

Introduction to the IBM i Performance Data Investigator

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Introduction to the IBM i Performance Data Investigator

Session Abstract

This session will review the Performance Data Investigator. It will cover where you find it, prerequisites you need to use it, and the basics on how you use it. The presentation will also show some simple examples of the types of charts you can find within this easy-to-use performance tool.



IBM Navigator for i

- IBM Navigator for i is the Web console for managing IBM i
 - Has much of the function as System i Navigator
 - but with a browser user interface
 - Simply point your browser to `http://systemname:2001`

The image shows two overlapping browser window screenshots. The left window is a login form titled 'IBM Navigator for i'. It features the IBM logo in the top right corner, the product name, and a circular icon with an 'i' and 'for Business' text. Below this are two input fields labeled 'User ID:' and 'Password:', and a 'Log in' button. The right window is the main welcome page, titled 'Welcome to the IBM Navigator for i'. It has a blue header bar with the word 'elcome' (partially visible) and window control icons. The main content area includes a heading, a link for 'About Console', a paragraph of introductory text, a paragraph about expanding the left-hand navigation, and another paragraph with a link to 'IBM i Tasks Page'.

Updates to the Performance Data Investigator - PTFs

- Major enhancements have been made to Navigator for i and the Performance Data Investigator
 - For 7.1 - install the latest level of:
 - HTTP Server group PTF SF99368
 - Java group – PTF SF99572
 - Database group PTF SF99701
 - Performance Tools group PTF SF99145
 - For 6.1 - install the latest level of:
 - HTTP Server group PTF SF99115
 - Java group – PTF SF99562
 - Database group PTF SF99601
 - Performance Tools group PTF SF99114

http://ibmsystemsmag.blogs.com/i_can/2009/10/i-can-investigate-performance-data.html

http://ibmsystemsmag.blogs.com/i_can/2011/05/new-systems-director-navigator-service-packs.html

http://ibmsystemsmag.blogs.com/i_can/2012/10/performance-data-investigatorbetter-than-ever.html

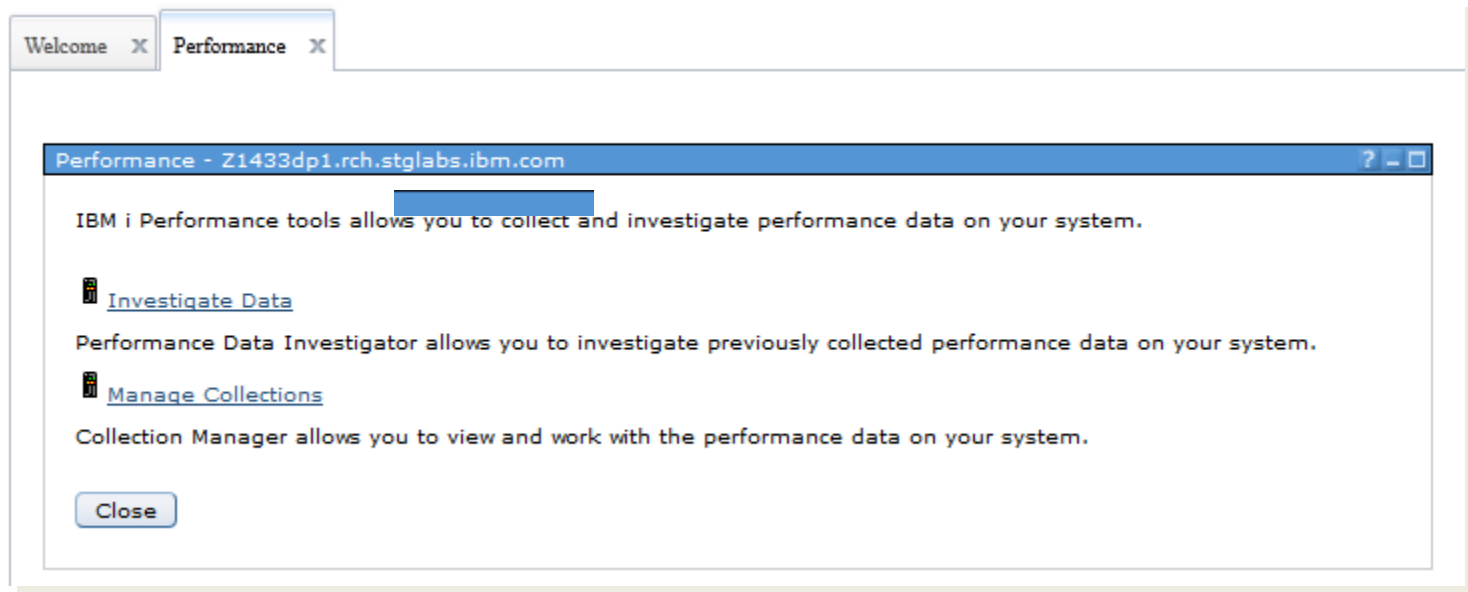
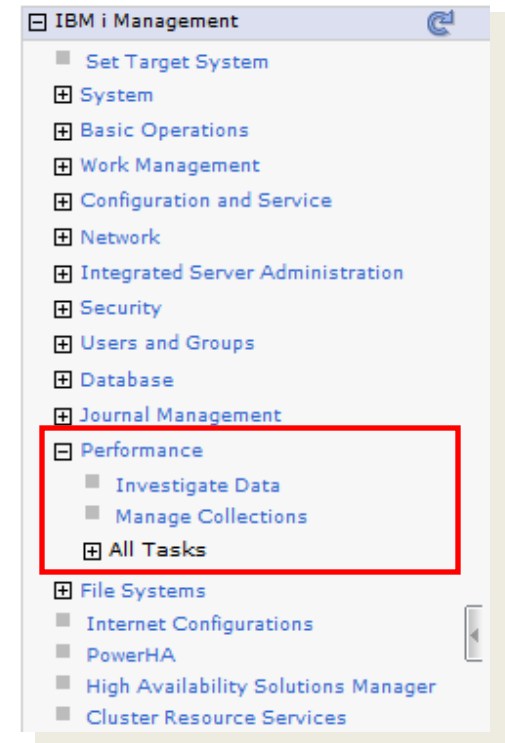
http://ibmsystemsmag.blogs.com/i_can/2013/03/navigator-for-i-enhancements.html

Browser Support

- Supported Browsers for the latest Navigator enhancements:
 - Internet Explorer 9
 - FireFox 10 ESR
- Browser tips:
 - Unexpected results could be browser related. Example problems are....
 - Hung charts
 - Empty tables
- Clear your browser cache after installing the PTFs
- Review your browser security settings
- For details see the following web page:
<https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/IBM%20i%20Technology%20Updates/page/Browser%20Tips>

Performance Tasks

- “Performance” is a major function in Navigator for i
 - Investigate Data
 - Manage Collections



Performance Tasks

- All Performance Tasks
 - Active Jobs
 - Disk Status
 - System Status
 - Collections
 - Reports
 - Define, start, stop and manage performance data collectors
 - Collection Services
 - Disk Watcher
 - Job Watcher

The screenshot displays a hierarchical tree view of performance management tasks. The root node is 'Performance', which is expanded to show several sub-nodes: 'Investigate Data', 'Manage Collections', 'All Tasks', 'Collections', 'Reports', 'Collectors', 'Job Watcher', and 'Collection Services'. Each of these sub-nodes is further expanded to show a list of specific actions or sub-tasks. For example, 'All Tasks' includes 'Active Jobs', 'Disk Status', 'Manage Collections', 'Investigate Data', 'Performance Management for Power Systems', and 'System Status'. 'Collections' includes 'Convert Collection', 'Copy Collection', 'Create Performance Data', 'Delete Collection', 'Restore Collection', and 'Save Collection'. 'Reports' includes 'Performance Data Report Definitions'. 'Collectors' is further divided into 'Disk Watcher' and 'Job Watcher', each with its own set of sub-tasks like 'Active Disk Watcher Collections', 'Disk Watcher Collections', 'Disk Watcher Definitions', 'Add Disk Watcher Definition', 'Start Disk Watcher', and 'Stop Disk Watcher'. 'Job Watcher' includes 'Active Job Watcher Collections', 'Job Watcher Collections', 'Job Watcher Definitions', 'Add Job Watcher Definition', 'Start Job Watcher', and 'Stop Job Watcher'. 'Collection Services' includes 'Active Collection Services Collections', 'Collection Services Collections', 'Collection Services Status', 'Configure Collection Services', 'Cycle Collection Services', 'Start Collection Services', and 'Stop Collection Services'.

- [-] Performance
 - [-] Investigate Data
 - [-] Manage Collections
 - [-] All Tasks
 - [-] Active Jobs
 - [-] Disk Status
 - [-] Manage Collections
 - [-] Investigate Data
 - [-] Performance Management for Power Systems
 - [-] System Status
 - [-] Collections
 - [-] Convert Collection
 - [-] Copy Collection
 - [-] Create Performance Data
 - [-] Delete Collection
 - [-] Restore Collection
 - [-] Save Collection
 - [-] Reports
 - [-] Performance Data Report Definitions
 - [-] Collectors
 - [-] Disk Watcher
 - [-] Active Disk Watcher Collections
 - [-] Disk Watcher Collections
 - [-] Disk Watcher Definitions
 - [-] Add Disk Watcher Definition
 - [-] Start Disk Watcher
 - [-] Stop Disk Watcher
 - [-] Job Watcher
 - [-] Active Job Watcher Collections
 - [-] Job Watcher Collections
 - [-] Job Watcher Definitions
 - [-] Add Job Watcher Definition
 - [-] Start Job Watcher
 - [-] Stop Job Watcher
 - [-] Collection Services
 - [-] Active Collection Services Collections
 - [-] Collection Services Collections
 - [-] Collection Services Status
 - [-] Configure Collection Services
 - [-] Cycle Collection Services
 - [-] Start Collection Services
 - [-] Stop Collection Services

Prerequisites

- IBM i for [Collection Services](#), [Health Indicators](#)
- Performance Tools Licensed Program Product
 - 5761PT1 for 6.1
 - 5770PT1 for 7.1
 - **Performance Tools - Manager Feature**
 - [Disk Watcher](#), [Performance Explorer](#), [Database](#)
 - Performance Tools - Agent Feature
 - **Performance Tools - [Job Watcher](#)**

Prerequisites: Performance Tools Licensed Program Product

The screenshot shows the 'Investigate Data - Performance Data Investigator' window. It features a 'Perspectives' pane on the left with a tree view containing: Performance Explorer, Disk Watcher, Job Watcher, Health Indicators, Collection Services, and Database. A yellow starburst with the word 'New!' is placed over the 'Database' item. Below the tree is a 'Collection' section with a 'Collection Library' dropdown set to 'QPFRRDATA' and a 'Collection Name' field set to 'Most Recent'. At the bottom are buttons for 'Display', 'Search', 'Options', and 'Close'.

Callout boxes on the right provide prerequisites for each feature:

- Performance Explorer:** IBM Performance Tools – Manager feature
- Disk Watcher:** IBM Performance Tools – Manager feature
- Job Watcher:** IBM Performance Tools – Job Watcher feature
- Health Indicators:** IBM i 6.1 or later – Included with the base operating system
- Database:** IBM Performance Tools – Manager feature and latest PTFs

Prerequisites: Authorizing Users to PDI

- Users need to be authorized to use the investigate data and collection manager performance tasks
- Include users on the QPMCCDATA authorization list

```

                                Edit Authorization List

Object . . . . . : QPMCCDATA      Owner . . . . . : QSYS
  Library . . . . . : QSYS        Primary group . . . : *NONE

Type changes to current authorities, press Enter.

User      Object Authority List
*PUBLIC   *EXCLUDE
QSYS      *ALL      X
PDI01     *USE
PDI02     *USE
PDI03     *USE
PDI04     *USE
PDI05     *USE
PDI06     *USE
PDI07     *USE
PDI08     *USE
PDI09     *USE
  
```

Prerequisites: Authorizing Users to the Collector Commands

- The collector commands (xxxPFRCOL) are shipped with *PUBLIC *EXCLUDE
- QPMCCFCN authorization list can be used to grant authority to all the collector commands

```

                                Edit Authorization List

Object . . . . . : QPMCCFCN      Owner . . . . . : QSYS
Library . . . . . : QSYS        Primary group . . . : *NONE

Type changes to current authorities, press Enter.

User      Object      List
Authority Authority Mgt
*PUBLIC   *EXCLUDE
QSYS      *ALL           X
DAWN      *USE
    
```

More...

Verify Collection Services is Active

- Collection Services is the foundation for many performance tasks
 - Make sure Collection Services is active
 - Started by default with 6.1 and later

[-] Collectors

- [+] Disk Watcher
- [+] Job Watcher
- [-] Collection Services
 - Active Collection Services Collections
 - Collection Services Collections
 - **Collection Services Status**
 - Configure Collection Services
 - Cycle Collection Services
 - Start Collection Services
 - Stop Collection Services

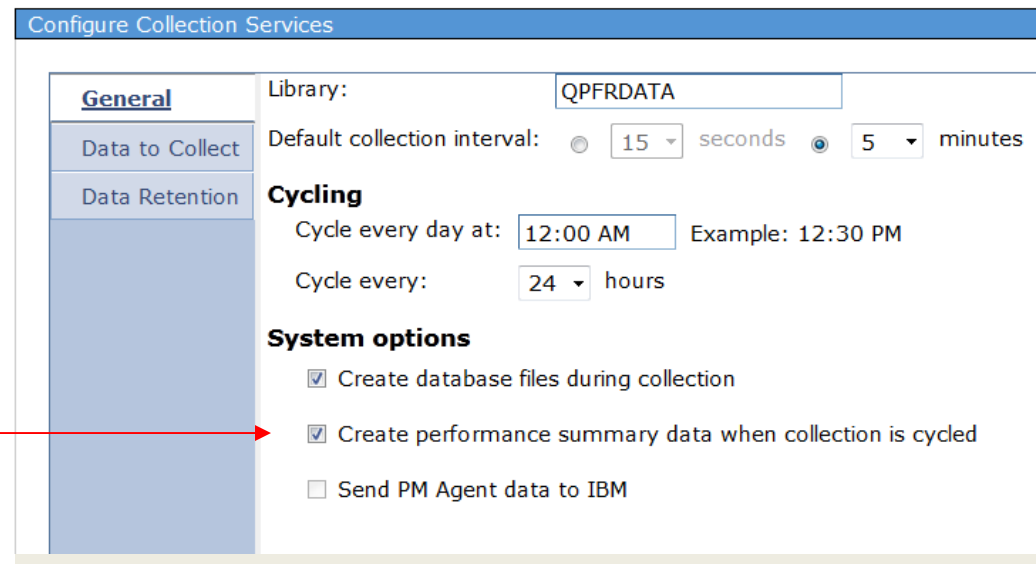
Collection Services Status

Status:	Started
Library:	QPFRDATA
Collection object:	Q058000002
Collection profile:	Standard plus protocol
Started:	Wed Feb 27 00:00:02 CST 2013
Cycle time:	00:00:00
Default collection interval:	00:05:00

OK

Performance Summary Data

- **Performance summary data may help the performance of PDI**
 - Underlying queries may run faster with performance summary data
 - Graphical interface
 - Check the “Create performance summary data...” option within Configure Collection Services



Command interface:

Change the “Create Performance Summary” option for the performance collection

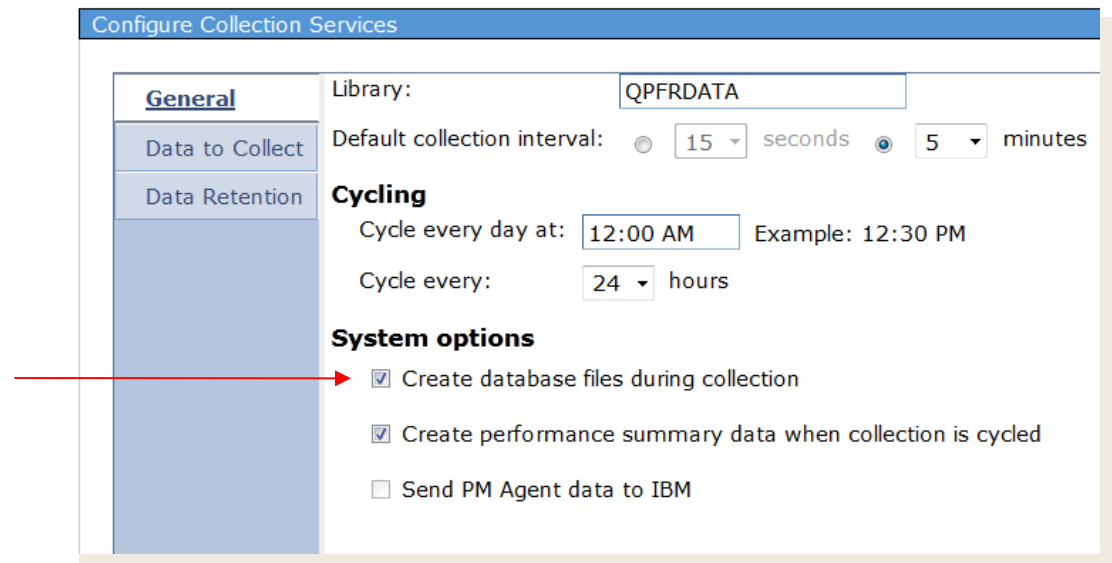
`CFGPFRCOL` command - `CRTPFRSUM (*YES)`

Or use the Create Performance Summary command - `CRTPFRSUM`

Prerequisites – Create Database Files During Collection

- **PDI requires data in the Collection Services DB2 files**

- Beginning with 6.1, the default is to create the database files during performance data collection
- If you have turned this off, you will not be able to view performance data with PDI until the data is created in the files
- Recommended to leave this setting at the default



Command interface:

The “Create Database files” option for the performance collection should be *YES
CFGPFRCOL command - CRTDBF (*YES)

Tips for Best Performance (of your Performance tasks)

- Good system tuning practices are essential

- CPU
- Memory
- Disk

Power5	Single User	Multiple Users
CPU	.5 processors uncapped	2 processors uncapped
Memory	2 GB in *BASE	6-8 GB in *BASE
Disk Arms	3	6

- Navigator tasks run primarily in the ADMIN2 job in the QHTTPSVR subsystem
- Ensure no bad DNS entries on the system
 - http://www-912.ibm.com/s_dir/slkbase.nsf/1ac66549a21402188625680b0002037e/b9e677063f24f859862575ee006b1881
- Use Application Runtime Expert to validate your environment
 - <http://www.ibm.com/developerworks/ibmi/library/i-applicationruntime/index.html>
 - **Network health checker** can be run from QShell:
 /QIBM/ProdData/OS/OSGi/templates/bin/areVerify.sh –network
http://ibmsystemsmag.blogs.com/i_can/2013/09/application-runtime-expert-network-health-checker.html
- Use the Web Performance Advisor to validate your Web Performance
 - <http://pic.dhe.ibm.com/infocenter/iseri5/v7r1m0/topic/rzaie/rzaieconwebperfadvisor.htm>
- PDI makes extensive use of SQL to gather data for charts and tables

Terminology

Collection Services is the mechanism used to gather performance data with little or no observable impact on the system performance. It allows you to control what data is collected and how that data is used.

Collection services data was generally analyzed by the Performance Tools LPP and Management Central Monitors in prior releases.

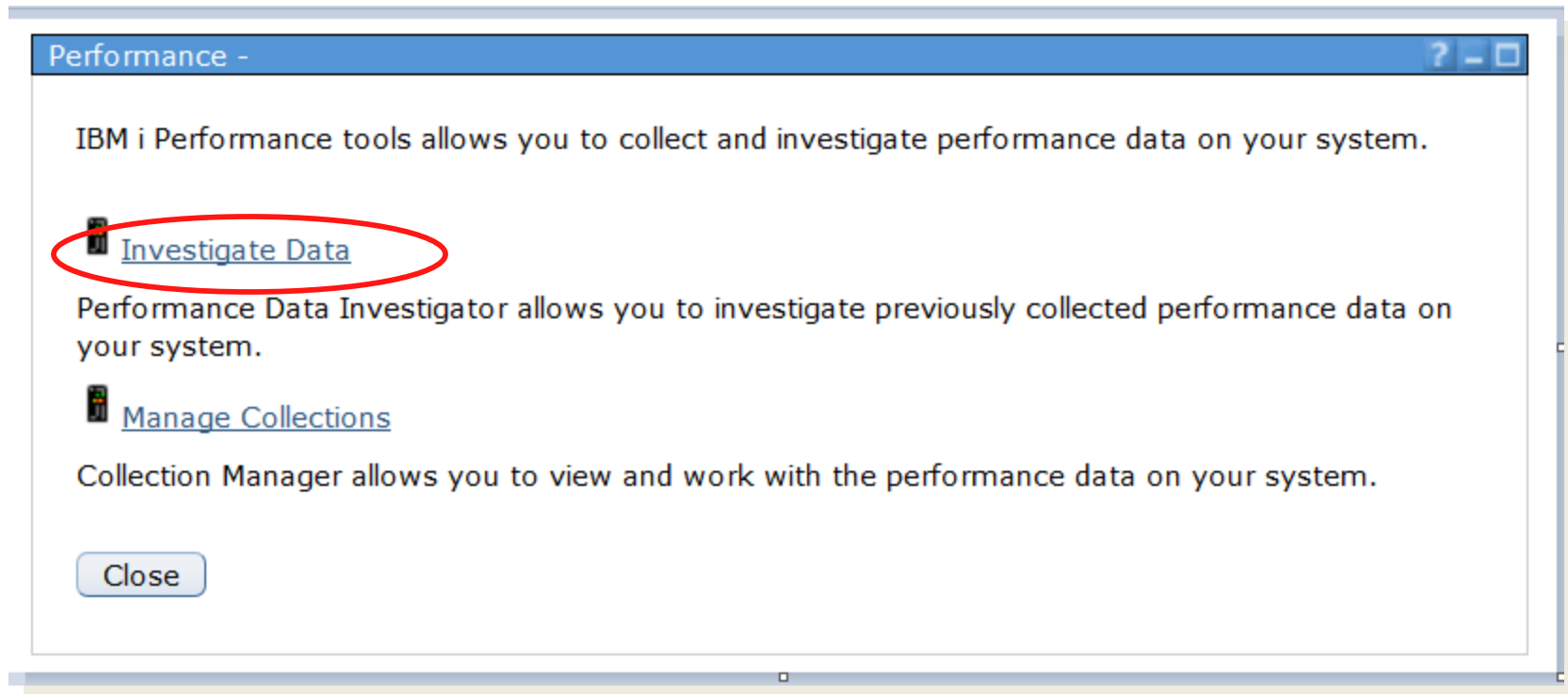
Collection Services data is available for performance analysis through the Web user interface and is the data used for initial analysis.

Standard Data is data from Collection Services which is normally collected on a 24 x 7 basis.

Wait Accounting is the technology used to collect wait time statistics. Wait points throughout the system are identified and categorized into groups, or 'buckets'. These wait statistics can then be analyzed to determine what a thread was doing when it was running as well as when it was not running.

IBM Navigator for i Performance Investigate Data

- [-] Performance
 - Investigate Data
 - Manage Collections



Investigate Data

Perspectives are a logical grouping of similar or related views that benefit from being rendered side-by-side for reference or context.

Investigate Data - Performance Data Investigator

Perspectives **Selection**

- [-] Performance Explorer
- [-] Disk Watcher
- [-] Job Watcher
- [-] Health Indicators
- [-] Collection Services
- [-] Database

Collection

Collection Library: QPFRDATA Collection Name: Most Recent

Display Search Options Close

Content Package is a set of perspectives that share a commonality (major theme).

Investigate Data – Select Collection



The screenshot shows the Performance Data Investigator interface. The left pane, titled 'Perspectives', lists several categories: Performance Explorer, Disk Watcher, Job Watcher, Health Indicators, Collection Services (highlighted with a red oval), and Database. The right pane, titled 'Selection', shows the details for the selected 'Collection Services' perspective. It includes a 'Name' field with the value 'Collection Services', a 'Description' field with the text 'Chart and table views over a variety of performance statistics from Collection Services performance data.', and a 'Default Perspective' field with the value 'Resource Utilization Overview'. Below the 'Perspectives' list is a 'Collection' section with a 'Collection Library' dropdown set to 'QPFRDATA' and a 'Collection Name' dropdown set to 'Most Recent'. At the bottom of the interface, there are buttons for 'Display', 'Search', 'Options', and 'Close'. A red box highlights the 'Collection' section at the bottom, and a red arrow points from a text box on the left to this section.

The Collection boxes allow you to specify which collection you want to work with. Only collections valid for the type of chart you select will be displayed.

Selecting a Collection

The latest PTFs provide support to see the date/time of the collections as well as additional perspectives.

Investigate Data - Performance Data Investigator

Perspectives

- Performance Explorer
- Disk Watcher
- Job Watcher
- Health Indicators
- Collection Services**
 - CPU Utilization and Waits Overview
 - CPU Utilization by Thread or Task
 - Resource Utilization Overview
 - Job Statistics Overviews
 - Waits
 - CPU
 - Disk
 - Physical Disk I/O
 - Synchronous Disk I/O
 - Memory
 - Page Faults
 - Logical Database I/O
 - Virtual I/O
 - Communications
 - 5250 Di
 - Physica
 - Java
 - Timeline
 - Workloa
 - Collecti
- Database

Selection

Name
Collection Services

Description
Chart and table views over a variety of performance statistics from Collection Services performance data.

Default Perspective
Resource Utilization Overview

Collection

Collection Library
QPFRRDATA

Most Recent

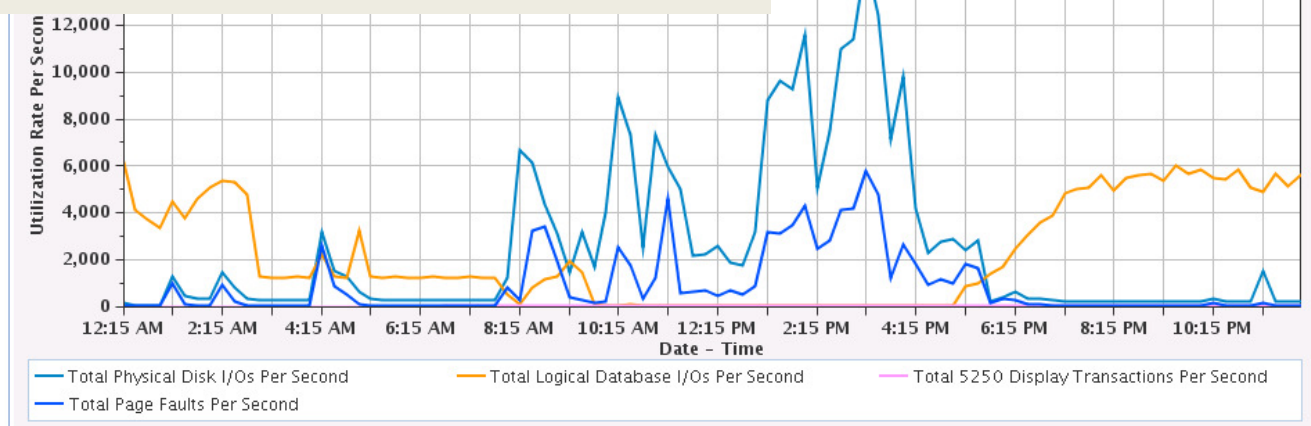
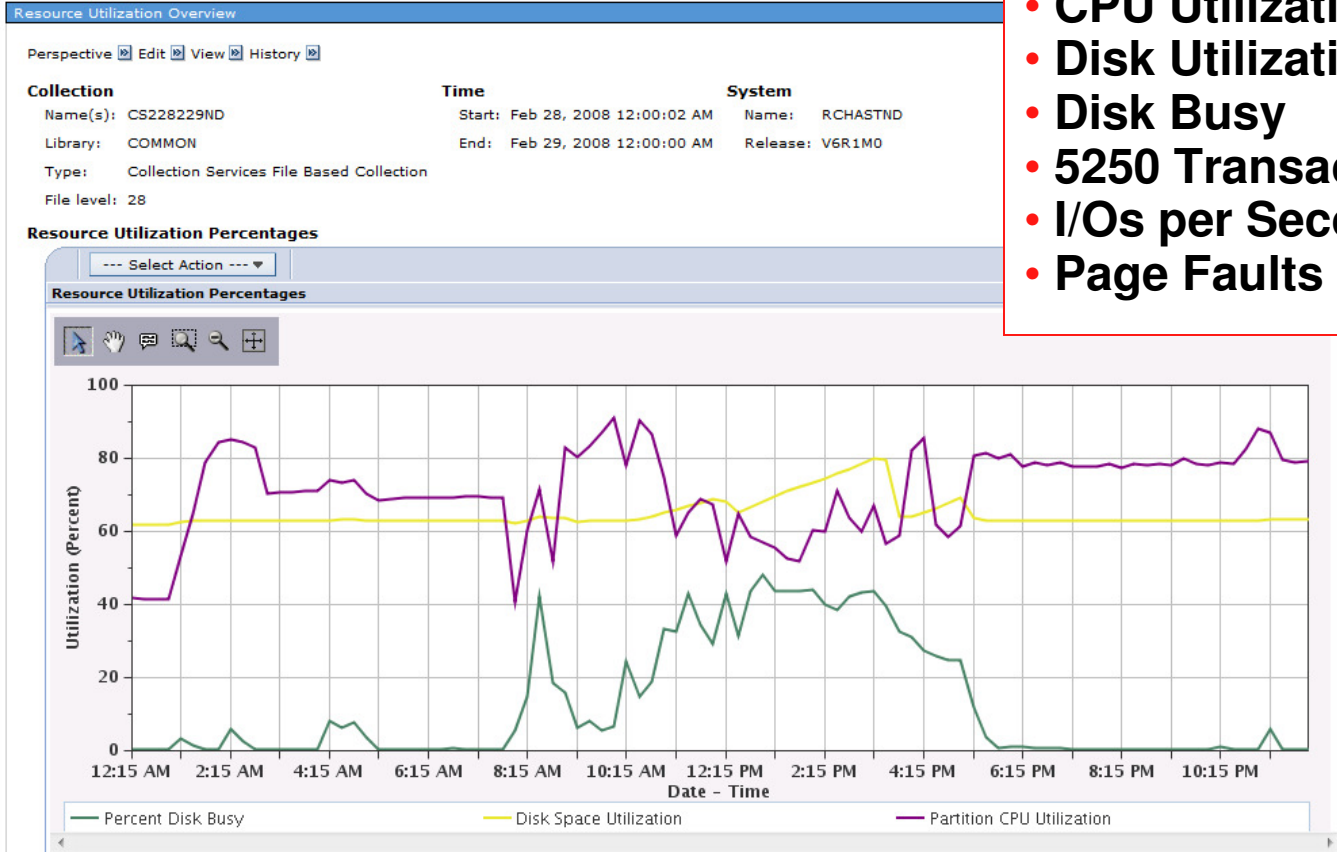
Q208000002 (*CSFILE) - Jul 27, 2013 12:00:02 AM
Q209000002 (*CSFILE) - Jul 28, 2013 12:00:02 AM
Q210000002 (*CSFILE) - Jul 29, 2013 12:00:02 AM
Q211000002 (*CSFILE) - Jul 30, 2013 12:00:02 AM
Q212000002 (*CSFILE) - Jul 31, 2013 12:00:02 AM
Q213000002 (*CSFILE) - Aug 1, 2013 12:00:02 AM
Q213105005 (*CSFILE) - Aug 1, 2013 10:50:05 AM
Q214000003 (*CSFILE) - Aug 2, 2013 12:00:04 AM
Q215000002 (*CSFILE) - Aug 3, 2013 12:00:02 AM
Q216000002 (*CSFILE) - Aug 4, 2013 12:00:02 AM
Q217000002 (*CSFILE) - Aug 5, 2013 12:00:02 AM
Q218000002 (*CSFILE) - Aug 6, 2013 12:00:02 AM
Q219000002 (*CSFILE) - Aug 7, 2013 12:00:02 AM

Buttons: Display Search Options Close

Resource Utilization Overview

Summary for general overall health:

- CPU Utilization
- Disk Utilization
- Disk Busy
- 5250 Transactions
- I/Os per Second
- Page Faults



Resource Utilization Overview - Percentages



Resource Utilization Overview

Perspective Edit View History

Collection

Name(s): CS228229ND
Library: COMMON
Type: Collection Services File Based Collection
File level: 28

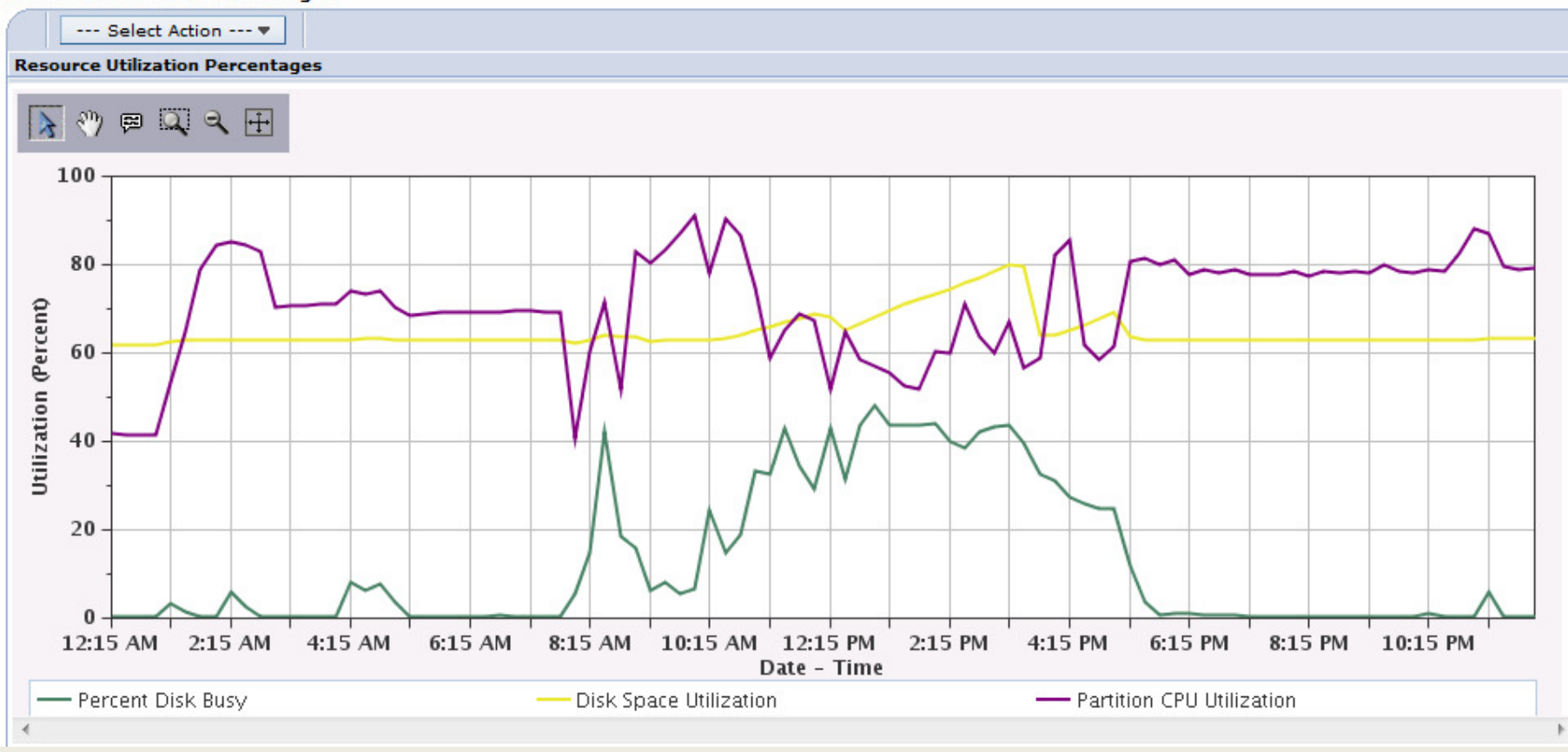
Time

Start: Feb 28, 2008 12:00
End: Feb 29, 2008 12:00

Summary for general overall health:

- CPU Utilization
- Disk Utilization
- Disk Busy

Resource Utilization Percentages

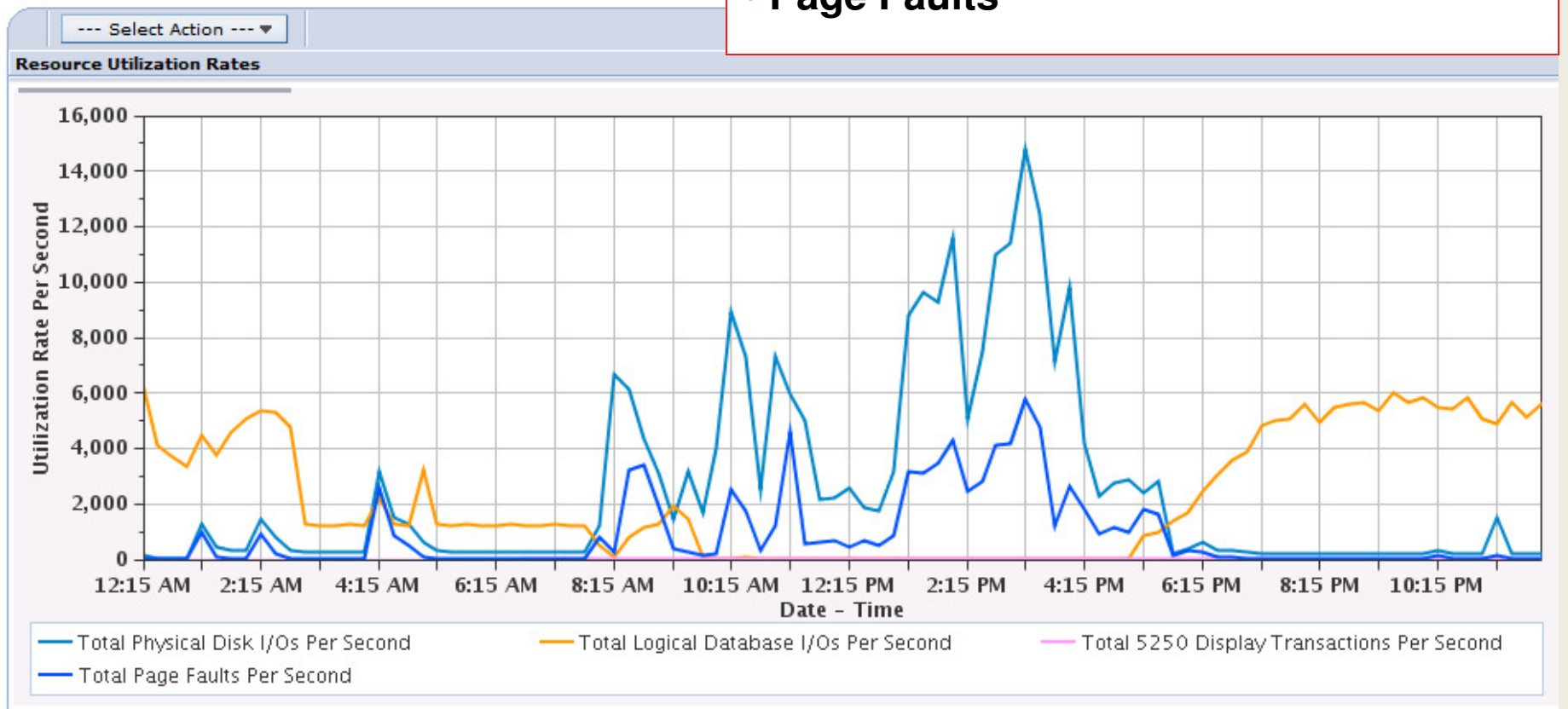


Resource Utilization Overview - Rates

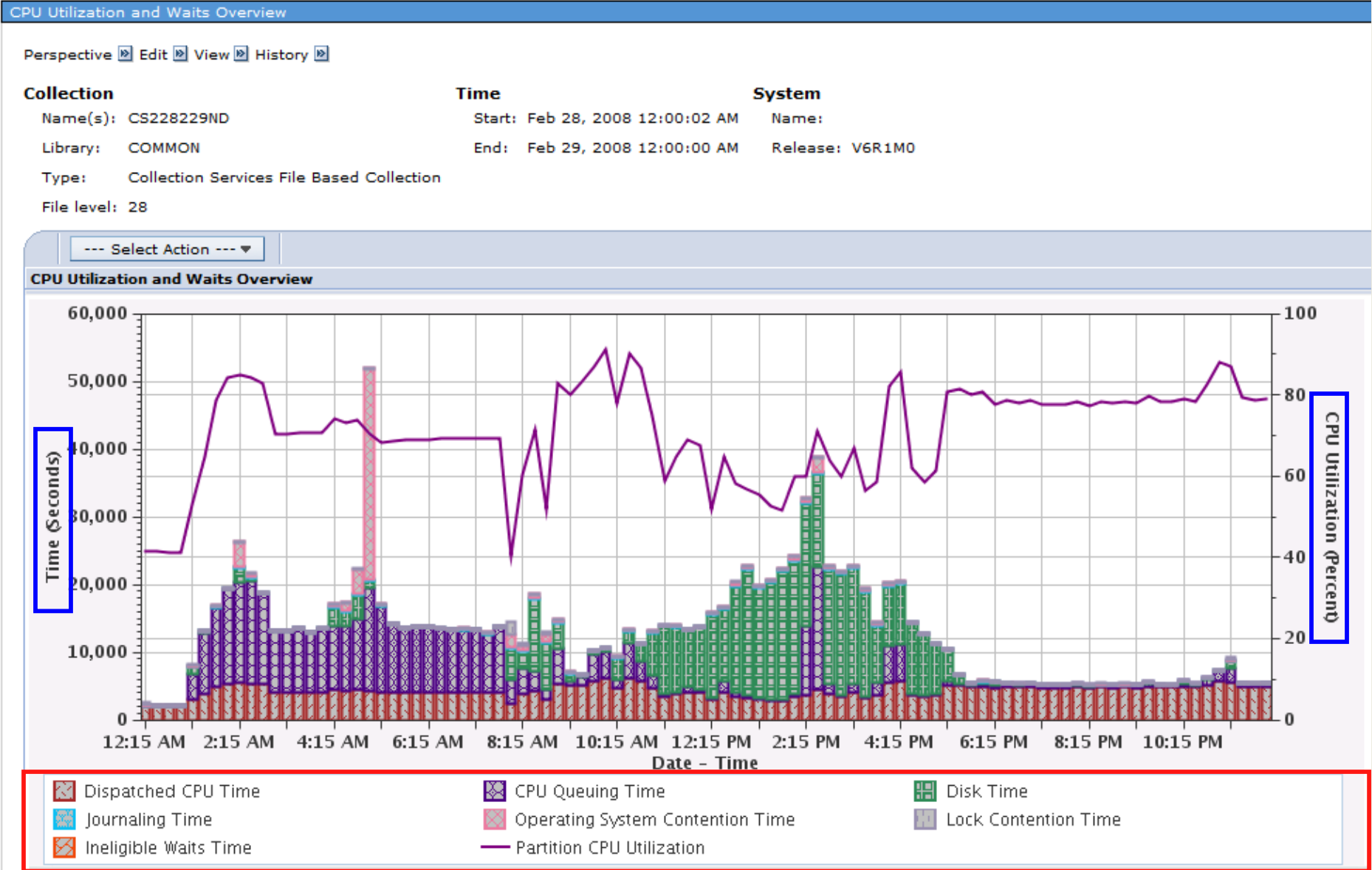
Summary for general overall health:

- 5250 Transactions
- I/Os per Second
- Page Faults

Resource Utilization Rates



CPU Utilization and Waits Overview



Graphing Multiple Collections

- If your collection library has 5 or fewer collections, an **All** option is available to display all the collections in one graph
- It will take longer to display the graph
 - Multiple collections means larger queries!
- **Hint:** when the graph appears, you need to use the “reset zoom” tool to display all the data.

