IMS Performance - Getting The Most Out Of Your Monitoring Technology: Isolating And Solving Common Issues

Ed Woods
IBM Corporation

Session 9808
Tuesday, August 9th
9:30 – 10:30 AM
Agenda

- Understanding the workload
  - IMS as part of a bigger picture
- Real Time IMS monitoring examples
  - Typical steps in problem analysis
- Historical data collection considerations
- Alerting and corrective actions
- Integrated monitoring and management
IMS Is Part Of A Much Bigger Picture

- IMS works as a central component of many critical applications
- Application connectivity and flow may take many forms
- Understanding the flow helps drive monitoring requirements
Understanding The Flow Of IMS Processing
What Are The Potential Bottlenecks?
Monitoring Information
Real Time *versus* Historical *versus* Alerts

A complete monitoring approach will commonly require elements of each of the following:

- **Real time performance and availability**
  - Current resource utilization, availability, and status

- **Historical performance and availability**
  - Detailed historical performance and availability information
  - Interval historical information for trending and analysis

- **Alerts and Automation**
  - Alert notification of critical performance and availability issues
  - Notification of alerts (visual or via other means)
  - Automated corrective action (where appropriate)
Creating A Consolidated Monitoring Strategy To Analyze IMS Processing And Bottlenecks

- Managing and analyzing IMS performance depends upon an understanding of the flow of the workload
  - What is the workload?
  - What is the flow of the workload?
  - Where are the potential workload bottlenecks?
  - If the workload is bottlenecked, to what extent?

- Build a monitoring strategy to focus on key metrics
  - Transaction response time – with application grouping
  - Transaction rate information at various levels
    - IMS transaction response time correlated with transaction rate
    - Transaction enqueue/dequeue rate at various levels
      - Enqueue/dequeue rate at the system level, OTMA level, Fast Path level
  - Bottleneck analysis (wait states for the system and by workload group)
  - Transaction queue depth
    - Queuing at the system level and the transaction level
    - Queuing at other levels (FP BALG, MSC link, etc.)
  - Dependent region processing (region occupancy)
Examples Of Typical IMS Performance And Availability Challenges

- Poor IMS response time, trans queuing and/or bottlenecked
  - IMS transactions queued
  - IMS scheduling delays
  - IMS application performance/system bottlenecks

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  - CICS/DBCTL connection bottlenecks
  - Network delays
  - Delays related to IMS Connect, OTMA, APPC, etc.

- IMS database and subsystem delays
  - IMS database delays
    - High I/O, poor BP performance and IMS lock conflicts

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Understanding The Workload Response Time Analysis

Response Time Analysis (RTA) provides critical information on workload flow, issues, and outliers

RTA does several things
  - Captures detailed response time data from IMS and stores it in user-definable groups
    - Consider grouping related workload for analysis purposes
  - RTA measures queuing and service times within IMS
    - Input queue time, Processing time, Output queue time
  - Groups work in conjunction with Bottleneck Analysis

RTA group considerations
  - Focus user-defined groups on key workload
    - Loved ones and problem children
Use Response Time Analysis To Understand Transaction Performance And To Identify Potential Issues

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Analyze transaction response time over various time intervals

RTA will show transaction response time for workload groups, broken down by component, and various time intervals.

Input queue time
Processing time
Output queue time

Where is the issue?

Identify tran with longest response times
Monitor the flow of the workload
Use Response Time Analysis to identify problems and outliers.

Use RTA to understand the flow of the workload.

Message counts and rates

Response Time Analysis broken out by component

Monitor message counts and rates
If RTA Indicates An Elongation Of Response Time, Look At Transaction Rates And Transaction Queuing.

IMS Health workspace focuses on many key rate metrics.

Real time indicators at the system level of transaction rates and queuing.

Enqueue/dequeue rates

CPU rates

Enqueue/Dequeue rates by category for the system.
Further Analysis – Are Transactions Queued?  
Drill Down For More Detail

From the navigation tree go to Transaction Summary

Look at Transactions by state and click the link for drill down detail
High region occupancy may be an indication of application delays. May result in higher response time, scheduling delays, and transaction queues.

