IntelliMagic

Best Practices in 2019 for z/OS Application Infrastructure Availability

Using Operations Analytics Processes on RMF/SMF

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Availability Intelligence

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?

You need a solution that

1	Is interactive
2	Predicts problems and is prescriptive
3	Generates cost optimization intelligence
4	Compares and highlights changes
5	Identifies workload sources and infrastructure elements
6	Supports application infrastructure views
7	Utilizes white box analytics
8	Powerfully bridges the skills gap

Part 1
Strategic / Management
3 Best Practices

Effectiveness in z/OS Infrastructure Analysis

With what speed and frequency do you encounter dangerous curves with the size and complexity of your infrastructure?

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

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

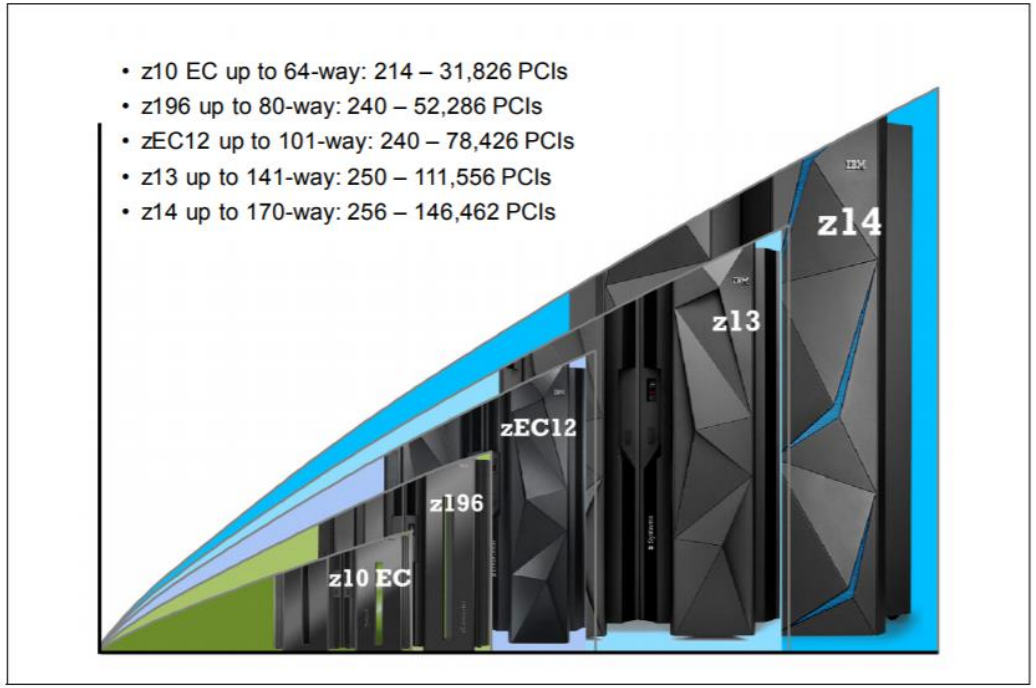


Figure 12-1 IBM Z server generations capacity comparison

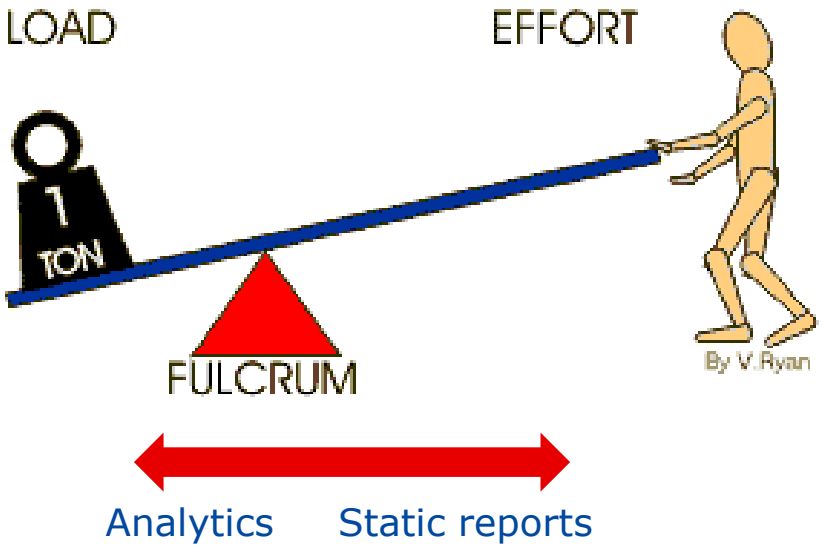
Old Adage: "If you can't measure it, you can't manage it"

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?