Collection Services

- CPU Utilization and Waits Overview
- CPU Utilization by Thread or Task
- Resource Utilization Overview
- Job Statistics Overviews
- Waits
- CPU
- Disk
- Physical Disk I/O
- Synchronous Disk I/O
- Memory
- Page Faults
- Logical Database I/O
- Virtual I/O
- Communications
- 5250 Display Transactions
- Physical System
- Java
- Timeline
- Workload
- Collections
- Database

Collection

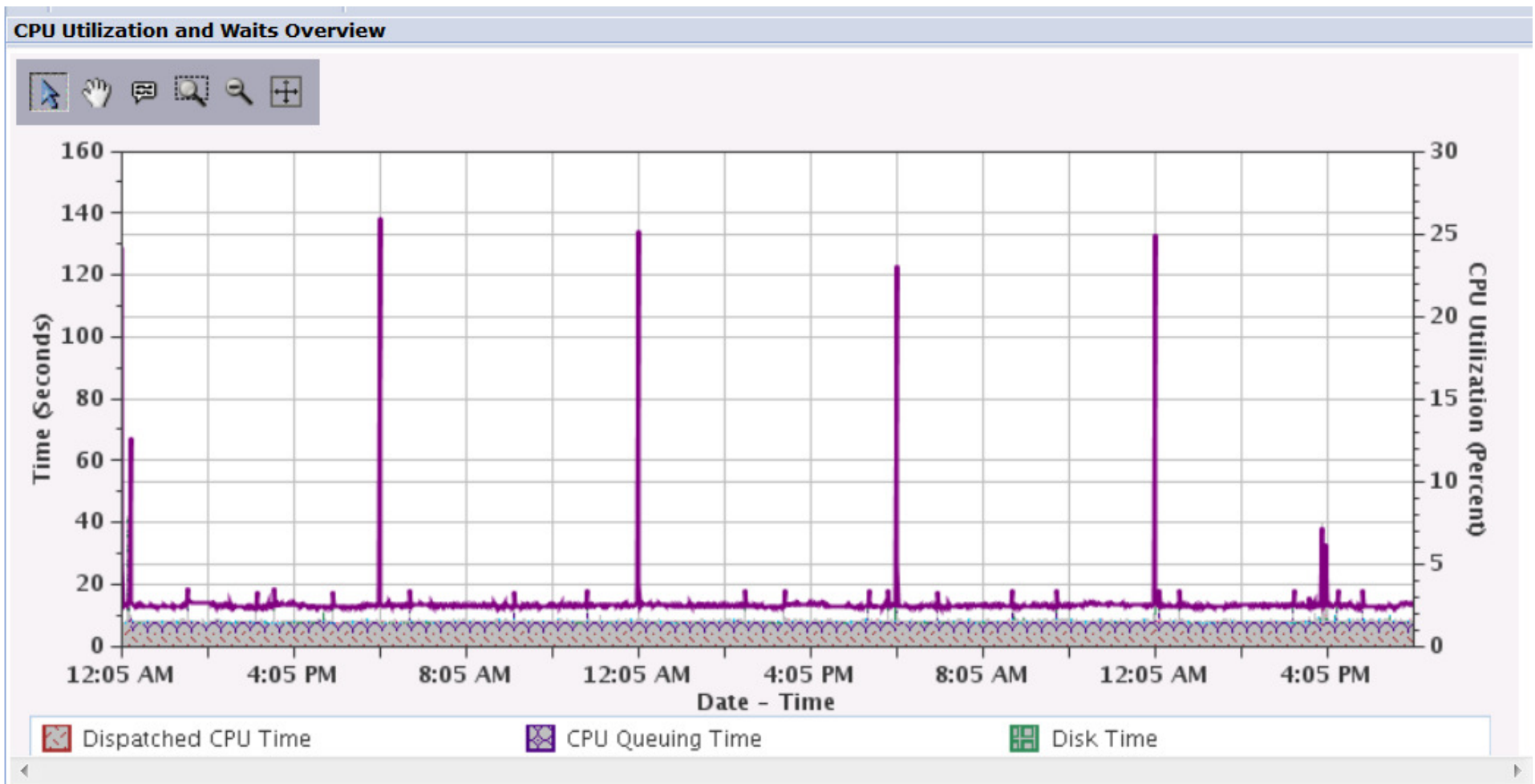
Collection Library: PERFDATA

Collection	Date
Most Recent	
All	
Q235000002 (*.CSFILE)	Aug 23, 2013 12:00:02 AM
Q236000002 (*.CSFILE)	Aug 24, 2013 12:00:02 AM
Q237000002 (*.CSFILE)	Aug 25, 2013 12:00:02 AM
Q238000002 (*.CSFILE)	Aug 26, 2013 12:00:02 AM
Q239000002 (*.CSFILE)	Aug 27, 2013 12:00:02 AM

Most Recent

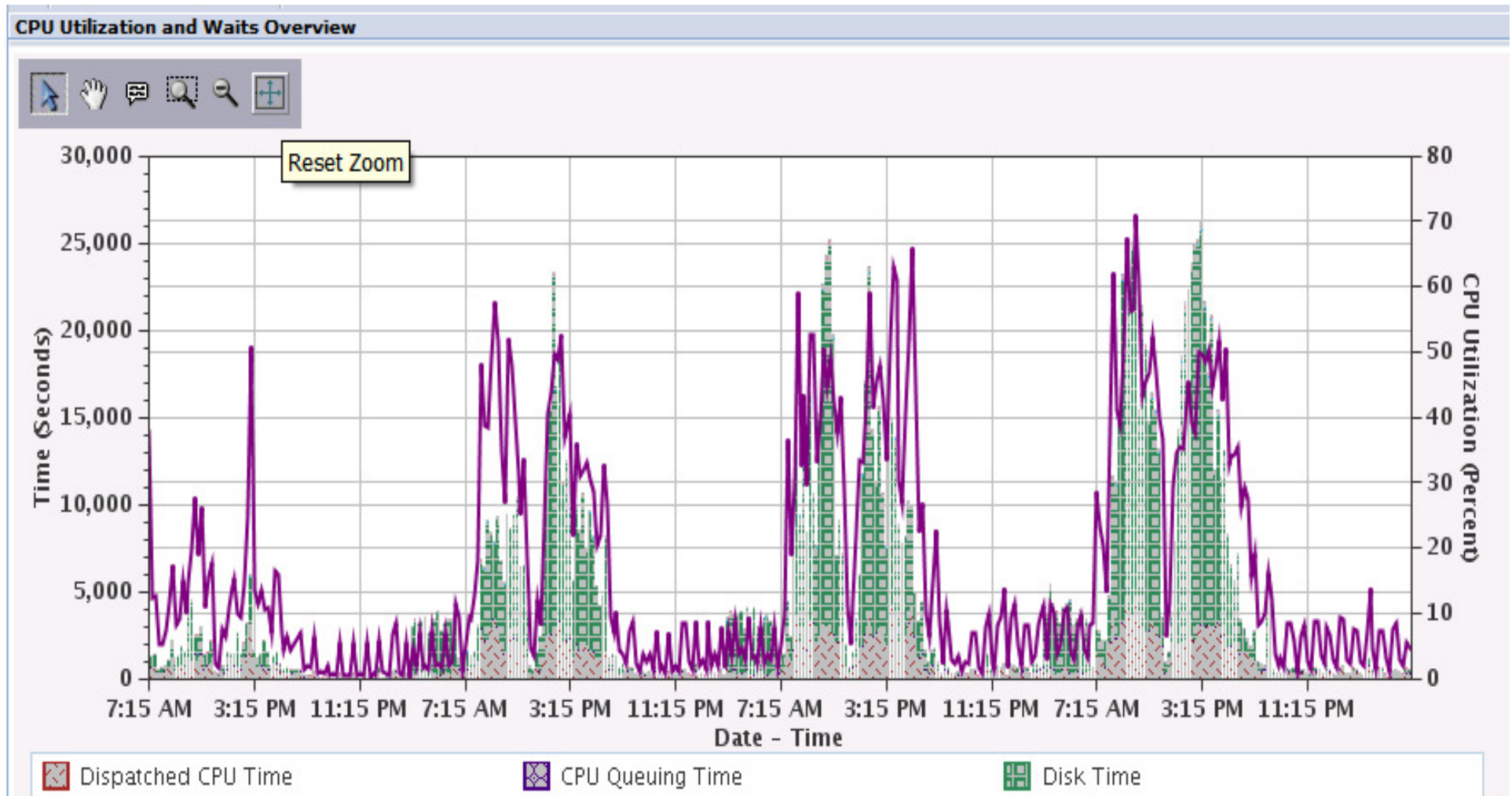
Graphing Multiple Collections

- This example shows five days of (uninteresting) collection services data
 - Do you know what ran each day at midnight?



A More Interesting Example

- 4 days of more interesting performance data. Observe the pattern...

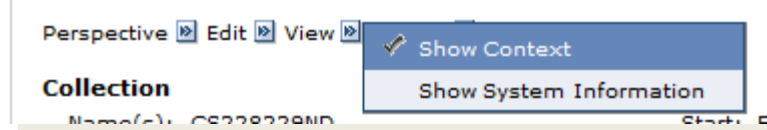


View Collection or System Details



Toggle on/off the detailed information regarding the collection or the system from which the collection originated

Provides quick access to primary system information on CS collections
From QAPMCONF file for the Collection Services Collection being viewed



Show/hide Context

Show/hide System Information

CPU Utilization and Waits Overview

Perspective Edit View History

Collection		Time	System		
Name(s):	Q234000002	Start:	Aug 22, 2013 12:00:02 AM	Name:	ETC3T1
Library:	QPFRDATA	End:	Ongoing	Release:	V7R1M0
Type:	Collection Services File Based Collection				
File level:	36				
System Information					
Name:	ETC3T1	Total Processors:	Not Available	Interactive Threshold:	100%
Release:	V7R1M0	Processors / Cores Active:	4	System ASP Capacity	88.89 GB
Type:	7998	Available Processors:	Not Available	Hypervisor Memory:	1,152 MB
Model:	61X	Virtual Processors:	1	Primary Partition:	0
Serial Number:	10-065FA	Installed Processor Count:	4	Partition ID:	21
Processor Feature Code:	52BE	Processor Units (allocated to partition):	0.5	Partition Count:	3
Processor Feature:	8400	Processor Sharing/Capped:	Yes / No	Partition Memory:	8 GB
Generated On:	ETC3T1				

History – Navigation history and other easily-accessible options

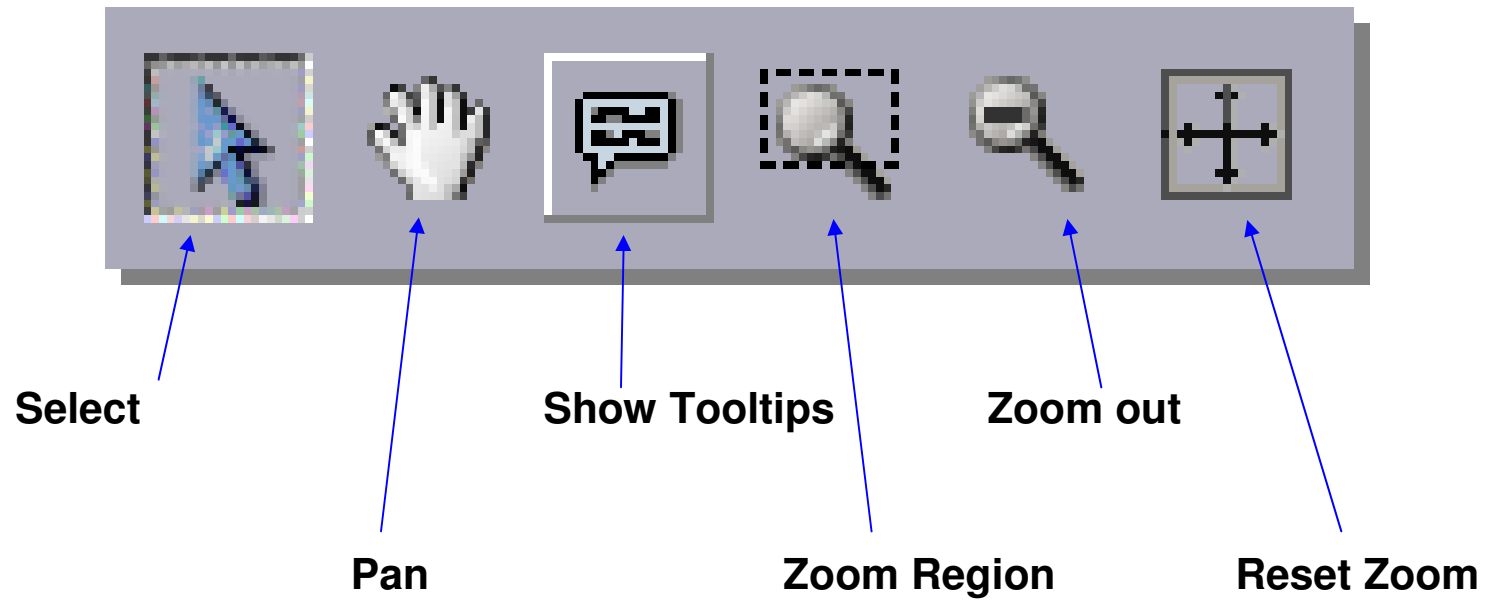
Waits by Pool

Perspective » Edit » View » History »

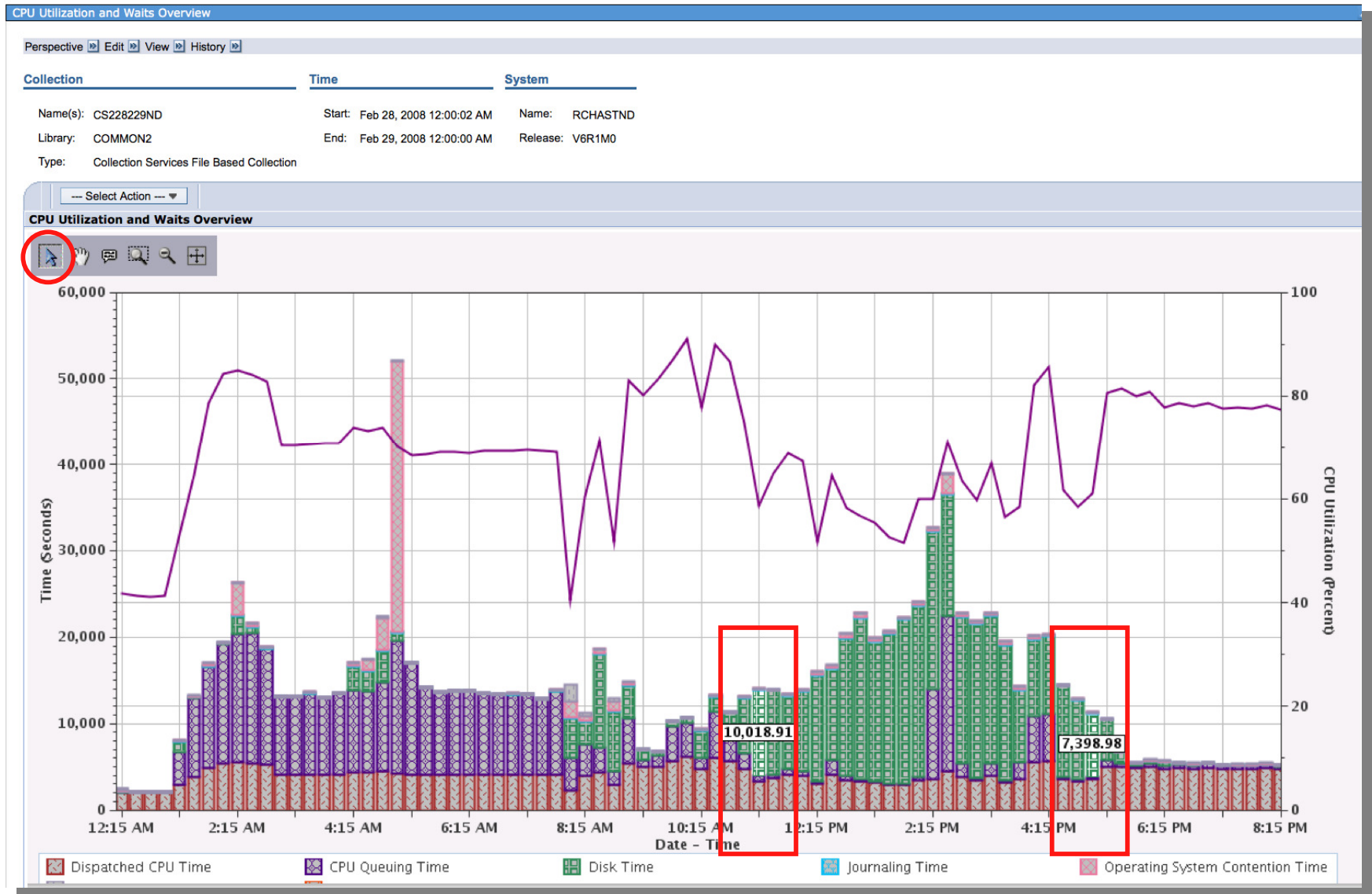
Collection
 Name(s): Q058000002
 Library: QPFRDATA
 Type: Collection Services File Base
 File level: 36

- Home
- Waits Overview
- Waits for One Job or Task
- Waits by Job or Task
- Disk Waits Overview
- CPU Utilization and Waits Overview

Tools – Interact with the Charts



Selection



Pan



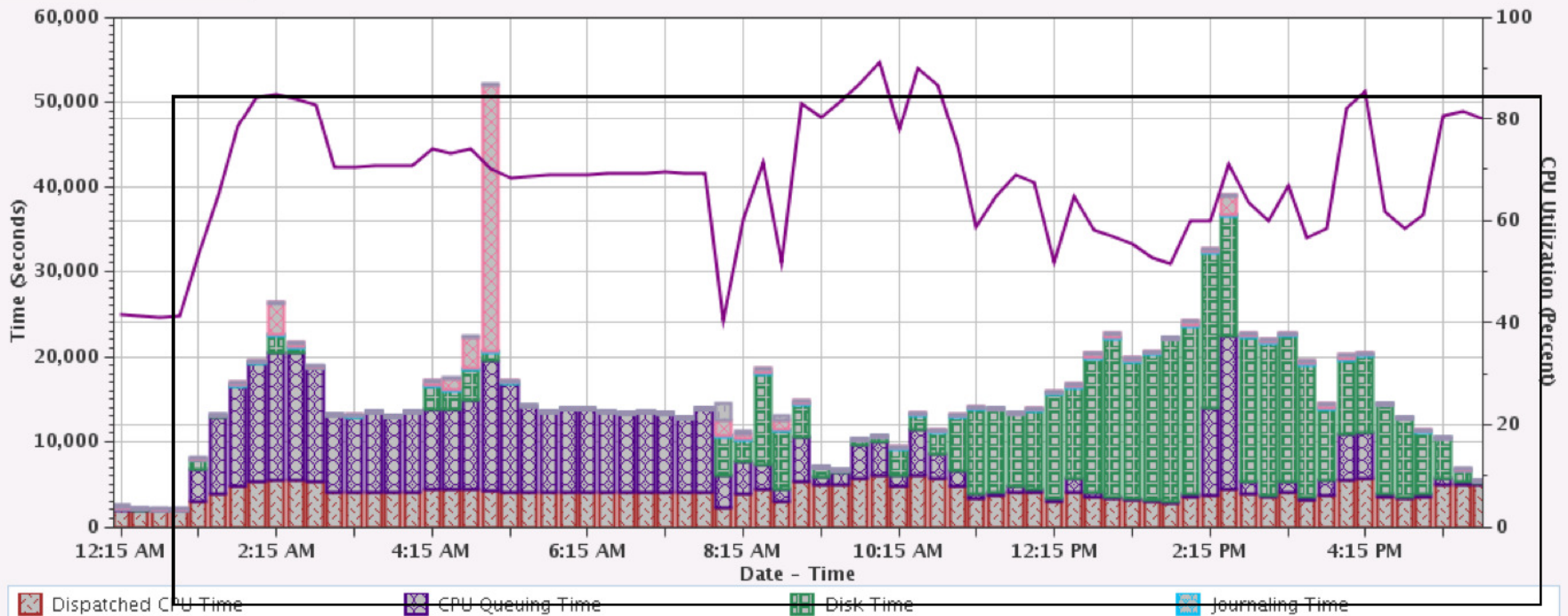
CPU Utilization and Waits Overview

Perspective Edit View History

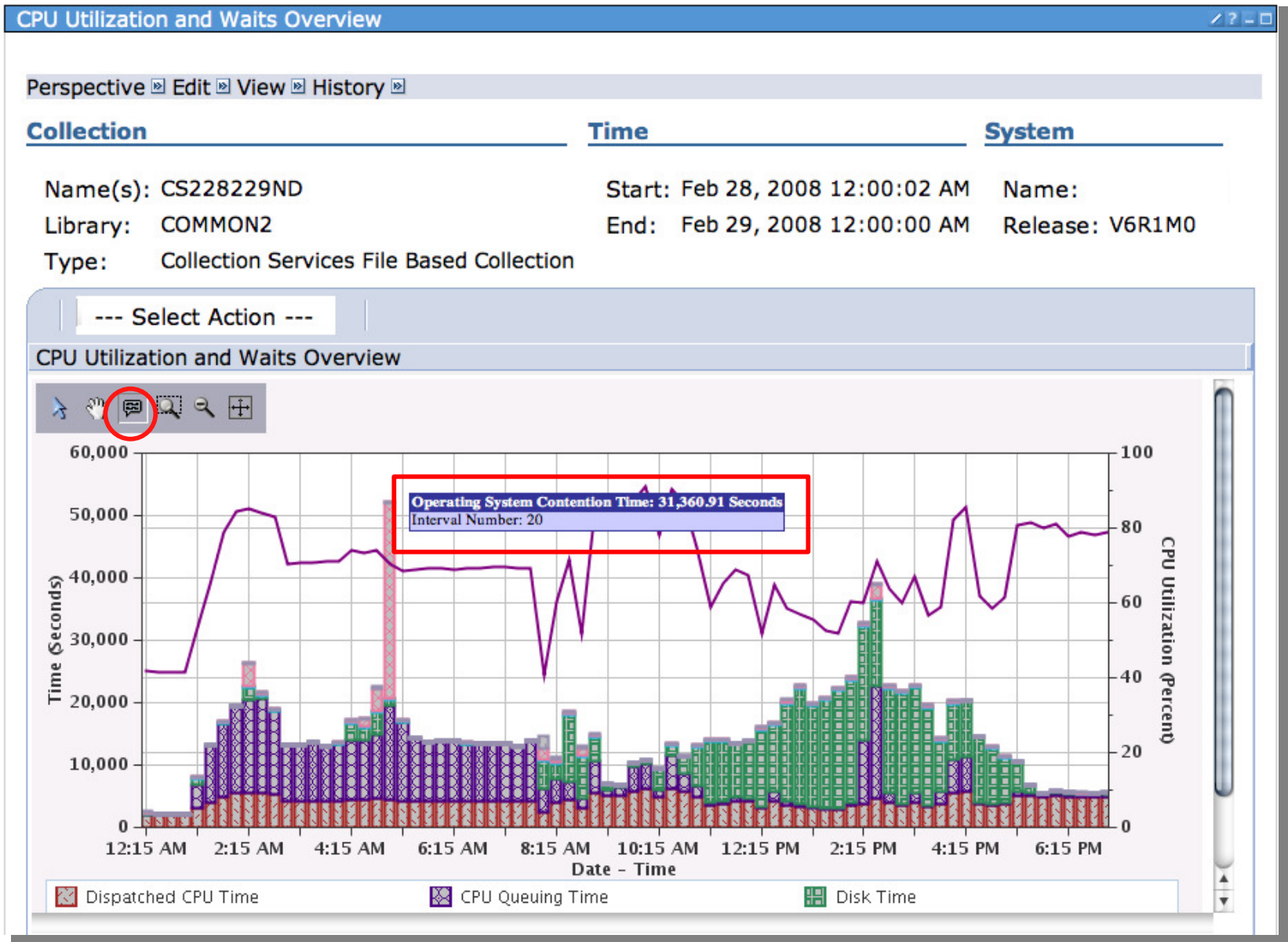
Collection	Time	System
Name(s): CS228229ND	Start: Feb 28, 2008 12:00:02 AM	Name:
Library: COMMON2	End: Feb 29, 2008 12:00:00 AM	Release: V6R1M0
Type: Collection Services File Based Collection		

-- Select Action --

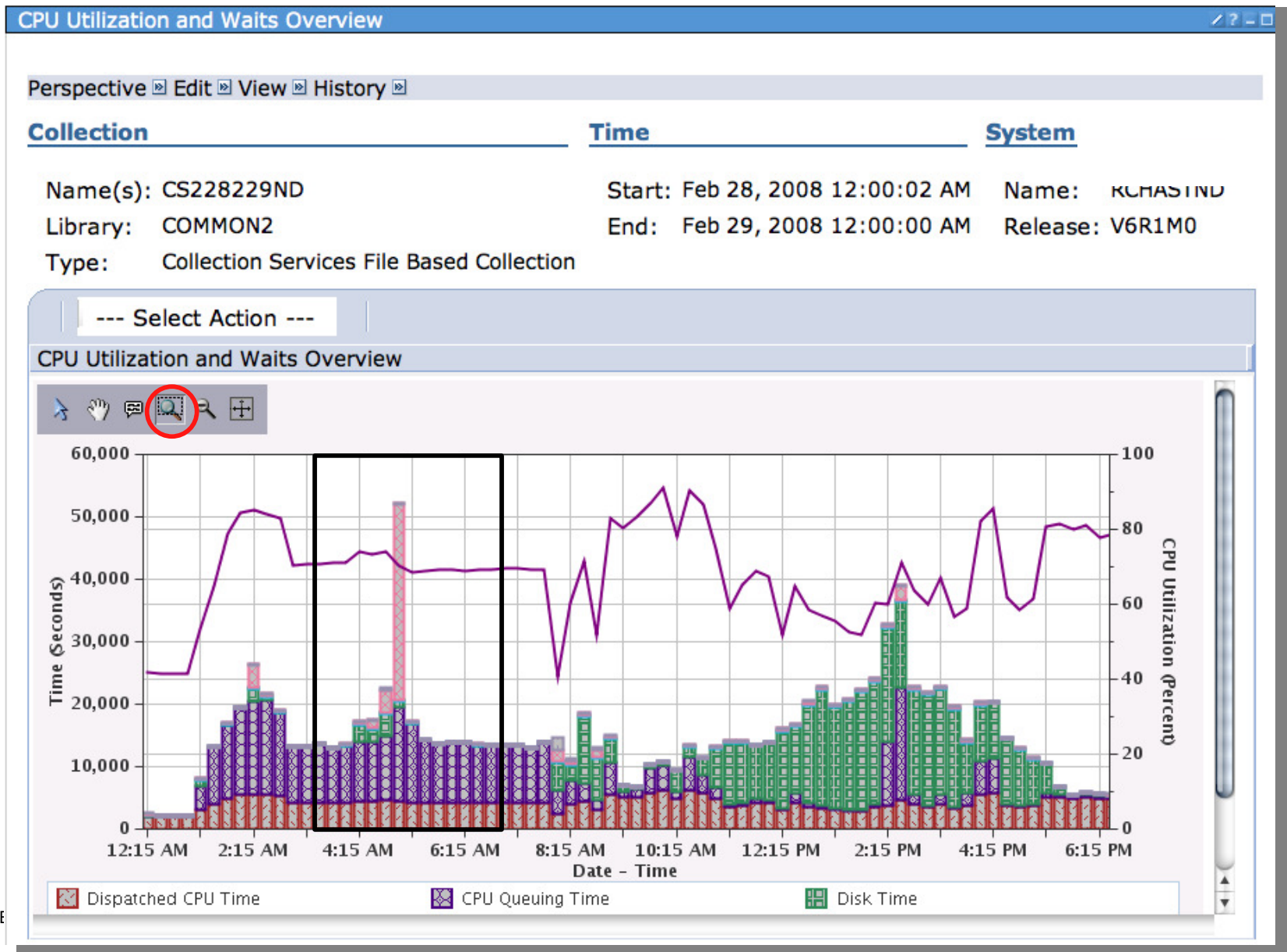
CPU Utilization and Waits Overview



Tool Tips

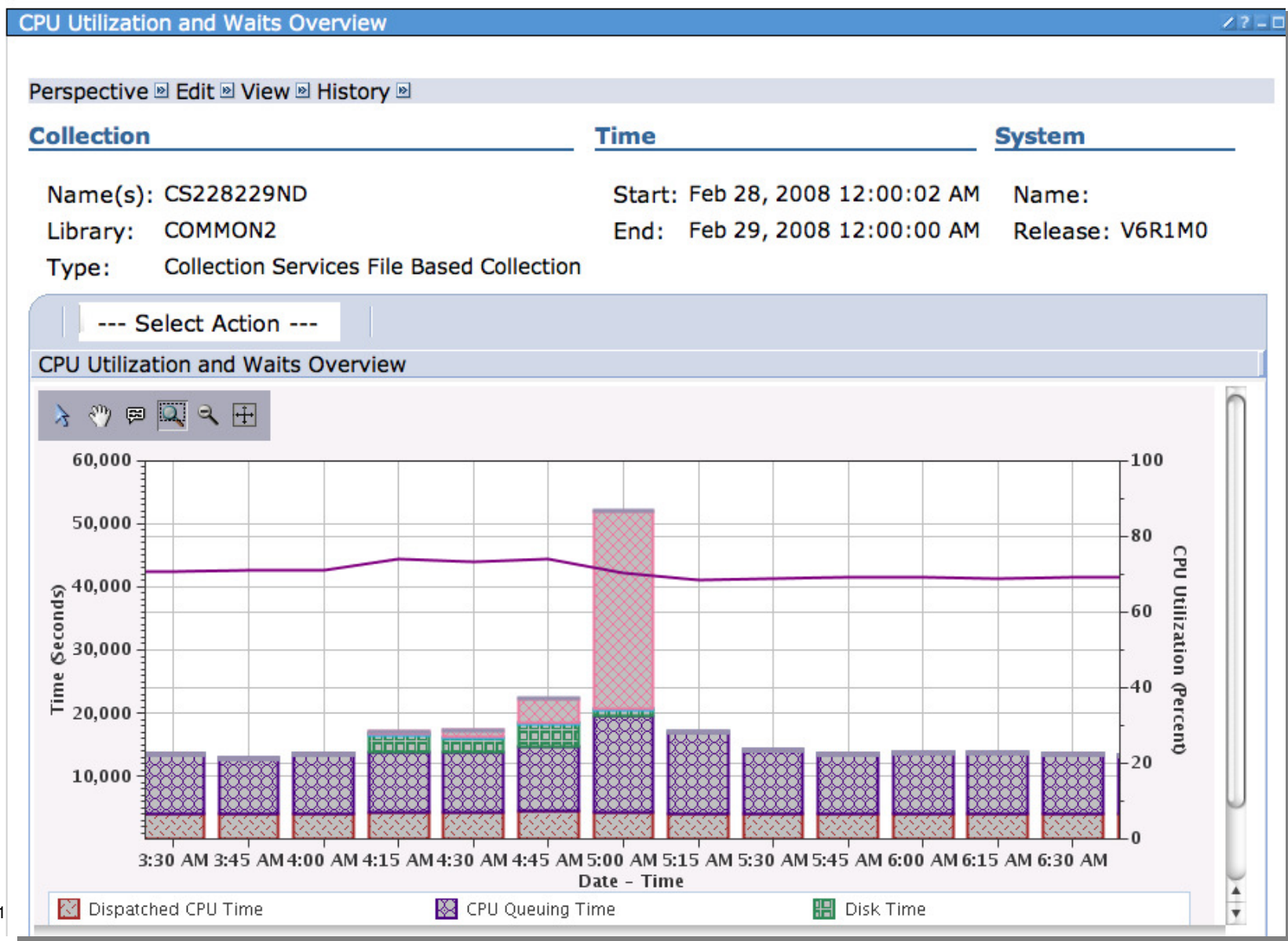


Zoom Region





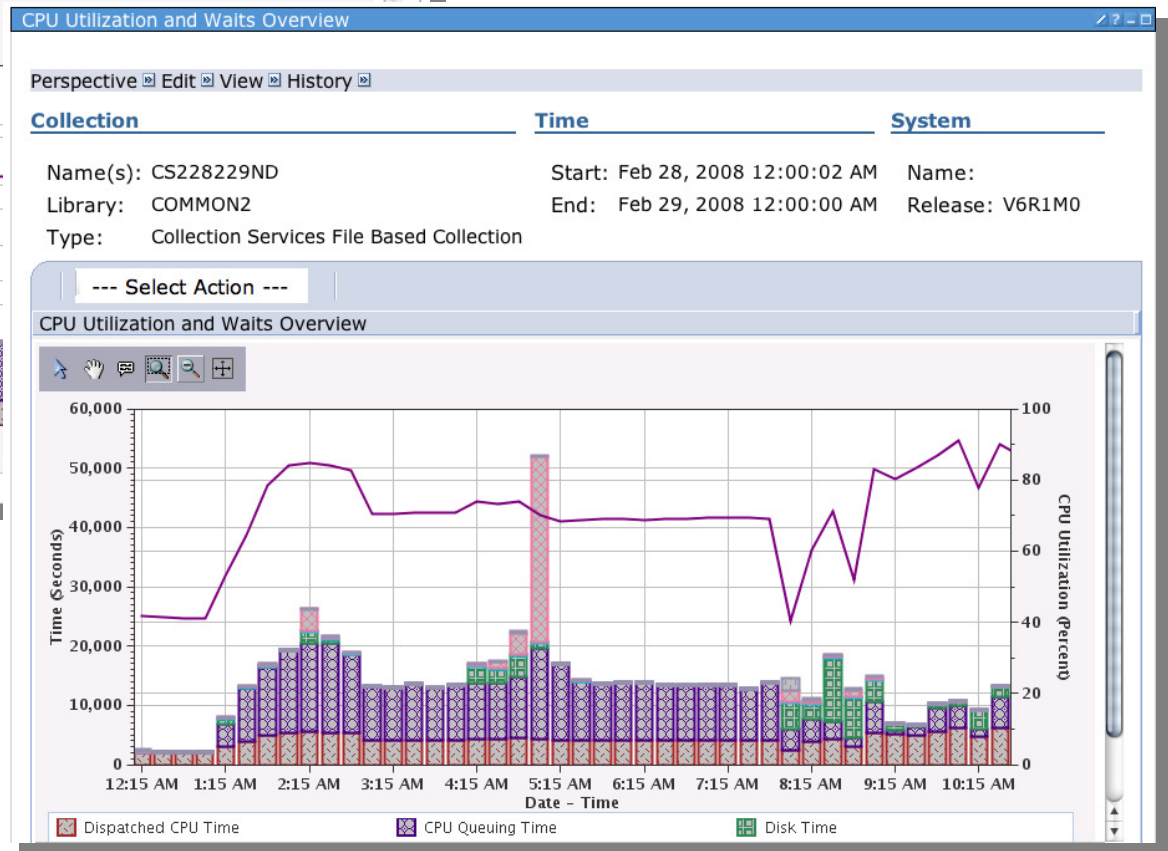
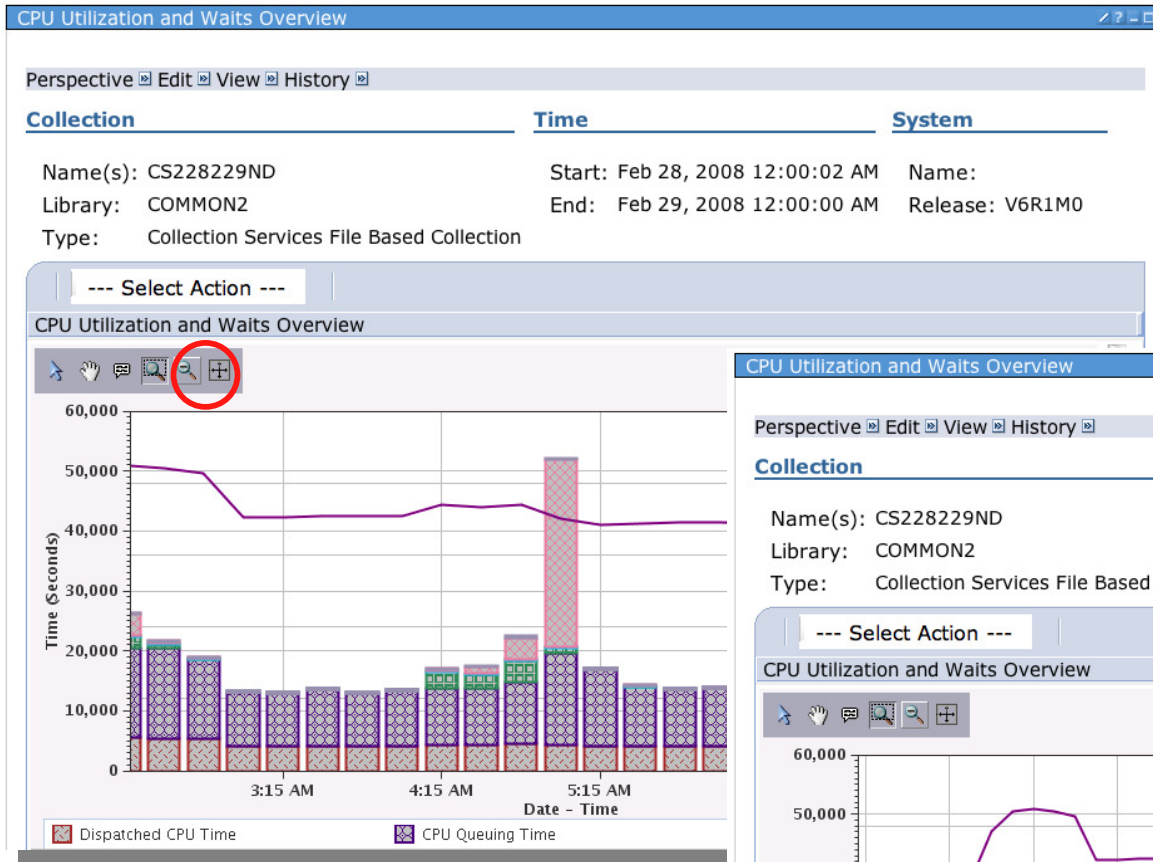
Zoom Region Results



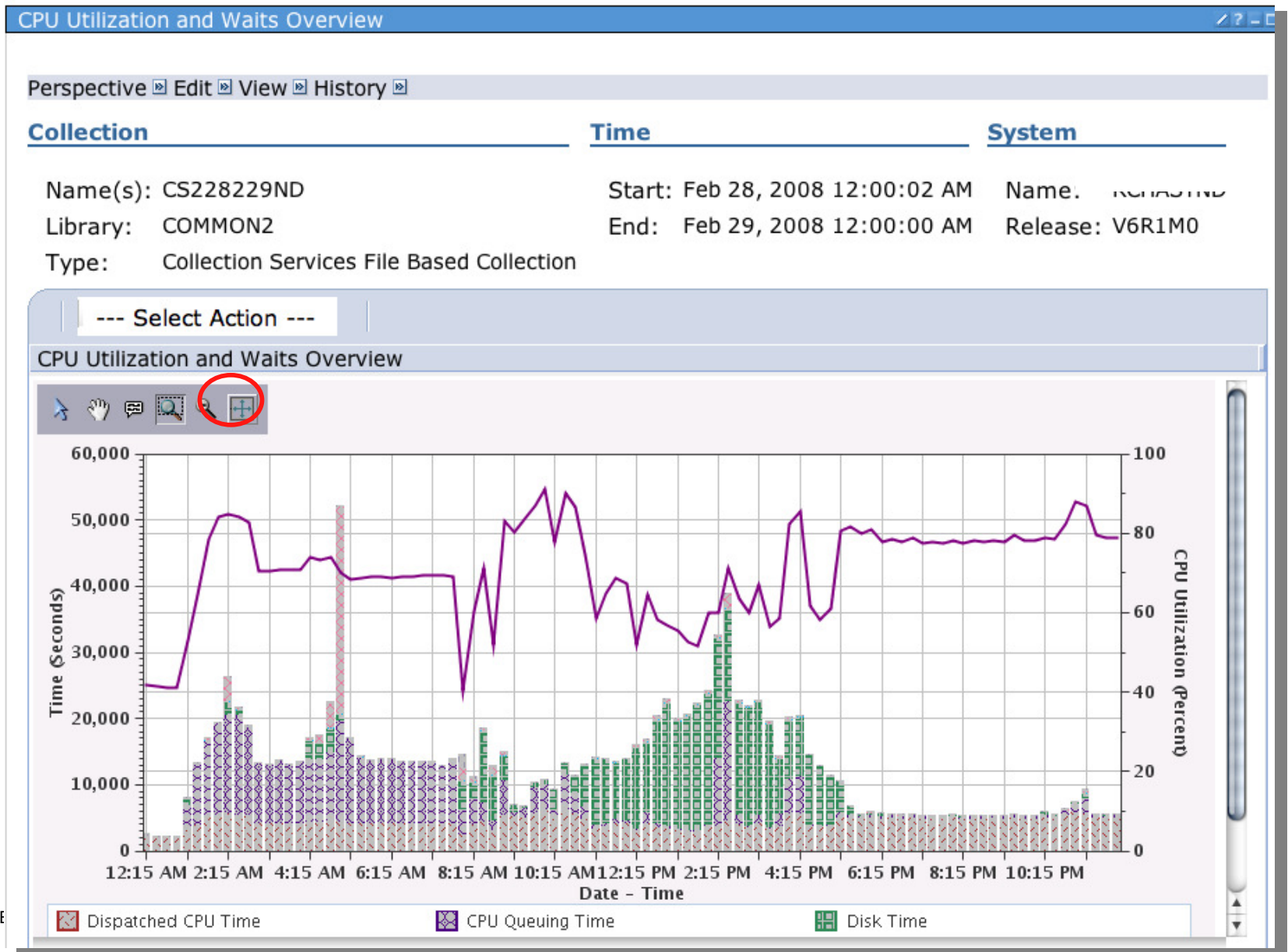
Zoom Out



Zoom out expands the graph each time it is clicked

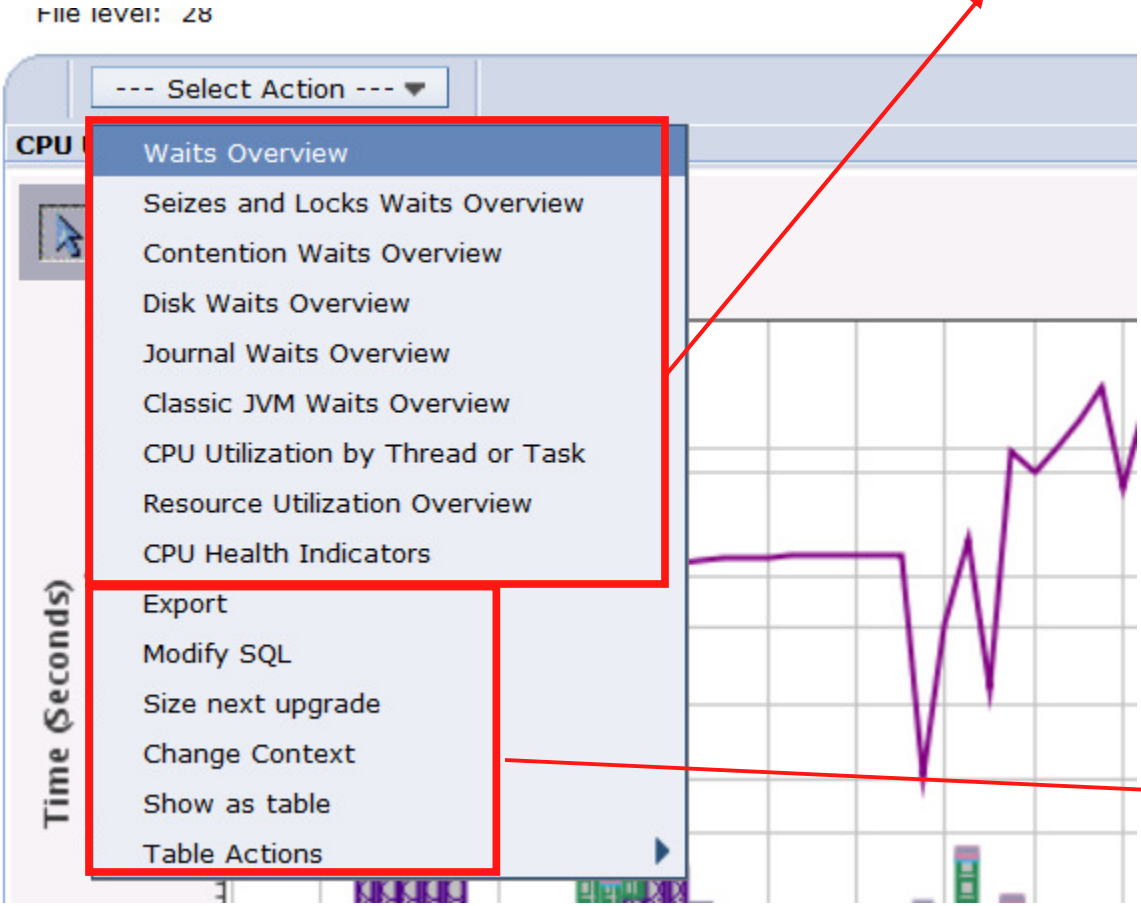


Reset Zoom



Drill-down

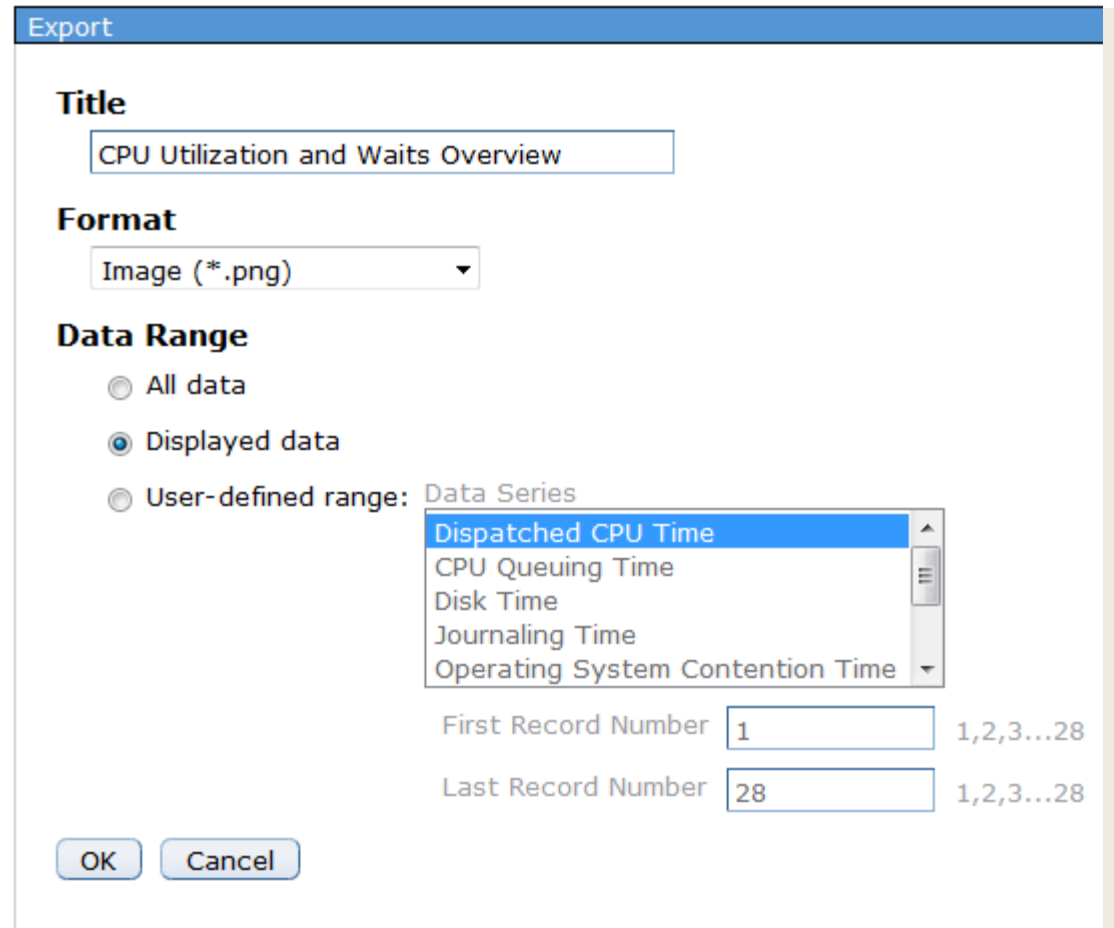
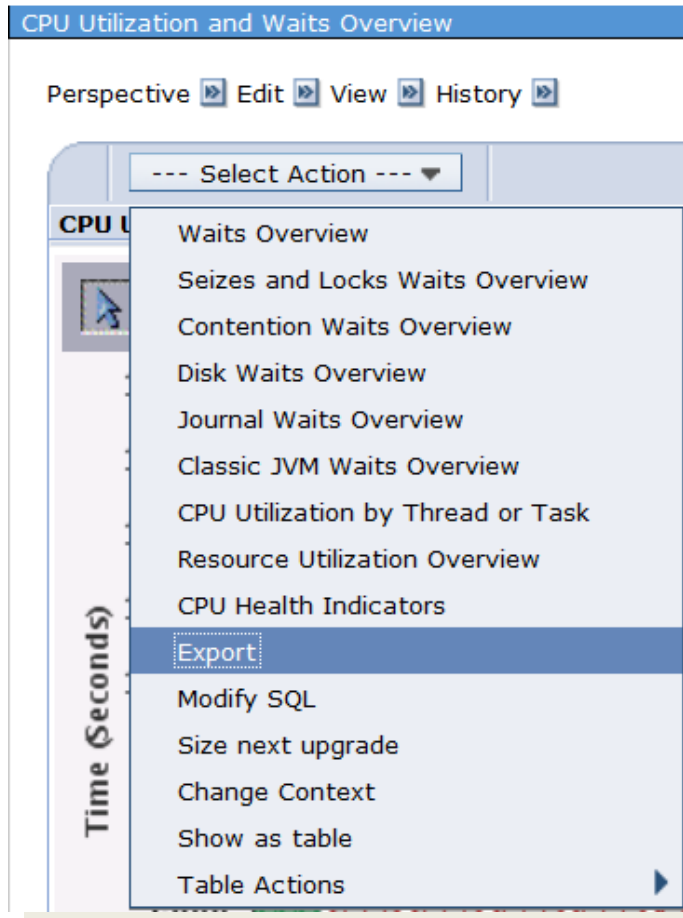
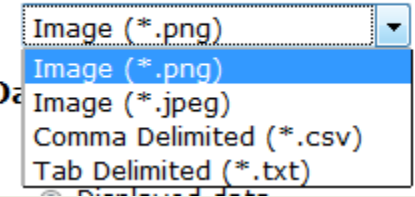
Graph options for next step in analysis



Other options to work with data or refine graphs

Export - *.png, *.jpeg, *.csv, *.txt

Format



Modify SQL – customize the queries

CPU Utilization and Waits Overview

Perspective Edit View History

--- Select Action ---

- Waits Overview
- Seizes and Locks Waits Overview
- Contention Waits Overview
- Disk Waits Overview
- Journal Waits Overview
- Classic JVM Waits Overview
- CPU Utilization by Thread or T
- Resource Utilization Overview
- CPU Health Indicators
- Export
- Modify SQL**
- Size next upgrade
- Change Context
- Show as table
- Table Actions

Time (Seconds)

Modify SQL

Reset

```

SELECT
  QSY.INTNUM,
  QSY.CSDTETIM AS CSDTETIM,
  MAX(PCTSYSCPU) AS PCTSYSCPU,
  SUM(TIME01) * .000001 AS WB01,
  SUM(TIME02) * .000001 AS WB02,
  SUM(TIME05 + TIME06 + TIME07 + TIME08 + TIME09 + TIME10) * .000001 AS WB050607080910,
  SUM(TIME11) * .000001 AS WB11,
  SUM(TIME14 + TIME15 + TIME19 + TIME32) * .000001 AS WB14151932,
  SUM(TIME16 + TIME17) * .000001 AS WB1617,
  SUM(TIME18) * .000001 AS WB18,
  100 AS PCT100,
  DTETIM AS DTETIM,
  DTECEN AS DTECEN
FROM
  (
    SELECT
      DTECEN || DTETIM AS CSDTETIM,
      DOUBLE(JWTM01) AS TIME01,
      DOUBLE(JWTM02) AS TIME02,
  
```

Allow collection choice

OK Cancel

Change Context

Change Context

Details
Use the fields below to adjust your current context. These changes will only affect this panel and any subsequent panel, not previous panels.

