Data Entry with PI Manual Logger

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1. PI System Basics

1.1 What is a PI System?

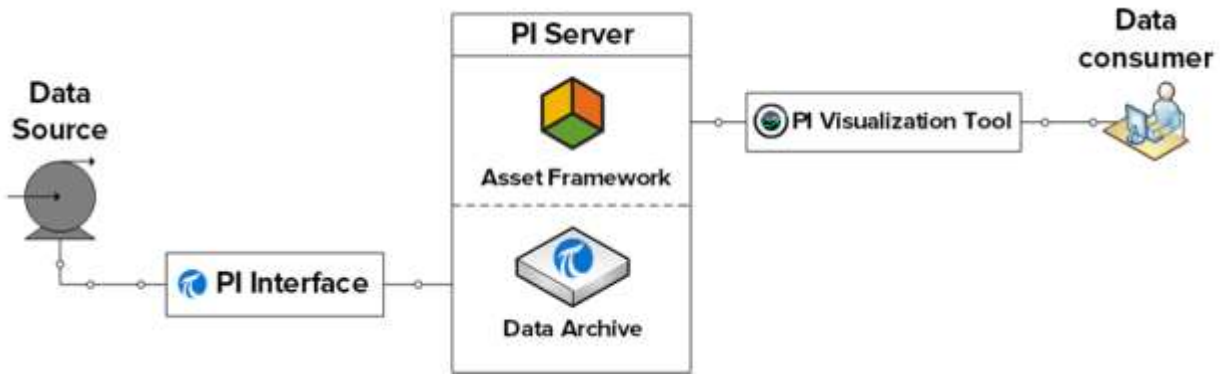
Objectives

- Define the components of a PI System.
- Draw a diagram of the architecture of a PI System.

1.1.1 The PI System described

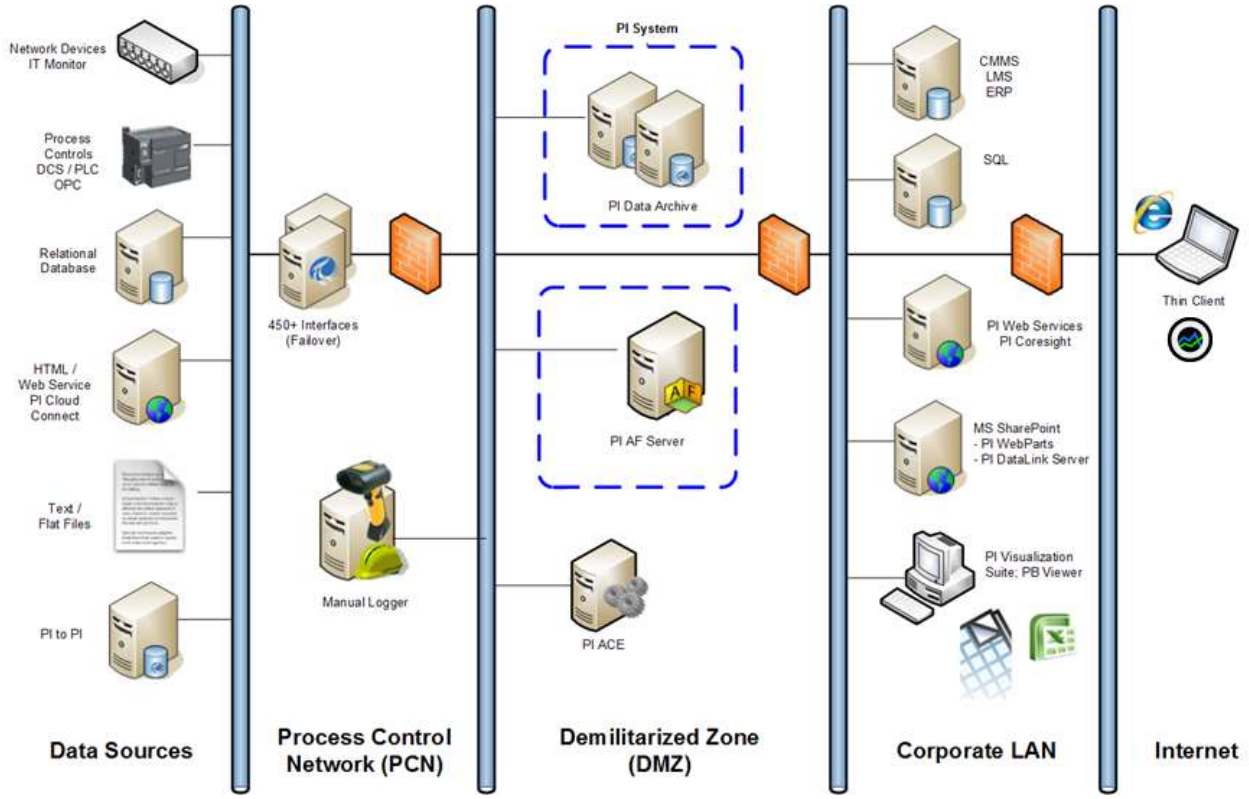
The PI System collects, stores, and manages data from your plant or process. Your data sources connect to one or more PI Interface nodes. The PI Interface nodes collect data from your data sources and store into the PI Data Archive.
Asset Framework (AF) organizes and enhances the data. Users consume the data by the use of a tool of the PI Visualization Suite (PVS) such as PI Vision.

The following is a diagram of the components of a simple PI System:



1.1.2 Architecture of a Typical PI System

Sometimes the architecture can be very simple. Some customers have as few as one or two PI Interfaces feeding data to a Data Archive from which the data can be consumed by various applications. The following is an example of a fully developed PI System, which includes most of the widely used OSIsoft products.



In the diagram above, two PI Data Archive computers are shown to represent a **PI Data Archive collective**. A collective is a configuration of multiple servers that act as a logical PI Data Archive server in your PI System to provide high availability (HA), disaster recovery, load distribution, and increased scalability. A collective consists of one primary server and one or more secondary servers.

Note: In computer security, a demilitarized zone, named after the military usage of the term and normally abbreviated to DMZ; also known as a Data Management Zone or Demarcation Zone or Perimeter Network, is a physical or logical subnetwork that contains and exposes an organization's external services to a larger, untrusted network, usually the Internet. The purpose of a DMZ is to add an additional layer of security to an organization's Local Area Network (LAN); an external attacker only has access to equipment in the DMZ, rather than the whole of the network. [Reference: http://en.wikipedia.org]

1.2 PI Points

What is a PI Point?

A PI Point (sometimes referred to as a PI Tag) is a unique storage point for time-series data in the **PI Data Archive**. It is a single point of measurement and has a value with a timestamp, such as a temperature of 31.2 ºC on 31-Jan-2022 23:59:00.

Some common PI Point attributes

- **Name:** The name of the PI Point, which must be unique within the PI Data Archive.
- **Description**: A free text field attached to a PI Point, often used to enter a human friendly description of the PI Point.
- **Point Type:** This attributes defines the type of data that is stored in the PI Data Archive, e.g. float, integer, string, etc.
- **Point Source**: This attribute commonly specifies which PI Interface is collecting the data for the PI Point.

1.3 Time and the PI System

Objectives

- Define the time abbreviations in the PI System.
- Define the time expressions in the PI System.
- Introduction to Future Data.
- Explain how the PI System handles times zones and daylight savings time (DST).

You can use a special syntax, called PI System time, when specifying inputs for timestamps and time intervals. The PI System time uses specific abbreviations, which you combine to create time expressions.

1.3.1 PI System Time Abbreviations

When specifying a PI System time, you can use specific abbreviations that represent time units and reference times.

Abbreviation	Time-unit
s	second
m	minute
h	hour
d	day
w	week
mo	month
y	year

To specify time units, you can specify the abbreviation, the full time unit, or the plural version of the time unit, such as s, second, or seconds. You must include a valid value with any time unit. If specifying seconds, minutes, or hours, you can specify a fractional value. You cannot specify fractional values for other time units.

Abbreviation	Full	Reference-time
*		Current time.
t (or T)	today	00:00:00 (midnight) of the current day
y (or Y)	yesterday	00:00:00 (midnight) of the previous day

Abbreviation	Full	Reference-time
sun	Sunday	00:00:00 (midnight) on the most recent Sunday
mon	Monday	00:00:00 (midnight) on the most recent Monday
tue	Tuesday	00:00:00 (midnight) on the most recent Tuesday
wed	Wednesday	00:00:00 (midnight) on the most recent Wednesday
thu	Thursday	00:00:00 (midnight) on the most recent Thursday
fri	Friday	00:00:00 (midnight) on the most recent Friday
sat	Saturday	00:00:00 (midnight) on the most recent Saturday

1.3.2 PI System Time Expressions

The PI System time expressions can include a reference-time and a time offset, indicated by a direction (either + or -) and a time unit with a value. PI System time expressions might include:

- Only a reference time, such as “y”
- Only a time offset, such as “+3h”
- A reference-time with a time offset, such as “y+3h”

A reference-time can be a fixed time, such as “24-aug-2012 09:50:00”, or a valid reference-time abbreviation, such as “t”.

You can only include one-time offset in an expression. Including multiple offsets can lead to unpredictable results. For example, the following time expressions are not valid:

1.3.3 Timestamp Specification

To specify inputs for timestamps, you can enter time expressions that contain:

Fixed times

A fixed time always represents the same time, regardless of the field or the current time.

Input	Meaning
23-aug-12 15:00:00	3:00 p.m. on August 23, 2012
25-sep-12	00:00:00 (midnight) on September 25, 2012

Reference-time Abbreviations

A reference-time abbreviation represents a time relative to the current time.

Input	Meaning
*	Current time (now)
3-1 or 3/1	00:00:00 (midnight) on March 1 of the current year
2011	00:00:00 (midnight) on the current month and day in the year 2011
25	00:00:00 (midnight) on the 25th of the current month
t	00:00:00 on the current date (today)
y	00:00:00 on the previous date (yesterday)
tue	00:00:00 on the most recent Tuesday

Reference-time Abbreviations or Fixed Times with a Time Offset

When included with a fixed time or a reference-time abbreviation, a time offset adds or subtracts from the specified time.

Input	Meaning
*-1h	One hour ago
t+8h	08:00:00 (8:00 a.m.) today
y-8h	16:00:00 (4:00 p.m.) the day before yesterday
mon+14.5h	14:30:00 (2:30 p.m.) most recent Monday
sat-1m	23:59:00 (11:59 p.m.) last Friday

Time Offsets

Entered alone in a time field, time offsets specify a time relative to an implied reference-time. The implied reference-time depends on the field where you enter the expression:

- For a start time, the reference-time is the current clock time.
- For an end time, the reference-time is the start time.
- For a single time stamp, the reference-time is the current clock time.

Time field	Input	Meaning
Start time	-1d	One day before the current clock time (24 hours before the current clock time)
End time	+6h	Six hours after the start time
End time	-30m	30 minutes before the start time
Time stamp	-15s	15 seconds before the current clock time

1.3.4 Future Data

Future data is data associated with a future time stamp. Data Archive 2015 allows storage and retrieval of data with time stamps beyond current time, allowing you to store data within a time range of January, 1970 through January, 2038. With Data Archive 2015 you can capture and analyze data with future time stamps, and use PI visualization tools to graphically create possible forecasts or predictions for your business.

Just as with historical data, to specify inputs for timestamps, you can enter time expressions previous discussed fixed time, reference times, and reference-time abbreviations or fixed times with a time offset. The difference being the timestamp will be in the future. Some example expressions are:

Input	Meaning
*+1h	An hour from now
t+3d	Three days from today at midnight
Y+1y	A year from yesterday

1.3.5 How Does the PI System Adjust for Time Zones and DST?

The short answer is: we do not!

When we collect data, we convert it to UTC (Universal Coordinated Time), or what used to be called Greenwich Mean Time (GMT). This means that each day has exactly 24 hours. The local machine clock of the user looking at the data makes any adjustments for time, such as time zone or DST.

If your region observes DST, once a year the day will look like it has 23 hours and another 25, but the PI Server never knows anything other than 24-hour days.

In addition, because the clients and PI Server know what time zone they are in, the data can be viewed with respect to the s***erver time*** or the c***lient time***. This is determined by a setting in the client tool.

1.3.6 Exercise – PI System Times

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

Determine the "real" dates and times indicated by the PI System times in the table below:
(assume now: Tuesday, 20-May-2014 10:12:23 AM)

Abbreviation	Answer
* - 30m	
T-1d	
y + 8h	
12 8:	
Tuesday – 2d	

Express the following times in valid PI System time abbreviations:

Abbreviation	Answer
Today at 6:30 AM	
Monday at 5:45 am	
12 hours ago	
The first day this month	
Tomorrow at 7:00 AM	
2 hours from now	

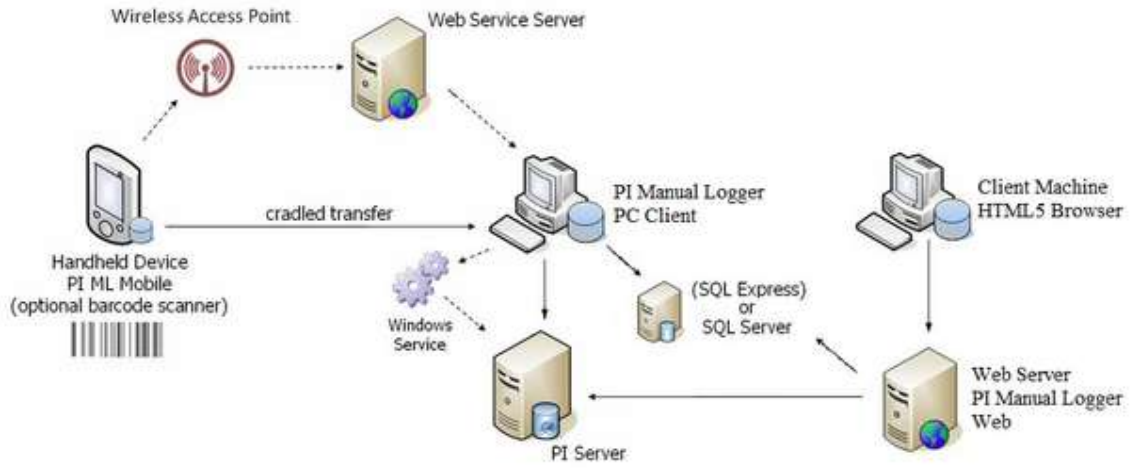
2. Introducing PI Manual Logger

PI Manual Logger (PIML) is a set of client applications for manually entering data to the PI Data Archive.

Your facility may have a significant amount of data that cannot be collected automatically from instrumentation and control systems. PIML provides these alternative data entry methods:

- Enter data using PI Manual Logger data entry screens on a PC.
- Enter data using an HTML5-compliant browser on mobile devices that use Apple iOS, Google Android, and Windows Phone operating systems.
- Enter data on a Microsoft Windows Mobile device, a Windows Vista/7 or Windows 8 laptop, or a Tablet PC. You can review, edit, and approve the data on a PC before you transmit it to PI Data Archive.

2.1 Architecture and installation components



The PI Manual Logger product suite is distributed in 3 install kits, each comprises the following components:

Kit	Component	Description
PI Manual Logger 2014	PI Manual Logger PC Client	You use the PC Client to configure tours and enter data collected from field equipment. You review, edit, or approve the data on the PC Client before sending it to PI Data Archive. (It is not just a client application that allows you to run tours from a PC. It is the ONLY administrator application.)
	PI Manual Logger Windows Services (optional)	You use the Windows Services to check the central SQL database and determine whether it needs to update cached data, update tag attributes or send queued future data to PI Data Archive.
	PI Manual Logger Web Services (optional)	You use this feature to transfer tours and tour runs wirelessly through ASP.NET 2.0 Web Services interface from PI Manual Logger Mobile 2012.
PI Manual Logger Web 2017 R2	PI Manual Logger Web	You use your HTML-5 compatible web browser to enter tour run data.
PI Manual Logger Mobile 2012	PI Manual Logger Mobile 2012	You use PI Manual Logger Mobile 2012 to collect data from field equipment with a handheld Windows Mobile device. You can transfer this data to the PC Client wirelessly if the device supports a wireless connection, or by cradling the device. Use the barcode feature to scan equipment to identify tags and enter data.

In addition, the architecture diagram above also shows 2 other key components/machines that are not part of the PIML install kit:

- **SQL Server** - holds the PI Manual Logger backend database (*PimlWindows*). The metadata for PIML, i.e. tours, users, user groups, historical tour runs are stored in this backend database. The metadata is provided to the PC Client and to PI Manual Logger Web so that the application can function.
- **PI Data Archive** - the server where PI tags are obtained from to be placed on tour, and also where data is being sent to. Each instance of PI Manual Logger can write to one PI Data Archive or PI Collective. If you need to write to multiple PI Data Archives, you will need to manually change the configuration of PIML to connect to the other Data Archive. You are not able to write to multiple Data Archives/ Collectives at the same time.