Lead Measures & White-Box /Contextual Analysis

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**

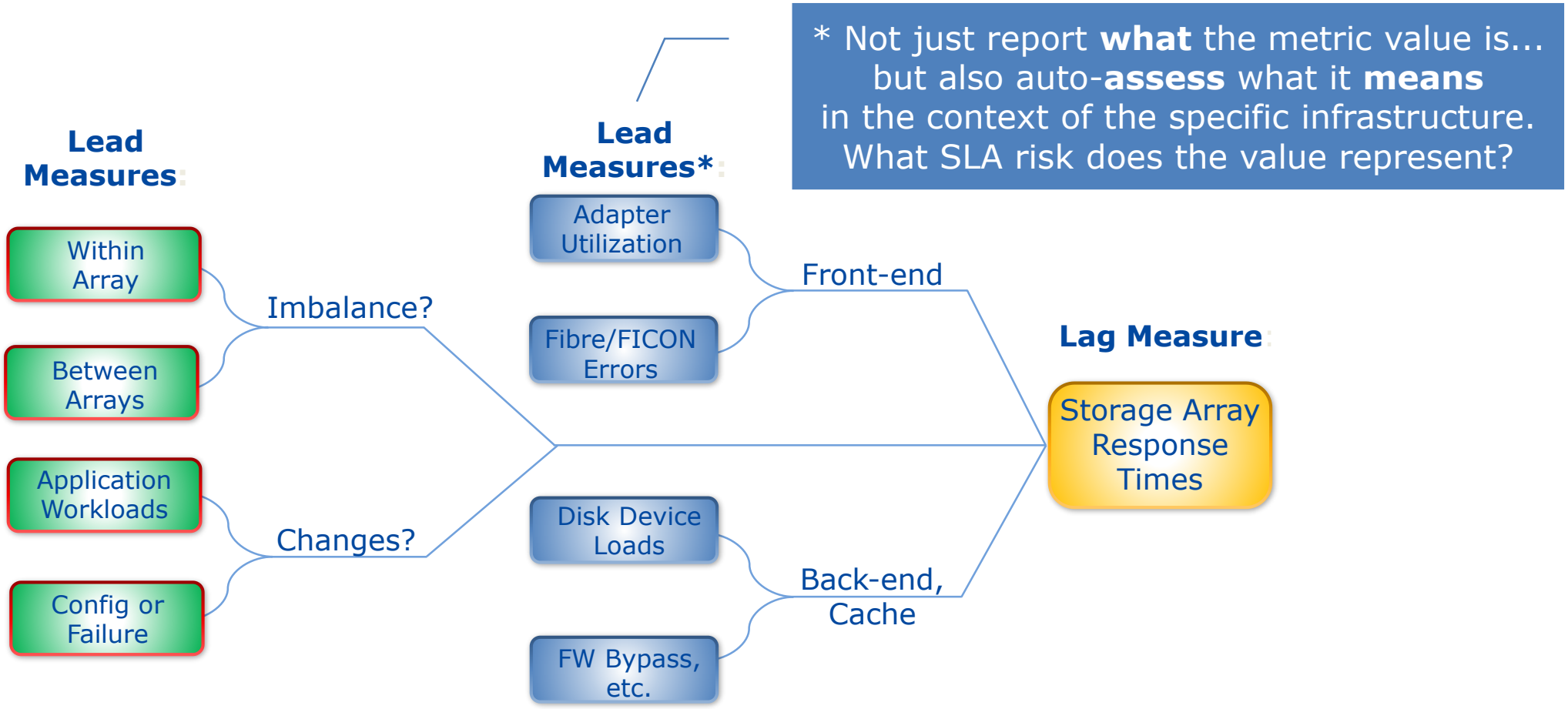
Lag

Lead

Lag

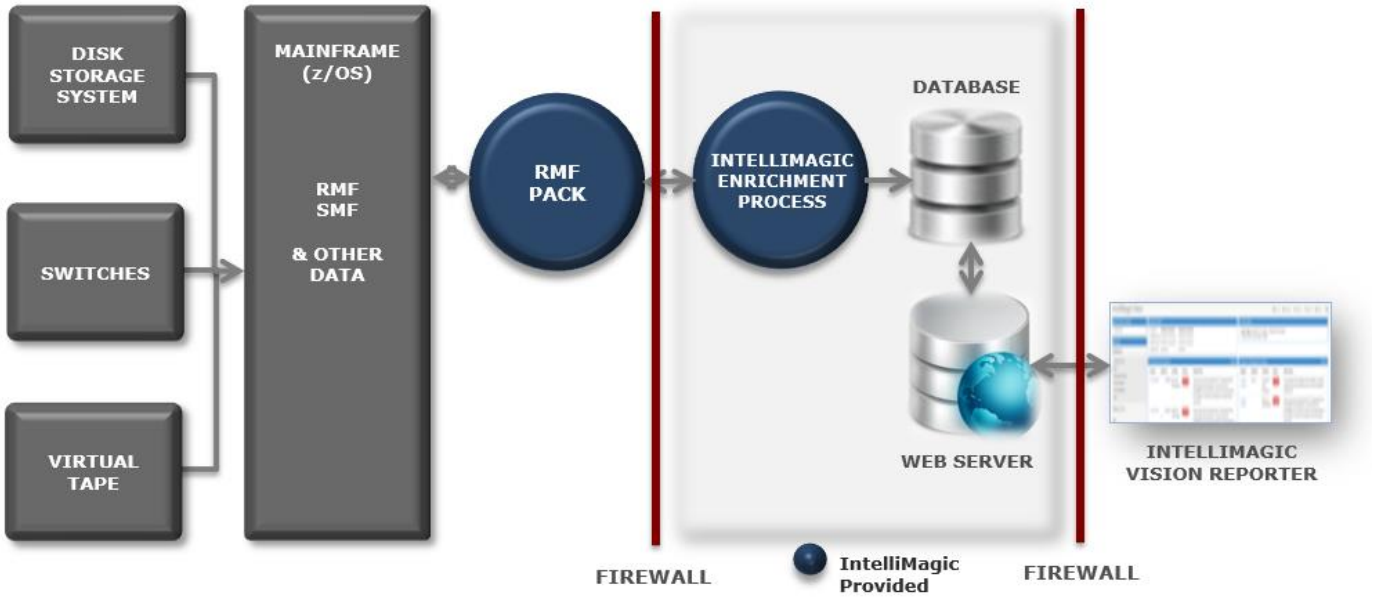
Lead

Example with the Storage Infrastructure



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

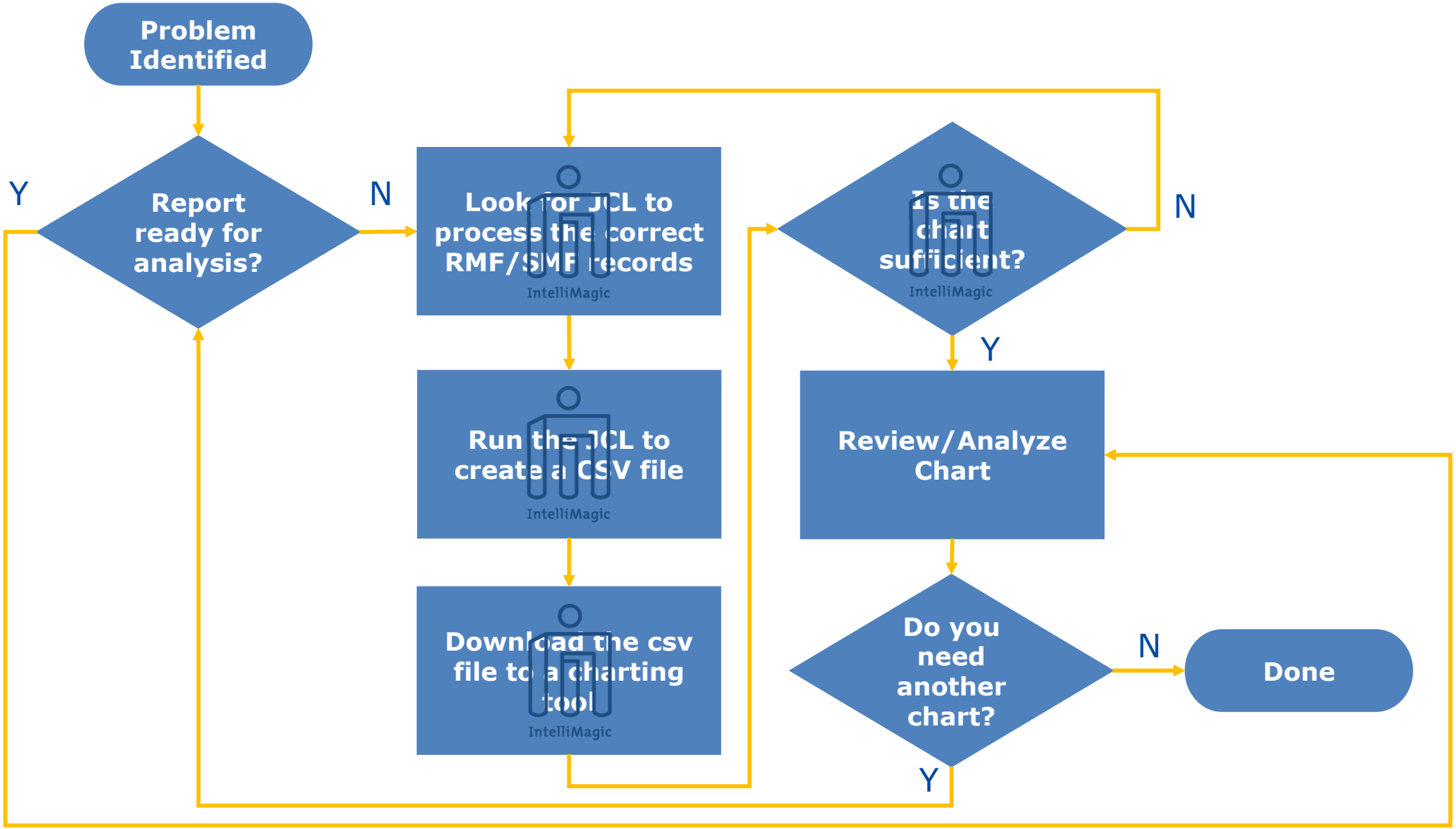
Elevate

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?
Y
N
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?
N
Y
Review/Analyze Chart
Do you need another chart?
N
Done
Y

Best Practice 1

A solution that is interactive

IntelliMagic Vision

My Dashboard | Create Report | Options | Help

Dashboards | Applications | Disk Storage | Disk Replication | Systems, Paging, WLM | CF and XCF | TCP/IP and MQ | Jobs and Data Sets | FICON Directors | Tape Performance | ... Dashboard Menu | Tape Configuration

FAVORITES

LPAR PROCESSOR UTILIZATION DASHBOARD [RATING: 0.19]

for all Systems by System ID — Full report

IGT 8/15/2017 12:00:00 AM - 8/16/2017 12:00:00 AM (Custom: 8/15/2017 12:00:00 AM - 8/16/2017 12:00:00 AM, All days). Sysplex <all>, Shift <all>

System ID	CP Dispatch Time	MVS Busy	LPAR Busy	zIIP Dispatch Time	CP work eligible for execution on zIIP	zAAP Dispatch Time	CP work eligible for execution on zAAP
SY10							
SY11							
SY12							
SY13							
SYS1							
SYS2							
SYS3							
SYS4							
SYS5							
SYS6							
SYS7							

PERFORMANCE WARNINGS AND EXCEPTIONS

for all Storage Groups — Full report

IGT 8/21/2017 12:00:00 AM - 8/22/2017 2:39:56 PM (Last 1 days, All days). Sysplex <all>, Shift <all>

Key	Variable	Rating Type	Rating
PIRI0	Disconnect	User SLO	0.19
PIRI0	Response Time	User SLO	0.11
PIRI0	Read Hit Percentage	User SLO	0.11

WLM DASHBOARD BY IMPORTANCE [RATING: 2.28]

For z/OS Sysplex ID 'SYSPLEX1' by Importance — Full report

IGT 8/16/2017 12:00:00 AM - 8/17/2017 12:00:00 AM (Custom: 8/16/2017 12:00:00 AM - 8/17/2017 12:00:00 AM, All days). Sysplex <all>, Shift <all>

Importance	Performance Index	All CP processor time used	zAAP Processor Usage	CP time eligible for execution on zAAP	zIIP Processor Usage	CP time eligible for execution on zIIP	I/O Ra
0-Sys							
1							
2							
3							
4							
5							
Disc							

WLM SERVICE CLASS DASHBOARD [RATING: 1.59]

For z/OS Sysplex ID 'SYSPLEX1', for Importance '2' by Service... — Full report

IGT 8/21/2017 12:00:00 AM - 8/22/2017 2:39:56 PM (Last 1 days, All days). Sysplex <all>, Shift <

Service Class	Performance Index	All CP processor time used	zAAP Processor Usage	CP time eligible for execution on zAAP	zIIP Processor Usage	CP time eligible for execution on zIIP	I/O Rat
CICSTD							
DDFMED							
DDFSTD							
JESCIS							
JESLOM							
OMVHIG							
OMVSTD							
STCDDF							
STCHIG							
TSOSTD							