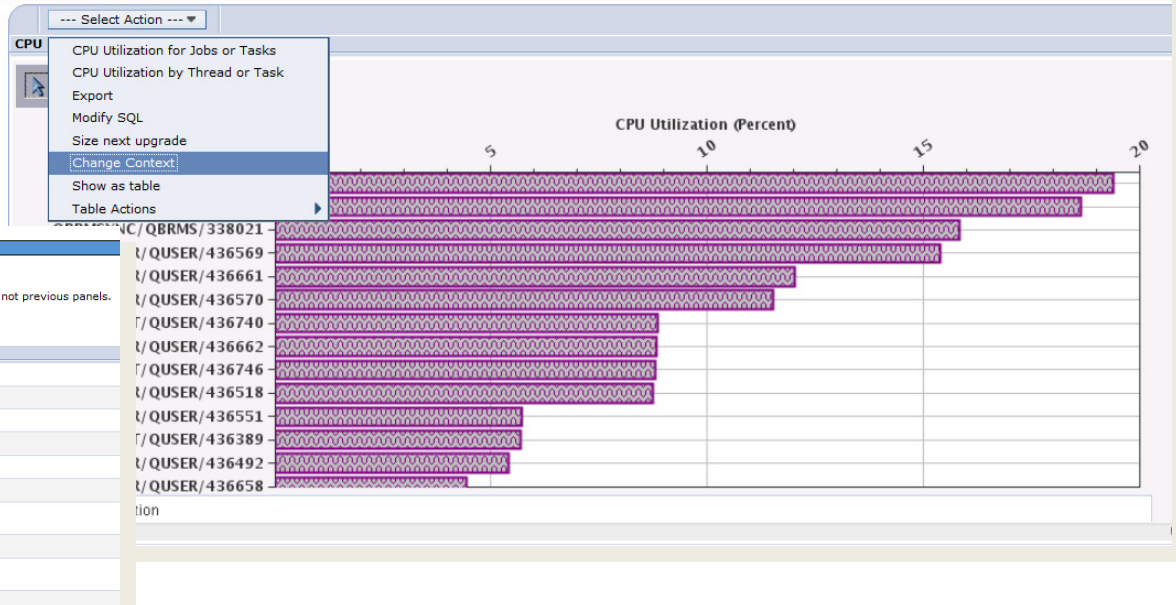
Variable

Variable	Description	Value	Required
Set 1			
Case 1			
JBNAME	Name	QRWTSRVR	No
JBNBR	Job Number		No
JBUSER	Job User		No
MINDTECEN	Century Digit		No
MINDTETIM	Interval Date And Time		No
MAXDTECEN	Century Digit		No
MAXDTETIM	Interval Date And Time		No
Collection Library		PDIDEMO	Yes
Collection Name		Q071123119	Yes

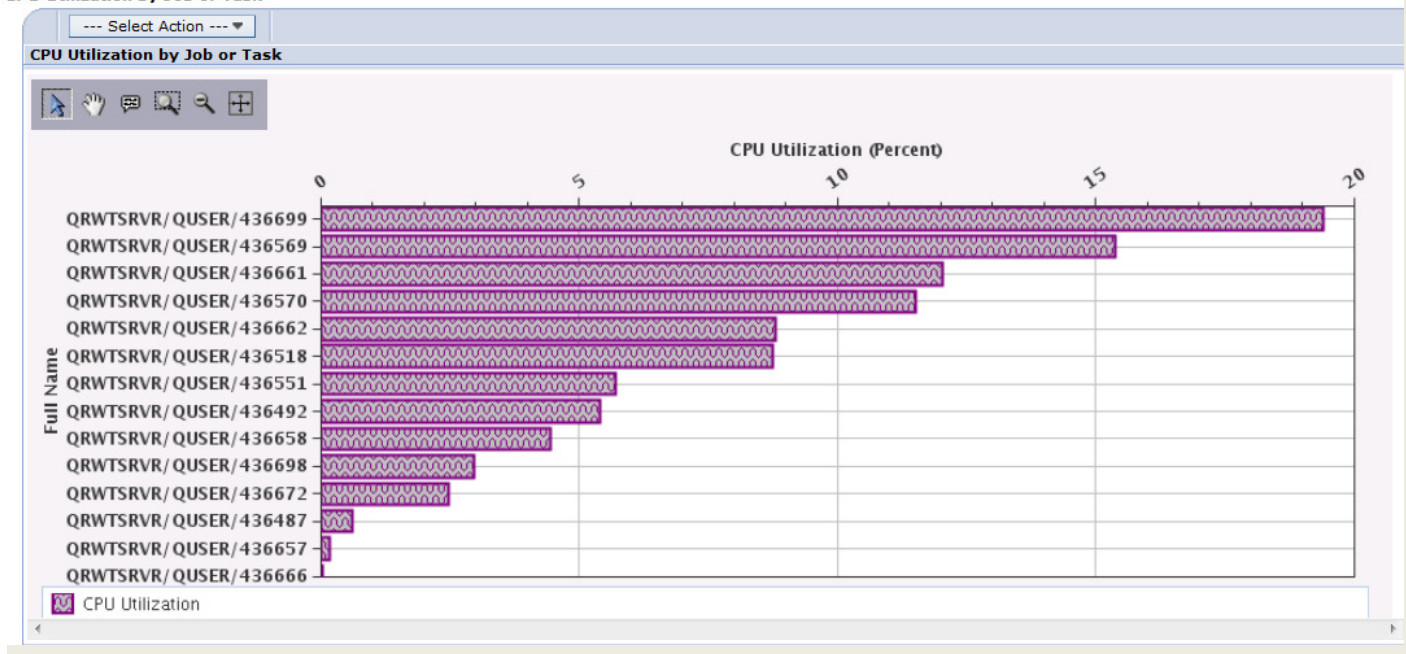
Page 1 of 1 1 Go Rows 11

OK Cancel

CPU Utilization by Job or Task

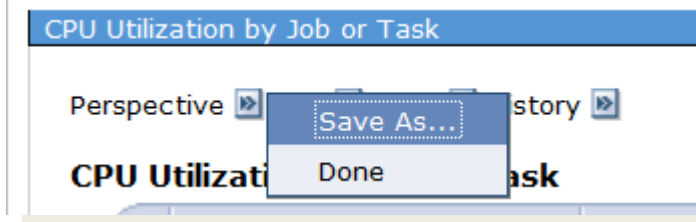


CPU Utilization by Job or Task



Perspective → Save As

When a table or chart is modified, you can save that table or chart for your own custom perspective using “Save As...”



Save a Perspective

Saving a custom perspective

Original Location
Collection Services > CPU > CPU Utilization by Job or Task

Save Location

<p>Perspectives</p> <ul style="list-style-type: none"> 📁 Custom Perspectives - DMMAY <ul style="list-style-type: none"> [Empty] 	<p>Selection</p> <p>Name Custom Perspectives - DMMAY</p> <p>Description Perspectives that have been saved by the user.</p>
--	---

Perspective

*Name:

Description:

Locked

Perspective → Save As

CPU Utilization by Job or Task

Perspective Edit View History



Save Complete

This perspective was saved successfully.

URL to saved perspective:

https://isz1p13.rch.stglabs.ibm.com:2005/ibm/action/launch?pageID=com.ibm.i5OS.webnav.navigationElement.WebnavBasePortlet&system=localhost&WnLocale=en_US&WnSTM=true&task=perf.invdt&packid=ccp_DMMAY&persid=perspective_ID_213976_ccp&collection=PDIDEMO.Q071123119

[Close Message](#)

Investigate Data - Performance Data Investigator

Perspectives

- [Performance Explorer](#)
- [Disk Watcher](#)
- [Job Watcher](#)
- [Collection Services](#)
- [Health Indicators](#)
- [Custom Perspectives - DMMAY](#)
 - [CPU Utilization by Job or Task - QRWTSRVR](#)

Selection

Name

Custom Perspectives - DMMAY

Description

Perspectives that have been saved by the user.

Collection

Collection Library	Collection Name
<input type="text" value="QPFRRDATA"/>	<input type="text" value="Most Recent"/>

Show as Table

--- Select Action ---

- Waits Overview
- Seizes and Locks Waits Overview
- Contention Waits Overview
- Disk Waits Overview
- Journal Waits Overview
- Classic JVM Waits Overview
- CPU Utilization by Thread or Task
- Resource Utilization Overview
- CPU Health Indicators
- Export
- Modify SQL
- Size next upgrade
- Change Context
- Show as table

Table Actions

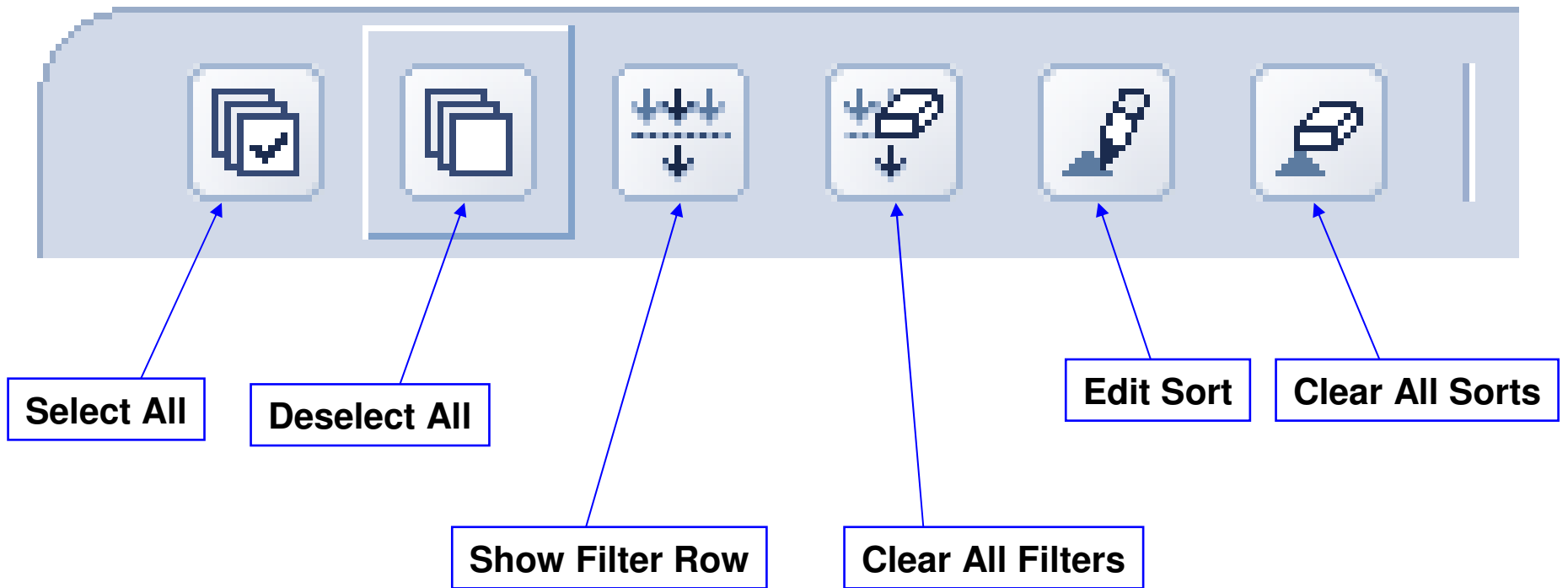
CPU Utilization and Waits Overview

Perspective Edit View History

Select	Interval Number ^	Date - Time	Partition CPU Utilization (Percent) ^	Dispatched CPU Time (Seconds) ^	CPU Queuing Time (Seconds) ^	Disk Time (Seconds) ^	Journaling Time (Seconds) ^	Operating System Contention Time (Seconds) ^
<input type="checkbox"/>	1	Feb 28, 2008 12:15:00 AM	41.65	2125.7	12.25	64.4	35.71	22.6
<input type="checkbox"/>	2	Feb 28, 2008 12:30:00 AM	41.4	2110.42	12.16	10.72	34.68	3.62
<input type="checkbox"/>	3	Feb 28, 2008 12:45:00 AM	41.14	2096.73	12.38	5.32	35.3	3.5
<input type="checkbox"/>	4	Feb 28, 2008 1:00:00 AM	41.23	2104.27	11.71	5.67	35.35	3.29
<input type="checkbox"/>	5	Feb 28, 2008 1:15:00 AM	52.99	2959.23	3759.2	1180.33	47.49	141.01
<input type="checkbox"/>	6	Feb 28, 2008 1:30:00 AM	64.62	3847.86	9061.6	217.47	32.11	113.34
<input type="checkbox"/>	7	Feb 28, 2008 1:45:00 AM	78.58	4853.43	11796.74	41.63	41.27	308.02
<input type="checkbox"/>	8	Feb 28, 2008 2:00:00 AM	84.22	5367.69	13984.72	23.12	52.58	35.85
<input type="checkbox"/>	9	Feb 28, 2008 2:15:00 AM	84.89	5469.88	14931.39	2163.59	69.93	3686.04
<input type="checkbox"/>	10	Feb 28, 2008 2:30:00 AM	84.07	5406.56	15063.64	697.16	72.47	399.18
<input type="checkbox"/>	11	Feb 28, 2008 2:45:00 AM	82.82	5272.46	13472.69	57.49	48.64	46.06
<input type="checkbox"/>	12	Feb 28, 2008 3:00:00 AM	70.36	4141.47	9068.85	20.63	1.19	22.3

Total: 96 Filtered: 96

Table Features



Filtering

Show Filter Row

Select	Interval Number	Date - Time	Partition CPU Utilization (Percent)	Dispatched CPU Time (Seconds)	CPU Queuing Time (Seconds)	Disk Time (Seconds)	Journaling Time (Seconds)	Operating System Contention Time (Seconds)
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter

Select	Interval Number	Date - Time	Partition CPU Utilization (Percent)	Dispatched CPU Time (Seconds)	CPU Queuing Time (Seconds)	Disk Time (Seconds)	Journaling Time (Seconds)	Operating System Contention Time (Seconds)
	Filter	Filter	Filter		Filter	Filter	Filter	Filter

Condition

- All numbers
- Numbers less than
- Numbers less than or equal to
- Numbers greater than
- Numbers greater than or equal to
- Numbers equal to
- Numbers not equal to
- Numbers between
- Numbers between and including

		Feb 28, 2008 12:05:00 AM	41.65	2125.7	12.25	64.4	35.71	22.6
		Feb 28, 2008 12:30:00 AM	41.4	2110.42	12.16	10.72	34.68	3.62
		Feb 28, 2008 12:35:00 AM	41.14	2096.73	12.38	5.32	35.3	3.5

Sorting

Select	Interval Number	Date - Time	Partition CPU Utilization (Percent)	Dispatched CPU Time (Seconds)	CPU Queuing Time (Seconds)	Disk Time (Seconds)	Journaling Time (Seconds)	Operating System Contention Time (Seconds)
			41.65	2125.7	12.25	64.4	35.71	
			41.4	2110.42	12.16	10.72	34.68	
			41.14	2096.73	12.38	5.32	35.3	
			41.23	2104.27	11.71	5.67	35.35	
			52.99	2959.23	3759.2	1180.33	47.49	
			64.62	3847.86	9061.6	217.47	32.11	
			78.58	4853.43	11796.74	41.63	41.27	
			84.22	5367.69	13984.72	23.12	52.58	

First Sort
 Date - Time | Ascending

Second Sort
 | Ascending

Third Sort
 Interval Number | Ascending

Columns ...

The screenshot shows a 'Columns' dialog box with the following components:

- Background Application Menu:** A dropdown menu with 'Columns...' highlighted. Other items include 'Waits Overview', 'Seizes and Locks Waits Overview', 'Contention Waits Overview', 'Disk Waits Overview', 'Journal Waits Overview', 'Classic JVM Waits Overview', 'CPU Utilization by Thread', 'Resource Utilization Overview', 'CPU Health Indicators', 'Export', 'Modify SQL', 'Size next upgrade', 'Change Context', 'Show as chart', 'Show find toolbar', and 'Table Actions'.
- Dialog Title:** 'Columns'
- Available columns:** A list box containing '[Empty]'. Below it are 'Add Before' and 'Add After' buttons.
- Current columns:** A list box containing:
 - Interval Number
 - Date - Time
 - Partition CPU Utilization
 - Dispatched CPU Time
 - CPU Queuing Time
 - Disk Time
 - Journaling Time
 - Operating System Contention Time
 - Lock Contention Time
 - Ineligible Waits Time
 To the right of this list are 'Remove', 'Move Up', and 'Move Down' buttons.
- Buttons:** 'OK', 'Cancel', and 'Help' buttons are located at the bottom of the dialog.

Show find toolbar / Hide find toolbar

Search the table

CPU Utilization and Waits Overview

Perspective Edit View History

Collection
Name(s): Q067000002
Library: QPFRDATA
Type: Collection Services File Based Collection
File level: 36

Time
Start: Mar 8, 2013 12:00:02 AM
End: Ongoing

System
Name:
Release: V7R1M0

Search for: Condition: Column: Direction:
 Match case

--- Select Action ---

Select	Interval Number	Date - Time	Partition CPU Utilization (Percent)	Dispatched CPU Time (Seconds)	CPU Q Time (
<input type="checkbox"/>	1	Mar 8, 2013 12:15:00 AM	0.13	32.95	
<input type="checkbox"/>	2	Mar 8, 2013 12:30:00 AM	0.02	5.61	

--- Select Action ---

- Waits Overview
- Seizes and Locks Waits Overview
- Contention Waits Overview
- Disk Waits Overview
- Journal Waits Overview
- Classic JVM Waits Overview
- CPU Utilization by Thread or Task
- Resource Utilization Overview
- CPU Health Indicators
- Export
- Modify SQL
- Size next upgrade
- Change Context
- Show as chart
- Columns...
- Show find toolbar
- Table Actions

Columns...

- Hide find toolbar

New Table Support



- The latest PTFs enable improved table support
 - Collection manager and PDI Reports use the new table support
 - “Show as table” still uses the old table support

Manage Collections - Etc3t1.rchland.ibm.com

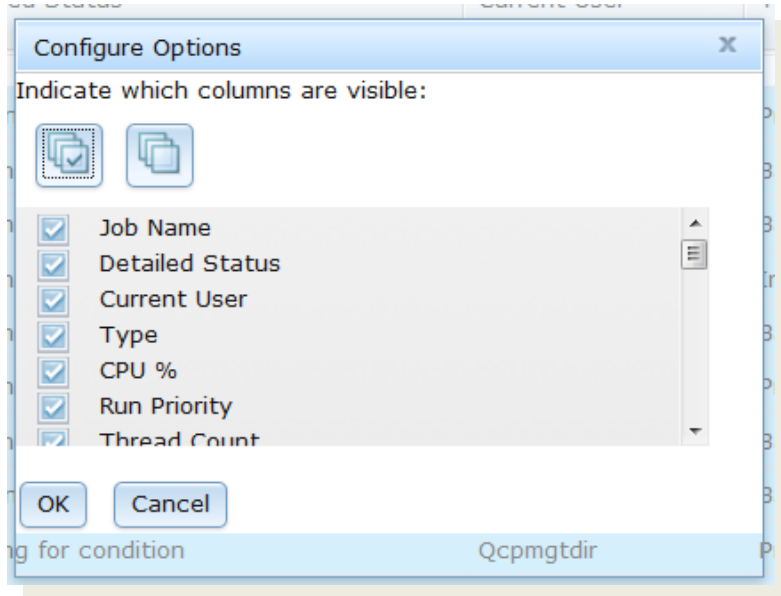
Filter

<input type="checkbox"/>	Name	Library	Type	Status	Started	Ended	Size MB	System
No filter applied								
<input type="checkbox"/>	Q081000002	QPFRDATA	Collection Services File Based Collection	Complete	3/22/13 1:00:02 AM	3/23/13 1:00:00 AM	218.023	ETC3
<input type="checkbox"/>	Q082000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Complete	3/23/13 1:00:02 AM	3/24/13 1:00:02 AM	151.332	ETC3
<input type="checkbox"/>	Q082000002	QPFRDATA	Collection Services File Based Collection	Complete	3/23/13 1:00:02 AM	3/24/13 1:00:00 AM	217.023	ETC3
<input type="checkbox"/>	Q083000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Complete	3/24/13 1:00:02 AM	3/25/13 1:00:02 AM	156.332	ETC3
<input type="checkbox"/>	Q083000002	QPFRDATA	Collection Services File Based Collection	Complete	3/24/13 1:00:02 AM	3/25/13 1:00:00 AM	220.023	ETC3
<input type="checkbox"/>	Q084000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Complete	3/25/13 1:00:02 AM	3/26/13 1:00:02 AM	156.332	ETC3
<input type="checkbox"/>	Q084000002	QPFRDATA	Collection Services File Based Collection	Complete	3/25/13 1:00:02 AM	3/26/13 1:00:00 AM	219.523	ETC3
<input type="checkbox"/>	Q066000002	QPFRDATA	Collection Services File Based Collection	Complete	3/7/13 12:00:02 AM	3/8/13 12:00:00 AM	233.281	ETC3
<input type="checkbox"/>	Q085000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Complete	3/26/13 1:00:02 AM	3/27/13 1:00:02 AM	160.332	ETC3
<input type="checkbox"/>	Q085000002	QPFRDATA	Collection Services File Based Collection	Complete	3/26/13 1:00:02 AM	3/27/13 1:00:00 AM	225.652	ETC3
<input type="checkbox"/>	Q086000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Complete	3/27/13 1:00:02 AM	3/28/13 1:00:02 AM	158.332	ETC3
<input type="checkbox"/>	Q086000002	QPFRDATA	Collection Services File Based Collection	Complete	3/27/13 1:00:02 AM	3/28/13 1:00:00 AM	225.523	ETC3
<input type="checkbox"/>	Q087000002	QPFRDATA	Collection Services *MGTCOL Obj Based Co	Active	3/28/13 1:00:02 AM		2.094	ETC3
<input type="checkbox"/>	Q087000002	QPFRDATA	Collection Services File Based Collection	Active	3/28/13 1:00:02 AM		3.602	ETC3
<input type="checkbox"/>	Q073000002	QPFRDATA	Collection Services File Based Collection	Complete	3/14/13 1:00:02 AM	3/15/13 1:00:00 AM	220.515	ETC3

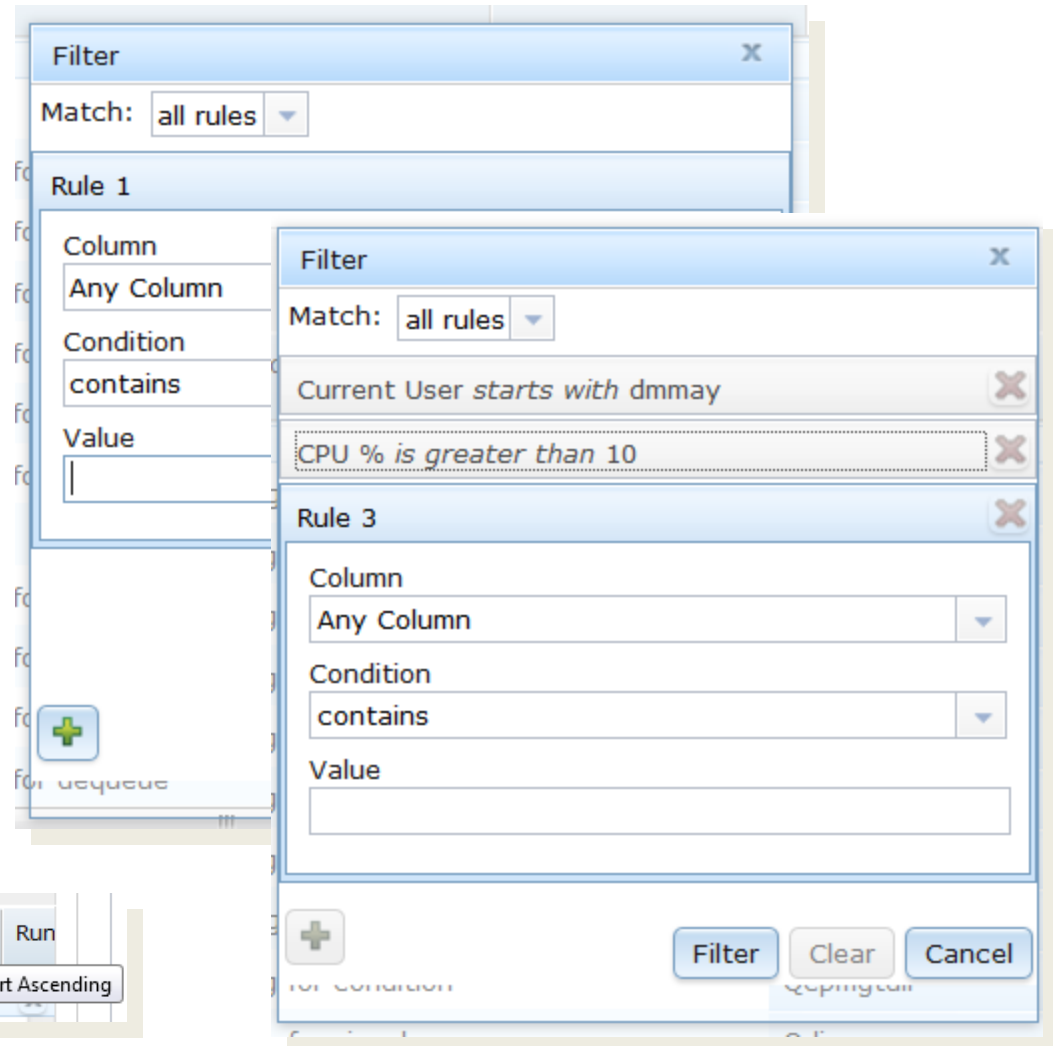
1 - 22 of 22 items 5 | 10 | 25 | 50 | 100 | All

New Table Support – Same Features, New UI

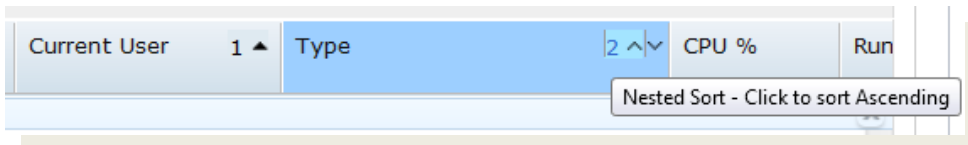
Configure Options for Columns



Filter column data

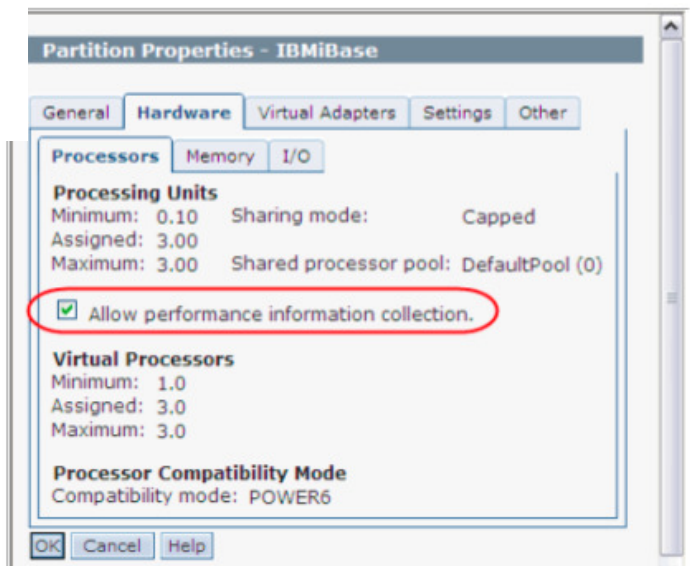
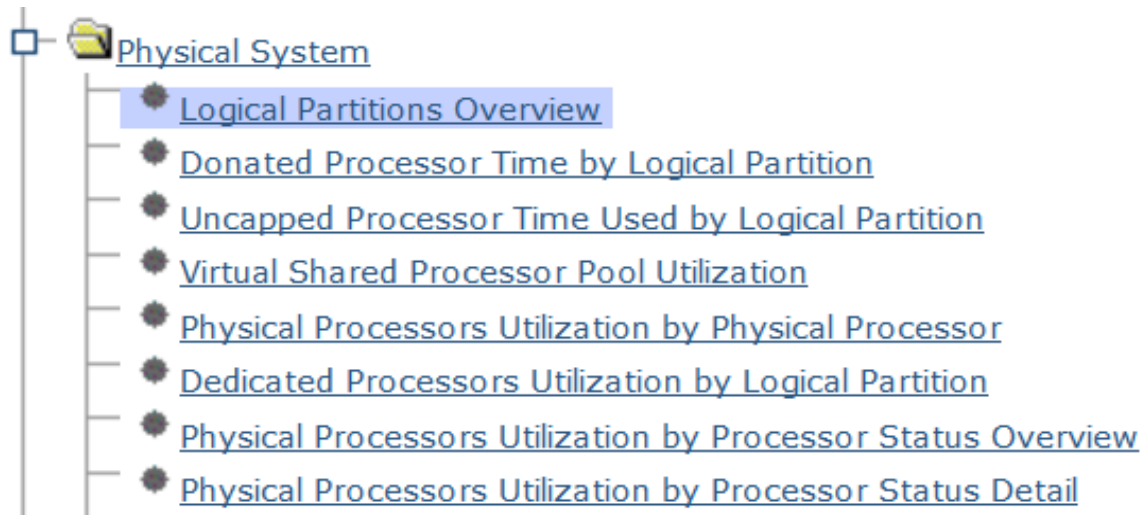


Sort Columns



Physical System Charts – Frame view of Performance!

Collection Services has the ability to collect certain high-level cross-partition processor performance metrics for all logical partitions on the same single physical server regardless of operating system. This is available on Power 6 and above servers, with a minimum firmware level xx340_061. When this data is available, it can be viewed via several perspectives found under "Physical System".

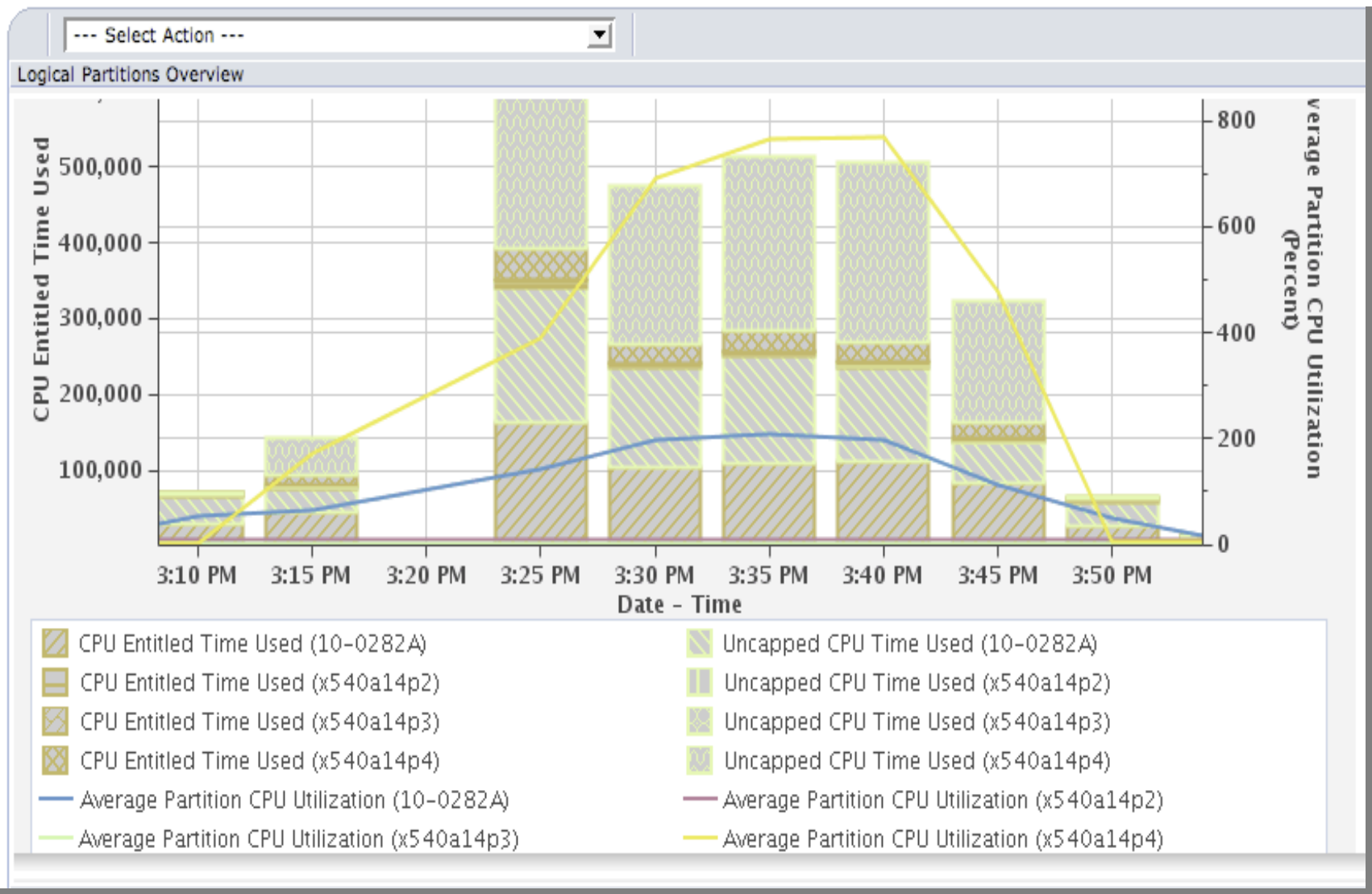


HMC option to enable performance collection must be turned on for the IBM i partition to collect the data

http://ibmsystemsmag.blogs.com/i_can/2009/10/i-can-display-cpu-utilization-for-all-partitions.html

Logical Partitions Overview

Requires Power 6 and IBM i 6.1 or later



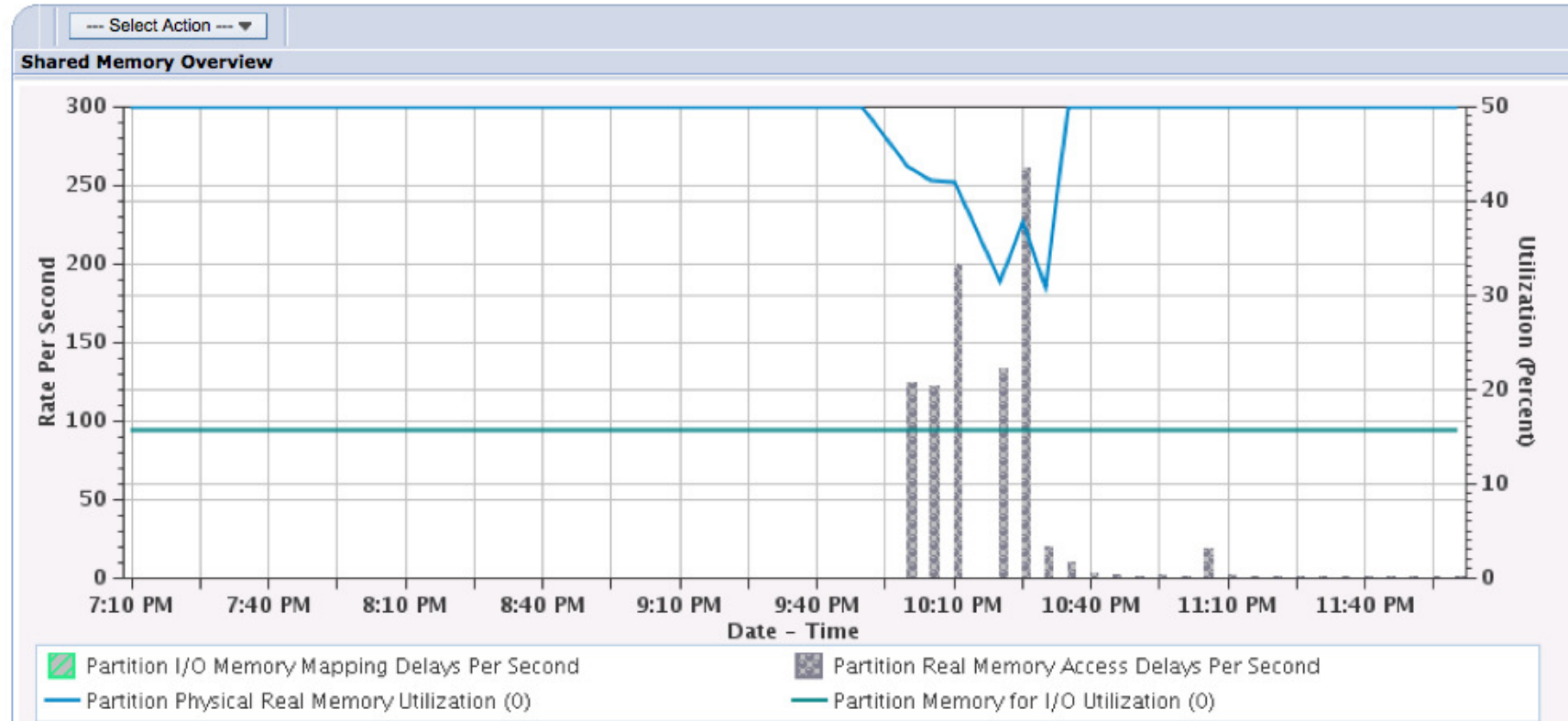
Shared Memory Overview

- Physical System
 - Logical Partitions Overview
 - Donated Processor Time by Logical Partition
 - Uncapped Processor Time Used by Logical Partition
 - Virtual Shared Processor Pool Utilization
 - Physical Processors Utilization by Physical Processor
 - Dedicated Processors Utilization by Logical Partition
 - Physical Processors Utilization by Processor Status Overview
 - Physical Processors Utilization by Processor Status Detail
 - Shared Memory Overview**

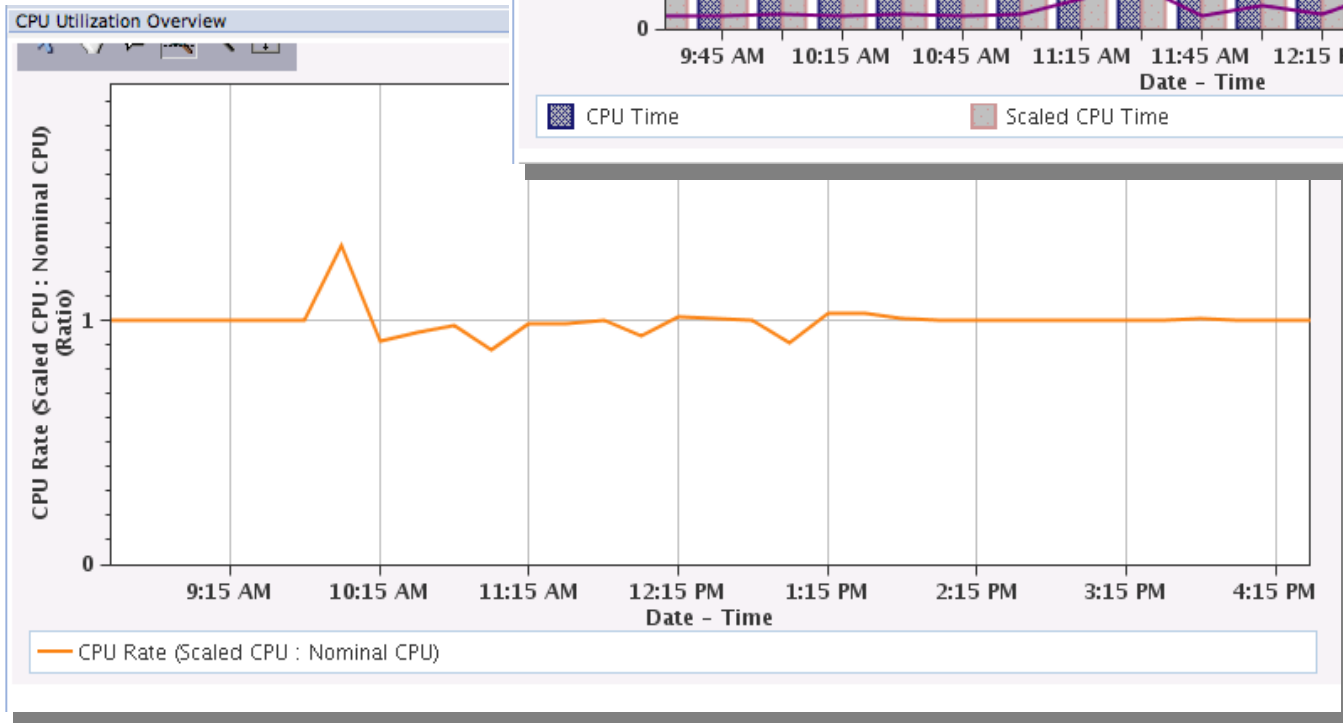
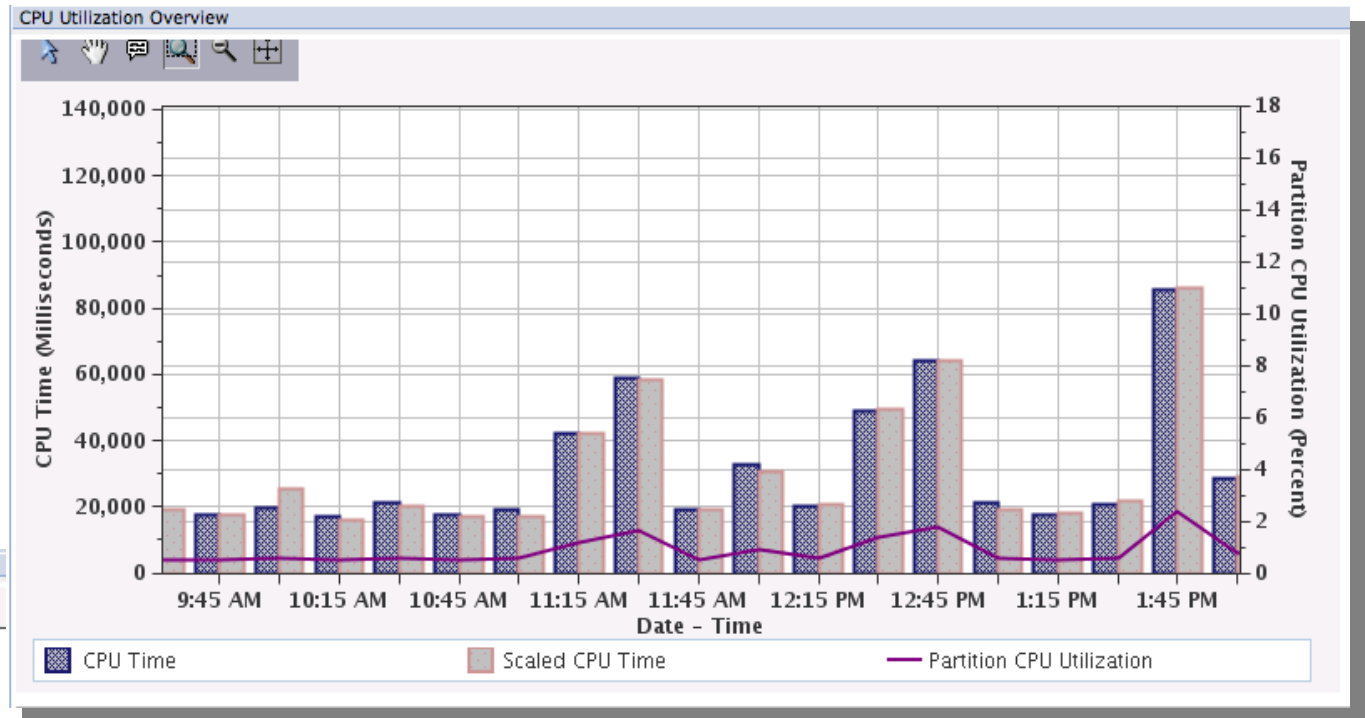
Shared Memory Overview