For installation instructions, please consult the *PI Manual Logger Administrator Guide*.

This course will not go into much detail on PI Manual Logger Mobile and the PI Manual Logger Web Services as they have both mostly been replaced by PI Manual Logger Web.

2.1.1 Architecture in this training environment

There are four servers in this training cloud environment, all within the PISCHOOL domain. Key software installed on each server are summarized below:

PISRV01

- PI Manual Logger PC Client
- PI Manual Logger Windows Services
- SQL server
- PI Data Archive and Asset Framework
- Microsoft Excel with PI Builder and PI DataLink

PIWEB01

- PI Manual Logger Web
- Google Chrome
- Microsoft Excel with PI Builder and PI DataLink

PICLIENT01

- Google Chrome
- Microsoft Excel with PI Builder and PI DataLink

PIDC

- Domain Controller

2.2 Terminology

Tour – a configuration that consists of specific PI tags to facilitate data collection.

Tour run – a set of values, statuses, comments and timestamps entered for tags of a tour at a specific time.

Tag group – Associate tags within a tour by placing them into a tag group. The tag group can be a piece of physical equipment or a set of measurements for a process that are usually measured together.

Consult the user guide for a full list of *PI Manual Logger terminology*.

3. Security and user management

3.1 PimlWindows SQL database security

To use PIML PC Client, end users need access to the PimlWindows SQL database, specifically the db_datareader and db_datawriter roles for basic read/write privileges.

Consult the user guide for steps to add a user account to PIMLWindows database.

If a user only uses PIML Web to collect data (i.e. does not need to use PIML PC Client at all) AND PIML Web is configured to not delegate end user credentials to the SQL server, then the end user account does not need permission on the PimlWindows SQL database. We will discuss more about PIML Web in a later chapter.

3.1.1 Exercise - Add a user account to PIMLWindows database

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

PIML users need read/write access to the PimlWindows SQL database.

Approach

Using SSMS on PISRV01, create new SQL logins for PIML users and assign the necessary permissions to the database. If there are many users, AD group can be leveraged for better management, i.e. create one login just for the AD group that contains all PIML user accounts.

3.2 PI Data Archive security

PI Data Archive security is configured in relation to PI Manual Logger to govern:

- what users connect to PI.
- what users can read and write to what tags.
    - Users need tag read access to build tours and see previous values.
    - Users need tag write access to send data from PI Manual Logger.
        - If PISDK buffering is used – then pibufss does the actual writes to PI tags, so pibufss on the given PI Manual Logger station must have write access to the tags.

This can be configured by creating:

- PI Mappings for all Manual Logger AD users/groups (preferred), or
- PI Trusts (not recommended; less secure than PI Mapping) for PimlWindows.exe from each workstation.

These PI Mappings/PI Trusts are then assigned to a PI Identity that has the required read/write permissions on the PI tags.

3.2.1 Exercise – Configure PI Data Archive Security

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

PI Manual Logger users need to be able to retrieve PI tag properties, as well as read and write data.

Approach

Create a new PI Identity *PIMLUser* reserved for PI Manual Logger access needs.

Create PI Mapping for any PI Manual Logger windows users to access PI. If there are many users, mapping to AD groups is preferred.

3.2.2 Exercise – Create PI Digital State Sets and Tags

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

Create PI tags and Digital State sets for manual data collection.

Approach

Use the following files in C:\Class folder to quickly build digital state sets and PI tags:

SMT_DigitalStates_PIML.csv

PIBuilder_Tags_PIML.xlsx (**identity PIMLUser must first exist**)

In most cases, all manual data should be recorded.
- Exception = 0%
- Compressing = Off

For more details about exception and compression, please see YouTube video Exception and Compression Quick Summary.

3.3 PIML security (Users and Groups)

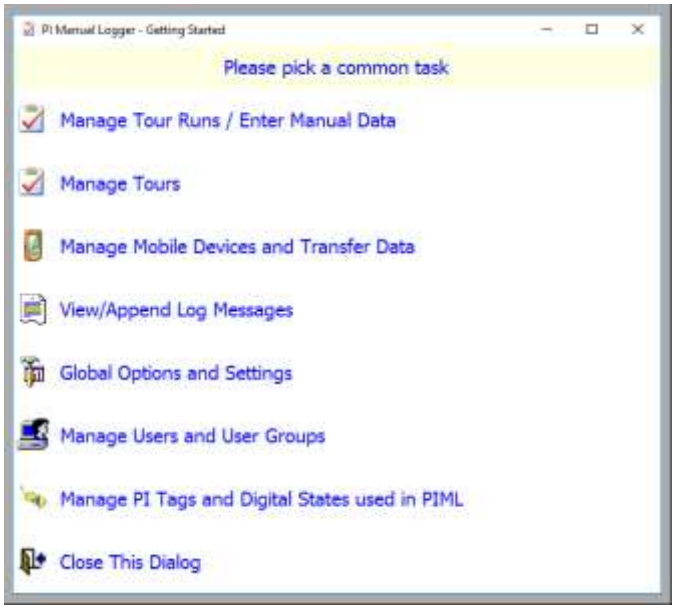
3.3.1 Default account for first time login

Launch PI Manual Logger PC Client and log in using the default account that comes with every new install:

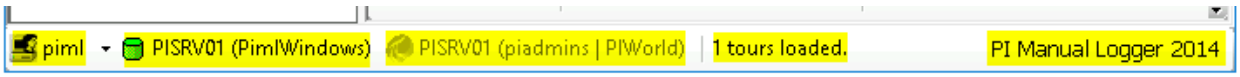
Name: piml

Password: piml

After logging in, the ***Getting Started*** dialog box appears. This dialog box provides shortcuts to some common tasks, such as add new users or groups, manage tours, etc. You can close this window and open it later by clicking on ***PIML > Getting Started Window.***



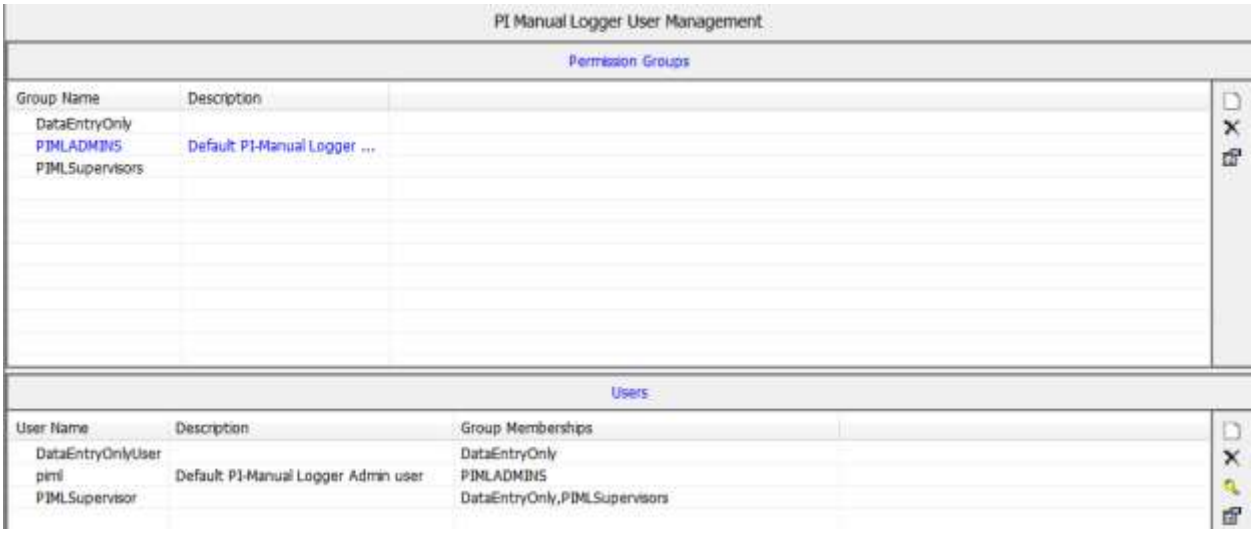
The status bar at the bottom of the main window shows the current PI Manual Logger user, current SQL Server database, the current connected PI Data Archive, any status messages, and the current version of the main PI Manual Logger application. Click the information on the status bar to change settings or show details.



3.3.2 PI Manual Logger Users and Groups

Go to *PIML > Manage User Database,* or the ***Getting Started Window > Manage Users and User Groups***

- Users belong to groups.
- Users belonging to PIMLADMINS group are administrators by default. This is defined in *Tools > Global Options > Security Settings*
- Management and data entry rights are defined at a tour level (during tour configuration) by assigning groups



In the Users pane, the following actions are possible.

- Add a new user
- Change or reset the password of an existing user
- View or change the properties and group memberships of a user
- Delete a user

In the Permission Groups pane, the following actions are possible.

- Add a new group
- View or change group properties and its user memberships
- Remove a group

Note: PI Manual Logger Users and Groups is separate from PI security!

3.3.3 Exercise – Create PI Manual Logger Users and User Groups

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

You have installed PI Manual Logger and would like to verify your connection settings with the PI Server and the SQL Server. Additionally, you must now create users before data can be collected. You will create two groups, the Operators group for the data collectors and the Supervisors group to approve and submit data. The Supervisors group will also have to be selected as the Admin User Group.

Approach

Using the PI Manual Logger menu or the status bar, verify the following: connection to the desired PI Server, connection to the SQL server, and user logged in.

Create four new users: Paul, Sam, Brad and Tony. (Beware of *case-sensitivity*)

Create two new groups: Supervisors and Operators.

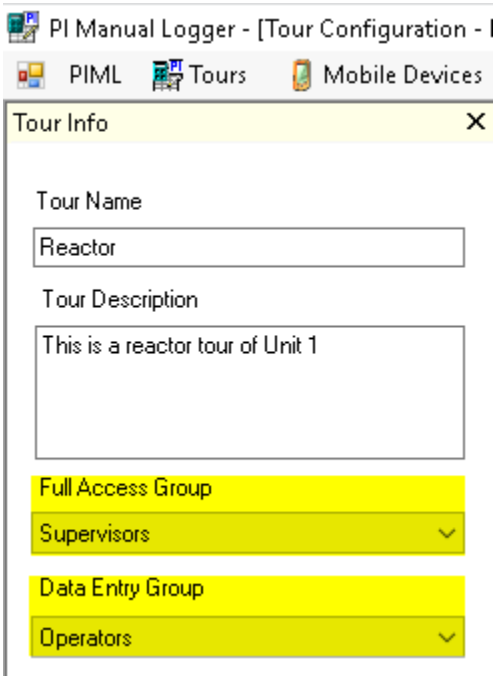
- Paul and Sam will belong to the Operators group and they will be the data collectors.
- Brad, Tony and the default *piml* user will belong to the Supervisors group; they will review, approve and submit data.

Make the Supervisors group as the Admin User Group.

3.3.4 Full Access Group vs. Data Entry Group

Management and data entry rights are set during Tour Configuration by assigning groups.

- *Full Access Group* can manage the tour. Members of such groups can modify the tour, enter and review data for the tour, as well as delete tour runs.
- *Data Entry Group* can only enter data for the tour. Members of such groups can only enter and modify tour run data. They cannot delete tour runs.



4. Tour configuration management

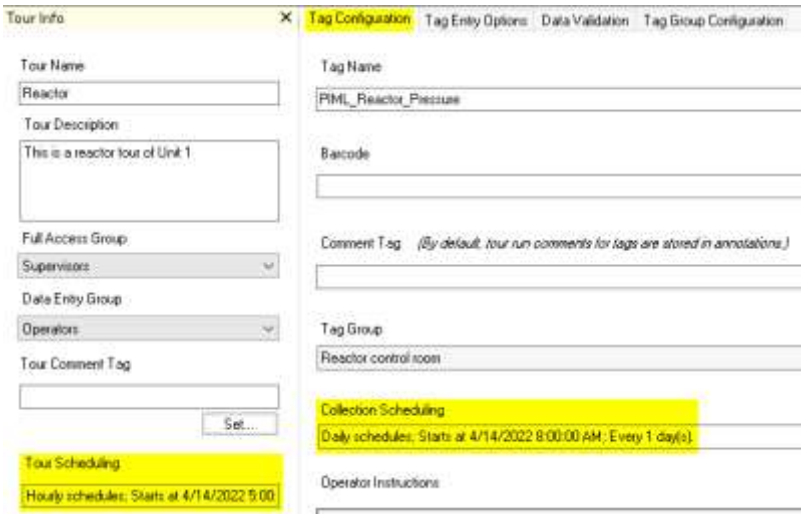
4.1 Tour Basics

In PI Manual Logger, a *tour* is a list of tags grouped together in order to facilitate data collection. The ***Tour List*** can be open by clicking on ***Tours > Tours List***, here you can create, modify, and delete tours from the PI Manual Logger database. To create/edit tours, you must be a member of the PIMLAdmins group. Otherwise, the ***Tour Configuration*** dialog box opens in read-only mode.

What makes up a *tour*:

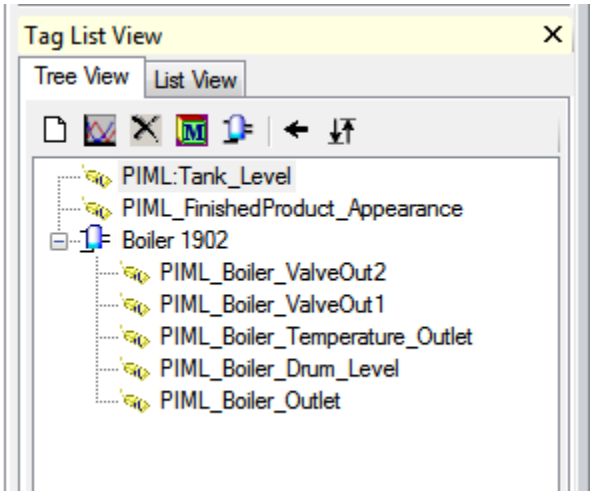
- Tour Name
- Full Access Group
- Data Entry Group
- Tag List
- Groups (optional)
- Description (optional)
- Comment Tag (optional)
- Schedule (optional)
- Tour Options
- Tag Options

Tour options are settings that pertain to the entire tour. There are group and tag options as well. The more "specific" level the option gets priority (tag > group > tour). For instance, if there is both scheduling set on a tour and a tag, the tag scheduling takes precedence.



4.2 Tour Features

Groups are a way to organize tags within a tour. Groups may contain tags and may contain groups, which can be represented in a hierarchy. A common use of groups is to represent equipment. The tag list view from a PI Manual Logger tour configuration is shown below. In this example, there is a group Boiler 1902, which contains tags that are various measurements on the boiler.



Many configuration options for tags apply to groups as well, such as scheduling, barcode assignment, comments, CMDE – all of which will be covered later in the workbook.

Scheduling can be set for tours. Scheduling **provides a guide** for collection times; **it does not enforce or alarm collection times**. When configured, scheduling dictates the suggested timestamp for a tour. In addition, group and tag scheduling, if configured, can dictate whether tags are *due* on a given tour run.

On PI Manual Logger on a PC, in the tag list view, icons denote whether a tag is

- due ,
- not due ,
- data has been entered ,
- data has been entered and is in limit violation .

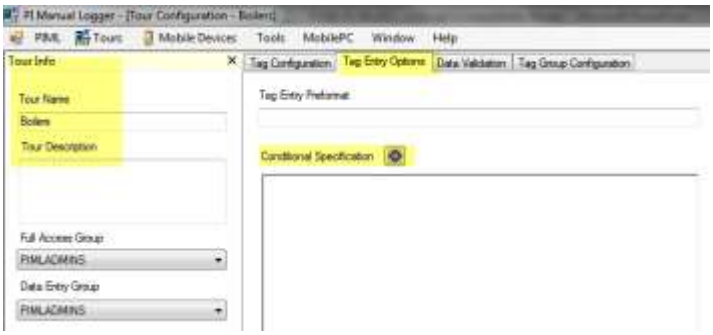
Conditional Manual Data Entry (CMDE) allows one to add a calculation/logic to a tag or group to determine if it should be due for collection. CMDE is another form of scheduling but is calculation/logic based rather than clock based.

An example of a CMDE formula:

```
If(CurrentValue("Tag1")+CurrentValue("Tag2")<=100, CollectNow(), Skip())
```

Refer to the user manual for CMDE syntax details.

CDME can be defined for a tag on the Tag Entry Options tab when configuring a tour (see next figure). It can also be defined for a group on the Tag Group Configuration tab when configuring a tour.

