Gain New Levels of Visibility and Insight to your z/OS Systems, DASD and Tape Resources using IntelliMagic Vision

Lee LaFrese, Senior Performance Consultant  lee.lafrese@intellimagic.com

Todd Havekost, Senior Performance Consultant  Todd.Havekost@intellimagic.com
Agenda

• **Introduction and Overview**
  – Lee LaFrese, Senior Performance Consultant

• **Deep Dive on z/OS Systems**
  – Todd Havekost, Senior Performance Consultant

• **Deep Dive on z/OS DASD, Replication and Tape**
  – Lee LaFrese, Senior Performance Consultant
How Visibility Protects Availability

Why build a lighthouse?

Shed Light on Hidden Dangers

Provide Guidance in Unfamiliar Waters

Prevent a Shipwreck
What Deeper Visibility Looks Like

GBs of data on:
- volumes, jobs, data sets, drives, replication,
  LPARs, channels...

"IntelliMagic"

Exception
Warning
Healthy

Dashboards with Key Risk Indicators
Quick drill-downs to show underlying issues
Covers Entire z/OS Infrastructure

- Storage Systems (74.1, 74.5, 74.8, 78.3)
- Replication: GDPS GM, EMC SRDF/A, XRC (105, 206, 42.11)
- Host channels (73), FICON Director (74.7)
- Processors
  - CEC, LPARs (70, 72, 113)
  - WLM goals (72)
  - Paging (75)
- Coupling Facility (74.4)
- XCF (74.2)
- Tape and Virtual Tape (SMF 14,15,21,30, IBM BVIR, Oracle StorageTek)
- Job records (SMF 30) and Dataset records (SMF 42).
- Supports all z/OS mainframe disk storage (EMC, IBM, HDS, HP)

Note: Not all features listed are included in every license
Combine RMF Data

IntelliMagic Vision filters and enriches RMF data for data mining:

• **Align** native z/OS and external data
  – e.g. 74.1 device and 74.5 cache counters

• **Eliminate** redundant data across z/OS images
  – For each system there is unique as well as duplicate data
  – No easy way to ‘sum’ data from multiple systems

• **Correlate** event data to intervals
  – e.g. tape mounts, job end

• **Supplement** with external data
  – Sometimes needed to get the complete picture
  – e.g. EMC SQ Mirror, DCOLLECT, BVIR
Software as a Service; Fastest Route to Value

- Good problem to solve with Software as a Service
- Easy Access to intelligence relevant to different roles
- Access to IntelliMagic experts for knowledge transfer, analysis
- Solution infrastructure is managed for you, creating more focus
Detect Risks

• Health rules are applied to enriched RMF data

• This results in **Ratings** that show risk levels

- **Green** = Healthy
- **Yellow** = Early Warning
  - Resource getting busier, availability risk to application
- **Red** = Exception
  - Busy or slow resource, impact to application

• This process is applied to over 150 metrics, with many thousands of data points every RMF interval!
Automatically identify performance risks and efficiency opportunities with 1000’s of automated health checks across a large infrastructure.
Performance Summary Multi-Chart

- One click drill down to a multi-chart
- Shows time charts for all the metrics from the dashboard
- Border of the chart shows the rating (gray = no opinion)
- Click to see a larger chart with more detail

Easy to drill down from high level charts to greater detail using simple point and click. For example from Disk Storage go to SSIDs, volumes, datasets, ports, RAID arrays, storage pools and channels
Embedded Expertise: Quantify Good vs. Bad

Automatically rate existing and new metrics using built-in expert knowledge about z/OS and your infrastructure to derive intelligence about performance threats and efficiency opportunities.
Embedded Expertise: Rate Exception Severity

A three level rating system based on hardware capabilities

A three level, dynamic rating based on both workload characteristics and hardware
z/OS Systems
Systems Module – Overview

Legacy
- CEC, LPAR, 4HRA (70)
- Real Storage, Paging (71)
- WLM (72)
- Channels (73)
- CF, XCF, FICON Dir. (74)
- Page Datasets (75)
- Virtual Storage (78)
- Address Space (30)

Emerging
- zIIP SMT* (70)
- Transaction* (72)
- PCIe/zEDC (74)
- SCM (Flash)* (74)
- SCRT/Usage* (89, 30)
- LPAR Topology (99)
- Processor Cache (113)