Perspective

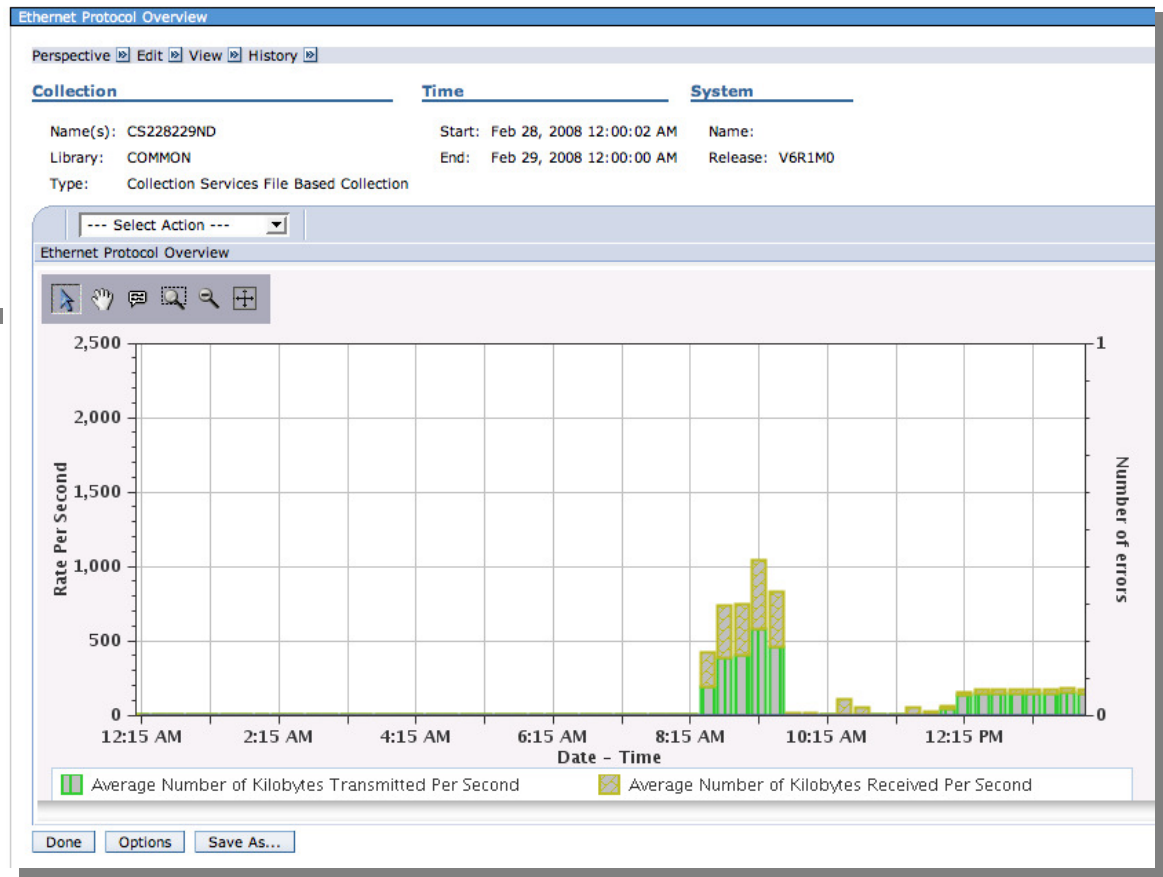
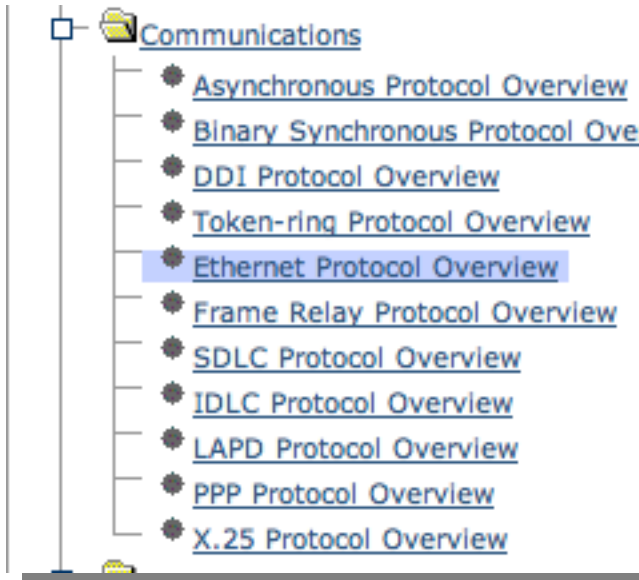
Collection	Time	System
Name(s): AMS1	Start: Aug 11, 2008 7:06:22 PM	Name: A'
Library: AMSD	End: Aug 12, 2008 12:00:05 AM	Release: V6R1M0
Type: Collection Services File Based Collection		



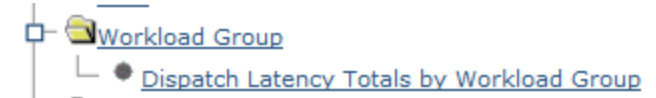
Scaled CPU



Communications Perspectives

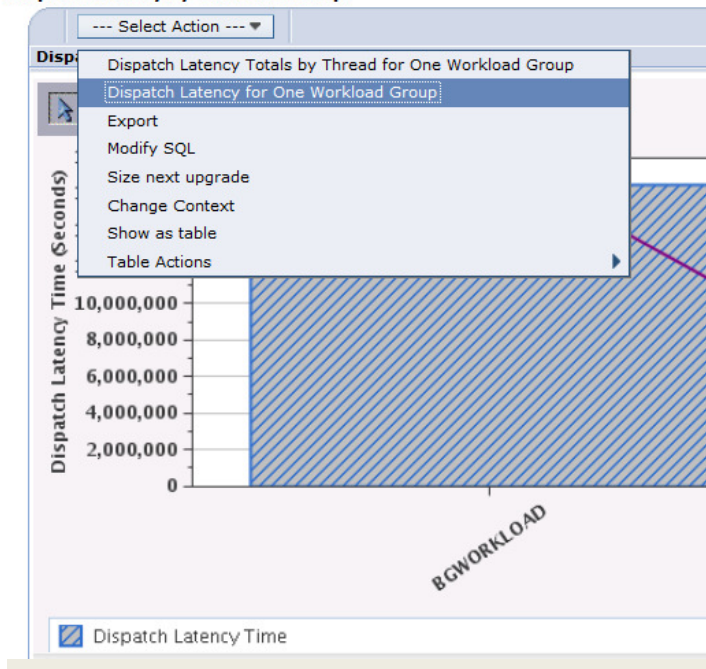


Workload Group Perspectives

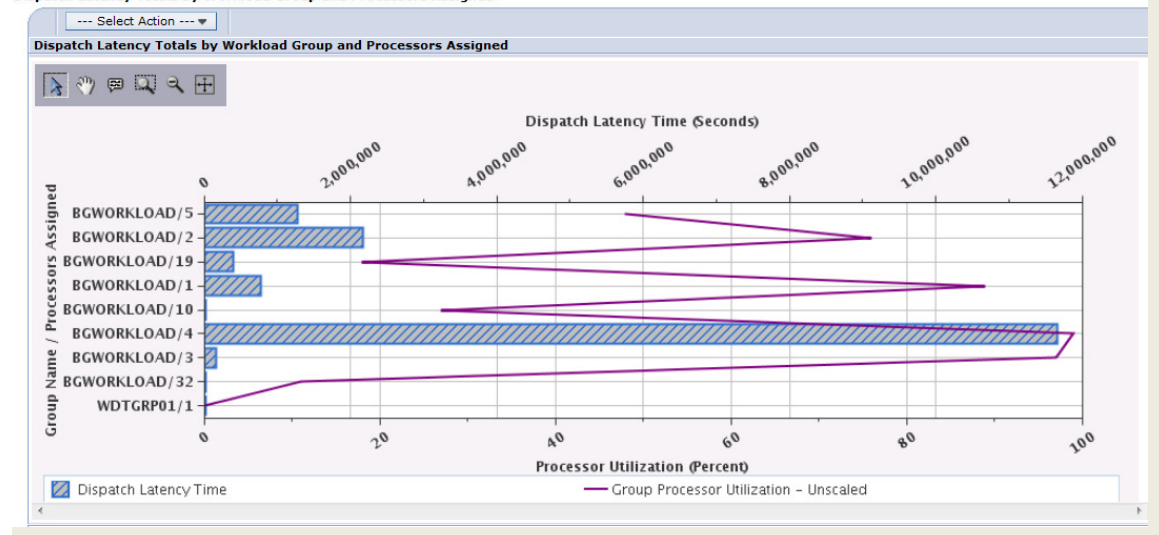


- Workload group performance metrics are collected by Collection Services in the QAPMSYSWLC file
<http://pic.dhe.ibm.com/infocenter/iseriess/v7r1m0/topic/rzahx/rzahxqapmsyswlc.htm>
- PDI has some graphs to display workload group dispatch latency

Dispatch Latency by Workload Group



Dispatch Latency Totals by Workload Group and Processors Assigned



Description

This chart shows an overview of workload group dispatch latency. It shows the total delay time for each workload group. This is the amount of time threads that were ready to run could not be dispatched due to the group's maximum concurrent processor limit.

Integrated Workload group data

Added Workload Delay and Group information to some charts on job data

Workload group delay time

- The amount of time this thread could not be dispatched due to workload group.

Workload group

- The identifier for the workload group this thread belonged to at the time this data was sampled.

CPU Utilization by Job or Task

Select	Job Number	CPU Utilization (Percent)	CPU Time (Milliseconds)	Scaled CPU Utilization (Percent)	Scaled CPU Time (Milliseconds)	Workload Group Delay Time (Milliseconds)	Job Type	Job Subtype
<input type="checkbox"/>	392352	0	1826	0	1826	2509313	B	
<input type="checkbox"/>	394767	0	1826	0	1826	2514772	B	
<input type="checkbox"/>	393796	0	1826	0	1826	2511459	B	
<input type="checkbox"/>	393955	0	1826	0	1826	2515482	B	

CPU → CPU Utilization by Job or Task

CPU → CPU Utilization by Thread or Task

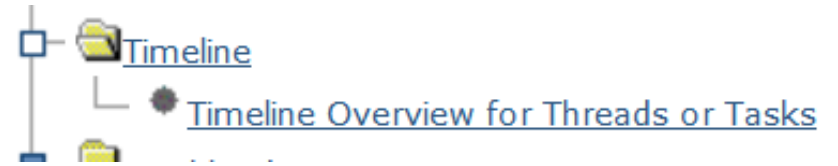
CPU Utilization by Thread or Task

Perspective Edit View History

Collection Name(s): Q341000005 Time Start: Dec 7, 2010 12:00:05 AM System Name: RCHPOST3
 Library: WLCTEST End: Dec 8, 2010 12:01:26 AM Release: V6R1M0
 Type: Collection Services File Based Collection
 File level: 36

Select	Scaled CPU Utilization (Percent)	Scaled CPU Time (Milliseconds)	Workload Group Delay Time (Milliseconds)	Workload Group ID	Job Type	Job Subtype	Minimum Job Pool	Maximum Job Pool
<input type="checkbox"/>	0	1822		2517868	1	B	02	02
<input type="checkbox"/>	0	1822		2519859	1	B	02	02
<input type="checkbox"/>	0	1822		2515353	1	B	02	02

Timeline



- New Timeline perspective
The timeline bars on the chart represent the elapsed time of threads or tasks
 - Dispatched CPU Time
 - CPU Queuing Time
 - Other Waits Time

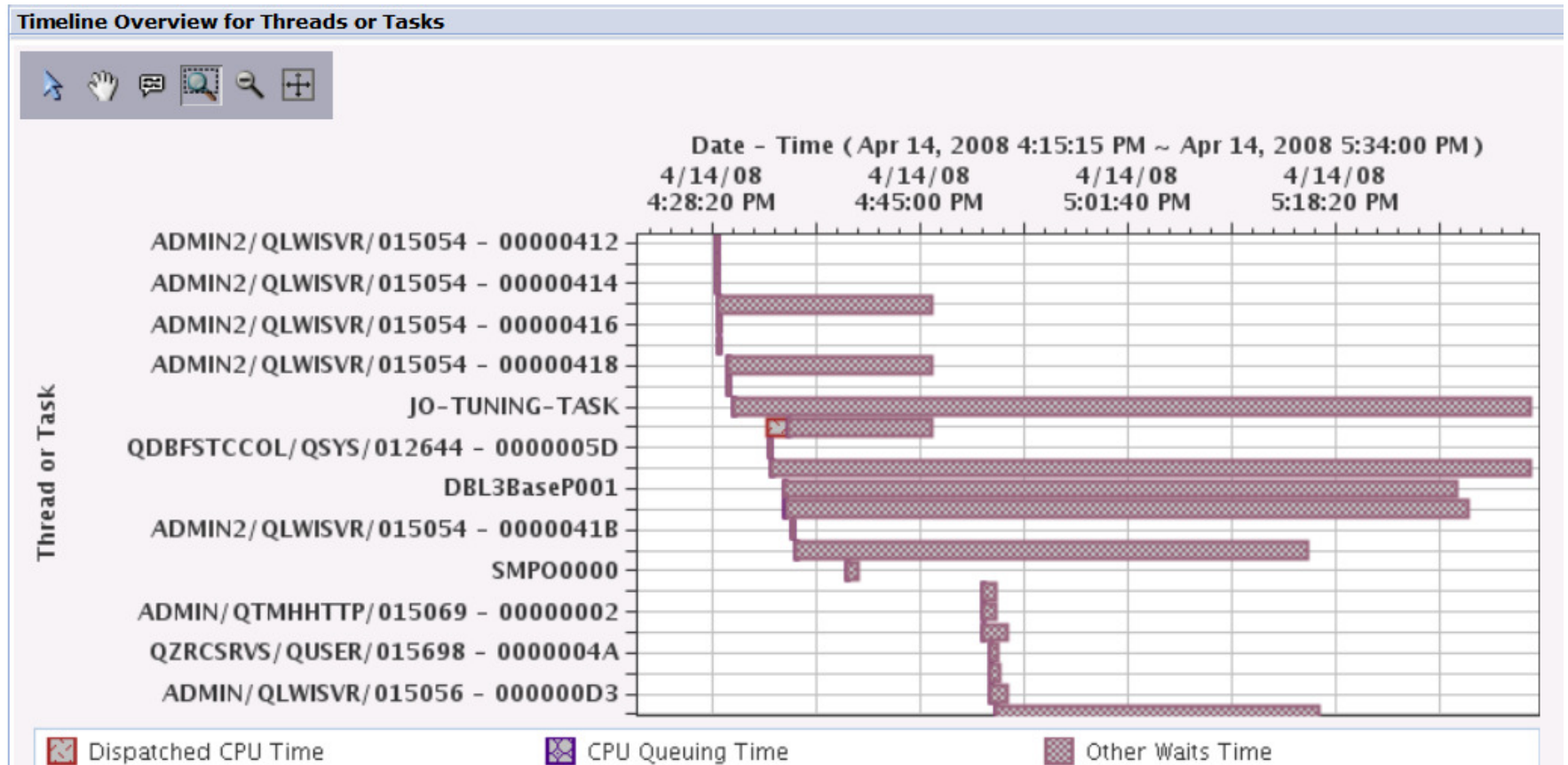
Selection

Name

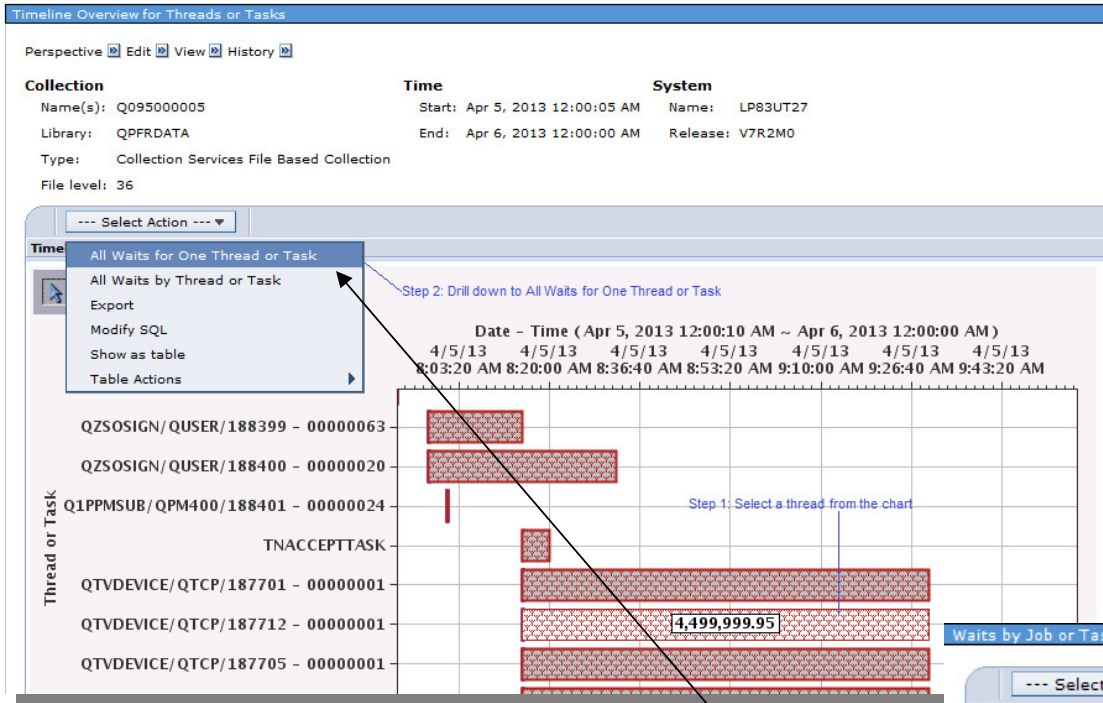
Timeline Overview for Threads or Tasks

Description

This chart shows the timeline overview for threads or tasks. Use this chart to select a thread or task for viewing its detailed run and wait contributions.



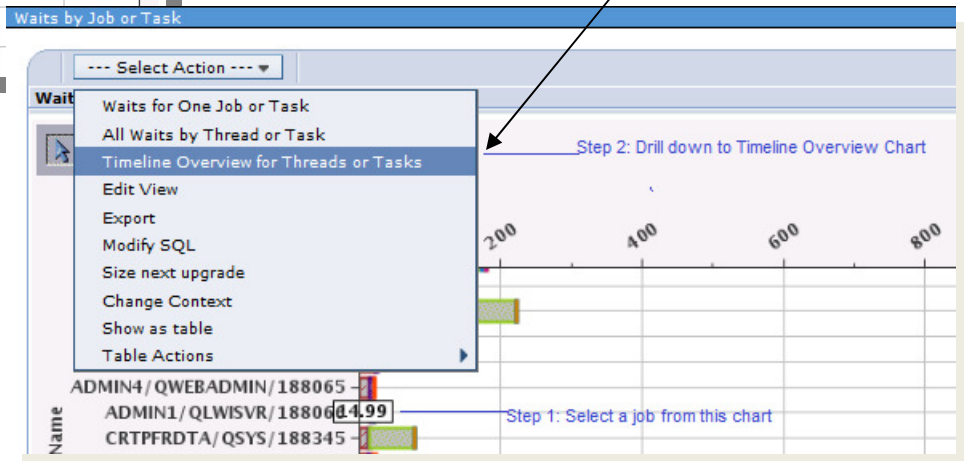
Timeline Overview for Threads or Tasks



Drilldown to this new chart from existing charts

- Waits by Job or Task
- All Waits by Thread or Task

Select one thread or task and drill down to “All Waits for One Thread or Task”
or
“All Waits by Thread or Task”



Metric Finder

Collection

Collection Library: QPFRDATA Collection Name: Most Recent

Metric Finder

Metric

Metric Name:

- Primary Affinity Domain ID
- SMAPP Evaluations Served
- SMAPP Index Build Time Estimations
- SMT Hardware Threads:
- SQL Cursor Count
- SQL Cursor Reuse
- STRPFMON Trace Type:
- Samples Taken
- SaveDocument URLs Received
- Scaled CPU Microseconds

Collection

- Scaled CPU Time**
- Scaled CPU Time Microseconds
- Scaled CPU Time Used
- Scaled CPU Utilization
- Search String Commands
- Second Most Frequent Journal Entry Type
- Secondary Affinity Domain ID
- Secondary Control Unit
- Secondary Line Description
- Secondary Thread Flag
- Secondary Thread Thresh (ms):

Metric Finder

Metric

Metric Name:

Scaled CPU Time

Perspective

Select	Perspective
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization Overview
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Generic Job or Task
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Job Current User Profile
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Job User Profile
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Job or Task
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Pool
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Server Type
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Subsystem
<input type="radio"/>	Collection Services --> CPU --> CPU Utilization by Thread or Task
<input type="radio"/>	Collection Services --> CPU Utilization by Thread or Task

Page 1 of 1

1 Go

Rows 10

Total:

Collection

Collection Library: QPFRDATA Collection Name: Most Recent

Additional Content Packages

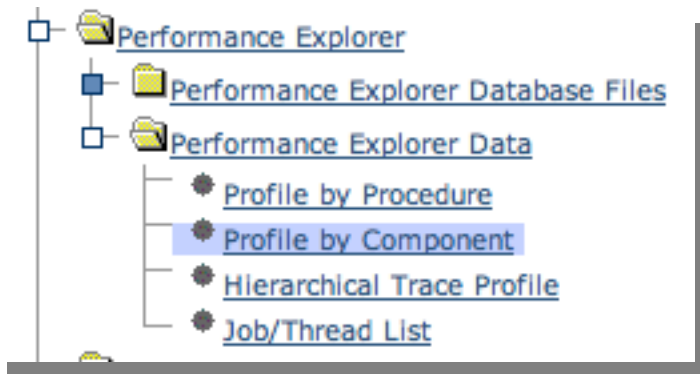
Investigate Data - Performance Data Investigator

Perspectives	Selection
<input checked="" type="checkbox"/> Performance Explorer	
<input type="checkbox"/> Disk Watcher	
<input type="checkbox"/> Job Watcher	
<input checked="" type="checkbox"/> Health Indicators	
<input type="checkbox"/> Collection Services	
<input checked="" type="checkbox"/> Database	

Collection

Collection Library: QPFRDATA
 Collection Name: Most Recent

Performance Explorer



The Profile Perspectives provide function similar to what Performance Data Trace Visualizer offers

Profile by Component

Perspective Edit View History

Collection	Time	System
Name(s): MYTPROF	Start: Sep 25, 1997 2:16:32 PM	Name:
Library: PEXTPTST	End: Sep 25, 1997 2:18:16 PM	Release: V5R3M0
Type: Performance Explorer File Based Collection		

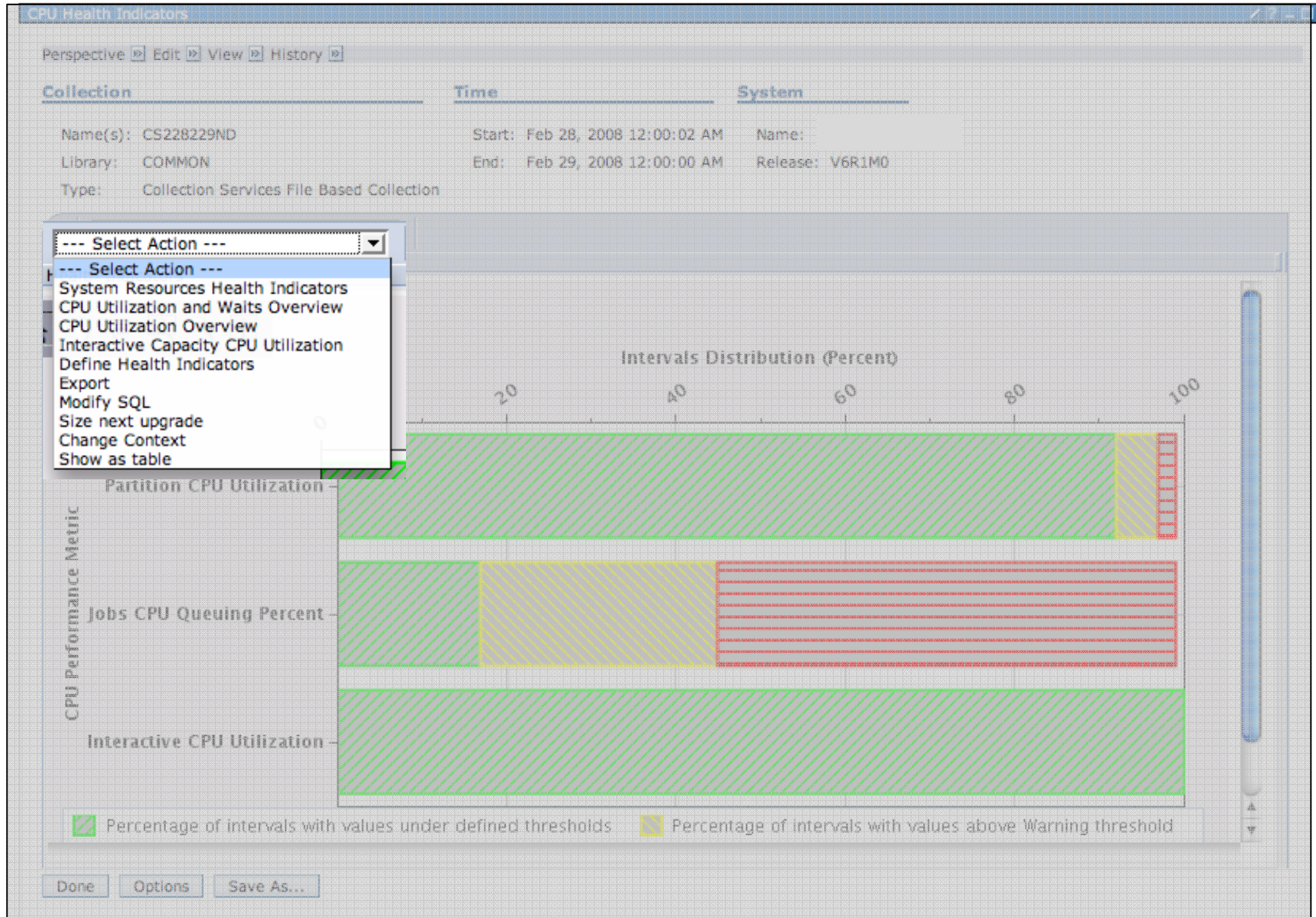
Profile by Component

Select	Total	Component	Procedure Name	Hit Count
<input type="checkbox"/>	Total			24112(100%)
<input type="checkbox"/>		SLIC Database		5228(21.68%)
<input type="checkbox"/>		SLIC Index		4354(18.06%)
<input type="checkbox"/>		SLIC Common Functions		1525(6.32%)
<input type="checkbox"/>		SLIC Storage Management		1404(5.82%)
<input type="checkbox"/>		SLIC Activation/Invocation		1170(4.85%)
<input type="checkbox"/>		Unknown		1058(4.39%)
<input type="checkbox"/>		XPF Message Handler		990(4.11%)
<input type="checkbox"/>		XPF DB2/400 Query Optimizer		805(3.34%)
<input type="checkbox"/>		SLIC String Functions		799(3.31%)
<input type="checkbox"/>		XPF Database Other		783(3.25%)
<input type="checkbox"/>		SLIC Seize/Release		757(3.14%)

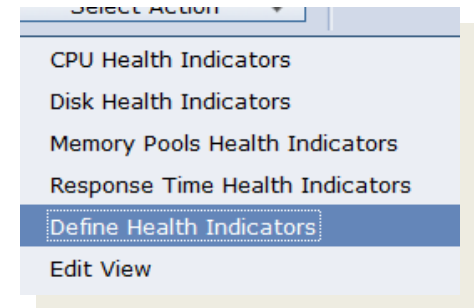
Page 1 of 6 1 Go Total: 71 Displayed: 12

Done Options Save As...

CPU Health Indicators



Define Health Indicators



Define Health Indicators

System Resources Health Indicators	Available Indicators		Selected Indicators	Current Threshold Values
CPU	[Empty]	Add >>	Interactive CPU Utilization	Warning: 70
Disk		Remove <<	Jobs CPU Queuing Percent	Action: 90
Memory Pools			Partition CPU Utilization	
5250 OLTP Response Time				

Define Health Indicators

System Resources Health Indicators	Available Indicators		Selected Indicators	Current Threshold Values
CPU	[Empty]	Add >>	Average Disk Percent Busy	Warning: 20
Disk		Remove <<	Average Disk Space Percent Used	Action: 30
Memory Pools			Average Disk Response Time	
5250 OLTP Response Time				

Define Health Indicators

System Resources Health Indicators	Available Indicators		Selected Indicators	Current Threshold Values
CPU	[Empty]	Add >>	Page Faults Pending Per Second	Warning: 4000
Disk		Remove <<	Page Faults Per Second	Action: 5000
Memory Pools				
5250 OLTP Response Time				

Options

Investigate Data - Performance Data Investigator

Options

- Use patterns Use patterns where applicable in charts.
- Show charts Whenever possible, show charts instead of tables.
- Enable design mode Enable advanced features allowing design and development of new content.
- Show help Show help messages for many tasks.
- Show SQL error messages Show SQL error messages to user.
- Set table size Rows: Columns: Specify the number of visible rows and columns shown for tables.

Default library

Specify the default library that will be used when a collection is selected.

- Use Collection Services configured library
- Use last visited library
- Use library:

Option – Show SQL Error Messages

Options

- Use patterns Use patterns where applicable in charts.
- Show charts Whenever possible, show charts instead of tables.
- Enable design mode Enable advanced features allowing design and development of new co
- Show help Show help messages for many tasks.
- Show SQL error messages Show SQL error messages to user.
- Set table size Rows: Columns: Specify the number of visible rows shown for tables.

Default library

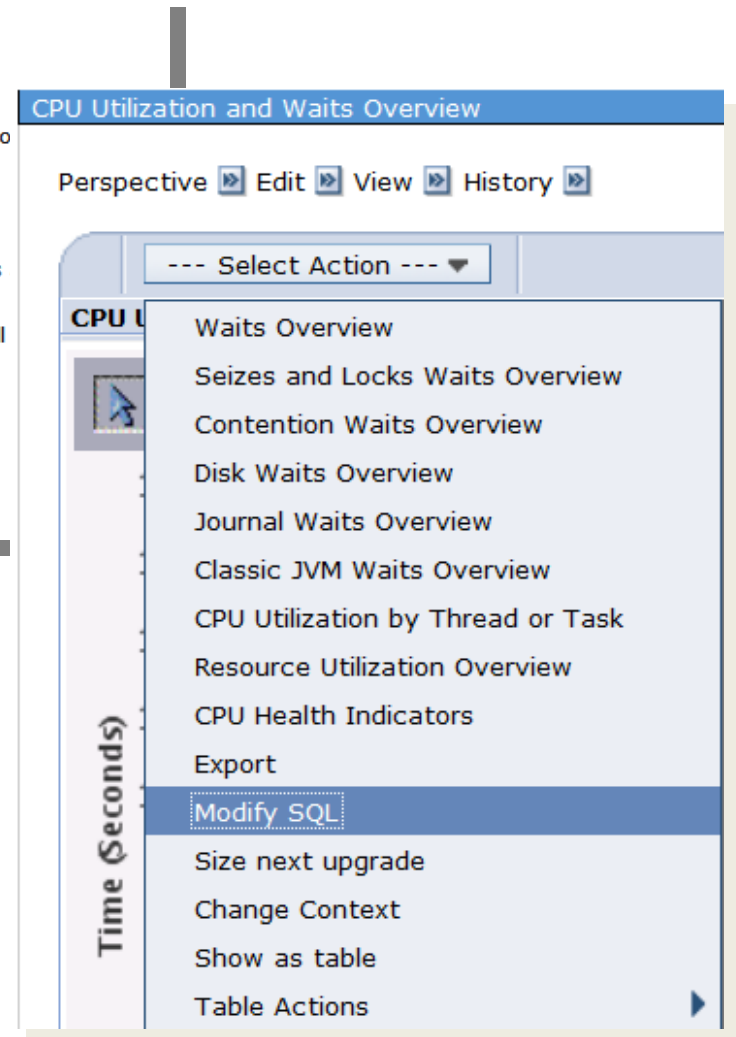
- Use Collection Services configured library
- Use last visited library
- Use library:

Specify the default library that will when a collection is selected.

OK Cancel

Check this Option

Modify SQL window will provide error message to help solve SQL errors.



Show SQL Error Messages

Modify SQL

SQL Statement

Reset

```

SELECT
  QSY.INTNUM,
  QSY.CSDTETIM AS CSDTETIM,
  MAX(PCTSYSCPU) AS PCTSYSCPU,
  SUM(TIME01) * .000001 AS WB01,
  SUM(TIME02) * .000001 AS WB02,
  SUM(TIME05 + TIME06 + TIME07 + TIME08 + TIME09 + TIME10) * .000001 AS WB050607080910,
  SUM(TIME11) * .000
  SUM(TIME14 + TIME
  SUM(TIME16 + TIME
  SUM(TIME18) * .000
  100 AS PCT100,
  DTETIM AS DTETIM,
  DTECEN AS DTECEN
FROM
  (
    SELECT
      DTECEN
      DOUBLE(
      DOUBLE(

```

Allow collection choice

OK Cancel

Modify SQL window
Now easier to see SQL errors

Modify SQL

The query you entered can not be understood by this application. Please correct and try again.

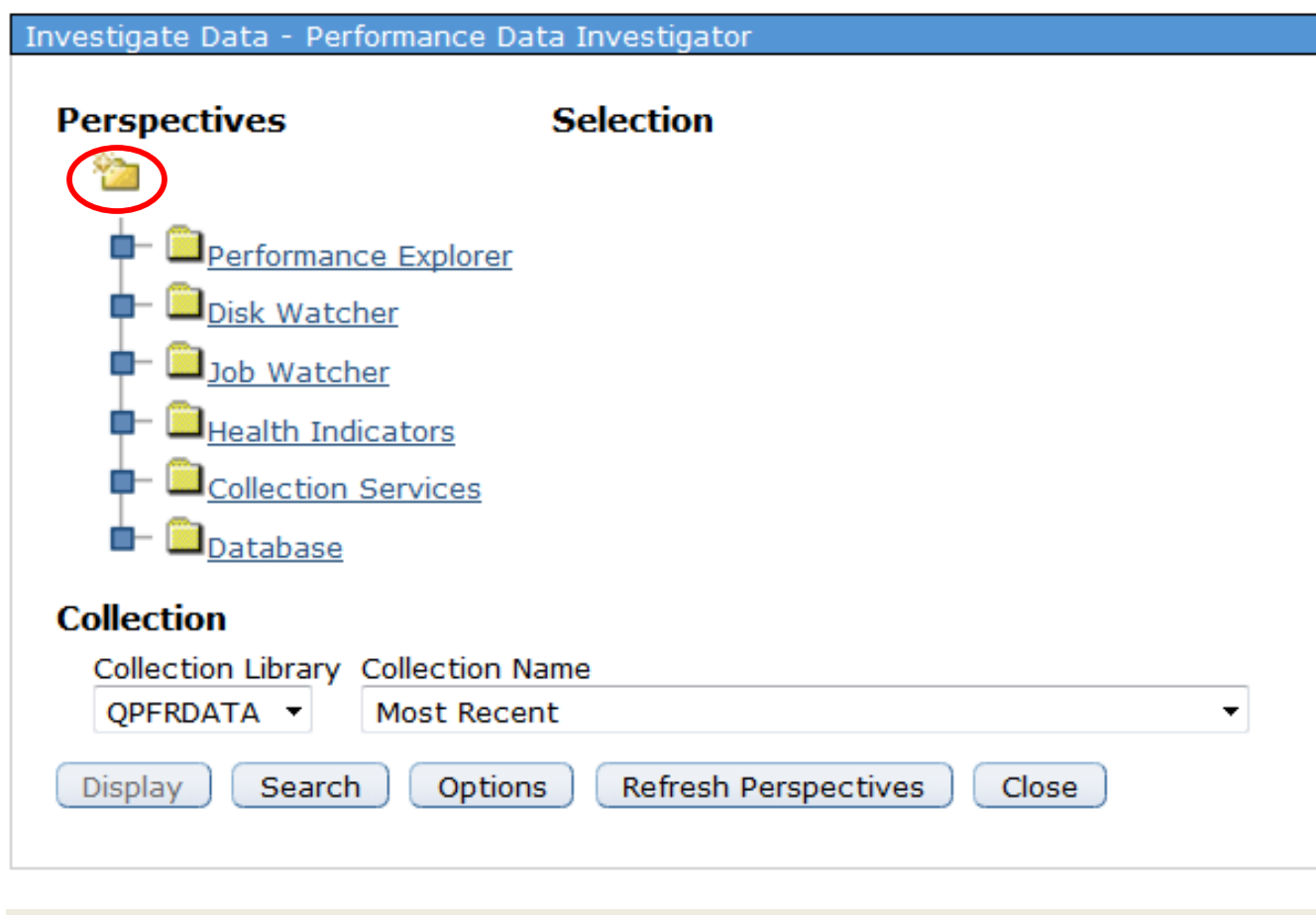
(LRPOWELL) - SQLQuery.executeQuery() - Select String: SELECT QSY.CSDTETIM AS CSDTETIM, QSY.PARTCPUUTIL, QDK.PCTDSKFULL, QDK.PCTDSKBUSY, QSY.INTNUM, QSY.DTETIM AS DTETIM, QSY.DTECE AS DTECEN FROM (SELECT DTETIM, DTECEN AS DTECEN, INTNUM, DTECEN || DTETIM AS CSDTETIM, DOUBLE(SYSPTU)/DOUBLE(SYSCTA) * 100 AS PARTCPUUTIL FROM QTEMP.QPFRDATAQAPMSYSTEMQ146000002 QSY) QSY INNER JOIN (SELECT CSDTETIM, CASE WHEN SUM(DSCAP) <> 0 THEN (SUM(DSCAP - DSAVL) / SUM(DSCAP)) * 100 ELSE 0 END AS PCTDSKFULL, AVG(PCTDSKBUSY) AS PCTDSKBUSY FROM (SELECT QSY.DTECEN || QSY.DTETIM AS CSDTETIM, DOUBLE(MAX(DSCAP)) AS DSCAP, DOUBLE(MIN(DSAVL)) AS DSAVL, AVG(CASE WHEN DSSMPL <> 0 THEN DOUBLE(DSSMPL - DSNBSY) / DOUBLE(DSSMPL) * 100 ELSE 0 END) AS PCTDSKBUSY FROM QTEMP.QPFRDATAQAPMSYSTEMQ146000002 QSY LEFT OUTER JOIN QTEMP.QPFRDATAQAPMDISKQ146000002 QDS ON QSY.INTNUM = QDS.INTNUM WHERE ((DSASP = '1')) GROUP BY QSY.DTETIM, QSY.DTECEN, DSARM, DMFLAG) A GROUP BY CSDTETIM) QDK ON QSY.CSDTETIM = QDK.CSDTETIM ORDER BY CSDTETIM

[SQL0205] Column DTECE not in table QSY in *N.

OK

Design Mode

Once you “Enable Design Mode” additional options become available to create and edit your own charts and tables.



Creating Custom Content Packages

The image displays three screenshots from an IBM dashboard interface, illustrating the process of creating custom content packages.

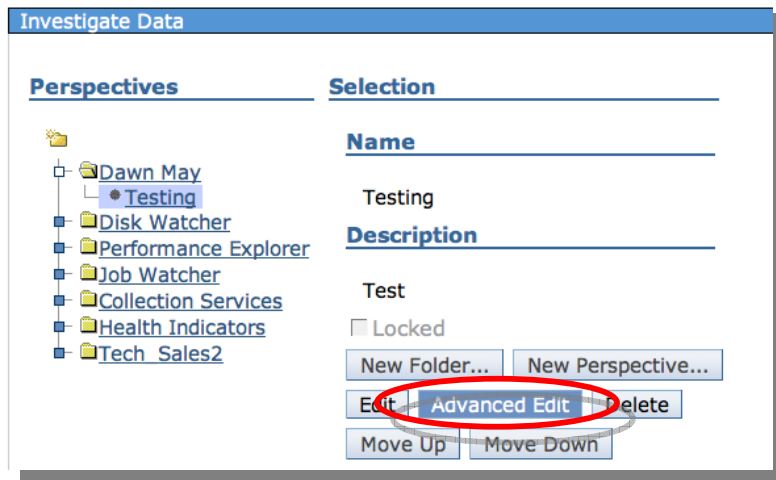
New Package: This dialog box allows users to create a new package. It includes a "Name" field with an asterisk indicating it is required, a "Description" text area, and "OK" and "Cancel" buttons.

Add View: This dialog box is used to configure a view. It includes:

- View:** A "Name" field containing "Dawn May" and a "Type" selection with radio buttons for "Table" and "Chart".
- Data Set:** A "Modify SQL" button.
- Drilldown:** A list of folders: "Health Indicators", "Collection Services", and "Dawn May", each with a checkbox.
- Chart Properties:** A checkbox for "Transpose Axes".
- Data Series:** A list box containing "[Empty]" with buttons for "Add...", "Edit...", "Delete", "Move Up", and "Move Down".
- Thresholds:** A list box containing "[Empty]" with buttons for "Add...", "Edit...", and "Delete".

Investigate Data: This panel shows a tree view of "Perspectives" under the "Selection" tab. The tree includes folders for "Dawn May", "Disk Watcher", "Performance Explorer", "Job Watcher", "Collection Services", "Health Indicators", and "Tech_Sales2".

Advanced Edit – Edit the markup language directly



Edit PML

Performance Markup Language (PML) Text:

```
<?xml version="1.0" encoding="UTF-8"?>
<perspective description="Test" id="perspective_ID_504772_ccp"
label="Testing" locked="false">
  <view class="com.ibm.as400.pt.viewer.views.ChartView"
id="view_ID_504773_ccp" label="Custom Chart">
    <chartProperties transposeAxes="false">
      <dataSeries chartType="line" renderMode="clustered">
        <domain>
          <field value="INTNUM"/>
        </domain>
        <range>
          <field backgroundColor="RANDOM" color="RANDOM"
pattern="RANDOM" value="JBLWT"/>
        </range>
      </dataSeries>
    </chartProperties>
    <dataSet>
      <from>
        <value>
          <collection file="QAPMJOBOS"/>
        </value>
      </from>
      <select>
        <field value="INTNUM"/>
        <field value="DTETIM"/>
        <field value="INTSEC"/>
        <field value="DTECEN"/>
        <field value="JBNAME"/>
        <field value="JBUSER"/>
        <field value="JBNBR"/>
      </select>
    </dataSet>
  </view>
</perspective>
```


Design Mode – Edit View

CPU Utilization and Waits Overview

Perspective Edit View History

Collection

Name(s): Q067000002
 Library: QPFRDATA
 Type: Collection Services File Based Collection
 File level: 36

--- Select Action --- ▼

- Waits Overview
- Seizes and Locks Waits Overview
- Contention Waits Overview
- Disk Waits Overview
- Journal Waits Overview
- Classic JVM Waits Overview
- CPU Utilization by Thread or Task
- Resource Utilization Overview
- CPU Health Indicators
- Edit View**
- Export
- Modify SQL
- Size next upgrade
- Change Context
- Show as table
- Table Actions

Time (Seconds)

Edit View

View

Name: CPU Utilization and Waits Overview

Type: Table Chart

Data Set

Modify SQL

Drilldown

- Collection Services
 - CPU Utilization and Waits Overview
 - CPU Utilization by Thread or Task
 - Resource Utilization Overview
 - Job Statistics Overviews
 - Waits
 - Waits Overview
 - Seizes and Locks Waits Overview
 - Contention Waits Overview
 - Disk Waits Overview
 - Journal Waits Overview
 - Classic JVM Waits Overview
 - All Waits by Thread or Task
 - Waits by Job or Task
 - Waits by Generic Job or Task
 - Waits by Job User Profile
 - Waits by Job Current User Profile
 - Waits by Pool
 - Waits by Subsystem

Design Mode – Edit View

Chart Properties

Transpose Axes

Data Series

Group0

Partition CPU Utilization

Add...

Edit...

Delete

Move Up

Move Down

Thresholds

[Empty]

Add...

Edit...

