Best Practices in 2019 for z/OS Application Infrastructure Availability

Using Operations Analytics Processes on RMF/SMF

Brent Phillips, Managing Director, Americas
Jack Opgenorth, Sr. IntelliMagic Consultant

www.intellimagic.com
Objective: z/OS Infrastructure Availability

Part 1 – Strategic / Management: 3 Best Practices

• Why is performance availability and cost optimization on the platform difficult, and what to do about it?

Part 2 – Technical / Operational: 8 Best Practices

• How does a new approach to RMF/SMF data analysis impact the day to day activities of the human analyst?
Agenda: Part 1 – Strategic / Management

*Why is performance availability and cost optimization on the platform difficult and what to do about it?*

1. Is it difficult for your site today?
2. What has changed to make it more difficult
3. Three Strategic / Management Best practices
   1. Give the Team a Technological Force Multiplier
   2. Interpret the Data with Machine-Powered Contextual Analysis
   3. Leverage Analytics in the Cloud
**Agenda:** Part 2 – Technical / Operations

*How does a new approach to RMF/SMF data analysis impact the day to day activities of the human analyst?*

<table>
<thead>
<tr>
<th>You need a solution that</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Is interactive</td>
<td>Predicts problems and is prescriptive</td>
<td>Generates cost optimization intelligence</td>
<td>Compares and highlights changes</td>
<td>Identifies workload sources and infrastructure elements</td>
<td>Supports application infrastructure views</td>
<td>Utilizes white box analytics</td>
<td>Powerfully bridges the skills gap</td>
</tr>
</tbody>
</table>
Part 1
Strategic / Management
3 Best Practices
Effectiveness in z/OS Infrastructure Analysis

Top 4 indicators of efficient and effective “curve navigation”

1. Most often, you see performance and cost problems ahead of time
2. Problem resolution is frequently quick and without undue stress
3. Infrastructure cost inefficiency quickly and easily identified
4. Machine power used to multiply expertise and limited team time

With what speed and frequency do you encounter dangerous curves with the size and complexity of your infrastructure?
Why is it so Difficult?

- Too much data
- Increased complexity
- Larger infrastructure size/scope
- More dynamic workloads
- Not enough experts
- 30-year-old reporting process

Old Adage: “If you can’t measure it, you can’t manage it”

It is NOT a problem of measurement, but interpretation and usage

New Adage: “If you can’t interpret it, you can’t manage it”
Best Practice 1 – Give the Team a Force Multiplier

- Deep expertise is needed to write and interpret reports today
- Skills gap is accelerating
- Historic low headcount ratios

- More reports are not the answer
- Use the power of the machine to augment the humans
  - Benefits experts and new staff
Best Practice 2: Automated Analysis in Context

“Artificial intelligence is the science of making machines do things that would require intelligence if done by men”

- Marvin Minsky 1968

Can the AI tell me if the metric values are good or bad and why?

What “things” can we make the machine do?

1. Statistical analysis to recognize relative pattern changes

2. Automated analysis using expert knowledge of infrastructure context:
   - Workload levels vs component utilizations
   - Configuration best practices
   - IBM Redbook best practices
Design Approach for Automated Analysis

**Black-box Analysis**
Typical for most statistical approaches

- Platform-agnostic
- Easy, relative correlations only
- Focused on problem symptom metrics, not truly predictive
- Has the workload changed?

**White-box Analysis**
creates *Availability Intelligence*

- Platform-specific interpretation
- Hard, z/OS contextual correlations
- Focused on root causes to derive predictive and prescriptive insights
- Can subcomponents handle the work?
Expert knowledge about the infrastructure context

1. **LEAD** Measures, not just **LAG** Measures
   - Lag measure:
     - Shows the goal to achieve, Easy to obtain
   - Lead measure - 3 characteristics:
     - Predictive - significantly influences Lag measure
     - Changeable – something you can impact
     - Harder to obtain – requires deep expert knowledge

2. Minimizes **False Positives**
   without killing the **False Negatives**
Example with the Storage Infrastructure

*Not just report what the metric value is... but also auto-assess what it means in the context of the specific infrastructure. What SLA risk does the value represent?
Best Practice 3: Leverage Analytics in the Cloud

• Enable the team to focus on analysis and remediation

• Not:
  – Product infrastructure management
  – Software upgrades
  – Database management
  – Ensuring hourly processing

• Also provides easy access to fractional experts for advisory services
Strategic Best Practice Benefits

**Prevent**
- **Predict and Prevent** IT issues without incurring typical false positive/false negative issues
- **Automatically Quantify** risks in the infrastructure for peak workloads or configuration issues prior to production impact being felt by application end-users.
- **Continuous Health Check** of application and infrastructure stress; assess millions of metrics using context-specific expert knowledge and statistical analysis

**Resolve**
- **Accelerate Mean Time To Resolution** for unpredictable problems w/ AI diagnosis
- **Rapidly Identify Where Problems are Occurring** with infrastructure wide exception (anomaly) tables, automated compare of time periods, and more
- **Who, Where, When, Why** to see and understand what applications are affected, what part of the infrastructure, what time frames, and get clues as to probable cause

**Optimize**
- **Save money** without compromising service levels or availability
- **Reduce cost** with superior visibility into drivers of cost such as inefficient CPU utilization, configuration and priority issues, imbalance of workloads across hardware resources, consolidation opportunities, etc.
- **Reduce hardware spend** without negative impact on service levels

**Elevate**
- **Empower New Staff AND Experts**, Replace antiquated reporting with automated analytics
- **Artificial Intelligence as a Force Multiplier** using built-in expert knowledge and statistics will assess and rates key metrics as good vs. bad from a performance or efficiency perspective for the analyst
- **Cloud Delivery** – Immediate access with no maintenance needed
Part 2
Technical / Operational
8 Best Practices
Problem Identified

Report ready for analysis?

