An Introduction to the IBM i Navigator Performance Tasks

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@dawnmayiCan

Introduction to the IBM i Navigator Performance Tasks

Navigator for i has an extensive set of performance tasks and this session review the basics of these performance tasks and how to use them.

This presentation will review the Performance Data Investigator, aka "Investigate Data", which allows you to graphically view and analyze IBM i performance data, including some helpful tips on how you can "Investigate Data" to better understand your system's performance and how you can use the Performance Data Investigator for day-to-day management of your IBM i partition. This session will also review the newest performance tasks, including database performance graphs, health indicators, performance reports, system monitors, and how to use batch model for sizing exercises.
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

Updates to Navigator and the Performance Tasks

- Major enhancements have been made to Navigator for i and the Performance Tasks

  - IBM i 7.2
    - HTTP Server group - SF99713
    - Java group - SF99716
    - Database group - SF99702
    - Performance Tools group - SF99714
  
  - IBM i 7.1
    - HTTP Server group - SF99368
    - Java group - SF99572
    - Database group - SF99701
    - Performance Tools group - SF99145

  - IBM i 6.1
    - HTTP Server group - SF99115
    - Java group - SF99562
    - Database group - SF99601
    - Performance Tools group - SF99114

Navigator Enhancements were taken back to 6.1 and 7.1 in December 2014
Browser Support

- Supported Browsers for the latest Navigator enhancements:
  - Internet Explorer 9
  - FireFox 20 or newer
  - Google Chrome 25 or higher

- 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 browser tips

Tips for Best Performance for Navigator (and the Performance tasks)

- Good system tuning practices are essential
  - CPU
  - Memory
  - Disk

- PDI makes extensive use of SQL to gather data for charts and tables
- Navigator tasks run in the ADMIN2 job in the QHTTPSVR subsystem

- Ensure no bad DNS entries on the system

- Use Application Runtime Expert to validate your environment
  - Network health checker can be run from QShell:
    
    /QIBM/ProdData/OS/OSGi/templates/bin/areVerify.sh –network

- Use the Web Performance Advisor to validate your Web Performance
Navigator Search

Search for Navigator tasks by **things** you know

*You can find tasks without having to know how to navigate to them*

- **Jobs**
  - Active Jobs [Work with a list of active jobs]
  - Server Jobs [Display NetServer server]
  - Active Jobs [Work with a list of active jobs]
  - Reset Scheduled Jobs
  - Scheduled Jobs [Work with a list of Properties [Scheduled Jobs Properties]]
  - Server Jobs [Work with a list of server]
  - User Jobs [Work with a list of your own]
  - Display Server Jobs [VPN Server Jobs]

Navigator - Favorites

- Throughout Navigator, can save favorites
  - Including favorite Performance Data Investigator perspectives
Favorites

- Action drop-down or a “Save as Favorite” button
Navigator – Target Systems

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

You can manage IBM i 5.4, 6.1, 7.1, and 7.2
Not all features are available on all releases

Set Target System

HTTP Server runs on the system you initially log into.

You can manage a second system; no web server is required on the second system; the Host Servers are used
IBM Navigator for i
Performance Tasks

Performance -
IBM i Performance tools allows you to collect and investigate data.

• Investigate Data
Performance Data Investigator allows you to investigate previously collected performance data on your system.

• Manage Collections
Collection Manager allows you to view and work with the performance data on your system.

HELLO
my name is
Investigate Data
Navigator Performance Tasks

- Major enhancements only on 7.2
  - Database content package enhancements
  - Monitors
  - Sizing
    - Batch Model

- Most functions are now available on all releases
  - .... with some exceptions

Packaging

Performance Tools Licensed Program Product

- IBM i for Collection Services, Health Indicators, Monitors

- Performance Tools Licensed Program Product
  - 5761PT1 for 6.1
  - 5770PT1 for 7.1 and 7.2

- Performance Tools LPP - Options
  - Performance Tools - Manager Feature
    - Disk Watcher, Performance Explorer, Database, Batch Model
  - Performance Tools - Agent Feature
  - Performance Tools - Job Watcher
Content Packages