Delete

OK

Add Data Series

Domain: Date - Time The domain is locked since this chart already has a domain specified.

Range: Available Selected

Interval Number	Add >>	Select	Name	Color	Background Color	Pattern
100 Percent Utilization	Remove <<		None			

Type: Line (poly)

Breakdown: None

Tooltip fields: None

Interval Number

Date - Time

Partition CPU Utilization

Dispatched CPU Time

CPU Queuing Time

OK Cancel

Add Threshold

Name:

Field: Lock Contention Time

Color: Random

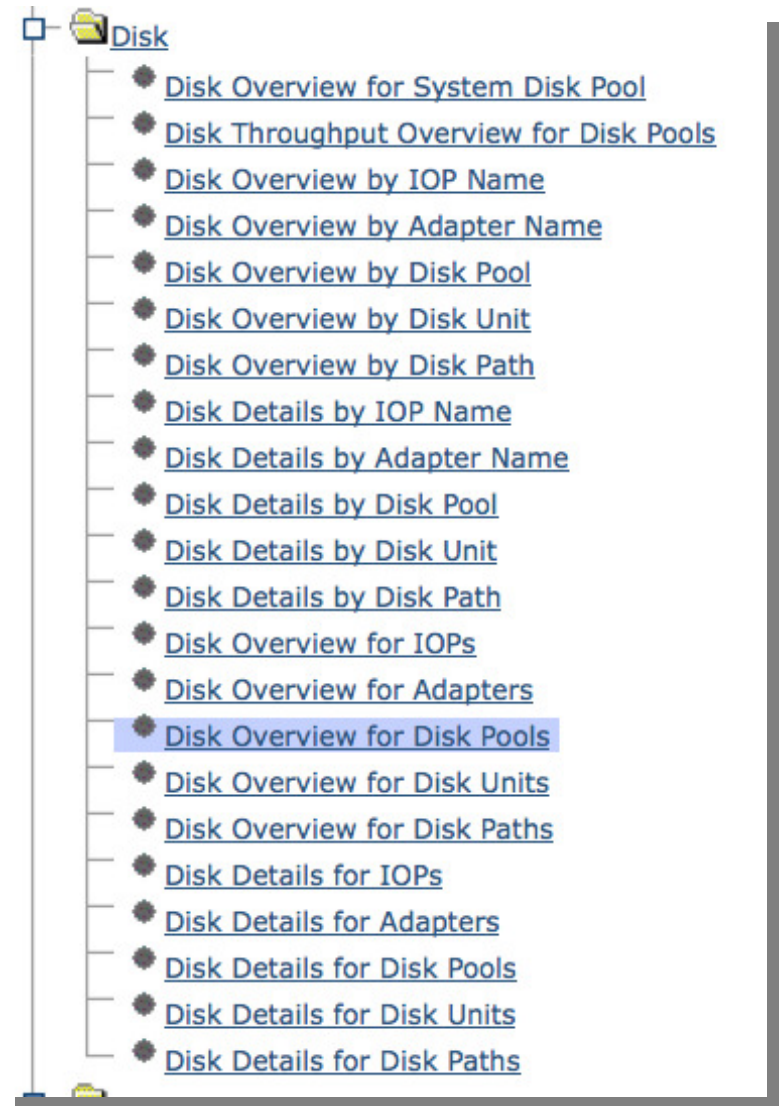
Current Value: Seconds Reset to Default Value

Default Value: Seconds Update to Current Value

OK Cancel

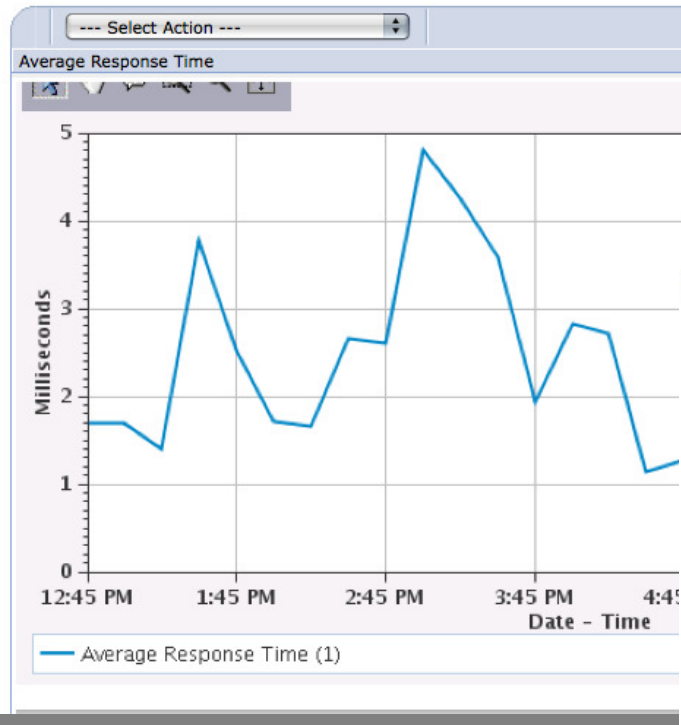
Design Mode - Add Data Series

- The Add Data Series option allows you to add additional data to your graphs for customization
- Example: Use Design Mode for Edit View actions
 - Start with ...
Disk → Disk Overview for Disk Pools
- We can combine the Average Response Time and Percent Disk Busy metrics to be on one chart



Disk Overview for Disk Pools gives us two charts we want this in one...

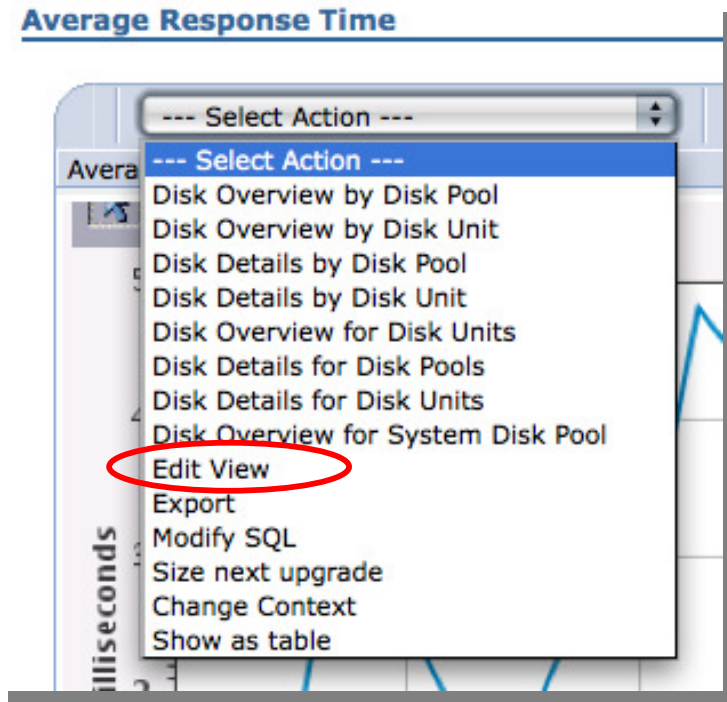
Average Response Time



Percent Disk Busy



Select Edit View from the Average Response Time chart's action drop-down



Scroll down and find the “Data Series” Box and take “Add...”

Chart Properties

Transpose Axes

Data Series

Average Response Time

Add...

Edit...

Delete

Move Up

Move Down

Thresholds

Select the new Range “Percent Disk Busy” then click on “Add”



Add Data Series

Domain: The domain is locked since this chart already has a domain specified.

Range: Available Selected

Interval Number
Drive Capacity
Percent Disk Capacity Full
Percent Disk Busy
Reads Per Second

Type:

Breakdown:

Tooltip fields: None
 Interval Number
Interval Date And Time

Select Random for the pattern, use a bar Type graph, and turn on Tooltips for “Percent Disk Busy”

Add Data Series

Domain: The domain is locked since this chart already has a domain specified.

OK

Range: Available Selected

Interval Number
Drive Capacity
Percent Disk Capacity Full
Reads Per Second
Writes Per Second

Type:

Breakdown:

Tooltip fields: None
 Disk Pool Identifier
Drive Capacity
Percent Disk Capacity Full
Average Response Time
Percent Disk Busy

Select	Name	Color	Background Color	Pattern
<input type="checkbox"/>	Percent Disk Busy	Use entry from below 498366	Random	Random

OK Cancel



Edit View



Information

The data series has been added.

[Close Message](#)

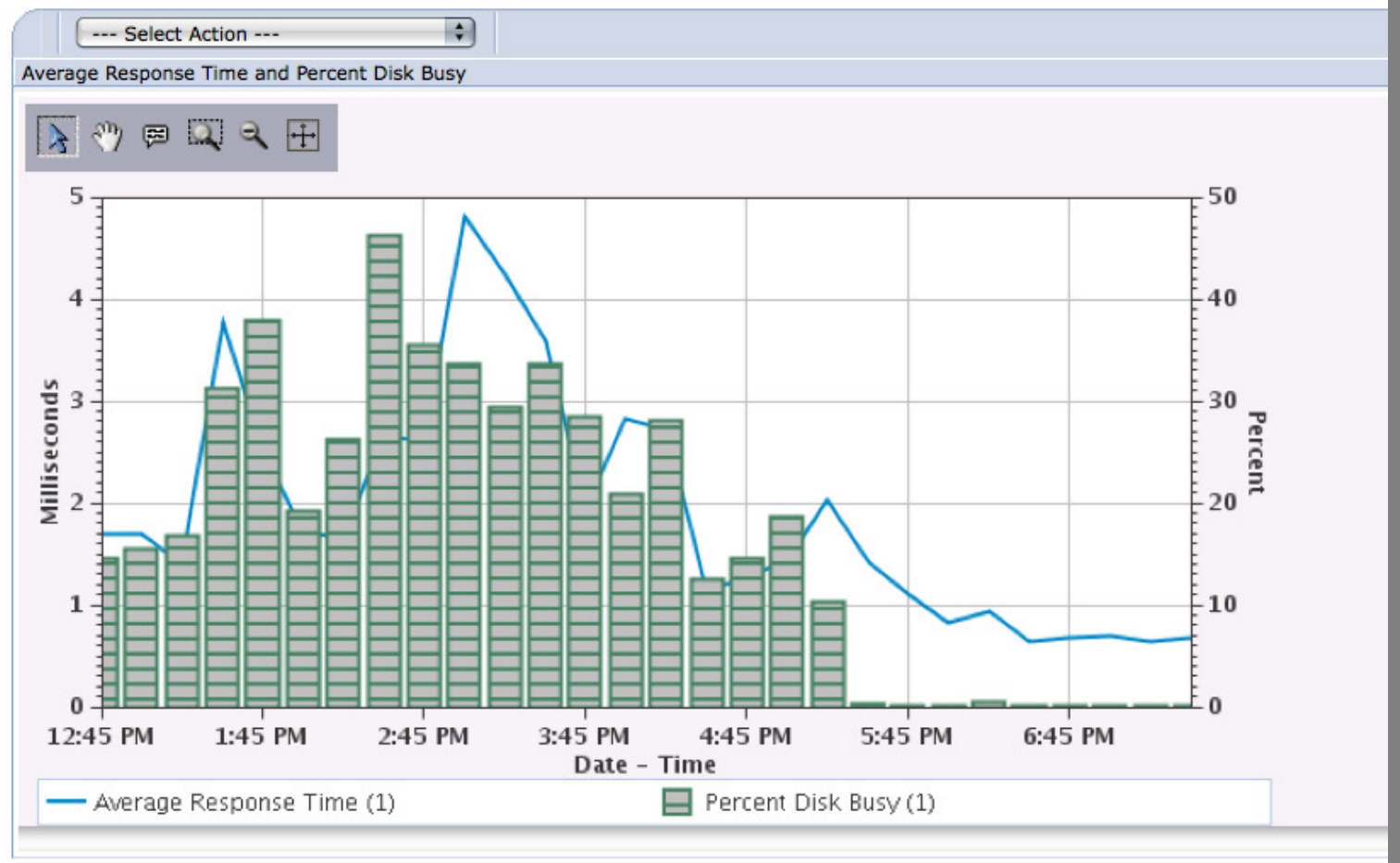
View

Name:

Type: Table **Average Response Time and Percent Disk Busy**

Modify the View title and click Ok

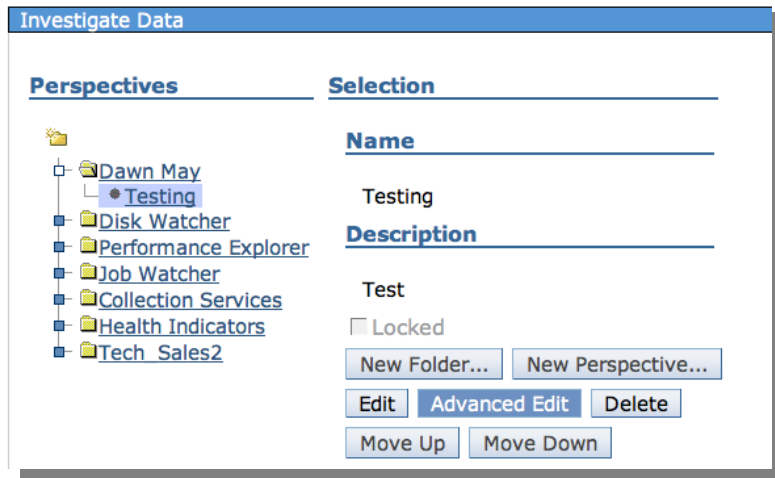
You now have the customized chart



Custom Content Packages – PML Location

- Custom content packages are stored in the following directory:

\QIBM\UserData\OS400\iSeriesNavigator\config\PML\CCP



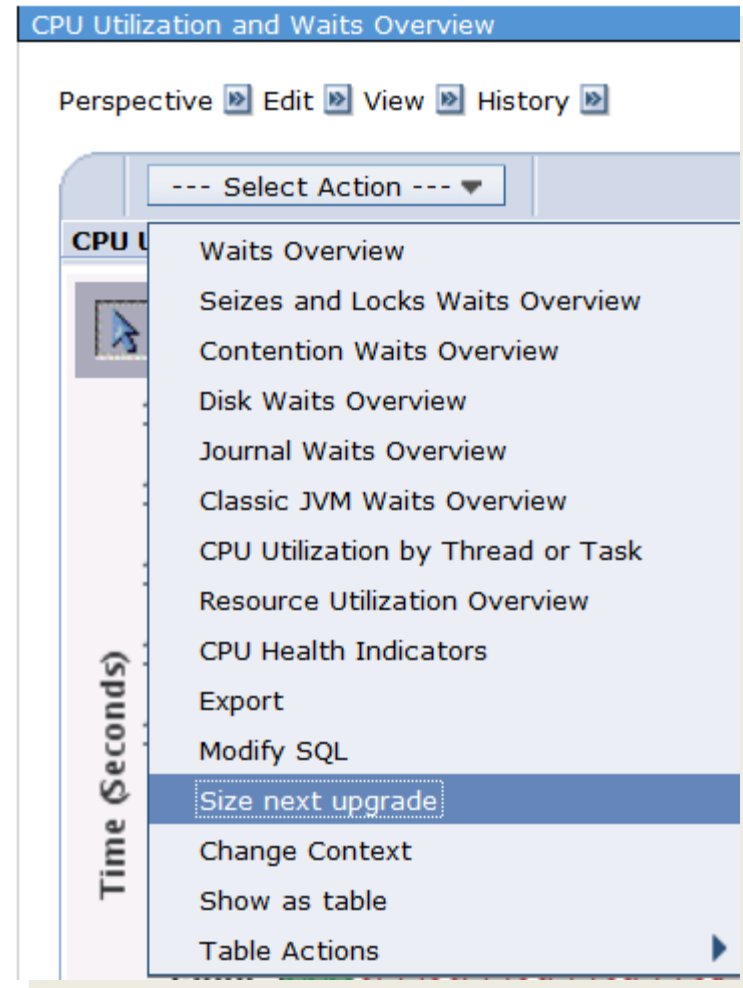
Size Next Upgrade



Send data directly to the IBM Workload Estimator

Takes the measured data from Collection Services and inputs it to the IBM Workload Estimator (WLE)

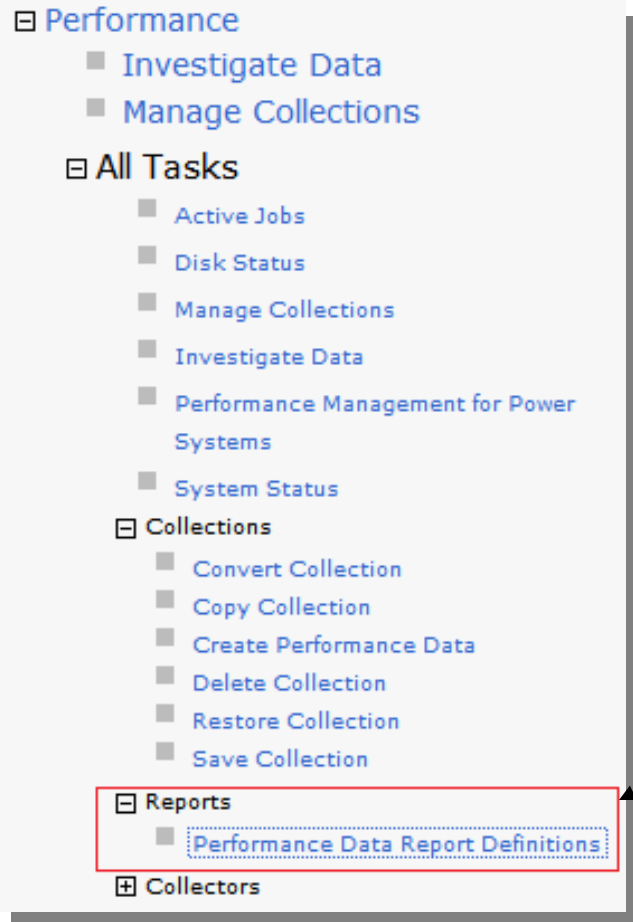
Intended for a one-time sizing activity



Performance Data Reports

“Executive” Reports

- Create a group of printed or online graphs of performance perspectives.
- Generate a PDF or zip file containing the requested graphs for the collection
- Use for weekly reports



Create Performance Data Report

Start here with Reports ->
Performance Data Report Definitions

http://ibmsystemsmag.blogs.com/i_can/2013/05/performance-reports-with-the-performance-data-investigator.html

Report Definitions

Performance Data Report Definitions -

Filter

<input type="checkbox"/>	Name	Description
	No filter applied	
<input type="checkbox"/>	Health Indicators	A predefined performance
<input type="checkbox"/>	System Overview	A predefined performance
<input type="checkbox"/>	Resource Consumption	A predefined performance

Create Performance Data Report

Report definition: System Overview

Output type: PDF

Collection: Most Recent

Library: QPFRDATA

Type: Collection Services File Based Collection

OK Cancel

Create your own Report Definition

Performance Data Report Definitions - Etc3t1.rchland.ibm.com

Add Performance Data Report Definition

Add Performance Data Report Definition

Name:

Description:

Perspectives

Select	Perspective	Package
<input type="checkbox"/>	None	

Collection

Collection: Most Recent

Library: QPFRDATA

Type:

Cover Page

Title:

Report definition name

Date created

Perspectives

Collection name

Performance Data Report Definitions - Etc3t1.rchland.ibm.com

Actions

- New
 - Add Performance Data Report Definition...
- Refresh
- Advanced Filter
- Export
 - A predefined performance
- Configure Options
 - A predefined performance

Name	Description
No filter applied	
Health Indica	A predefined performance
System Ove	A predefined performance
Resource C	A predefined performance

Add Performance Data Report Definition

Add Perspective

Filter

Collection name: CS228229ND (*.CSFILE)

Library: COMMON

Perspectives

- Database
- Collection Services
 - CPU Utilization and Waits Overview
 - Resource Utilization Overview
 - Job Statistics Overviews
 - Waits
 - CPU
 - Disk
 - Physical Disk I/O
 - Synchronous Disk I/O

Add Performance Data Report Definition

Add Performance Data Report Definition

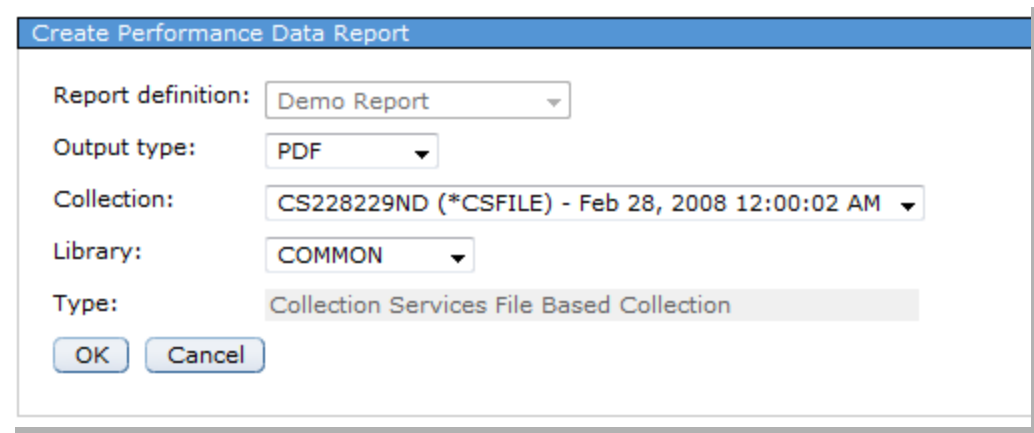
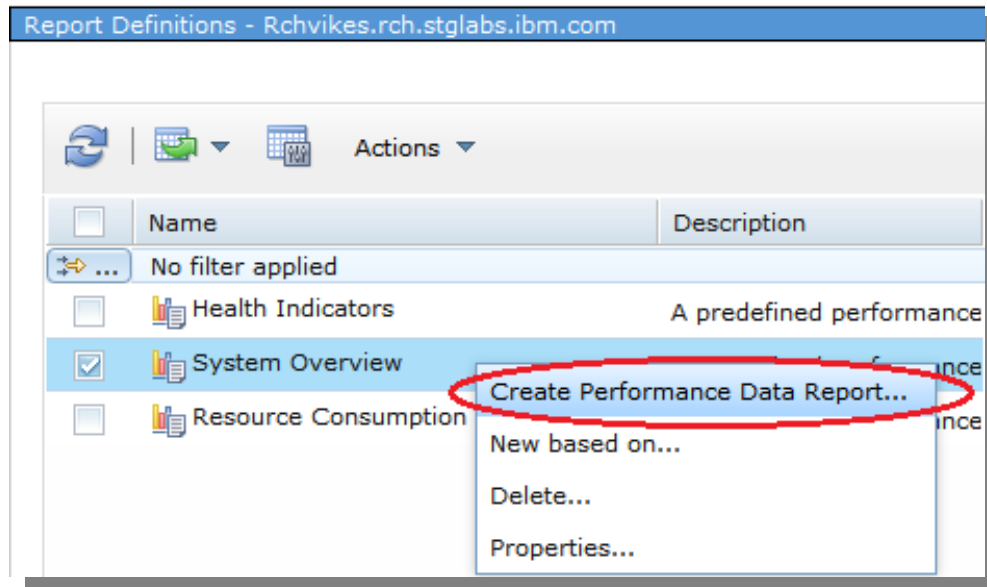
Name: Demo Report

Description: Report prepared for my presentation

Perspectives

Select	Perspective	Package
<input type="checkbox"/>	CPU Utilization and Waits Overview	Collection Services
<input type="checkbox"/>	Page Faults Overview	Collection Services
<input type="checkbox"/>	Synchronous Disk I/O Overview	Collection Services

Create Performance Data Report



Resulting Report (PDF example)

Feb 28, 2013 10:03:43 AM

Performance data report definition:

Demo Report

Report title:

Example Report based upon COMMON performance collection

Perspectives included in report:

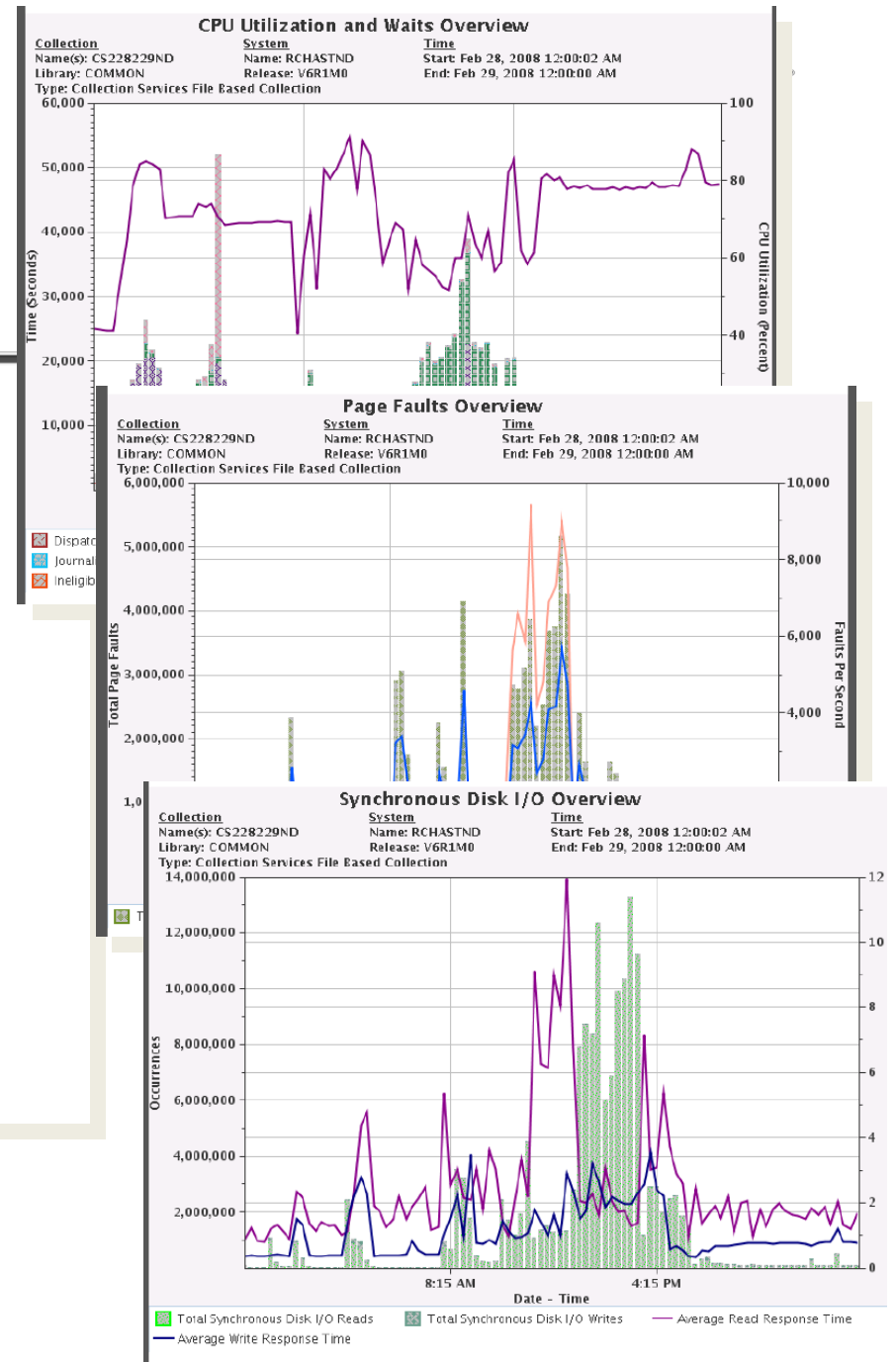
CPU Utilization and Waits Overview

Page Faults Overview

Synchronous Disk I/O Overview

Library/Collection used for report:

Common/Cs228229nd



Integration with Active Jobs

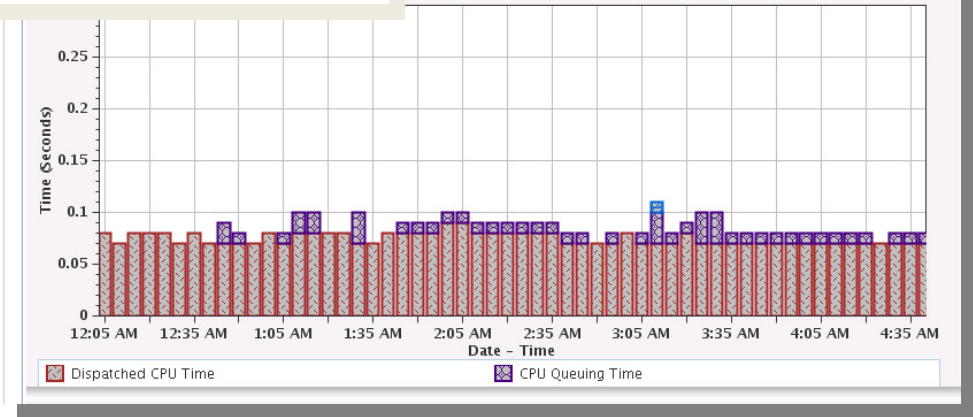
<input type="checkbox"/>	Qzdas01M1	Waiting for time interval	Qsecorr
<input checked="" type="checkbox"/>	Qzdas01M1	Waiting for time interval	Dmmay
<input type="checkbox"/>		Waiting for time interval	Dmmay
<input type="checkbox"/>		Waiting for time interval	Dmmay
<input type="checkbox"/>		Waiting for time interval	Qwqadmin
<input type="checkbox"/>		Waiting for time interval	Qwqadmin
<input type="checkbox"/>		Waiting for time interval	Qwqadmin
<input type="checkbox"/>		Waiting for time interval	Dmmay
<input type="checkbox"/>		Waiting for time interval	Dmmay

5 | 10 | 25 | 50 | **100** | All

- Reset Statistics
- Printer Output
- Job Log
- Details
- Reply...
- Hold...
- Release
- Move...
- Delete/End...
- Performance
 - Elapsed Performance Statistics
 - Investigate Job Wait Data
 - Start Job Watcher
- Properties

System

Oct 1, 2009 12:00:06 AM Name: ISZ1LP13
 Ongoing Release: 1/701MN



Integration with System Status



System Status - €

Last refresh: 3/8/13 12:46:53 PM

General	Jobs
Jobs	Total: 4,537
Processors	Active: 262
Memory	Addresses used
Disk Space	Permanent: 0.010 %
Addresses	Temporary: 0.022 %
	Total disk space: 95.44 GB
	System disk pool
	Capacity: 95.44 GB
	Usage: 79.118 %

[System Resources Health Indicators](#)

System Status - €

Last refresh: 3/8/13 12:46:53 PM

General	Total memory: 4,096.00 MB
Jobs	Active Memory Pools
Processors	Memory Pools Health Indicators
Memory	
Disk Space	
Addresses	

System Status

Last refresh: 3/8/13 12:46:53 PM

General	CPU usage (elapsed): 0.0 %
Jobs	Type of processors: Shared - uncapped
Processors	Processing power: 0.20 processing units
Memory	Virtual processors: 2
Disk Space	Interactive performance: 0 %
Addresses	Shared processor pool usage (elapsed): 0.0 %
	Uncapped CPU capacity pool usage (elapsed): 0.0 %

[CPU Health Indicators](#)

System Status - €

Last refresh: 3/8/13 12:46:53 PM

General	Total disk space: 95.44 GB
Jobs	System disk pool
Processors	Capacity: 95.44 GB
Memory	Usage: 79.118 %
Disk Space	Temporary storage used
Addresses	Current: 8,407 MB
	Maximum since last system restart: 8,435 MB

[Disk Status](#)

[Storage System Values](#)

[Disk Health Indicators](#)

Integration with Disk Status



Disk Status - Z:

Refresh Elapsed time: 00:00:00

Actions

- Investigate Disk Data
- Start Disk Watcher
- Reset Statistics
- Columns...
- Refresh
- Advanced Filter
- Export
- Configure Op

Unit	Size (MB)	% Used	% Busy
1	69,794	75.7	0

Collection

Collection	Time	System
Name(s): Q067000002	Start: Mar 8, 2013 12:00:02 AM	Name: Z1433DP1
Library: QPFRDATA	End: Ongoing	Release: V7R1M0
Type: Collection Services File Based Collection		
File level: 36		

Average Response Time

Disk Unit Name	Average Response Time (ms)
0003	0.82
0004	0.75
0002	0.68
0001	0.62

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Set Target System

Welcome dmmay

Target system:
ctcweb54.rchland.ibm.com
Mysystem



Target system: localhost

IBM® Navigator for i

Welcome

IBM i Management

Set Target System

System

You can now connect to one partition, but manage a different partition.

Allows you to manage 5.4 and 6.1 partitions.

Welcome x Set Target System x

Set Target System

Your target system can be the local system where you are running IBM Navigator for i, or you can specify a different system to manage.

Select the system you want to manage, then press OK.

Select	System Name	Release	User
<input type="radio"/>	ctcweb54.rchland.ibm.com	v6r1m0	Dmmay
<input type="radio"/>	ctcweb54.rchland.ibm.com	v7r1m0	Dmmay
<input checked="" type="radio"/>	ctcweb54.rchland.ibm.com	v5r4m0	Dmmay
<input type="radio"/>	another.rchland.ibm.com	v7r1m0	Dmmay

Page 1 of 1 1 Go Rows 4 Total: 4 Selected: 1

OK Cancel

Add
Remove
Change



Investigate Data Database

Need latest PTF groups, including the database group, for this support
Must have the Performance Tools LPP, Manager feature, Installed

Available on both IBM i 6.1 and 7.1

Integration with Database



- Leverage the capabilities of PDI with valuable data gathered from database
 - PDI charting of
 - SQL Plan Cache Snapshots and Event Monitors
 - SQL Performance Monitor files
- Collection Services added collection of job-level SQL metrics
- Visual charts and/or tables in PDI that are focused on database related metrics
- Navigation between database and performance tasks

Database Perspectives

Investigate Data - Performance Data Investigator

Perspectives	Selection
<input type="checkbox"/> Performance Explorer	
<input type="checkbox"/> Disk Watcher	
<input type="checkbox"/> Job Watcher	
<input type="checkbox"/> Health Indicators	
<input type="checkbox"/> Collection Services	
<input checked="" type="checkbox"/> Database	

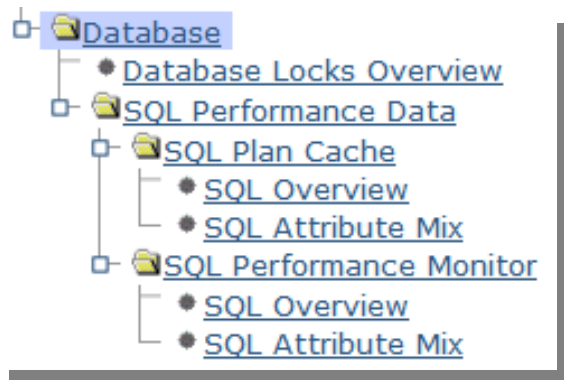
Collection

Collection Library:
 Collection Name:

Integration with Database – package overview

Database Package for 6.1

- Database Locks Overview
- SQL Performance Data
 - SQL Plan Cache Snapshots and Event Monitors
 - SQL Performance Monitor

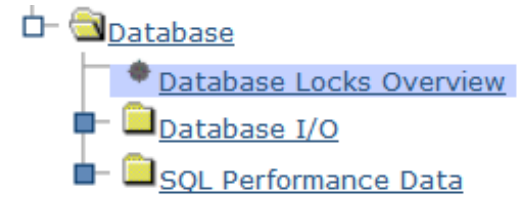


Database Package for 7.1

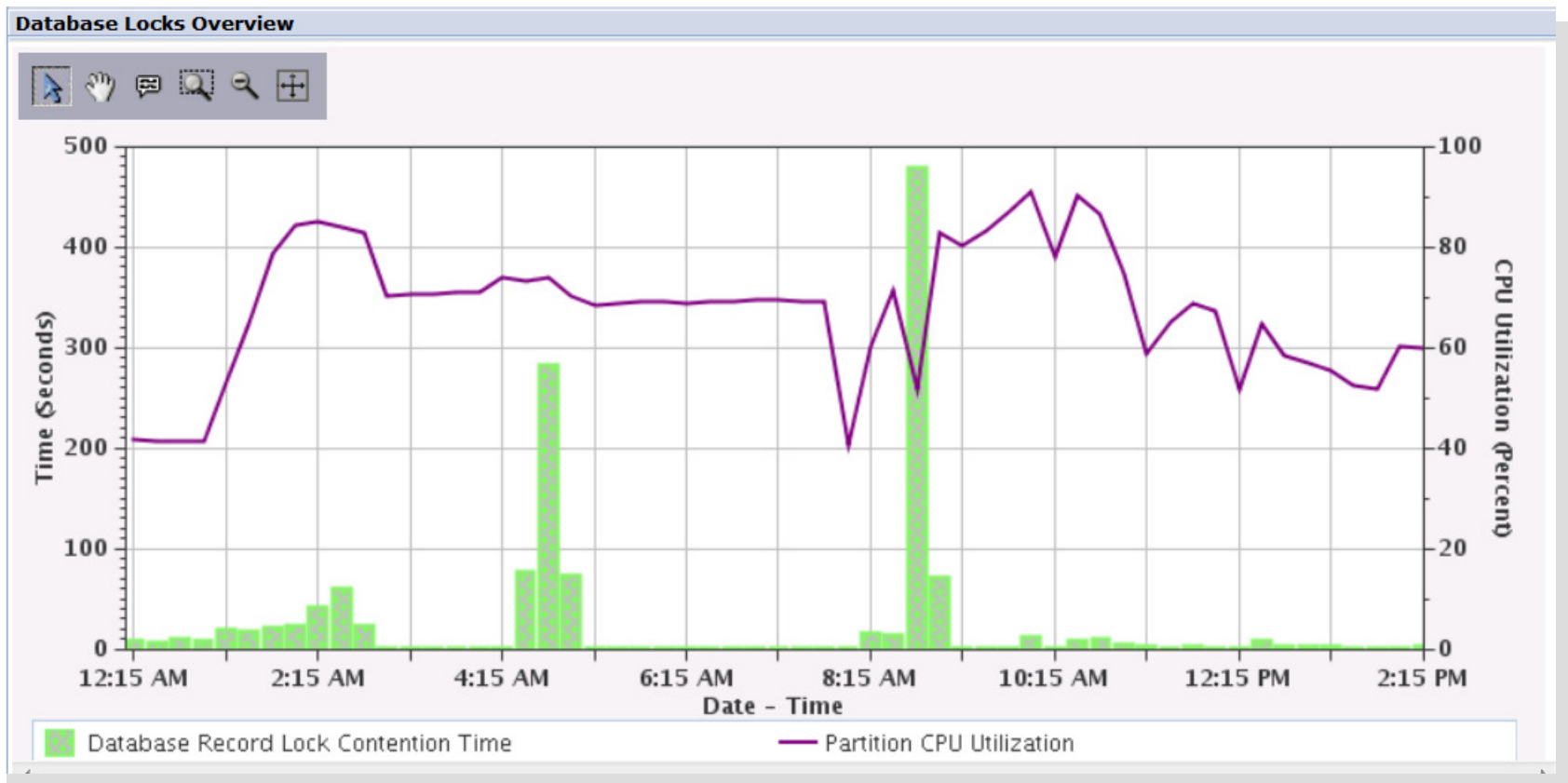
- Database Locks Overview
- Physical Database I/O
 - Utilizes Job Level SQL Metrics
- SQL Performance Data
 - SQL Plan Cache Snapshots and Event Monitors
 - SQL Performance Monitor



Database Locks Overview



- The database locks overview gives you a graph of database record lock contention
- It is based on Collection Services data



Job-Level Database Statistics

The following metrics have been added to the job performance data *JOBMI category of Collection Services in 7.1

- SQL clock time (total time in SQ and below) per thread (microseconds)
- SQL unscaled CPU per thread (microseconds)
- SQL scaled CPU per thread (microseconds)
- SQL synchronous database reads per thread
- SQL synchronous nondatabase reads per thread
- SQL synchronous database writes per thread
- SQL synchronous nondatabase writes per thread
- SQL asynchronous database reads per thread
- SQL asynchronous nondatabase reads per thread
- SQL asynchronous database writes per thread
- SQL asynchronous nondatabase writes per thread
- Number of high level SQL statements per thread

- Special instructions to activate the support

<https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/IBM%20i%20Technology%20Updates/page/Job%20Level%20SQL%20Metrics>

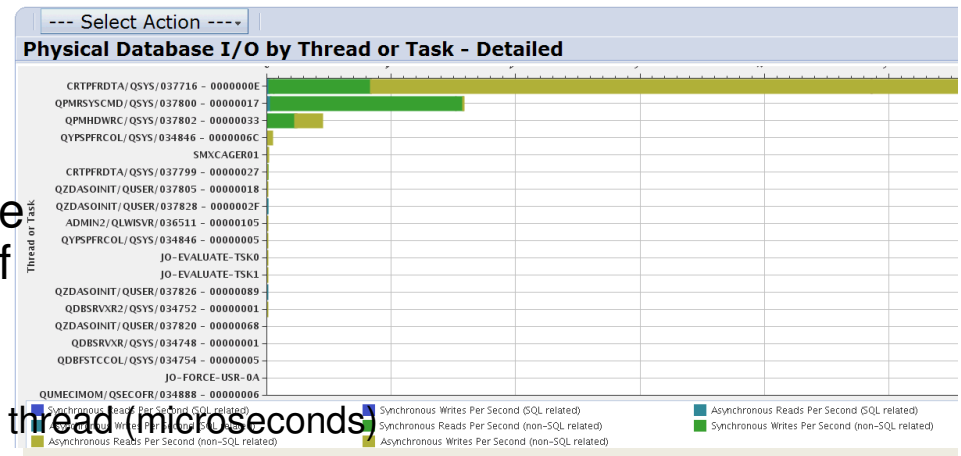
- Error if you try to display one of these charts but have not activated the support:



Chart error

Chart is blank due to an SQL query error. [SQL0206] Column or global variable JBSQLADBW not found. To add the missing field to the collection, update the collection library files to the most recent version.

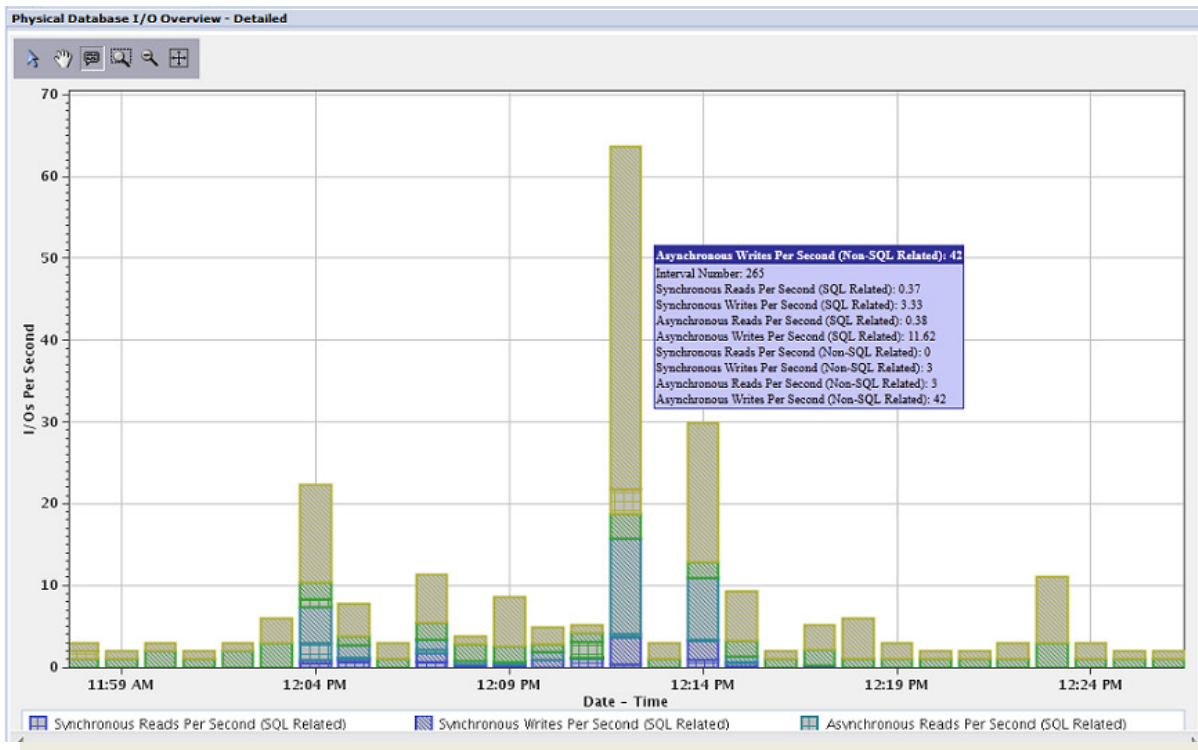
[Close Message](#)



Database – Physical Database I/O

Available on 7.1 only

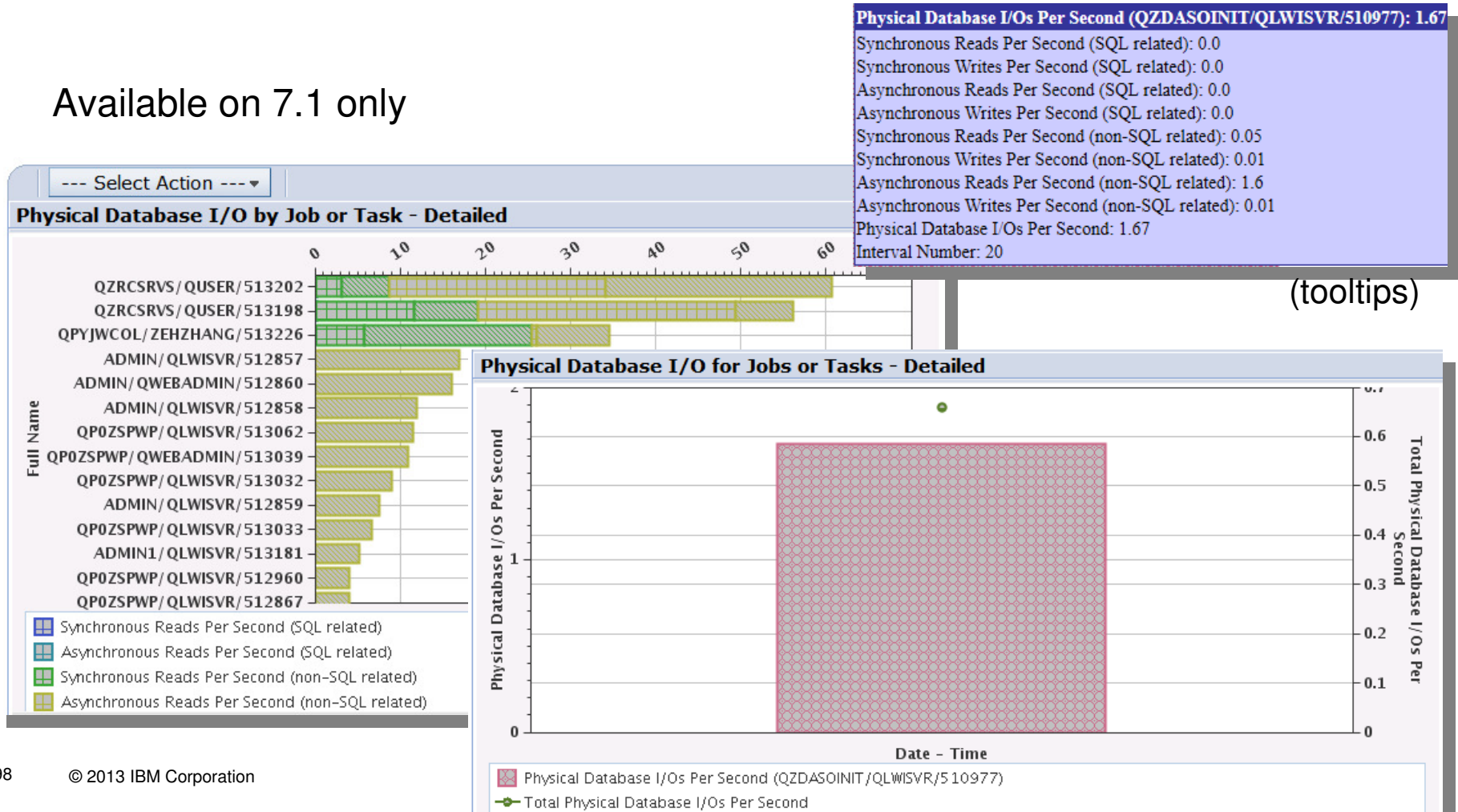
- Database
 - Database I/O
 - Physical I/O
 - Detailed Views
 - Physical Database I/O Overview - Detailed
 - Physical Database I/O by Job or Task - Detailed
 - Physical Database I/O by Thread or Task - Detailed
 - Physical Database I/O by Generic Job or Task - Detailed
 - Physical Database I/O by Job User Profile - Detailed
 - Physical Database I/O by Job Current User Profile - Detailed
 - Physical Database I/O by Subsystem - Detailed
 - Physical Database I/O by Server Type - Detailed



Job-Level Database Statistics

- Ten new perspectives (8 on perspective list plus 2 drilldowns)
 - Physical Database I/O for Jobs or Tasks - Detailed
 - Physical Database I/O for One Job or Task - Detailed

Available on 7.1 only



Integration with Database

Launch from the Database list with Investigate Performance Data

Launch from iNav client

SQL Performance Monitors - Z1433dp1

Database: Zh22dp1

Name	Type	Status
No filter applied		
amonitor2	Detailed	Ended
<input checked="" type="checkbox"/> amonitor3	Detailed	Ended
as		Imported
asmalltest		
asum		

Context menu for amonitor3:

- End
- Analyze...
- Investigate Performance Data...

