# IBM i Performance Data Investigator

## Browser-based viewing of performance data

Dawn May April 12, 2011

The Performance Data Investigator (PDI) is available with the IBM Systems Director Navigator Web console. Using PDI, you can do analysis of performance data from Collection Services, Job Watcher, Disk Watcher, and Performance Explorer. This article reviews the key features of PDI.

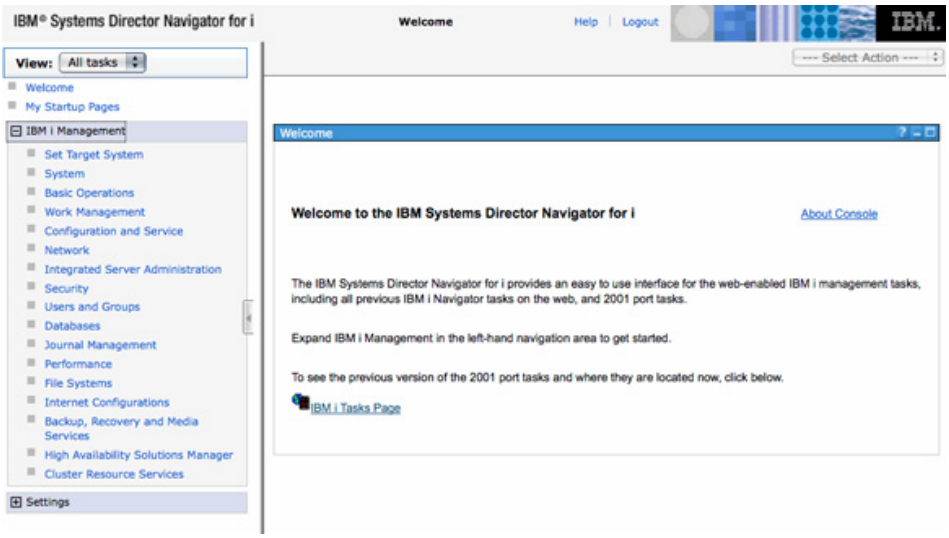
## Getting started with the Performance Data Investigator

The Performance Data Investigator is a browser-based graphical user interface for viewing and analyzing IBM i performance data. The Performance Data Investigator is a general name for the function; **Investigate Data** is the actual task name.

To use the Performance Data Investigator (PDI), you need to use IBM Systems Director Navigator. IBM Systems Director Navigator is the IBM i web console that was introduced with the V6.1 release. Everything you need to use this web console is installed by default with the V6.1 or later releases (see "Systems Director Navigator for i Key points" in the Related topics section). The HTTP admin server is required, and it is automatically started with the V6.1 release and later.

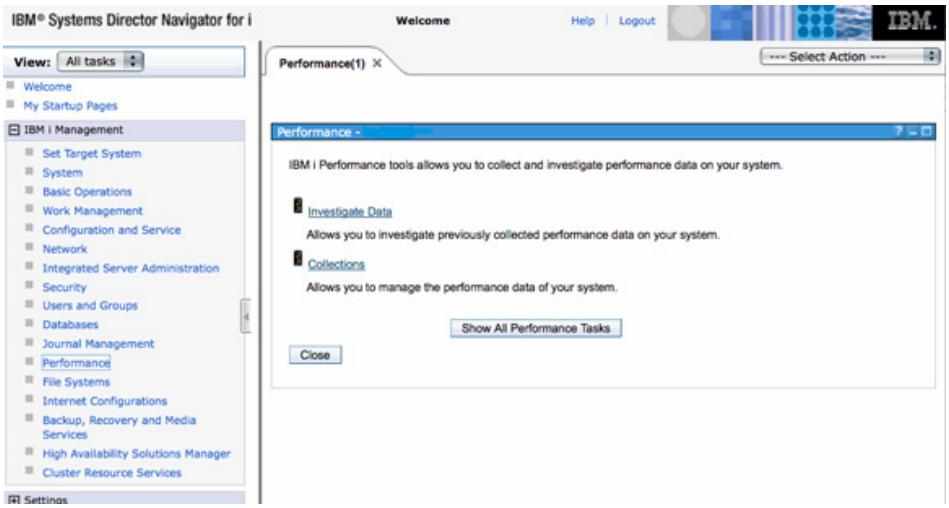
The performance tasks are within the web console. Simply point your browser at your IBM i partition, using the 2001 port (for example, http://mysystem:2001) where mysystem is the IBM i partition hostname. You get a sign-on screen where you enter your IBM i user ID and password. Once you sign on, you see the Welcome panel and the tasks available in the left-hand navigation pane.

