PI Vision: Beyond the Basics

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Introduction

This course is designed for people who have already used PI Vision. Students should already be familiar with how to create displays in PI Vision and understand how PI Vision is able to leverage AF Templates.

Exercises can be solved using PI Vision and PI System Explorer. If you have not used PI Vision before that's okay. Just try and follow the solution guide that's at the end of the workbook and is after each exercise.

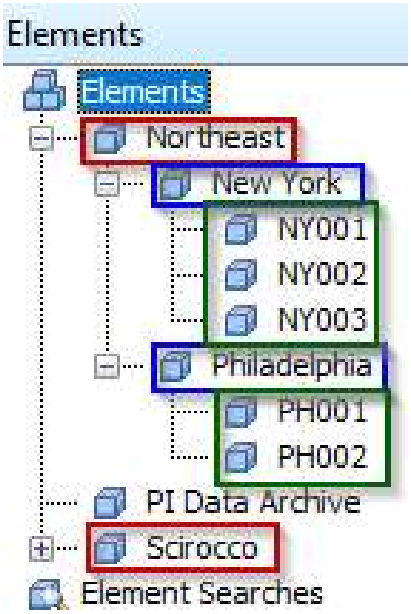
Approach

Specific questions or scenarios will be presented to solve primarily using AVEVA PI Vision as your visualization and analysis tool. More advanced features of PI Vision will have a strong reliance on AF so you will also need to use PI System Explorer (PSE). Each exercise can be completed with PI Vision and PSE.

The scenario for this course is that you have just been hired as a consultant for energy management solutions. Your first client is a wind farm energy company, and you are tasked with creating some advanced PI Vision displays that employees can use to monitor their turbines.

Scenario: Energy Management Solutions

You have just been hired as a consultant for Energy Management Solutions. Your first client is a Wind Farm energy company, and you are tasking with creating some advanced PI Vision displays that employees can use to monitor their turbines. Luckily, the company has just completed a project building out an AF database that has correctly templatized their AF Assets. Their AF structure features three main levels, Region, Farm, and Turbine.



Red – Region
Blue – Farm
Green - Turbine

Within AF, the customer has configured Event Frames to monitor Turbine downtime. These Event Frames are set to trigger whenever the turbine is in a status other than “Run”.

You know that this structure will make it possible for you to utilize template dependent features within PI Vision which can save you time when building out displays.

Exercises

Exercise 1: Creating a Turbine Information Display

Exercise Objectives:

- Create a display showing Turbine level information
- Utilize a multi-level collection to navigate through their AF database

Scenario:

Your first assignment is to create a Turbine Information Display. The client would like to have a display that shows Power and Production information for each Turbine that is selected. The client has 22 turbines in total. With your knowledge of PI Vision, you know if you make a display using attributes from the same template you can use the Asset Drop Down box to make a reusable display that can be applied to all turbines. The client informs you though that they do not want to have users using the Asset Drop Down box. They would like to have an on-screen symbol that they can select to change the context of the display at various levels and only be able to see Turbines in the selected Region and Farm.

Approach:

1. Use the shortcut on the desktop to launch PI Vision using Microsoft Edge.

    a. Alternatively, start Microsoft Edge and navigate to https://pisrv01.pischool.int/pivision

2. Click New Display in PI Vision. Save the display as *Windfarm Turbine Overview.*

3. Create three collections, one for each level of the hierarchy that contain the asset name. There should be one for **Region Name**, **Farm Name**, and **Turbine Name**.

Hint: On the OSIsoft YouTube Learning Channel there is a video called: PI Vision Alternative Context Switching with Collections and Multiple Filters (https://www.youtube.com/watch?v=_QlyKSJyy9o&t=387s)

4. Configure the collection's navigation link to change the root context of the current display
5. Create symbols in PI Vision that can be used to monitor Power and Production of the Turbines. Specifically, the **Active Power, Apparent Power,** and **Lifetime Production** attributes will be useful.
6. Once finished, select the drop-down arrow on the right hand side of the Asset Drop Down box and click the gear icon. Then in the Configure Context Switching pane on the right select the option for "Do not show".
7. Save the display as *Windfarm Turbine Overview_Your initials.*

Questions:

What is the **Hourly Lifetime Production** for Turbine GE004 in Santaella?

What is the difference in **Active Power** and **Apparent Power** for Turbine RB009 in Finisterre?

Exercise 2: Turbine Events Display

Exercise Objectives:

- Use the Events Table to see recent Event Frames
- Analyze Event frames with the Details page

Scenario:

Your client loved your Turbine information display, but they would also like to see a display they can use to better track their Event frames. Currently they are monitoring turbine downtime events and would like a display to visualize that. They would like the display to contain all the most recent events from the selected turbine.

Approach:

1. Create a new display in PI Vision. Save the display as *Windfarm Turbine Detail_Your initials.*
2. Create symbols on the display showing the Turbine name and status.
    a Only create the display using data from one turbine.
3. Add an Events Table show Event Frames for all assets on the display.
    a Hint: This can be done by selecting the Events tab and using the Create Events Table button

Event Name	Asset	Event Type	▲ Start Time	End Time	Acknowledgement
OSIDemo_NY001 - 2019-08-15 04:30:00.000	NY001	Downtime	8/15/2019 4:30:00 AM	8/15/2019 4:35:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 04:45:00.000	NY001	Downtime	8/15/2019 4:45:00 AM	8/15/2019 4:50:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 04:55:00.000	NY001	Downtime	8/15/2019 4:55:00 AM	8/15/2019 5:00:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:10:00.000	NY001	Downtime	8/15/2019 5:10:00 AM	8/15/2019 5:15:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:25:00.000	NY001	Downtime	8/15/2019 5:25:00 AM	8/15/2019 5:35:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 05:40:00.000	NY001	Downtime	8/15/2019 5:40:00 AM	8/15/2019 5:45:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 06:05:00.000	NY001	Downtime	8/15/2019 6:05:00 AM	8/15/2019 6:10:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-15 06:35:00.000	NY001	Downtime	8/15/2019 6:35:00 AM	8/15/2019 6:40:00 AM	Acknowledge
OSIDemo_NY001 - 2019-08-	NY001	Downtime	8/15/2019 7:00:00 AM	8/15/2019 7:05:00 AM	Acknowledge

4. While in run mode, single click the Event to open the Details display.

5. Save the display as *Windfarm Turbine Detail_Your initials.*

Questions:

When was the last time turbine PH002 in Philadelphia had a downtime Event?

What was the approximate peak **Lost Revenue Rate** in that time range?

What was the approximate minimum **Apparent Power** for that time range?

Exercise 3: Linking the displays

Exercise Objectives:

- Use AF to dynamically build URLs to the Event Details display.
- Create an Asset Comparison table to display those URLs in PI Vision.

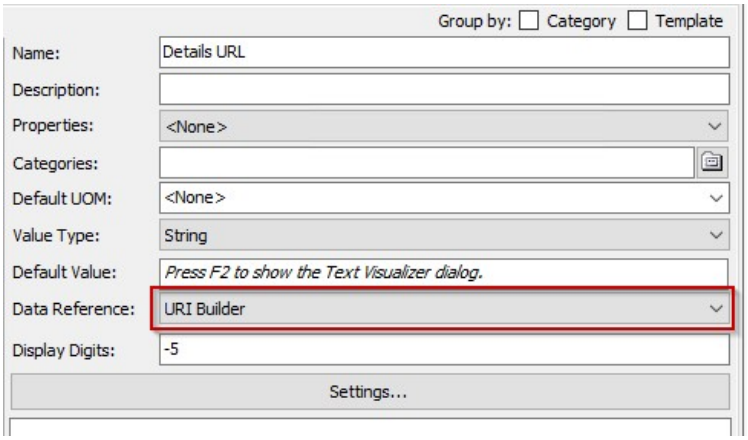
Scenario:

Again, your latest display was well received by the client. As you already know they do not like to have their users go through the Asset Drop Down box to change the context of the display, so they are looking for an alternate solution. What they would like to have is a way to navigate from the Information display to the Events display and have that link provide the context for the Events display.

Approach:

1. Open PI System Explorer and select the Wind Farm Database
2. Navigate to Library and under Templates > Element Templates > Turbine
3. Modify the Details URL attribute so it will take you to the Turbine Events Display

Hint 1: The URI builder data reference may be of use here



Hint 2: URL parameters can be used to set the context of the display
https://docs.osisoft.com/bundle/pi-vision/page/url-parameters-reference.html

Hint 3: Substitution parameters can be used to quickly build out the path to the element.

i. **%System%** - Gets the name of the AF Server the attribute is on

ii. **%Database%** - Gets the name of the database the attribute is on

iii. **%ElementPath%** - Gets the path to the element the attribute is on (not including server and database)

4. Create an Asset Comparison table in PI Vision and pull in the URL attributes

5. Modify the Details URL Yesterday attribute in AF to also change the time context of the display and add those attributes to your Asset Comparison Table as well. For the time context use “y” as the start time and “t” as the end time

Questions:

What does the time range of start time “y” and end time “t” correspond to?

Try to use another URL parameter in System Explorer.

Exercise 4: Ad Hoc Trending in PI Vision

Exercise Objective:

- Analyze an existing display using the Ad Hoc functionality of PI Vision

Scenario:

After seeing the advance displays you have been making your client has taken it upon themselves to make a display of their own. They created a display called Wind Farm Overview but are having trouble analyzing the display to answer specific questions about their operations.