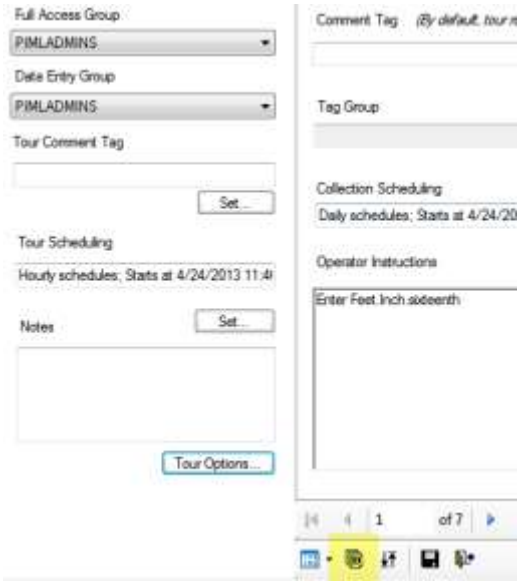


CMDE IntelliSense feature

- CTRL + SHIFT. Prompts with a list of CMDE functions along with their descriptions
- CTRL + T. Prompts with a list of tags in the tour
- CTRL + O. Prompts with a list of CMDE operators

Available Digital States

All PI tags, even those that are numeric such as a float32, can have a digital state event. The state value could be used to indicate that an equipment is down; a sample is bad, etc. To make digital states available for entry on a tour, they are assigned using the *Tour States* button while configuring a tour. Only states from the *SYSTEM* state table are available.



States that are assigned to a tour are available during data entry in a drop down box. Note that these digital states are different from those a digital tag. If a digital tag is included on a tour, all of its states are available for entry.

Barcodes

You can use a barcode as an alias for a tag name. You can also assign a barcode to a tag group (such as a piece of equipment, an area, or a building). Assignment of the barcode is done during tour configuration.

When a barcode is scanned, PI Manual Logger moves to the associated tag or the first tag of the associated group. This aids in navigation, so one is freed from sequential data entry dictated simply by the tag order of the tour.

Barcode feature is used with PI Manual Logger Web or PI Manual Logger Mobile 2012. For more details:

- How to use barcode in PI Manual Logger Web
- PI Manual Logger Mobile 2012 supported scanning devices

Comments

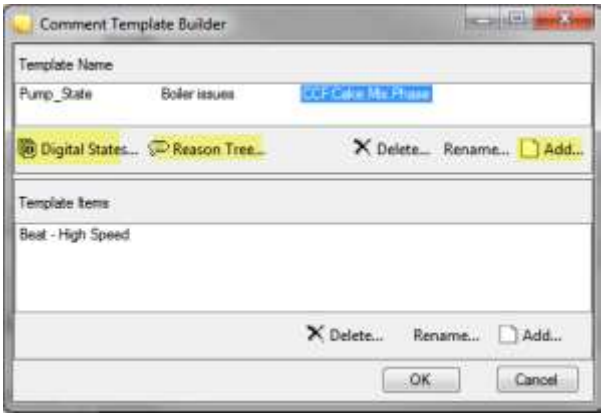
Entering comments

There are several configuration options for comment entry:

- No configuration – data entry is free-form text.
- Configure comment templates (essentially a comment pick list) using the *Comment Template Builder* (Tools > Comment Templates). Comment Templates are global and not tour specific. The templates can be
    a. newly created using the builder

b. imported from existing Digital State sets

c. imported from Reason Tree codes (built using PI SMT)



Storing comments

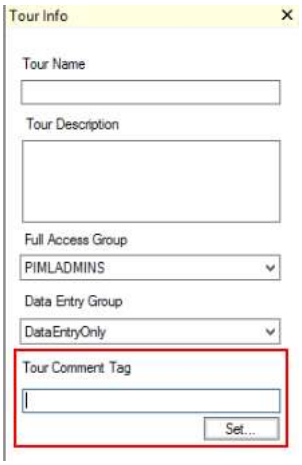
Options for storing comments are:

- If no configuration is done, then comments on tag values are stored as annotations.
- The other option is to define a comment tag per tour tag (during tour configuration). This comment tag will then receive the comment.

There is also an option to write/store comments to both annotation and comment tag.

Tour comments

A comment tag may also be assigned to tour. If so, a user may enter a comment for the entire tour.



A summary of PI Manual Logger comments options shown in table below:

Where	Comments an option?	Dropdown list available?	Stored in annotations?	Stored in comment tags?
Tour Run	Yes	Y if comment templates used	NA	Yes if a tour comment tag is defined. If not, only stored in PI Manual Logger DB.
Tour run group	Yes	Y if comment templates used	NA	Yes if a tour comment tag is defined. If not, only stored in PI Manual Logger DB.
Individual tag data value	Yes	Y if comment templates used	Yes in all cases.	Yes if a comment tag is defined for the tour run tag. In this case both annotation and a value to comment tag are stored.

Viewing Tag Data and Properties

Tag data is available in PI Manual Logger in several modes:

- a trend during tag configuration,
- a trend and list of previous values during data entry.

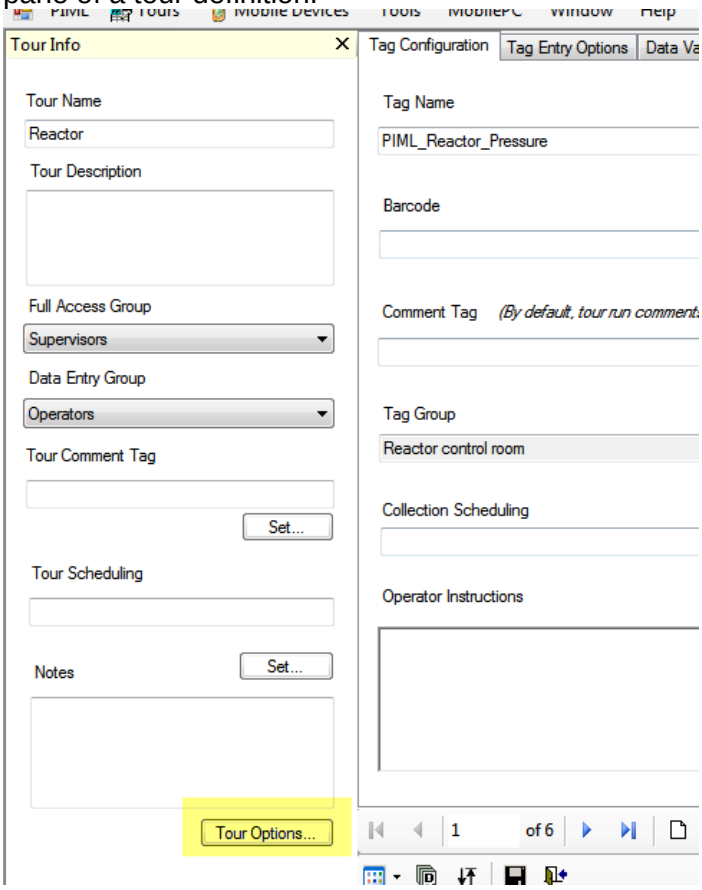
PI tag attributes are available during tour configuration.

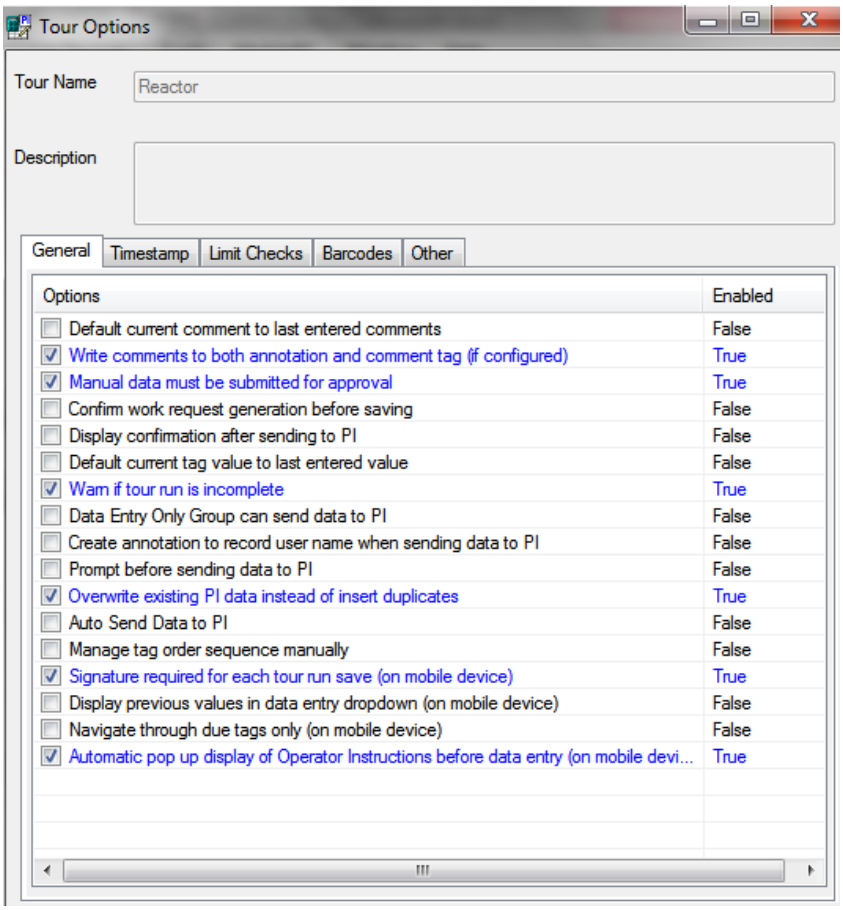
4.3 PI Manual Logger Options Overview

There are sets of options in PI Manual Logger: *tour options, user options,* and *global options.* We will review some noteworthy options, however a full explanation of every option can be found in the user guide.

4.3.1 Tour Options

The tour options are specific to a given tour. The options are accessed in the left pane of a tour definition.





Most of the options are self-explanatory. Note that some such as *Navigate through due tags only* are specific to mobile devices.

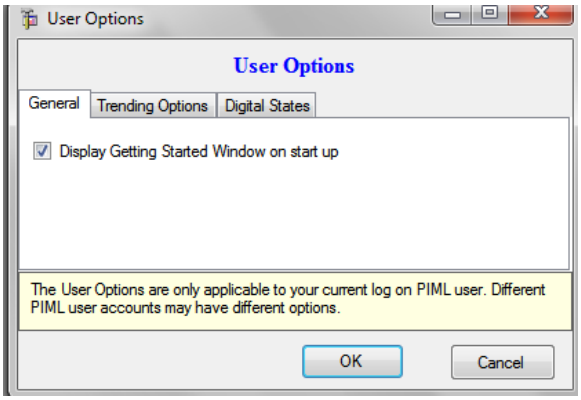
Some noteworthy options are:

Create annotation to record user name when sending data to PI
Select for PI Manual Logger to create an annotation together with the PI tag value when sending manual data to the PI Server. After the annotation and tag value are sent to the PI Data Archive, you can view them with the built-in Annotation viewer inside PI Manual Logger in addition to the PI Manual Logger Trend control. You can also use PI ProcessBook or PI DataLink to retrieve and view the recorded user name.

Data Entry Only Group can send data to PI
Select to enable users in the *Data Entry Only* group to send collected data to PI tags. However, they are still prohibited from performing other tasks only permitted to members in the *Full Access* group, such as managing tours or users.

4.3.2 User Options

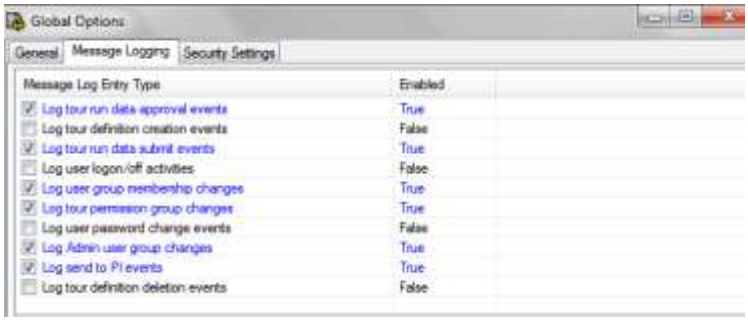
You should open Tools > User Options and we will explore them as a class.



4.3.3 Global Options

You should open Tools > Global Options and we will explore them as a class. You must be a PIML admin to access this menu.

Of special note, if your deployment may have several operators writing data to the database, it is recommended that you select the **Enable SQL Server Snapshot Isolation Level** check box. This facilitates any read operations that are made during the write operations. Otherwise delays may occur due to the multiple write transactions.



The bulk of the options are the Message Logging, which dictates what information will be logged. The messages can be reviewed at menu PIML > Message Log

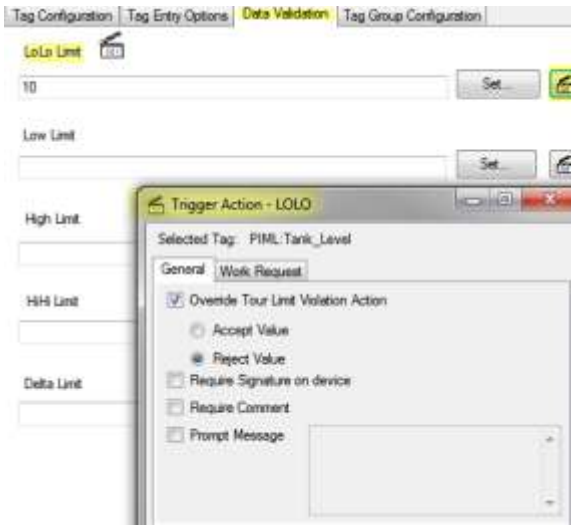
The Security Settings are important as this where the Admin User Group is specified (by default PIMLAdmins).

> **Caution**: If you are a member of the current *Admin User* Group and you it to a group you do not belong to, you can no longer access the **Global Options** dialog box.

4.4 Data Validation

Limits and Trigger Actions

Limits can be set per tag during tour configuration. Limits may be absolute values or referenced tags. A variety of actions (trigger actions) upon violations may be defined. Examples include reject or accept value.



4.5 Exercise – Create and Configure Tours

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

You must create two new tours (one for *lab data* and one for *reactor data*) for your newly installed PI Manual Logger. You will then add tags to your tour and order the tags in the order that they need to be collected using tag groups. At the end of the exercise you will create an additional tour for *boiler data*. You anticipate that the operators may have comments on the lab values they record.

Approach

Tour 1: Lab Data

- Using the Tour Creation Wizard you will create a Tour called Lab and add all the tags associated with the lab (prefix PIML_FinishedProduct). On the PIML_FinishedProductAppearance, the operator may need to comment. Comment templates can facilitate operator use of comments.
- In addition, digital states can be defined for a tour. These are different from states for a tag of digital point type. These provide states that can be chosen for any tag value. For example for a numeric sample value, *Sample Bad* may be entered. These digital states are defined on a tour basis. Assign digital states for the Lab tour.

Tour 2: Reactor Data

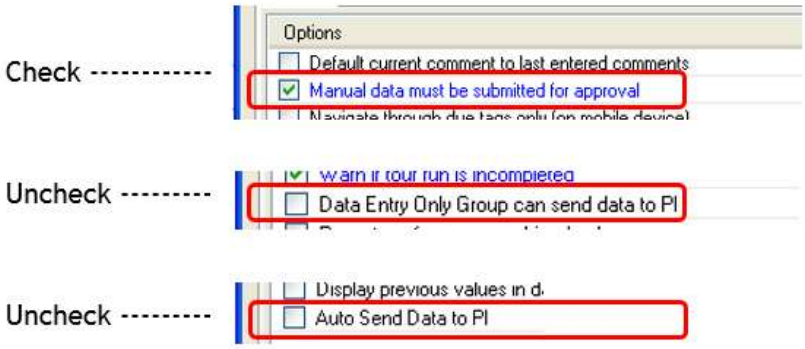
- Using the New Tour dialog box you will create a second tour called *Reactor* (without using the tour creation wizard). Save the tour and close. Using the *Tour Configuration* window edit the *Reactor* tour by adding all the tags associated with the reactor (prefix PIML_Reactor). Organize the tags into two different groups and experiment with ordering the tags.

Tour 3: Boiler Data

- Use what you learned to create a *Boiler Data* tour.

4.6 Approval Process for Sending Data to PI

Tour Configuration - menu Tour Options



If you check *Manual data must be submitted for approval* it will only allow someone in the *full access* group to send Data to PI.

Setting *Data Entry Only Group can send data to PI* to OFF (unchecked) will only allow regular users to be able to submit data for consideration.

If you want to really review the data and not have it automatically written to PI then make sure, you uncheck *Auto Send Data to PI*. Otherwise, you run the risk of sending data to PI by accidentally opening and closing a tour run.

4.7 Exercise – Define Collection Schedule and Options

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

You need to create a data collection schedule for one of your recently created tours (*Reactor* only). Configure the tour so that a signature is required and the data is reviewed before being sent to the PI server.

Approach

Open the *Reactor* tour and create an hourly collection schedule.

Additionally, configure the tour with the following options: the tour requires a signature by the operators; the supervisors must review the data before being sent to the PI Server, default the tour time to the current timestamp.

