Configuring a Simple PI System

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Contents

Lesson 1 - Installing and Configuring PI Data Archive

Objectives

- Review the pre-installation check list
- Describe the steps to obtain a License File
- Know the installation steps of PI Server
- Become familiar with the directory structure of PI Data Archive (PI folder)
- Start and stop the PI Data Archive server

Pre-installation Checks

It is critical that you perform the pre-installation checks. If you neglect this step in some cases you will get an error, and in others, the installation will stop.

- **Log on as Administrator** (or with administrative privileges). The installer must be either the administrator or member of the local Administrators group. In addition, the account must have write permission to MS SQL Server. Validate that the user has the correct permissions.

- ***Always check the PI Data Archive Server operating system clock when installing any PI System.*** Ensure the clock on each machine has the correct time and it is in the correct time zone. In your work environment, all clocks should be synchronised from a network time source. Changing the clock after installation will cause problems.
- **Update Windows**. A properly updated Windows Operating System will have the required prerequisites. If you require any prerequisite components, you will need to install them before the installation proceeds.
- **Install Microsoft SQL Server.** The version you use is your choice. You now should know the pros and cons of each of the available offerings.
- **Obtain your PI Server License File.** Download the file from the OSIsoft Customer Portal https://my.osisoft.com; an explanation is forthcoming.

Supported Operating Systems

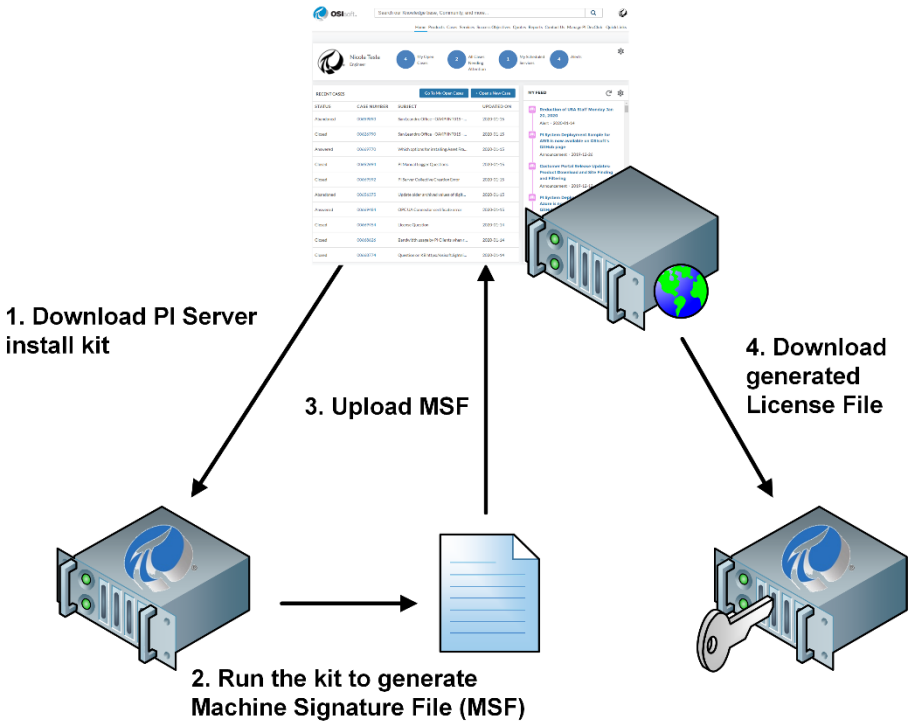
Starting with PI Data Archive 2016, only 64-bit version is available and requires a 64-bit Operating System. For production systems, PI Data Archive version 2018 SP3 or higher can be deployed on the following Microsoft Windows Server operating systems, in decreasing order of recommendation:

- Windows Server 2019 – all editions; in both Full and Core installations

- Windows Server 2016 – all editions; in both Full and Core installations
- Windows Server 2012 R2 – all editions; in both Full and Core installations
- Windows Server 2012 – all editions; in both Full and Core installations

License File Activation (For reference only – already completed on PISRV1)

A **License File** must be generated before the PI Data Archive server is installed. The OSIsoft Customer Portal allows you to generate your site-specific PI Server license file. This license file controls which applications can run on the PI Data Archive Server and displays running parameters, such as the point count limit.



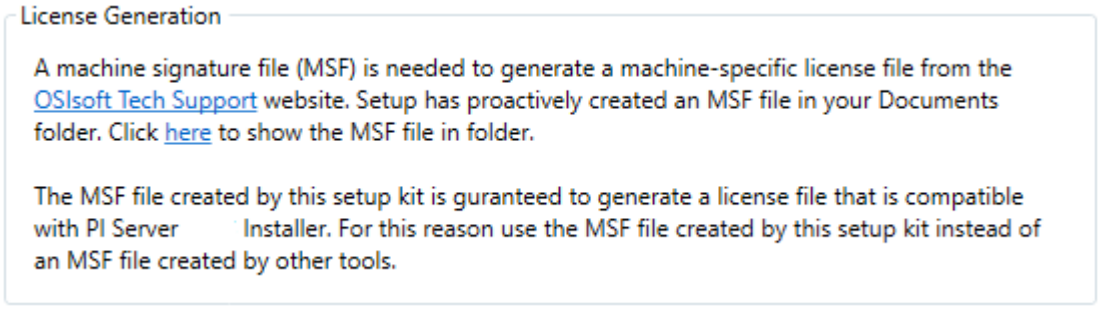
When the license file is generated, view the PI Server Manifest to verify the server details.

In order to generate license file, a **Machine Signature File (MSF)** is required. The PI Server install kit is capable to generate the MSF by itself, you must copy the install kit to a local disk on the PI Data Archive Server computer and then run the kit.

The kit will generate the MSF file to Documents folder of user running it.

i.e. *C:\Users\<username>\Documents*

If the PI Data Archive Server is on a virtual machine (VM), run the utility on the VM. If you generate the MSF on the wrong computer (on your laptop, for example) then the license activation file will match the laptop computer. If you install PI Data Archive Server on a different computer or VM, the server will not run as expected. The license file must be present during the installation. It can be on a flash drive, CD, or any media that can be read by PI Data Archive Server during installation. The setup program copies the license file to the %PISERVER%\dat directory during installation; the original file will no longer be used.



Consult the *License PI Data Archive* section of the *PI Server Installation and Upgrade Guide* for full details.

Install the PI Server (For reference only – already completed on PISRV1)

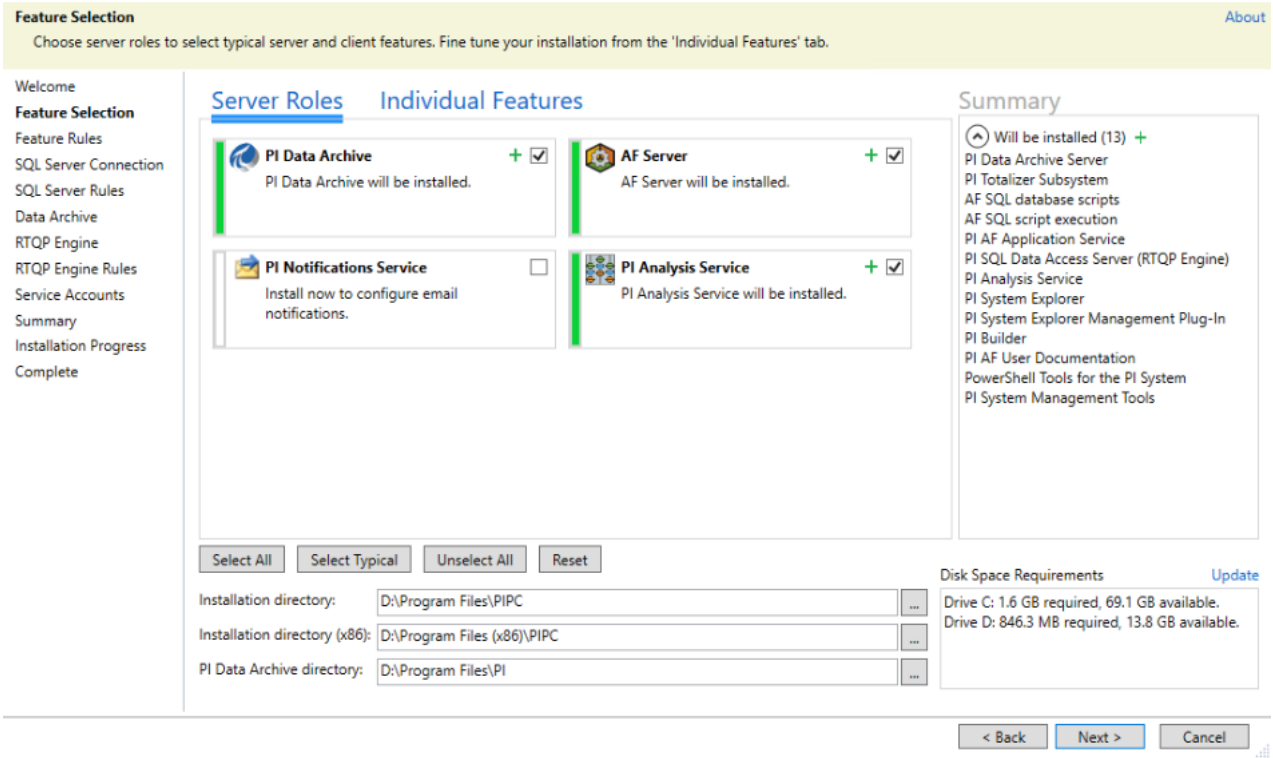
Description

You are ready to begin the PI System installation.

You should have validated the prerequisites and Microsoft SQL Server, have the install kit and license file, and performed all the computer checks (clock, etc.) You did, didn't you?

Approach

1. In the installation folder, you will find the PI Server installation kit.
2. Right-click and **"Run as Administrator"**. After the Welcome screen, where you can deselect the participation in PI System Customer Experience Improvement Program there is a feature selection screen where we check the components we would like to install. Select all except PI Notifications Service.