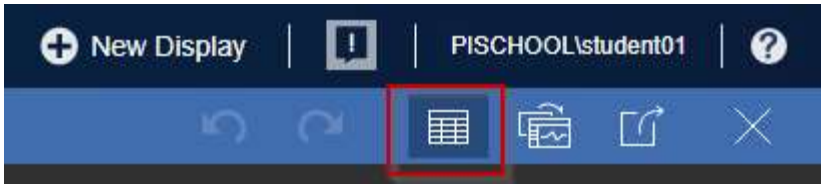
Approach:

1. Open the display called Wind Farm Overview.

2. While in Run mode, hold the CTRL key and select the Wholesale Price attributes and Lost Power attributes.

3. Click the Ad Hoc trend button:

4. Ensure the summary table is being shown:



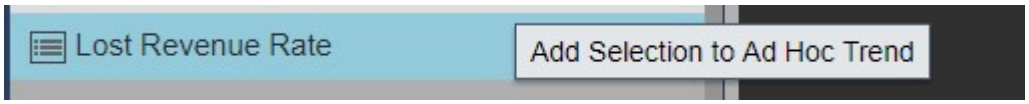
What was the maximum **Wholesale Price** over the last 8 hours for both regions?

What was the **Wholesale Price** for the Northeast region yesterday at 1 PM?

5. Close the Ad Hoc display workspace and add the **Total Revenue** attributes which are shown in the trend symbols to the Ad Hoc Trend workspace.

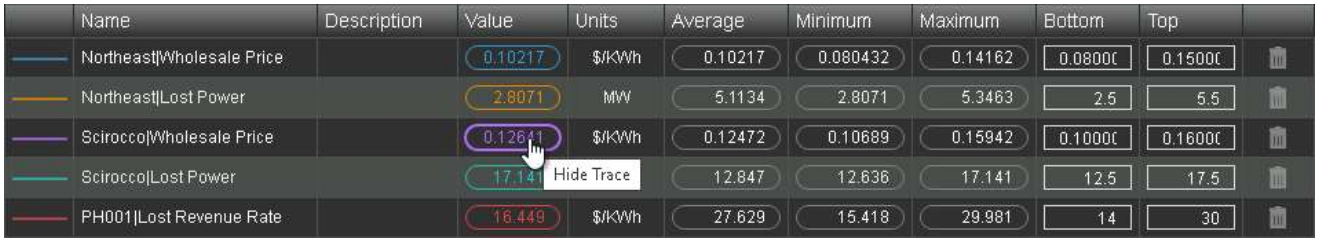
6. On the same display drill down to the **Lost Revenue Rate** attribute for PH001.

7. Right Click the attribute and select “Add Selection to Ad Hoc Trend.



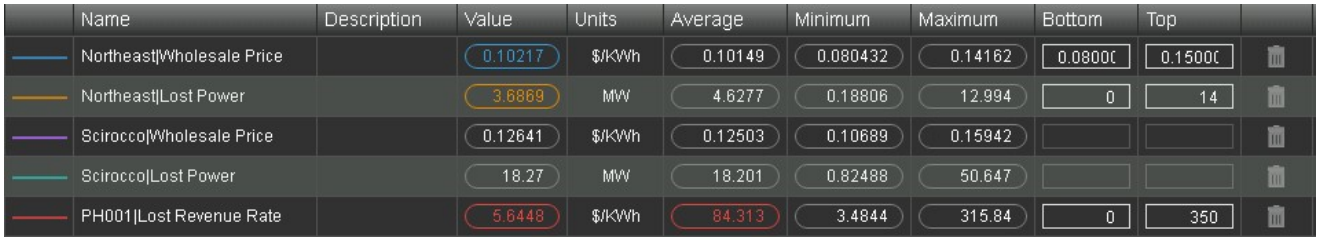
8. Open your Ad Hoc display workspace and hide the trends for **Wholesale Price** and **Lost Power** for the Scirocco region.

   Note: In the solution video you will see a check box to show/hide traces as it is used in PI Vision 2019. In PI Vision 2020 you can click the value field in the summary table to hide a trace.



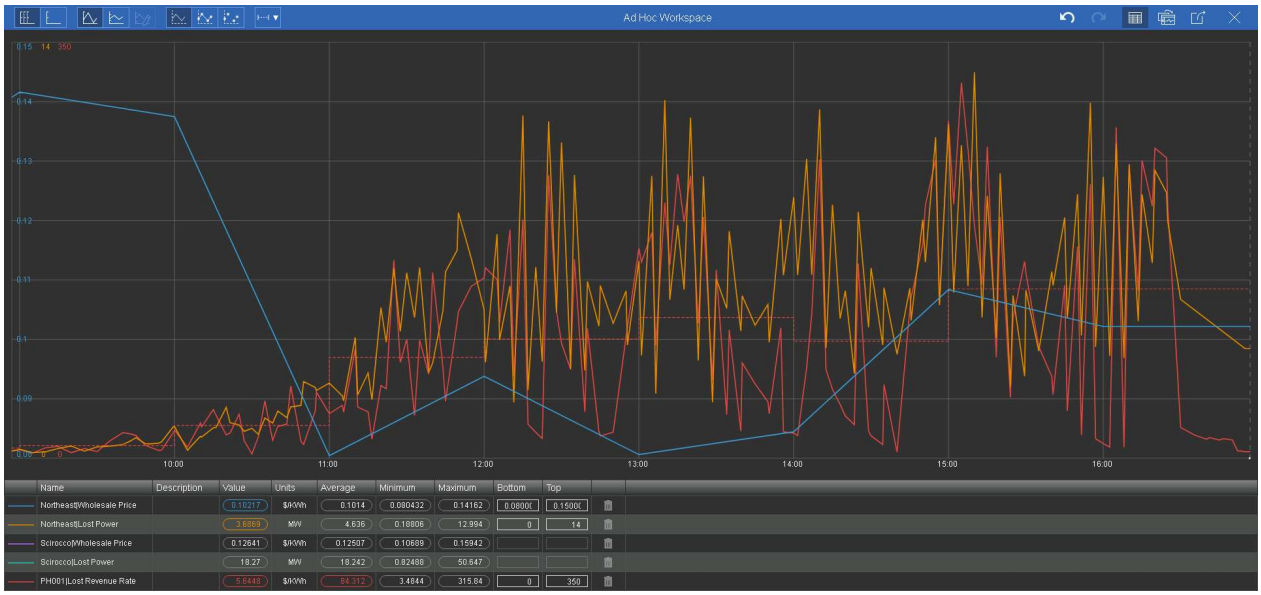
Is there a correlation between the **Lost Revenue Rate** of PH001 and the entire Northeast region?

9. Beginning with PI Vision 2020 you can add Minimum, Maximum, and Average summary traces with customizable intervals to the trend in the ad hoc workspace. Click on the Average for the **Lost Revenue Rate** of PH001 in the summary table to get the Average value shown on the trend. The Average value in the summary table gets highlighted in the color corresponding to the trend line.



10. Click the Summary Intervals drop-down menu.

11. Select the Step option with an interval of 1 hour.



Exercise 5: PI Vision Advanced Calculations

Exercise Objective:

- Create a PI Vision Calculation
- Understand the Advanced Options within the PI Vision Calculation

Scenario:

After seeing the Ad Hoc analysis performed in the previous exercise the client now has some additional on-demand type analysis they would like you to perform. They would now like to see what percentage of total Wholesale Price the Scirocco region comprises. Furthermore they would like to see this percentage calculated each hour and plotted clearly on a trend.

Approach:

1. Open the Wind Farm Overview display.
2. Create a calculation to represent the percentage of **Wholesale Price** the Scirocco region comprises and configure it to calculate on the hour.
    a. Hint 1: The calculation will be as follows
        *i. 'Wholesale Price'/('Wholesale Price' + '\Northeast|Wholesale Price')*100*
3. Plot the calculation Value in a trend and enable data markers on the trend.

Questions:

What is the current percentage of Wholesale Price for the Scirocco region?

What was the percentage 4 hours ago?

Exercise 6: XY Plot with Reference Curve

Exercise Objective:

- Create an XY Plot in PI Vision.
- Add a Reference Curve to the XY Plot

Scenario:

The client has now informed you that they would be interested in visualizing the relationship between Active Power and Apparent Power on each of their turbines in the Turbine Events Display. On the customer's side they have set up an AF Analysis that is calculating a value for their Apparent Power.

Approach:

1. Open the Windfarm Turbine Detail Display and drill down to the Turbine currently on the display.

2. Create an XY plot with **Active Power** on the X axis and **Apparent Power** on the Y axis.

3. For the Y axis column add the **Calculated Apparent Power** attribute.

4. Configure the second set of markers to serve as a reference curve.

Hint: https://customers.osisoft.com/s/knowledgearticle?knowledgeArticleUrl=KB01580

Solution Guide

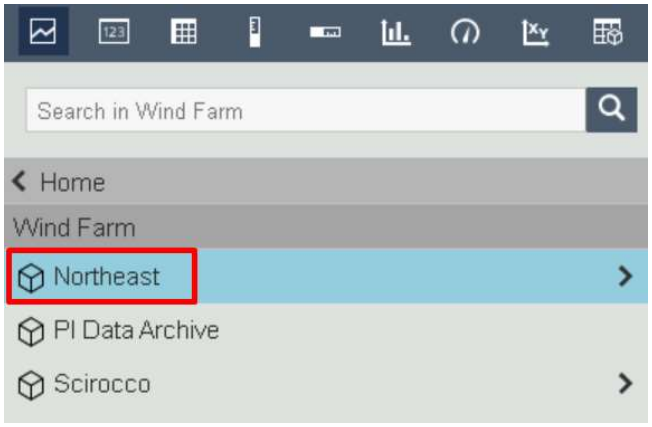
Solution for Exercise 1: Creating a Turbine Information Display

1. Connect to PI Vision by clicking the PI Vision shortcut on the desktop.

2. Click the New Display button.

3. On the left hand tree select the Wind Farm database.

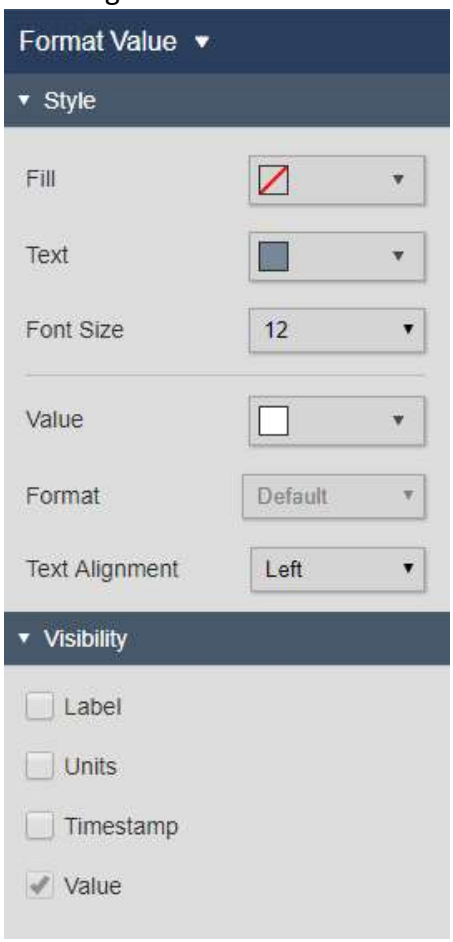
4. Drill down to the Northeast level in the Assets pane.