• 6.1 and 7.1:
  – Health Indicators
  – Database
  – Job Watcher
  – Disk Watcher
  – Performance Explorer

• New in 7.2:
  – Monitor
  – Batch Model

Prerequisites
  Authorizing Users to the Performance Tasks

  • Users need to be authorized to use the investigate data and collection manager performance tasks

  • Include users on the QPMCCDATA and QPMCCFCN authorization lists
    ▪ Can be done via GUI or green screen
Application Administration for Performance Tasks

Enhanced Left Frame Navigation

PDI Perspectives Tree
Investigate Data

Resource Utilization Overview

Summary for general overall health:
- CPU Utilization
- Disk Utilization
- Disk Busy
- 5250 Transactions
- I/Os per Second
- Page Faults
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 "full zoom out" tool to display all the data.
An Interesting Example
4 days of performance data. Observe the pattern...

Display Charts in Separate Window

It's useful to compare two graphs side-by-side...
Two Different Charts from Two Different Days

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
Investigate Data Search

New with 7.2 (and now on earlier releases)

- New "Investigate Data Search"
  - Replaces the old search (aka "metric finder")

- Searches in the:
  - Content package and perspective names
  - View
  - Description
  - Metrics
  - SQL

  - Search without metrics and SQL for faster results
  - Add metrics and SQL for more detail searches
Metric Finder

Collection
Collection Library: QFRDATA
Collection Name: Most Recent
Display: Search: Options: Refresh Perspectives: Close

Health Indicators

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Database Health Indicators are new in 7.2

7.2 screen captures

Define Health Indicators

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Define Health Indicators

Reports
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

Start with Report Definitions

Enhanced Left Frame Navigation

Performance Data Report actions

Click on the action to start a new tab. Get to the action you want more quickly.

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Report Definitions

Create your own Report Definition

Add Performance Data Report Definition

1. Actions
2. Perspectives
3. Selection
4. Name

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Create Performance Data Report

Resulting Report (PDF example)
7.2 System Monitors

- System Monitors are new with Navigator in 7.2
  - Similar to Management Central System Monitors

- System Monitor data comes from Collection Services

- You view System Monitor data with the Performance Data Investigator
Monitors with IBM Navigator for i

Select what you want to monitor
Set monitoring intervals
Set thresholds
Define actions taken when a threshold is reached
Manage event logs

List of system monitors on the system

Create New System Monitor

Set Monitor General Information
Metrics to Monitor

Link to configure thresholds and actions

Navigator - System Monitor Metrics

- CPU Utilization (Average)
- CPU Utilization (Interactive Jobs)
- CPU Utilization (Uncapped)
- CPU Utilization (SQL)
- Interactive Response Time (Average and Maximum)
- Transaction Rate (Interactive)
- Batch Logical Database I/O
- Disk Arm Utilization (Average and Maximum)
- Disk Arm Utilization for User/System/Independent ASP (Average and Maximum)
- Disk Storage Utilization (Average and Maximum)
- Disk Storage Utilization for User/System/Independent ASP (Average and Maximum)
- Communications Line Utilization (Average and Maximum)
- LAN Utilization (Maximum and Average)
- Machine Pool Faults
- User Pool Faults (Maximum and Average)
- Spool File Creation Rate
- Shared Processor Pool Utilization (Virtual and Physical)
- Temporary Storage Utilization

Red are new with 7.2 Navigator Monitors
Configure Metric

Metric name
Collection Interval
Threshold 1 & 2

Investigate Data - Monitor

• Investigate Monitor Data starting from the monitor
Investigate Data - Monitor

- Investigate Monitor Data via the Performance Data Investigator
  - This interface allows you to view monitor data without having set up a system monitor

System Monitor Graphs in PDI

Display Graphs in PDI

New Perspective Package
System Monitor Graphs in PDI

Table data behind the chart

7.2 Batch Model
Batch Model

• Batch performance is important for many customers

• "What can I do to my system in order to meet my overnight batch runtime requirements?"
  – (also known as the Batch Window )

