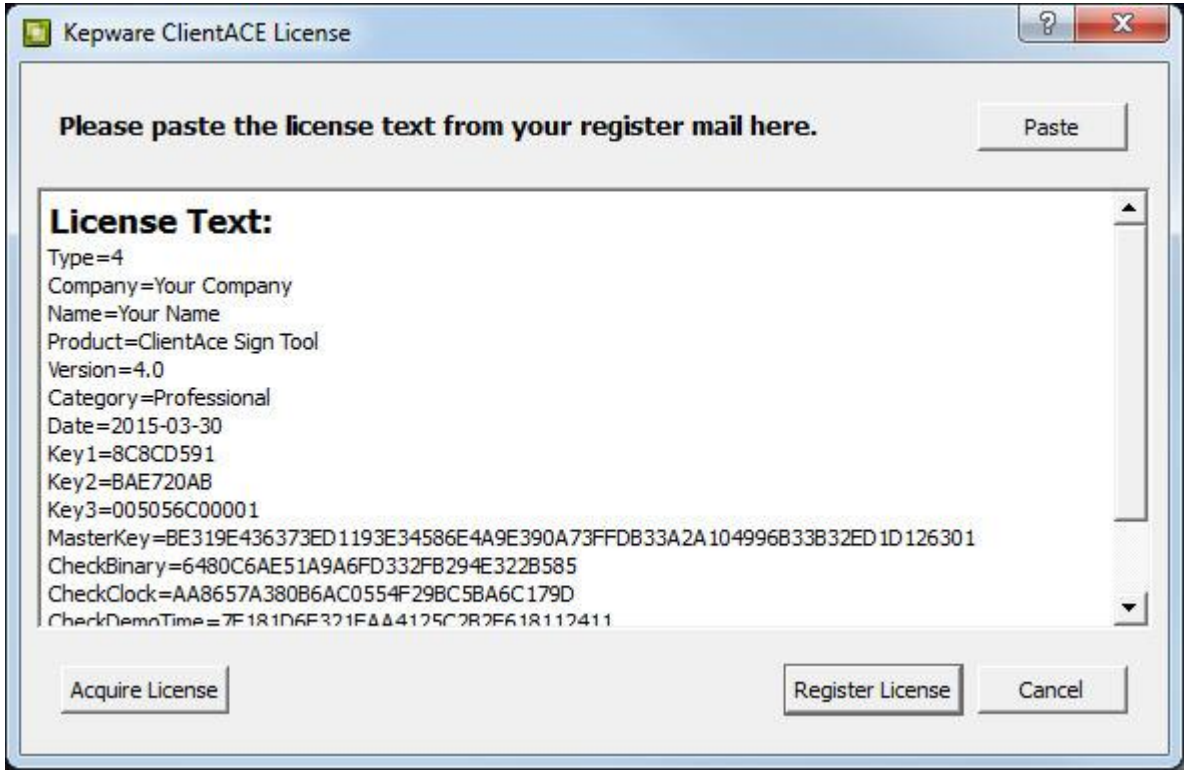
- Once finished, click **OK**. At that point, the email client application will display a new email message that has been pre-populated with information. To send the message to Kepware, click **Send**.



Important: In order to process the license, Kepware needs both the **License Information and the LSA number that was provided at the time of purchase**. License requests cannot be processed without a valid LSA number.

Activating Client Ace

- Kepware's reply email will include the product's license text. Copy the code and then paste it into **Kepware ClientACE License**.



USE CASES

END USER

BASTIAN SOLUTIONS

Organization

Bastian Solutions India Pvt. Ltd. is an independent system integrator dedicated to helping customers increase their productivity through proven automation, information systems and sound operating procedures. They provide turnkey solutions from design engineering and simulation all the way through installation and project management.

Industry

Robotics, ASRS, Material Handling and Conveyor systems

Solutions

SIEMENS Suite, UCON and Client Ace

Challenge

Bastian required a solution that is able to take in all the data from mobile robots, automated storage, ASRS, AGV, RFID and conveyor systems and communicate with the electronic warehouse management system (EWM) via Telegrams

- Telegrams are generated from the EWM via 20 separate TCP/IP Ports. Generated telegrams are to be received simultaneously from respective ports.
- Each telegram consists of 40nos. of characters as length and it has the information about bar code, sender & receiver
- The controller has to send values of required tags which should be concatenated as telegram and posted to EWM via TCP/IP ports respectively.

How Kepware Fits in:

- The Manufacturing suite provided the maximum value and centralization of data in the warehouse.
- The UCON is used to interface the Barcode Scanner through TCP/IP
- Client Ace allowed a custom utility(Telegram Extract Service) to be developed and tested quickly. This Telegram Extract Service will receive all telegrams generated by EWM and it will differentiate the telegrams to respective tags and write it to KEPServer EX
- For posting the telegrams from PLC to EWM, Telegram Extract Service will read the tag values from KEPServer EX and concatenate it into telegram with specified rules and logic and sends to EWM machine.

Results

- An highly complex system runs on Kepware's KEPServer EX powered by applications developed with Client Ace. The manufacturing suite also means that Bastian is open to scale up and pick and match their controllers in the future if needed.

PREFERRED PARTNER

Bulk Connections

Organization

Bulk Connections is the Coal and Mangenese storage and loading facility in Durban Harbour in South Africa. Products arrives via road and rail, stored in stacks, then loaded onto ships via conveyer belt and bottom dump bins brought to the loading cranes by special haulers.