5. On the top symbol bar select the Value symbol.

6. From the Attributes pane select the **Region Name** attribute and drag it onto the display.

7. Format the Value symbol to only show the Value by right clicking the symbol and selecting "**Format Value…**"



8. Increase the font size to make the symbol larger.

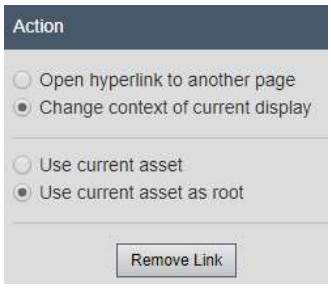
9. Once finished formatting click back in the display space.

10. Right click the symbol and select "**Convert to Collection…**"

11. Click back in the display to close the Configuration pane. Then select the collection and click "**Modify Collection**"

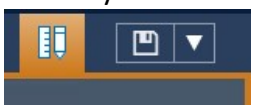
12. Then right click on the Value symbol and select "**Add Navigation Link**"

13. Under the Action section select "**Change context of current display**" and "**Use current asset as root**"

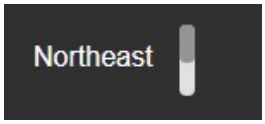


14. Click back onto the display and click the Exit Modify Mode button.

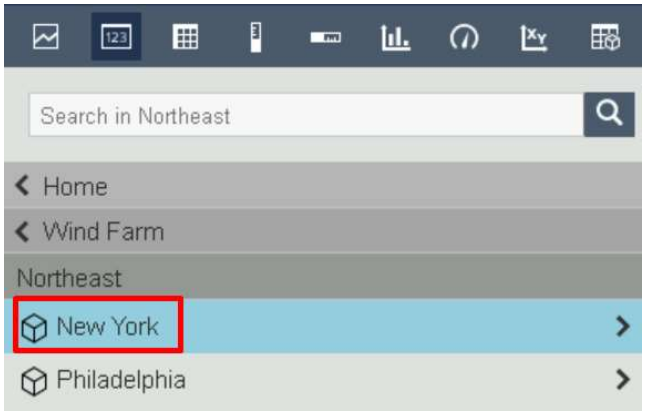
15. Ensure you are in build mode.



16. Format the collection so only one item is showing.



17. In the Assets pane drill down to the **New York** Element.



18. Confirm the Value symbol is still selected, find the **Farm Name** attribute, and drag it onto the display.

19. Repeat steps 7-15 to format the symbol, create a collection, and configure the navigation for the symbol.

20. Drill down to the **NY001** Element

21. Confirm the Value symbol is still selected, find the **Turbine Name** attribute, and drag it onto the display.

22. Repeat steps 7-15 to format the symbol, create a collection, and configure the navigation for the symbol.

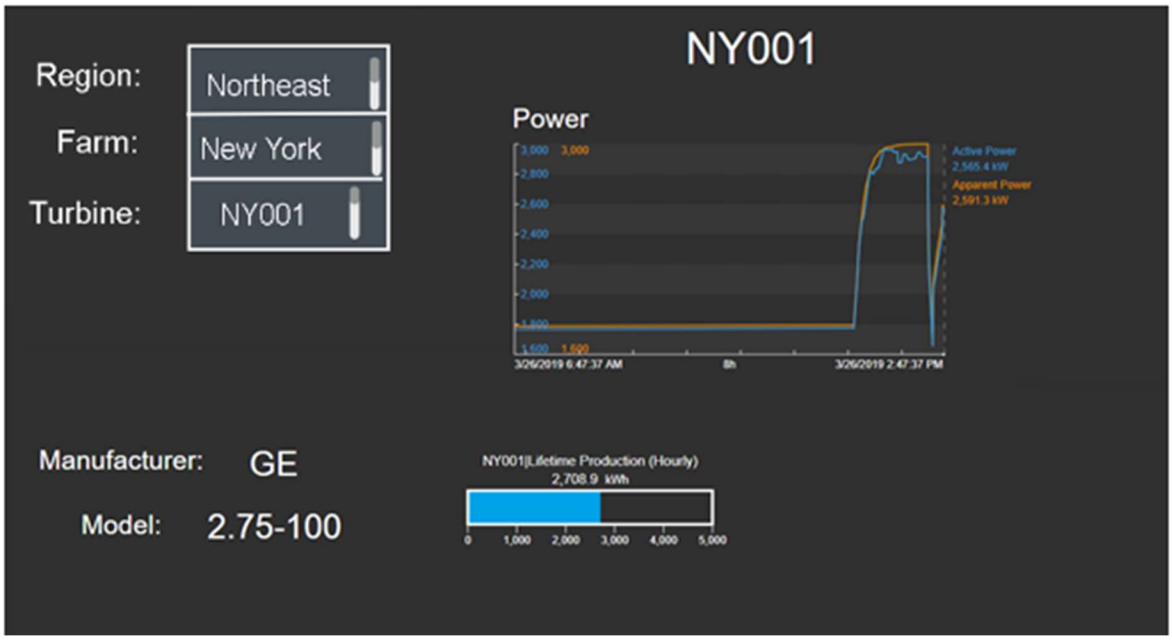
23. Add text symbols to the display and format the collections as desired. An example can be seen below:

24. While still on turbine NY001 create another value symbol to show the **Turbine Name.** This will not be made into a collection and can be used to show which turbine is selected.

25. Select the horizontal gauge symbol and find the **Lifetime Production (Hourly)** attribute. Drag it onto the screen to create the symbol.

26. Select the trend symbol and select the **Active Power** and **Apparent Power** attributes. Drag those onto the display to make a trend symbol.

27. Format the display as desired. An example display can be seen below:



28. Select the drop-down arrow on the right-hand side of the Asset Drop Down box and click the gear icon.

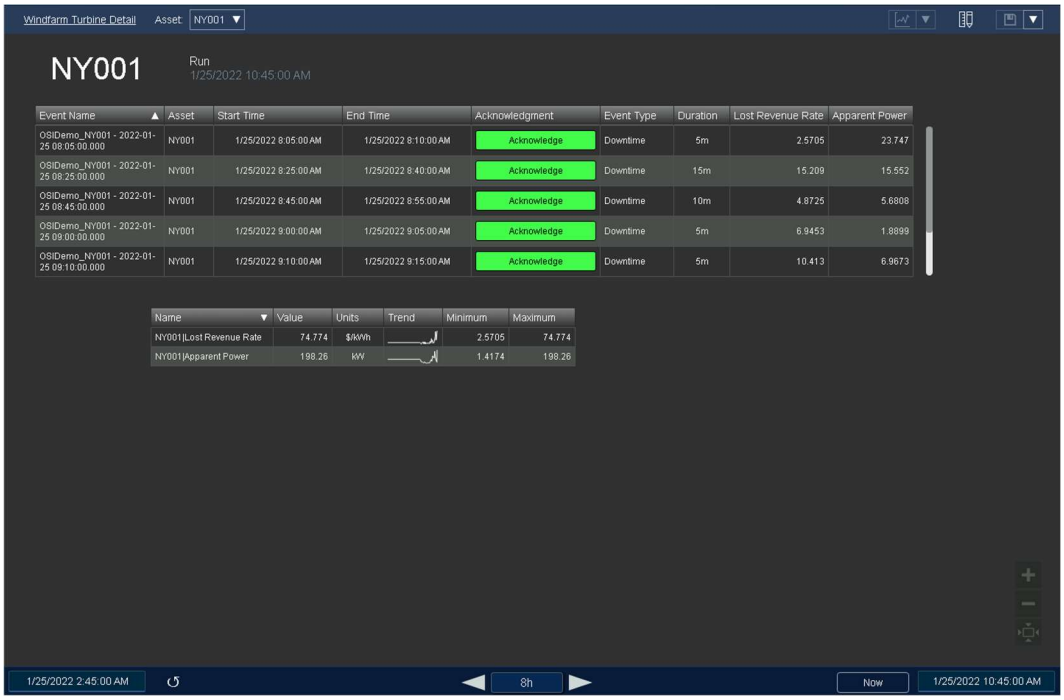
29. In the Configure Context Switching pane on the right select the option for "**Do not show**".