SQL Plan Cache Event Monitors - Z1433dp1

Database: Zh22dp1

Name	Status	Schema
No filter applied		
myeventmon1	Ended	FLANAGAN
<input checked="" type="checkbox"/> SQL Plan Cache Event		PDITESTLIB
SQL Plan Cache PDI		ZZLIB

Context menu for SQL Plan Cache Event:

- End
- Analyze...
- Investigate Performance Data...

SQL Plan Cache Snapshots - Z1433dp1

Database: Zh22dp1

Name	Schema
No filter applied	
asmalltest2	QGPL
<input checked="" type="checkbox"/> kxkSnapshot	ZZLIB
lrp1	LRP
my snap1	

Context menu for kxkSnapshot:

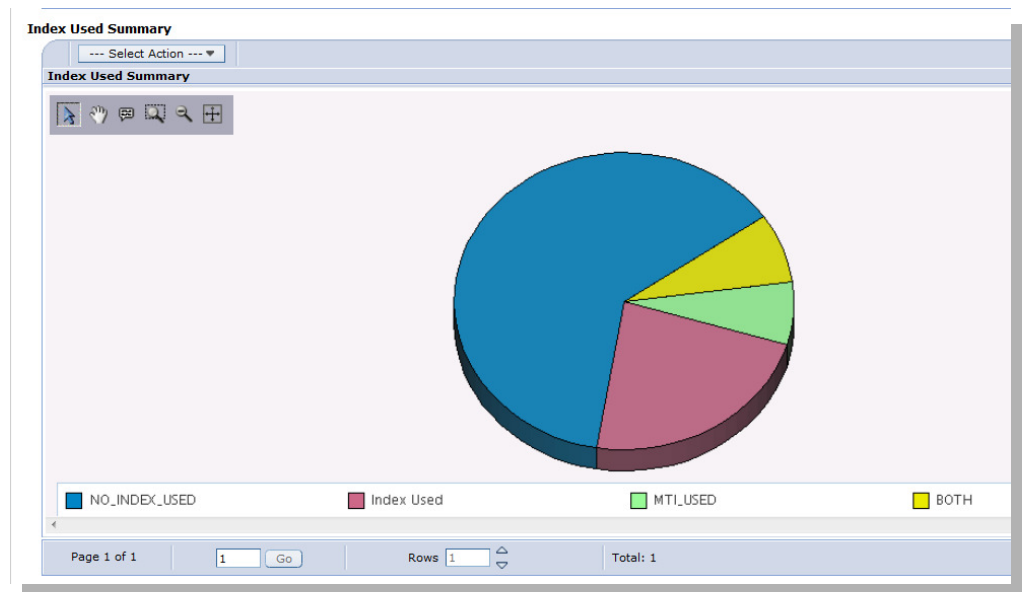
- Analyze...
- Investigate Performance Data...

SQL Overview

Several graphs:

- Query time summary
- Open summary
- Open type summary
- Statement usage summary
- Index used summary
- Index create summary
- Index advised
- Statistics advised
- MQT use
- Access plan use
- Parallel degree usage

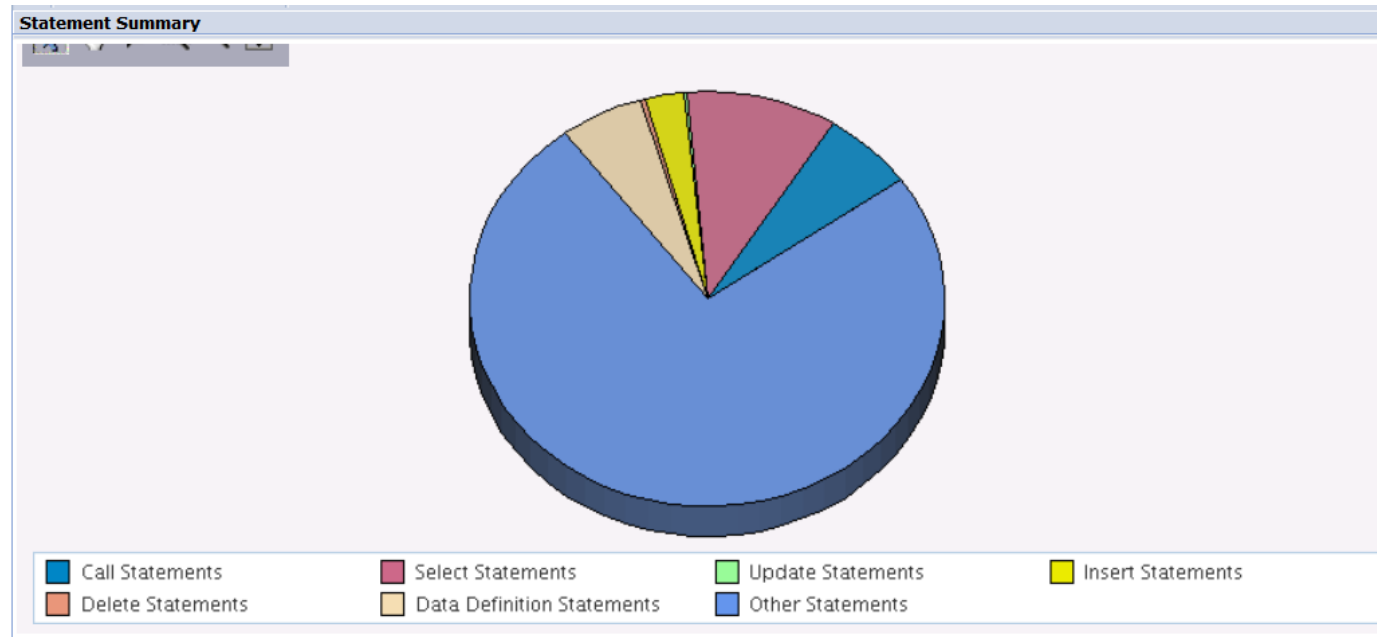
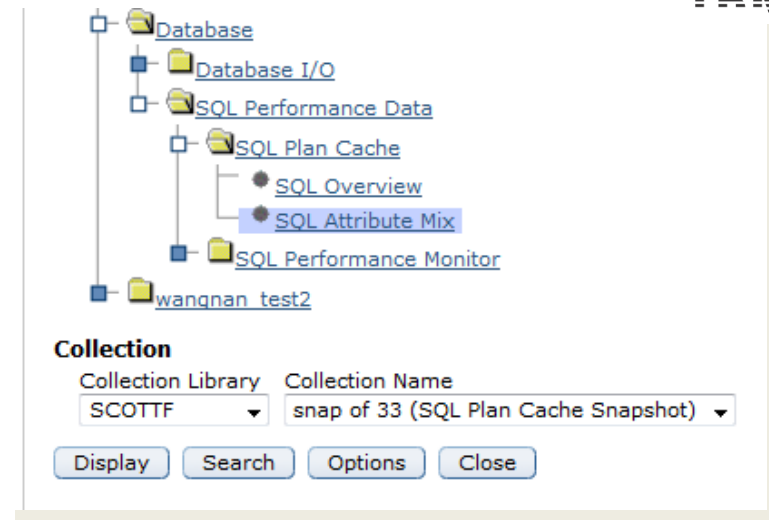
The screenshot shows the Performance Data Investigator (PDI) interface. The title bar reads "Investigate Data - Performance Data Investigator". On the left, a tree view under "Database" shows "SQL Performance Data" expanded to "SQL Plan Cache", with "SQL Overview" selected. On the right, the "Selection" pane shows "Name: SQL Overview" and "Description: This perspective gives a comprehensive picture of how queries are running overall." Below this, the "Collection" pane shows "Collection Library: DMMLIB" and "Collection Name: Plan Cache Snapshot for PDI (SQL Plan Cache Snapshot)". Buttons for "Display", "Search", "Options", and "Close" are visible at the bottom.



SQL Attribute Mix

Several graphs:

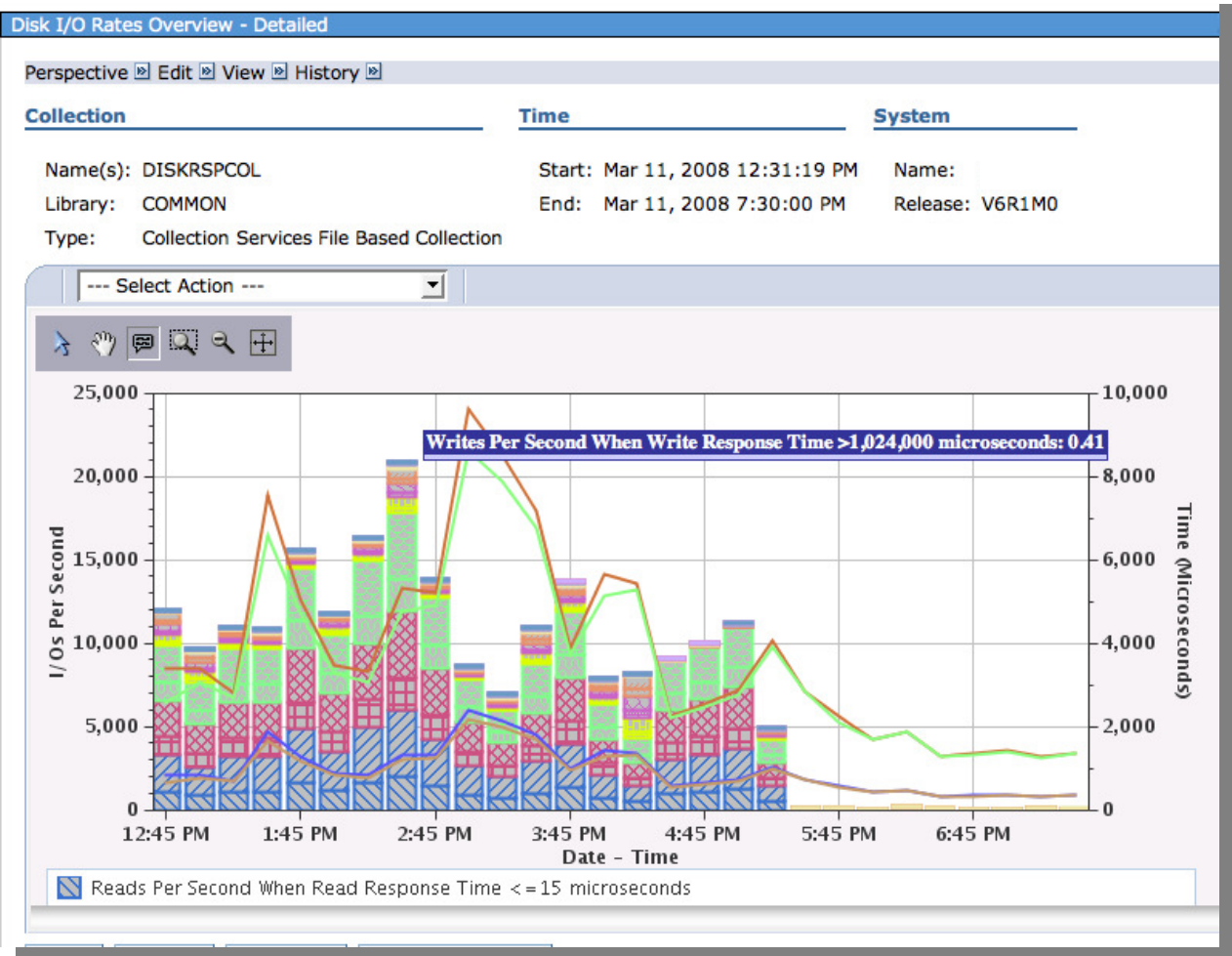
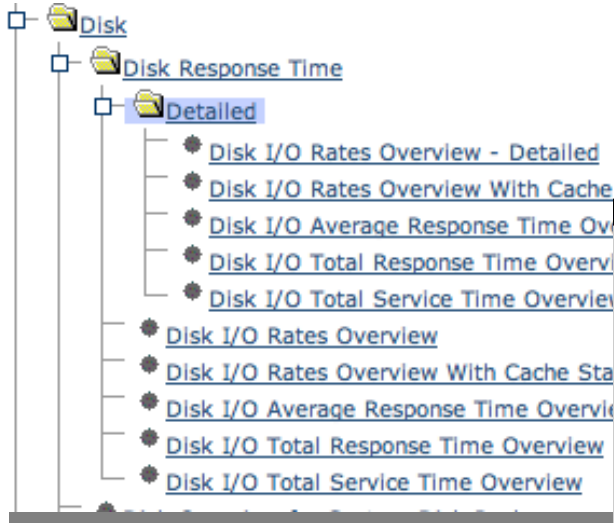
- Statement summary
- Statement type summary
- Isolation level summary
- Allow copy data summary
- Sort sequence summary
- Close cursor summary
- Naming summary
- Optimization goal
- Blocking summary



Investigate Data

7.1 Features (not available on 6.1)

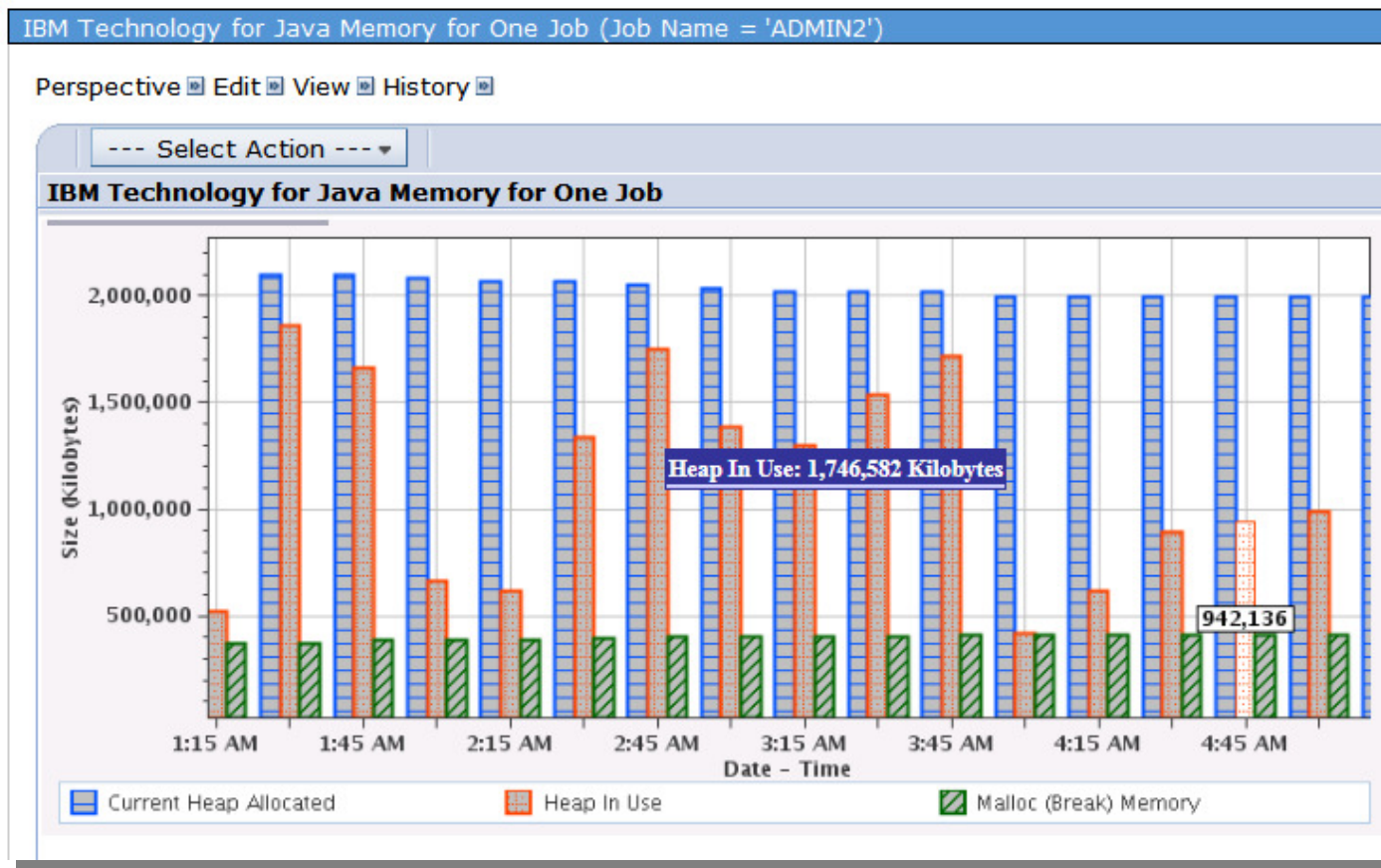
Disk Response Time Charts



A very easy interface to see if you have slow disk operations

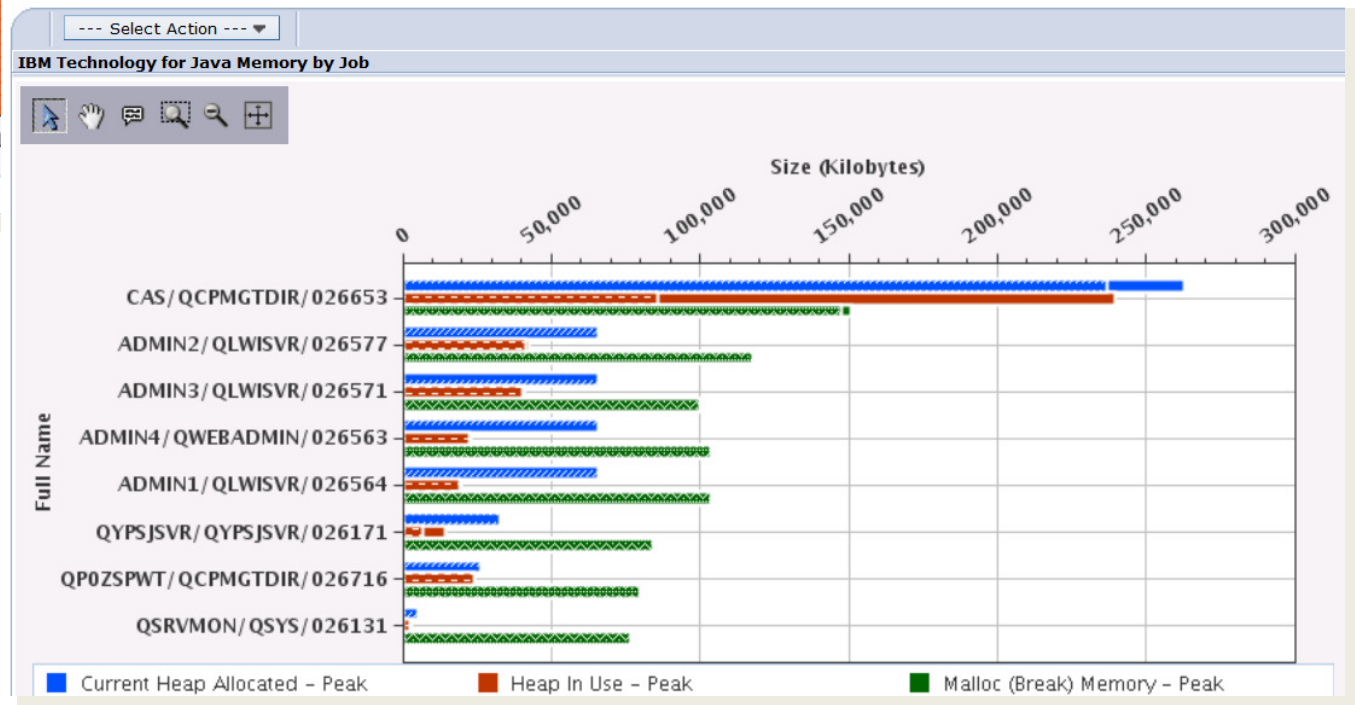
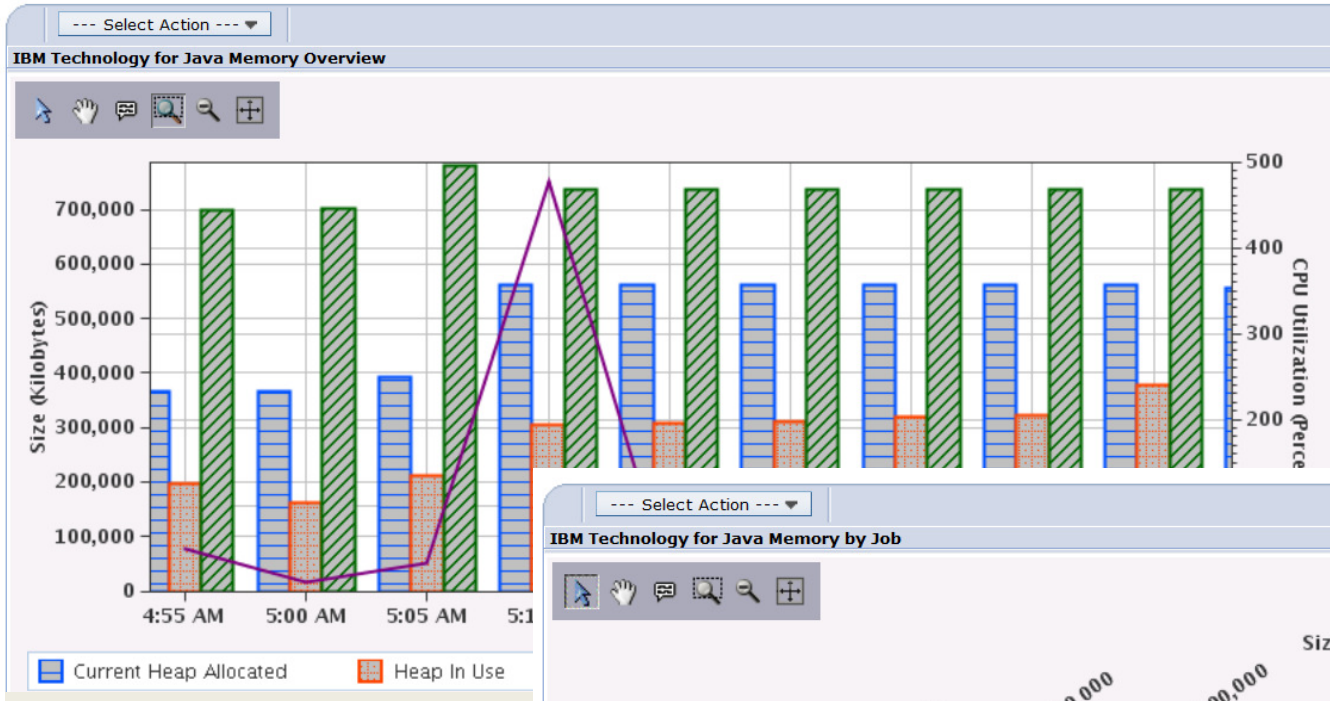
Java Perspectives

Drilldown for one job - Look at the heap and memory usage over time for one selected job.

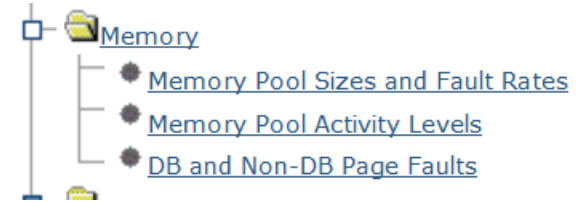


IBM Technology for Java Memory for One Job

Java Perspectives



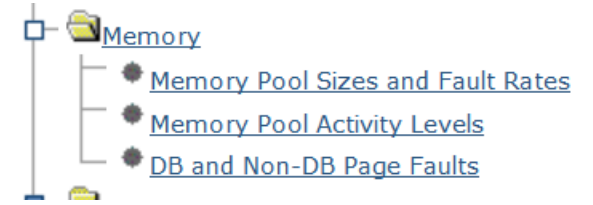
Memory



- Memory perspectives are now available
- Similar information from what you get on WRKSYSSTS....

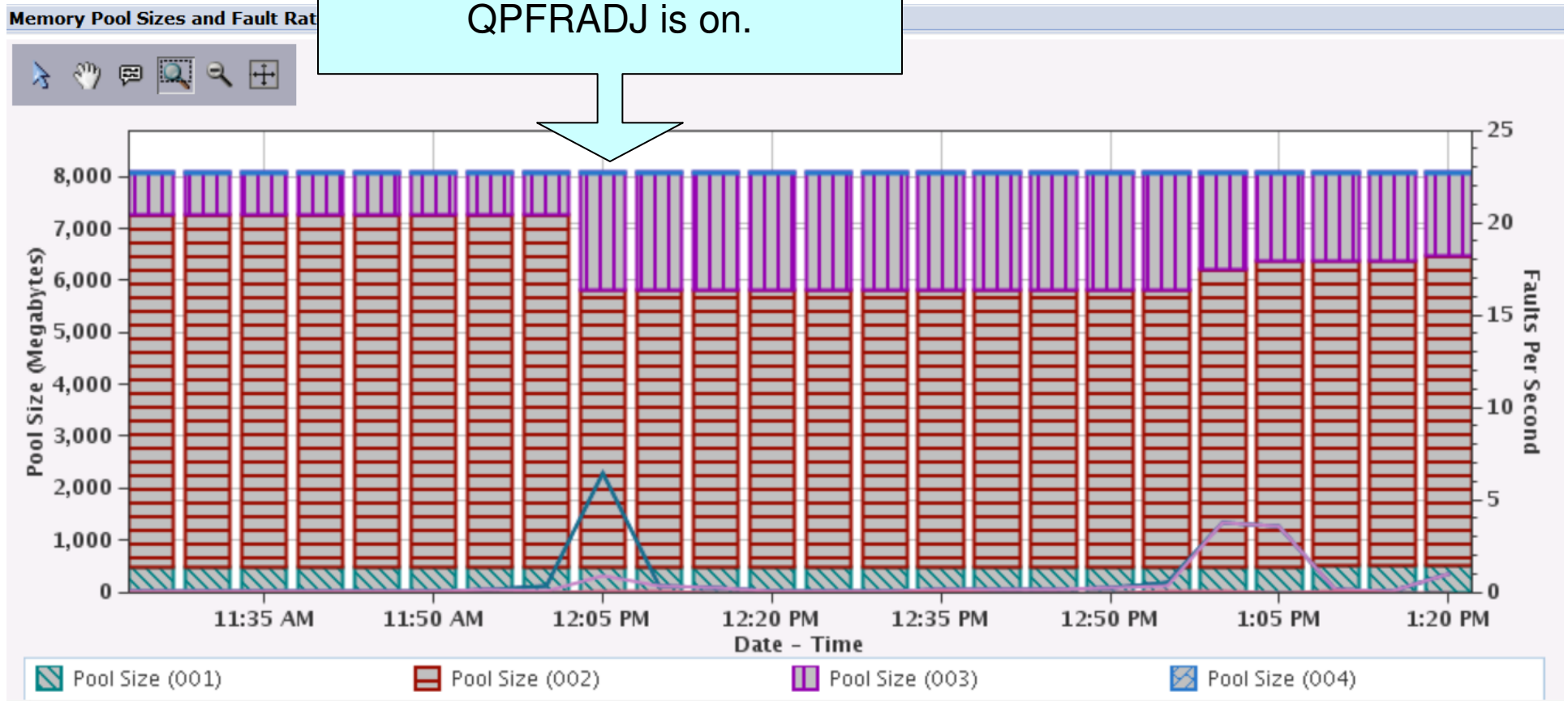
System Pool	Pool Size (M)	Reserved Size (M)	Max Active	-----DB-----	Pages	---Non-DB---	Pages
1	<u>490.59</u>	247.83	+++++	.0	.0	.0	.0
2	<u>5344.71</u>	6.07	<u>149</u>	.0	.0	.0	.0
3	<u>2283.44</u>	.00	<u>203</u>	.0	.0	12.3	29.0
4	<u>.25</u>	.00	<u>5</u>	.0	.0	.0	.0

Memory



- In a graphical view!

Note the change in pool sizes. QPFRADJ is on.



Memory Charts

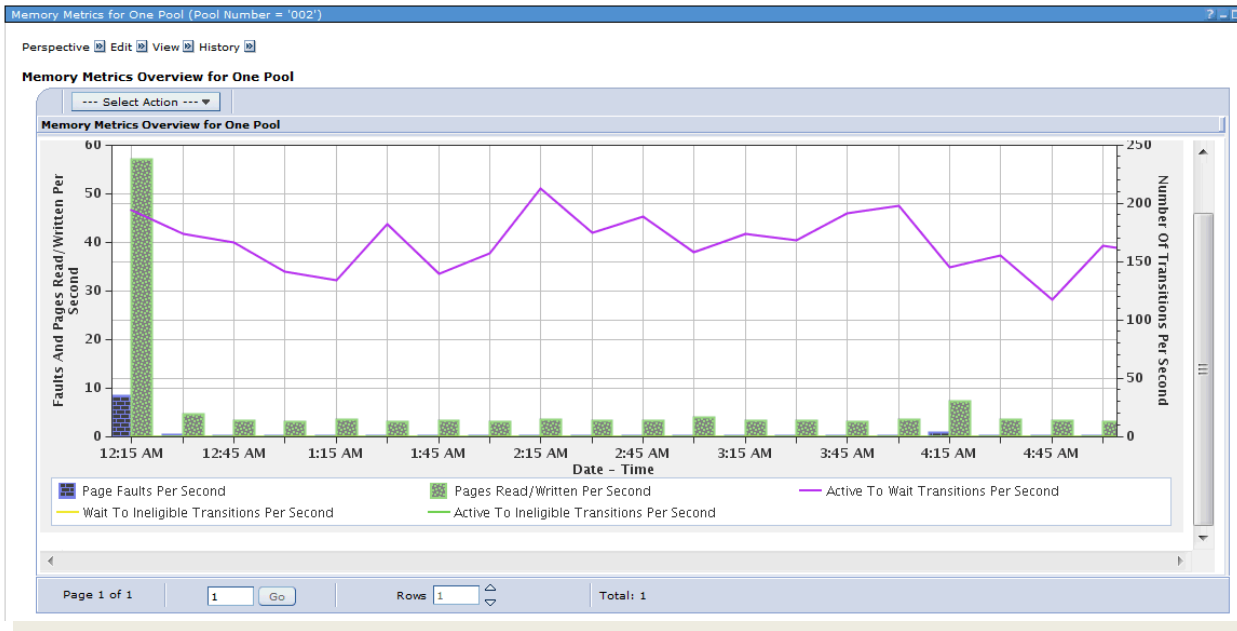
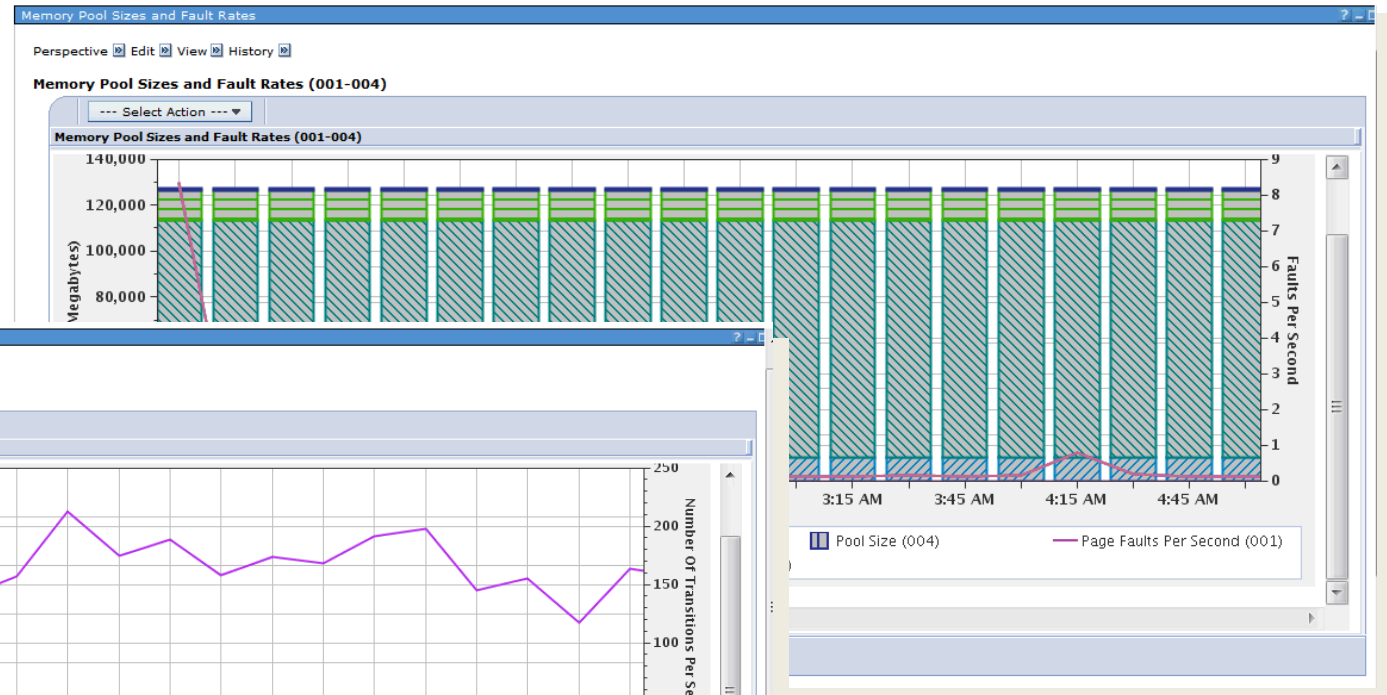
3 views or charts in each perspective

- **Memory Pool Sizes and Fault Rates**
 - View 1: Memory Pool Sizes and Fault Rates (001-004)
 - View 2: Memory Pool Sizes (All Pools)
 - View 3: Fault Rates (All Pools)
- **Memory Pool Activity Levels**
 - View 1: Memory Pool Activity Levels and Ineligible Transitions Per Second (001-004)
 - View 2: Memory Pool Activity Levels (All Pools)
 - View 3: Ineligible Transitions Per Second (All Pools)
- **DB and Non-DB Page Faults**
 - View 1: DB and Non-DB Page Faults Overview (All Pools)
 - View 2: DB Page Faults (All Pools)
 - View 3: Non-DB Page Faults (All Pools)
- Drilldown:
 - **Memory Metrics for One Pool**
 - View 1: Memory Metrics Overview for One Pool
 - View 2: DB and Non-DB Page Faults for One Pool
 - View 3: DB and Non-DB Pages Read/Written for One Pool

Memory Perspectives

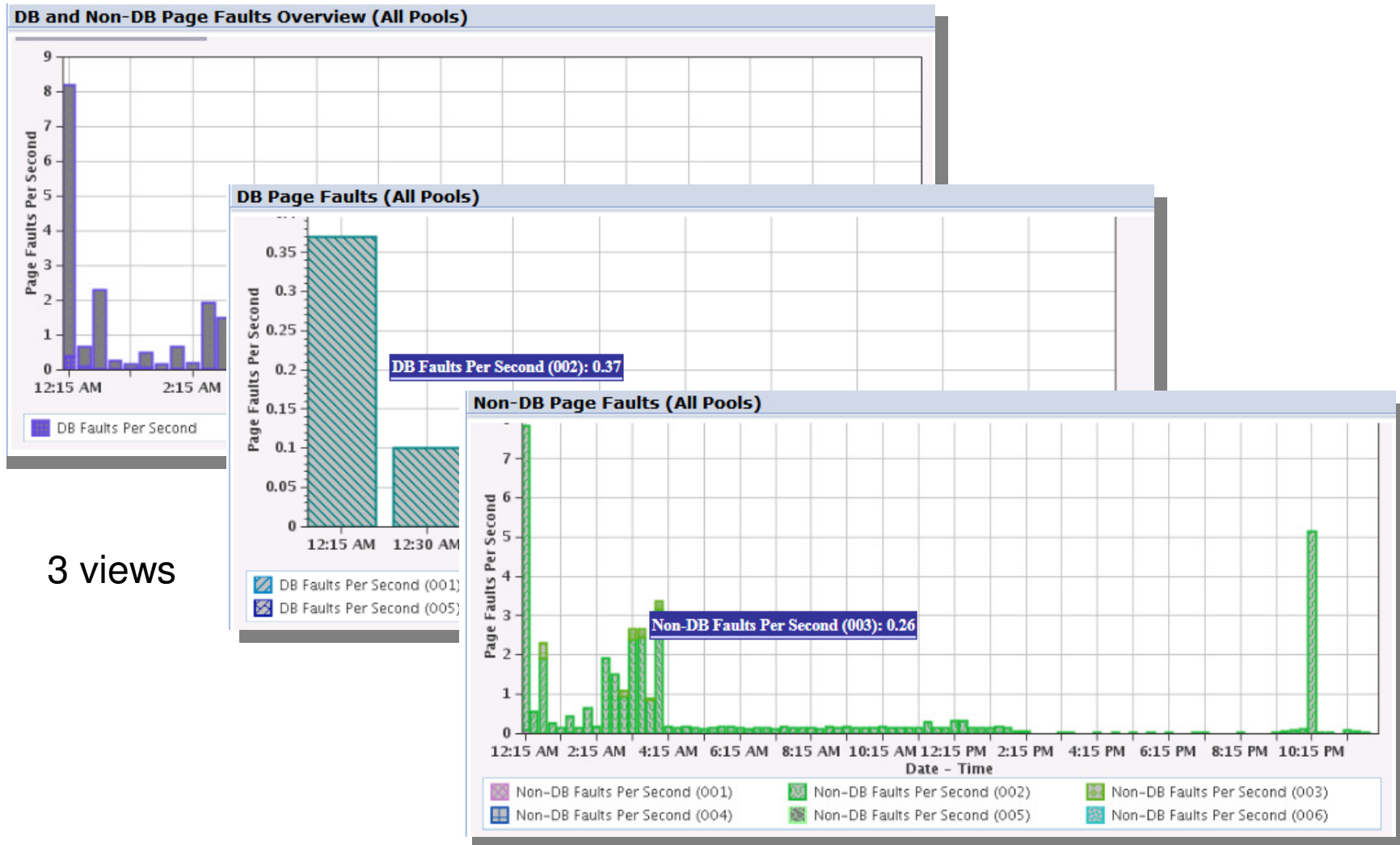
Memory Pool Sizes and Fault Rates –
View one: (Pools 001-004)

- Memory
 - Memory Pool Sizes and Fault Rates
 - Memory Pool Activity Levels
 - DB and Non-DB Page Faults



Memory Pool Activity Levels –
View one: Memory
metrics overview for one
pool

Memory Perspectives – DB and non-DB Page Faults



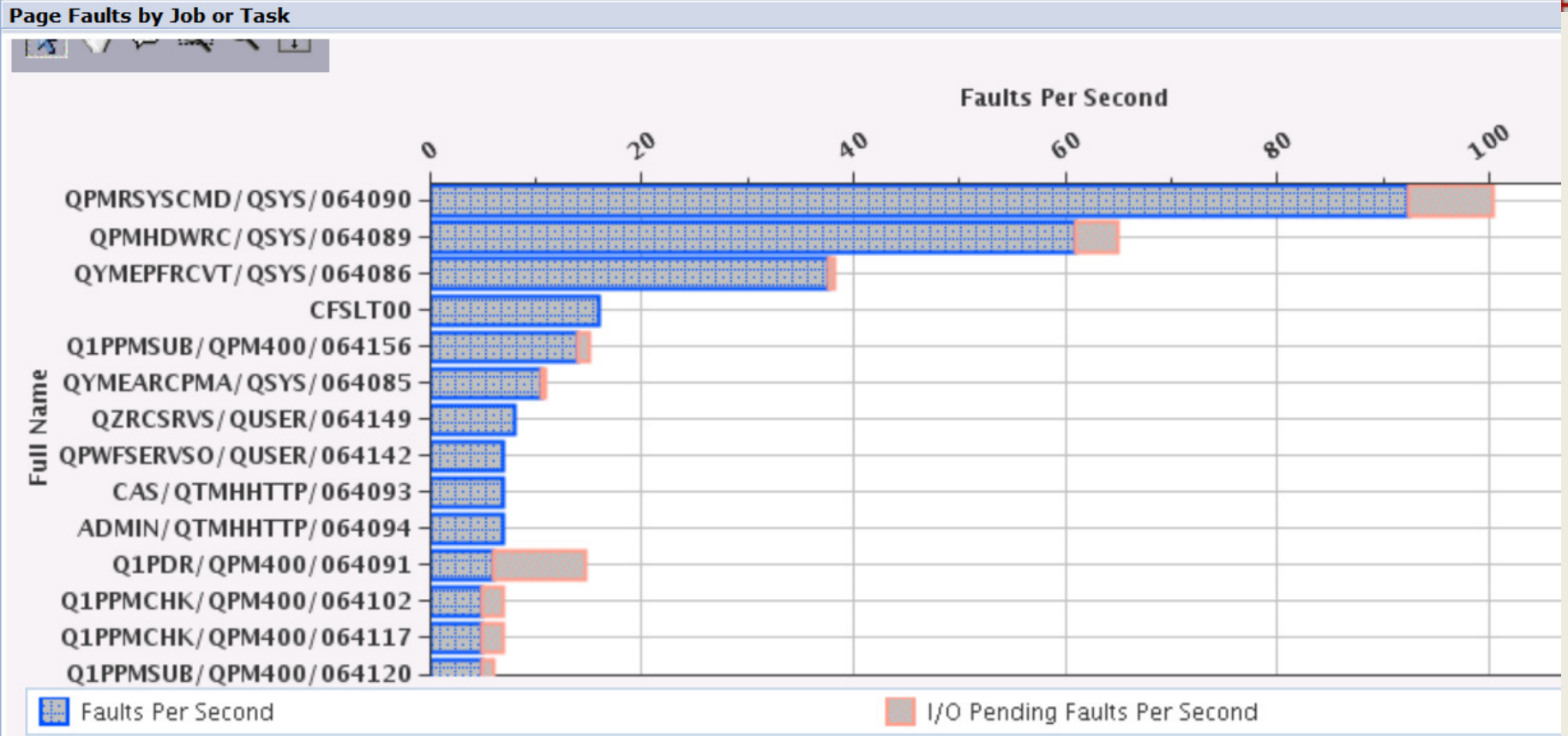
3 views

Memory - Drilldown

Memory Pool Sizes and Fault Rates (001-004)

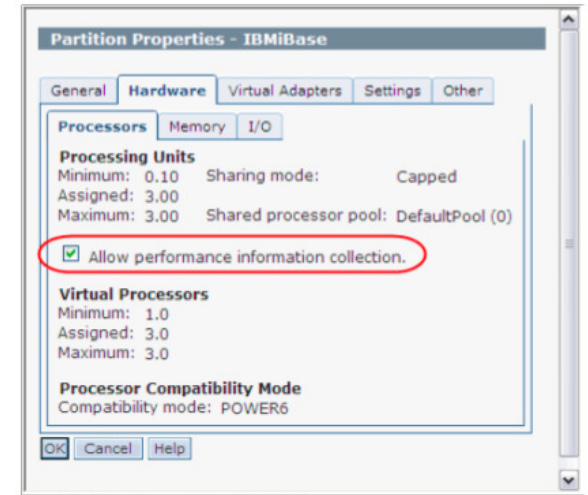
--- Select Action --- ▼

- Memory Metrics for One Pool
- Memory Pool Activity Levels
- DB and Non-DB Page Faults
- Page Faults by Job or Task**
- Waits by Pool
- Disk Waits Overview
- Memory Pools Health Indicators
- Export