Guided Tour

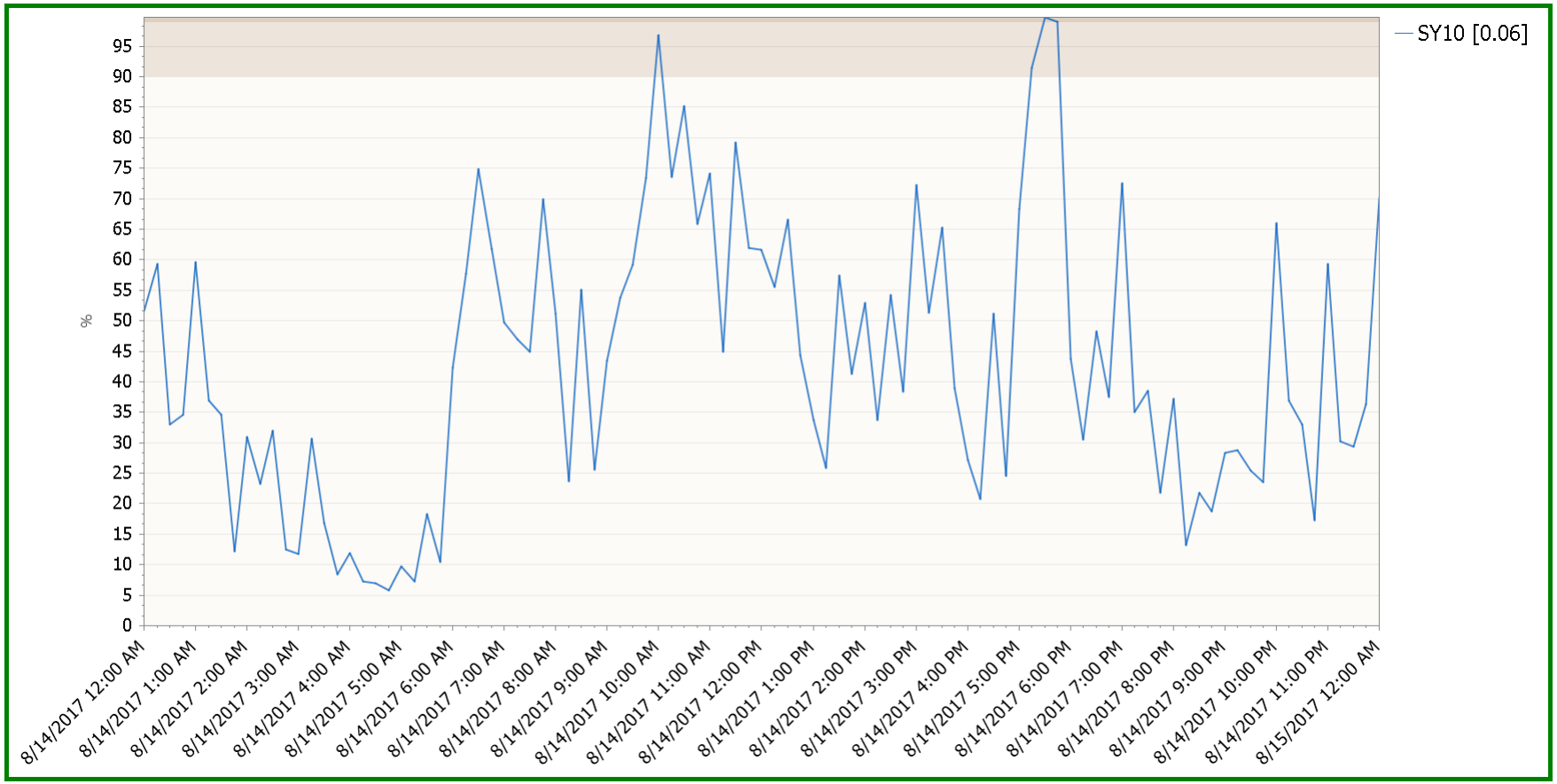
Best Practice 2

A solution that predicts problems and is prescriptive

MVS Busy (%) [rating: 0.06]

For System ID 'SY10'

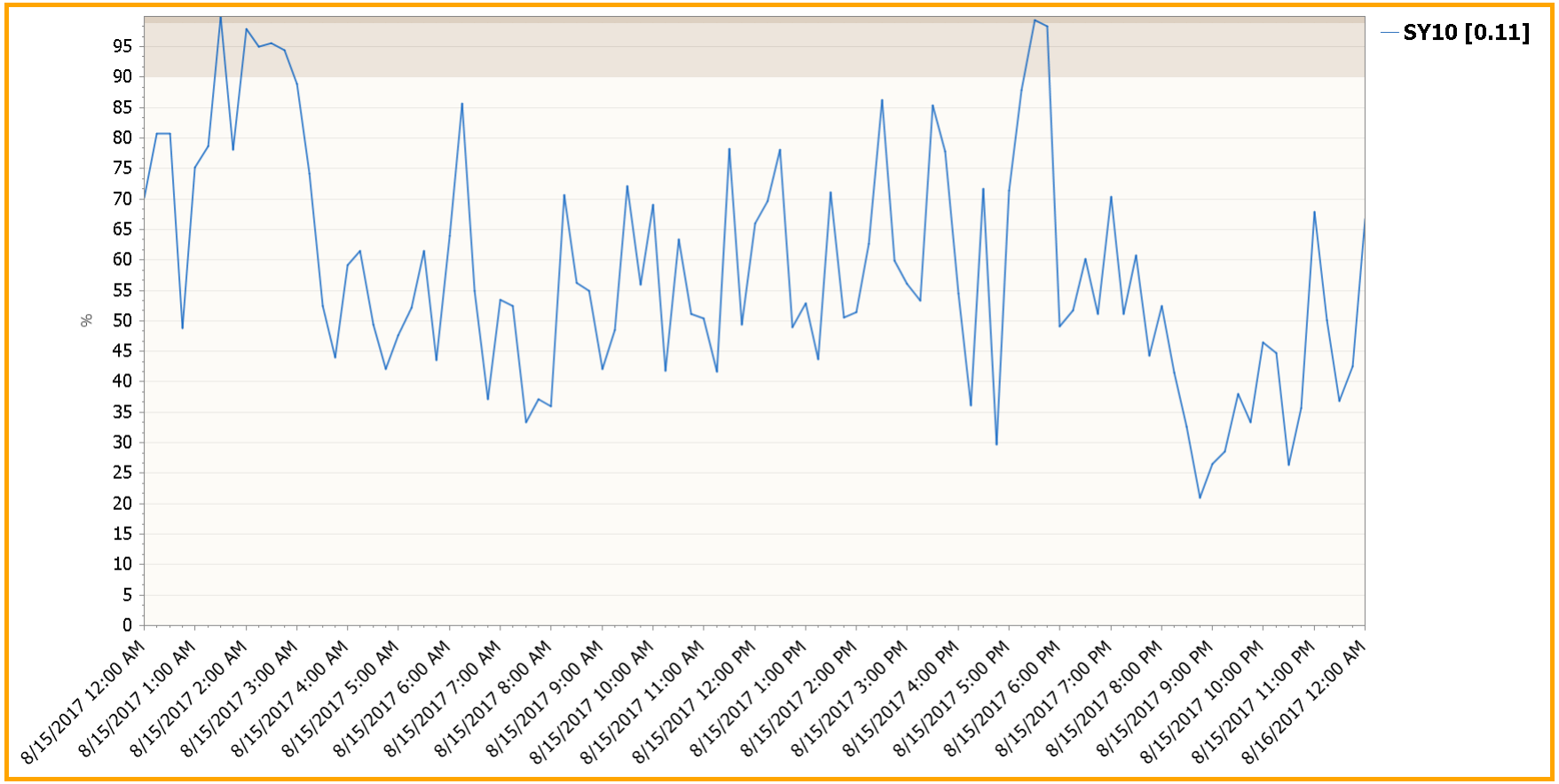
Rating based on System data using System Thresholds



MVS Busy (%) [rating: 0.11]

For System ID 'SY10'