• A sizing tool
  – based on Collection Services performance data
  – predicts batch workload run times, resources used, and duration of the "batch window"

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Batch Model

- **What does it do?**
  - Helps you optimize workloads by locating times during the batch window when more efficient job scheduling can improve total system throughput
  - Models workload increases
  - Predicts the changes in throughput that will result from hardware upgrades (processor or disk)
  - Predicts run times for individual workloads and the overall batch window
  - Models batch workloads that are CPU or disk intensive

- **How does it work?**
  - Links individual workloads together to create an ordered series of workloads
  - Powered by an iterative analytic model that attempts to converge on a solution
  - Predicts utilization, throughput and response time for each workload
### Batch Model

#### Change Batch Model – Processor

<table>
<thead>
<tr>
<th>General</th>
<th>Processor Information</th>
<th>Storage</th>
<th>Workloads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model/Feature/Frequency/Cores:</td>
<td>570-9117-MMA 7386 5000 2-16</td>
<td>Partition dedicated processors</td>
<td>Processor: 2</td>
</tr>
<tr>
<td>Number of processors:</td>
<td>2</td>
<td>Number of processors:</td>
<td>2</td>
</tr>
<tr>
<td>Processing units:</td>
<td>2.0</td>
<td>Number of processors:</td>
<td>2</td>
</tr>
<tr>
<td>SMT enabled:</td>
<td>Automatic</td>
<td>Number of processors:</td>
<td>2</td>
</tr>
<tr>
<td>Maximum number of SMT hardware threads:</td>
<td>0</td>
<td>Number of processors:</td>
<td>2</td>
</tr>
</tbody>
</table>

### Batch Model

#### Change Batch Model – Storage

**Add, Change, or Delete Disk Configurations**

<table>
<thead>
<tr>
<th>Original Storage Configuration</th>
<th>Dual Disk Enclosure Configured</th>
<th>Disk Attachment Family Name</th>
<th>Storage Type</th>
<th>Disk Speed (MB/s) or Generation</th>
<th>Number of Disks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Disk Enclosure Configured</td>
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</tr>
</tbody>
</table>
**Batch Model**

*Workload Timeline Overview*

Compare Measured vs Modeled Workload Timelines

---

**Exceptional Wait Detailed Overview**

Investigate the waits that make up the “exceptional wait” time
Batch Model

Resource Utilization Overview

Compare the Measured vs Modeled Resource Utilization

Batch Model with Prior Release Collections

• You can restore Collection Services data from 6.1 or 7.1 onto a 7.2 partition
  – … and use batch model with that prior release data
Performance Tasks and Work Management

Investigate Data for an Active Job

Active jobs – what’s happening right now

Job wait data
Collection Services job data

How did I get here?
Integration with System Status

System Status - etc312.richmond.ibm.com

Last refresh: 3/6/15 9:50:28 AM

- Jobs
  - Total: 3,135
    - Active: 214

- Addresses used
  - Permanent: 0.007 %
  - Temporary: 0.013 %
- Total disk space: 95.44 GB

System disk pool
- Capacity: 95.44 GB
- Usage: 93.706 %

Integration with Disk Status

Disk Status - Z1

- Investigate Disk Data
- Start Disk Watcher

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Investigate Data

Database

Need latest PTF groups, including the database group

Must have the Performance Tools LPP, Manager feature, Installed

Available on both IBM i 6.1 and 7.1

Additional enhancements with 7.2

Integration with Database

• Leverage the capabilities of PDI with valuable data gathered from database

• Collection Services collection of job-level SQL metrics

• Performance Data Investigator charting of
  – SQL Plan Cache Snapshots and Event Monitors
  – SQL Performance Monitor files
  – Collection services 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

<table>
<thead>
<tr>
<th>Perspectives</th>
<th>Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Explorer</td>
<td></td>
</tr>
<tr>
<td>Disk Watcher</td>
<td></td>
</tr>
<tr>
<td>Job Watcher</td>
<td></td>
</tr>
<tr>
<td>Health Indicators</td>
<td></td>
</tr>
<tr>
<td>Collection Services</td>
<td></td>
</tr>
<tr>
<td><strong>Database</strong></td>
<td></td>
</tr>
</tbody>
</table>

Collection

Collection Library    Collection Name
QPFRTDATA    Most Recent

Display    Search    Options    Close

Database tasks...