Also, add a LoLo, Low, High and HiHi Limit of 150, 200, 420 and 470 to the Data Validation tab of the Temperature tag. Add an action to require an operator comment when the LoLo or HiHi limits are violated, and an operator signature when the Low or High limits are exceeded.

Lastly add the following digital states to the tour: Unit Down and Out of Serv. These digital states are part of the PI System digital state set.

4.8 Exercise – Conditional Data Entry and Operator Instruction

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

Open the *Reactor* tour and specify a conditional data entry for the capacity, cooling water intake and valve tags. Add an operator instruction for the reactor ValveOut1 tag.

Approach

Open the tour definition and specify a conditional data entry for the Reactor Capacity, such that the tag only collected if reactor pressure <= 10 or reactor pressure not equal “UnitDown”.

Under the Reactor ValveOut1 tag provide operator instructions to ensure both relief valves are closed but unlocked.

4.9 Exercise – Export and Import Tour Configuration

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

In this activity, you will export tour configuration data to an XML file and modify the file outside PI Manual Logger. There are several reasons why you might want to export and import tours:

- To transfer tours from one PI Manual Logger database to another, for example when moving data from a development to a production environment.
- To bulk load tour configurations.
- To edit tour configurations in an Excel spreadsheet. It is often easier to re-sequence PI tags this way.
- To rename PI tags. This task is easier to accomplish in an XML file rather than in PI Manual Logger.
- To export data to Technical Support for troubleshooting.

Approach

Export all the tours you have created in PI Manual Logger.

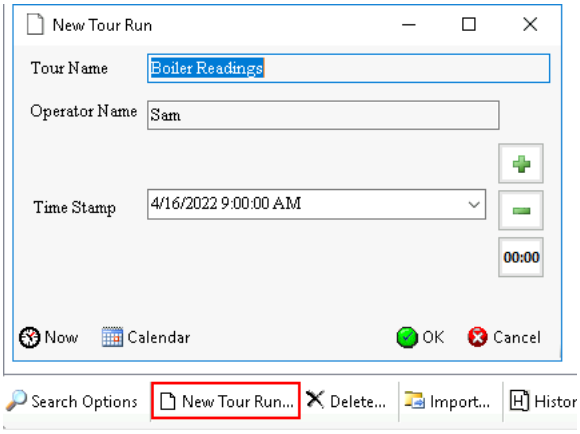
Open the XML file in Excel using the PI Manual Logger tour configuration schema file.

- Modify the Reactor tour the following way: change the HiHi limit of the temperature tag to 500.
- Modify the Lab tour in the following way: Re-sequence the tags such that the first tag to collect data for is pH, then Density, BoilingPoint and lastly Appearance.

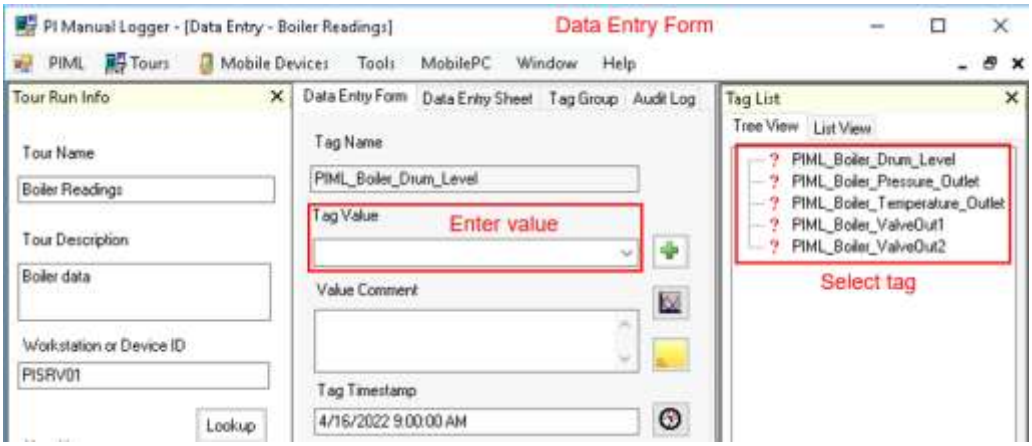
Import back all the tours into PI Manual Logger. Verify that the changes to the Reactor tour were saved.

5. Collecting Data with Tour Run

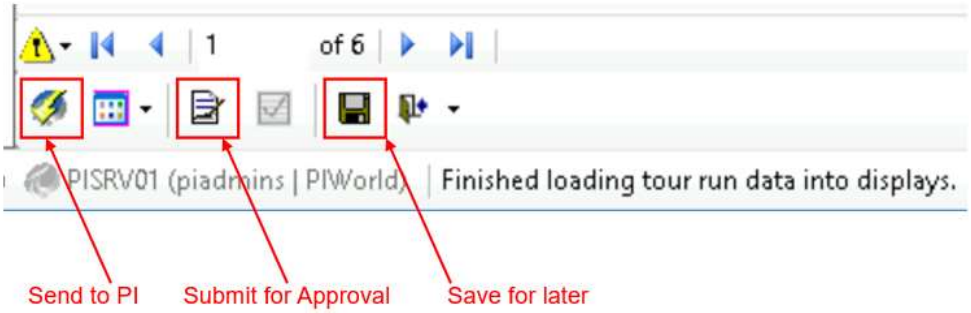
Start a tour run



Enter data

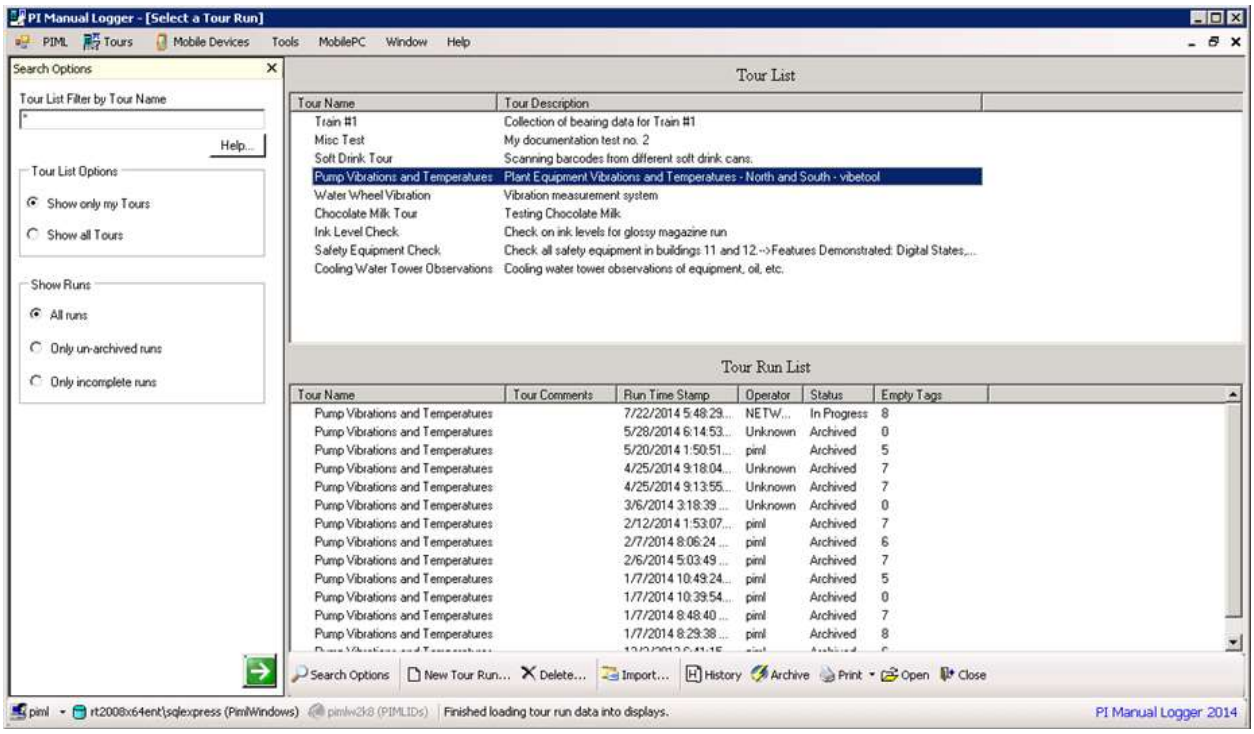


Finish options



Check tour run status

To review a tour run status, select *Tours > Tour Run List (Manual Data Entry and Review)*. This launches the *Select a Tour Run* window that lists available tours and tour runs that have already been created for each tour.



In the Tour List pane, select the tour you want. The tour runs associated with the selected tour are displayed in the Tour Run List pane.

The Tour Run List pane displays the status of existing tour runs for the tour you have selected. Status values are:

Status	Description
Ad hoc	Tour run was performed but all conditional checking (such as clock scheduling and CMDE) was ignored.
Archived	All non-empty values in the run have been written to PI Data Archive.
Completed	The run has been completed but the values have not been archived. This should only occur when approval is needed for data. Runs with this status have been successfully stored in SQL.
In Progress	Data entry has started but is incomplete.
Queued	The run has been completed but contains future data that cannot be sent to PI Data Archive yet. Queued data (or future data) is not placed in the queued data list to be sent to PI Data Archive until the data is approved.
Submitted	Data entry is complete and is ready for review.

5.1 Exercise – Create and Save Tour Runs

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

In this exercise, you will collect data with PI Manual Logger by creating tour runs. You will then view a history of previous values and will save the data.

Approach

Create new tour runs for the *Lab* and *Reactor* tour and enter values for each one of the tags using the *Data Entry* dialog window. Preview a trend of previous values by clicking on the trend icon next to the tag value input box. Preview some of the previous values by clicking on the *previous values* tab in the tag info pane. (There may not be any, if the tags are newly created).

Finally, repeat for the *Boiler* tour.

5.2 Collecting future data

PI Manual Logger does not support sending future data (more than 10 minutes into the future) to the PI Data Archive. When future data is collected, the data is stored in the queued table (tour run status shows Queued) until it needs to be sent to PI Data Archive when the timestamp becomes current.

You can do this manually, or have PI Manual Logger Windows Services send the queued data to PI Data Archive automatically on a scheduled basis after the timestamp of the queued data becomes current.

Procedure

1. To send the queued data manually, select PIML > PI Tags and Digital States.
2. Click the Queued Data tab. A list of all queued data that is now viable (less than 10 minutes into the future) is displayed.
3. Choose one of the following actions:
    a. Click  (the Send Queued Data to PI button) .
    b. Right-click and select Send to PI.

All queued data that is now viable (less than 10 minutes into the future) is sent to PI Data Archive.

Note: We will discuss more about PI Manual Logger Windows Services in a later chapter.

5.3 Exercise – Create and Save Tour Runs with future data

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

In this exercise, you will repeat the data collection process by creating a tour run of the *Lab* tour, but with a timestamp in the future.

Approach

Create a new tour run for the *Lab* tour and enter values for each one of the tags using a timestamp of 20-30 minutes into the future.

Check that the tour run has a status of Queued. Verify that the future data is not sent to the PI Data Archive.

When the timestamp becomes current, manually send the queued data to PI.

6. Tour Run Reviews and Maintenance

6.1 Tour Run Reviews

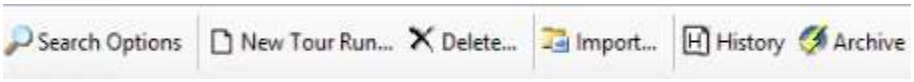
Users who belong to the Full Permission Group assigned to a tour can review and modify any submitted and unarchived tour run data before sending it to PI Data Archive.

Procedure

1. Select Tours > Tour Run List (Manual Data Entry and Review) or press F6.
2. In the Tour List, select the tour you need to review.
3. Optional. To group the tours in the Tour Run List by Completed status, click the Status column heading.
4. Double-click the completed tour you need to review, or select it and click Open Open.
5. Click Yes in response to the confirmation prompt.
6. In the Data Entry window, review and modify (e.g. correct/re-enter) the data as appropriate.
7. Click Approve . The Data Entry window closes and the status of the tour run changes to Archived.

Besides reviewing and modifying tour run data, here you can also perform other tasks such as:

- Review status of runs.
- Check history of runs: provides additional details such as user, workstation ID, etc…
- Search tour runs.
- Delete selected tour runs.



6.1.1 Exercise – Approve the Data for the PI Archive

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

You want to review the data collected in the previous exercise before it is written to the PI Server.

Approach

Go into the tour run list. Select the *Reactor tour* from the top panel and then double-click the specific run from the lower panel. Review the tour run and the values collected. You can modify or remove any bad values. You can also add or edit any comments. Approve and send the data to the PI server.

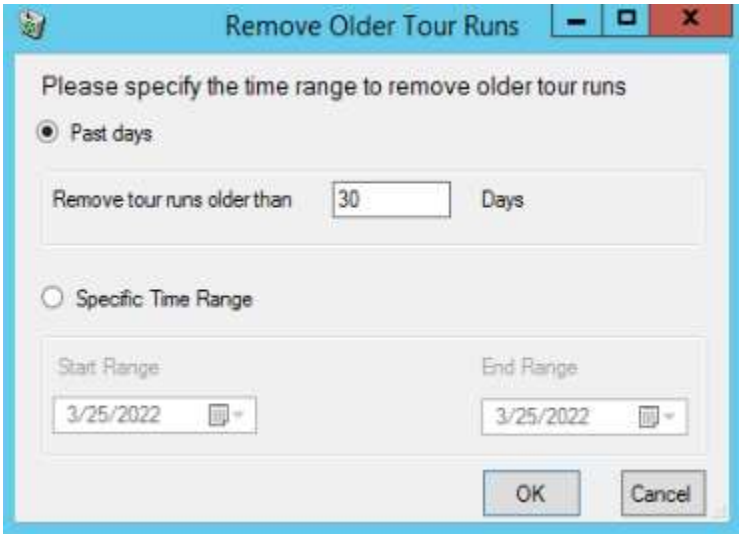
6.2 Tour Run Maintenance

You access the Tour Run Maintenance window from Tours > Tour Run Maintenance.

Note: Only users that are members of the PIML administrative group can access this function.

Here in this Tour Run Maintenance window, very much like the Tour Run List window, you can manage and review unapproved tour run data stored in the database. You can also remove any unapproved tour run data.

On top of that, there is also an option here for you to delete/remove older tour runs by specifying a time range. OSIsoft recommends that you periodically remove old tour runs that have been archived (that is, sent to PI Data Archive) to improve PI Manual Logger performance.



Note: Approved tour run data is saved in the target PI points. OSIsoft recommends that you use PI client tools, such as PI ProcessBook and PI DataLink, to view the approved data available.

7. PI Manual Logger Audits

Auditing PI Manual Logger On the PI Server

Security on the PC application is integrated with PI trusts or PI Mapping. When users log in to a PC workstation and start PI Manual Logger, they are authenticated against the established PI trust or PI Mapping on the currently connected PI Data Archive. After they are authenticated to this PI Data Archive, they can access data in the PI Data Archive. All connections to the PI server are recorded in the PI server message log.

Changes to PI data (such as from a PI Manual Logger user) can be trailed if PI Auditing is enabled. See the *Auditing the PI Data Archive* section of the PI Server manual for details.

Auditing on User Database Changes

Administrators can audit changes in the user database, such as user password changes and user group relationship changes. Click **Tools>Global Options. S**elect the **Message Logging** tab. Select from these options:

- Log user group membership changes.
- Log user password change events.
- Log Admin user group changes.

Auditing on Tour Definition Deletion and Creation

You can audit tour definition creation and deletion events. Click **Tools>Global Options. S**elect the **Message Logging** tab. Select from these options:

- Log tour definition creation events.
- Log tour definition deletion events.

Auditing on Data Transfer

All successful data transfers from PI Manual Logger to PI Data Archive is audited and logged into the PI Manual Logger database. To view these logs, use the *Message Log Viewer*.

Auditing on Manual data must be submitted for approval tour option

If the tour option Manual data must be submitted for approval is set to True, submit and approve events can be logged to the Message Log if the following options are enabled:

- Log tour run data approval events
- Log tour run data submit events

Auditing on Data Changes in PI Manual Logger

If a user makes changes to an existing tag value, its timestamp, or its comment, the action is audited and saved in the tour run audit trail. You can view the audit trail in the *Tour Run Audit Log.*

From PIML PC Client, Tours > Tour Run Maintenance > double click a Tour Run > Audit Log tab.