Rating based on System data using System Thresholds

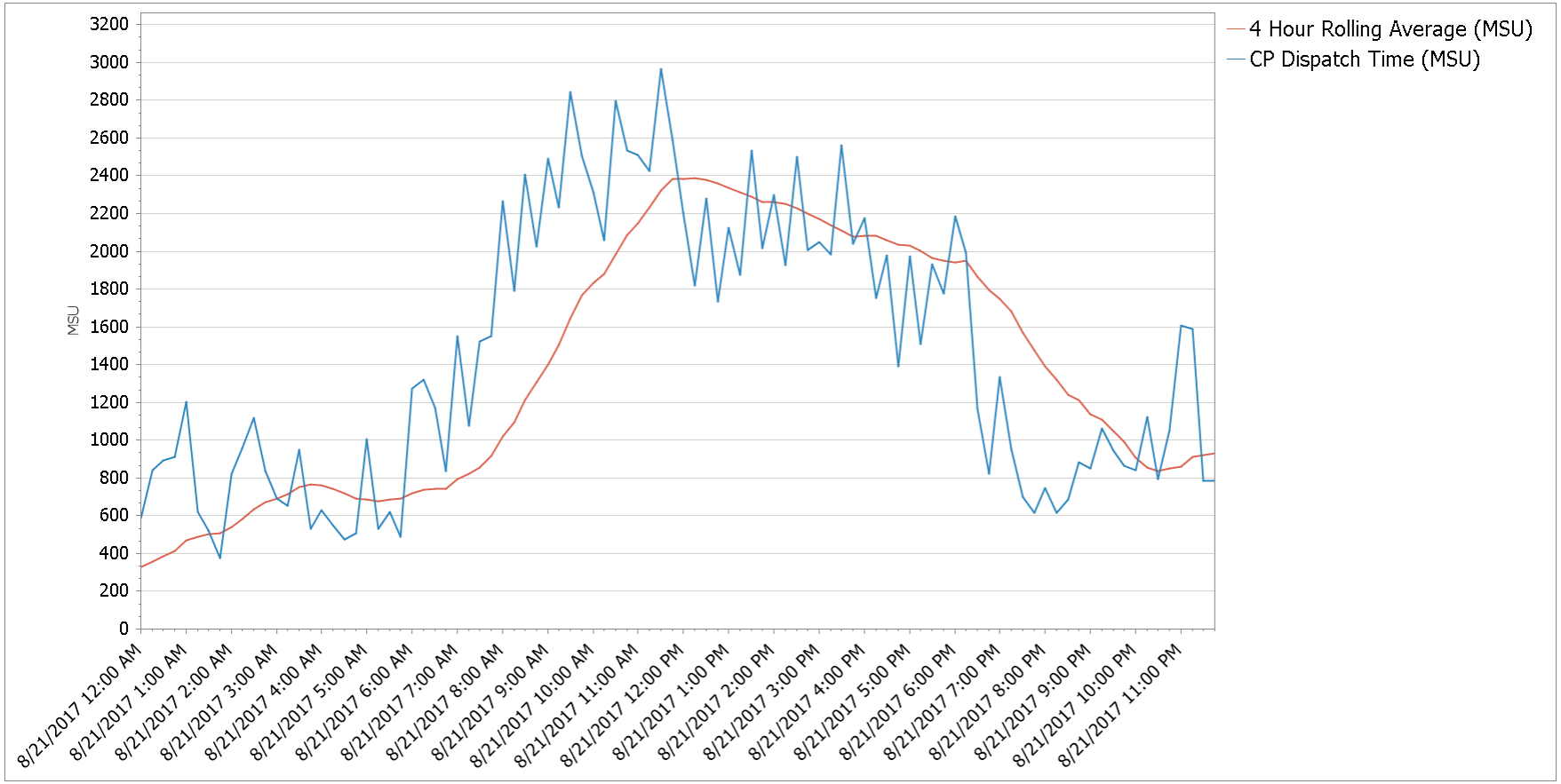


Best Practice 3

A solution that generates cost optimization intelligence

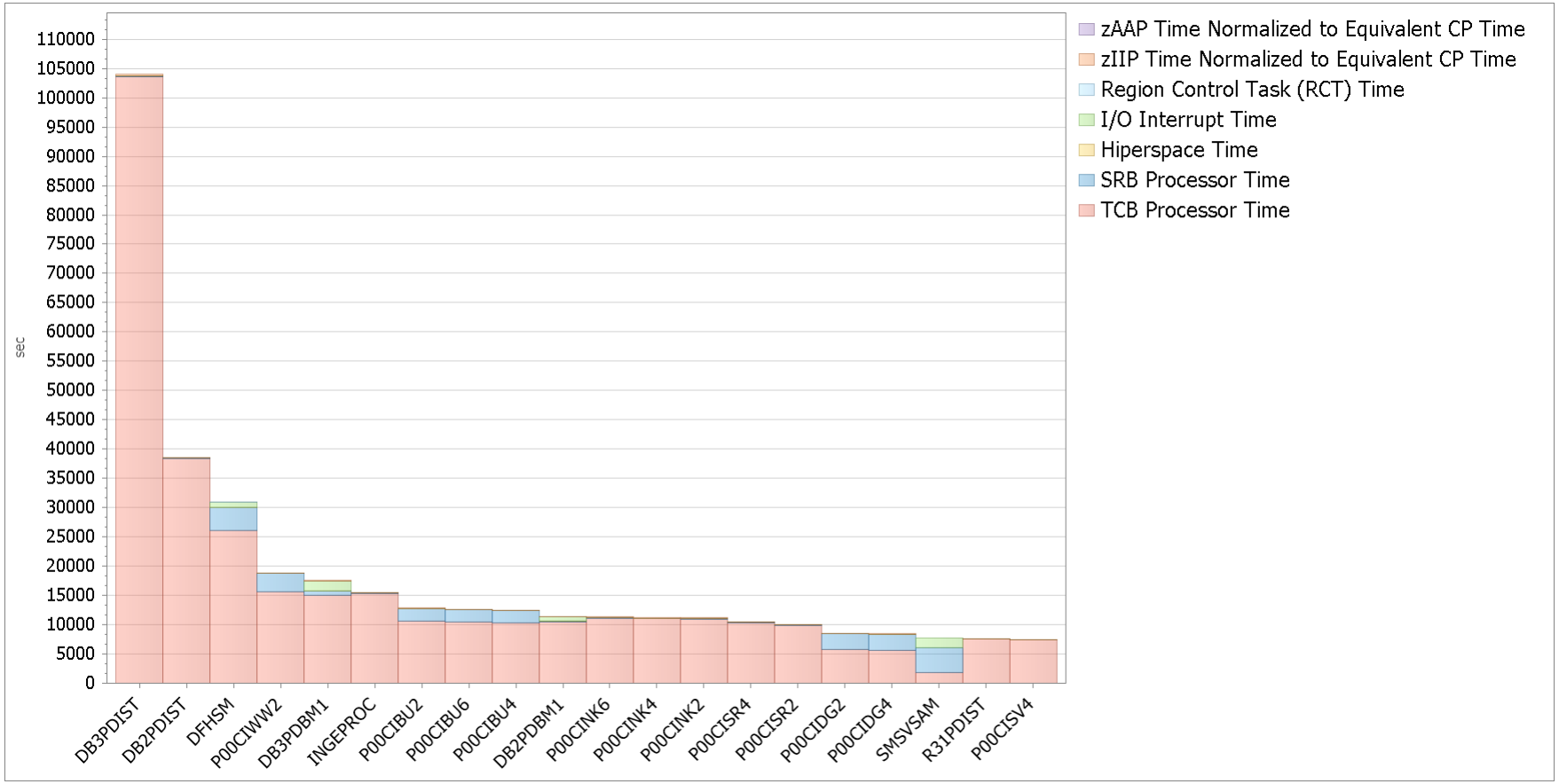
Rolling 4 Hour Average vs RMF Interval Average (MSU)

For Processor Complex Serial Number 'JAQ-97D25'



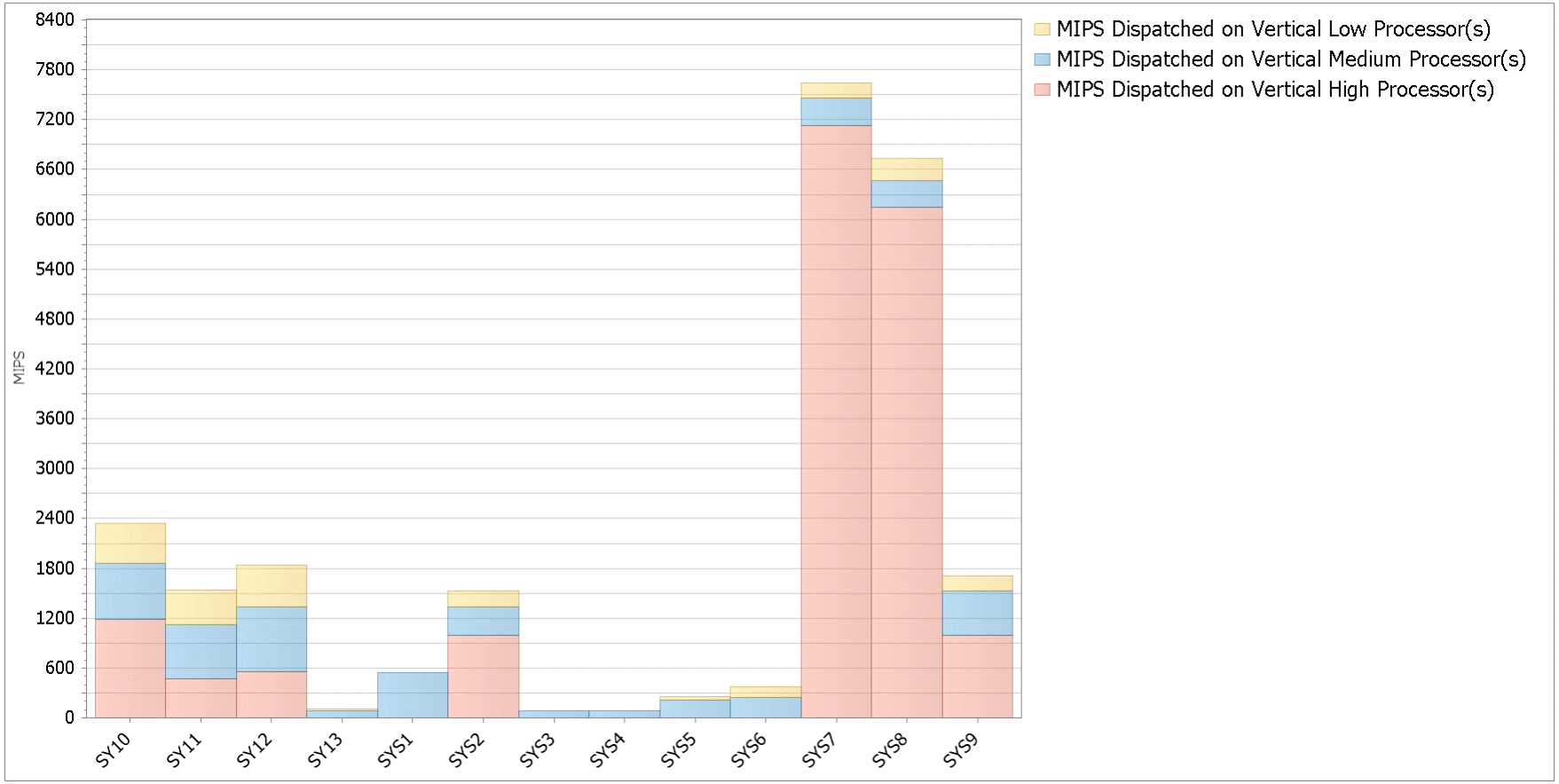
Processor time components (CP, zIIP and zAAP) (sec) (top 20)