30. Ensure your display is in run mode and select the collections to change the display.

31. Save the display and answer the exercise questions.

Solution for Exercise 2: Turbine Events Display

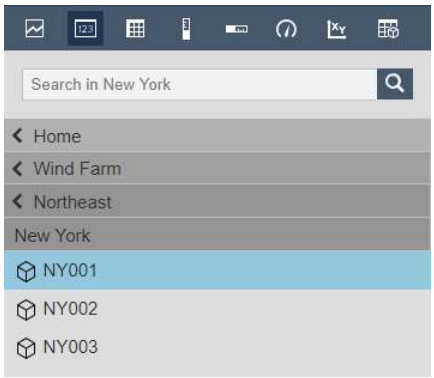
Example of a display that we will create in this exercise:



1. Connect to PI Vision by clicking the PI Vision shortcut on the desktop.

2. Click the New Display button.

3. Drill down to the Turbine **NY001** in the Assets pane.



4. Select the Value symbol and drag over the **Turbine Name.**
5. Configure the symbol to just show the turbine name.

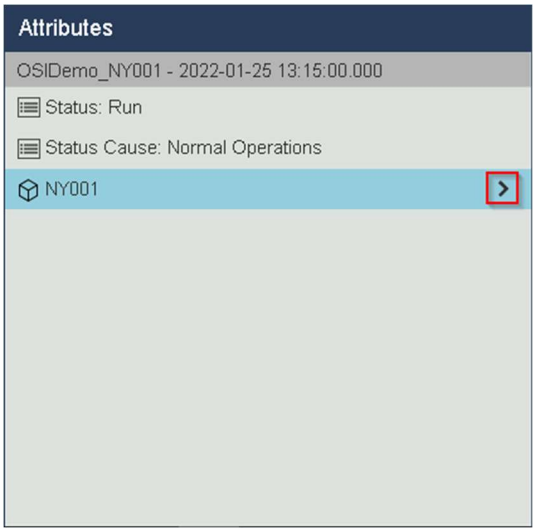
6. Add a value symbols for the **Status.**

7. On the left side of the screen select the Events icon to explore Event Frames.

8. Verify that Event Frames have populated in the Events Pane and select the "**Create Events Table**" button. If no Events are present ensure the "*Automatically refresh the list*" option is checked.

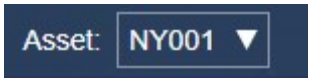
9. Right-click on the event table and select the **Configure Table…** option and use the arrow button to move **Event Type** and **Duration** from Additional Attributes up to Current Columns.

10. Use the arrow next to the asset name in the Attributes pane to see the list of asset attributes. Drag and drop the attributes **Lost Revenue Rate** and **Apparent Power** on the Events Table. The table will display the attribute values at the end time of the event frame.



11. Save the display as *Windfarm Turbine Detail_Your initials*.

12. Put the display in Monitor mode and click on an Event in the table. This will open the details display and you can answer the exercise questions. If you need to change the context of the display you can use the Asset drop down box.



Tipps to find the solution to the questions:

When was the last time turbine PH002 in Philadelphia had a downtime Event?

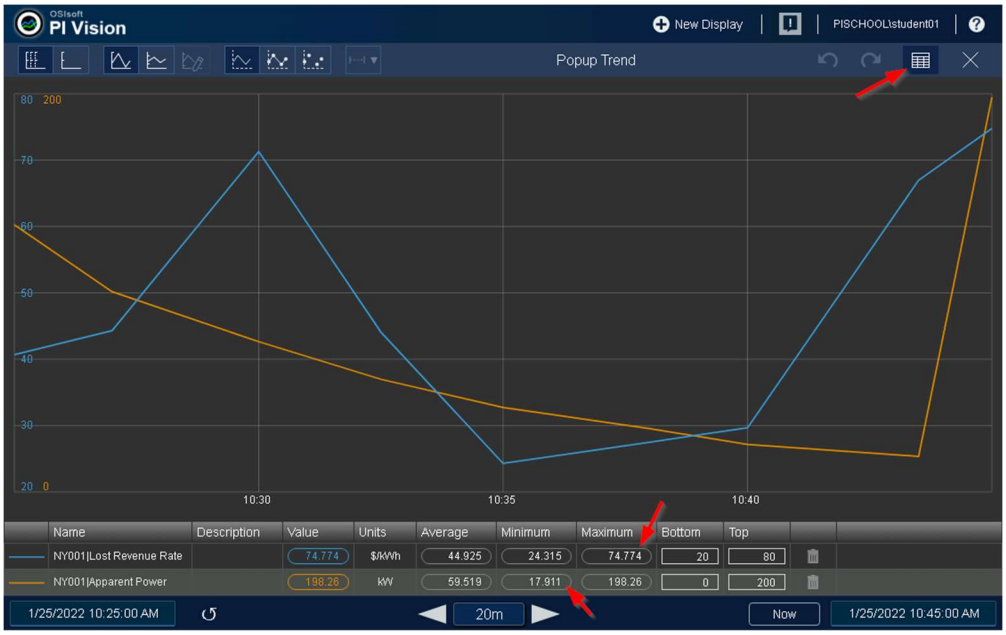
Scroll through the event table to find the newest event at the bottom of the table or use the arrow at the **Event Name** or **Start Time** column header to have the column sorted in descending order.

Event Name	Asset	Start Time	End Time
OSIDemo_NY001 - 2022-01-25 10:25:00.000	NY001	1/25/2022 10:25:00 AM	1/25/2022 10:45:00 AM
OSIDemo_NY001 - 2022-01-25 09:50:00.000	NY001	1/25/2022 9:50:00 AM	1/25/2022 9:55:00 AM
OSIDemo_NY001 - 2022-01-25 09:10:00.000	NY001	1/25/2022 9:10:00 AM	1/25/2022 9:15:00 AM
OSIDemo_NY001 - 2022-01-25 09:00:00.000	NY001	1/25/2022 9:00:00 AM	1/25/2022 9:05:00 AM
OSIDemo_NY001 - 2022-01-25 08:45:00.000	NY001	1/25/2022 8:45:00 AM	1/25/2022 8:55:00 AM
OSIDemo_NY001 - 2022-01-25 08:25:00.000	NY001	1/25/2022 8:25:00 AM	1/25/2022 8:40:00 AM
OSIDemo_NY001 - 2022-01-25 08:05:00.000	NY001	1/25/2022 8:05:00 AM	1/25/2022 8:10:00 AM

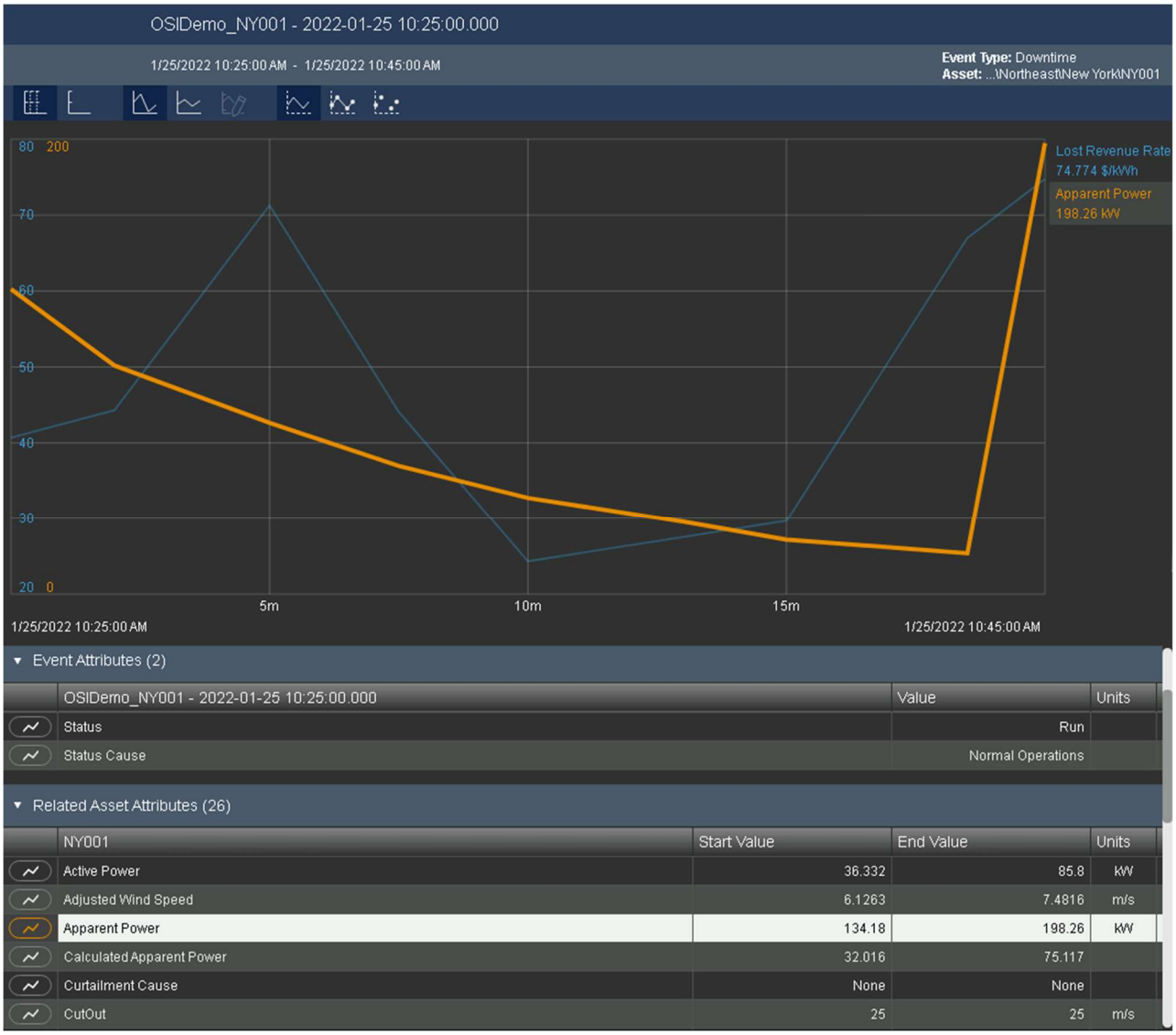
Finding maximum and minimum values to answer the questions:

- **What was the approximate peak Lost Revenue Rate in that time range?**
- **What was the approximate minimum Apparent Power for that time range?**