Auditing on duration of tour runs

The duration of a tour run is recorded and saved in the dbo.tblTourRunAuditLog table in the AuditLog field. The format for this information is as follows:

```
Total Duration: 00:00:29

 Session 1: Duration: 00:00:04 Start Time: 2017-06-
30T17:05:46.789Z End Time: 2017-06-30T17:05:51.245Z

 Duration Between Sessions: 00:00:14

 Session 2: Duration: 00:00:24 Start Time: 2017-06-
30T17:06:05.518Z End Time: 2017-06-30T17:06:29.909Z
```

8. PI Manual Logger Message Logs

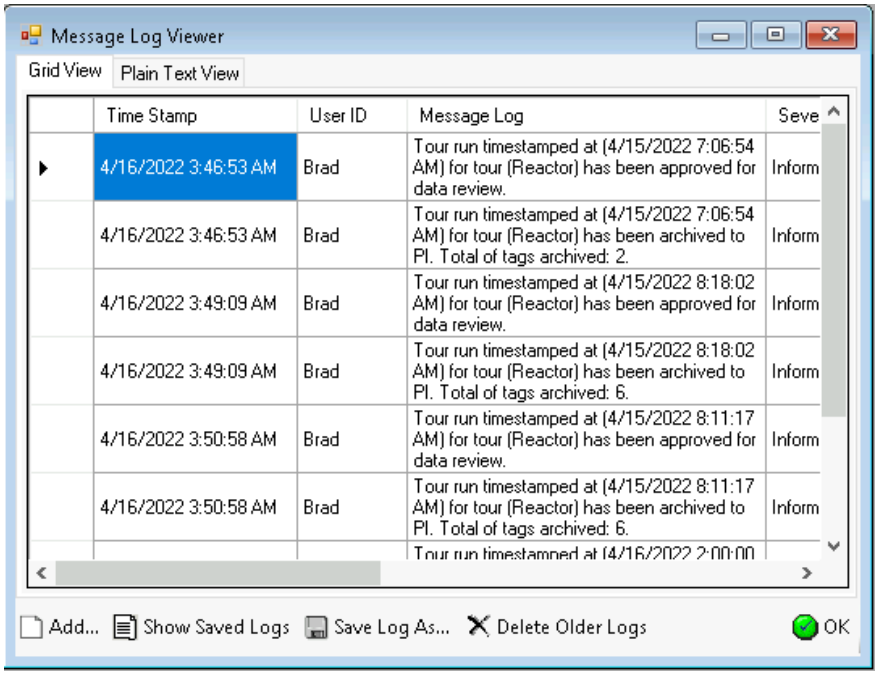
The following activities and events are saved in the message log for auditing purposes:

- Successful or failed tour creation, modification, and deletion, including the details on which tour and which user made the change.
- Successful or failed archive action for tour run data, including details on which user was involved in the action.
- Other failed access events.

To view the history of the PI Manual Logger message logs, select **PIML > Message Log**.

In the **Message Log Viewer** dialog box, you can view logs in **Grid View** and **Plain Text View** by clicking the corresponding tabs. To view all logs in the PI Manual Logger database, click **Show Saved Logs**.

Note: **Show Saved Logs** displays 30 days at a time. Continue to press the **Show Saved Logs** button to view additional days.



9. PI Manual Logger Web

9.1 Overview

PI Manual Logger Web is an HTML5 based web application that enables users to enter tour run data using a web browser on a desktop or on a modern device, such as a tablet or smartphone. The application is served by the IIS Web Application (runs under PimlWebServiceAppPool), which is installed by the PI Manual Logger Web install kit. The install kit also creates additional stored procedures (SPROCs) in the PimlWindows SQL database that are used to allow the web application to retrieve and run tours.

Note: PI Manual Logger PC Client must be installed and PimlWindows SQL database must exists BEFORE installing PI Manual Logger Web.

The first time you want to launch PI Manual Logger Web, you must have a network connection to the web server to load tours into the browser cache. After that, a network connection is needed only when you want to:

- Send data to PI Data Archive (or cache it in the PI Manual Logger database)

  Or

- Update tour definitions (using “Refresh” button on the home page). Tour definition updates include previous values, historical values, changes to which tags are collected or to tag limits, and so on.

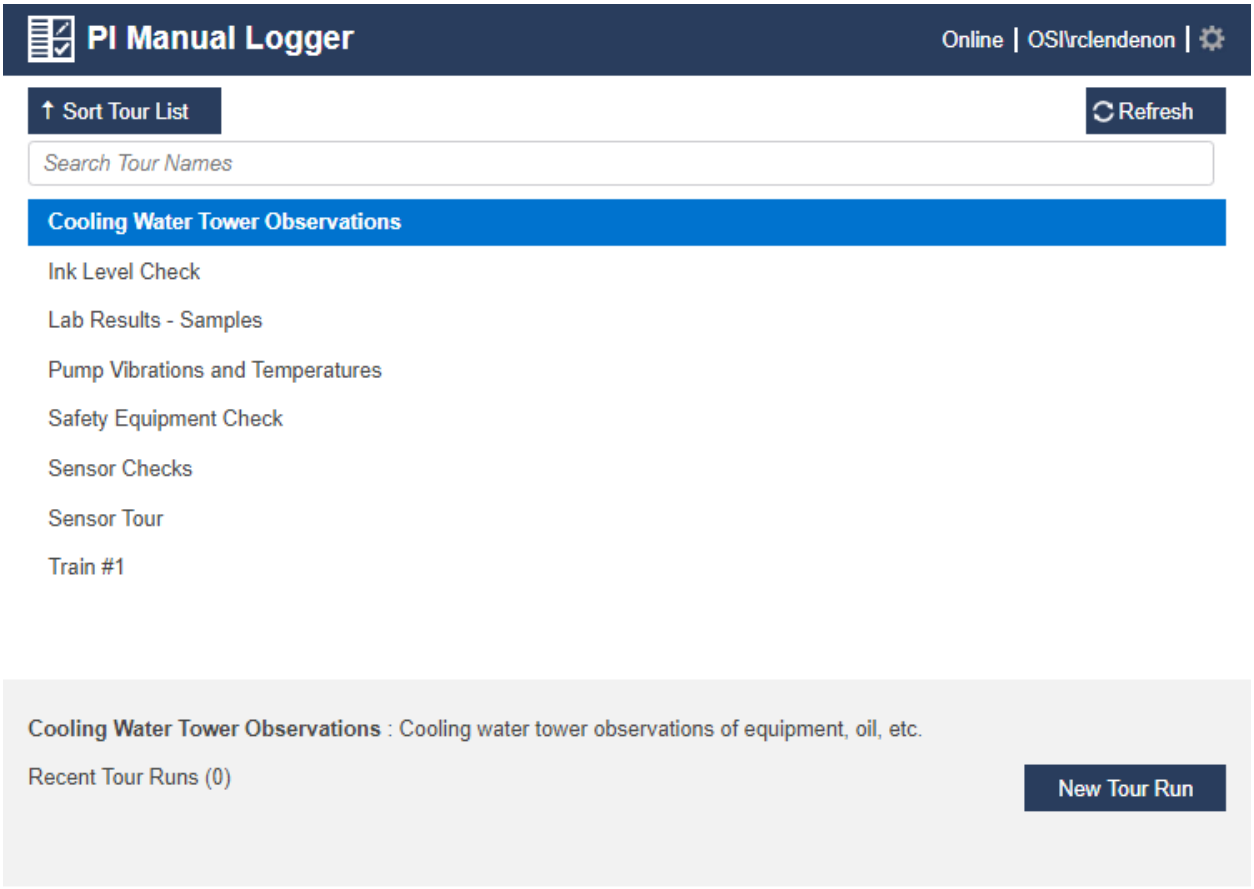
Otherwise, data collection can be performed entirely Offline (i.e. no connection to PI). This is especially true when most plants do not have WiFi on the production floor as a safety precaution. Tour data is entered by users and saved in the browser cache. When users go back into the WiFi zone and have network connection ("online"), they can then submit the saved tour runs.

9.2 PI Manual Logger Web Data Entry

To connect to PI Manual Logger Web, open a browser and enter a URL similar to the following:

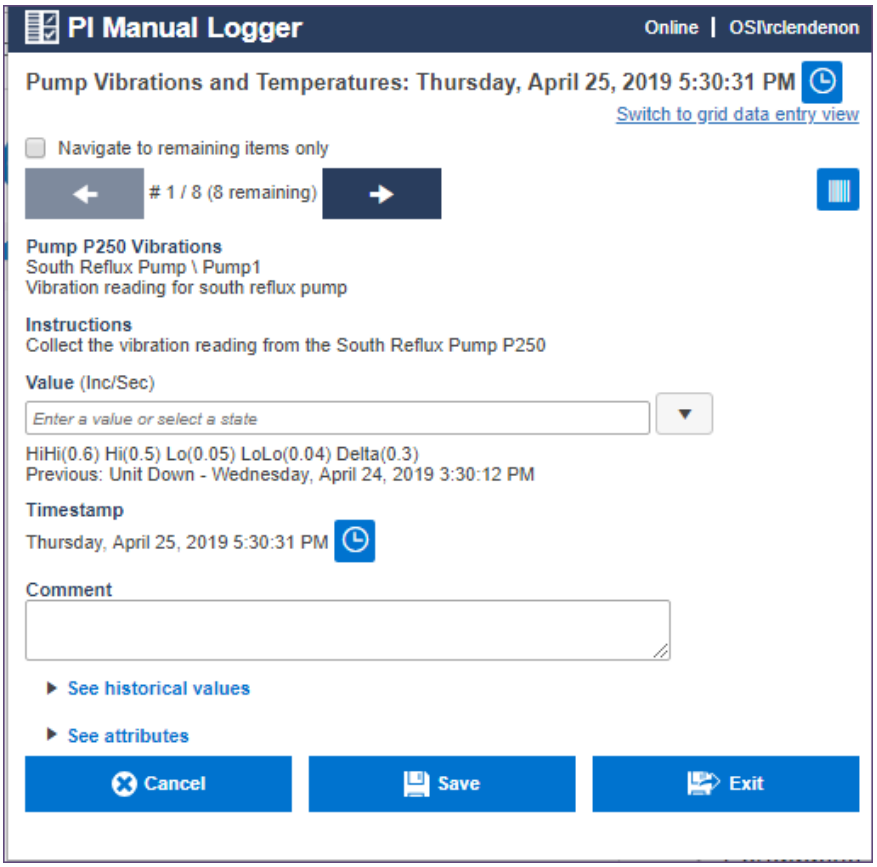
https://<webServer>/Piml.web

The tours to which you have access are displayed on the home page.



1. Select a Tour from the Tour List
2. Click New Tour Run
3. Use the individual data entry page to enter tour run data on a per tag basis, and in the tag sequence established during tour configuration. This is the default display for PI Manual Logger Web.

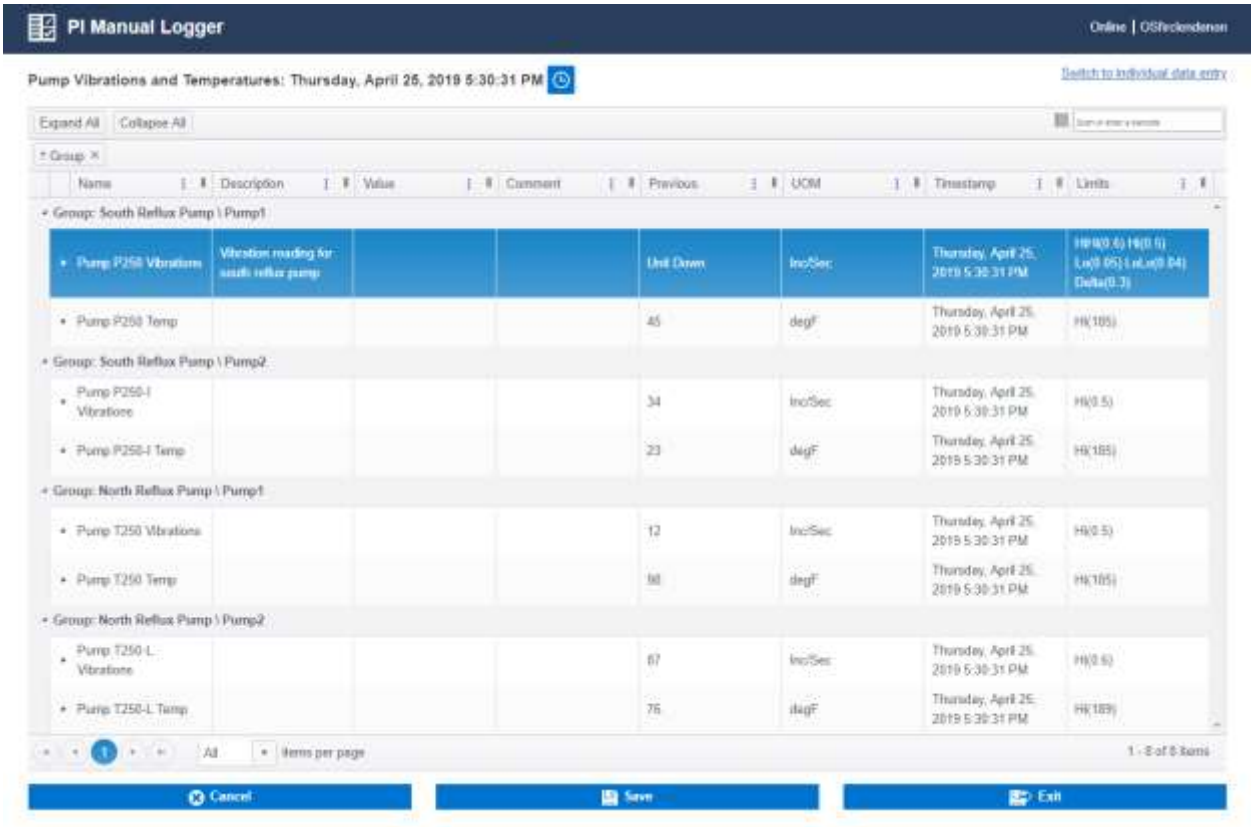
Individual data entry



- Tagname is displayed immediately below the navigation buttons. The full group path to which the tag belongs in the tour is displayed under the tag name.
- Descriptor, if defined, appears below the tag name.
- Operator Instructions, if defined, under the Instructions label.
- Value and Comments (optional) may be entered.
- If the tag is digital type or digital states associated with the tour, the Value dropdown will list digital states.
- Engineering Units, if defined, appear next to the Value label.
- Limits, if defined, are displayed below the Value field.
- Previous tag event is displayed after the Previous label
- The timestamp associated with the current tag event is displayed. Depending on tour configuration settings, you can change the timestamp.
- Historical values and Attributes (such as UOM, Zero, Span, Point Type, or Digital Set) are also available. By default these are minimized.
- The blue barcode icon (top right) is used for scanning or entering a barcode (if configured).

You can also switch to grid data entry view from the top right link.

Grid-based data entry



- Tags are initially organized by groups defined in your tour configuration. You can change it to have the rows grouped by any column value.
- Default columns in grid data entry are Name, Description, Value, Previous Value, UOM, Comment, Timestamp, and Limits. You can also customize the columns and move them to different positions, as required.
- The columns can be sorted
- Expanding a row reveals a chart of previous values
- See the user guide for a list of Grid-based data entry page controls

Finally, when you hit the **Save** button, tour run data is sent to the PI Data Archive server if all of these conditions are met:

- General Tour Option *Manual data must be submitted for approval* is false.
- General Tour Option *Auto Send Data to PI* is true.
- The data timestamp is not in the future.

Note: Approval of tour run data (if required) can only be performed in PI Manual Logger PC Client.

9.2.1 Exercise – Enter and Save data with PI Manual Logger Web

This exercise is designed to maximize learning in a specific topic area. You are invited to watch what the instructor is doing and perform the same steps at the same time, or your instructor will have instructions and will coach you if you need assistance during the activity.

Problem Description

You want to enter data using PI Manual Logger Web.

Approach

Open a browser, go to the PI Manual Logger Web URL (http://*webserver*/PIML.web).

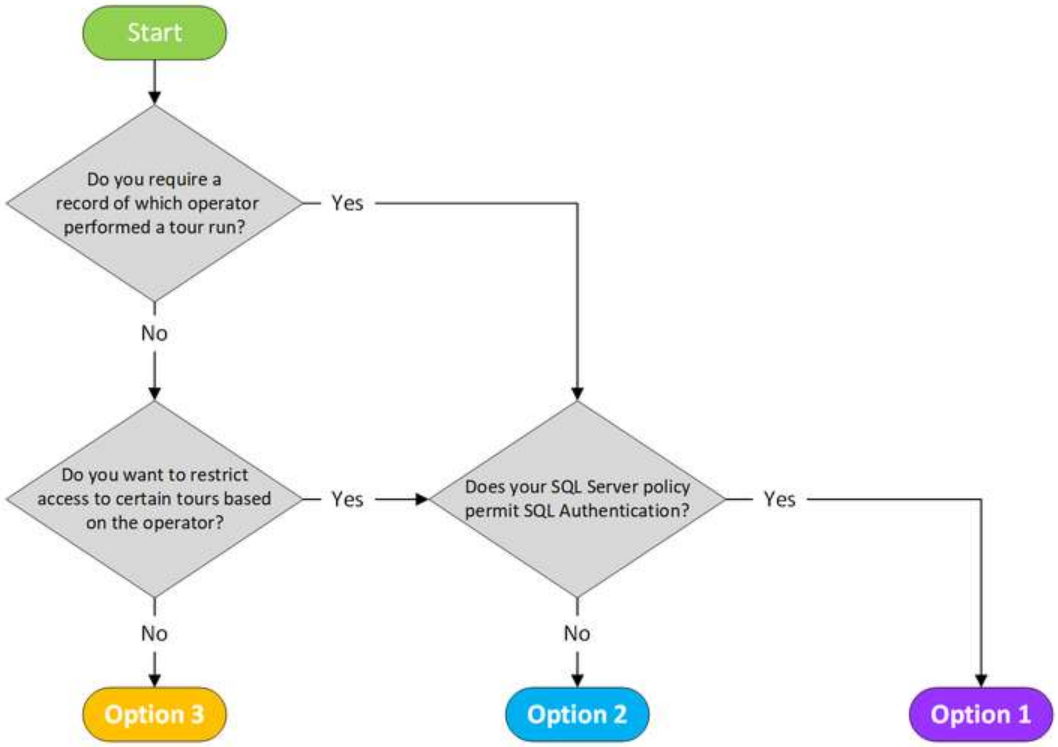
Select the *Boiler* tour from the top panel. Enter values and some comments. Enter some of data using the grid view. Send the data to the PI Data Archive. Confirm that the data and comments have been stored.