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

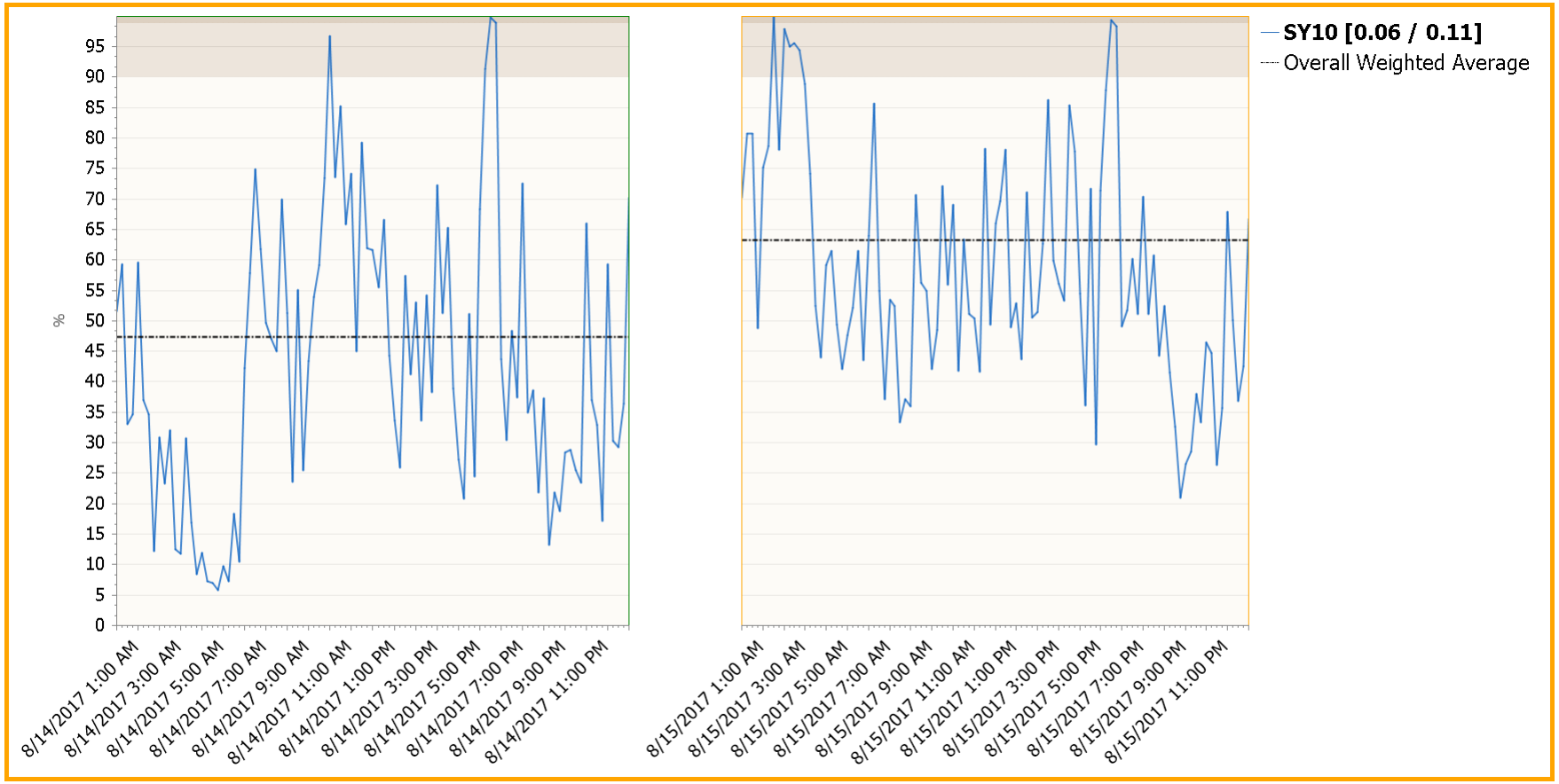
A solution that compares and highlights changes

MVS Busy (%) [rating: 0.06 / 0.11]

For System ID 'SY10'

Rating based on System data using System Thresholds

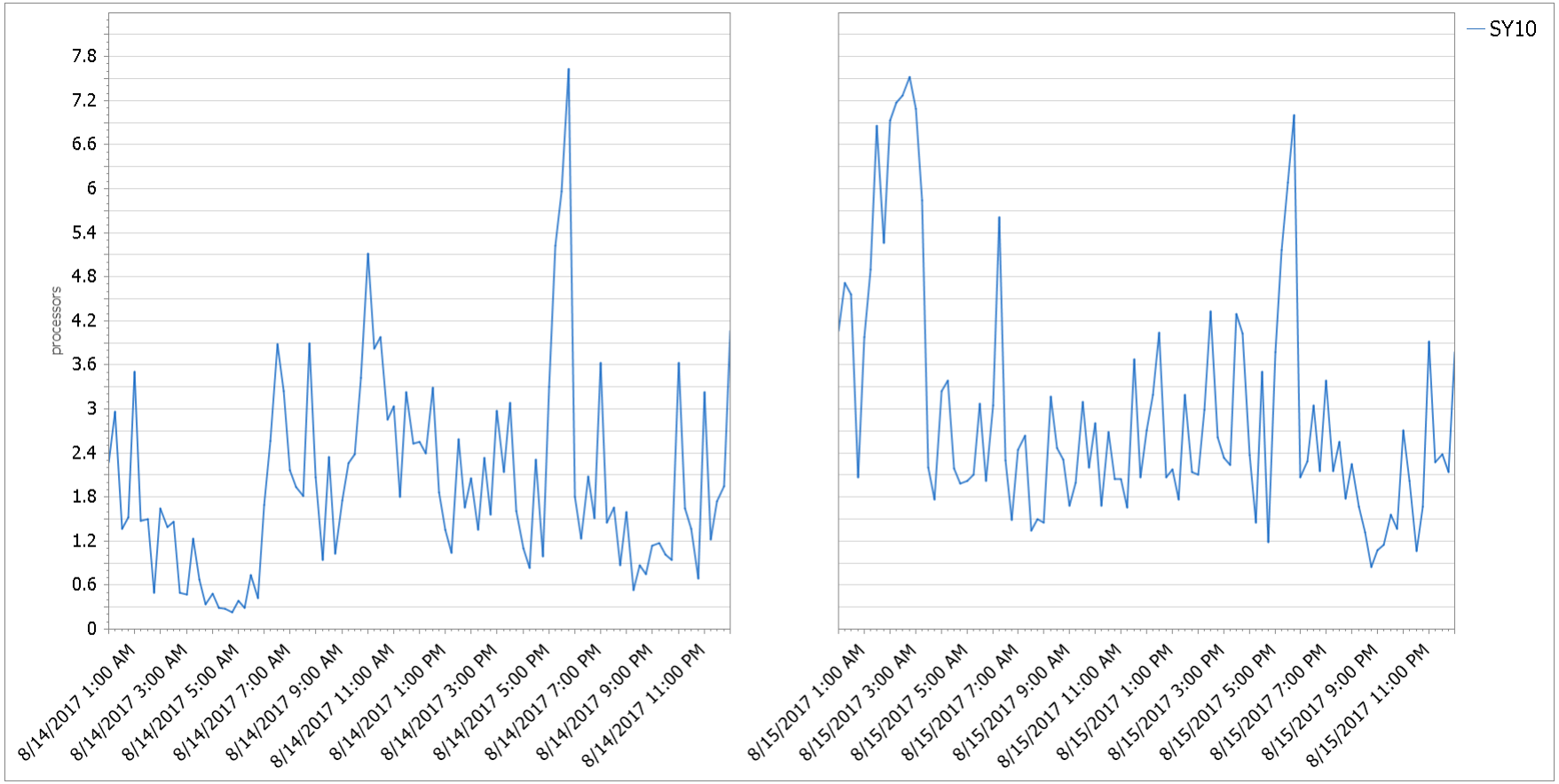
Change: 33.69% Absolute change: 15.93 %



CPs Dispatched by LPAR (processors)

For System ID 'SY10'