* - GA 1Q 2017
Processor Cache Efficiency / 4HRA / MLC Reduction
Cycles Per Instruction
CPI with Components of RNI
RNI by Logical CP

CPs 6 & 8 VMs

CPs 6 & 8 VHs
% CP Time Dispatched on VHs by CEC
Dispatched MIPS by CEC by Polarity
Dispatched MIPS by LPAR by Polarity
Estimated Impact Cache & TLB Misses for CPs

L3 Off-Drawer
Rolling 4 Hour Average by CEC (MSU)
Rolling 4 Hour Average vs RMF Interval Average (MSU)
CP Dispatch Time – By Workload
CP Dispatch Time – By System
CP Dispatch Time – By Service Class
Flexibility of User Interface – CPU Usage

- By CEC
- By System
- By Workload
- By WLM Importance Level*
- By Service Class
- By Report Class
- By Address Space

- By MIPS / MSUs* / CPs
- Each drilldown 1 click away
- Instantly compare 2 intervals

* - GA 1Q 2017
MLC Assessment Offer

Purpose:
- Identify unrealized MLC reduction opportunities

Process:
- Send IntelliMagic Data
- Analysis by IntelliMagic Experts
- Presentation of MLC Assessment Results

Cost: No charge for qualified sites in North America
Coupling Facility
Coupling Facility by Structures (top 30)
Coupling Facility Structures Minicharts

The charts show service time data from the by-structure measurement in the coupling facility. The dashboard will show the synchronous and asynchronous request rates, as well as charts for any delays that are incurred. When there are no delays for peer subchannels and services, only the four charts may show delays, the other charts will only have zero values.

For Structure Name ‘DB30_GB06’

- Synchronous request rate (req/s)
- Asynchronous request rate (req/s)
- Service time for synchronous requests (microseconds)
- Service time for asynchronous requests (microseconds)
- Rate for Queued Requests (req/s) [settings: 0.10]
- Percentage of requests that are queued (%) [settings: 0.01]
- Delay time for Queued Requests (microseconds)
- Rate of waiting for peer subchannel with reserve lw...
- Percentage of requests waiting for peer subchannel...

- Total peer-subchannel-waiting...
- Rate of waiting for peer-subchannel...
- Percentage of waiting for peer-subchannel...
- Peer-subchannel-waiting time (microseconds) [settings]
- Rate of waiting for peer completion conditions (req/s)
- Percentage of waiting for peer completion conditions (%)
- Waiting-for-peer-completion time (microseconds) [settings]
- Requests delayed in case of dump serialization (req/s)
- Percentage of requests delayed in because of dump...
- Delay time for requests delayed in case of dump...

IntelliMagic
Service Time for Synchronous Requests
CF Service Times & Request Rates - Customized

- Service time for synchronous requests (microseconds)
- Service time for asynchronous requests (microseconds)
- Synchronous request rate (req/s)
- Asynchronous request rate (req/s)
PCI Express / zEDC Compression
Utilization for all Hardware Accelerators
Compression Ratio for Compress Requests
Compress Input (MB/s)
Transaction Reporting by Service Class and Report Class
Transaction Rate by Service Class
CPU per Transaction
Average Concurrent Transactions
## Systems Module – Overview

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### Emerging
- zIIP SMT* (70)
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* - GA 1Q 2017
z/OS Disk and Replication
I/O Rate (I/Os per sec) for all Disk Storage Systems by Serial
Response Time (ms) [rating: 0.00] for all Disk Storage Systems by Serial
Dissecting Disconnect Time

• Compute Read Miss and Synchronous Replication components
  ▪ Service times based on cache, link and rank statistics
• Queuing & Delays is disconnect time that can’t be accounted for
  ▪ Could indicate overcommitted internal paths, HDDs or peer-to-peer links
  ▪ In this case, there was a spike in throughput that caused path contention
Front-end Adapter Utilization (%) [rating: 0.03]

Front-end Adapter Utilization (%) [rating: 0.03]
For Serial 'IBM000002' by HA Name
Read Hit Percentage (%) [rating: 0.00]
for all Disk Storage Systems by Serial
Back-end Read (MB/s)
for all Storage Pools by Serial
Replication Send (MB/s) [rating: 0.00]
for all Ports by Serial
Average RPO over interval (sec) [rating: 0.00]
for all Global Mirror Sessions by Session name
SRDF/A Cycle Time (sec)  
for all SRDF/A Sessions by Session