### Figure 1. IBM Systems Director Navigator Welcome panel




In the left hand navigation tree, select **Performance**. The Welcome panel for the Performance tasks displays and you have the **Investigate data** link. The **Investigate data** link is how you access the Performance Data Investigator.

### Figure 2. Performance tasks




## IBM i Performance Data

IBM i has four different kinds of performance data that you can analyze with PDI. The ability to collect this performance data is provided with the operating system. The Performance data collectors are:

- Collection Services
  Collection Services is the performance data collector with minimal overhead and is intended to be run 24/7. You can control what data is collected. Collection Services is on by default, and IBM recommends that you do not disable or turn off Collection Services. See the Related topics for additional information.

- Job Watcher
  Job Watcher is a performance data collector that is intended to be run to collect more detailed job performance data for diagnostic purposes. Job Watcher collects much of the same data that Collection Services does but also collects more detailed information, such as call stacks and SQL statements. The Job Watcher performance data collector was shipped with the IBM i operating system starting with the 6.1 release. See the Related topics for additional information.
- Disk Watcher
  Disk Watcher is a performance data collector that is intended to be run to collect detailed performance data for disk operations. Disk Watcher data can be useful for analyzing and optimizing application I/O. See the Related topics for additional information.
- Performance Explorer
  Performance Explorer (PEX) is the performance data collector that is used when the most detailed performance data is required for problem determination purposes. PEX also has a mode, called *profile*, that allows for application performance analysis. PDI only supports PEX profile collections. See the Related topics for additional information.

### Prerequisites

The Performance Data Investigator has different features available depending upon the Performance Tools option(s) you have installed on your IBM i partition. The graphical user interface for Collection Services is included with the base operating system. However, the GUI for the other performance data collectors requires the appropriate option of the IBM Performance Tools Licensed Program Product to be installed.

The following are the Performance Tools options required to use PDI with various kinds of IBM i performance data:

- Collection Services
  Included with the base operating system, IBM i V6.1 or later
- Job Watcher
  IBM Performance Tools Licensed Program Product, Job Watcher feature
- Disk Watcher
  IBM Performance Tools Licensed Program Product, Manager feature
- Performance Explorer
  IBM Performance Tools Licensed Program Product, Manager feature

In addition to having the required options of the IBM Performance Tools Licensed Program Product installed, you also need to ensure that any users that do not have a powerful user profile (for example, *ALLOBJ users) are added to the QPMCCDATA authorization list. Use `EDTAUTL QPMCCDATA` to edit the authorization list to add users.

## IBM i wait accounting

IBM i "wait accounting" is the technology that provides the ability to identify what any thread or task is waiting on when it is not using the CPU. Because threads and tasks can wait for a wide variety