Change: 49.89% Absolute change: 0.99 processors



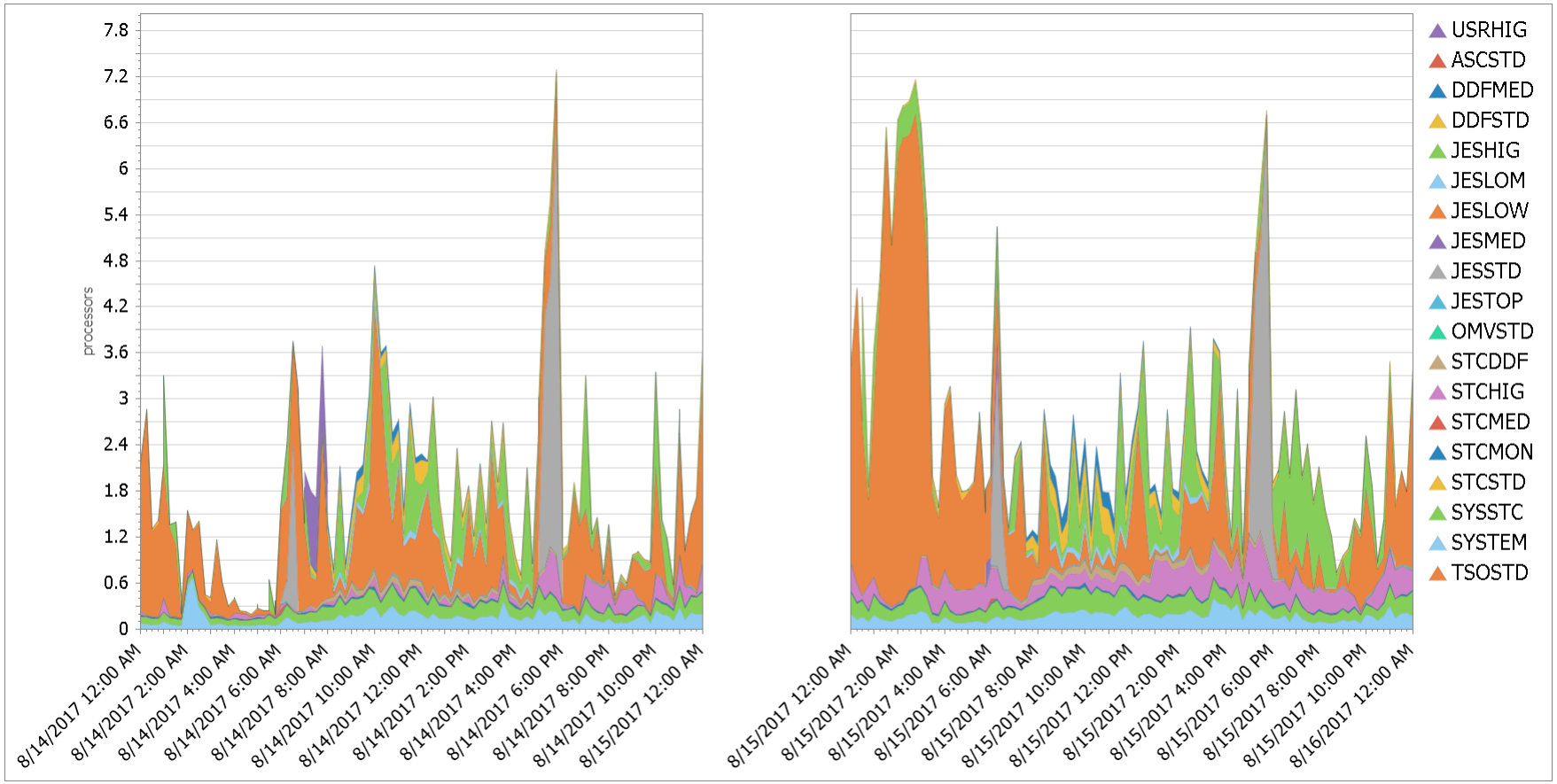
Best Practice 5

A solution that identifies workload sources and infrastructure elements

CPs used by Service Class (processors)

For System ID 'SY10' by Service Class

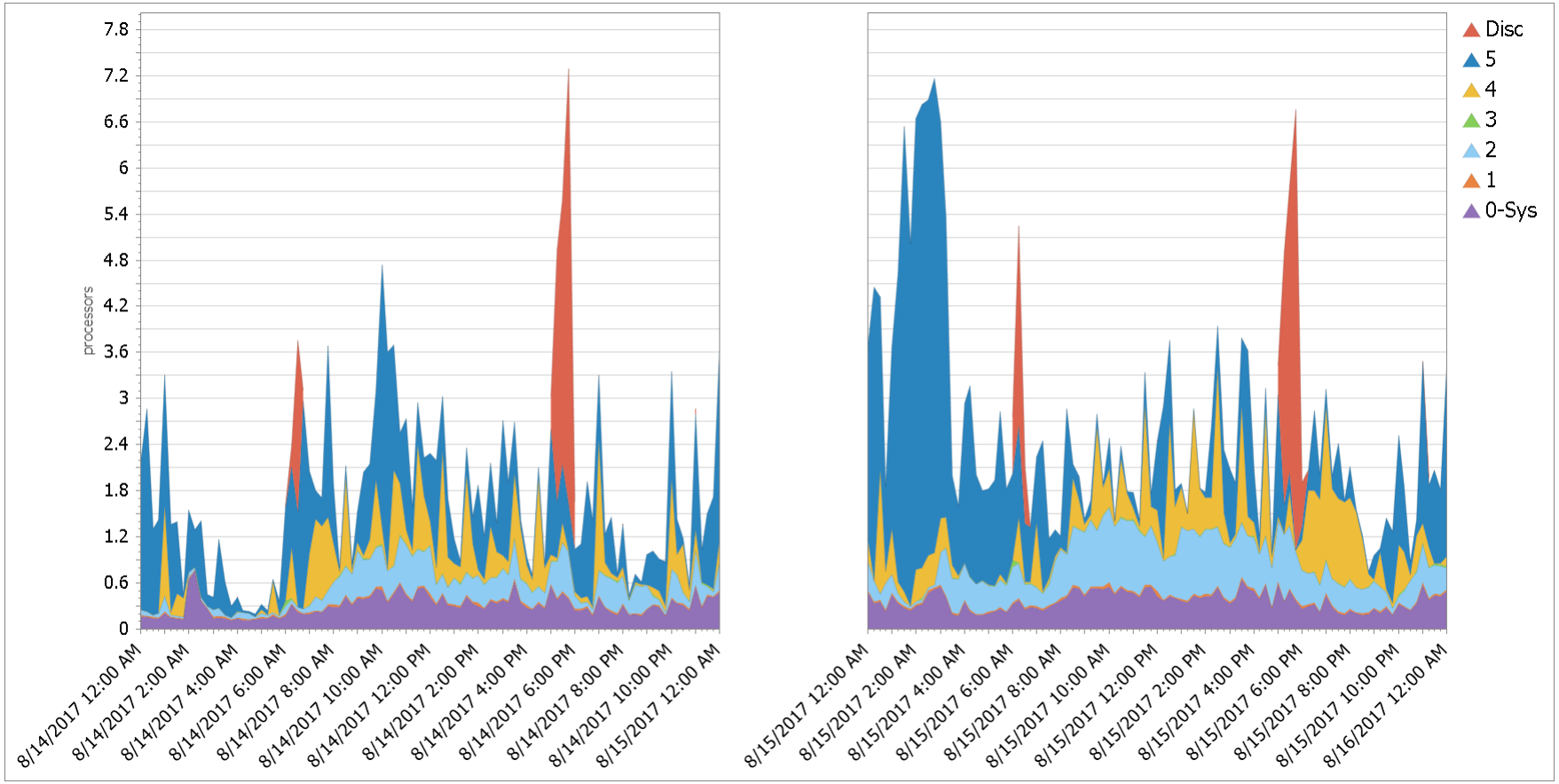
Change: 47.67% Absolute change: 0.06 processors



CPs used by WLM Importance Level (processors)