Database

- Databases
  - Lp02zR28
  - Isopine
- Schemas
- Database Maintenance
  - SQL Performance Monitors
  - SQL Plan Cache
    - SQL Plan Cache Snapshots
    - SQL Plan Cache Event Monitors
- Transactions
- OmmIfind Text Search
Integration with Database

Launch Investigate Performance Data from database tasks (available on all releases)

Launch from System i Navigator client
Integration with Database – package overview

• What you see in PDI will depend upon the currency of your HTTP Server Group PTF

• December 2014 update resulted in single source for all releases
  – You will see the same navigation for all releases
  – However, not all function is available on 6.1 and 7.1

  – The following slides will sort this out for you….
I/O Reads and Writes

- Shows you the SQL CPU Utilization sorted by thread
- A starting point to determine if your CPU utilization is due to SQL or other work
Database Locks Overview

A graph of database record lock contention from Collection Services data.

We can find out it was the QRWTSRVR jobs with record lock contention.
Database Perspectives

Database Package

- I/O Reads and Writes
- Physical Database I/O - Detailed
- Logical Database I/O – Detailed
- SQL Performance Data – Collection Services

Health Indicators Package

- Database Health Indicators

Physical Database I/O - Basic and Detailed

Basic – Provide more overview data, not broken down

Two metrics charted:
- Physical Database I/O Reads per second
- Physical Database I/O Writes per second

Detailed – Includes breakdown by Sync/Async, SQL & Non-SQL
Physical Database I/O – Basic

Physical Database I/O – Detailed
Requires 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
- Error if you try to display one of these charts but have not activated the support:
Job-Level Database Statistics

- Ten 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

Logical Database I/O - Basic and Detailed

- Basic are the same as under Collection Services, Logical Database I/O

- Detailed – Provide more breakdown of the data added in QAPMJOBOS

Logical database I/O read, write and all other I/O requests by SQL related and non-SQL related

7.1 and later
Logical Database I/O – Detailed

Reads, Writes & All Other I/O Requests
SQL Related & Non-SQL Related

- Drilldown to Database I/O for One Job and
- Database I/O for Jobs – 7 views: All I/Os for Jobs, Reads, Writes, Others (SQL & Non-SQL)

SQL Cursor and Native DB Opens

Charts that show SQL Cursor and Native DB Opens metrics:
- Native database (non-SQL) Full Opens,
- SQL Full Opens,
- SQL Pseudo Opens as rates per second
- (SQL Full open count data added by Collection Services in 7.1)
New Interval SQL plan cache data provided by Collection Services in 7.2

*SQL category – QAPMSQLPC file

Views:
- Query Opens
- Active Queries
- Plan Cache Searches
  - plans found and plans not found
- Plans Detailed
- Maintained Temporary Indexes (MTIs)
  - created and deleted over time
- Adaptive Query Processing (AQP)

Query Opens
- Full and pseudo query opens
- Number of queries that were hard closed

Active Query View
- Total number of active queries
- Query opens

New Interval SQL plan cache data provided by Collection Services in 7.2

*SQL category – QAPMSQLPC file
SQP Plan Cache - 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

SQP Plan Cache – 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

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Similar to the SQL Plan Cache perspectives, SQL Performance Monitor perspectives use PDI to graphically display SQL Performance Monitor information.

**Database Health Indicators**

- Analyzes all collection time intervals according to the defined thresholds for database.
- Shows the proportion of intervals where Database health indicators exceeded the defined thresholds.