Industry

Materials handling

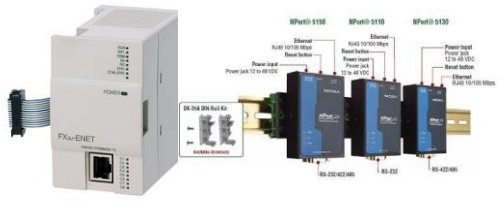
Solutions

KEPServerEX®

- Manufacturing Suite
- IoT – Thingworx plug-in

KEPWorx – IoT Service

Client - Ace



Operators are able to view the entire plant operations that impact on their particular task which improves the overall stacking and loading process. The stored data for real-time and historical reporting increases overall plant performance.
"Neil Upfold"

Challenge

Bulk Connections enlisted the help of eTX Data Services, (Kepware's Preferred Partner in South Africa) to design and implement a plant-wide Management Information System. They needed the ability to do the following:

- Install a fibre and radio network to connect entire plant
- Install operator visualization thin client terminals
- store the operations data in a database incl .reporting
- IoT system for visualization, analytics, KPIs, notifications
- Install plantwide wi-fi for PDA visualization
- Install cameras for operations improvement

Results

eTX's new solution provides flexibility, scalability, and accessibility . The ability to visualize current stacking and loading operations and produce accurate reporting has allowed Bulk Connections to do the following:

- Improve stacking and loading operations
- Reduce technical breakdowns
- Avoid product contamination
- Provide customers with improved reports
- Scaleable IoT solution will continue to be enhanced

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PREFERRED PARTNER

Treated Timber Products

Organization

Treated Timber Products (TTP) specializes in the production of Transmission, Telephone, Fencing and Building poles. Poles are pressure treated with either Creosote or Copper Chrome Arsenic (CCA) for local and export markets

Industry

Timber Pole Supplier

Solutions

KEPServerEX®

- Modbus
- DataLogger

Client - Ace

We now have real-time process visibility, of processes on both sites, at head office. We also now have automated, regulatory stored treatment data required by our customers
"Chantal Lee"

Challenge

TTP enlisted the help of eTX Data Services, (Kepware's Preferred Partner in South Africa) to design and implement a monitoring and data logging system on 2 remote sites

- Install Kepware to communicate with Drying Kilns and CCA and Creosote pressure treatment processes
- Configure the DataLogger to log data to MS SQL
- Customer produces their own reports from SQL
- Link satelite plant to headoffice plant via their WAN
- Create a mini SCADA using Client Ace to view both sites

Results

eTX's new solution provides flexibility, scalability, and accessibility . The ability to visualize treatment operations from a central location improves production and quality control and the automated data logging allows TTP to do the following:

- Improve Drying and Treatment operations
- Provide customers with actual logged process data
- Reduce reject levels
- Improve product quality
- Improve customer impressions of the business

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END USER

Hulamin

Organization

Hulamin is a world class leader in rolled and extruded aluminium. They also produce aluminium foil containers and recycle aluminium products

Industry

Metal - Aluminium

Solutions

KEPServerEX®

- Modbus
- InTouch Client

Client - Ace

Hulamin rolled out their Historian and production planning system over a number of years using Kepware to pass the data from process to the Historian. With Kepware's range of drivers, we were able to effectively link all relevant plant sections to their management systems "Neil Upfold"

Challenge

Hulamin has an installed base of Wonderware SCADA, Siemens Historian and an in-house developed production planning and management system. They did most of the Kepware work themselves

- Install Kepware InTouch Client drivers on each SCADA to link them to the Siemens SCADA
- Install Modbus and Allen Bradley drivers for Historian connection to other process controllers
- They purchased Client Ace to create their own ad-hoc SCADA displays in various sections of the plant

Results

Kepware's OPC server provides reliable process connectivity to their management systems which allows Hulamin to do the following:

- Improve product quality
- Improve production planning
- Reduce reject levels
- Improve real-time inter-related process visibility
- Improve customer impressions of the business

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Aerospace Industrial Development Corporation

END USER

Organization

Staunch Government support over the past several decades has enabled AIDC to establish a talented human resource base dedicated to the aviation industry and has well-equipped AIDC with the expertise and capability in aircraft system integration, aircraft development, parts manufacturing, aircraft assembly, testing and verification.

Industry

Manufacturing – Aerospace industry

Solutions

Manufacturing Suite, DataLogger Option and ClientAce

"Kepware has done a stellar job building a simple, reliable, and vendor-agnostic product with an unparalleled number of drivers designed to support basically any PLC and CNC we encounter in our plant." -Shyr-Kuen Chen, Ph.D.

Challenge

To build smart manufacturing systems, AIDC identified the following needs and roadblocks in their development:

- A solution that must be used to standardize across the corporate for data collection, consolidation, and presentation (Data Normalization)
- The solution must be proven and able to interoperate across different CNC machines from a variety of vendors
- The solution should allow the storing of the process values in a database system

How Kepware Fits in:

- KEPServer EX's native connectivity with Siemens meant little integration work for the current existing system
- Multi-channel and various Modbus data encoding feature of Kepware allowed data to flow into the system without hindrance

Results

- Increased ability to communicate with a wider range of PLCs and CNCs
- Streamlined communications by unifying multiple protocols under one single interface
- Reduced costs through faster deployment of projects
- Easily develop customized applications for smart manufacturing by themselves with Clientace

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Contact Information

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