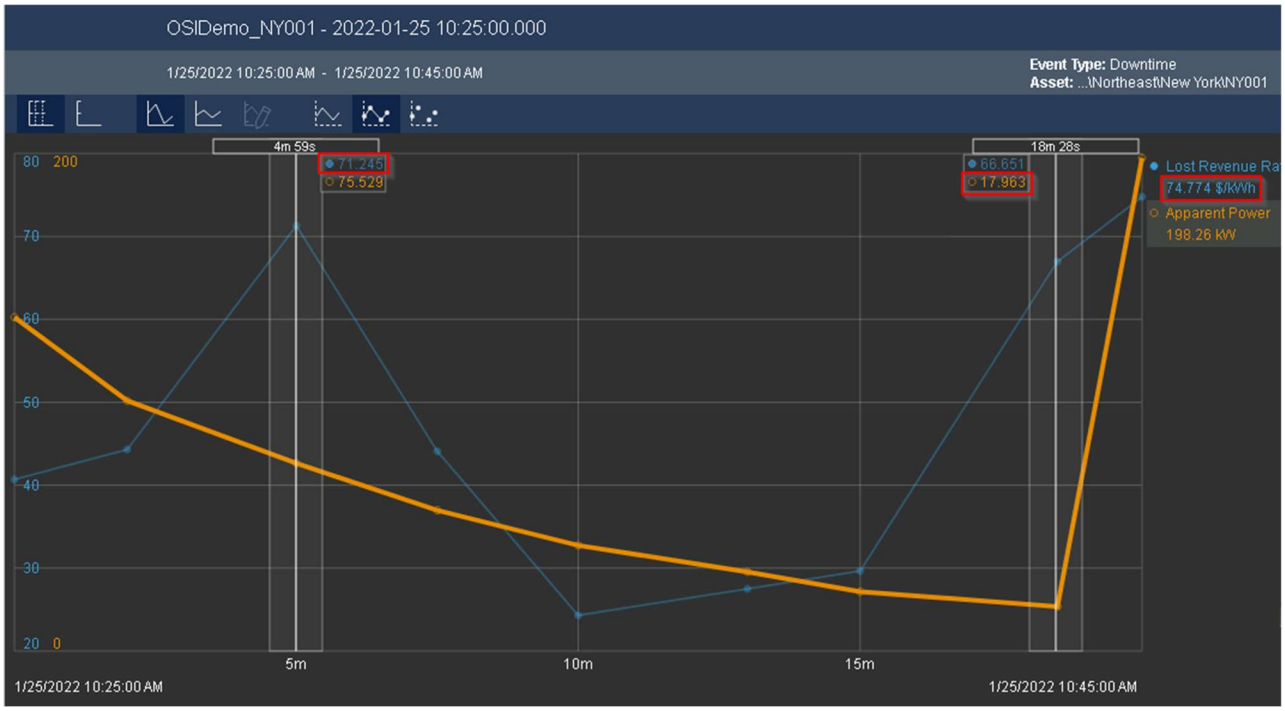
Option 1: Right click on the latest Event Frame in the Events Table and select Open Popup Trend From Row. In the Popup Trend, click on Show Summary Table in the upper left. The summary table will appear below the trend and displays the minimum and maximum values for the attributes in the trend.



Option 2: Click on the latest Event Frame in the Events Table while in Monitor Mode or right click and select Event Details. To bring the attributes onto the trend pane, click the line symbol to the left in the Related Asset Attributes list for Lost Revenue Rate and Apparent Power.

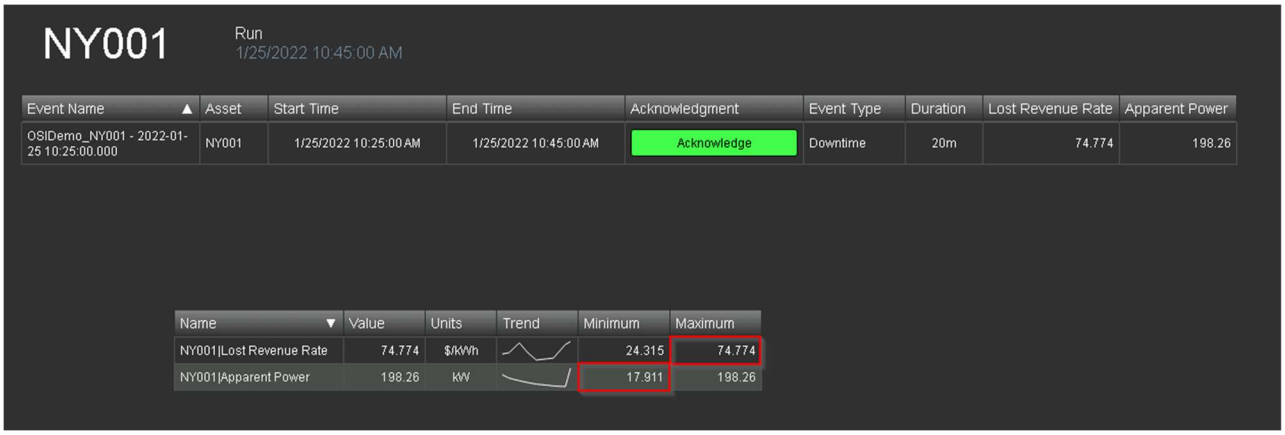


At the top you can change the appearance of the lines. For example, you can active Data Markers to easily see where the archived values are. To find the maximum and minimum values for the attributes, you can use a trend cursor by clicking on the trend at the timestamp of the minimum or maximum, respectively. The trend cursor can be moved by holding down the mouse button if you have not hit the maximum or minimum exactly. Still, it might be difficult to find the exact spot and get a precise value. Multiple cursors can be used simultaneously, simply click again on the trend.



In the example, I selected the peak at approximately 5 min as the maximum of the **Lost Revenue Rate**. Looking more carefully, you will notice that the trend is going higher at the end of the time range. The end time value is shown in the legend at the right.

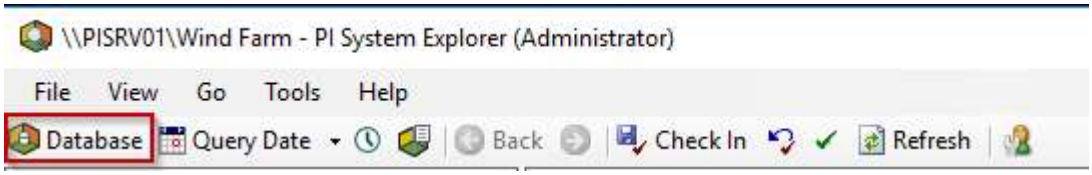
Option 3: Create a Table symbol on the Windfarm Turbine Detail display with the two attributes Lost Revenue Rate and Apparent Power. Make sure to show the Minimum and Maximum columns. Right click on the event in the Events Table and select Apply Time Range.



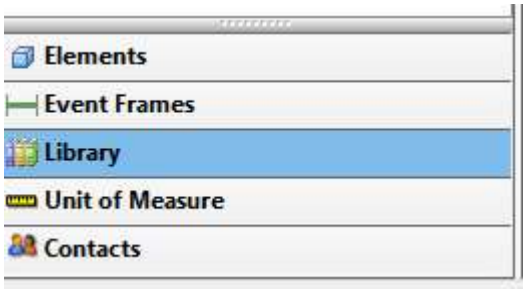
Solution for Exercise 3: Linking the displays

1. Open up PI System Explorer by clicking the PI System Explorer shortcut on the desktop.

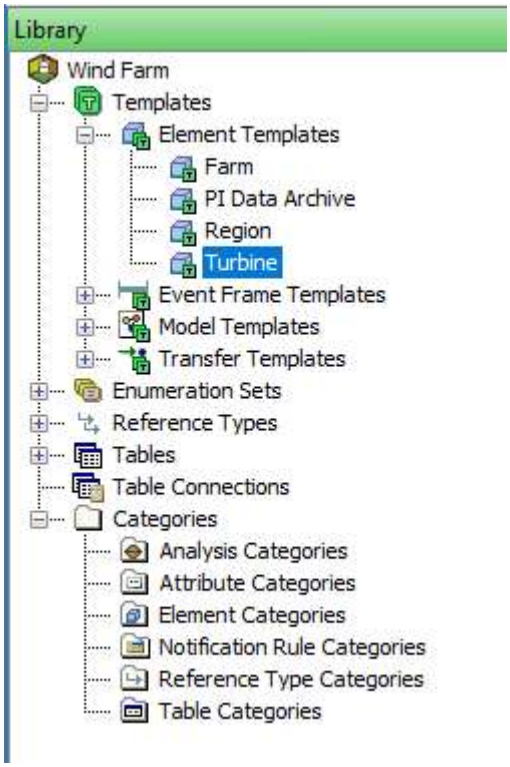
2. Open up the Wind Farm database by clicking the Database icon near the top left.



3. Once in the database select the Library tab in the bottom left.

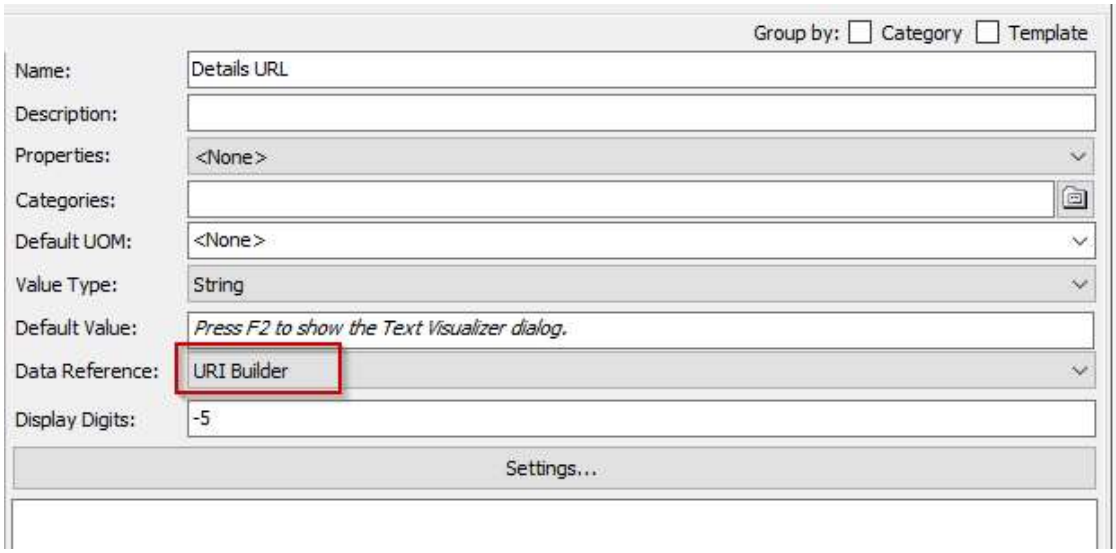


4. Expand the Templates section of the hierarchy and then expand the Element Templates section.



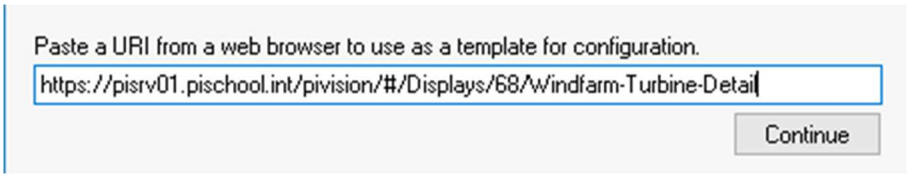
5. Select the Turbine Template then select the Attribute Templates tab as that is where we are going to configure the Details URL.