3. Select the installation directories for 64-bit and 32-bit PIPC folders and PI Data Archive Directory. In our case it is:
   - **D:\Program Files\PIPC**
   - **D:\Program Files (x86)\PIPC**
   - **D:\Program Files\PI**

Important Note: Since unified installation kit PI Server 2018, the fresh installation of PI Data Archive by default no longer installs these subsystems:

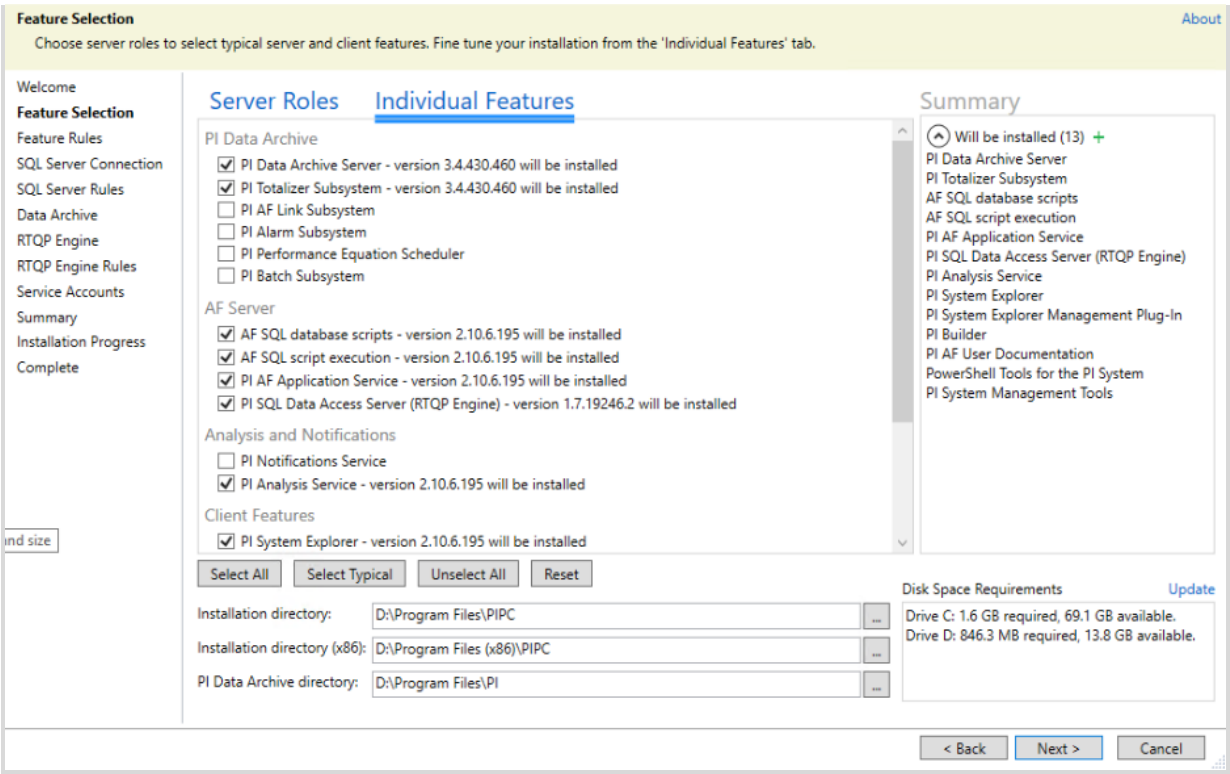
- PI AF Link Subsystem

- PI Alarm Subsystem

- PI Performance Equation Scheduler

- PI Batch Subsystem

If you wish to install those components, you switch to Individual Features section and tick the box. For upgrade from previous versions of PI Data Archive those components remain.



Since PI Server 2018 SP3, these PI Interfaces are no longer part of the installation kit:

- PI Interface for Performance Monitor

- PI Interface for Ping

- PI Interface for SNMP

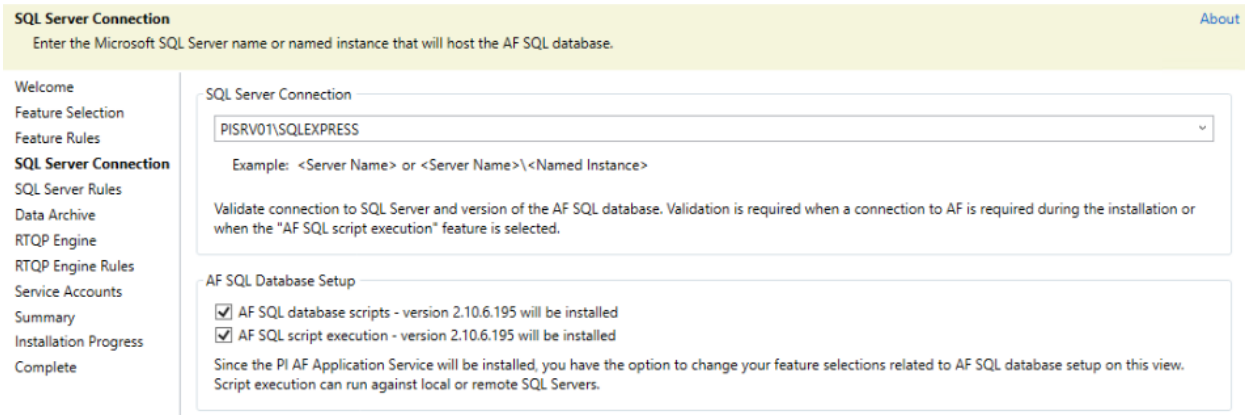
- PI Interface for TCP Response

- PI Interface for Random Data Simulator Data

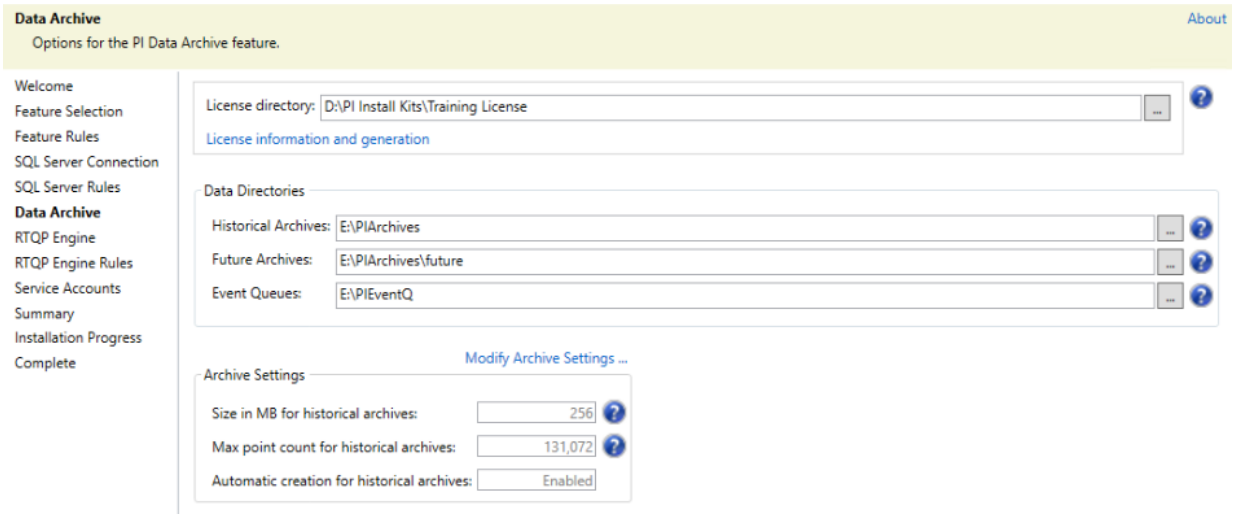
- PI Interface for RampSoak Simulator Data

Removing the PI Interfaces for Random and RampSoak Simulator Data from PI Server installation kit, eliminates default PI Points (*SINUSOID, SINUSOIDU, CDT158, CDM158, CDEP158, BA:LEVEL.1, BA:TEMP.1, BA:CONC.1, BA:ACTIVE.1* and *BA:PHASE.1*) from being installed, therefore **NO PI POINTS ARE PRESENT** on PI Data Archive after the installation.

4. Select the SQL server provided. In our case **PISRV01\SQLEXPRESS.** Keep the checks that AF SQL Database scripts will be installed and executed. Ensure the MS SQL Server service is started before installation.



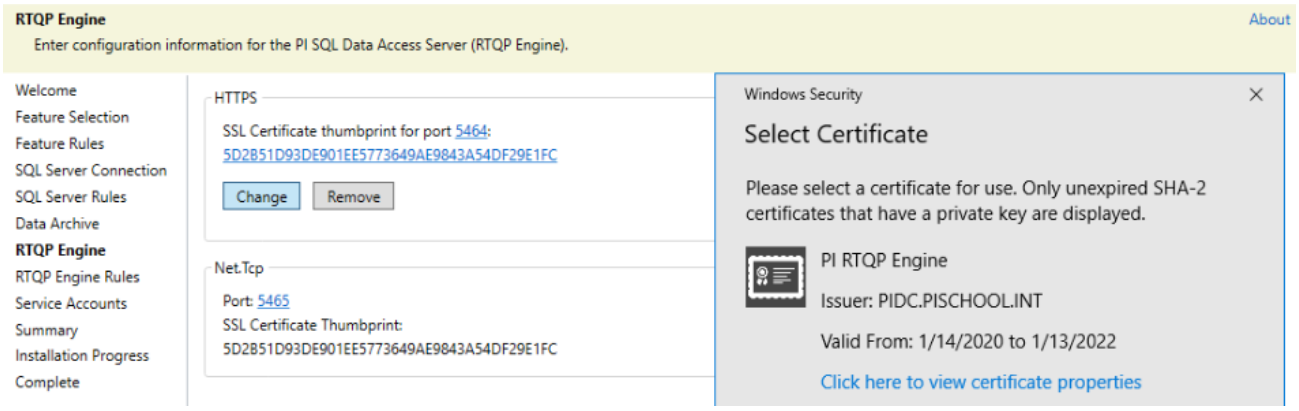
5. For PI Data Archive section select the License Directory and Data Directories



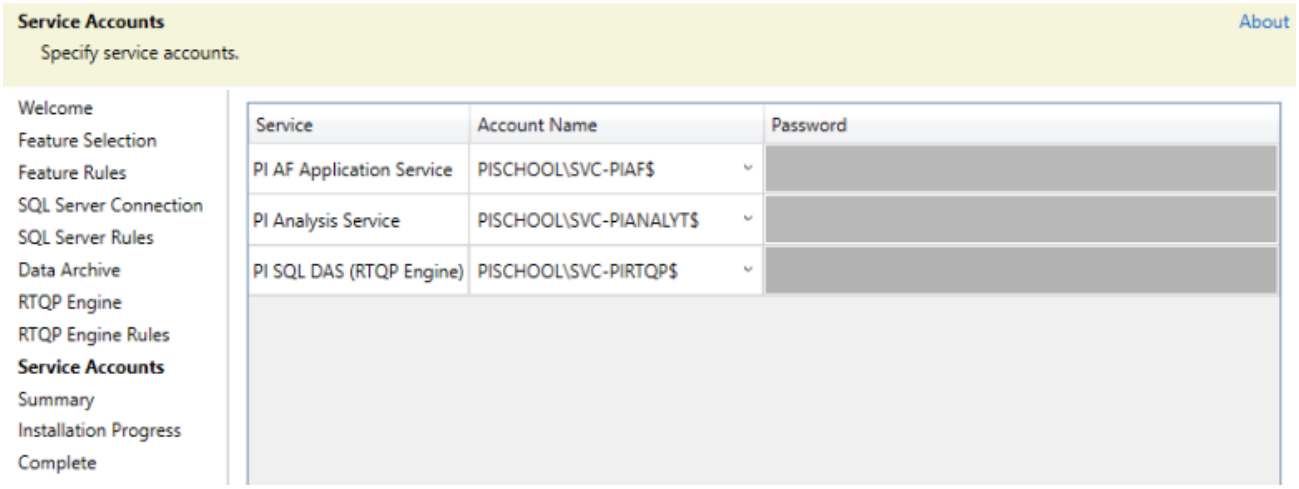
- License Directory to **D:\PI Install Kits\Training License**
- Historical Archives to **E:\PIArchives**
- Future Archive to **E:\PIArchives\future**
- Event Queues to **E:\PIEventQ**

In Archive settings you can modify the size for historical archives to lesser size than precalculated size (viz. chapter Archive Sizing)

6. At the RTQP Engine page, keep the default port 5465. For SSL certificate select the only available certificate **PI RTQP Engine**

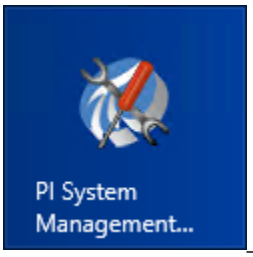


7. Select the gMSA accounts:
   - PI AF Application Service: **PISCHOOL\SVC-PIAF$**
   - PI Analysis Service: **PISCHOOL\SVC-PIANALYT$**
   - PI SQL DAS (RTQP Engine): **PISCHOOL\SVC-PIRTQP$**



8. Click Next to the Summary page and start the installation.
9. If MS Excel page pops up, click on Install button to install PI Builder plug-in.
10. After the installation is complete manually stop the PI Data Archive by executing the script **%PISERVER%\adm\pisrvstop.bat**.