**Drilldowns**

- Physical Database I/O Rate
- SQL Full ORs Rate
- Table Full ORs Rate
- Plans Built/Rebuilt Rate
- Moved From Cache Rate
- Physical Database I/O Rate - Basic
- Logical Database I/O Overview
- Query Opens
- Plans Detailed
- Plan Cache Searches
- Adaptive Query Processing (AQP)
- Define Health Indicators
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 – “Allow performance information collection” must be turned on for the IBM i partition to collect the data.
Logical Partitions Overview
Requires Power 6 and IBM i 6.1 or later

12X Bus Utilization

- Collection Services collects utilization data for 12X buses in the **QAPMBUSINT** file
  - Graphs shipped with PDI with **Spring 2014** update!
    - Previously you had to extend PDI with a custom content package to view this data
  - Enable Performance information collection on the HMC
Disk Response Time Charts

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

Java Perspectives

Find that job using a lot of heap…
Java Perspectives

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

Memory perspectives are now available

Similar information from what you get on WRKSYSSTS....
Memory

In a graphical view!

Note the change in pool sizes. QPFRADJ is on.

Memory - Drilldown

Find the jobs that are faulting…
Temporary Storage Allocation / Dealllocation Overview

Generally, allocations and deallocations following a similar pattern

![Graph showing temporary storage allocation and deallocation over time](image-url)
Temporary Storage Allocation by Job or Task

Generally, allocations and deallocations following a similar pattern

Storage Allocation Perspectives

7.2 and earlier

Storage Allocation/Deallocation Overview

Storage Allocation/Deallocation by Thread or Task

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Storage Allocation by Thread or Task

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
Select a job for drilldown …

You can see when the threads for that job ran

Tip: you can select more than one job for your drilldown selection
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 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 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?
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.

---

Some questions and examples
What has the performance adjuster been doing to my pools?

- Collection Services allows you to look *backward in time*.

What does the faulting look like when I was testing?
Who was the guilty party in that faulting??

• You can drill down into job statistics from the prior charts

• Or you can start directly with page faulting perspectives

I had a System Slowdown at 4:00 PM yesterday. Why?

• Start with a system-wide view –
  – CPU Utilization and waits overview

• Select the starting and ending times

• Drill-down into the desired metric
  – For example, CPU Utilization by Thread or Task

• Does one particular job stand out?
End of questions and examples

Documentation …

How do I learn about all the new stuff??

- Technology Refreshes
- Add function PTFs
- New release

and there's all that old stuff too…
Performance is now a major topic - no longer under Systems Management

Navigator is under Connecting to your system
IBM i developerWorks

- IBM i developerWorks is the web site to go to find out about
  - Latest function delivered via Technology Refreshes
  - Enhancements delivered via PTFs

PDI Enhancements via PTFs

1. IBM i developerWorks
2. Technology Updates
3. Performance Tools
4. Performance on the Web

You will find a list of enhancements by timeframe with links to the details.
www.ibm.com/power/i

References
IBM i Performance on developerWorks

- developerWorks
- Performance Tools
  - Additional performance tools resources
  - Performance on the Web
  - Performance Data Collectors
- Forum
- IBM i Performance Data Investigator
- IBM i Performance Data Investigator – Edit Perspectives
- IBM i Wait Accounting
- How to use the Batch Model performance tool

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iDoctor versus Performance Data Investigator

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>iDoctor</th>
<th>PDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface</td>
<td>Windows client</td>
<td>Browser</td>
</tr>
<tr>
<td>Wait Analysis</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Collection Services</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Job Watcher</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Disk Watcher</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Performance Explorer</td>
<td>Yes</td>
<td>Profile collections only</td>
</tr>
<tr>
<td>Database</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Job Watcher Monitors</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Customizable</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>User Defined graphs and queries</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Update Frequency</td>
<td>Monthly Experimental features</td>
<td>Twice Yearly</td>
</tr>
<tr>
<td>Support</td>
<td>Defect only</td>
<td>Standard SWMA</td>
</tr>
</tbody>
</table>
| Chargeable               | Yearly license   | Collection Services at no additional charge with i
                       |                  | Job 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                |
| Multilingual Support     | No               | Yes                  |