6. Select the Details URL attribute and change the Data Reference to URI Builder.



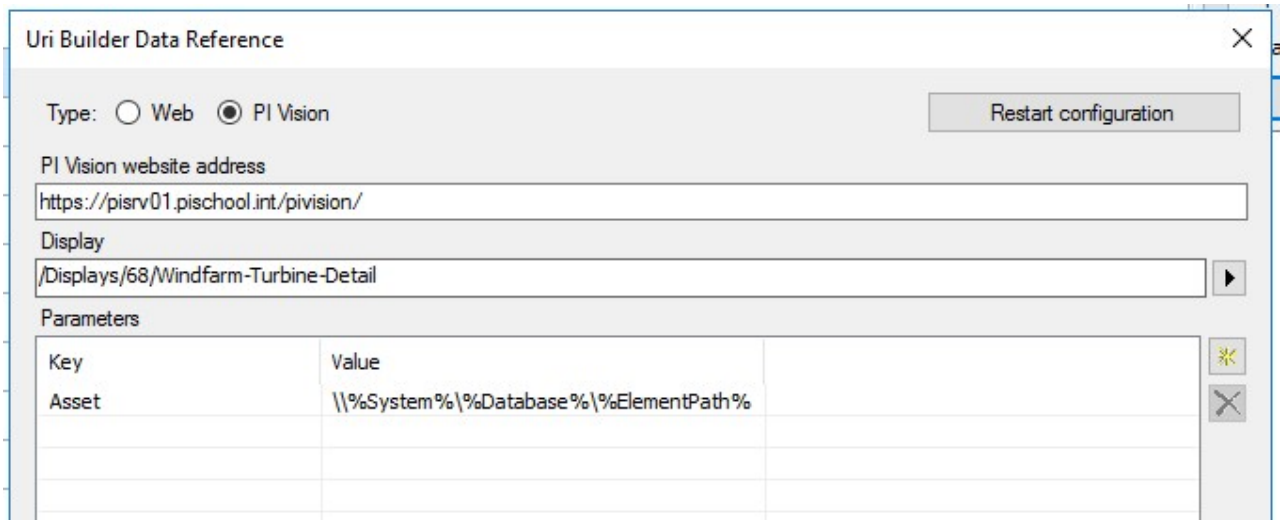
7. Click the “Settings…” button.

8. In the box copy and paste in the URL for the display you created in Exercise 2 and click Continue.



9. For the Type select PI Vision.

10. Click the * icon to add a new key.



11. For the key select Asset and for the value type \\%system%\%database%\%elementpath%

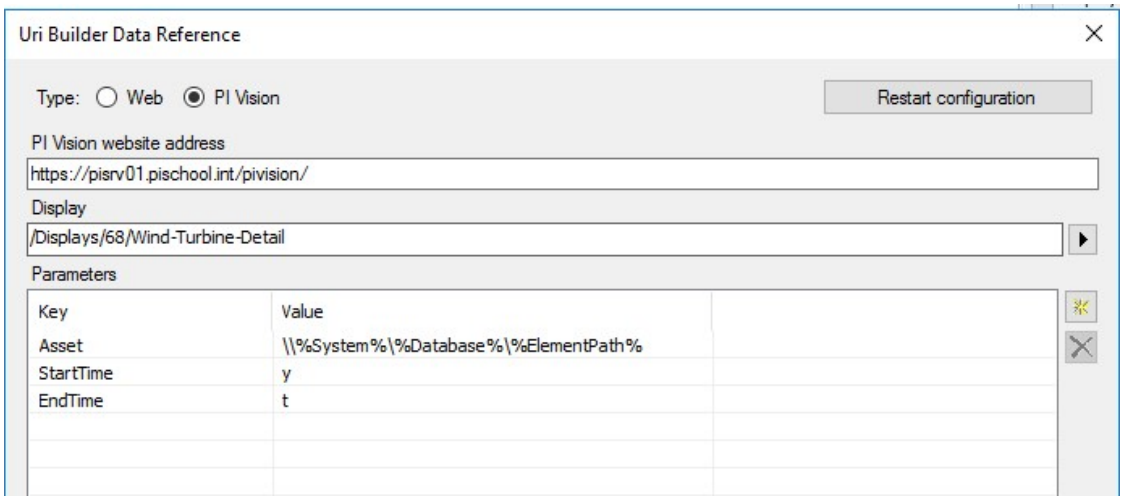
12. Click OK.

13. Select the Details URL Yesterday attribute.

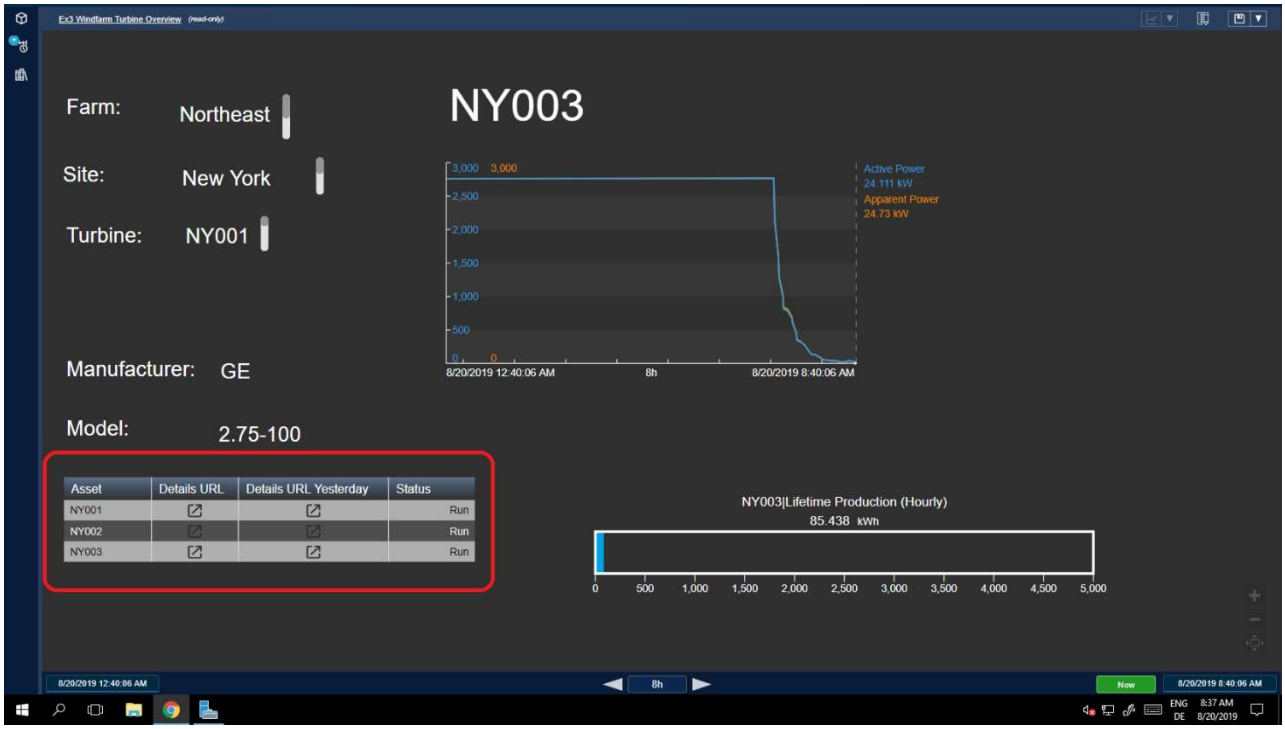
14. Repeat steps 6-11 for the new attribute.

15. In addition to the Asset key, create a StartTime key and set its value to “y”

16. Create an EndTime key and set its value to “t” and click on OK. When finished making changes be sure to Check In Changes in PSE.



The display that was created in exercise 1 will be expanded by an asset comparison table with the URI Builder attributes created before. Example:



17. Return to PI Vision and open the *Windfarm Turbine Overview_Your initials* display you created in Exercise 1.

18. Create an Asset Comparison Table Symbol on the display that includes the following attributes:
    a. **Status**
    b. **Details URL**
    c. **Details URL Yesterday**

19. Save the display and test the links by using Run mode and clicking on them.

20. For question 2, you can modify the Details URL Yesterday attribute by adding a new key.

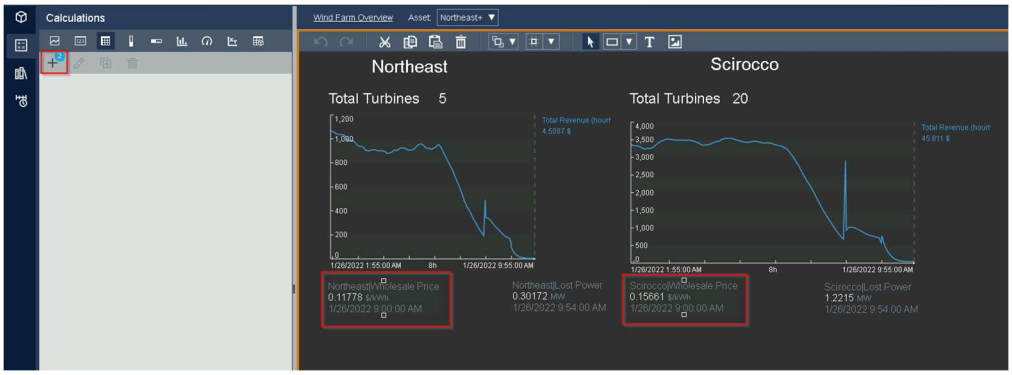
Solution for Exercise 4: Ad Hoc Trending in PI Vision

This Exercise was written to already provide step-by-step instructions.