The installation created PI System folder in Windows Start Menu with a list of selected applications. Find out what they are used for…



Lesson 3 - Installing and Configuring a PI Interface

Video: OSIsoft: Configuring a Simple PI System Online Course - Installing and Configuring a PI Interface

Common PI Interfaces

As we saw in the previous exercise, some of our PI Interfaces are designed for a specific data source, while others are built using standard communication protocols. Below is a list of our most popular PI Interfaces.

1. **PI Interface for OPC DA**

   Collects real-time data from OPC Servers using the OPC DA standard, arguably the most common communication protocol in the industrial automation industry.

2. **PI Interface for Universal File and Stream Loading (UFL)**

   Collects real-time, historic or future data from ASCII files (e.g. txt, csv xml files, etc.), serial ports and POP3 email servers. The PI Interface can be configured to collect data no matter the format of the data in the source file, making it one of our most versatile interfaces.

3. **PI Interface for RDBMS**

   Collects real-time, historic or future data from any Relational Database Management System that supports ODBC drivers (e.g. Microsoft SQL Server, Oracle Database, IBM Informix, etc.)

4. **PI Interface for Modbus Ethernet PLC**

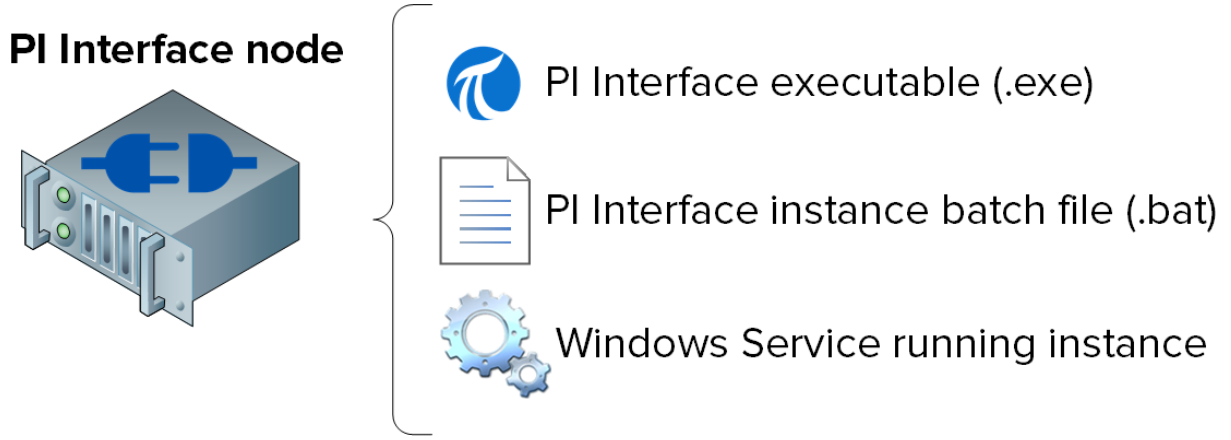
   Collects real-time data from PLCs that use the Modbus communication protocol

5. **PI to PI Interface**

   This PI Interface is used to send real-time, historic or future data from one Data Archive to another. A typical application of this PI Interface is to collect data from plant-level Data Archives to a centralized corporate Data Archive.

Define the components of a PI Interface

Once a PI Interface has been installed and configured on a computer, it consists of the following components:



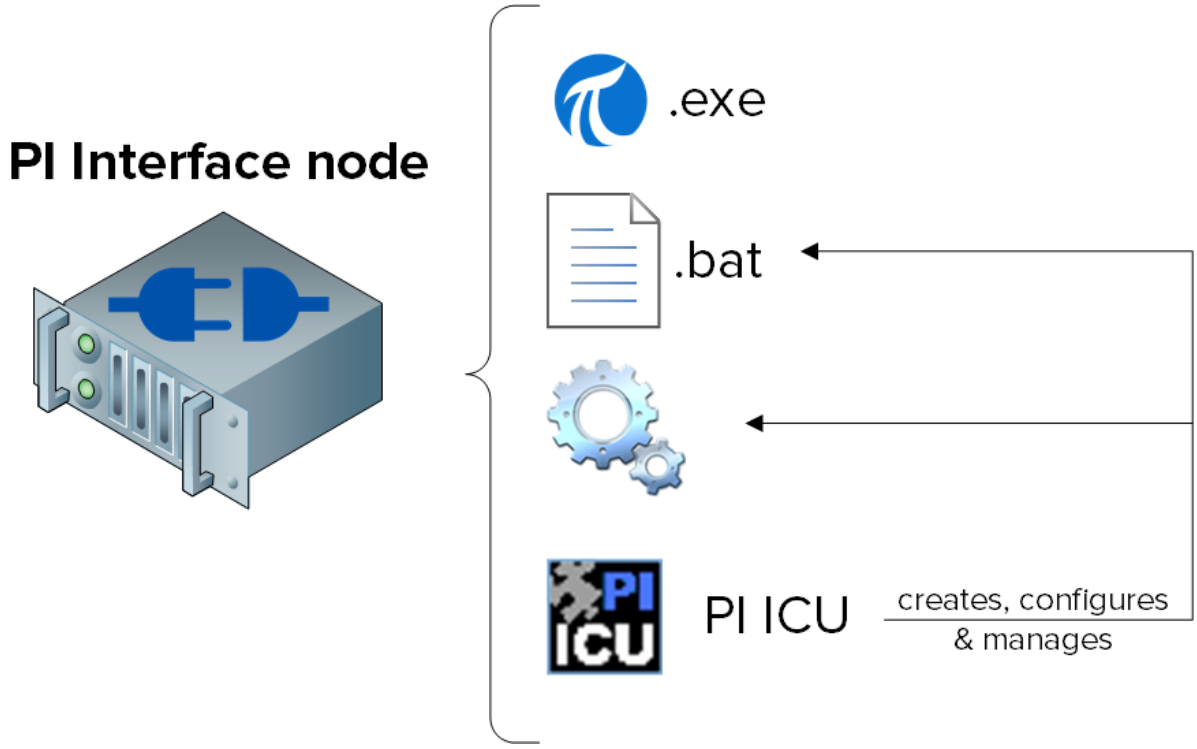
- **PI Interface executable**: This is the executable file that will run and perform the operations to collect data from the data source.
- **PI Interface instance batch file**: Although the executable performs all of the operations, it needs instructions, such as (1) which data source to collect from, (2) which Data Archive to send to, etc. A batch file will contain all of these instructions. Since you could have multiple data sources, you can create multiple batch files, and hence multiple *instances* of the PI interface running on a single node.
- **Windows Service running PI Interface instance**: In order for an instance of the PI Interface to run automatically when the computer starts, and run in the background, a Windows Service is created.

	Tip	Checking the services snap-in (services.msc) is a great way of identifying all of the PI Interfaces instances that are running on a single PI Interface node.

Define the PI Interface Configuration Utility

The PI Interface Configuration Utility (ICU) is a Graphical User Interface (GUI) that PI System administrators use to create and configure the PI Interface instance batch files and services.

The PI ICU will only configure batch files and services located on the computer where it is installed (it cannot be used to configure remote PI Interfaces).



Install and configure a PI Interface for OPC DA

Now that we are familiar with the PI Interface installation methodology, we can install and configure a new PI Interface to collect data in our Virtual Learning Environment. We will be doing so in the directed activities and exercises throughout the remaining sections of this chapter, by following the steps outlined in the section "PI Interface installation methodology"

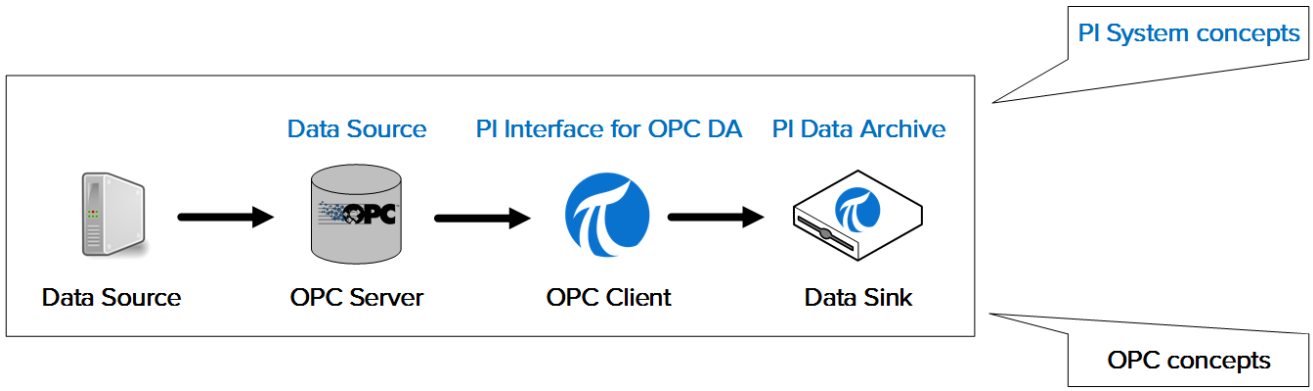
Our data source is an OPC DA Server installed on PIINT01 (therefore, we are using architecture B from the previous group discussion). This OPC DA Server exposes real-time data from 5 pumps in our process. Our goal will be to collect this process data and store it in the Data Archive. We will be installing our PI Interface on PIINT01. Since we have already chosen our PI Interface and our architecture, we have completed steps 1 and 2 of the installation methodology.

What is an OPC DA Server?

We chose an OPC DA Server as the data source for this class because it is the most common data source among our customers, making the PI Interface for OPC DA our most widely used interface.

OPC DA is a standard communication protocol developed for the industrial automation industry. As previously discussed, automation systems communicate using a wide-variety of different, often proprietary protocols. This makes communication between different systems very difficult. To solve this problem, multiple vendors got together and developed a series of platform-independent standards called OPC (Open Platform Communication). OPC DA is the standard for real-time data collection.