Then, simulate collecting data in Offline mode and note the differences.

9.3 PI Manual Logger Web Security

There are three ways to utilize Windows Active Directory (AD) credentials when using PI ML Web. Deciding which of the three options to use depends on your use case and security scenario. If possible, after considering the impact of each configuration option, use the first option below.

Use the following flowchart to decide between the three options:



Option 1: Authenticate with AD credentials to the web server and use a SQL login to perform all reads/writes on behalf of the PI ML Web user. This requires a SQL login, uses SQL authentication to connect to SQL, and only the SQL login requires read/write/execute permissions to the PimlWindows database.

Option 2: Enable Kerberos delegation on the web server and pass through the AD credentials so that reads/writes to PI ML are performed by the authenticated user. This allows the AD user to read/write to specific tours.

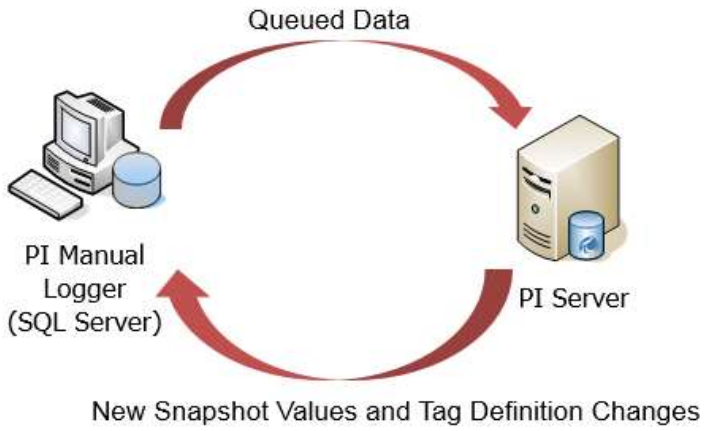
Option 3: Authenticate with AD credentials to the web server (IIS) and subsequently use the application pool identity for all reads/writes to PI ML. Option 3 will perform all tours reads and writes with the same identity regardless of the authenticated user. For example, every user allowed to authenticate to the web server will "see" tours and create new tour runs based on the PI ML permissions associated with the application pool identity.

10. PIML Windows Service

10.1 Features

- Windows Service that stores cached data in the PI Manual Logger database synchronized with the targeted PI Data Archive.
- Periodically updates the cached tag values in the PI Manual Logger database.
- Periodically updates the cached tag attributes and digital states in the PI Manual Logger database.
- Periodically checks any queued future data in the PI Manual Logger database and sends them to the targeted PI Data Archive when the queued time passes.

10.2 Architecture



10.3 Configuration

The account used for PI Manual Logger Windows Services needs:

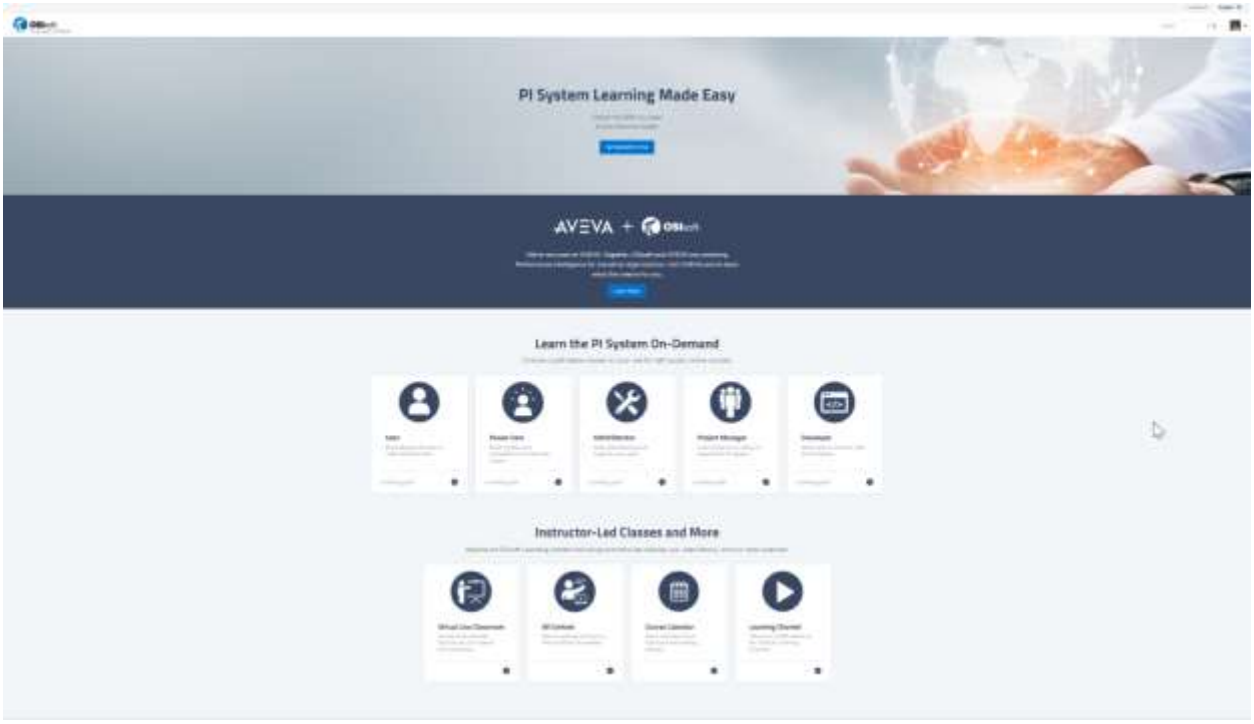
- db_datareader and db_datawriter database role membership to the PI Manual Logger SQL Server database, and
- read/write permissions on the PI Data Archive for both point and data security for all PI Manual Logger tags.

By default, PI Manual Logger Windows Services is scheduled to synchronize tour data with the target PI Data Archive every six hours. This is configurable to a minimum of one hour by changing the *PulsorTime* setting value in the *PIPC\PimlWindows\PimlServiceSettings.xml* file (requires restarting PI Manual Logger Windows Services).

11. Resources

11.1 OSIsoft Learning Website

The OSIsoft Learning website is located at https://learning.osisoft.com. This is the best place to learn more about the PI System. We have curated our online courses, instructor-led training, and hands-on labs in an easy to browse website. The platform is separated into learning paths, and for beginners, we suggest the **User** path.



Online Courses

Take a few minutes to click into the different learning paths and see the types of online courses offered for:

- Users – who need to see the data in real time or build reports with PI System data.
- Administrators – who keep the data flowing and support end users. These courses dive into the backend components of the PI System.
- Developers – who write code to interact with the PI System programmatically.
- Power Users – who are adept with the basics of the PI System and can boost their organization's efforts through building an enhanced Asset Framework structure.
- Project Managers – who need to lead initiatives to adopt or expand the PI System in the organization.

Our online courses cover a wide range of topics and are on-demand. When you sign up for an online course, you will immediately gain access to the course material for

30 days along with a Training Cloud Environment for you to practice the concepts discussed in the course.

You can also purchase a Training Cloud Environment separately from the courses if you want a place to explore the PI System outside of your company's production environment; however, we recommend using your own development system whenever possible to create meaningful results with your company's data as you learn from our online materials.

Instructor Led Courses

If you prefer having an instructor, you will want to check out our instructor-led Virtual or Classroom Courses. We have several training centers around the world for you to visit, so pick a location that is convenient for you (or combine some PI education with a vacation)!

To browse the available training centers and courses, follow these steps:

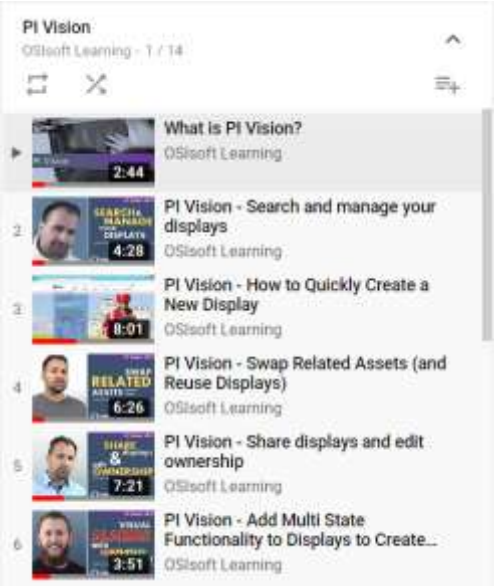
1. Click on "All Content"
2. Use the filter on the left to select "Classroom" under "Content Type"
3. Expand the "Location" category to browse our training centers
4. View the available courses offered at your selected location
    a. Some training locations offer course taught in languages other than English, feel free to use the "Language" filter to further refine your course options.
5. Click on the course that matches your interest and follow through registration

If you want to view the course calendar, you can click on the calendar icon  in the All Content page.

11.2 OSIsoft Learning YouTube Channel

Visit our YouTube Channel (@ youtube.com/OSIsoftLearning) to learn about the PI System by watching any of our 1000+ free videos on YouTube!

Playlists for various topics are available to help guide you through your training topic of choice from start to finish.



11.3 PI Square – The online PI System Community

PI Square (pisquare.osisoft.com) is your community to connect with peers worldwide, ask questions, share answers, meet others, and exchange ideas, to get more value out of your PI System.

The PI Square community has places you go to collaborate, called Spaces. These spaces are generally named for a specific topic or purpose. Each space can contain multiple types of content, including discussions, documents, blog posts, polls, and more. Currently, PI Square has the following four spaces:

- **All Things PI -** A general forum where OSIsoft Technical Support will keep watch to help answer questions and contribute to discussions. Use the product-specific spaces like PI Server or PI Visualization to find relevant content for whatever your needs may be.
- **PI Developers Club -** Here we have tools and support for developers to create applications for the PI System.
- **Learning Forums -** Our hub for students to interact and learn from each other while they pursue certificates in our on-demand online courses.
- **PI Square Groups –** Join a group that speaks to your specific industry's needs and learn from others in your field of their recommended best practices for projects on your horizon.

11.4 The Customer Portal

The **myosisoft.com** website has many tutorials on how to support related activities as well as quick links to take you to commonly used support pages:

OSIsoft Customer Portal Hints

- How to Get an OSIsoft Customer Portal Login
- How to Create a New Case
- How to Download Products and Generate Licenses
- How to Search for Articles
- How to Manage Users

From the Customer Portal, you can also:

- Download any PI product your company is licensed for using.
- View the PI System Roadmap to get information about the most current releases and what new features and products are on the horizon.
- Login and view your open and previously closed **Support Cases or create a new one.**
- Search through our **Knowledge Base** to try and troubleshoot any issues you may be having by referring to the rich collection of available KB Articles.

Here is the general phone number for the OSIsoft Technical Support:

Phone: +1 510 297-5828 in North America  24 Hour Telephone Support

Support may be provided in languages other than English in certain centres based on availability of attendants. If you select a local language option, we will make best efforts to connect you with an available Technical Support Engineer with that language skill. If no local language tech support engineer is available to assist you, you will be routed to the first available attendant.

Before you contact Technical Support, it is helpful to have certain information readily available. OSIsoft technical support engineers will ask:

- name of the product
- version number
- the time that the difficulty started
- the computer platform (CPU type, operating system, and version number)

11.5 Further Questions?

For questions about Licensing, you can find your account manager listed at http://www.osisoft.com/ **> Contact Us**

For questions about existing Support Issues, contact technical support (at +1 510 297-5828) or visit **my.osisoft.com**

For questions about unresolved training issues, contact your instructor or email learning@osisoft.com.

For all other questions, please contact our Customer Service group via email at customerservice@osisoft.com.

12. Appendix

12.1 Exercise Solutions

12.1.1 PI System Times (Exercise 1.3.6)

(assume now: Tuesday, 20-May-2014 10:12:23 AM)

Abbreviation	Answer
* - 30m	20 – May – 2014 09:42:23 AM
T-1d	19 – May – 2014 12:00:00 AM (midnight)
y + 8h	19 – May – 2014 08:00:00
12 8:	12 – May – 2014 08:00:00
Tuesday – 2d	18 – May – 2014 12:00:00 AM (midnight)

Abbreviation	Answer
Today at 6:30 AM	T+6.5h
Monday at 5:45 am	Mon+5.75h
12 hours ago	*-12h
The first day this month	1
Tomorrow at 7:00 AM	t+31h
2 hours from now	*+2h

12.1.2 Add a user account to PIMLWindows database (Exercise 3.1.1)

1. On PISRV01, launch SQL Server Management Studio (SSMS), and connect to PISRV01 SQL server
2. Object Explorer > Security > Logins > right click > New Login…
3. In the Login name field, search for or type in the AD domain group that contains all PI Manual Logger users, i.e. *PISCHOOL\Students*
4. Verify that Windows Authentication is selected
5. Go to User Mapping tab > select PimlWindows database
6. Database role membership:
    - Check db_datareader, db_datawriter, public
    - Uncheck db_owner
7. OK

12.1.3 Configure PI Data Archive Security (Exercise 3.2.1)

1. On PISRV01, launch PI System Management Tools (SMT)
2. Security > Identities, Users, and Groups
3. On PI Identities tab, right click > New Identity…
4. In the Identity field, type in *PIMLUser*, then Create
5. Go to Security > Mappings & Trusts
6. Right click > New Mapping…
7. In the Windows Account field, search for or type in the AD domain group that contains all PI Manual Logger users, i.e. *PISCHOOL\Students*
8. In the PI Identity field, select the new identity *PIMLUser*, then Create

Note

- If PIWorld is disabled and the end user is not mapped to any other identities that already have permission on the PI Server, then add the PIMLUser identity to PIPOINT Database Security with minimum read access.
    - PIWorld is not disabled in this training environment
- The PIMLUser identity needs access on all (existing and new) PIML tags, i.e. read access to point security and read+write access to data security. For bulk create/edit of a large number of tags, use PI Builder Excel Add-in.
    - In this training environment, there is no existing PIML tags, so there is nothing for us to update in terms of tag security. We will create new PIML tags with the necessary permissions in subsequent exercise.

12.1.4 Create PI Digital State Sets and Tags (Exercise 3.2.2)

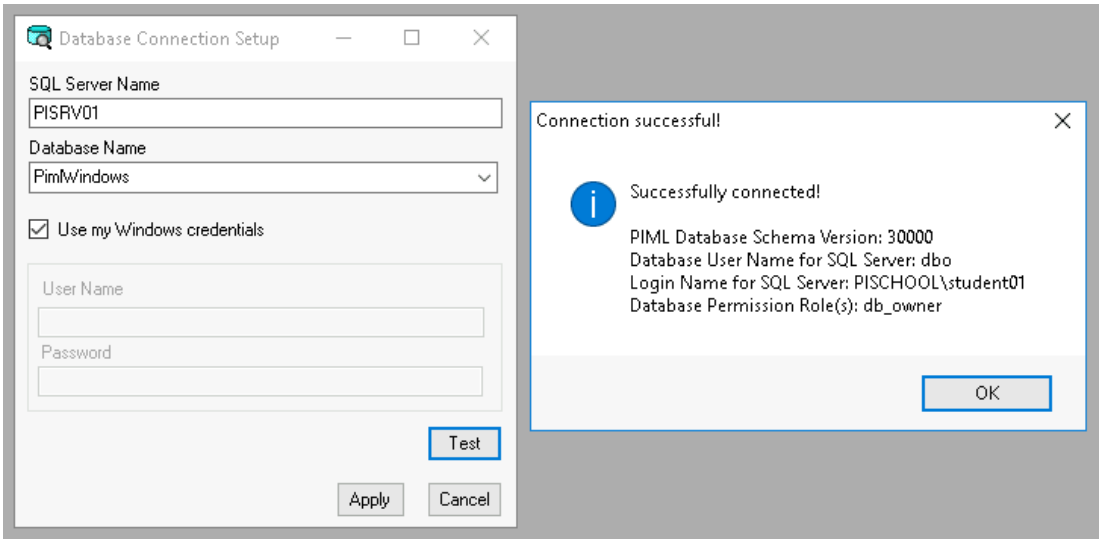
1. On PISRV01, launch PI SMT
2. Points > Digital States
3. Right click on any state > Import from File > browse to "C:\Class\SMT_DigitalStates_PIML.csv" > Create Set(s)
4. Verify that 3 new sets are created, i.e. Clarity, Open_Closed_NA, and Pump_State
5. Open "C:\Class\PIBuilder_Tags_PIML.xlsx" in Excel
6. On PI Builder ribbon, select PISRV01 from the Data Server dropdown
7. Publish > Edit Mode: Create Only
8. Verify that the publish action completed without errors, and the new PIML tags are successfully created.