Solution for Exercise 5: PI Vision Advanced Calculations

The *Wind Farm Overview* display that was used in Exercise 4 will be expanded to include an additional trend of calculated data.

1. In PI Vision open the Wind Farm Overview Display if not already opened.
2. Place the display in Design mode.
3. Select the Calculation tab and select the value symbols for the Northeast and Scirocco Wholesale Price attributes. Note that the parent element of the attribute that was selected first is used as the root element. In the following we show the steps when the Wholesale Price attribute of Scirocco is selected first. Click the '+' to create a new calculation.



4. Name the new calculation **Scirocco Wholesale Price Percentage**

5. The Expression box will show the following (with asset Scirocco selected as root):

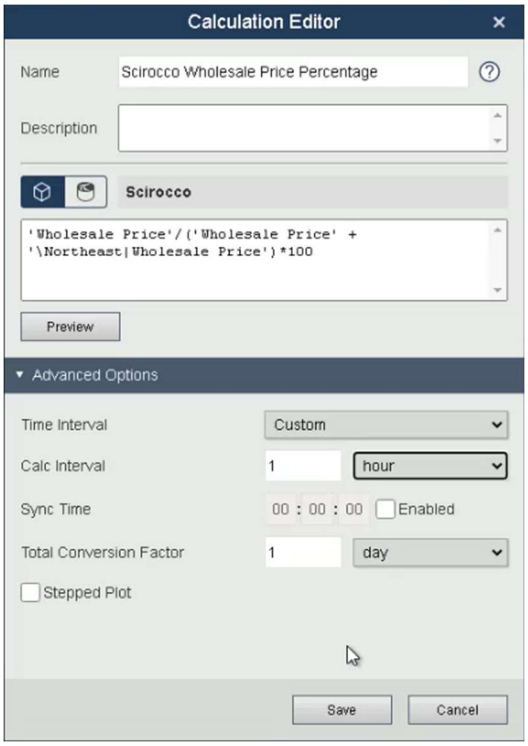
   'Wholesale Price' + '\Northeast|Wholesale Price'

6. Modify the Expression to the following:

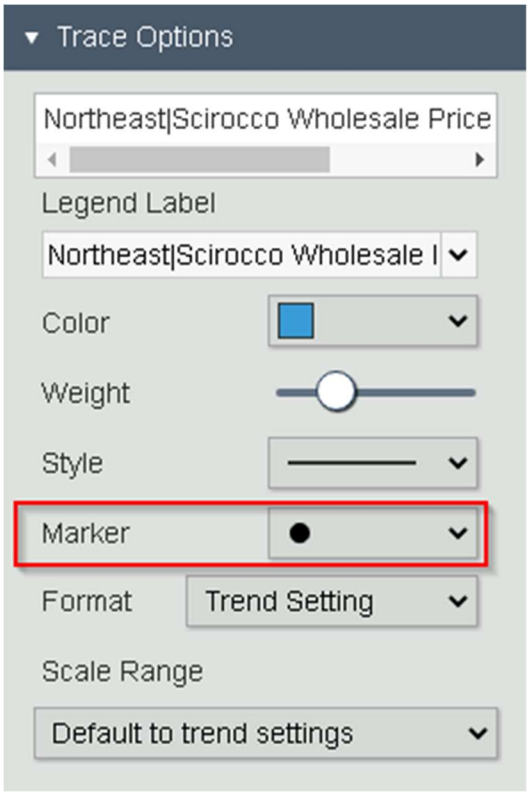
   *'Wholesale Price'/('Wholesale Price' + '\Northeast|Wholesale Price')*100*

7. Expand Advanced Options and change the Time Interval to Custom

8. Adjust the Calc Interval to **1 hour**



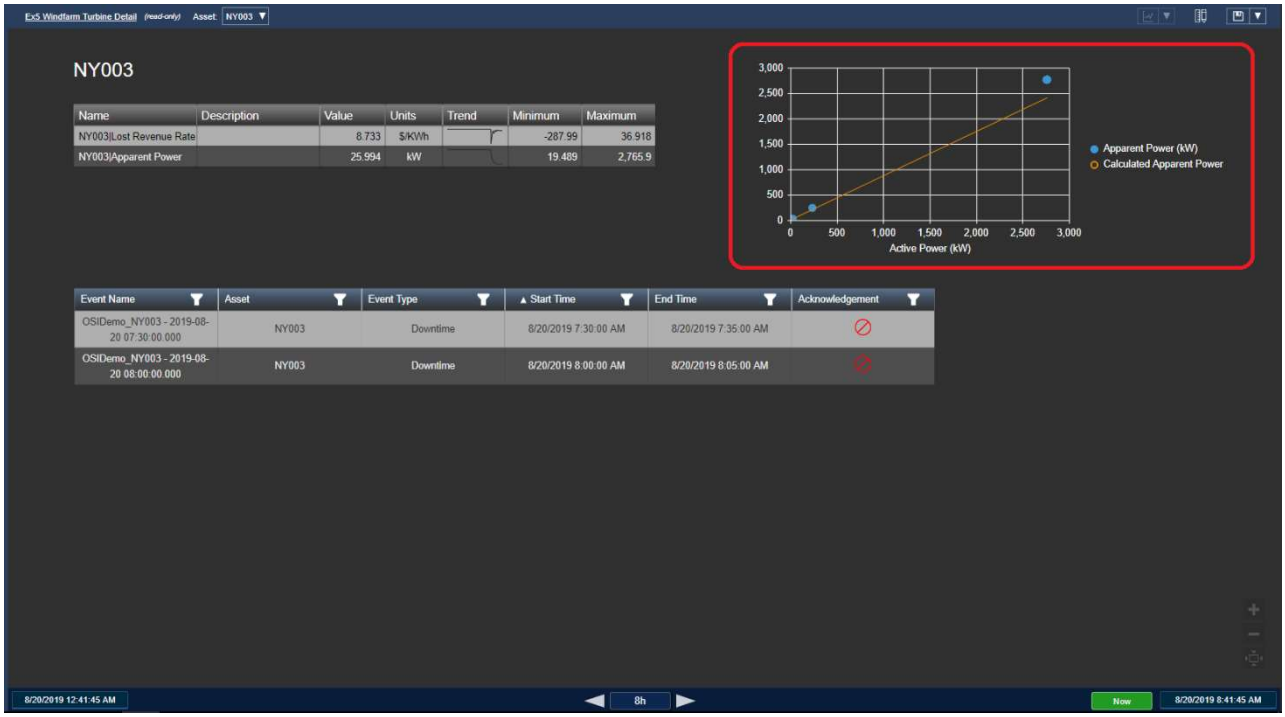
9. Save the calculation.
10. Select the Trend symbol in the PI Vision symbol tray.
11. Drag the Value Column of the calculation onto the display space to make a new trend.
12. Right click the trend and hit Configure Trend.
13. Expand Trace Options and make a selection for the Marker setting



14. Place the display in Run mode and use your trend and trend cursors to answer the exercise questions

Solution for Exercise 6: XY Plot with Reference Curve

The *Windfarm Turbine Detail* display that was created in exercise 3 will be expanded by an XY plot. Example:



1. In PI Vision open the Wind Farm Turbine Detail display you created in Exercise 2
2. Drill down in the Assets pane to whatever Turbine is currently shown on the display
3. Select the XY Plot symbol
4. In the Attributes pane select both the **Active Power** and **Apparent Power** attributes. You can select multiple attributes in PI Vision by holding the Ctrl key. Drag those on to a blank area in the display to make the XY plot
5. Right Click the XY Plot and select "**Configure XY Plot…**"

6. From the attributes pane find the **Calculated Apparent Power** attribute and drag it to the Y-axis of the XY Plot configuration

7. Under the Format section select the second row that has the **Calculated Apparent Power** attribute
8. Click the check box for Connecting Line and uncheck the box for Markers
9. Now click back in the display space and save your display.

PI Vision Security

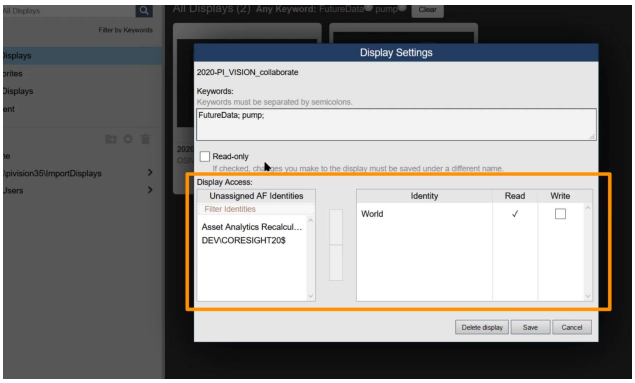
By default, any new display you create in PI Vision is private. Meaning that only you can view and edit it. You can however share it with other users and even grant them access to edit and save new versions. Let's see how PI Vision 2020 streamlines the process of granting users read and write access to displays.

Share Displays and Edit Access

The Display Settings window allows you to control a display's visibility and ownership. To access the Display Settings window, browse to the Home page and click Edit display settings on the display thumbnail that you want to edit. The options available on the Display Settings window depend on your PI Vision user role.

Administrators have access to all Display Settings. Display Owners may only access some options. The Keywords setting allows you to provide keywords separated by semi-colons. This makes it easier for someone to search and find this display. Checking the Read-only box disables saving any changes to the display by any user, including yourself. You must save the display under a different name to make changes. If you are an administrator, you can change the owner for the selected display. The display owner can make changes and save new versions of the original display. You can remove displays by clicking on the delete button. You cannot undo this action so make sure you are certain before you proceed.