Look for JCL to process the correct RMF/SMF records

Run the JCL to create a CSV file

Download the csv file to a charting tool

Is the chart sufficient?

Review/Analyze Chart

Do you need another chart?

Done
Best Practice 1
A solution that is interactive
Best Practice 2
A solution that predicts problems and is prescriptive
MVS Busy (%) [rating: 0.06]
For System ID 'SY10'
Rating based on System data using System Thresholds
MVS Busy (%) [rating: 0.11]

For System ID 'SY10'

Rating based on System data using System Thresholds
Best Practice 3
A solution that generates cost optimization intelligence
Rolling 4 Hour Average vs RMF Interval Average (MSU)
For Processor Complex Serial Number 'JAQ-97D25'
Processor time components (CP, zIIP and zAAP) (sec) (top 20)
For Processor Complex Serial Number 'JAQ-97D25' by Address Space Name
Dispatched CP MIPS by LPAR by Polarity (MIPS) for all Logical Processors by System ID
Best Practice 4

A solution that compares and highlights changes
MVS Busy (%) [rating: 0.06 / 0.11]
For System ID 'SY10'
Rating based on System data using System Thresholds
Change: 33.69% Absolute change: 15.93%
CPs Dispatched by LPAR (processors)
For System ID 'SY10'
Change: 49.89% Absolute change: 0.99 processors
Best Practice 5
A solution that identifies workload sources and infrastructure elements
CPs used by Service Class (processors)
For System ID 'SY10' by Service Class
Change: 47.67% Absolute change: 0.06 processors
CPs used by WLM Importance Level (processors)

For System ID 'SY10' by Importance
Change: 49.30% Absolute change: 0.15 processors
Best Practice 6
A solution that supports application infrastructure views
All CP processor time used for all Service Classes by Application
Change: 223.18% Absolute change: 2,135.76 s
All CP processor time used
For Application 'DATA_WH' by Service Class
Change: 185.02% Absolute change: 346.12 s
Processor time usage
showing address spaces with highest TCB time usage
For Application 'DATA_WH', for Service Class 'RKEAB2' by Address Space Name
Best Practice 7

A solution that utilizes white-box analytics
Response Time (ms) [rating: 0.00]

For DSS Serial Number 'IBM000004'
Rating based on DSS data using DSS Thresholds

Black-Box can do this
Disk Storage System Dashboard [rating: 0.37]
for all Disk Storage Systems by DSS Serial Number
Rating based on DSS data using DSS Thresholds

Everything is White-Box
DSS Performance Summary

The DSS Performance Summary provides an overview of the DSS performance. The charts on the top row show the I/O rate and I/O response time components; the charts on the bottom row show more detailed performance information as measured by IBM and/or computed by IntelliMagic Vision from measurements.
WLM Importance ratings per z/OS Sysplex [rating: 2.38] for all Service Classes by z/OS Sysplex ID
Rating based on Service Class Period Statistics data using Service Class Period Thresholds

31 service classes * 96 intervals = 2,976 intervals to analyze
WLM Dashboard by Importance [rating: 2.38]
For z/OS Sysplex ID 'SYSPLEX1' by Importance
Rating based on Service Class Period Statistics data using Service Class Period Thresholds
WLM Service Class Dashboard [rating: 2.38]
For z/OS Sysplex ID 'SYSPLEX1', for Importance '1' by Service Class
Rating based on Service Class Period Statistics data using Service Class Period Thresholds
Service Class minicharts
Best Practice 8
A solution that powerfully bridges the skills gap
Processor Utilization for Cryptographic Coprocessor (%) [rating: 0.00]

For Processor Complex Serial Number 'JAQ-97D25' by Crypto Processor and Crypto Processor Type
Rating based on Cryptographic Coprocessor data using System Thresholds
## Exception Tables

### TCP/IP and UDP Health

**for all TCP/IP by Sysplex ID**

<table>
<thead>
<tr>
<th>Key</th>
<th>Variable</th>
<th>Rating Type</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODPLEX</td>
<td>Receive Discarded</td>
<td>Error</td>
<td>0.14</td>
</tr>
</tbody>
</table>

**Observation:** There are more received packets discarded than expected.
## Best Practices for z/OS Application Infrastructure Availability in 2019

You need a solution that:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is interactive</td>
</tr>
<tr>
<td>2</td>
<td>Predicts problems and is prescriptive</td>
</tr>
<tr>
<td>3</td>
<td>Generates cost optimization intelligence</td>
</tr>
<tr>
<td>4</td>
<td>Compares and highlights changes</td>
</tr>
<tr>
<td>5</td>
<td>Identifies workload sources and infrastructure elements</td>
</tr>
<tr>
<td>6</td>
<td>Supports application infrastructure views</td>
</tr>
<tr>
<td>7</td>
<td>Utilizes white box analytics</td>
</tr>
<tr>
<td>8</td>
<td>Powerfully bridges the skills gap</td>
</tr>
</tbody>
</table>
Questions?
Thank you for attending

www.intellimagic.com