12.1.5 Create PI Manual Logger Users and User Groups (Exercise 3.3.3)

First, verify your settings by following these steps:

1. On PISRV01, launch PI Manual Logger PC Client. Log in with user *piml* and password *piml*. Close the Getting Started window.
2. Examine the status bar at the bottom of the PIML window to verify the user that is logged on, the PI Server you are connected to and the SQL server.

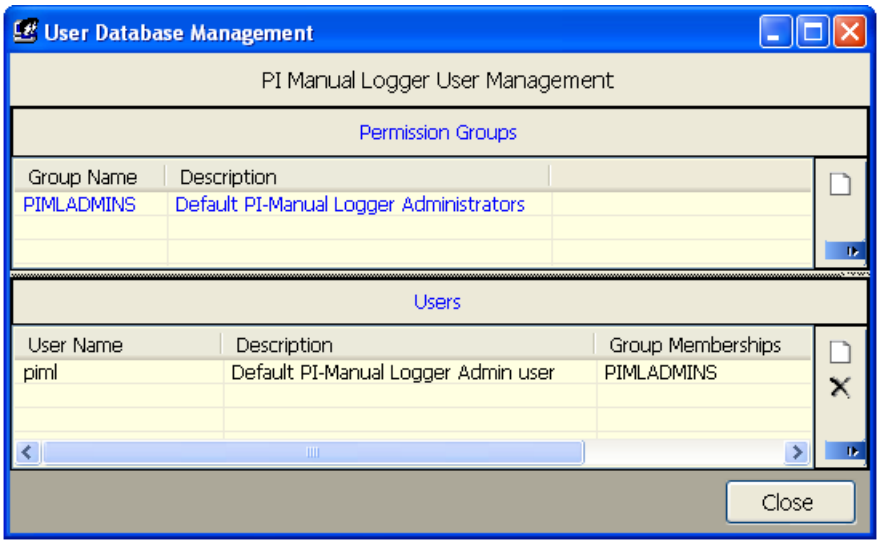
3. By clicking on the user name you can change the user password or switch logged on users.
4. These options are also available at the top of the PIML window under the **PIML** menu.
5. Click on the SQL server status to open the Database connection setup window.
6. Click on **Test** and verify that the test is successful.
7. These steps can also be performed from the PIML menu: **Tools** > **SQL Server Setup**



8. From the status bar, verify that you are connected to the desired PI Data Archive server. If you need to change the PI Server, go to **Tools** > **PI Data Archive Setup**
9. On the status bar you can also see PIML messages and click on the PIML version to display the About PI Manual Logger window and a list of the related software installed.

Next, create the user groups by following these steps:

1. Click **PIML > Manage User Database**. The **PI Manual Logger User Management** window appears.



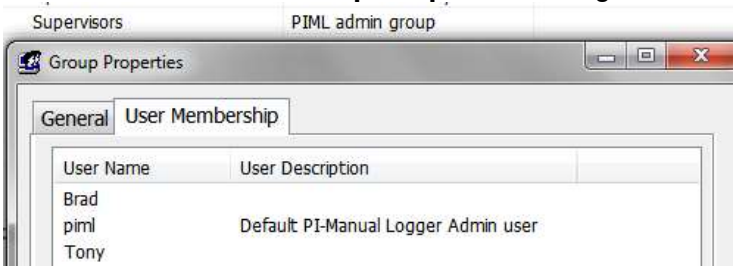
2. In the Permission Groups panel, click . The **New Permission Group** dialog box appears.
3. Enter the name “Supervisors” in the **Group Name** field. An entry for the **Description** field is optional.
4. Click **OK** to save the new group and close the dialog box.
5. Follow the same steps to create the “Operators” group.

Users can be created in this same dialog window:

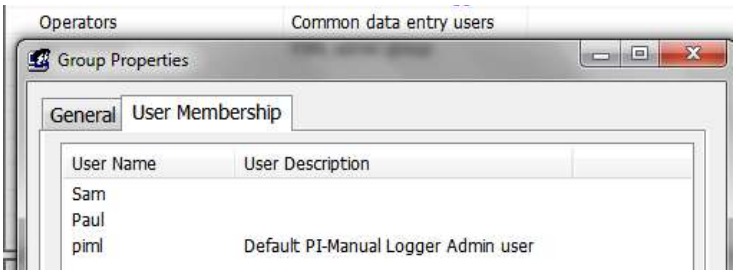
1. In the Users panel, click . The **New User** dialog box appears.
2. Enter the name “Brad” in the User Name field. An entry for the **Description** field is optional.
3. Enter a password and confirm it. Then click **OK** to save the user and close the dialog box.
4. Repeat the same process to create the users: Tony, Paul and Sam.

Adding a user to a group is simple:

1. In the Permission Groups panel, double-click the Supervisors group. The **Group Properties** dialog box appears.
2. Click the User Membership tab. Then click **Add**.
3. Select the users Brad, Tony and piml, and click **OK**.
4. Click OK to close the **Group Properties** dialog box.



5. Follow the same procedure to add Paul, Sam and piml to the Operators group.



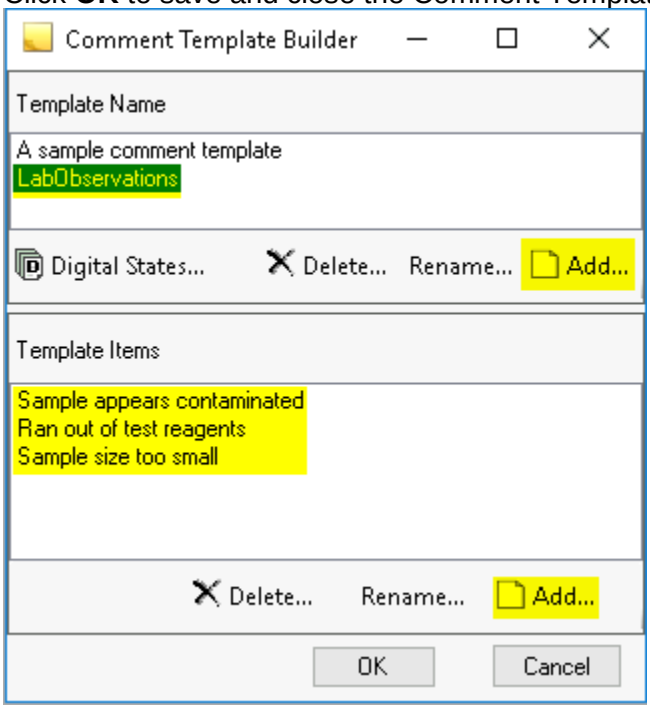
Making the Supervisors the Admin User Group:

1. On the PIML menu click on **Tools** and **Global Options**.
2. Click on the **Security Settings tab**.
3. On the drop down list for the **Admin User Group**, select Supervisors.
4. Click **OK**.
5. The Supervisors can now create, edit and delete tours.

12.1.6 Create and Configure Tours (Exercise 4.5)

Start by creating Comment templates:

1. Use the Tools> Comment Templates option.
2. In the top pane, **Add** a new template named LabObservations.
3. With the new template LabObservations selected, in the bottom pane **Add** comments such as “Sample appears contaminated”, “Ran out of test reagents”, “Sample size too small”.
4. Click **OK** to save and close the Comment Template Builder

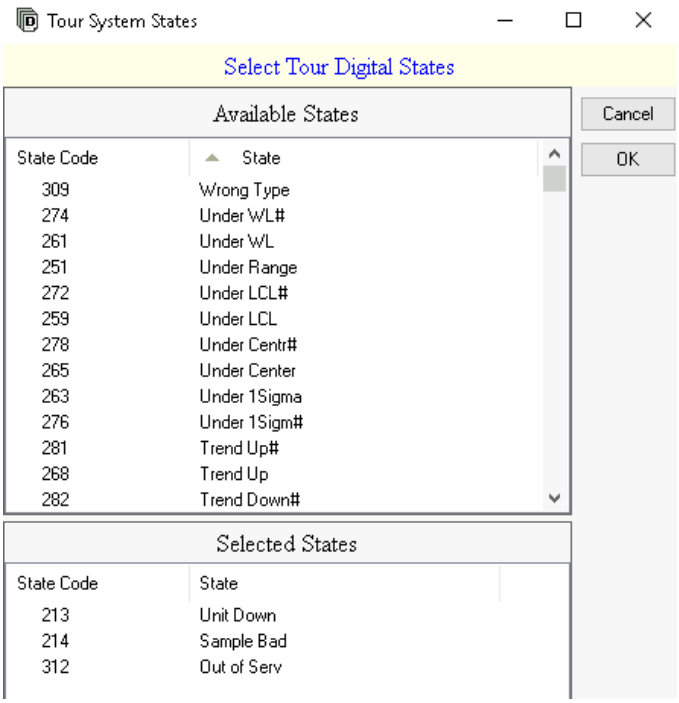


In addition to manual creation, existing digital states from PI can be used. Note that these are global, so no tour needs to be selected. A final note, the comment templates provide a “pick

list", but the data entry is not restricted to this. At data entry time, the user can choose a value from the template, modify the text or write freeform text entirely.

Now create a tour using the Tour Creation Wizard:

1. Login to PIML with the username Tony, a member of the Supervisors group with right to create and edit tours.
2. Click **Tours > New Tour**.
3. The **PIML Tour Creation Wizard** appears. Click **Next**.
4. On the **PIML Tour Creation Wizard** dialog box, fill in the required information:
   - Tour Name: Lab
   - Tour Description: Control room lab analyses
5. Click **Next**, and select the appropriate groups:
   - Full Permission Group: Supervisors
   - Data Entry Only Group: Operators
6. Click **Next**, and **Add** to add the tags that will be collected during the tour.
7. Search for all tags with a prefix PIML_FinishedProduct by typing PIML_Fin* in the **Tag Mask** field. There will be 4 tags.
8. **Select All** tags and click **OK**.
9. Click **Next** and **Finish**.
10. You will be taken to the **Tour Configuration** window.
11. Add Digital state sets to the tour. To get started, use the  digital states bottom at the bottom of the form. Clicking it will bring up the list of System states.
12. Choose and add (double click, or right click > Add Selected) the states *Unit Down*, *Sample Bad* and *Out of Serv*. Click OK to save/close the Tour System States window.



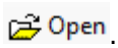
13. Close this window by clicking on the **x**  , in the upper right corner or in the exit icon  , on the bottom of the form. When prompted to save tour changes, click Yes.

The benefit of using the **PIML Tour Creation Wizard** is that there is a prompt for you to add tags to your tour through the **Tag Search** dialog box. This completes the Lab tour definition.

Create the next tour with the New Tour dialog box (i.e. without using the Wizard):

1. Click **Tours** > **New Tour.**
2. On the **PIML Tour Creation Wizard,** check the **Skip this wizard** box.
3. Click **Next** to open the **New Tour** dialog box and complete the boxes in the dialog box to define the tour.
4. Enter the following information in the window:
    - Tour Name: Reactor
    - Tour Description: This is a reactor tour of Unit 1
    - Full Access Group: Supervisors
    - Data Entry Only Group: Operators
    - Notes: Operators should perform this tour hourly
5. Click **OK**.
6. You will be taken to the **Tour Configuration** window. Close this window by clicking on the **x**  , in the upper right corner or in the exit icon  , on the bottom of the form. You will configure your tour and add tags later.

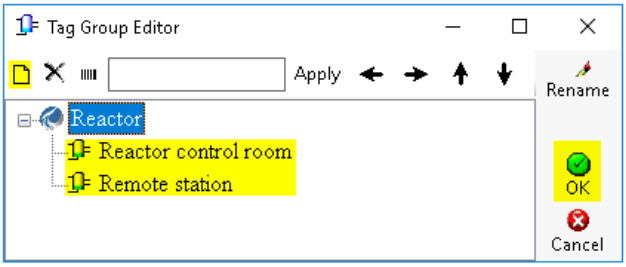
After tours are created, you can edit the tour and add tags:

1. Click **Tours** > **Tour List.**
2. Double click on the Reactor tour or select the Reactor tour and click on  .
3. Once in the **Tour Configuration** dialog box, select the **Tag List View** window.
4. You can always close any of these windows and then reopen them by clicking on the **View** icon  .
5. Click on the **View** icon and ensure that the following windows are open: Tour Info, Tag Attributes and Tag List View.
6. You can now add tags by clicking on the **Add new PI Tags…** icon  .
7. Search for all tags with a prefix PIML_Reactor by typing PIML_Reactor* in the **Tag Mask** field. There should be 6 tags.
8. **Select All** 6 tags and click **OK**.
9. You can now see all tags in the tour under the Tag List View window.
10. Click  at the bottom of the PIML window to save the changes.

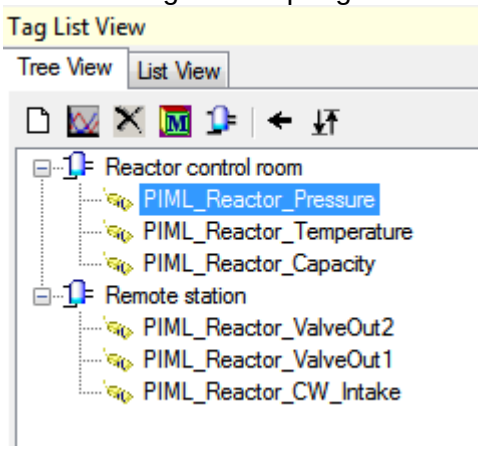
Group together tags:

1. Click the **Tag Group Editor** icon  .
2. Click the **Create a new Group** icon  .
3. Type “Reactor control room” and click **OK**.
4. Repeat the process and create a “Remote station” group.

5. Click OK to save/close the Tag Group Editor window.



6. You will see the new tag groups in the Tag List View window.
7. Drag the PIML_Reactor_Capacity, PIML_Reactor_Pressure and PIML_Reactor_Temperature tags to the Reactor control room group.
8. Drag the other tags to the Remote station group.
9. Click on the **Reorder Nodes** icon and the **Reorder Tag Sequence** window will open.
10. Expand the Reactor and select the Reactor control room group.
11. You will now see the tags in this group on the Tag Sequence Details window on the right.
12. Using the arrows on the right, reorder the tags until they match the order shown in the picture below. This will be the order in which the tags will be collected. (Alternatively, you can also drag and drop tags in the Tag List View to reorder sequence.)



13. Click  at the bottom of the PIML window to save the changes.
14. Click  to exit the Tour configuration window.

Following the steps described above, create one more tour with the following attributes:

- Tour Name: Boiler Readings
- Tour Description: Boiler data
- Full Access Group: Supervisors
- Data Entry Only Group: Operators
- Tags: All tags with the prefix PIML_Boiler (there are 5 tags)

12.1.7 Define Collection Schedule and Options (Exercise 4.7)

To create the hourly collection schedule for the Reactor tour:

1. Open the Reactor Tour by clicking on **Tours > Tour List**.
2. Double **click** on the Reactor tour.
3. Click on **Set** under **Tour Scheduling** in the **Tour Info** pane of the **Tour Configuration** dialog window.
4. Select **Clock Scheduling**
5. Click **Set**
6. Set the starting date as yesterday
7. Set the starting time as 5:00 am
8. Set the ending time as 10:00 am
9. Set Recurrence pattern: Hourly, every 12 hours
10. With these settings, the group of tags is due for collection any time between 5:00 am – 10:00 am and 5:00 pm – 10:00 pm.
11. Click **OK**, and click **OK** again
12. Click  at the bottom of the PIML window to save the changes.

To configure Tour options:

1. Click on **Tour Options** under **Notes** in the **Tour Info** pane of the **Tour Configuration** dialog window
2. Check the “Signature required for each tour run save (on mobile device)”, “Manual data must be submitted for approval”, and “Navigate through due tags only (on mobile device)” boxes
3. Uncheck the “Auto Send Data to PI” and “Data Entry Only Group can send data to PI” boxes
4. Click on the Timestamp tab
5. Select the “Default Tour Time to the Current Timestamp” box
6. Click **OK**
7. Inspect the other tabs and the options available under them.
8. Click  at the bottom of the PIML window to save the changes.