There are two required software components when communicating using an OPC standard: the OPC Server and the OPC Client. The OPC Server is a software application that exposes data from a data source in the OPC standard. The OPC Client is a software application that consumes data from an OPC Server, and translates it to a different format. *The PI Interface for OPC DA is an OPC Client*. The OPC Server is a non-OSIsoft application developed by another company.



Note: We will discuss the OPC UA standard in the chapter "PI Connector Management".

Install the PI Interface for OPC DA and the PI ICU

Activity Objectives

Complete steps 3 and 4 from the PI Interface installation methodology we outlined in this chapter.

> ***Step 3 :*** *Install the PI Interface and the PI ICU*
>
> ***Step 4 :*** *Validate that the PI Interface can communicate with the Data Archive*

Approach

Part 1 – Install the PI ICU and the PI Interface for OPC DA

Step 1 : On PIINT01, navigate to the folder C:\Course Folder\Install Kits

Step 2 : Right-click on the installation kit "PIICU_x.x.xx.xx_.exe" and select "Run as administrator".

Step 3 : Complete the steps in the installation wizard.

Step 4 : Repeat steps 2 and 3 with the following installation kits:

a. OPCInt_ReadOnly_x.x.x.xx_.exe

b. PIAPI-xxxx-for-Windows-Integrated-Security_x.x.x.xx_.exe

Note: The first install kit installs the Read-only version of the PI Interface for OPC DA. This version does not have the ability to write data back to the OPC Server. The read-only version is strongly recommended as an inherently safer technology that also simplifies compliance with security policy.

The second install kit installs the PI API for Windows Integrated Security. Although the PI OPC Interface comes with the PI API, this version is more secure. We will continue our discussion of PI API security in the section "PI System Security Management".

Part 2 – Validate that the PI Interface node can communicate with the Data Archive server over the network

Step 1 : We will first test to see whether network packets can travel from the PI Interface node to the Data Archive Server. On PIINT01, run the command prompt and use the **ping** command to test the connectivity to PISRV01.

Step 2 : Next, we will test to see whether network packets can travel from the Data Archive Server to the PI Interface node. On PISRV01, run the command prompt and use the **ping** command to test the connectivity to PIINT01.

Step 3 : Data sent to the Data Archive uses TCP port 5450. The final test is to verify whether that ping port is open on the Data Archive Server. On PIINT01:

a. Run the Windows Powershell application

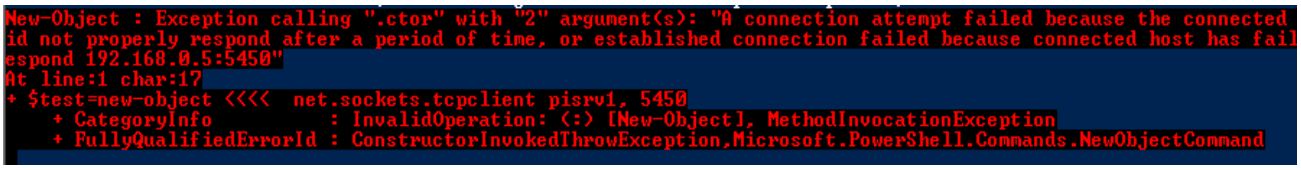
b. Run the following command:

(new-object net.sockets.tcpclient PISRV01, 5450).connected

If port 5450 is open, you will receive the message

True

If port 5450 is blocked, you will receive an error message:



Part 3 – Testing the two PI System connection protocols

There are two connection protocols that can be used to connect to the Data Archive: The older PI API and the newer PI SDK. PI Interfaces are typically built to use the PI API when sending data. Newer PI System software, such as the PI ICU, are built to use the PI SDK. Therefore, both need to work correctly on a PI Interface node. We will now verify whether we can connect to the Data Archive from the PI Interface using these protocols

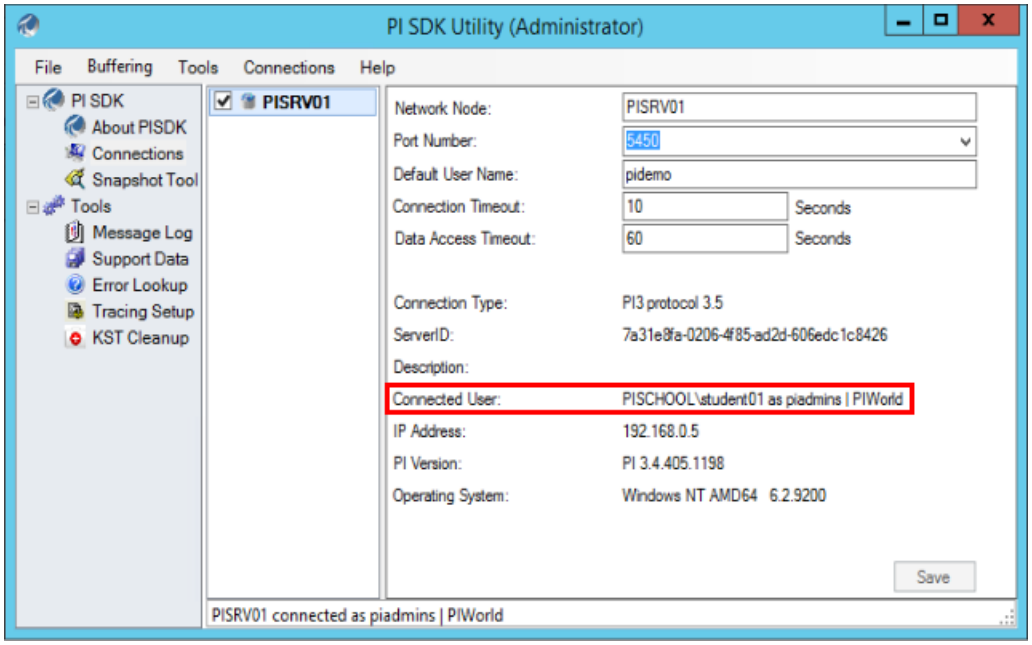
Step 1 : First, we will test a connection using the PI SDK.

a. Run the PI SDK Utility (AboutPI-SDK)

b. In the pane on the left side of the window, select "Connections"

c. In the second pane on the left, you should see the Data Archive name "PISRV01". Click the checkbox next to the name.

d. If the connection is successful, you should see your username and "connected as" in the "Connected User" Field.



Step 2 : Finally, we will test the PI API protocol

a. Run the command prompt

b. Navigate to the directory C:\Program Files (x86)\PIPC\bin

Hint: type "cd %pihome%\bin"

c. Run the command **apisnap PISRV01**

d. If the connection is successful, you should see the message:

```
C:\Program Files (x86)\PIPC\bin>apisnap PISRV01

APISNAP version 2.0.1.35
PI-API version 2.0.1.35
 Attempting connection to PISRV01

Enter tagname:
```

e. Enter the tagname "sinusoid". Do you get a value?

Note: We will continue our discussion of the PI API and PI SDK protocols in the section "PI System Security Management".

Validating the availability of data on the OPC DA Server

The PI System is responsible for reliably collecting and storing data. However, there is not much the PI System can do if data is not available at the data source. This is one of the most common issues with newly installed PI Interfaces, so it is important to validate data availability before moving on to PI Interface configuration.

When the data source is an OPC DA Server, OSIsoft provides a tool for this step, called the PI OPC Client Tool, which is installed with the PI Interface for OPC DA. In the section "What is an OPC DA Server?" we explained the concepts "OPC Server" and "OPC Client". The PI OPC Client Tool is an OPC client published by OSIsoft, designed to allow users to *view* data on the OPC Server, without collecting it.

Of course, the PI OPC Client Tool is not the only OPC Client that can be used to view data. Most OPC Server vendors include an OPC Client with the installation of the OPC Server. It is also recommended to test the availability of data on the OPC Server using this vendor-specific OPC Client.

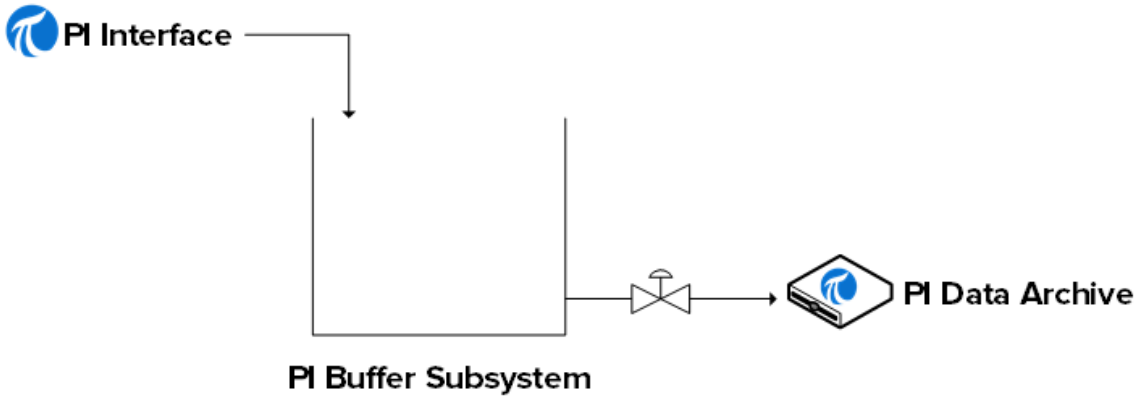
Lesson 4 – Understanding Importance of Buffering

Video: OSIsoft: Configuring a Simple PI System Online Course - Setting up Buffering on an Interface Node

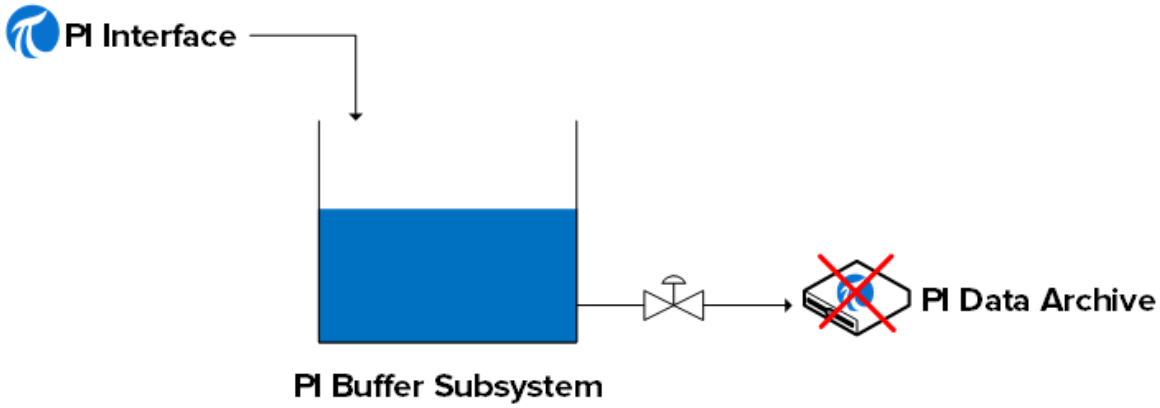
Defining the PI Buffer Subsystem

What is the PI Buffer Subsystem?