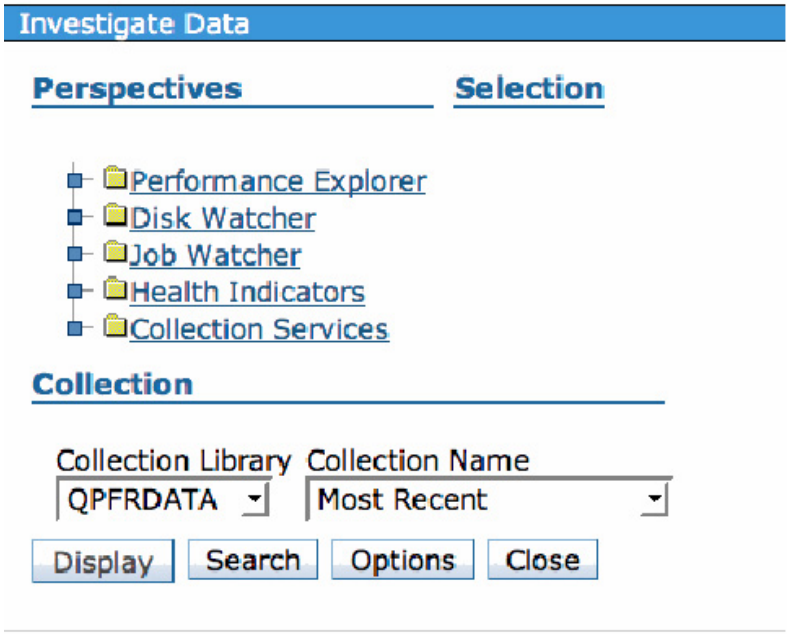
of reasons, wait technology can be very useful in understanding the wait conditions and possibly eliminating or reducing wait time, which can have a significant affect on performance.

Within the PDI, there are many charts that display wait information. Having a basic understanding of wait accounting helps you better understand those charts. See the Related topics section for additional information.

## Investigating Data

When you start the Investigate Data task, you will see a list of perspectives. A perspective is simply a chart or table of the performance data that you is displayed. Perspectives are groups into folders, and a collection of perspectives is called a content package. Each performance data collector has a content package. The content packages you see when you start the Investigate Data task will depend upon what options (if any) of the IBM i Performance Tools licensed program product that you have installed (see the prerequisites discussed earlier). Figure 3 below shows all of the possible content packages that are available.