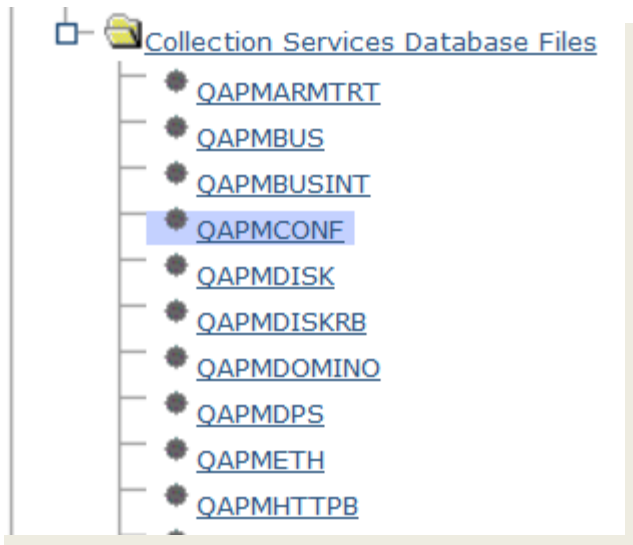
12X Bus Utilization

- Collection Services collects utilization data for 12X buses
 - QAPMBUSINT file
<http://pic.dhe.ibm.com/infocenter/series/v7r1m0/topic/rzahx/rzahxqapmbusint.htm>
 - There are currently no graphs shipped with PDI to view this data
 - But you can extend PDI with a custom content package to view this data
<http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4957>
 - Enable Performance information collection on the HMC
 - Install the custom content package to enable additional graphs on the 12X utilization data



Display Collection Services DB Files

.... QAPMCONF



QAPMCONF

Perspective Edit View History

Collection	Time	System
Name(s): Q067000002	Start: Mar 8, 2013 12:00:02 AM	Name: ETC3T1
Library: QPFRDATA	End: Ongoing	Release: V7R1M0
Type: Collection Services File Based Collection		
File level: 36		

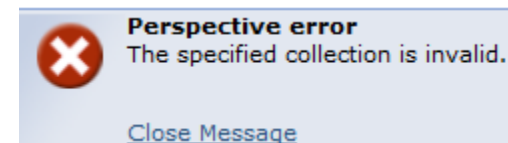
QAPMCONF Panel View

Library Name:	QPFRDATA	Processor Firmware Time:	No
Member Name:	Q067000002	Task Threshold Value (ms):	1,000
Start Time:	Mar 8, 2013 12:00:02 AM	Secondary Thread Thresh (ms):	1,000
Model Number:	61X	Disk Response Time Boundary 1 (us):	15
System Type:	7998	Disk Response Time Boundary 2 (us):	250
Partition Memory (KB):	4194304	Disk Response Time Boundary 3 (us):	1,000
Comm Data Collected:	Y	Disk Response Time Boundary 4 (us):	4,000
Machine Serial Number:	10-065FA	Disk Response Time Boundary 5 (us):	8,000
Response Time Boundary 1 (ms):	1000	Disk Response Time Boundary 6 (us):	16,000
Response Time Boundary 2 (ms):	2000	Disk Response Time Boundary 7 (us):	64,000
Response Time Boundary 3 (ms):	4000	Disk Response Time Boundary 8 (us):	256,000
Response Time Boundary 4 (ms):	8000	Disk Response Time Boundary 9 (us):	500,000
System ASP Capacity (KB):	93,206,752	Disk Response Time Boundary 10 (us):	1,024,000
Checksum Protection On:	N	Hypervisor Memory (MB):	640
Virtual Processors:	2	SMT Hardware Threads:	0
Installed Processors:	4	Time Interval (minutes):	5
Remote Response Boundary 1 (ms):	-	Interactive Limit (%):	100.00
Remote Response Boundary 2 (ms):	-	Time Interval (seconds):	300
Remote Response Boundary 3 (ms):	-	Interactive Threshold (%):	100.00
System ASP Capacity (KB):	93,206,752	Processor Multi-tasking Capability:	System Controlled
Perm 16MB Addr Remaining:	274,848,547,584	Output File System:	ETC3T1
Temp 16MB Addr Remaining:	274,814,995,200	Partition Count:	3
Disk Resp Time Boundary 1 (ms):	1	Processor Folding Support:	No
Disk Resp Time Boundary 2 (ms):	16	Partition ID:	2
Disk Resp Time Boundary 3 (ms):	64	Primary Partition ID:	0
Disk Resp Time Boundary 4 (ms):	256	Processor Units:	0.2
Disk Resp Time Boundary 5 (ms):	1,024	System Version:	7
Collection Data:	Consistent with *SYS	System Release:	1.0
Collect Internal Data:	N	System Name:	ETC3T1
*CSMGTCOL Collection Library:	QPFRDATA	Performance Monitor Select Job:	
*CSMGTCOL Collection Name:	Q067000002	Shared Processor Pool:	Yes
Database Consistency:		Partition Sharing Capped:	Uncapped
Database Limit (% of CPU):	100.0	Variable Processor Speed Capability:	1
		QPFRADJ System Value:	2

Considerations for Viewing Prior Release Performance data

- Performance data from earlier releases can be viewed with the Performance Data Investigator at the latest release
 - **Note:** Not all graphs and charts will be available after conversion due to changes in data content and format

- If prior release data has not been converted, you may get errors when trying to display charts



- Use the Convert Performance Collection (CVTPFRCOL) command
 - Collection Services data from 5.4 can be converted and viewed with PDI on 6.1 or 7.1
 - Collection Services data from 6.1 can be converted and viewed with PDI on 7.1
 - Performance Explorer data from 6.1 can be converted and viewed with PDI on 7.1
 - Job Watcher data from 6.1 can be converted and viewed with PDI on 7.1
 - Disk Watcher data from 6.1 can be converted and viewed with PDI on 7.1

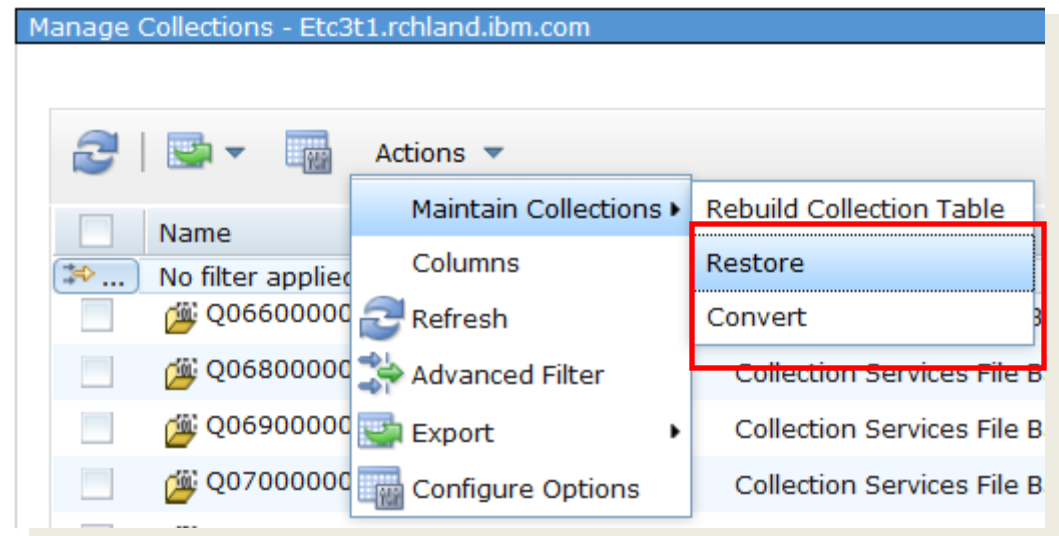
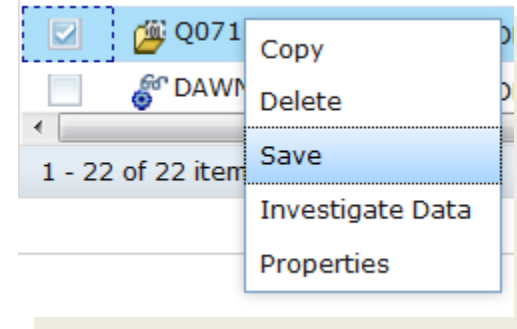
Considerations for Viewing Prior Release Performance data

- Convert the performance data to the current release format (commands)
 - For Collection Services data
 - The preferred approach is to save the Management Collection object to a save file
 - `SAVOBJ OBJ(MYMGTCOL) LIB(MYLIB) DEV(*SAVF) SAVF(MYLIB/MYSAVF)`
 - FTP the save file to the 6.1 or 7.1 partition
 - Use the Restore Performance Collection command (RSTPFRCOL) to restore the *CSMGTCOL collection
 - Use the Create Performance Data (CRTPFRTA) command to get the data into database files
 - Create Performance Data will create the data at the current release format
 - Note: the library in which the performance data is restored into needs to be at the current release level
 - For Job Watcher, Disk Watcher, or Performance Explorer collections
 - Save the performance data using the Save Performance Collection (SAVPFRCOL) command
 - FTP the save file to the 6.1 or 7.1 partition
 - Use the Restore Performance Collection (RSTPFRCOL) command to restore the data on the 6.1 or 7.1 partition. The TYPE parameter will vary between 6.1 and 7.1 releases.
 - Use the Convert Performance Collection (CVTPFRCOL) command to convert the prior release database files to the current release.

Considerations for Viewing Prior Release Performance data

- Convert the performance data to the current release format via the GUI

- The steps are similar to the prior slide:
 - Save the performance collection
 - FTP the save file to the desired 6.1 or 7.1 partition
 - Restore the collection via the Collection Manager
 - Convert the collection to the current release format



Disk Watcher



Investigate Data

Perspectives

- [-] Disk Watcher
 - [-] **Statistical Overviews**
 - [Disk Statistical Overview](#)
 - [Disk Statistical Overview by Disk Pool](#)
 - [Disk Statistical Overview by Disk Unit](#)
 - [Disk Statistical Overview by Disk Path](#)
 - [-] **Statistical Details**
 - [Disk Statistical Details by Disk Pool](#)
 - [Disk Statistical Details by Disk Unit](#)
 - [Disk Statistical Details by Disk Path](#)
 - [-] **Trace**
 - [-] **Disk Watcher Database Files**
 - [-] **Job Watcher**
 - [-] **Collection Services**

Selection

Statistical Overviews

Description

Charts that show a variety of performance statistics from Disk Watcher statistical data.

Default Perspective

[Disk Statistical Overview](#)

Collection

Collection Library	Collection Name
COMMON	Most Recent

- Most Recent
- All
- DAWNDW (*DWFILE)
- DAWNDWFULL (*DWFILE)
- DAWNDWSTAT (*DWFILE)
- DAWNFULL (*DWFILE)

Display Close

Disk Watcher – Statistical Overviews

Disk Statistical Overview

Perspective View

Collection

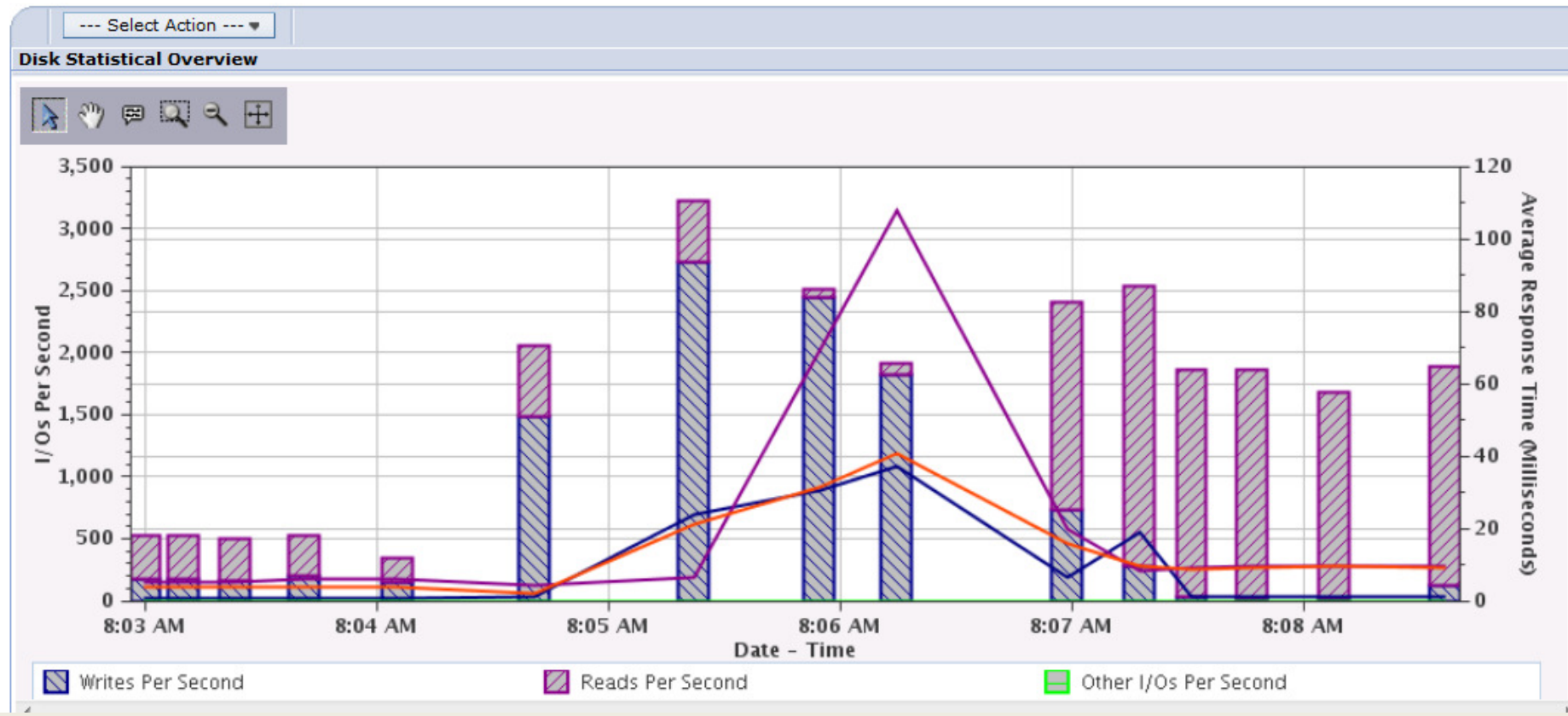
Name(s): DAWNFULL
 Library: COMMON
 Type: Disk Watcher File Based Collection
 File level: 1

Time

Start: Mar 12, 2008 8:02:48 AM
 End: Mar 12, 2008 8:08:36 AM

System

Name:
 Release: V6R1M0



Job Watcher

Investigate Data

Perspectives

- [-] Disk Watcher
- [-] Job Watcher
 - CPU Utilization and Waits Overview
 - CPU Utilization by Thread or Task
 - Resource Utilization Overview
 - [-] Job Statistics Overviews
 - [-] Waits
 - [-] CPU
 - [-] Physical Disk I/O
 - [-] Synchronous Disk I/O
 - [-] Page Faults
 - [-] Logical Database I/O
 - [-] 5250 Display Transactions
 - [-] Job Watcher Database Files
- [-] Collection Services

Selection

Job Watcher

Description

Chart and table views over a variety of performance statistics from Job Watcher performance data.

Default Perspective

[Resource Utilization Overview](#)

Collection

Collection Library	Collection Name
COMMON	DAWNJW2 (*JWFILE)
	Most Recent
	All
	JWOBJLOCKC (*JWFILE)
	DAWNJW229 (*JWFILE)
	DAWNJW2 (*JWFILE)

Display

Close

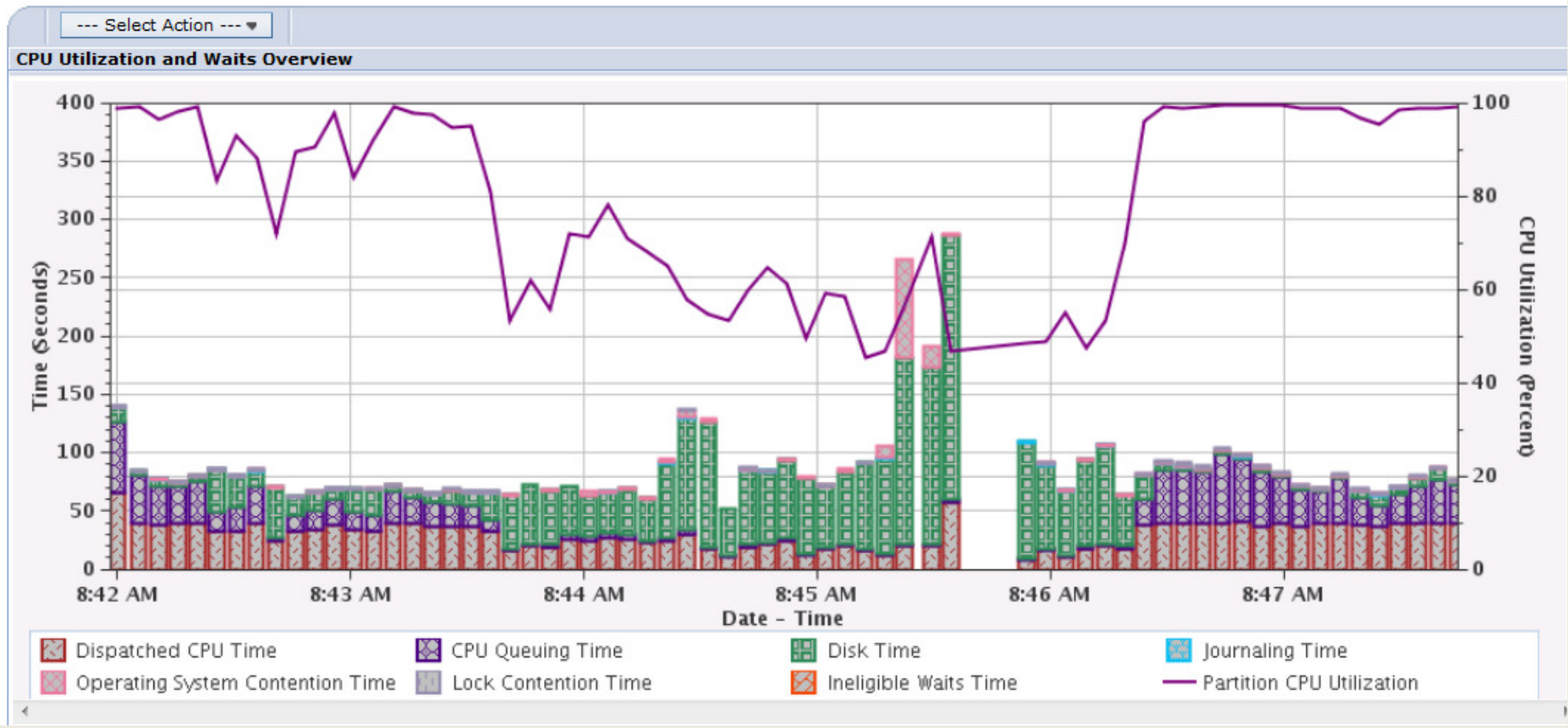


Job Watcher - CPU Utilization and Waits Overview

Collection
Name(s): DAWNJW2
Library: COMMON
Type: Job Watcher File Based Collection
File level: 3

Time
Start: Mar 12, 2008 8:42:26 AM
End: Mar 12, 2008 9:42:33 AM

System
Name:
Release: V6R1M0





Job Watcher – Show Holder

- If there is a holding job or task for the current thread or task, the “Show Holder” button will be displayed

Interval Details for One Thread or Task (Interval Number = '41', Initial Thread Task Count = '321780')

Perspective View

Collection
Name(s): DAWNJW2
Library: COMMON
Type: Job Watcher File Based Collection
File level: 3

Time
Start: Mar 12, 2008 8:42:26 AM
End: Mar 12, 2008 9:42:33 AM

System
Name: [REDACTED]
Release: V6R1M0

Thread or Task Details

Job information:	BEIJINGA/QTMHHTTP/351486 - 000000000000000008	Interval:	41
Current user profile:	QTMHHTTP1	Priority:	25
Object waited on:	None detected this interval	Pool:	2
Holding job or task:	BEIJINGA/QTMHHTTP/351495	Interval timestamp:	Mar 12, 2008 8:45:59 AM

Call Stack

Call Level	Program	Module	Procedure	Offset
1			qutde_block_trace	000000E4
2			slowLockSys__10QuGateCodeFQ2_2Qu	00000370
3			qurouter_no_kill	00000038
4			checkLockTable__17RmslHoldHashTable	000004AC
5			rmslLockCheck__FR11RmslPlmpSRPUTU	000000BC
6			#cfochr	00000338
7			#mnressp	00000614
8			#mnressp	000002B8
9			#cfmir	000000E8
10			syscall_A_portal	0000012C
11	QLIRPLL			000072DC
12			cblabbranch	000001D0

Job Watcher – Show Holder



- When clicking the “Show Holder” button, the holding job or task info will be

Interval Details for One Thread or Task (Interval Number = '41', Initial Thread Task Count = '323590')

Perspective Edit View History

Collection

Name(s): DAWNJW2
 Library: COMMON
 Type: Job Watcher File Based Collection
 File level: 3

Time

Start: Mar 12, 2008 8:42:26 AM
 End: Mar 12, 2008 9:42:33 AM

System

Name:
 Release: V6R1M0

Thread or Task Details

Job information:	BEIJINGA/QTMHHTTP/351495 - 0000000000000002	Interval:	41
Current user profile:	QTMHHTTP1	Priority:	25
Object waited on:	None detected this interval	Pool:	2
Holding job or task:	None detected this interval	Interval timestamp:	Mar 12, 2008 8:45:59 AM

Call Stack

Call Level	Program	Module	Procedure	Offset
1			qutde_stackless_block	000000C4
2			qu_dasd_fault_on_res_stack	0000026C
3			findEquals__8IxRadix3FRPcRIT1T2RCQ2	00000308
4			findLowestOfEquals__8IxRadix3FRC12D	00000148
5			retrieveEntry__22MaKeyedMchObjDirec	000000BC
6			machineObjPtr__22MaKeyedMchObjDire	00000020
7			masoOpenCondition__FRUtUl	0000009C
8			#cfmir	000000E8
9			syscall_A_portal	0000012C
10	QPOLLFS1	QP0LTM2S	holdLock__19P0LLfsPpcoAssistantFi	00000084
11	QPOLLFS1	QP0LTM2S	qp0l_lookupv__FP13qp0l_pathnameiP14	00000208
12	QPOLLFS1	QP0LTMSY	qp0lts_chdir__FPiT1P13qp0l_pathname	000005FC
Total: 33				

Manage Collections

- The Manager Collections tasks allows you to see and manage all of your performance data from one central location
- Various tasks can be launched from the Manage Collections task, including the Performance Data Investigator

Manage Collections - Isz1p13.rch.stglabs.ibm.com

Actions ▾

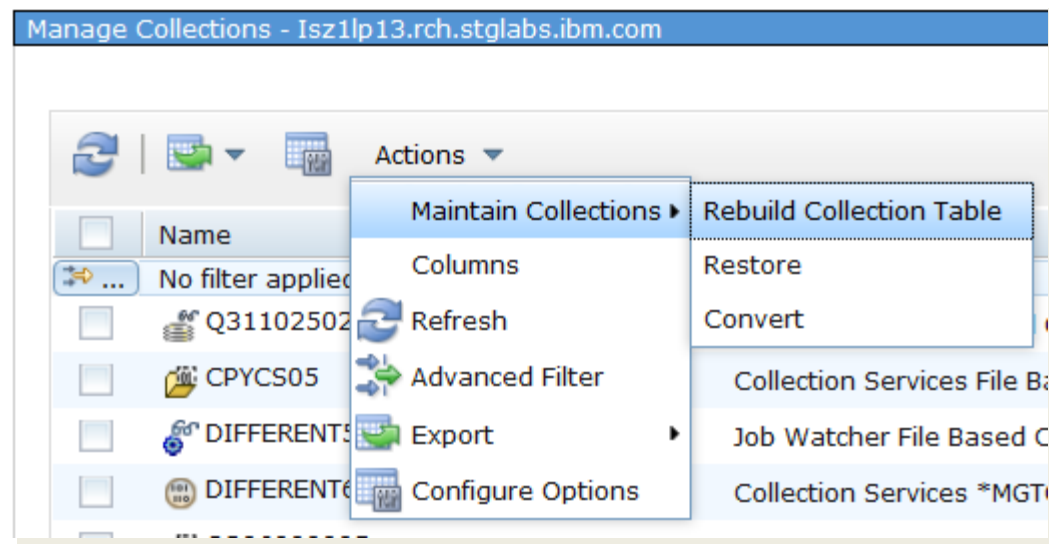
Name	Library	Type	Status	Started	Ended	Size MB	System	Version	
No filter applied									
Q311025028	ZZTEST	Disk Watcher File Based Collection	Complete	11/6/12 2:50:28 AM	11/6/12 2:51:20 AM	2.766	ISZ1LP13	V7R1M0	
Q307000005	DFLADP	Collection Services File Based Collection	Complete	6/11/12 4:25:07 PM	7/15/12 4:28:35 PM	1.754	ASWC	V7R1M0	
Q306121500	RAKLIB	Job Watcher File Based Collection	Complete	1/9/13 3:56:07 PM	1/9/13 4:12:10 PM	0.004	ISZ1LP13	V7R1M0	
Q309010017	RAKLIB	Collection Services *MGTCOL Obj Based C	Complete	6/11/12 4:25:07 PM	7/15/12 4:28:35 PM	3.684	ASWC	V7R1M0	
Q254000002	ZZTESTR	Collection Services File Based Collection	Complete	11/1/12 12:00:06 AM	11/1/12 12:03:25 PM	380.464	ISZ1LP13	V7R1M0	
Q307000005	ZZTESTR	Collection Services *MGTCOL Obj Based C	Complete	11/2/12 12:00:06 AM	11/3/12 12:00:04 AM	428.644	ISZ1LP13	V7R1M0	
Q254000002	ZZTESTR	Collection Services File Based Collection	Complete	11/2/12 12:00:06 AM	11/3/12 12:00:00 AM	401.808	ISZ1LP13	V7R1M0	
Q306121500	ZZTESTR	Collection Services File Based Collection	Complete	9/10/12 12:00:02 AM	9/10/12 10:20:00 PM	42.375	ISZ1LP13	V7R1M0	
Q309010017	ZZTESTR	Collection Services File Based Collection	Complete	11/1/12 12:15:03 PM	11/2/12 12:00:05 AM	344.484	ISZ1LP13	V7R1M0	
Q309010017	RONRNA1210	Collection Services File Based Collection	Complete	11/4/12 1:00:17 AM	11/4/12 11:01:04 PM	90.836	OCC01XX4	V7R1M0	
Q313000005	DFLTEST1	Collection Services File Based Collection	Complete	11/8/12 12:00:05 AM	11/8/12 2:06:30 PM	506.066	ISZ1LP13	V7R1M0	
NORMAL	QPEXDATA	Performance Explorer *MGTCOL Obj Based	Complete	1/7/13 3:37:10 PM	1/7/13 3:37:21 PM	4.039	ISZ1LP13	V7R1M0	
CSPFR0225	CRSS_MON	Collection Services File Based Collection	Complete	2/25/13 12:01:03 AM	2/26/13 12:00:00 AM	729.32	LDPROD	V6R1M0	
Q078110401	QPFRRDATA	Collection Services File Based Collection	Complete	3/19/13 11:04:04 AM	3/20/13 12:00:04 AM	76.016	ISZ1LP13	V7R1M0	
IBMPGX0002	DFLBUGNN1	Performance Explorer File Based Collection	Complete	12/12/12 8:09:41 PM	12/12/12 9:10:28 PM	2,459.21	FOHC2E	V7R1M0	
P122	QPEXDATA	Performance Explorer File Based Collection	Complete	1/6/13 3:00:03 PM	1/6/13 3:01:04 PM	0.061	ISZ1LP13	V7R1M0	

1 - 100 of 312 items

5 | 10 | 25 | 50 | 100 | All

Manage Collections

- If you restore performance data without using the Restore Performance Collection interface, collections may not display in the Manage Collections view.
- The “Rebuild Collection Table” option will rebuild the meta-data used for the Manage Collections task and then your performance data should be visible.



Performance Data - Analysis

Art of Performance Diagnostics with the Performance Data Investigator

Analyzing Performance Data Using PDI

- Now that you know all that PDI can do....
 - How do you really use it to analyze performance data?
 - There are no specific steps – it all depends upon what you see in the performance data
 - If you look at your performance data on a regular basis, you will learn your “normal” pattern which makes it easier to identify something unusual
 - Experience is the best teacher.

Analyzing Performance Data Using PDI

- Start by asking some questions:
 - What was the symptom of the problem?
 - Who reported the problem?

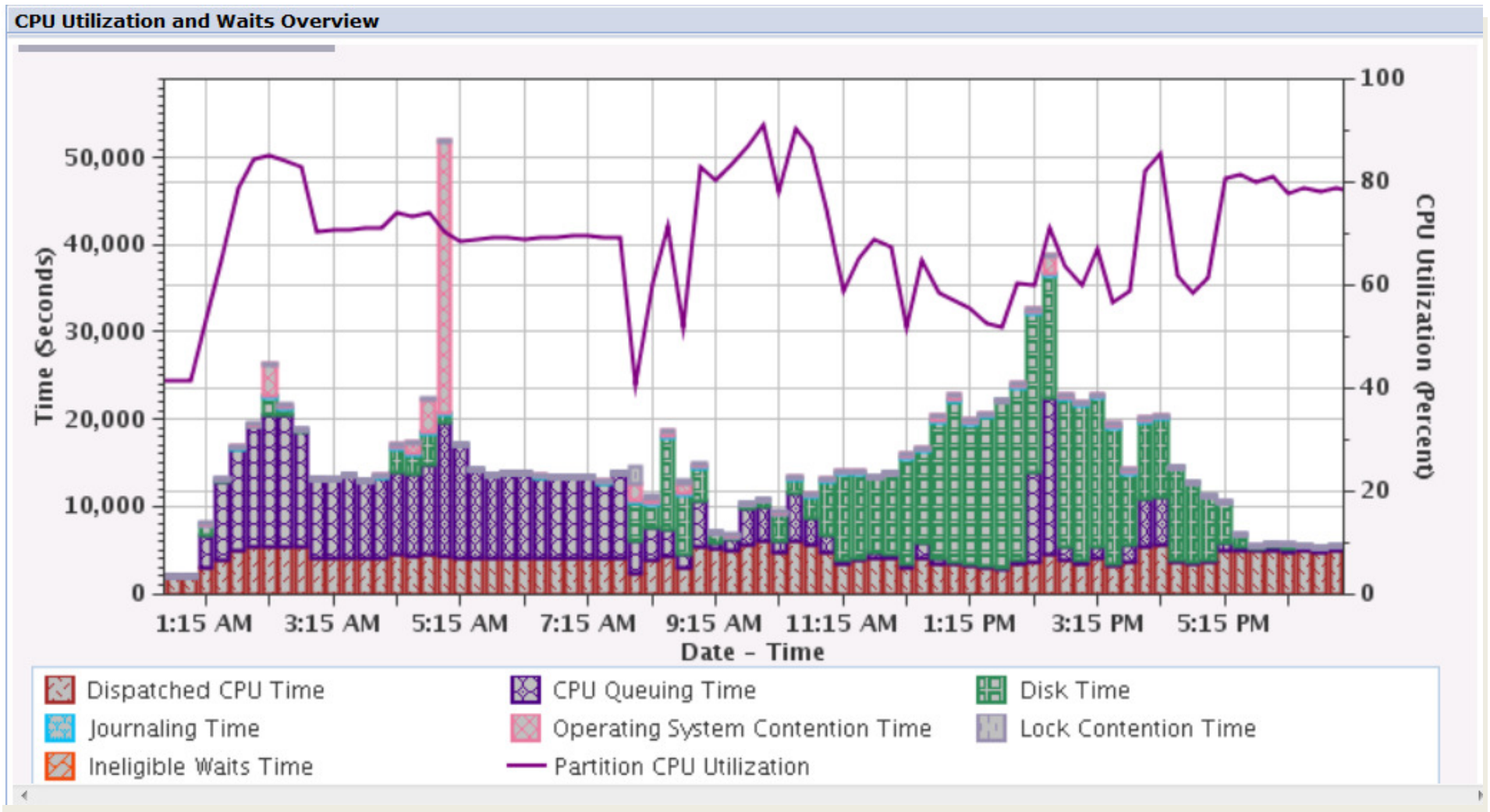
 - What time did it occur?
 - How long did it last?

 - Have there been any recent changes?
 - New or changed workload?
 - Any application changes?
 - Any recent hardware configuration changes?

 - What was the scope?
 - Did it impact the entire system?
 - Did it impact some subset of work?
 - Specific users?
 - Specific applications?

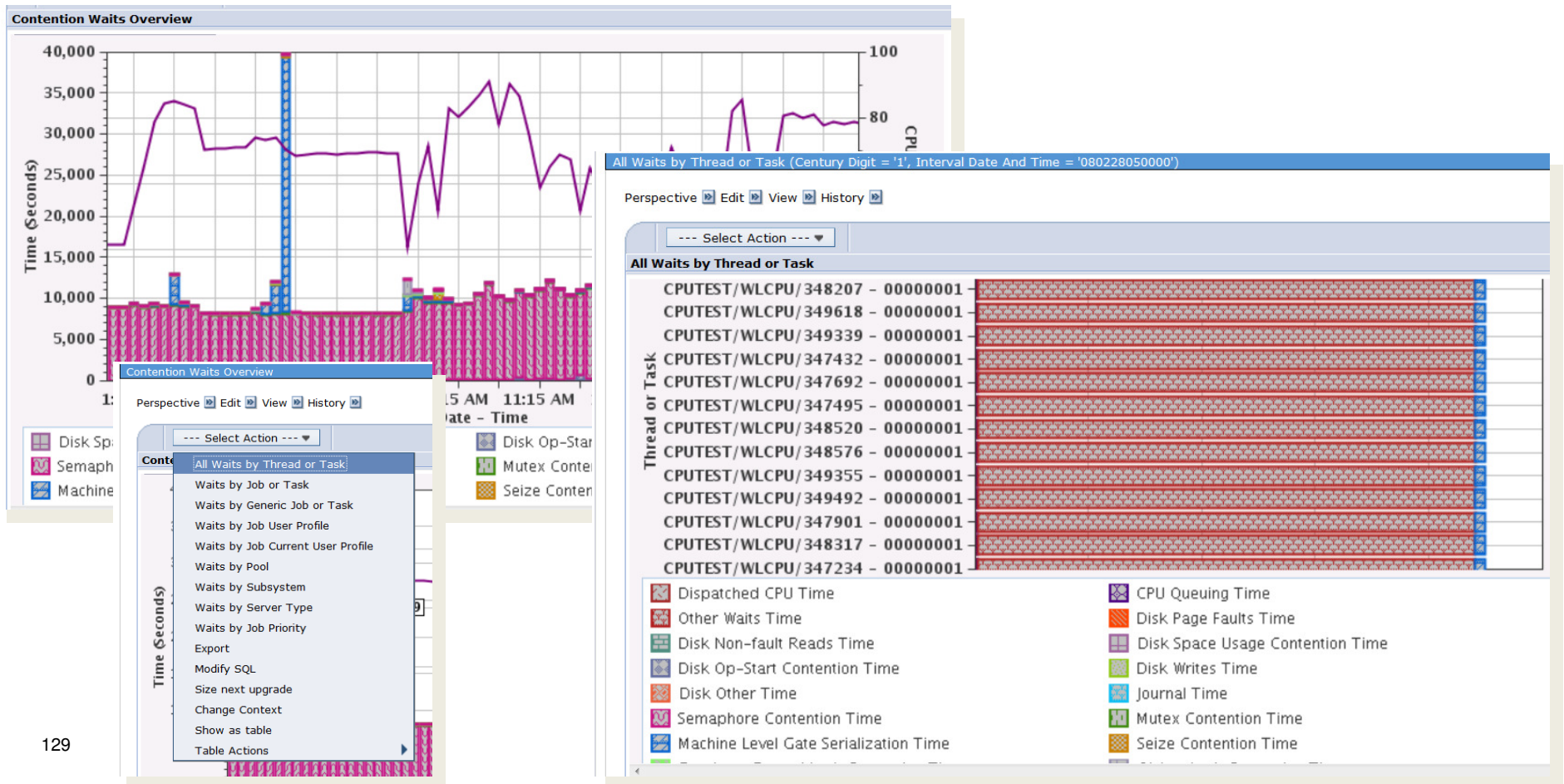
CPU Utilization and Waits Overview

I generally start with CPU Utilization and Waits Overview and look for *interesting* points
 Next steps will depend upon the answer to the prior questions, along with what you see.



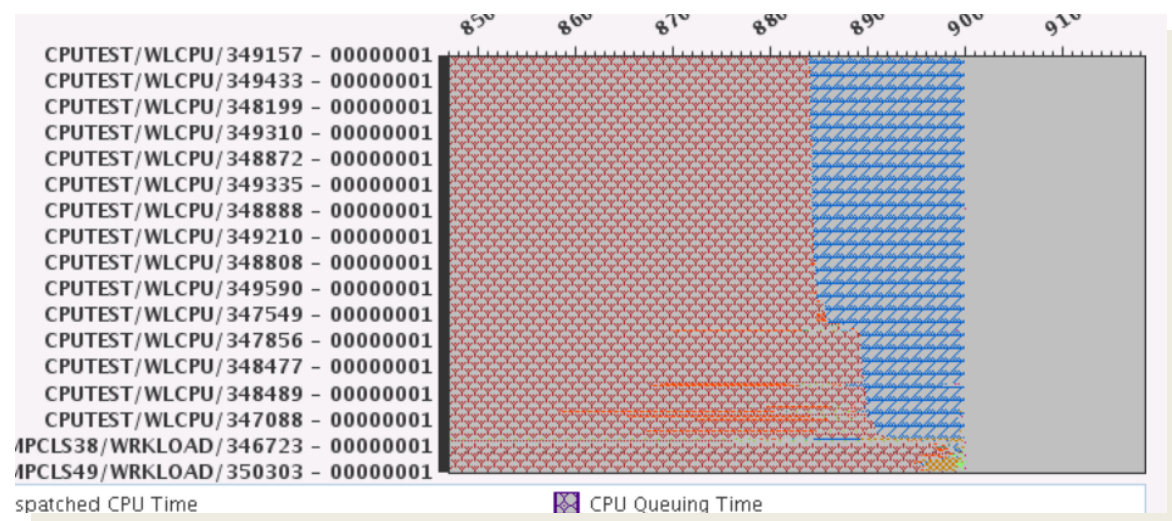
Using PDI, you can learn how to navigate through your data

- Collection Services data may not be able to resolve your problem, but it may very well help to identify areas where more detailed analysis is needed.



Drill-down based upon what you see

- While no one job was causing the spike in contention, we can find out many jobs were affected during that interval.
- This is an example where Collection Services can show us something is going on, but Job Watcher data is necessary to identify the root cause.

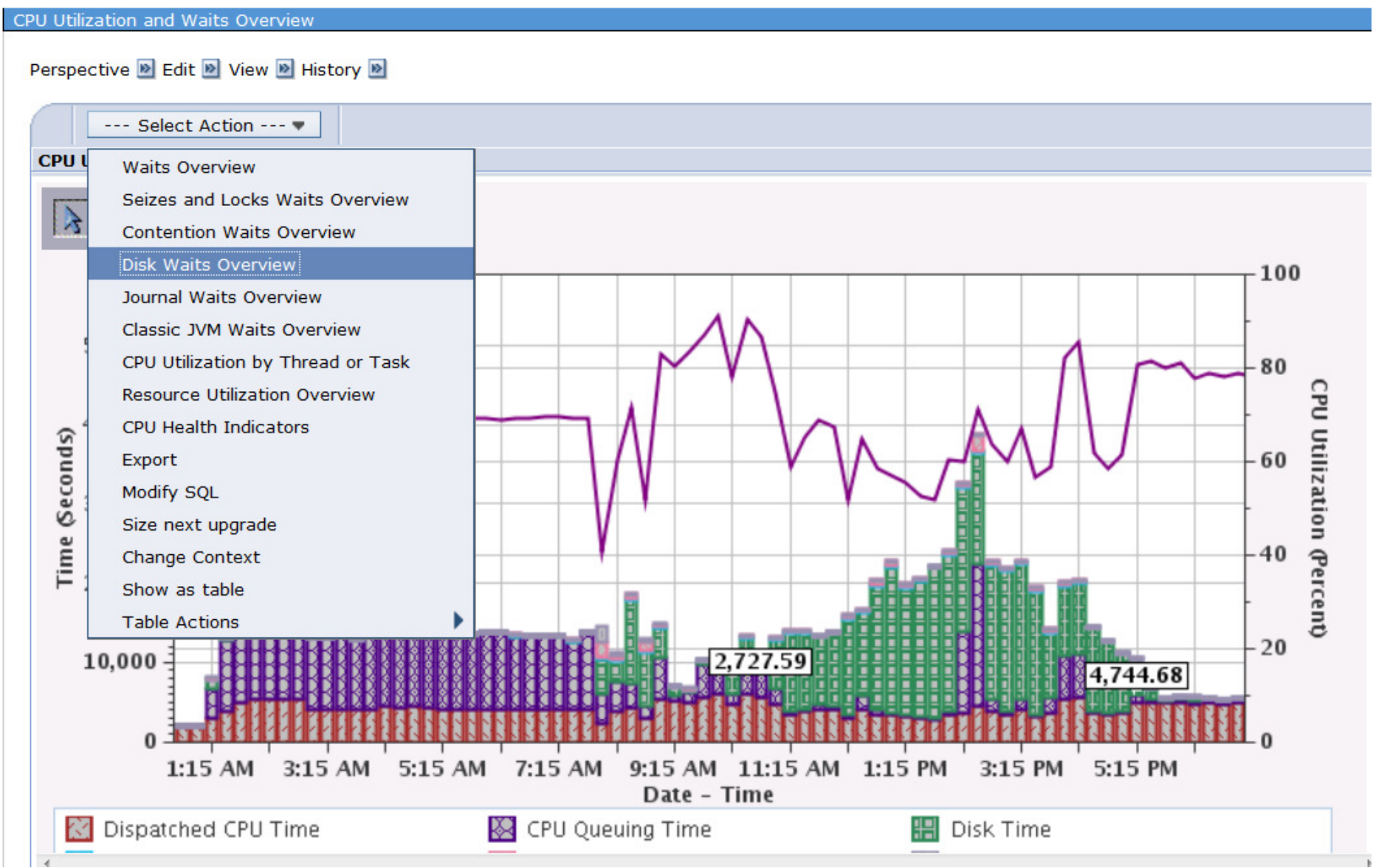




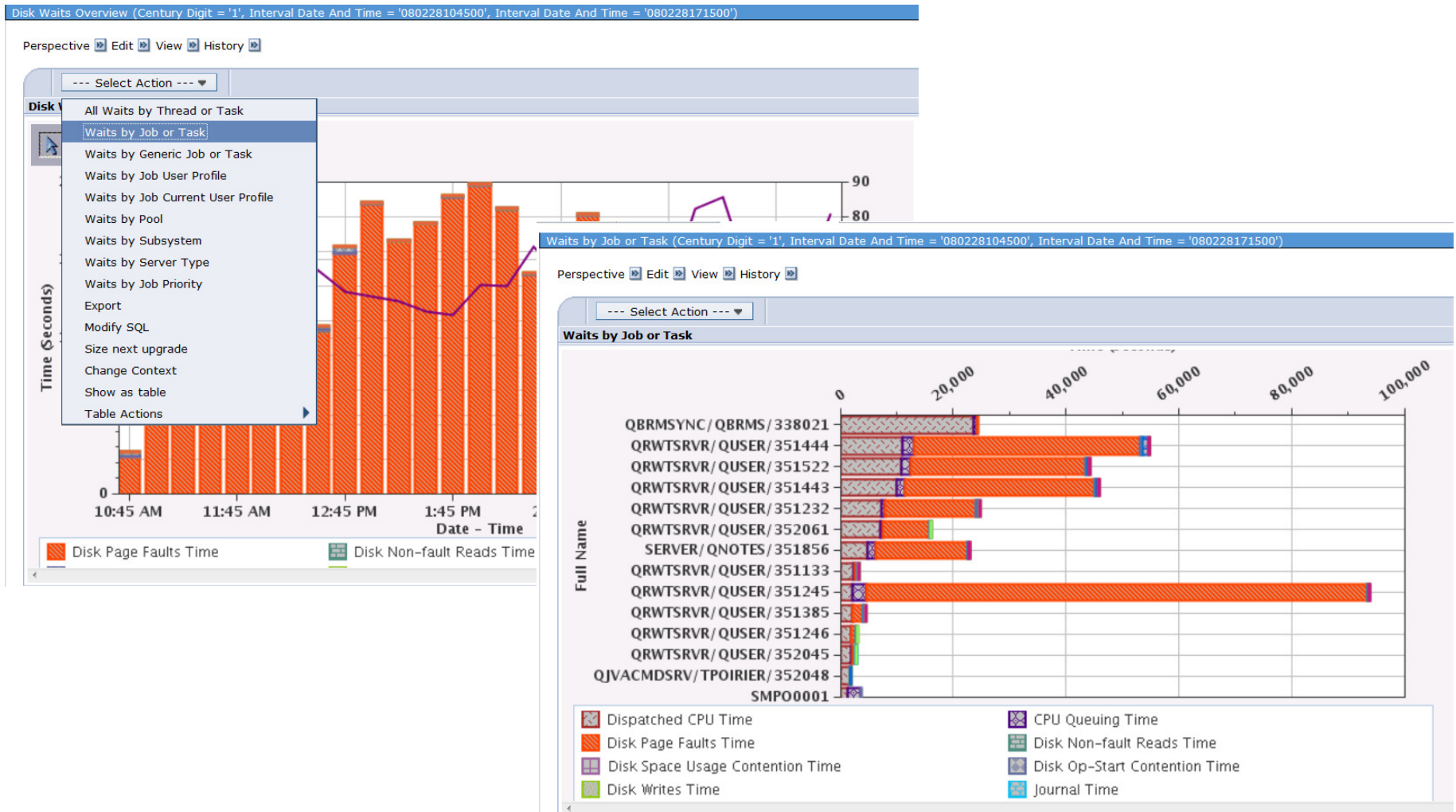
What is causing disk wait time?