The PI Buffer subsystem is an OSIsoft application installed with every PI Interface. Once configured, it buffers data on the PI Interface node. A good analogy for the PI Buffer Subsystem is a reservoir.



Under normal operation, when the valve to the Data Archive is open, data simply passes through the reservoir. When the valve closes (i.e. The Data Archive is down, or the network is down), as the PI Interface continues to collect data, this data will start accumulating in the reservoir.



When the valve opens again (the Data Archive, or network, are restored), the data will flush out of the reservoir and be sent to the Data Archive.

Note: There is another, older OSIsoft buffering service called the API Buffer Server. The PI Buffer Subsystem is the best option for most environments. The API Buffer Server should only be used if (1) the PI Server receiving the buffered data is older than version 3.4.375 and (2) the PI Interface runs on a non-Windows platform.

How does the PI Buffer Subsystem work?

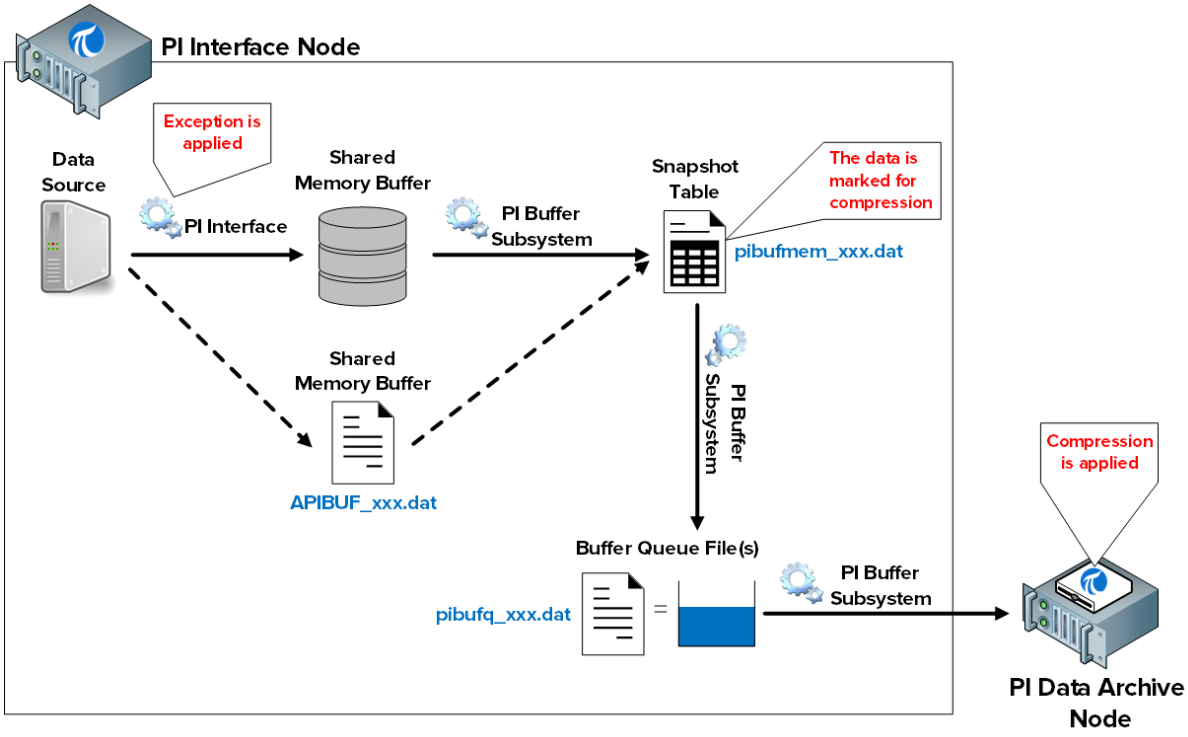
The PI Buffer Subsystem runs as a Windows Service.

The PI Buffer Subsystem does not just buffer data from a PI Interface. It can actually buffer data from any application (OSIsoft or custom-built) which is writing data to a Data Archive.

When the PI Buffer Subsystem has been configured, instead of writing data directly to the Data Archive, PI API applications (such as PI Interfaces) write the data to a "shared memory buffer".

The PI Buffer Subsystem performs the following steps:

1) Reads data from the shared memory buffer and transfers it to its "snapshot table"
2) From the snapshot table, marks the data for compression
3) Writes the data to a memory-mapped buffer queue file
4) Reads data from the buffer queue and sends it to the Data Archive



Note: Exception and Compression are mechanisms by which data is filtered, so that only meaningful data is kept in the Data Archive. The PI Interface is responsible for Exception. The PI

Buffer Subsystem marks events as either **Snapshot Only** (i.e. get rid of this value when a new one comes in) or **To Be Archived** (store this value). The Data Archive then treats the data accordingly.

The files involved in this process are:

1) Shared memory buffer: The location in memory where PI Interfaces write data. When this location is full, data is written to a file on disk called APIBUF_<Data Archive name>.dat
2) Snapshot table (pibufmem_<GUID>.dat): This table holds the most recent value received for all buffered PI Points.
3) Buffer queue file (pibufq_<GUID>.dat): This is the file that acts as our "tank". The default size of this file is 32 MB. When the file becomes full, a second file is created. When this file becomes fill, a third file is created. This will continue until the PI Interface node runs out of disk space.

Note: PI SDK and AFSDK applications write data directly into the PI Buffer subsystem's snapshot table, and so the first step above is skipped.

Configure Buffering

Activity Objectives

Complete step 9 from the PI Interface installation methodology we outlined in this chapter:

> ***Step 9 :*** *Configure buffering with the PI Buffer Subsystem*

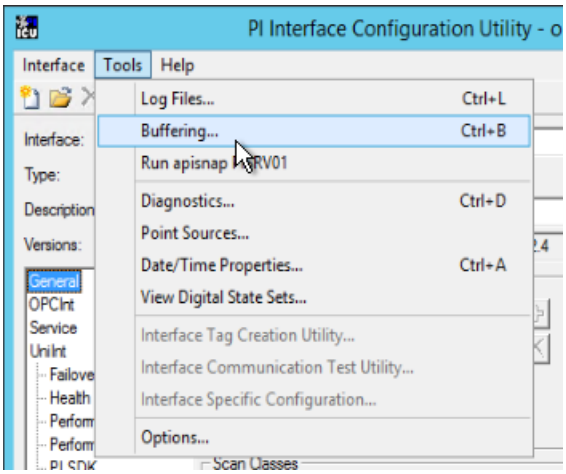
OSIsoft recommends using designated Windows Service Accounts to run PI System services that communicate over the network. Before starting, you made a request to your IT department to create a Service Account:

- PISCHOOL\svc-PIBuffer (password: student)

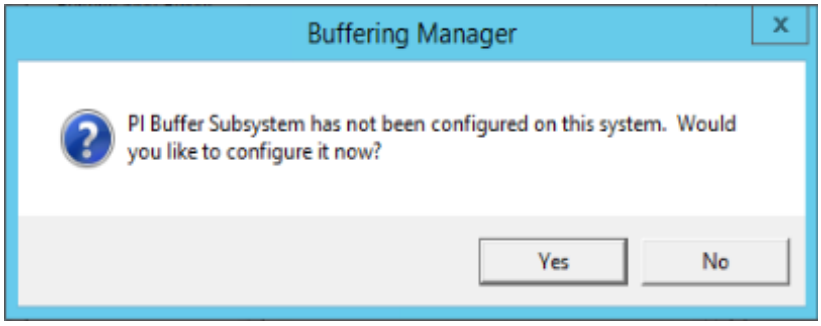
Approach

Part 1 – Configure the PI Buffer Subsystem

Step 1 : From PIINT01, run the PI ICU. Navigate to Tools > Buffering.

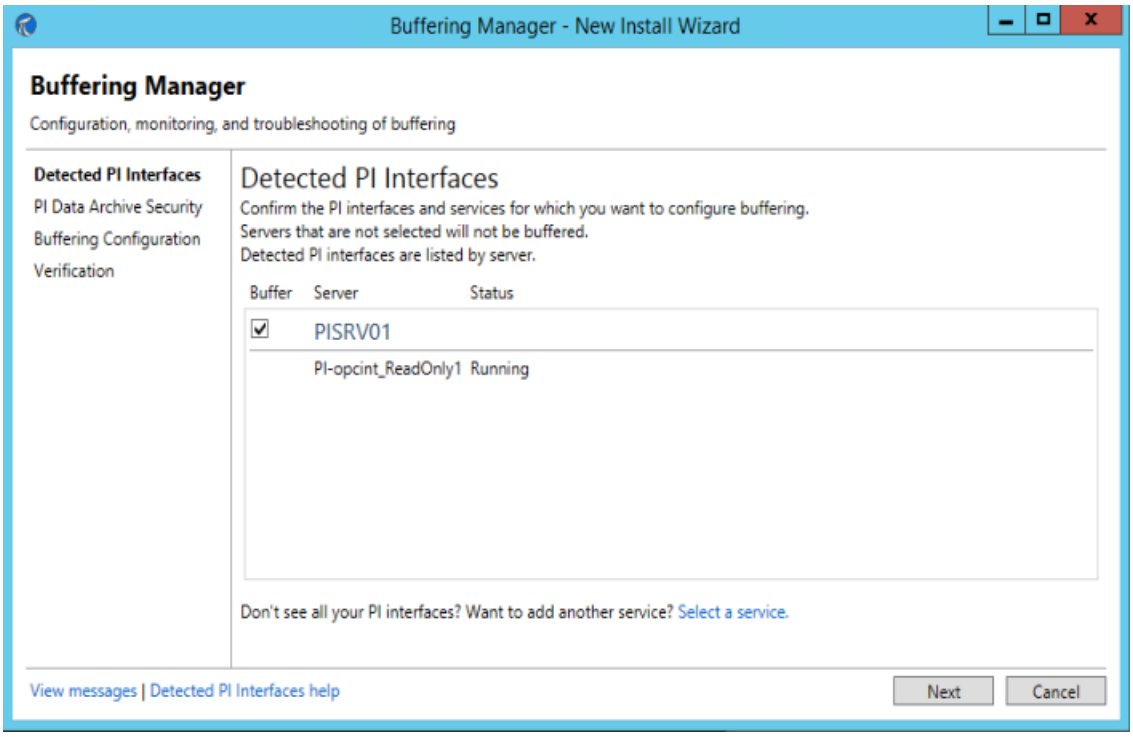


Step 2 : Select "**Yes**" to continue with the PI buffer subsystem configuration wizard