### Figure 3. Investigate Data content packages



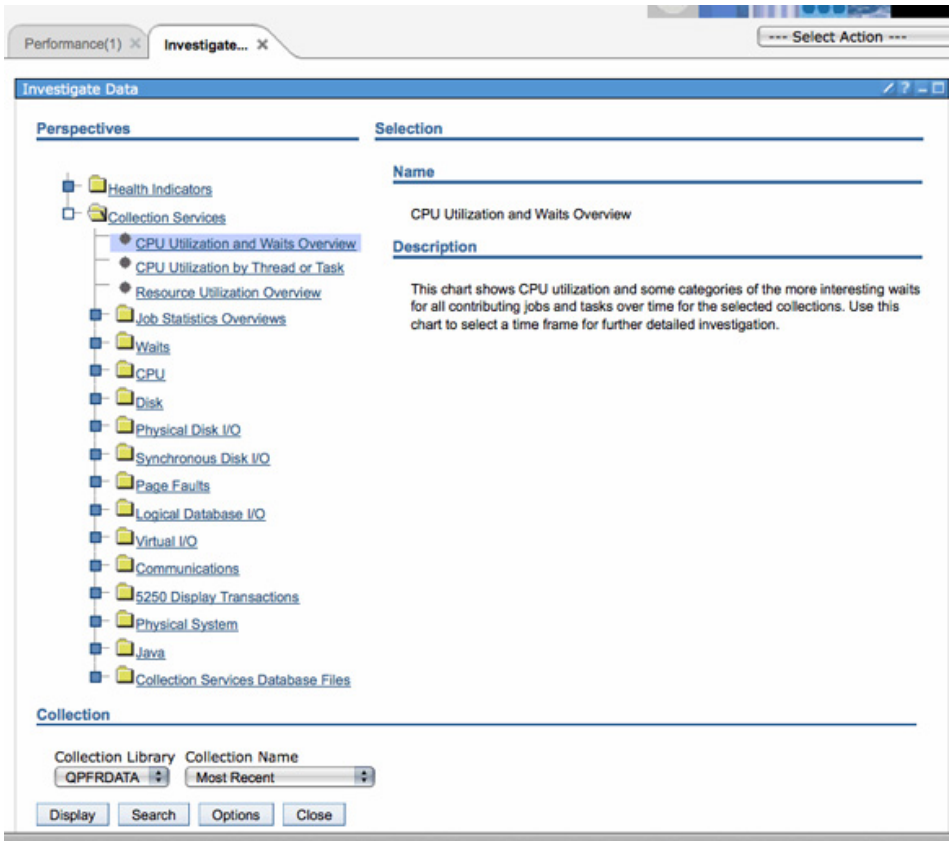

### Selecting a collection

For the purposes of this document, the discussion centers around the Collection Services content package, because that is included with the operating system and does not require the Performance Tools LPP.

To see the list of perspectives in a content package, you click on the folder icon in front of the content package name and that expands to show a list of nested folders where perspectives

are grouped by they types of performance data they display. Figure 4 below displays the list of perspectives in the Collection Services content package with the IBM i V7.1 release.

## Figure 4. Collection Services Perspectives




At the bottom of the **Investigate Data** panel is where you can specify the library in which the performance data resides and the name of the collection you want to investigate. The default library is QPFRDATA and the default collection is the most recent one, which allows you to look at the most recently collected performance data.

## Options

The options button on the main **Investigate Data** panel allows you to display the configuration options for the behavior of PDI. Most of the options are self-explanatory. However, **Enable Design Mode** deserves a brief mention. Design mode allows you to create your own content package and perspectives. The details of design more are far beyond this article.

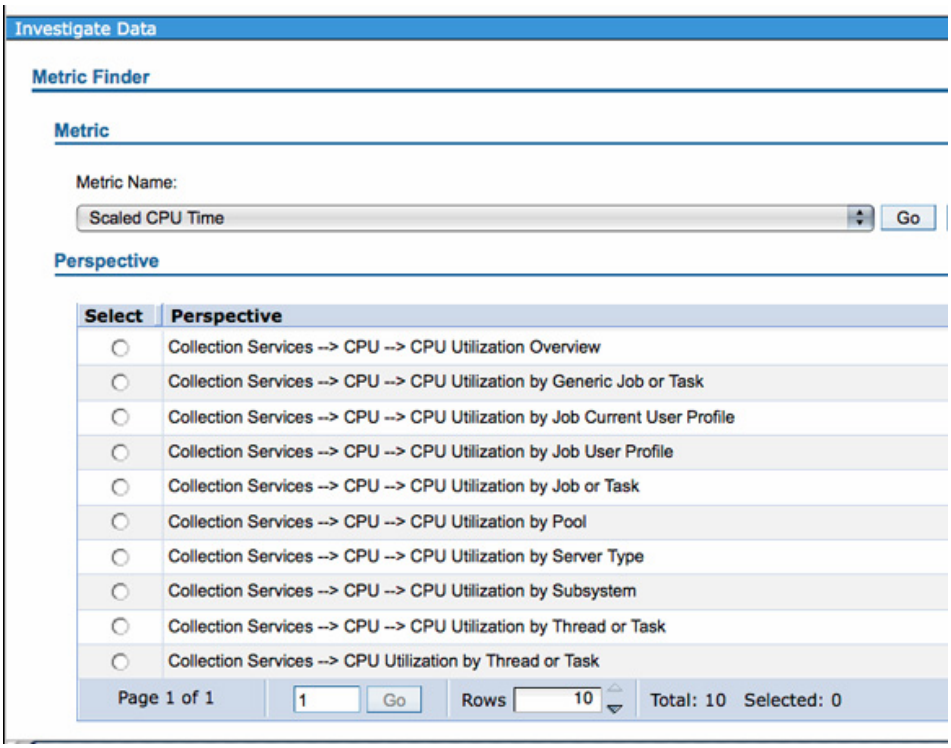
## Search

The search button on the main **Investigate Data** panel allows you to access the metric finder to search for performance metrics and identify what charts, tables, or files that metric exists in. The search option has two very good uses:

1. It provides a way for you to review every metric that is available

2. For any selected metric, the metric finder displays a list of charts or tables in which that metric is used. If the metric is not part of any chart or table, the metric finder will display the DB2 files in which that metric is stored.