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IBM i Performance FAQ
a MUST read!

http://www.ibm.com/common/ssi/cgi-bin/sisialias?subtype=W&entityType=SA&infotype=STGE_PO_PO_USEN&htmlfid=POW03102USEN&attachment=POW03102USEN.PDF

IBM i Web Sites with Performance Information

- IBM Knowledge Center
  - 7.1
  - 7.2

- IBM i Performance Management
  This web site has a lot of GREAT references and papers – see the resources tab
  - Performance Management for Power Systems
  - IBM Workload Estimator
  - iDoctor
  - Job Waits Whitepaper
What Happened to the PCRM?

- Performance Capabilities Reference Manual – “PCRM”

- Was THE reference manual for all things related to IBM i performance considerations
  - Content was carried forward but not always updated

- Beginning in 2014, the PCRM only covers CPW information
  - Updates for new hardware models and CPW ratings
  - Older versions are still available for download

- Use other sources for IBM i performance information:
  - The IBM i Performance FAQ
  - Papers under the resources section on the Performance Management site
  - Knowledge Center
See Performance Management Resource Library at …


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See Performance Management Resource Library at …


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Refer to these


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A Redbooks publication!

End to End Performance Management on IBM i

Understand the cycle of Performance Management

Maximize performance using the new graphical interface on V6.1

Learn tips and best practices


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IBM i 7.1 Technical Overview with Technology Refresh Updates

Covers the 7.1 content through Technology Refresh 7

Chapter 6 – Performance Tools

Chapter 17, Section 6 – Performance in Navigator for i

IBM i 7.2 Technical Overview with Technology Refresh Updates

Covers the 7.2 content through Technology Refresh 1

Section 2.8 – Performance

Section 8.6.7 – Job level SQL stats in Collection Services
Redbooks and Redpapers on IBM i Performance Tools

- IBM i 7.1 Technical Overview with Technology Refresh Updates
- IBM i 7.2 Technical Overview with Technology Refresh Updates
- Application and Program Performance Analysis Using PEX Statistics
- Best Practices for Managing IBM i Jobs and Output (and a few other special tips)
- i5/OS Diagnostic Tools for System Administrators: An A to Z Reference for Problem Determination

The following redbooks are a bit dated but still have some useful information.

- IBM Systems Director Navigator for IBM i (Chapter 9)
- IBM eServer iSeries Performance Management Tools
- A Systems Management Guide to Performance Management for System i and System p servers
- Sizing IBM i5/OS Work on IBM System i5 Partitions
- Managing OS/400 with Operations Navigator V5R1 Volume 5: Performance Management
- IBM iDoctor iSeries Job Watcher: Advanced Performance Tool
- IBM eServer iSeries Systems Management Handbook

Articles

- IBM Systems Magazine, IBM i – "Investigating the Investigator", May 2010
- SystemiNetwork - "Performance Data Investigator Consolidates Functions in One Place", June 2009
- SystemiNetwork - "IBM Systems Director Navigator for i: Performance Tasks Overview", June 2009
Articles on Job Watcher

- “Web Power”

- Introduction to Job Watcher Green Screen Commands

- Top 10 Hidden iDoctor Gems

- Using iDoctor for iSeries Job Watcher to Determine Why Jobs Wait
  http://www.ibmsystemsmag.com/ibmi/october05/technicalcorner/8896p1.aspx

Articles on Disk Performance

- A New Way to Look at Disk Performance

- Analyzing Disk Watcher Data
  http://www.ibmsystemsmag.com/ibmi/tipstechniques/systemsmanagement/Analyzing-Disk-Watcher-Data/

- Using Wait State Accounting to Determine Disk Performance

- Understanding Disk Performance, Part 2: Disk Operation on i5/OS

- Understanding Disk Performance Metrics
  http://prodeveloper.com/systems-management/understanding-disk-performance-metrics

- Planning for Solid State Drives
  http://ibmsystemsmag.blogs.com/ibmi/2012/01/planning-for-solid-state-drives.html