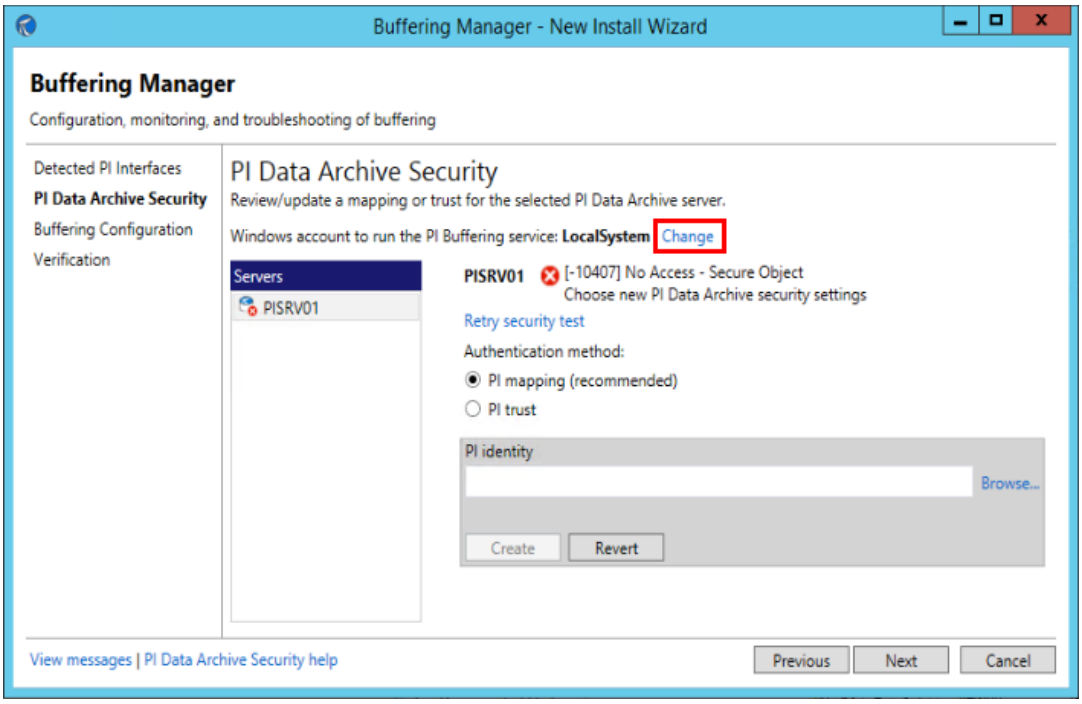
Step 3 : Select "**Continue with configuration**".

Step 4 : You should see the Data Archive "PISRV01" and the PI Interface name we configured earlier. Check the box and click "Next".

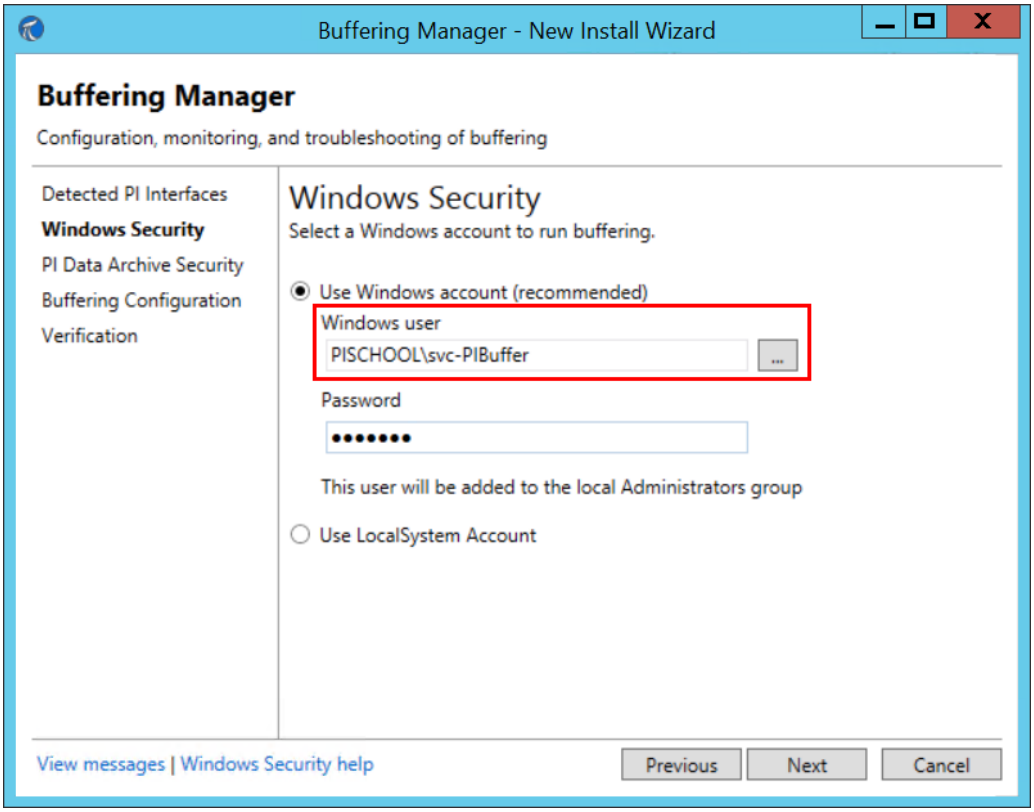


Step 5 : This step ensures that the PI Buffer Subsystem will the granted the correct security on the Data Archive.

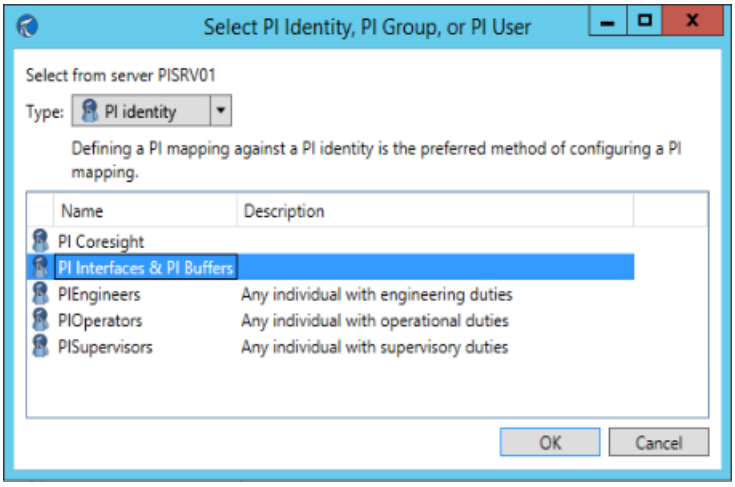
i. The default service account for the PI Buffer Subsystem is LocalSystem. This account has more privilege on the local computer than is needed. Before proceeding, we will change this service account to our dedicated domain account. Click on "Change" next to "LocalSystem"



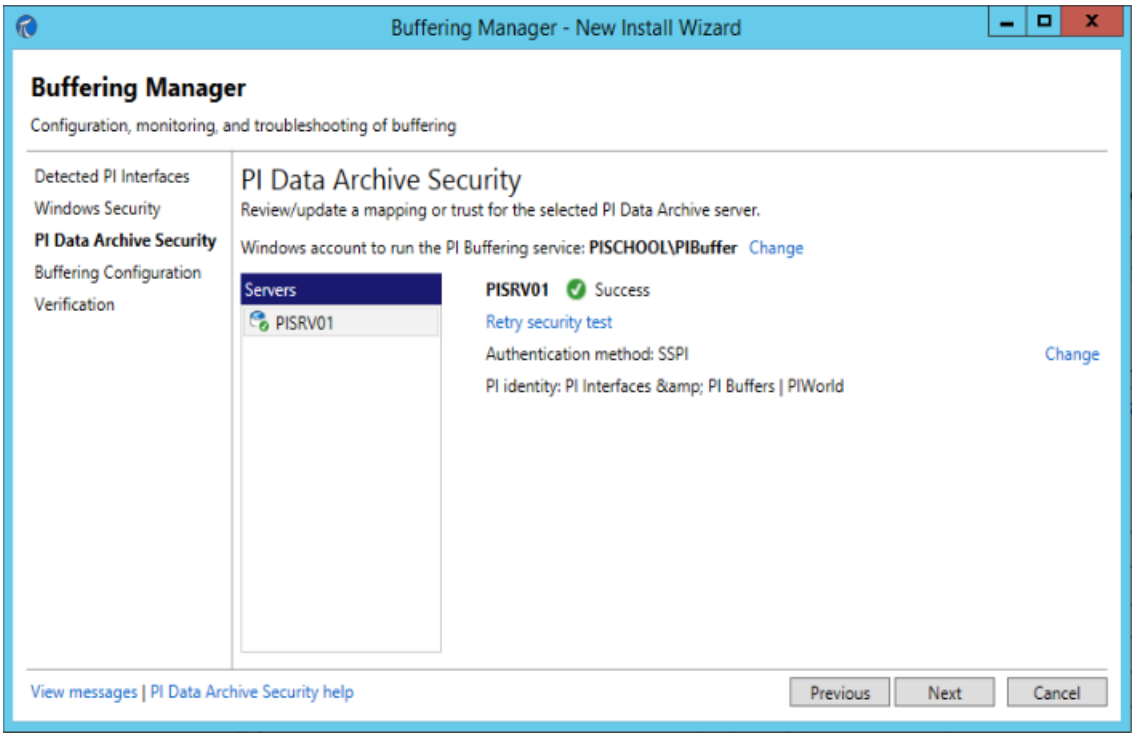
ii. Select "Use Windows account". Enter the account "PISCHOOL\svc-PIBuffer" with password "student". Click on "Next".



iii. Once you've returned to the security test window, we will create the PI Mapping we need to authenticate on the Data Archive. Click on "Browse…" in the PI Identity field, and select the identity we created earlier called "PI Interfae & PI Buffers", then click "OK".

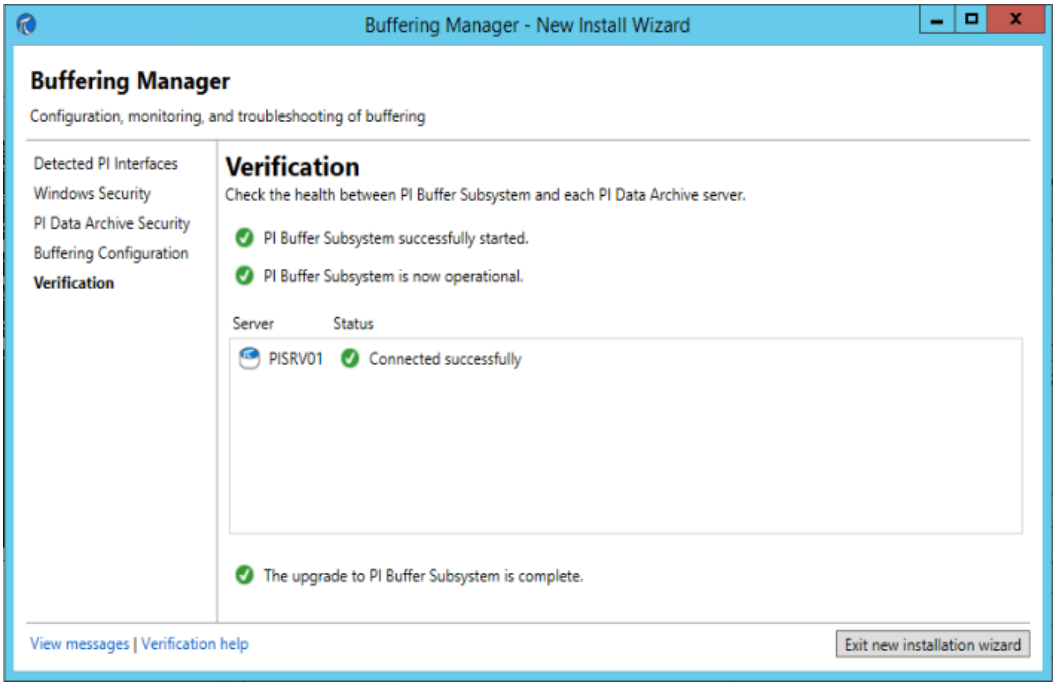


iv. Once you return to the Data Archive Security window, click "Create". You should now have a green checkmark on this page. Click "Next".