### Figure 5. Metric Finder

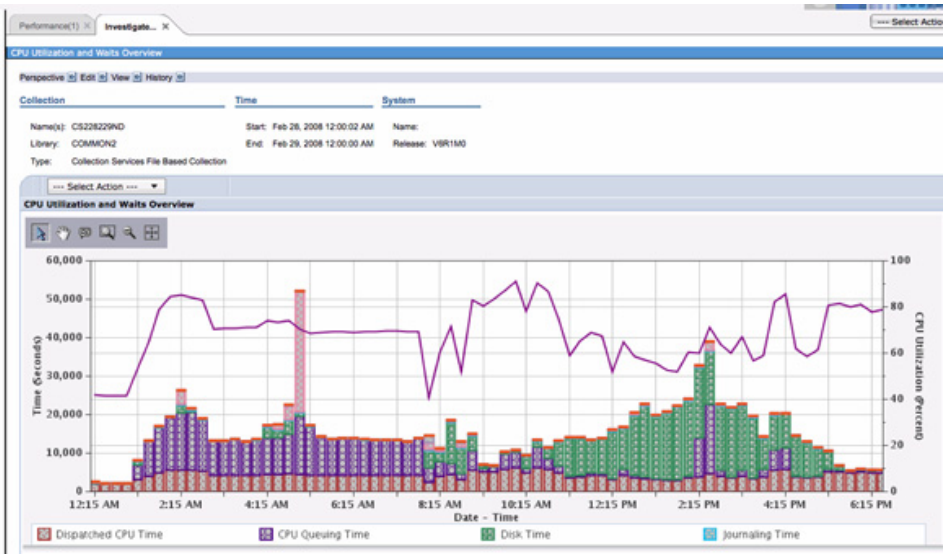



## Displaying performance data

Displaying performance data with PDI has many features for interacting with the displayed data, switching between chart and table views, data customization, and more. This section briefly reviews the main features of PDI when displaying performance data.

A good starting point with Collection Services data is the **CPU utilization and waits overview**. This chart shows the CPU utilization of the partition along with the wait information for the collection. This perspective can often give you a good idea for the timeframes you may want to consider for deeper analysis.

## Figure 6. CPU utilization and waits overview




## Tools to interact with charts

Every chart has the following tools, shown in Figure 7 below, that you can use to interact with the chart:

## Figure 7. Tools

- Selection
  This is the arrow icon and is used to select and deselect points in the chart. You can use the selection tool to identify start and end points to reduce the timeframe of the data you want to analyze. You can also select specific metrics which can influence the display of data in future drill-down selections.
- Pan
  The pan tool is represented by the hand icon and allows you to pan through the data in the graph, moving left or right.
- Show tooltips
  This is the conversational bubble icon in the tool tray and allows you to turn on or off the fly-over information. Turning on tooltips allows you to instantly see some basic information about the metrics displayed in the chart as you move your cursor over the chart.
- Zoom region
  This is the magnifying glass icon with an dotted box around it; the zoom region tool allows you to zoom in on the chart to get more detailed view of the data.
- Zoom out
  This is the magnifying glass icon with the minus sign on it and provides the ability to step-wise zoom out.

- Reset zoom
  This is the cross inside a box icon and expands the chart to show the full timeframe of the collection.

## Navigation short-cuts

There are navigation short-cuts at the top of every perspective. The **Perspective** and **Edit** navigation short-cuts are simply easy ways to access the GUI controls rather than having to scroll to the bottom of the chart to use the buttons for **Done**, **Options**, **Save As**, and if in design mode, **Edit Perspective**.

In addition, the **View** option allows you to toggle on or off the header that displays some information about the collection you are viewing. The **History** option displays the drill-down perspectives that have been used to get to the current perspective. In addition, the **History** option allows you to return **Home**, which is a fast way to exit back to the main **Investigate Data** panel.