For System ID 'SY10' by Importance

Change: 49.30% Absolute change: 0.15 processors



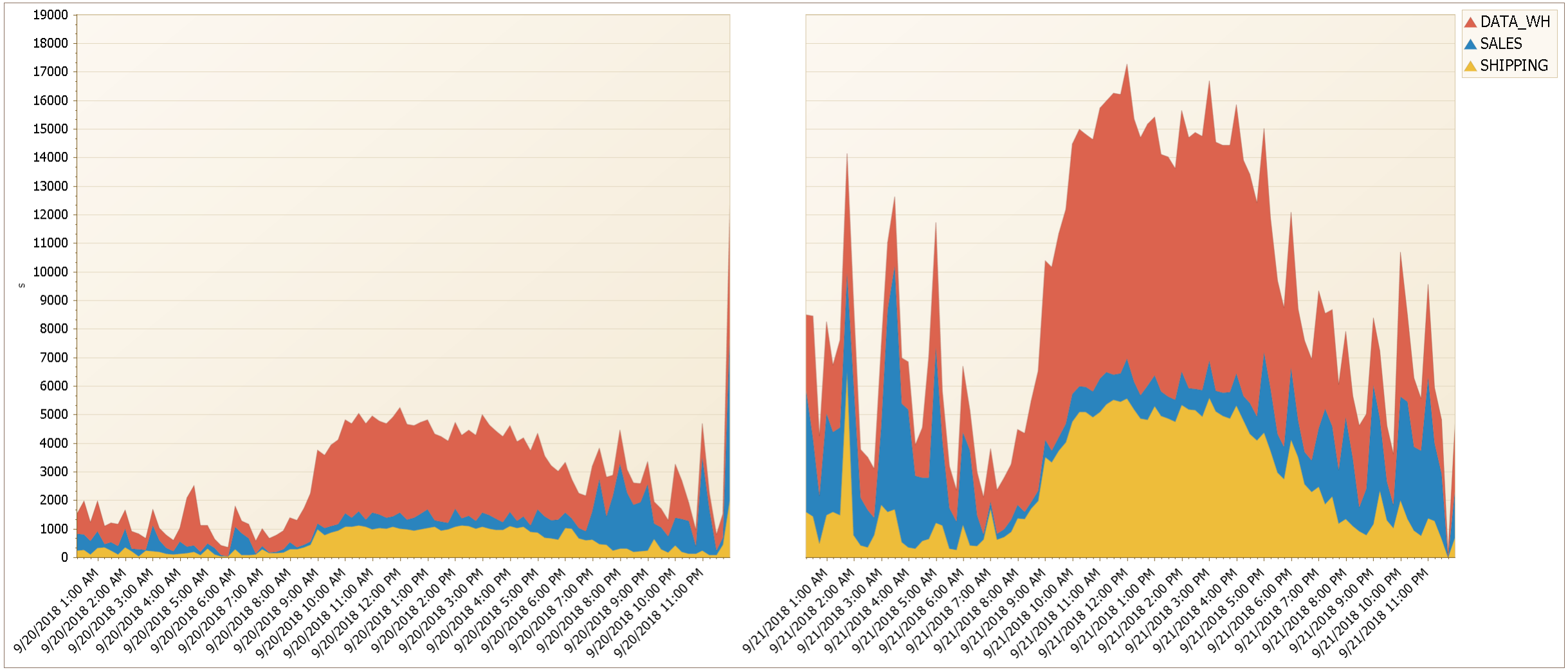
Best Practice 6

A solution that supports application infrastructure views

All CP processor time used

for all Service Classes by Application

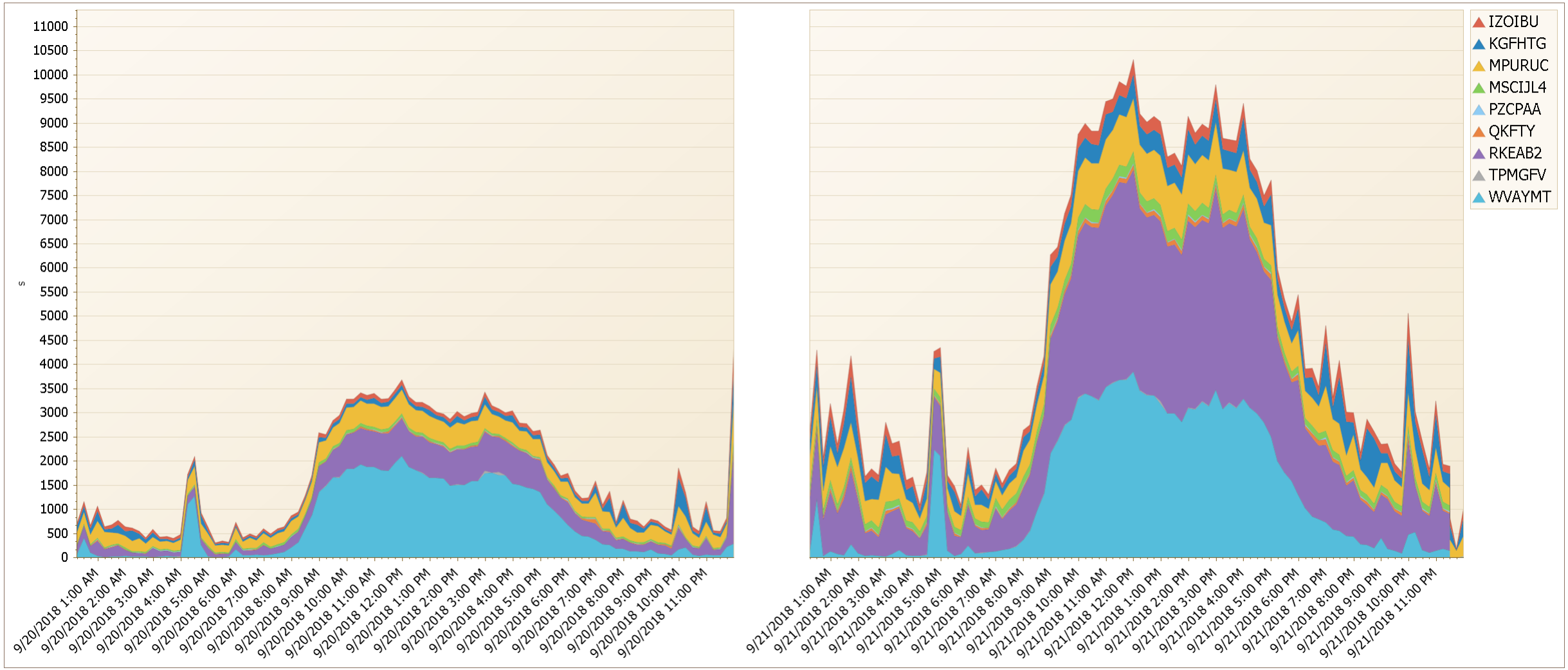
Change: 223.18% Absolute change: 2,135.76 s



All CP processor time used

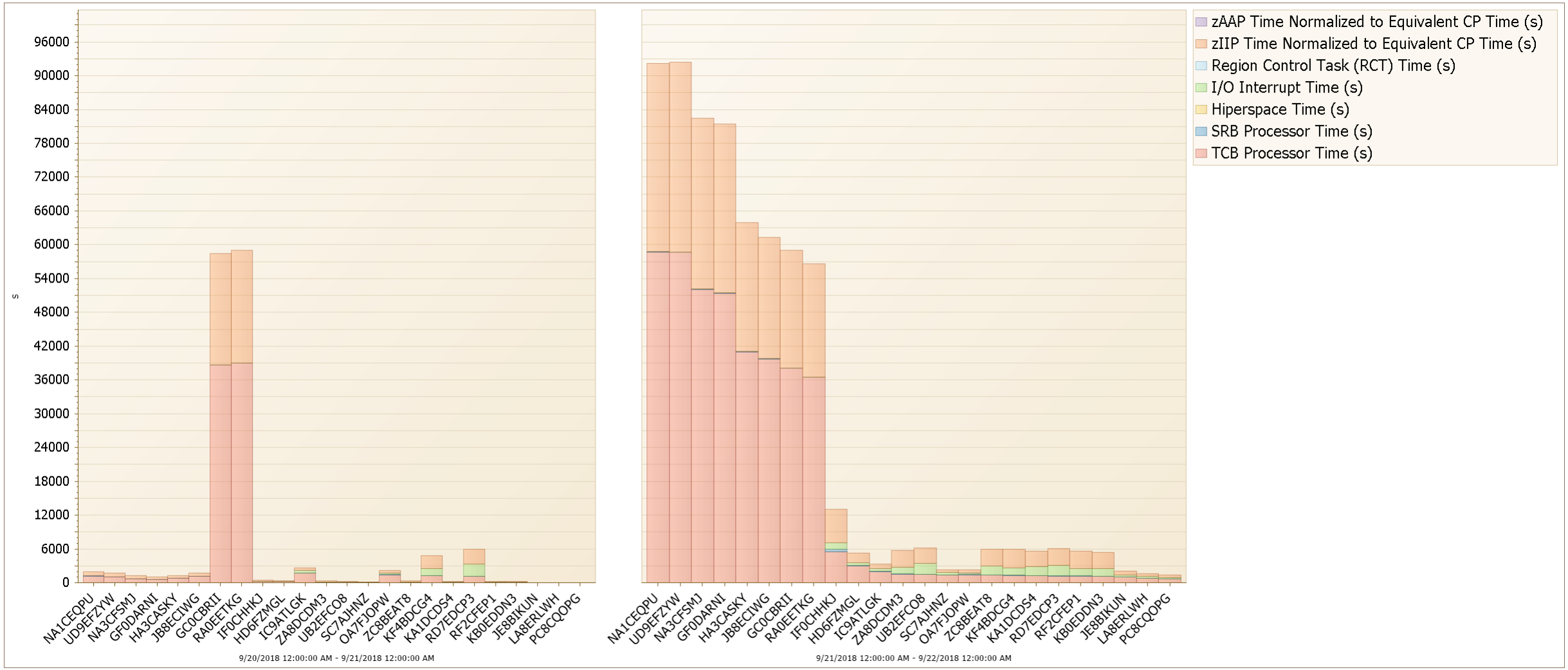
For Application 'DATA_WH' by Service Class