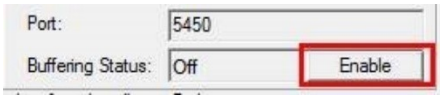
Step 6 : You can now select the Buffer Queues location. For this environment **set the location to E:\OSIsoft\Buffering**. If possible, it is strongly recommended to separate the buffer queue from the OS drive in order to avoid failure on the interface node by filling the main drive.

Step 7 : The last window will run a verification on the status of the PI Buffer Subsystem. If there is no errors, you can **exit the installation wizard**.



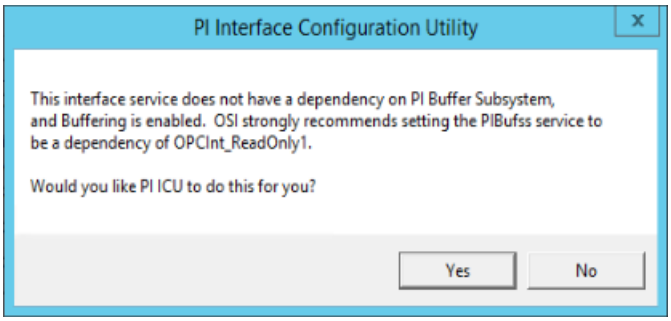
Step 8 : Once the installation wizard completed and closed the Buffering Manager window will open showing the status and statistics of the PI Buffer Subsystem. To re-open this window from the PI ICU, navigate to Tools > Buffering.

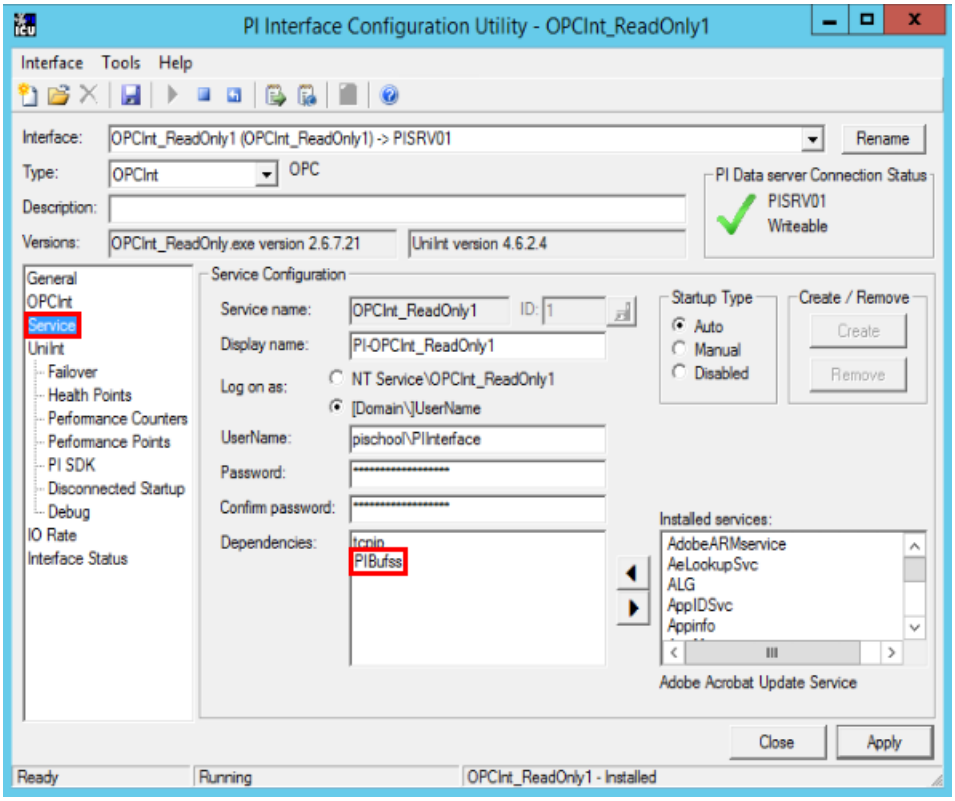
Step 9 : Each interface must be configured individually to enable buffering from the PI ICU general tab.



In order to buffer data from a PI Interface, the PI Buffer Subsystem must start before all the PI Interfaces on the machine. Since both are run using Windows Services, it is possible to configure a dependency on the PI Buffer Subsystem.

You can verify the configuration by navigating to the PI ICU > Service tab, and verifying the "Dependencies" field. The PI ICU will automatically detect if a dependency on PIBufss is missing. Notice PIBufss is added to the interface service dependencies when we select "yes."





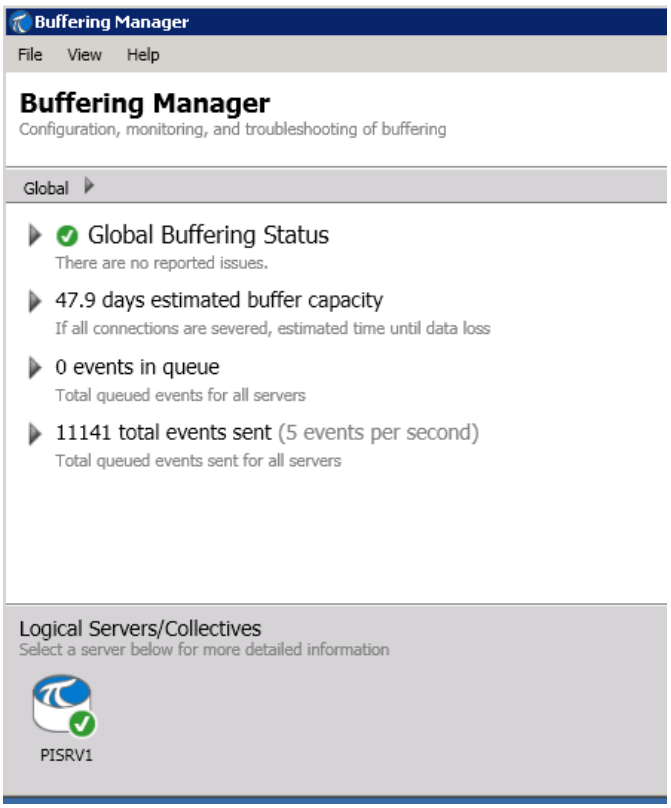
Part 2 – Validate buffering

A very important troubleshooting tool is how to verify whether data is truly buffering on our PI Interface node. Since version 4.3 of the PI Buffer Subsystem, this task has been made much easier with the introduction of the "Buffering Manager" GUI. Since this tool is not available with older versions, we will demonstrate how to verify the buffering status in both scenarios

Method 1: Buffering Manager

Step 1 : From PIINT01, Run the PI ICU. From the top of the window, select Tools > Buffering

Step 2 : In the Buffering Manager, the buffering statistics update in real-time to show the Global Buffering Status, the estimated buffer capacity, the events in queue, and the total events sent in real time:



To confirm that events are flowing through the buffer, make sure that the "total events sent" is increasing. The buffering manager will also report issues such as low disk space, important error messages, etc.

Method 2: Command line utility pibufss

Step 1 : From PIINT01, run a command prompt, navigate to the directory C:\Program Files\PIPC\bin
Hint: type "cd %pihome%\bin"

Step 2 : Run the command **pibufss -cfg**

This command will show you the overall buffering status.

```
C:\Program Files\PIPC\bin>pibufss -cfg

*** Configuration:
Buffering: On (API data buffered)
Loaded physical server global parameters: queuePath=C:\ProgramData\OSIsoft\Buffering
authenticationOptions=SSPI;TRUST

*** Buffer Sessions:
  1 non-HA server, name: pisrv1, session count: 1
    1 [pisrv1] state: SendingData, successful connections: 6
      PI identities: PIBuffers, auth type: SSPI
      firstcon: 16-Jul-19 02:17:53, lastreg: 25-Sep-19 09:14:02, regid: 4
      total events sent: 144184296, snapshot posts: 17764427, queued events: 5
```

Step 3 : Run the command **pibufss -qs**

This command will show you the statistics of the buffer queue file. A healthy buffer queue will have reads and writes from this file.

```
C:\Program Files\PIPC\bin>PIBUFSS -QS
Current buffered servers:
  1. pisrv1
pisrv1 is automatically selected for the command.
Current buffer sessions:
  1. pisrv1 (PISRV1)
pisrv1 is automatically selected for the command.

Counters for 25-Sep-19 09:51:59.38994 (pibufq_6b93fc02-590e-4cd5-a39d-decf24ecbf46.00
00.dat)
             Primary File Size:      33554432           0
             Primary Page Size:         65536           0
            Primary Data Pages:           511           0
              Write Page Index:             8           0
               Read Page Index:             8           0
      Current Write Queue File:             0           0
       Current Read Queue File:             0           0
             Total Page Shifts:             8           0
               Available Pages:           510           0      (99.8%)
       Average Events per Page:             0           0
  Estimated Remaining Capacity:       1288030           0
         Bytes in Primary File:           104           0
        Events in Primary File:             4           0
            Total Event Writes:     144181716           0
             Total Event Reads:     144181712           0
          Number of Queue Files:             1           0
                Events in Queue:             4           0
```

Step 4 : To stop the statistics, press Ctrl+C

Lesson 5 - Creating and Managing PI Points

Video: OSIsoft: Configuring a Simple PI System Online Course - Creating and Managing PI Points

Objectives

- Define a PI Point
- Describe the different point types
- Describe the basic point attributes
- Build and edit points with Point Builder
- Describe a digital state set
- Create a digital state set
- Create digital state points
- Build and edit points with the PI Builder add-in to Excel.
- Connect the OPC data to PI points

What is a PI Point?

A PI point is a unique storage point for data in the PI Server.

For more information see "PI Point Classes and Attributes" in *PI Data Archive System Management Guide*.

Some examples are:

- A flow rate from a flow meter (would use floating point [also known as float, real] data)
- A DCS controller's mode of operation (may use digital or discrete data)
- The batch number of a product (can use one of float, integer, or string data)
- Text comments from an operator (using string [character] data)
- The result of a calculation (float or integer data)
- Memory % usage in a server (uses floating point data)

Note: Some industries and customers use the term "tag." In the PI system, *point, tag* and *data stream* are synonymous.

Point Class

The Point Class is simply the name for a defined set of point *attributes*. The PI Data Archive is pre-configured with the point classes you will need. The typical PI System has no need for additional point classes.