What transaction, PSB, and how many calls?

How busy is the region?

Tran elapsed Input Queue time
Where Is The Bottleneck?
Use Bottleneck Analysis To Identify Waits By Category

Bottleneck analysis does a detailed analysis of IMS workload and determines where the workload is spending its time. Delay percentages are broken out for short term and long term intervals.

Bottleneck analysis will help identify workload bottlenecks.

% delay by category
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Monitor IMS Connect Processing
Track Transaction Level Response Time

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IMS Connect monitoring provides detailed transaction level response time information.

Note – Detailed IMS Connect monitoring requires IMS Connect Extensions.
Understanding The Impact Of The Network On IMS Response Time

Including network monitoring detail provides a more complete analysis of IMS response time.

OMEGAMON XE For Mainframe Networks
Network time for IMS transactions

OMEGAMON XE For IMS
IMS host response time including queue and processing time for the transaction.
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➔ Poor IMS response time, trans queuing and/or bottlenecked
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➔ External subsystem (DB2) delays – elongate IMS application time
  ➔ DB2 thread connection issues
  ➔ DB2 SQL delays
  ➔ DB2 database I/O delays and BP performance
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IMS I/O Bottlenecks And Contention

Monitor BP usage and hit ratios

Monitor I/O delays and bottlenecks
- Database I/O
- IMS dataset I/O
- LGMSG SHMSG I/O

Bottleneck analysis shows I/O delays

Database information (including HALDB and Fastpath support)
 IMS Lock Analysis Information In The Tivoli Portal

More detailed analysis of lock holders/waiters, and full support for both IRLM and PI locking in the TEP

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<thead>
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Drill into application detail
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Where Is The Bottleneck?
Use Bottleneck To Analyze Where The Workload May Be Bottlenecked

Bottleneck Analysis breaks workload into components (for example):
- Using CPU/Waiting for CPU
- Scheduling Waits
- IMS lwaits
- Database Waits
- z/OS system waits
- Waits for DB2 or MQ

Use Bottleneck Analysis to determine where to look next

External subsystem waits
IMS Historical Performance And Availability Analysis
Categories Of History Data Collection

- **EPILOG Historical**
  - Historical analysis of response, bottlenecks and IMS resources
  - Stored in VSAM Epilog Data Store (EDS) by group and time interval

- **TRF Historical**
  - Detailed transaction & database data
    - individual transactions
  - Detailed performance analysis & chargeback

- **Near Term Historical**
  - Detail on recent transaction execution

- **Tivoli Enterprise Portal Historical**
  - Tivoli Data Warehouse history
  - Use for trending analysis

**Interval summary (with some detail)**

**Detail records**

**Recent detail**

**Interval snapshot trending**
Near Term History Of IMS Transactions

Manage near term history collection

Near term history with drill down for more detail
Use History To Track And Trend Key IMS Performance Indicators

Use the Tivoli Portal to collect performance history data for such things as IMS Bottlenecks, OTMA, Response time analysis, IMS system statistics, IMS transaction status.
IMS Historical Performance Analysis Workspace

- Plot chart analysis of key IMS performance metrics
- Plot charts of history by time interval. Use for trend analysis.
- Transactions by status
- IMS Bottlenecks
- Response time and processing rate
- Enqueue/dequeue rates
Use Chart Functions For Statistical Analysis
Are We Trending The Wrong Way?

Baseline analysis and arithmetic functions

Area plot charts provide a different perspective of history
Benefits Of An Integrated Alert Management Methodology

- Improved ability to manage increasingly complex composite applications
  - Enables an integrated approach to the management of subsystems, platforms, and application components

- Reduce time to problem resolution
  - Identify potential issues more rapidly

- Improved event management and problem isolation
  - More meaningful and useful problem alerts

- Improved event correlation and management
  - Eliminate the “noise” and focus on key issues

- Superior performance analysis capabilities
  - Monitor and manage based upon actual information, not anecdotal data
Alert Example Using The Tivoli Enterprise Portal
To Integrate Essential Performance Information And Manage Alerts

Tivoli Enterprise Portal (The TEP) enables integrated alert and automation capabilities.