## Figure 8. Navigation shortcuts


## Drill-down

From any perspective, you have drill-down options to go to other charts or tables for analysis purposes; the drill-down options are found in the action drop-down box.

There are also options in the action drop-down box to work with the data or to refine the charts.

- **Export**
  Export allows you to take the chart or table you are displaying and export it for use with other applications, such as presentations, documents, or spreadsheets.
  Charts can be exported as images—PNG and JPEG are the two image types that are supported. CSV and TXT are the export types supported for table data.
- **Modify SQL**
  Every chart or table you display provides you with the option of Modify SQL. Modify SQL shows you the SQL statement behind the chart or table. You can then change this SQL statement to customize the query. Beware, this is not for a novice SQL user!
- **Size Next Upgrade**
  Size Next Upgrade allows you to take the selected performance data and send it to the IBM Systems Workload Estimator (WLE) to do a capacity planning exercise based upon the data you have selected. It is important to select a beginning and ending interval for the data you want to send to WLE, otherwise the entire collection will be sent to WLE. Generally, you will want to identify a timeframe of peak workload activity for a sizing exercise, not a full 24-hour collection.
- **Change Context**

Change Context allows you to modify the criteria for which the information is displayed in a chart – it is a nice way to limit the data that is used to build the chart. For example, by using Change Context, if you were displaying a chart that graphed information about jobs, you could specify only jobs with a particular name or user profile are displayed in the chart. Change Context also allows you to change the collection you are working with or change the timeframe you want to display.

If you have changed a chart by using Change Context, you have the ability to save that changed chart in your own personal set of customized perspectives.

- **Show as table**
  Every chart can be displayed as a table. The Show as table option displays the data that is behind the chart in table form. What's nice about Show as table is that you can see all the data that was returned as a result of working with the performance data. In many cases, the table data has more columns of data available that are actually displayed in the chart. You can search, eliminate some data, sort the data, choose different sort criteria, etc., when in table mode and then you can display the chart with the changes to the table data. This is one way to customize the information you display via PDI.

  If you have customized a chart by manipulating the table data, you have the ability to save that customized chart in your own personal set of customized perspectives.
- **Table actions**
  This article isn't going to describe the table actions that are available to you in the IBM Systems Director Navigator Web console; the table actions when using PDI are the same as the table actions on any other table within Director Navigator.
- **Custom perspectives for your user profile**
  As mentioned in other sections, if you modify or customize a chart or table, you can save those changes to your own customized perspectives. When you save charts or tables after you have modified them, there will be a new content package on the main **Investigate Data** panel that starts with **Custom Perspectives** appended with your user profile name. This is where you will find all the customizations that you have done. You can use these customized charts and tables to view performance data from other collections as well.

## Performance Data Investigator and Set Target System

In the 7.1 release, IBM Systems Director Navigator added a function called **Set Target System**. This allows the web infrastructure to support Director Navigator to run on one partition, but you can use Director Navigator to manage a second partition.

There are a couple considerations for using PDI with **Set Target System**:

- If the target system you are managing is at the 5.4 release, the **Performance** tasks is not be available and you are not able to use PDI.
- If the target system you are managing is at the V6.1 release, the **Performance** tasks that you have available are limited to those supported on the V6.1 release.

## Conclusion

The Performance Data Investigator is a powerful tool for analyzing performance data. This article has just touched upon the major features of this graphical tool. As you use PDI, you will discover

that it has a great deal of function and a lot of flexibility so you can view your performance data and proactively manage your system's performance.

## Related topics

- Find out more about IBM Systems Director Navigator.
- Learn the key points for Systems Director Navigator for i .
- Visit the IBM i 7.1 Information Center to get more information about
  - Performance data collectors
  - Collection Services
  - Job Watcher
  - Disk Watcher
  - Performance Explorer
  - Wait Accounting
- Follow Dawn's blog, i Can... Tell You Why You are Waiting to get a high-level overview of IBM i wait accounting.