Display Access



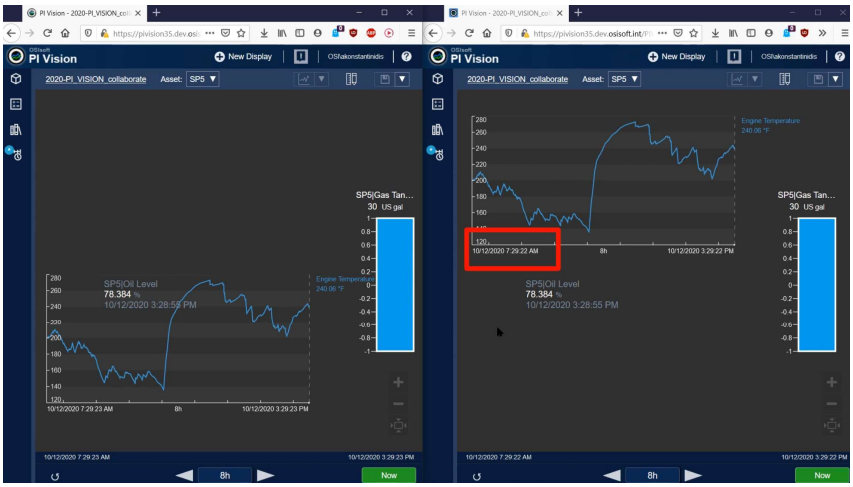
In this section you can assign read and write access to your display for selected AF identities. A PI AF identity represents a set of access permissions for a group of users. This is setup by your PI Administrator. You can use the identity group World to share your display with everyone in your organization. You can specify the type of access that you want to grant to a display for an AF Identity.

- Read access: users can see and open the display
- Write access: users can save changes to a display

Read access is granted by default to any AF identity added. To grant Write access you must check the appropriate box. Click an identity under *Unassigned AF Identities* and then click *Add Permissions* to grant that AF Identity access to the display.

Collaborate on Your Displays

Users can access the same display at the same time. If one of them modifies the contents of the display, these changes will be automatically applied to the displays of the other users within 2 minutes. The user who made the changes would need to save the display and exit edit mode.



If another user attempts to also make changes to the display before it updates, an indication will popup. This notifies them that the display has been changed. Their options are then to either save their display as a new version or reload to update their display. This way users avoid change conflict and are guaranteed to be looking at the same version of the display.

If you want to view the changes to a display before accepting them, you can open the display in a new browser tab and then decide whether to keep the changes or not.

Manage PI Vision Displays

Manage Role-Based User Access Level

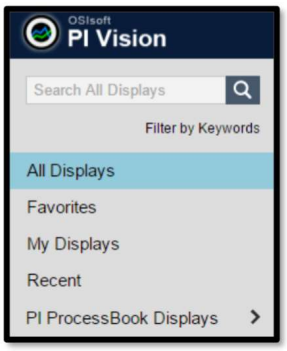
Your PI Vision Administrator can give users different level of access by assigning and managing user roles on the PI Vision Administration website. PI Vision provides two access roles based on PI AF identities:

- **Publisher**: users have full access to the application and can save displays.
- **Explorer**: users have access to the application but cannot save or share displays. An Explorer can still export data from a display.

PI Vision Homepage

In the homepage of PI Vision, you can View and Search All Displays that you have access to, Filter displays by Labels, or navigate logical groups to find displays. These groups are listed below:

- ALL DISPLAYS: lists all public and private displays
- FAVORITES: filters the thumbnails to show only favorites (starred displays)
- MY DISPLAYS: shows all displays that you have created.
- RECENT: PI Vision automatically remembers displays that you used within the last seven days.
- FOLDER HOME: shows the folders that your administrator has configured for you to access PI ProcessBook displays. Below this option, the list of folders for accessing PI ProcessBook displays will be listed. In the example shown in the screenshot below, this folder is named “PI ProcessBook Displays”.



Organizing PI Vision Displays

PI Vision offers new options for organization of displays to provide a quicker way of finding displays of interest.

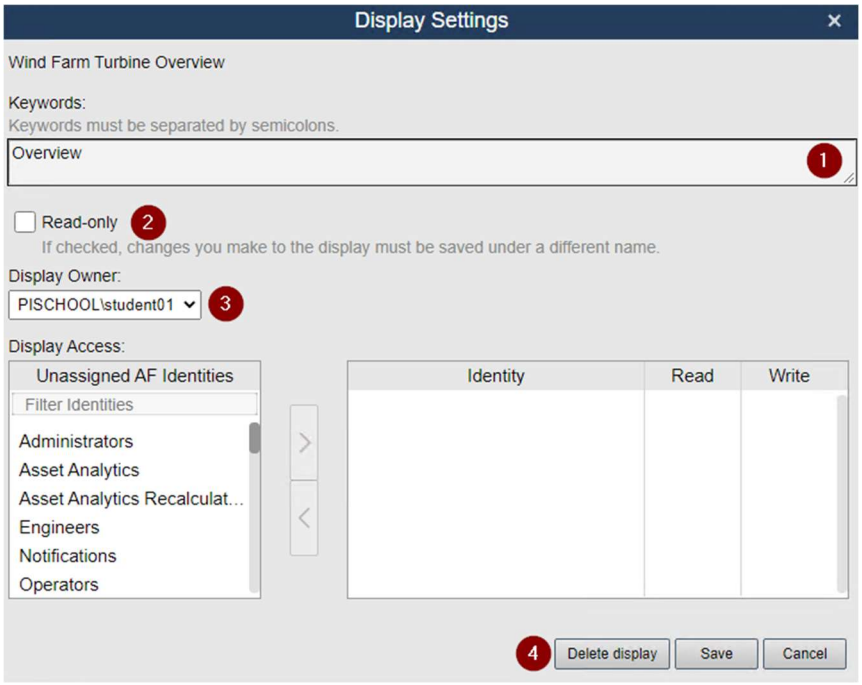
- Search All Displays: Displays are searchable by name or owner.
- Favorites: You can mark displays as "favorites" by clicking the star icon. Favorites are a user-specific property.
- Keywords: You can apply keywords to displays to categorize them. The keywords can be viewed in a keyword cloud by selecting "Filter by Keywords." Within the keyword cloud,

the keywords are sorted alphabetically, and their size is determined by their relative frequency. Keywords applied by one user are visible to the rest of the users.

- You can add a keyword by clicking the Display Settings icon and typing in the keyword in the Keywords box. Once you start typing the keyword, the matching available keywords become available in a list, as shown in the image below.

Editing PI Vision Displays

Some of the editing options are available from the PI Vision homepage and some from the PI Vision display itself.



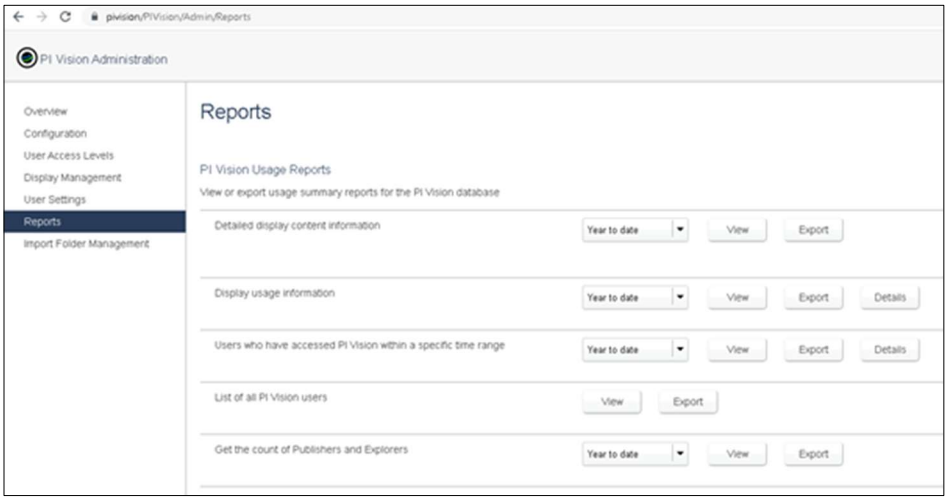
From the homepage, clicking on the Display Settings icon you will see the following options:

- **Keyword:** allows you to provide semi-colon separated keywords that someone may use while searching for this display.
- **Read-only access**: click here to disable saving any changes to the display by any user, including yourself. If you want to make changes to a display that is Read-only, open that display and save it under a different name.

- **Display Owner:** change the owner for the selected display to a different user. This display will appear in the selected user's Private displays if you do not grant access to any AF Identities when you click Save. You can make anyone else in your organization the owner of any display. (Only visible to the Administrators).
- **Delete Display:** If you no longer need a display and want to remove it, click Delete display. Make sure you are certain before you delete a display. You cannot undo this action.

Reports

PI Vision administrators can view or export six different reports about the usage of PI Vision. The reports are available under the Reports tab on the PI Vision Administration site. In the virtual environment you can access the PI Vision Administration site under the URL https://pisrv01.pischool.int/pivision/admin.



Each of the report types is defined as follows.

- **Detailed display content information -** Provides a summary of the contents of displays created during a specified time range. This can include information about data items, symbols, display visibility, and display ownership.
- **Display usage information -** Provides a count of total views and unique users that have accessed a display in the specified time range.
- **Users who have accessed PI Vision within a specific time range -** Provides a count of users who have opened PI Vision displays each month during the specified time range.
- **List of all PI Vision users -** Provides a count of displays owned by each PI Vision user.
- **Get the count of Publishers and Explorers -** Provides a count of Publisher and Explorer licensed users that have accessed PI Vision in the specified time range.

- **Calculation usage information –** Provides detailed information about calculations used in PI Vision displays. The details include calculation name, asset content, expression, calculation interval, display name, etc.

Final Exam

The final exam in this course is taken online. Please check the course listing online for more detail.