To create validation limits and trigger actions:

1. Select the PIML_Reactor_Temperature in the **Tag List View**.
2. Select the **Data Validation** tab.
3. Enter the following information in the window:
    - LoLo Limit: 150
    - Low Limit: 200
    - High Limit: 420
    - HiHi Limit: 470
4. Click on the Trigger Action button () for the LoLo Limit.
5. Select the “Require Comment” check box.
6. Repeat the steps for the HiHi Limit.
7. Click on the Trigger Action button () for the Low Limit.

8. Select the “Require Signature on device” check box.
9. Click **Yes** at the prompting.
10. Repeat the steps for the High Limit.

Add digital states to the tour:

1. Click on  at the bottom of the Tour configuration window.
2. Double click on the following digital sets to add them to the tour: Unit Down and Out of Serv.
3. Click **OK** when done.
4. Click  at the bottom of the PIML window to save the changes.

12.1.8 Conditional Data Entry and Operator Instruction (Exercise 4.8)

To edit the tour:

1. Log in as an admin user – such as Tony.
2. Open the Tour List by clicking **Tours > Tour List**
3. Open the Reactor tour previously created
4. Using the Tag List View, select the PIML_Reactor_Capacity tag
5. Click on **Tag Entry Options**
6. Under Conditional Specification type the equation:
   - If(CurrentValue("PIML_Reactor_Pressure") >10 || CurrentValue("PIML_Reactor_Pressure") ==DigCode("Unit Down") ,Skip(),CollectNow())

The **||** *symbol is the* ***Or*** *operator.*

Note: CMDE can be defined for an individual tag or for a group of tags. CMDE for individual tags takes precedence over any group CMDE. Please see *Supported Functions* in the *PI Manual Logger User Guide,* for a complete list of supported functions.

To activate the editor's IntelliSense feature, use these key combinations:

Ctrl + Shift. Prompts with a list of CMDE functions along with their descriptions.

Ctrl + t. Prompts with a list of tags in the tour.

Ctrl + o. Prompts with a list of CMDE operators.

7. Enter the same Conditional Specification for the PIML_Reactor_ValveOut1, PIML_Reactor_ValveOut2, and PIML_Reactor_CW_Intake tags.
8. Navigate to the PIML_Reactor_ValveOut1 tag.
9. In the **Tag Configuration** tab and in the **Operator Instructions** box type: “Ensure both relief valves are closed but unlocked during normal operations”.
10. Click  at the bottom of the PIML window to save the changes.

Note: It is possible to insert a hyperlink to a file or an HTTP website or an FTP site in the operator instructions. Multiple hyperlinks can appear in operator instructions used for tour runs executed on a PC, and the operator can choose the hyperlink to open. Operator instructions for mobile devices can contain only one working hyperlink.

If the operator enters a value for a tag and then accesses the tag a second time, the operator instructions do not open automatically. However, the operator can click to display them again.

12.1.9 Export and Import Tour Configuration (Exercise 4.9)

1. Go to **Tours** > **Tour List.**
2. Select all the tours in your list.
3. Click on **Export.**
4. When the **Export Tour Definitions** dialog box opens, browse or type the location and name of an XML file.
5. Click **OK**.
6. You can save or close the export log.
7. Open the PIML tour configuration schema file located in C:\Program Files (x86)\PIPC\PimlWindows\OSIsoft.PIML.TourConfigurations.xlsx
8. Once the file is open in Excel you will have a workbook with 4 worksheets. Make sure the Developer tab is open, otherwise in Excel go to File > Options > Customize Ribbon > Main Tabs > check Developer > OK.
9. Under the **Developer tab** in the **XML** group, click on **Import** and open the XML exported from PIML.
10. In the first worksheet you will see the tour information, the second sheet contains the tour options, the third sheet contains tag groups, and the last sheet contains the tags to be collected.
11. Go to the last worksheet titled PIML Tags, find the PIML_Reactor_Temperature tag in the Reactor tour. Go to the column containing the HiHi limit of 470 and change it to 500.
12. Find the 4 tags in Lab tour, and change their values of the Sequence column: 1 for pH, 2 for Density, 3 for BoilingPoint and 4 for Appearance.
13. Under the **Developer tab** in the **XML** group, click on **Export** and provide a new name for the XML file such as tourstobeimported.xml.
14. Return to PIML and go to **Tours** > **Tour List.**
15. Click on **Import**, browse to and select the new/modified XML file, click OK to begin import. When the import is complete close the logs.
16. Open the Reactor tour and navigate to the PIML_Reactor_Temperature tag.
17. Go to the Data Validation tab and inspect the HiHi Limit to ensure the value was changed to 500.
18. Open the Lab tour and verify the tag sequence in the Tag List View.

12.1.10 Create and Save Tour Runs (Exercise 5.1)

Create a tour run for the Reactor tour:

1. Log in as an operator user – such as Sam.
2. Go to **Tours** > **Tour Run List**
3. Select the Reactor tour and click on **New Tour Run**
4. When the New Tour Run window is displayed, set the time stamp to yesterday at 9:00 PM. The reason for choosing this specific timestamp is because we want to simulate tag due for data collection based on tour scheduling (5am-10am or 5pm-10pm), but depending on when this exercise is done the current timestamp may not fall within that range.
5. Click **OK**
6. The tour run opens and the first tag is displayed in the Data Entry Form.
7. Notice that all tags will have a red ? icon by the tags in the tag list view, indicating they are due for data collection.
8. Enter 1300 in the Tag Value field for the PIML_Reactor_Pressure. Use the previous values tab in the right pane to review historical data. Double-click the adhoc trend to see historical data from this tag. Pan back in time, zoom and revert – just like a ProcessBook trend. Click  at the bottom of the PIML window to move to the next tag.
9. Enter 100 in the Tag Value field for the PIML_Reactor_Temperature and click  at the bottom of the PIML window.
10. A warning window will be displayed saying the Low and LoLo limits have been violated.
11. Click **OK.**
12. A warning window will be displayed saying that you are required to enter a comment for the tag.
13. Click **OK**
14. Type: “Temperature is low due to startup of Reactor” in the Value Comment field of the tag.
15. Click  at the bottom of the PIML window again.
16. Again, the same warning window will be displayed saying the Low and LoLo limits have been violated.
17. Click **OK** and now the Data Entry Form for the next tag will be displayed.
18. PIML displays the next tag, however these tags do not need to be collected according to the conditional data collection (CMDE). In the PIML mobile device, tags that are not due for collection are not displayed. In PIML PC Client, these tags will have an X icon by the tags in the tag list view. This is also a good example of the more “specific” tag level option taking priority over the entire tour option (tour scheduling). Initially, the last 4 tags were also due based on tour scheduling, but CMDE logic (at tag level) now determines that they are no longer due for collection.
19. Click Save  and Exit  .
20. In the Tour Run List pane, you should see that the Status of this tour run is Completed.
21. Repeat the process by creating a new tour run for the Reactor tour.
22. Set the time stamp to 1 hour ago. It does not matter if this time stamp leads to tags due for collection or not. If tags are not due for collection, they will have an X icon by them in the tag list view. Regardless, you can still continue to collect data because PIML does not enforce it, i.e. it does not stop you from collecting data.
23. Enter the following values (you can also try to use the Data Entry Sheet tab):

    - PIML_Reactor_Pressure: 8.5
    - PIML_Reactor_Temperature: 405

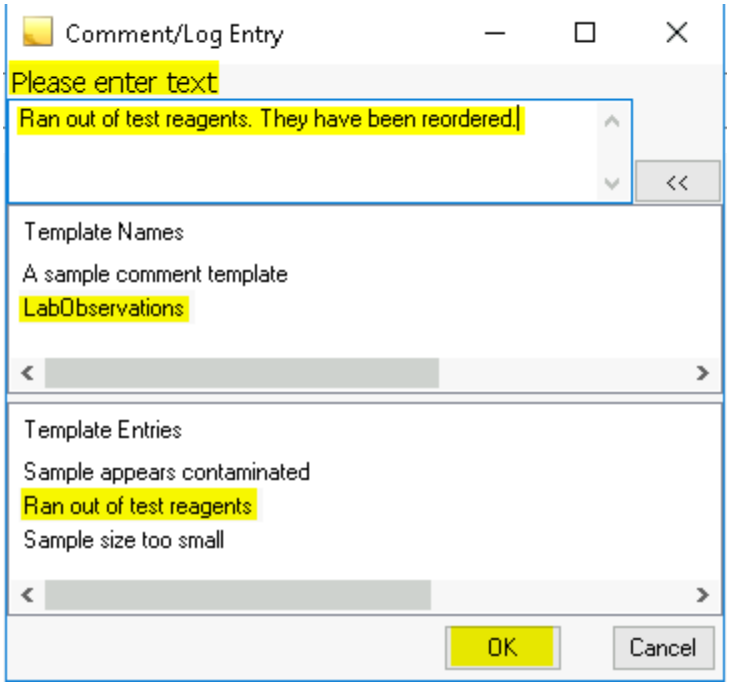
- PIML_Reactor_Capacity : 60.7
- PIML_Reactor_ValveOut2: Closed (select from Tag Value field dropdown)
- PIML_Reactor_ValveOut1: Closed (select from Tag Value field dropdown)
- PIML_Reactor_CW_Intake: 75

24. Click Save and Exit .
25. In the Tour Run List pane, you should see that the Status of this tour run is Completed.

Note: Save and exit is done as Send to PI restricted. Data will be sent after approval.

Create a tour run for the Lab tour:

1. Following similar steps as above, set the tour run time stamp to 1 hour ago, and enter the following values for the tags in the Lab tour:
    - PIML_FinishedProduct_pH: Out of Serv (select from Tag Value field dropdown)
        - Next to the Value Comment field, click **Use Comment Templates…**, click the **>>** arrow button, choose the LabObservations comment template, **double click** "Ran out of test reagents"
        - Type additional comments (free text) at the end – "They have been reordered."
        - Click OK



- PIML_FinishedProduct_Density: 1.7
- PIML_FinishedProduct_BoilingPoint: 200
- PIML_FinishedProduct_Appearance: Clear

2. Choose SendtoPI  (Unlike the Reactor tour, no approval is needed for Lab tour so a direct SendtoPI is possible). Verify the message at the status bar at the bottom of PIML window: “Data successfully sent to PI”.

    - Even if you click Save  and then Exit  , Lab tour run data will still be sent to PI directly, because tour option “Auto Send Data to PI” is True and there is no approval process configured for this Lab tour.

3. Exit  .
4. In the Tour Run List pane, you should see that the Status of this tour run is Archived.

Create a tour run for the Boiler tour:

1. Following similar steps as above, set the tour run time stamp to 1 hour ago, and enter the following values for the tags in the Boiler tour:

    - PIML_Boiler_Drum_Level: 50
    - PIML_Boiler_Pressure_Outlet: 700
    - PIML_Boiler_Temperature_Outlet: 300
    - PIML_Boiler_ValveOut1: Open
    - PIML_Boiler_ValveOut2: Closed

2. Choose SendtoPI  (Unlike the Reactor tour, no approval is needed for Boiler tour so a direct SendtoPI is possible).
3. Exit  .
4. In the Tour Run List pane, you should see that the Status of this tour run is Archived.

Review data in PI with PI DataLink (PI SMT can also be used for similar purpose):

1. Open a new Excel sheet and select cell A1
2. Go to the PI DataLink ribbon, and click the **Search** icon to do a tag search
3. Navigate to PISRV01 PI Data Archive, insert tagmask of PIML*, and then click Search
4. Select all Reactor, Lab and Boiler tags, then click OK
5. Select cell B1, and click the **Current Value** button on the PI DataLink ribbon
6. Data item: highlight tag list on worksheet
7. Choose the “Time at left” option, and click OK
8. Verify that Lab and Boiler tags have data from the tour runs
9. Verify that Reactor tags do not have data yet (values still show Pt Created), because Reactor data has not been approved.
10. **To see the comments** from the Lab tour run for the PIML_FinishedProduct_pH tag, use the **Compressed Data** function on a separate/empty cell. Fill in the data item, start time, and end time fields, and check the “Show time stamps” and “**Show annotations**” boxes.

12.1.11 Create and Save Tour Runs with future data (Exercise 5.3)

1. Tours > Tour Run List
2. Select Lab tour > New Tour Run
3. Put a timestamp of 20-30 minutes into the future.
4. Enter the following values for the tags in the Lab tour:
    - PIML_FinishedProduct_pH: 1.4
    - PIML_FinishedProduct_Density: 5
    - PIML_FinishedProduct_BoilingPoint: 250
    - PIML_FinishedProduct_Appearance: Cloudy
5. Choose Save, and then Exit
6. Notice that in the Tour Run List pane, the Status of this tour run is Queued.
7. Check with PI DataLink or PI SMT that future data is not sent to PI.
8. Wait for the timestamp of the queued data to become current, then go to PIML > PI Tags and Digital States > Queued Data tab > select row(s) > Send Queued Data to PI
9. Check with PI DataLink or PI SMT again that data is now in PI.
10. Tour run status has now changed from Queued to Archived.

12.1.12 Approve the Data for the PI Archive (Exercise 6.1.1)

1. Log in to PIML PC Client as a supervisor user – Brad.
2. Tours > Tour Run List
3. Select the *Reactor* tour from the top panel
4. From the bottom panel, double click a Completed tour run to open it.
5. Click “Yes” when prompted with “Do you want to review/modify the completed tour run?”
6. Review/modify tour run data as necessary. You can modify or remove any bad values. You can also add or edit any comments.
7. Click Approve
8. The Data Entry window automatically closes, and the tour run status changes from Completed to Archived
9. (optional) Repeat for remaining completed tour run(s)
10. Use PI DataLink or PI SMT to verify Reactor data has been sent to PI

12.1.13 Enter and Save data with PI Manual Logger Web (Exercise 9.2.1)

Collect the data:

1. On PICLIENT01, open Google Chrome
2. Navigate to https://piweb01/piml.web or use the bookmark saved
3. If the home page says “Tours Not Found”, click the Refresh button on the top right corner, and click Yes on the prompt.
4. In general, if the Refresh button says “Updates Available”, it means Tour Configuration has changed. So we should always Refresh to get the latest configuration.
5. Select the Boiler tour.
6. Click the New Tour Run button.
7. Change the tour run timestamp to 2 hours ago
8. Enter 45 for the first tag, PIML_Boiler_Drum_Level

9. Click the arrow to move to the next tag.
10. Enter 680 for the second tag, PIML_Boiler_Pressure_Outlet. Enter a comment “Pressure sensor needs maintenance.”
11. “Switch to grid data entry view” from top right corner
12. Enter the remaining tags with the following values:
    - PIML_Boiler_Temperature_Outlet: 350
    - PIML_Boiler_ValveOut1: Closed
    - PIML_Boiler_ValveOut2: Closed
13. Click Save and Exit. Notice the small green prompt at the top right corner that says “Data was saved successfully”

Change a tag value of previous/recent tour run:

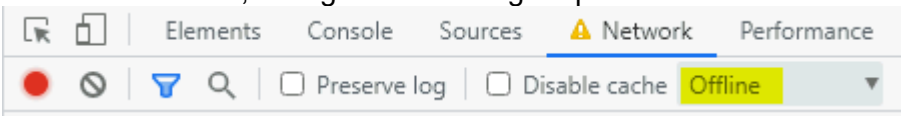
1. Select the Boiler tour again.
2. Choose the tour run by time from the list below.
3. Update the value for PIML_Boiler_Drum_Level to 40.
4. Click on Save and Exit.

Confirm the data is saved to PI:

1. Open Excel
2. Using the PI Datalink Compressed Data (or Current Value), find the values for each tag of the tour.
3. When using Compressed Data function for the PIML_Boiler_Drum_Level tag, also check the “**Show value attributes**” box. This returns the value “S” in an additional column, which means the tag value was substituted (from original 45 to 40).

Simulate offline data collection:

1. On the Google Chrome browser within PICLIENT01, hit F12 to open the Developer tool.
2. In the Network tab, change the following drop down box from “No throttling” to “Offline”.



3. Notice that the top right corner of PIML web homepage shows “Offline” and the Refresh button is greyed out.
4. Select the Boiler tour and start a New Tour Run
5. Enter values for all the 5 tags.
6. Save and Exit. Notice the small green prompt at the top right corner that says “Data was saved **locally**”
7. Verify with PI DataLink that this set of data is not sent to PI
8. Change the network tab dropdown back to “No throttling”.
9. Notice that the top right corner of PIML web homepage shows “Online” and the Refresh button is active again
10. Click Refresh and then Yes, to send tour run data from the local browser storage to PI.
11. Notice the small green prompt at the top right corner that says “Data was saved **successfully**”
12. Using PI DataLink, confirm this set of data is now in PI.