Now Let's Look at the Disk Waits



We see it's faulting.... So let's view Waits by Job or Task



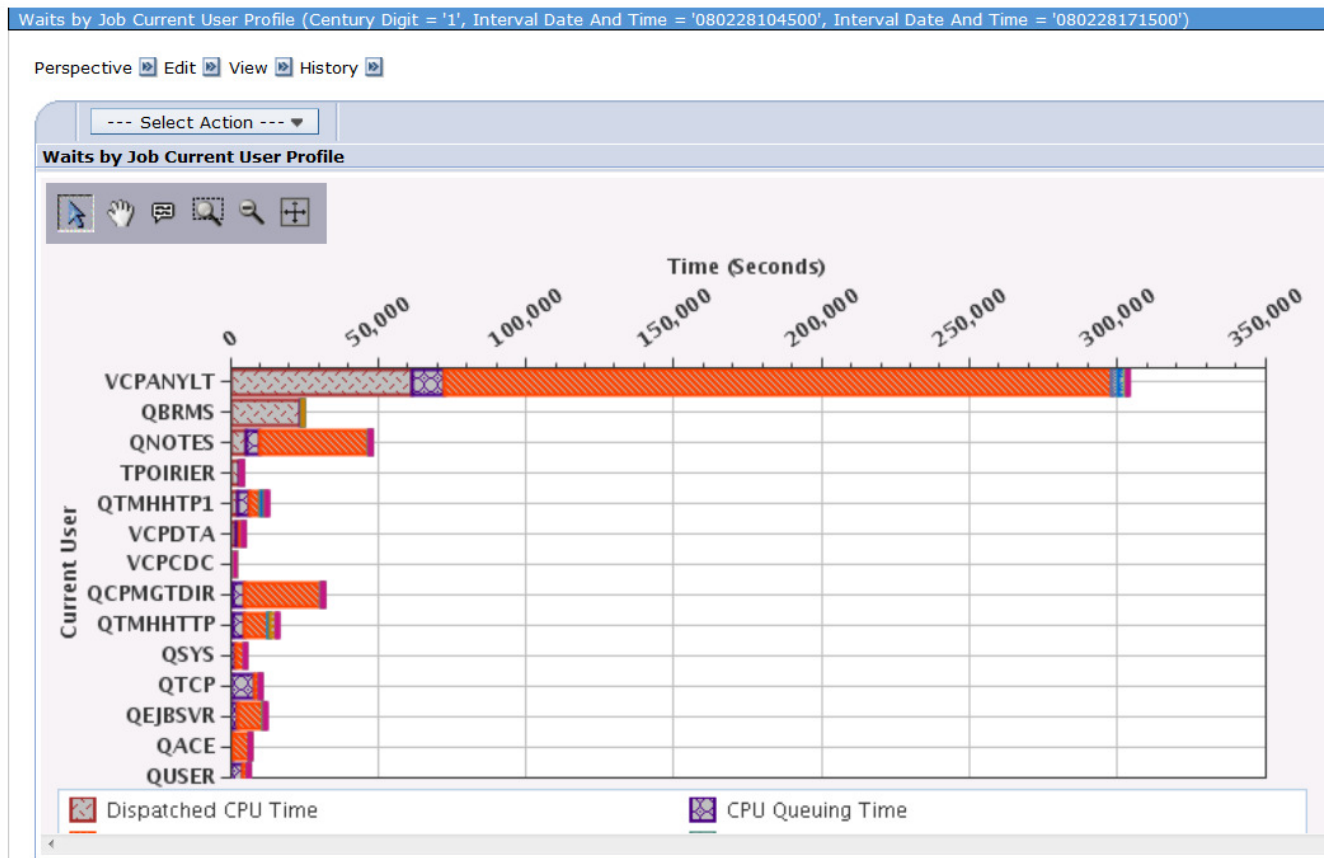
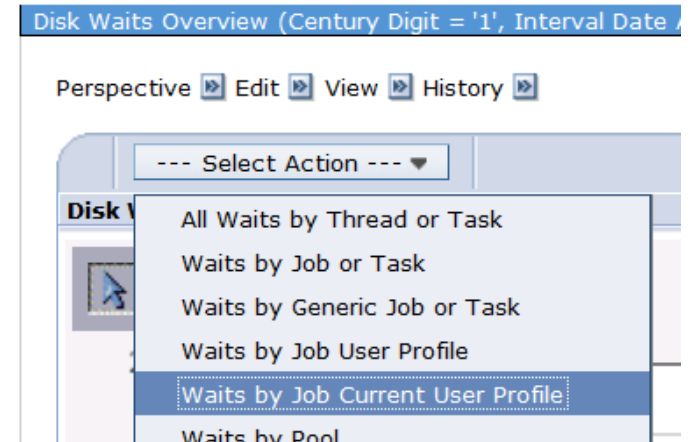
So let's find out who the user is...

We now have several clues:

We know the jobs

We know the time

We know the user profile





How do I analyze Job Watcher data?

- Scope the problem
 - What time?
 - What users or jobs?
- Look for trends in the data
- Look for presence of waits
 - Drill down into wait details
- Display call stacks for running or waiting jobs





Machine Gate Serialization

Investigate Data - Job Watcher

Investigate Data - Performance Data Investigator

Perspectives

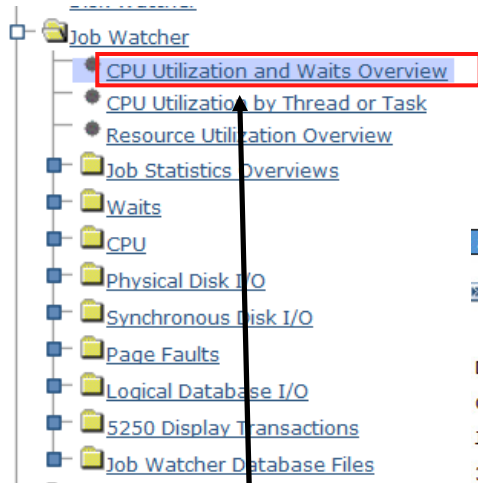
- [-] Performance Explorer
- [-] Disk Watcher
- [-] Job Watcher
 - CPU Utilization and Waits Overview
 - CPU Utilization by Thread or Task
 - Resource Utilization Overview
 - [-] Job Statistics Overviews
 - [-] Waits
 - [-] CPU
 - [-] Physical Disk I/O
 - [-] Synchronous Disk I/O
 - [-] Page Faults
 - [-] Logical Database I/O
 - [-] 5250 Display Transactions
 - [-] Job Watcher Database Files
- [-] Health Indicators
- [-] Collection Services
- [-] Database

Selection

Name
CPU Utilization and Waits Overview

Description
This chart shows CPU utilization and some categories of the more interesting waits for all contributing jobs and tasks over time for the selected collections. Use this chart to select a time frame for further detailed investigation.

CPU Utilization and Waits Overview



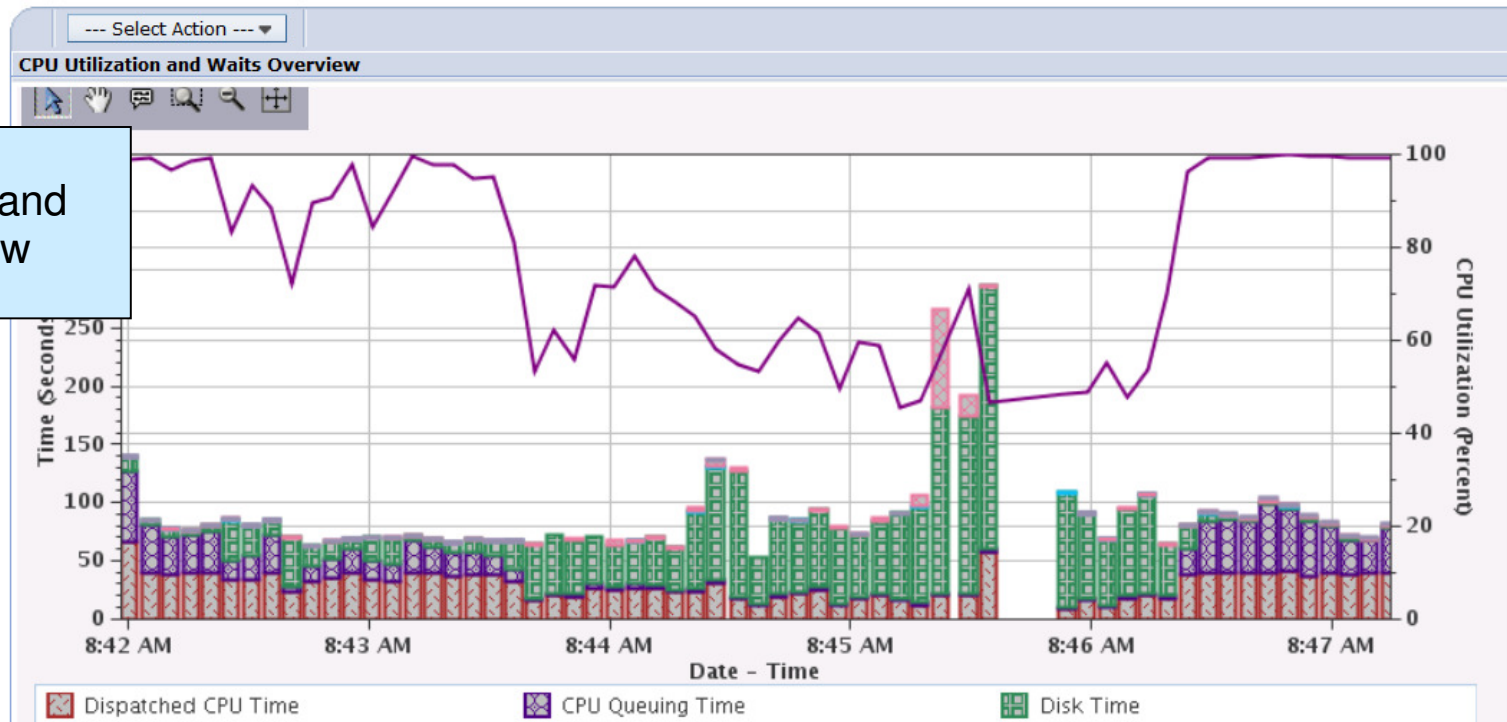
Both Collection Services and Job Watcher have a “CPU Utilization and Waits Overview” graph as a general starting point for wait analysis

and Waits Overview

Edit View History

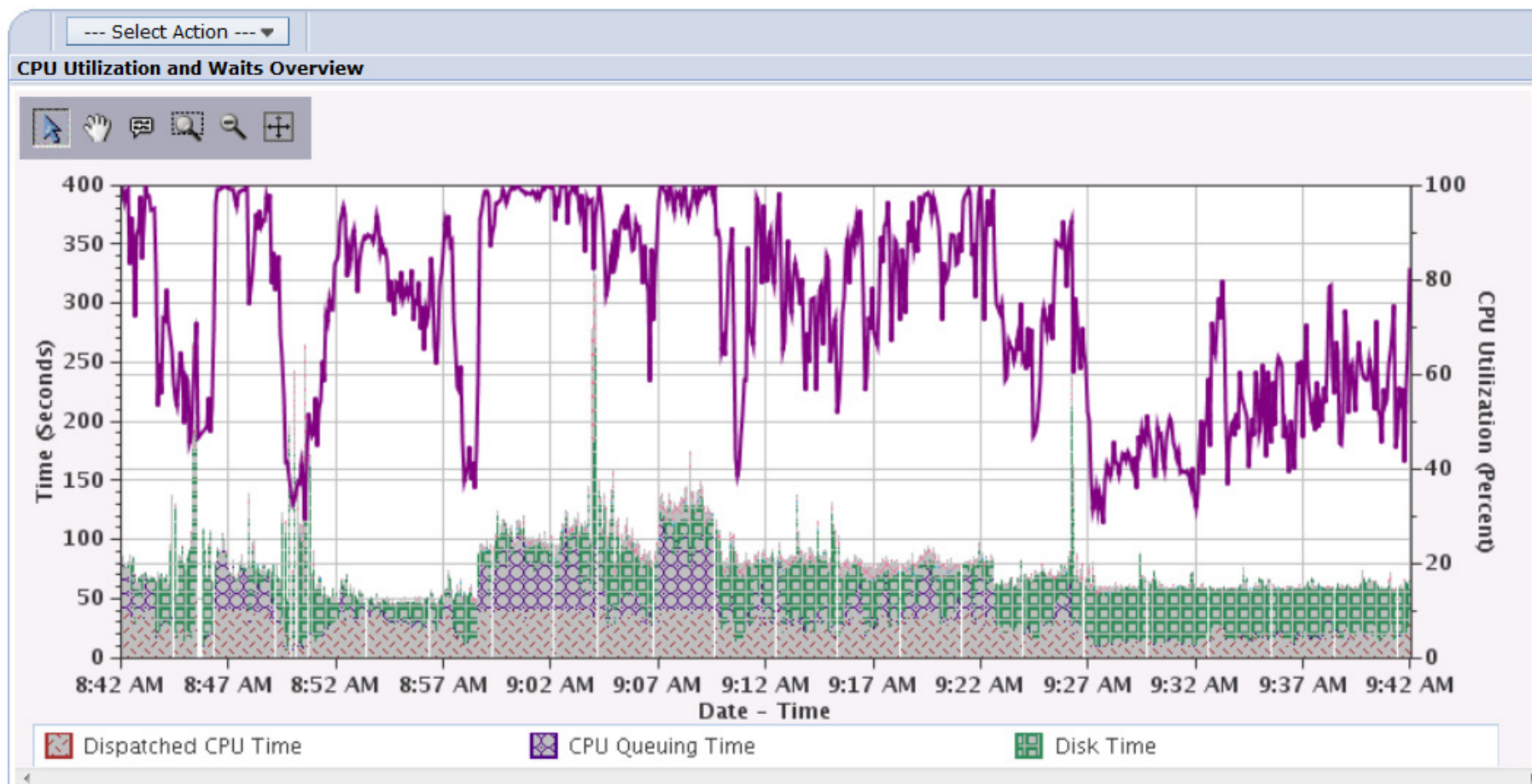
Time	System
DAWNJW2	Start: Mar 12, 2008 8:42:26 AM Name: RCHASTND
COMMON	End: Mar 12, 2008 9:42:33 AM Release: V6R1M0
Job Watcher File Based Collection	
3	

CPU Utilization and Waits Overview

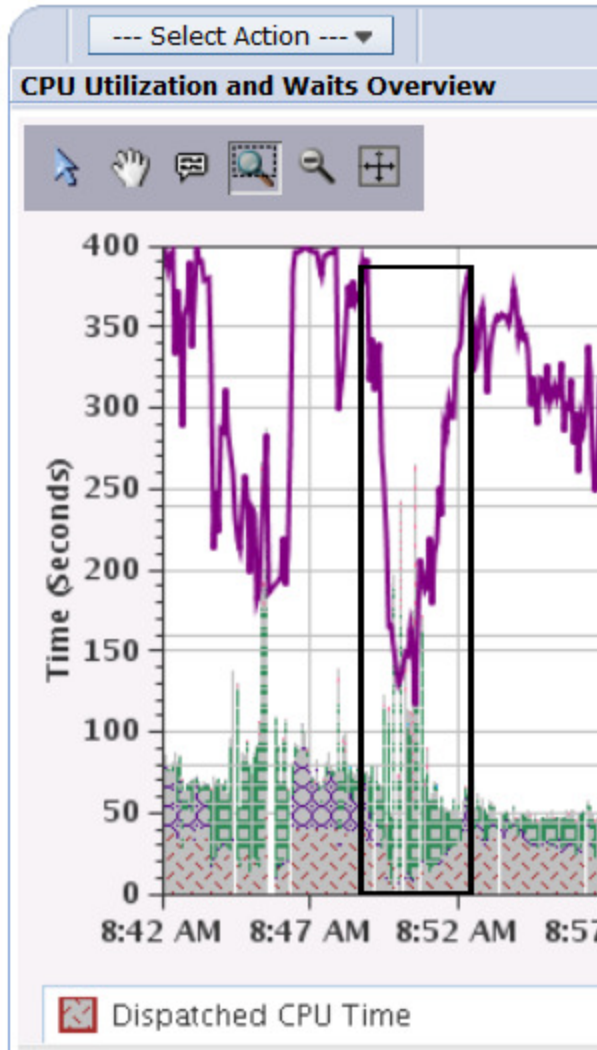


Let's look at the entire collection. Full zoom out...

- There are a lot of interesting things to investigate here.....

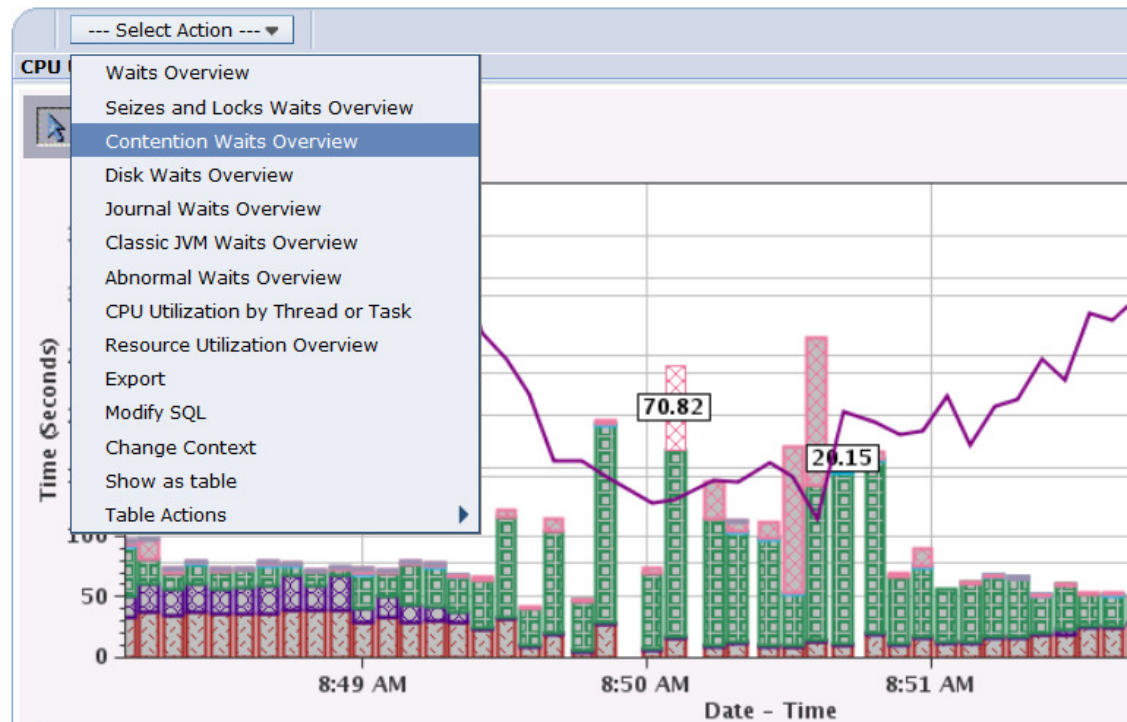


Let's zoom into the time where we see the large drop in CPU



We can see operating system contention occurred during the time when the CPU Utilization dropped.

Select the beginning and ending intervals to investigate and then drill into Contention Waits Overview

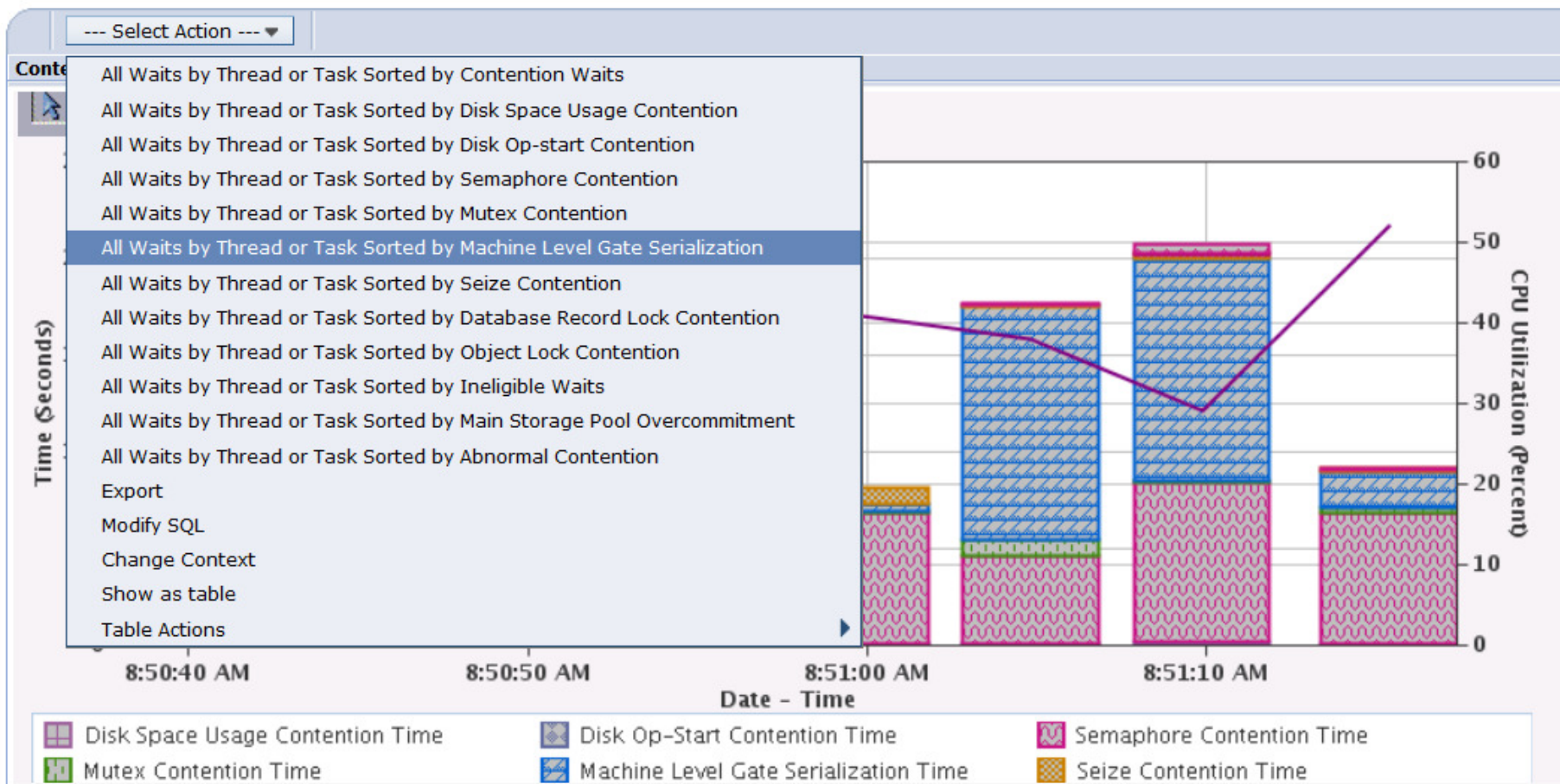




Machine level gate serialization is a major reason for the contention waits.

We want to see if we can figure out who might be causing the contention. Drill into All Waits by Thread or Task Sorted by Machine Level Gate Serialization so we can see the jobs/threads/tasks that are all waiting.

Note: Drilling into waits by thread or task can take some time.... be patient.

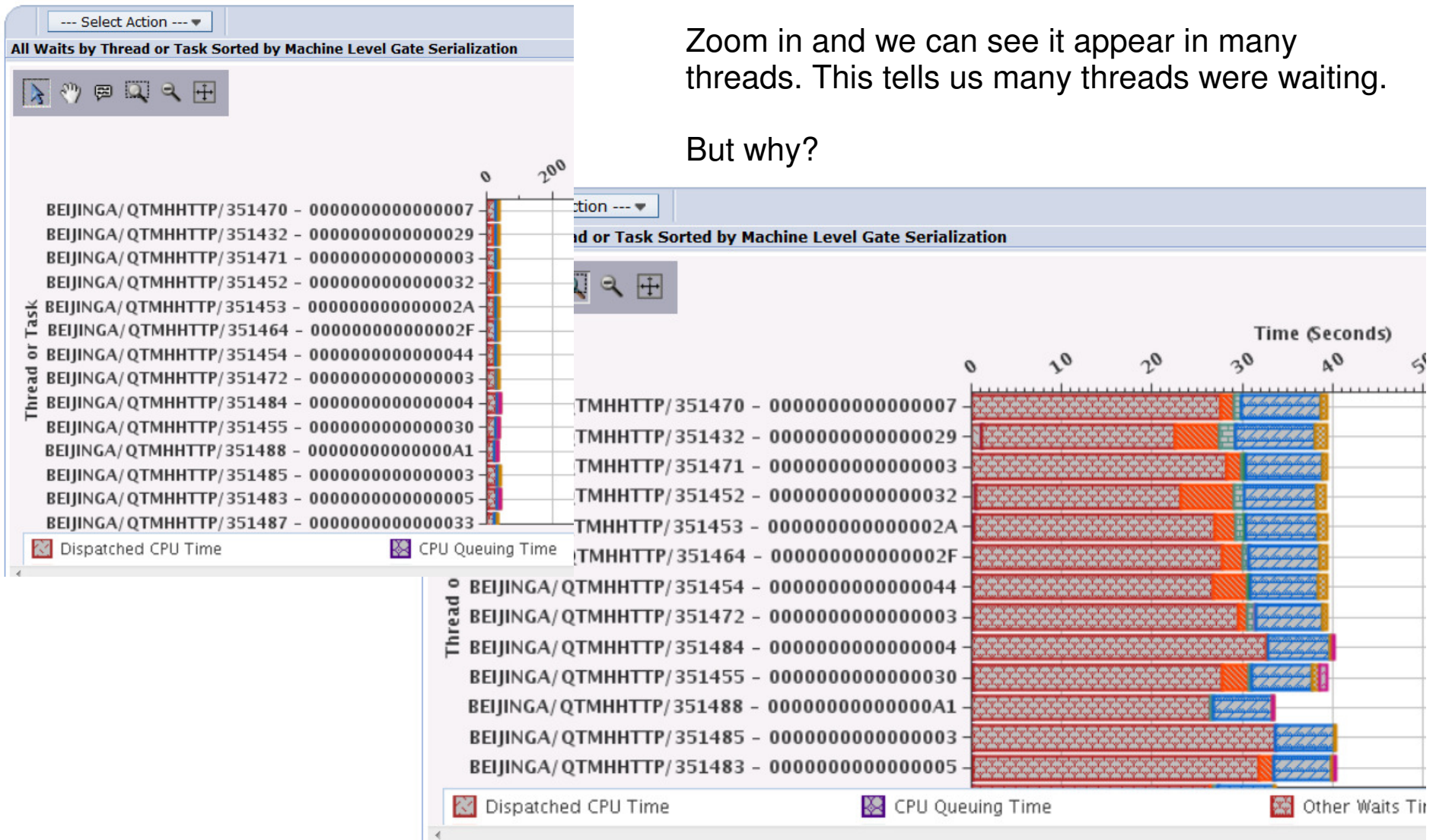


Zoom into see more detail

We can't see the machine level gate serialization details at first;

Zoom in and we can see it appear in many threads. This tells us many threads were waiting.

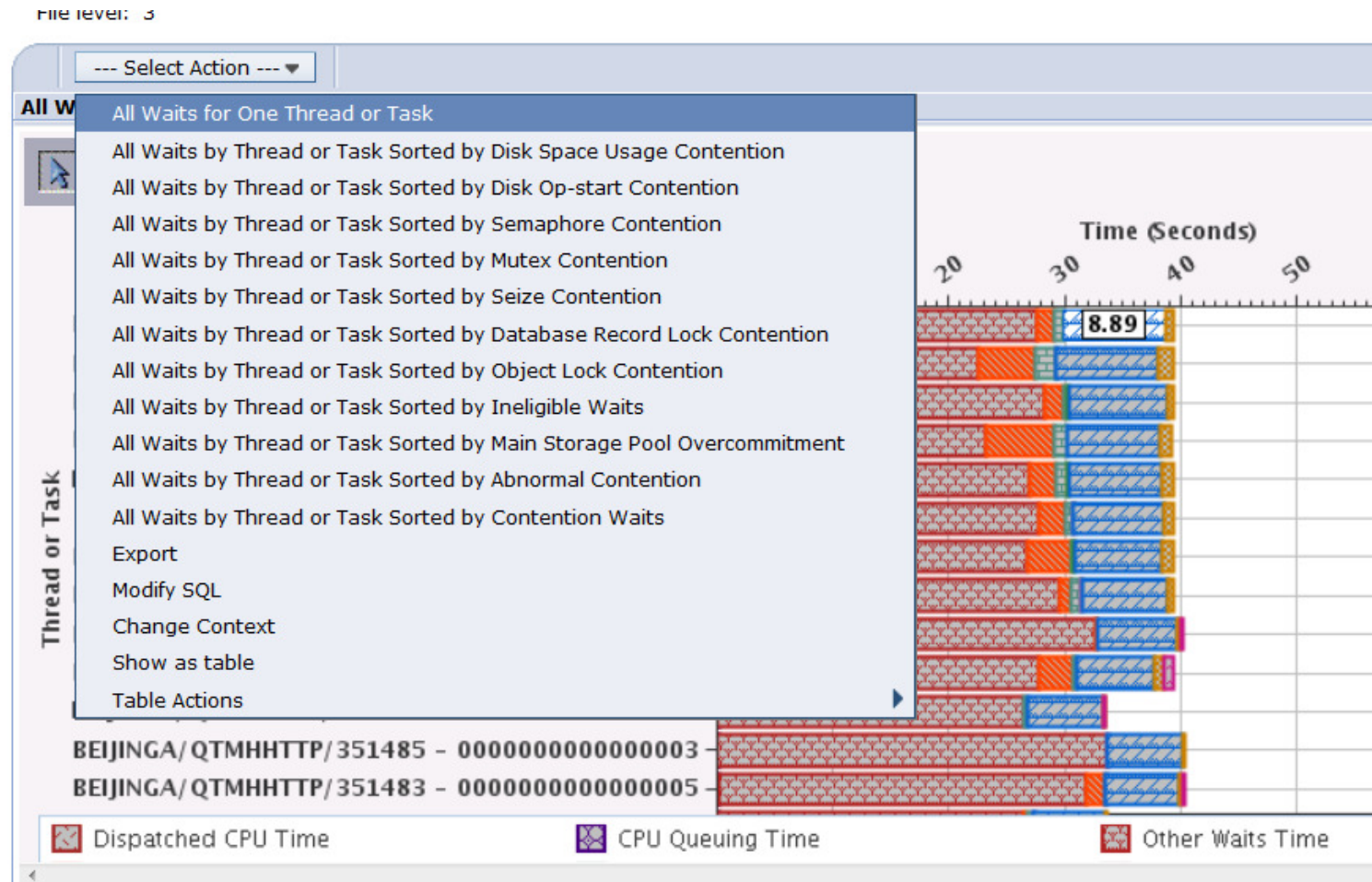
But why?



Select a thread and look at the waits for that one thread.

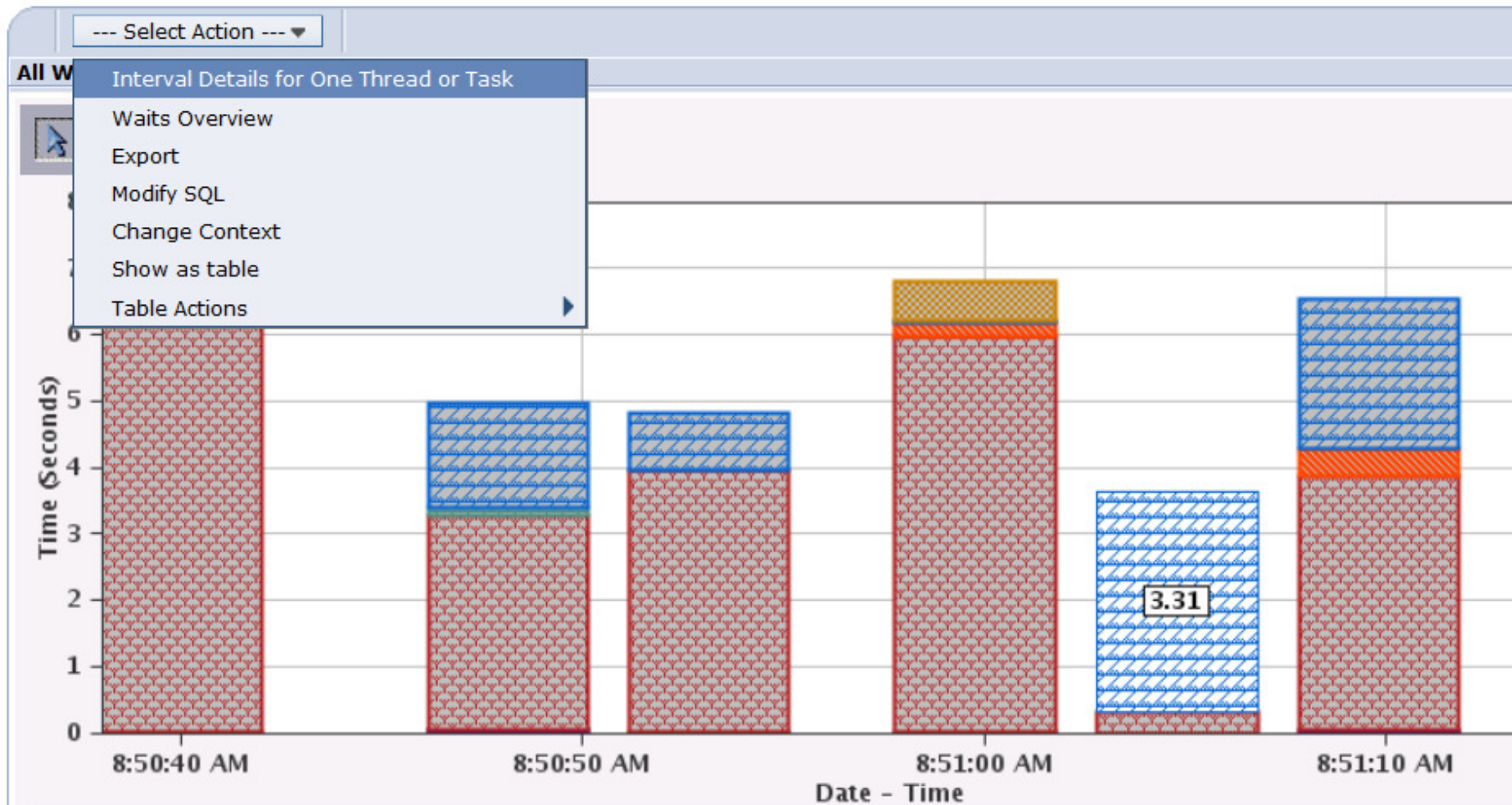


It may be necessary to drill down into **interval details** for several threads to find the one with the information we need...



Select an interval

View Interval details for one thread or task





And here is where we discover Job Watcher's power....

Interval Details for One Thread or Task (Interval Number = '97', Initial Thread Task Count = '319696')

Perspective ▶ Edit ▶ View ▶ History ▶

Collection

Name(s): DAWNJW2
Library: COMMON
Type: Job Watcher File Based Collection
File level: 3

Time

Start: Mar 12, 2008 8:42:26 AM
End: Mar 12, 2008 9:42:33 AM

System

Name: RCHASTND
Release: V6R1M0

Thread or Task Details

Job information: BEIJINGA/QTMHHTTP/351470 -
000000000000000007

Interval: 97

Current user profile: QTMHHTTP1

Priority: 25

Object waited on: QAUDJRN
Holding job or task: QDBSRV02/QSYS/345313

Pool: 2

Interval timestamp: Mar 12, 2008 8:51:05 AM

Show Holder

Call Stack

We can see the call stack to see how we got to this wait point

This thread is waiting for the QAUDJRN journal at 8:51:05.

In the call stack you will see an entry that shows the job is creating an audit journal entry.

Note that access to the audit journal is serialized by a “gate”. So why is this job blocked and waiting to create the audit record?

Procedure	Offset
qutde_block_trace	000000E4
slowLock__10QuGateCodeFQ2_2Qu8LockModeUIN32Q2_8TDQSEnu	000003F0
#journal	0000066C
auditIt__19CfCreateAuditRecordFv	00000444
validateDescQueue__11LoDescEntryFRtPt	00000390
recvDescriptors__12LoSocketUnixFR15LoSocketManagerRtPt	000002B8
recv__19LoReceiveStreamUnixFR15LoSocketManagerRiP6msghdrPt	000006A0
recvmsg__8LoSocketFR15LoSocketManagerP6msghdrPtUl	0000018C
recvmsg__FtP6msghdrT1PtP7timeval15LoAddressFormat	00000680
recvMsgHandler__FP19LoSocketRecvMsgData	00000448
LoSocketOp__FUtP13LoSocketOpHdr	00000254
socketop	000001DC

We can easily go look at the thread that is holding the resource

Show Holder

Thread or Task Details

Job information:	QDBSRV02/QSYS/345313 - 000000000000000001	Interval:	97
Current user profile:	QSYS	Priority:	16
Object waited on:	QAUDJRN	Pool:	2
Holding job or task:	None detected this interval	Interval timestamp:	Mar 12, 2008 8:51:06 AM

Call Stack

--- Select Action --- ▼				
Call Level	Program	Module	Procedure	Offset
1			qutde_stackless_block	000000C4
2			qu_dasd_fault_on_res_stack	0000026C
3			#jomodjp	00009944
4			#cfmir	000000E8
5			syscall_A_portal	0000012C
6	QJOCHGJN			00009238
7			cblabbranch	000001D0
8			aiuser_program_call_portal	000000C4
9	QJORETRY			00004188
10			cblabbranch	000001D0
11			aiuser_program_call_portal	000000C4
12	QDBSERVE			000009BC
			Total: 15	



If the audit journal information was still available, you could look at it.

This screen capture shows the audit journal entries from the matching time period.

NR is Next Receiver

PR is Previous Receiver

```
Display Journal Entries

Journal . . . . . : QAUDJRN      Library . . . . . : QSYS
Largest sequence number on this screen . . . . . : 00000000000088885894
Type options, press Enter.
  5=Display entire entry
```

Opt	Sequence	Code	Type	Object	Library	Job	Time
	88885883	T	GS			BEIJINGA	8:51:02
	88885884	T	SK			OSYSARB	8:51:02
	88885885	J	NR			QDBSRV02	8:51:02
	88885886	J	PR			QDBSRV02	8:51:06
	88885887	T	GS			BEIJINGA	8:51:07
	88885888	T	GS			BEIJINGA	8:51:07
	88885889	T	GS			BEIJINGA	8:51:07
	88885890	T	SK			OSYSARB	8:51:07
	88885891	T	GS			BEIJINGA	8:51:07
	88885892	T	GS			BEIJINGA	8:51:07
	88885893	T	GS			BEIJINGA	8:51:07
	88885894	T	GS			BEIJINGA	8:51:07

F3=Exit F12=Cancel

More...



ithankyou

www.ibm.com/power/i

References



iDoctor versus Performance Data Investigator

There are two graphical interfaces for performance data analysis...which should you use?

Feature	iDoctor	PDI
Interface	Windows client	Browser
Wait Analysis	Yes	Yes
Collection Services	Yes	Yes
Job Watcher	Yes	Yes
Disk Watcher	Yes	Yes
Performance Explorer	Yes	Profile collections only
Database	Yes	Yes
Job Watcher Monitors	Yes	No
Customizable	Yes	Yes
User Defined graphs and queries	Yes	Yes
Update Frequency	Monthly Experimental features	Twice Yearly
Support	Defect only	Standard SWMA
Chargeable	Yearly license	<ul style="list-style-type: none">•Collection Services at no additional charge with i•Disk Watcher, Database, and Performance Explorer included with base PT1 product•Job Watcher is an additional option of PT1 and has an additional charge
Experimental Features	Yes (e.g., VIOS Investigator)	No
Multinational language support	No	Yes

IBM i Performance on developerWorks

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<https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/IBM%20i%20Technology%20Updates/page/Performance%20Tools>
 - Additional performance tools resources
<https://www.ibm.com/developerworks/mydeveloperworks/wikis/home/wiki/IBM%20i%20Technology%20Updates/page/Resources>
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- Forum
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- IBM i Performance Data Investigator
<http://www.ibm.com/developerworks/ibmi/library/i-pdi/index.html>
- IBM i Performance Data Investigator – Edit Perspectives
<http://www.ibm.com/developerworks/ibmi/library/i-pdiedit/index.html>
- IBM i Wait Accounting
<http://www.ibm.com/developerworks/ibmi/library/i-ibmi-wait-accounting/>

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IBM i Performance FAQ – a “Must Read”

http://www.ibm.com/common/ssi/cgi-bin/ssialias?subtype=WH&infotype=SA&appname=STGE_PO_PO_USEN&htmlfid=POW03102USEN&attachment=POW031021ISEN.PDF



IBM i on Power - Performance FAQ

February 5, 2013

Updated version available in October 2013

Performance Management Web Page



<http://www-03.ibm.com/systems/power/software/i/management/performance/index.html>

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Performance Data Investigator (PDI)

Use the Investigate Data task found in the web-based IBM Systems Director Navigator for i to view and analyze the data collected from any of the four data collectors found on IBM i. This powerful tool allows you the ability to work with the data interactively in chart or table form.

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PM for Power Systems

A tool that can automatically collect system utilization information and can produce regular reports which show the utilization and growth trends of your system.

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Plan and prepare for changes in the data center when using the IBM i operating system on Power Systems hardware with help from IBM Systems Lab Services and Training. Whether assessing how an application performs when moving to the next release, determining the impact of application changes or understanding the benefits of new hardware, our team

A **Red**books publication!

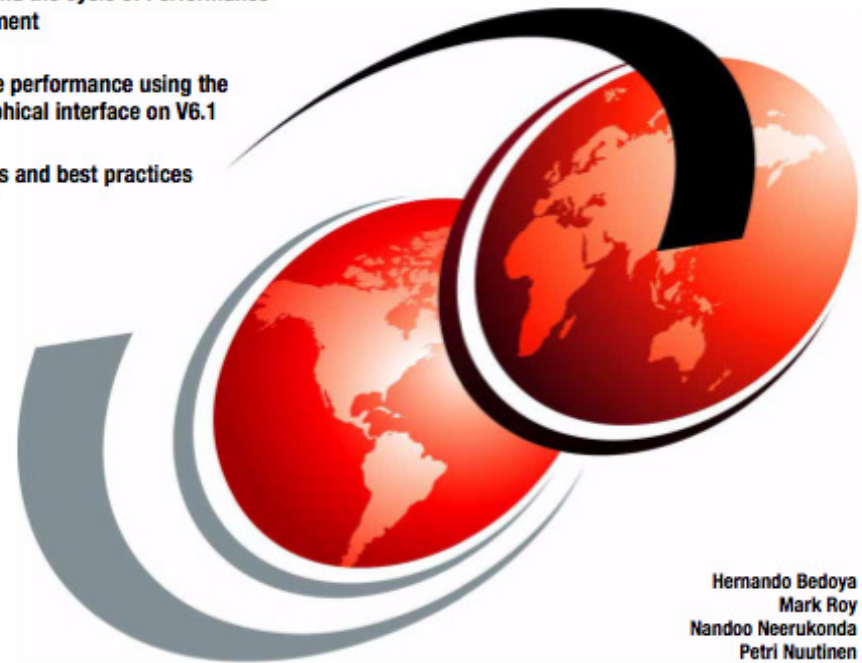


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IBM Navigator for i Redbook

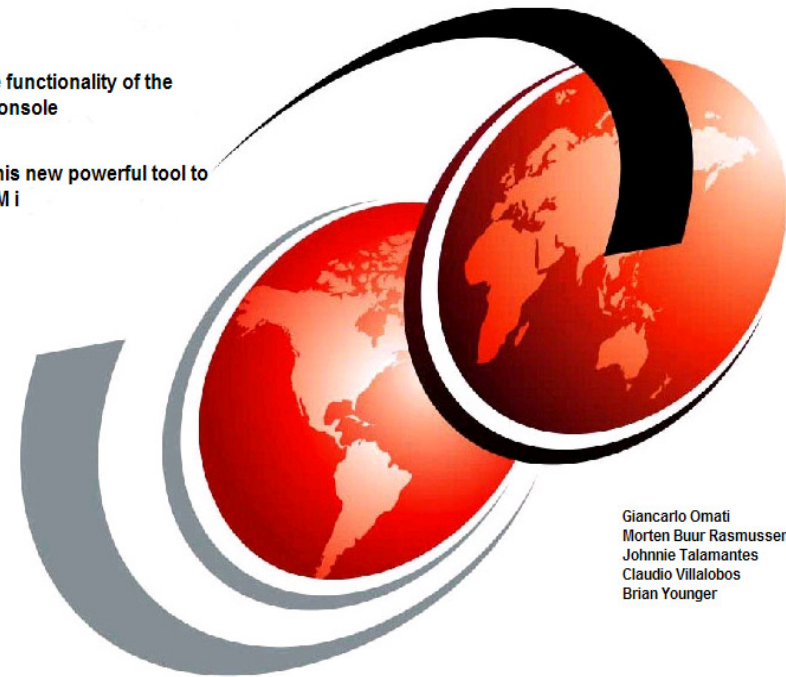
- Released December 2009
- Chapter 9 focuses on Performance tasks
- Redbook number: SG24-7789-00
- *This Redbook is a bit outdated with all the enhancements over the past two years.*

IBM Systems Director Navigator for i

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Performance Capabilities Reference
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