All points are based on the **Base** point class. However, these points do not have the complete set of attributes required to collect data via an interface. Although points created by PI Connectors are of Base point class

The **Classic** point class contains all the Base point class ***plus all of the attributes required by the interface to connect to the data source and collect data.***

Point Type

The PI Data Archive, designed to collect and store **time-series** data, can store almost any data type.

There is no absolute when selecting point type but matching the PI point type with the data type on the source is usually a good start. For example, if the data source indicates that the data collected is a REAL32 then you would most likely use Float32 (a 32-bit floating-point value).

Creating and Managing PI Points with SMT

There are many ways to create points in the PI Server. Throughout the course, we will show you the most common.

One tool that may be used to build and edit points is **Point Builder** in PI SMT.

> The Point Builder plug-in for PI SMT is a graphical tool that allows the user to create and edit PI points. This tool allows the system manager to set the attributes for each point individually during PI point creation and allows you to edit them afterward. Some attributes are system assigned and cannot be changed.

Another tool tool best suited to bulk build and edit points is **PI Builder**.

The PI Builder is an add-in to Microsoft Excel. The spreadsheet format is convenient when viewing and editing in bulk, with a row for each point or element and a column for each attribute.

PI Builder requires the spreadsheet to have the following layout:

- The attribute names are listed in the top row.

- The point names are listed in the second column.
- Each point has its attributes listed under the headings in the top row, one point per row.
- Select a point row by putting **X** in the first column. Import or export operations are performed on these selected points only.

PI Point Attributes and PI Interfaces

Remember the statement, "always reading the documentation manual"? Each interface can use point attributes in a different manner. That is why each interface documentation specifies what point attributes are used and how.

Listed below are the common point attributes and how they are ***commonly*** used.

ALWAYS consult the interface manual!

Instrument Tag	Name of the point/location in the source data system. *Often it must match the data source exactly!*
Extended Descriptor	Place for detailed query instructions.
Future Data	If defined as '*Allow*' it means that events with time stamps in the future may be stored.
Exception Specifications	Defines a significant change in value.
Point Source	Must match the value set in the interface configuration. See the /PS parameter in the interface start-up file.
Location1	*Typically*, the Location1 field is used for the interface instance number (/ID)
Location4	*Typically,* the field is the scan class number. (/f)
Scan	Include the PI point in the list of points to scan (always set to ON)

Lesson 6 - Troubleshooting a PI System

Message Logs

The first step in troubleshooting is always the same: check the message logs! All PI System software write messages to log files. It is therefore important to learn which log files to check, and how to read them.

1. **PI Message Logs**

   Also known as the "SDK Logs", these are the logs of all applications based on the PI SDK. There is one PI Message log per computer where an SDK application is installed. The logs are managed by the PI Message Subsystem.

   Applications that write to this log:

   - Data Archive subsystems
   - PI Interfaces (UniInt version 4.5.0.x and later)
   - PI Client applications

   How to access these logs:

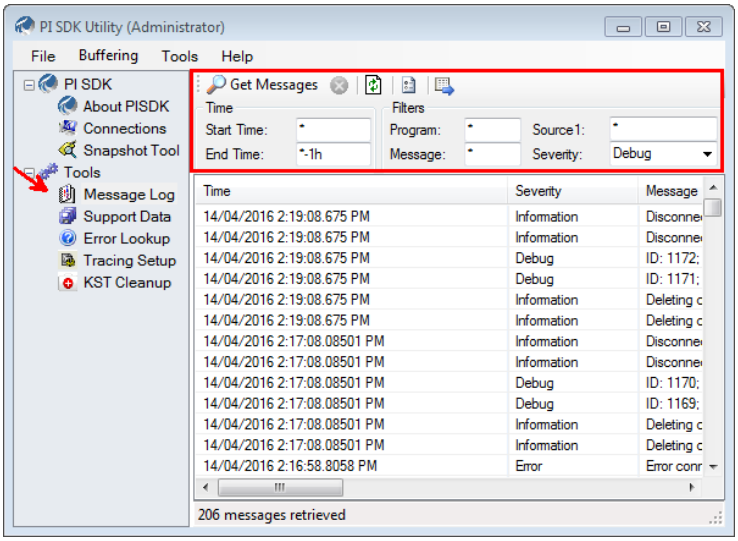
   - On the Data Archive: SMT > Operations > Message Logs
   - On all computers with PI-SDK 1.4.0 and greater:

     Step 1 : Run the program "PISDKUtility"

     Step 2 : In the left pane, select Tools > Message Logs

     Step 3 : Set the filters to obtain messages (start time, severity, etc.)

     Step 4 : Click on "Get Messages"



- On a PI Interface node: PI ICU > Press the "View Current PI Message Log continuously" button 
- On all computers, you can use the command line utility pigetmsg.exe

  Step 1 : Open a command prompt window

  Step 2 : Change the directory to pi\adm or pipc\adm

  Step 3 : Type **pigetmsg –f** to view the logs continuously

  Step 4 : For more filtering options, type **pigetmsg –?**

2. **Event Logs**

   Event Logs are the centralized logs on a Windows machine. There are two different types of logs:

   - **Windows Logs**: These logs includes all important events on the operating system, split up into the following categories: Application, Security, Setup, System and Forwarded Events.
   - **Applications and Services Logs**: These logs are specifically for applications, with each application writing to its own log.

   PI System applications write to the Windows Application Log, and sometimes to a dedicated log under Applications and Services.

   It's also a good idea to look at the other Windows logs (Security, System) if you suspect an issue might have occurred at the operating system level.

   Applications that write to these logs:

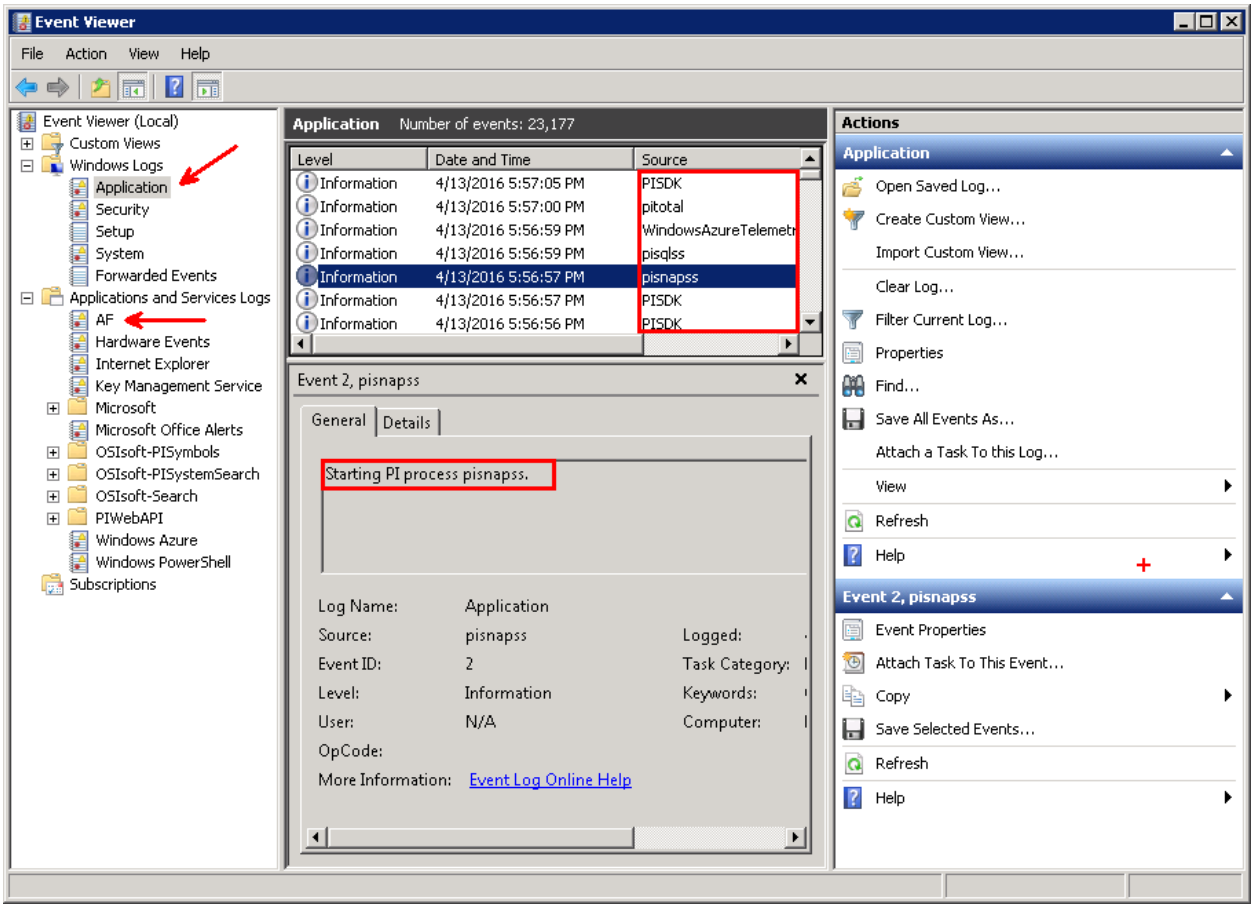
   - AF Application Service
   - PI Analysis Service
   - Data Archive Subsystems (occasionally)

   How to access these logs:

   Step 1 : Run the application "Event Viewer"

   Step 2 : To access the Windows Application log, browse to Windows Log > Application. Look at the "Source" column to find messages written by PI System applications. You can also use the filter functionality of Event Viewer.

   Step 3 : To access a specific application's log, browse to Application and Services Logs, then find the name of your application (e.g. AF)



3. **PIPC Logs**

   These logs are only used by older, PI API based applications. You should only need to access these logs if you are running older software.

   Applications that write to these logs:

   - PI Interfaces with a UniInt version earlier than 2.5.0.x
   - PI API based applications

   How to access these logs:

   - On a PI Interface node: PI ICU > Press the "View current pipc.log continuously" button 
   - Open the file PIPC\dat\pipc.log

Where to Look for Answers

So you found an error message, now what? There are a few resources you can use to translate that message and find your solution:

1. **Search for a Solution on the Tech Support website** (https://techsupport.osisoft.com/Troubleshooting/)

   This solution search crawls all of our online resources, including product documentation, Knowledge Base (KB) articles, PI Square forum discussions, Known Issues, and more.

2. **Search the PI Live Library** (https://livelibrary.osisoft.com)

   This is an online repository of OSIsoft documentation. It contains all of the up to date administration and user guides for our products.

3. **Ask the community on PISquare** (https://pisquare.osisoft.com)

4. **Contact OSIsoft Tech Support!** (https://my.osisoft.com)

   When contacting Technical Support, always make sure to have the following information on hand:

   a. A clear description of the issue
   b. Product and version information
   c. A copy of the relevant message logs
   d. Relevant screenshots, and if possible, steps to reproduce the issue
   e. Urgency and Impact of this case
   f. Your PI Server Serial Number (SMT > Operation > Licensing > InstallatonID)