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Using and Delay components per service class (%) (top 20)
for all Service Classes by Service Class
z/OS Tape
SMF data from each LPAR, includes VSM events also
RMF data about tape devices
Collect data on a per sysplex basis

SMF Type 14: DSN Read
SMF Type 15: DSN Write
SMF Type 30: Jobs/Programs
SMF Type 21: Tape Demounts

RMF Type 74.1: Device Data

z/OS

z/OS

TMS

Optional: Real and/or Virtual Tape

HSC events (VSM)

Optional: BVIR (TS7700)

TS7700 BVIR data is per Library (Grid/Cluster)
Oracle HSC writes special SMF records for VSM events (Default Type 235)
The TS7700 Dashboards summarize the analysis.

Each of these dashboards checks a particular aspect of the TS7700 performance and capacity.
Channel Throughput (MB/s) for all TS7700 Grids
Replication – Receiving Cluster

Replication as Viewed from Receiving Cluster(s)
by Grid Name

This is REPLICATION from the perspective of the receiving cluster(s).
1) Levels for Copy and Replication are indicators of how many and how much data remains to be copied to the cluster.
2) The Queue Ages indicate how old the volumes are that need to be copied.
3) The Inbound copy data rate indicates how fast the replication has been proceeding. This can be affected by whether the source cluster is using a Deferred Copy Workflow or not. And how much of a throttle is being applied.

Logical Volumes for Copy (#)

Replication Backlog: Data that needs to be copied (GB) [rating: 0.97]

Average Deferred Queue Age (minute) [rating: 0.60]

Average Immediate Queue Age (minute) [rating: 0.09]

Inbound Total Copy Data Rate (MiB/s)
Back-end Overview multi-chart
TS7700 Cache Flows

All data flows in and out of Cache (MiB/s)

For Grid Name "", for Cluster "OL3"
Oracle StorageTek VSM

HSC writes SMF records for tape events
VSM: Host Throughputs
VSM: VTV mounts by Type
VSM: VTV Migration Multi-chart
z/OS tape information provided

Charts for activity (mounts, throughput) by

• Volume Group (Application or data set mask)
• Device Group (Control Unit)
• LPARs and Jobs
• Program names (IDCAMS, ARCCTL, etc.)
• Data set names
• Tape Technology (3490E, 3590B, 3592, etc.)
• Media Type (CST, ECCST, HPCT128, ETC_700, etc.)

Also details like

• Number of tape mounts per system for dataset ‘xxx.HMIGTAPE.DATASET’
• Jobs names that use program ‘ADSMxxxx’
Top 30 Programs
Megabytes Transferred
Host Throughput by Volume Group
IntelliMagic Vision for zOS Tape Operational Benefits

Understanding your tape workloads and when they occur
– Mounts
– Mount times
– Throughputs
– Utilizations
– Cache effectiveness
– Replication Backlogs and Ages
– Migration Backlogs
– Physical Drive Utilizations
Reporting Capabilities
Customization and Reporting

• Customize charts:
  – Change title, remove series, filter ...
  – Change variable, add variable, add average line ...
  – Change time frame and compare to prior days or weeks
  – Create fully customized chart from scratch

• Create your own chart sets with your favorite charts

• Any chart or report may be saved and exported to PDF, Power Point or CSV

• Email reports based on a schedule and/or based on conditions

• Easily create a custom home page and favorites in Web Reporter
Example - Compare with another day
Summary
Operational Benefits – IntelliMagic Vision

Data is at your fingertips all of the time

Built in thresholds based on hardware capabilities

Embedded Expertise to Highlight Risks

See trends and patterns over time

Easy drill down to root cause
Key Business Values – IntelliMagic Vision

Proactively **Avoid** outages and service disruptions based on **Domain Knowledge** of hardware capabilities

- **Accelerate Resolution** of problems while **Reducing** staff time and risk of SLA violations
- **Gain Visibility** and control of the infrastructure
- **Key Resource** to enhance staff training and depth of knowledge
Questions?
For More Information please contact...

Len Santalucia, CTO & Business Development Manager
Vicom Infinity, Inc.
One Penn Plaza – Suite 2010
New York, NY 10119
917-856-4493 mobile
lsantalucia@vicominfinity.com

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