- Moving Data to Solid State Drives
  http://www.ibmsystemsmag.com/ibmi/storage/disk/data_ssd/

- Customer use of SSDs

- A Look at System i Integrated DASD Configuration and Performance under i5/OS
  - Redpaper REDP-3919-00
    http://www.redbooks.ibm.com/abstracts/redp3919.html
Systems Management References

- Navigator for i on developerWorks

- IBM Application Runtime Expert
  http://www-03.ibm.com/systems/power/software/are/index.html

- Uncovering Application Runtime Expert – IBM i 7.1

- Web Performance Advisor

- IBM Systems Director
  http://www-03.ibm.com/systems/software/director/

- IBM Tivoli Monitoring

- IBM Tivoli Monitoring Agent for IBM i
  IBM Tivoli Monitoring IBM i OS Agent Reference Version 6.3 Fix Pack 2.pdf

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- Resolving SQL query and native IO performance problems
- Tuning RPG, COBOL, C, and Java (including WebSphere Application Server) programs
- Removing bottlenecks, resolving intermittent issues
- Resolving memory leaks, temporary storage growth problems, etc.
- Tuning memory pools, disk subsystems, system values, and LPAR settings for best performance
- Optimizing Solid State Drive (SSD) performance
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Learn the science and art of performance analysis, methodology and problem solving

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Managing and analyzing the data can be quite complex. During this workshop, the IBM Systems Lab Services IBM i team will share useful techniques for analyzing performance data on key IBM i resources, and will cover strategies for solving performance problems. It will aid in building a future foundation of performance methodology you can apply in your environment.

Overview:

- Topics covered include:
  - Key performance analysis concepts
  - Performance tools
  - Performance data collectors (Job Watcher, Disk Watcher, etc.)
  - Wait accounting
- Core methodology and analysis of:
  - Locks
  - Memory
  - I/O subsystem
  - CPU
- Concept reinforcement through case studies and lab exercises
- May include discussions on theory, problem solving, prevention and best practices

Workshop details:

- Intermediate IBM i skill level
- 3 day workshop, public or private (on-site)

Workshop availability and enrollment:
http://www-03.ibm.com/systems/power/software/support/workshops/performance-analysis.html

For additional information regarding private workshops, please contact Mike Gordon, STG Lab Services, at mgordo@us.ibm.com
Performance and Scalability Services

- The IBM i Performance and Scalability Services Center can provide facilities and hardware IN ROCHESTER to assist you in testing hardware or software changes
  - “Traditional” benchmarks
  - Release-to-release upgrades
  - Assess and tune application and database performance
  - Stress test your system
  - Determine impact of application changes
  - Proofs of Concept (e.g. HA alternatives; SSD analysis, external storage, etc.)
  - Evaluate application scalability
  - Capacity planning

- ... all with the availability of Lab Services IBM i experts and development personnel

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IBM i Solid State Drive Performance Services

Evaluate the benefits of SSD technologies with IBM i based applications

Features
- Three options to best meet client needs:
  1. Data collection on the client system with analytical services to determine the benefit SSDs will provide. The analysis also identifies which specific objects should be stored on SSDs to optimize benefits.
  2. Remote access to a fixed Power IBM i configuration to load and test client workloads on both SSDs and traditional disk drives (HDDs). Assessment is made of the delta between workload performance on SSDs and HDDs.
  3. Hardware configured to client specifications with client workloads run on a system in the Performance and Scalability Services Center in Rochester, MN. Client has onsite access to state of the art test center. Optimal SSD configuration for current and future workload requirements is determined from analysis of workload runs.

Typical Benefits
- “Real data” available to assess if SSDs are for you.
- Multiple offerings provide flexibility in the scope and depth of the analysis you choose to perform.
- With the assistance of our Lab Services experts, clients will learn how to optimize the use of SSDs to meet their processing and business requirements.

Contact
- To initiate these services, submit a request form at url: http://www.ibm.com/systems/services/labservices/psscontact.html

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