IMS as part of the bigger picture.

IMS is an essential component of many mission critical applications.

Performance and availability management requires an integrated approach.

Icons indicate an alert.
Situations – Usage And Benefits Highlight Performance And Availability Issues

Click to see alert detail

Flyover pop-up shows the name of the ‘situation’ alert
Categories Of Typical Situation Alerts

- **Availability**
  - Application availability
  - Essential infrastructure availability
  - Subsystem availability

- **Performance**
  - Subsystem performance
  - Application performance
  - Identification of performance issues

- **Resource**
  - Subsystem resource utilization
  - Application resource utilization

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Alert Notification Types And Options

- Visual View – Custom Views – Enterprise View
  - Red/Yellow indicators and icons in Tivoli Enterprise Portal or TBSM displays
- Console messages
  - Example - Issuing messages and commands to the z/OS console
  - Use this as a mechanism to feed other automation
- Paging and emails
  - Issue commands to feed paging systems
  - Use 3rd party tools such as Postie to issue emails from the command prompt
  - Console messages may be used to feed email systems
- SNMP traps and alerts
  - Issue SNMP traps from the command prompt using situations or policies
- Netcool/OMNIbus events
  - OMNIbus acts as an event correlation engine
  - May receive events via traps or the EIF interface
- Alerts to 3rd party (non-IBM) tools
Application Performance Example
Situations To Monitor Response Time

Using boolean logic allows the alert to be application sensitive.
A single situation can handle multiple application groups, if needed.

Consider alerting on R0 versus R1 response time. R0 only considers Input Queue and processing time, and excludes outqueue time.

Note – this is the RTA group name

Consider using the persistence option to filter out outliers
Application Performance Example
Monitoring Transaction Level Queuing

Monitor the queuing and status of the PART transaction.
If PART is queued or the Queue depth is beyond a certain level generate an alert.
Region occupancy measures how busy the message region is.

Create situations to monitor region occupancy by region type and/or region name.
Subsystem Performance Example
Monitoring Queuing At The Subsystem Level

This situation will alert on transaction queue depth for the subsystem.

Note – this is a subsystem level number. For more granular queue alerts you may use other situation examples.
Application Availability Example
Alert On Critical Transactions In A Stopped Status

Alerts may be set at the transaction level for status. Logic may be added for time of day and day of week.

Various transaction statuses that may be alerted on.
Create Situation Alerts When Certain Bottleneck Analysis Wait Percentages Exceed A Threshold

You may create situation alerts incorporating IMS wait reasons and percentages as part of the situation logic.

For example:
- Alert if DB wait time > n%
- Alert if DB2 wait time > n%
- Alert if Sched wait > n%
Create An Integrated View Of The Enterprise
Ease Problem Notification/Isolation
IBM solutions that integrate via the Tivoli Enterprise Portal

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<th>Tool</th>
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<td>OMEGAMON XE on z/OS</td>
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<td>NetView for z/OS</td>
<td>IBM Tivoli NetView for z/OS V5.3</td>
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<td>Network</td>
<td>OMEGAMON XE for Mainframe Networks</td>
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<td>OMEGAMON XE for DB2 PE/PM</td>
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<td>CICS</td>
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<td>OMEGAMON XE for Messaging</td>
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Use OMEGAMON And The Tivoli Enterprise Portal To Consolidate Performance Analysis - Example

In the integrated performance view pull together detailed performance information for multiple components.
Summary

- It’s always important to begin with an understanding of the workload
- Have monitoring in place for key resources
- Consider History options along with real time
- Alerting can be important
- Integrated monitoring and management enables the ‘Big Picture’ view
Check Out My Blog
http://tivoliwithaz.blogspot.com

Visit my blog on IBM Tivoli performance and availability management of System z. Lots of information on OMEGAMON, Automation, and many things Tivoli...
Thank You!!