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



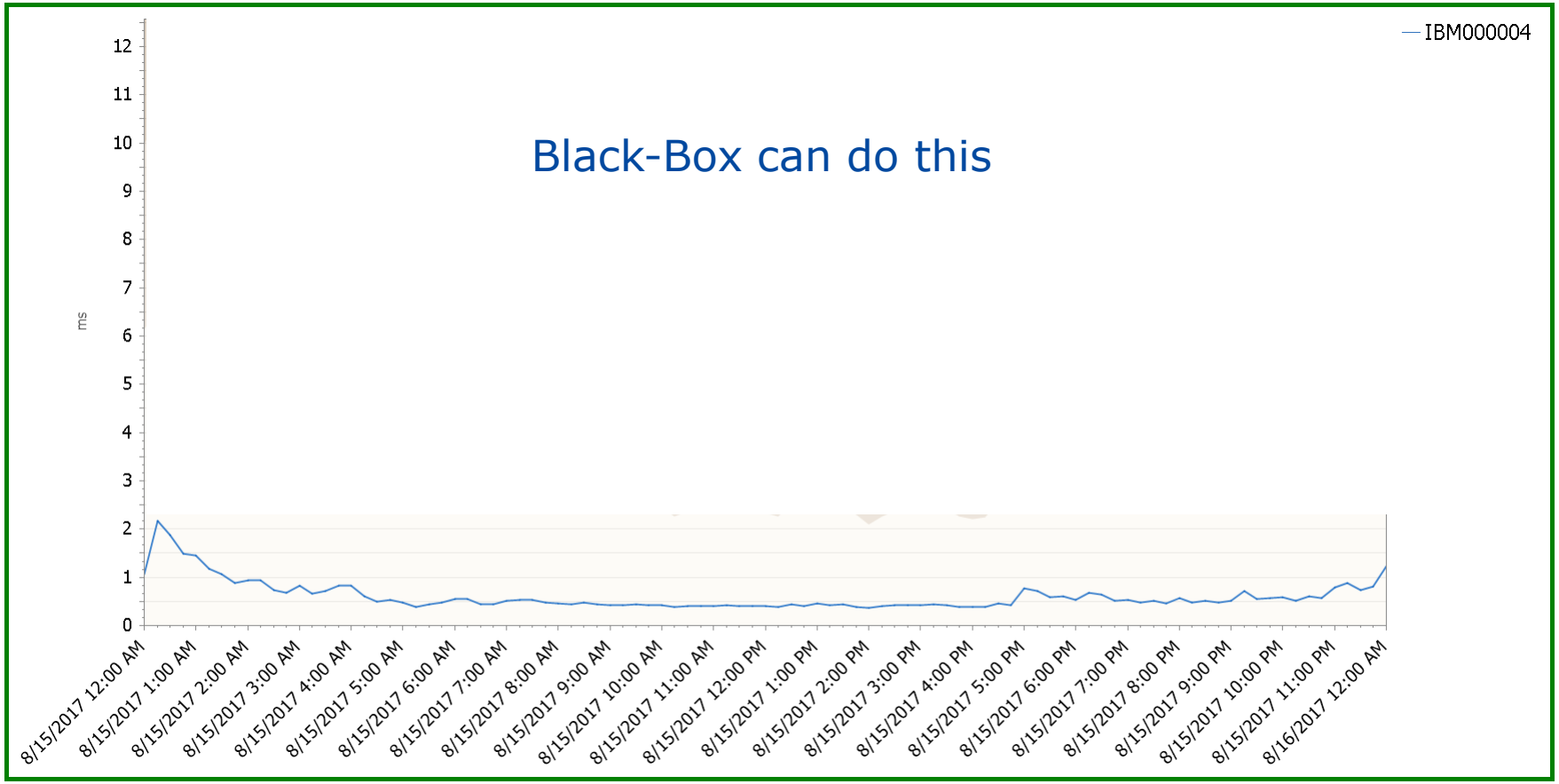
Best Practice 7

A solution that utilizes white-box analytics

Response Time (ms) [rating: 0.00]

For DSS Serial Number 'IBM000004'

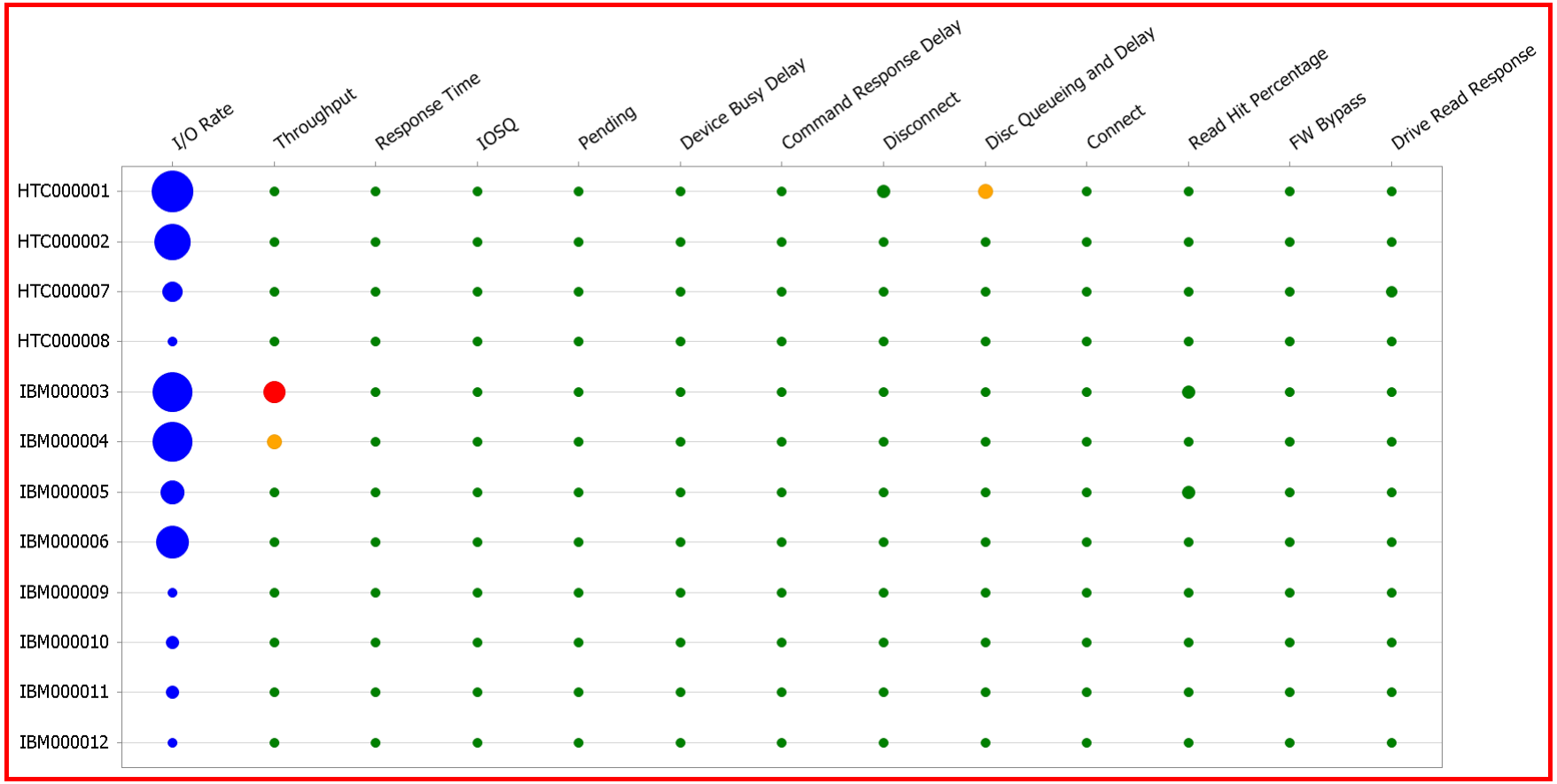
Rating based on DSS data using DSS Thresholds



Disk Storage System Dashboard [rating: 0.37]

for all Disk Storage Systems by DSS Serial Number

Rating based on DSS data using DSS Thresholds

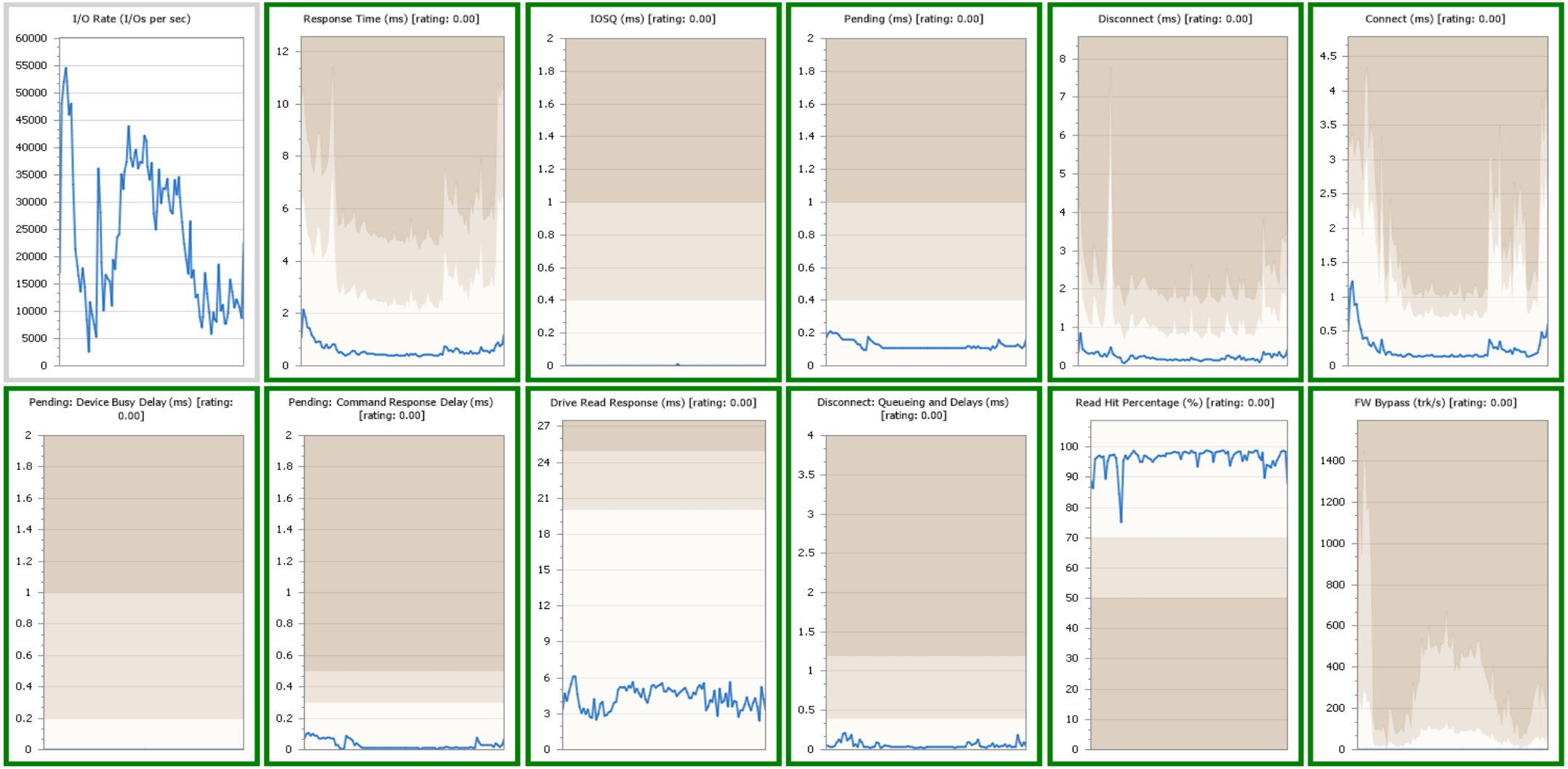


Everything is White-Box

DSS Performance Summary

For DSS Serial Number 'IBM000004'

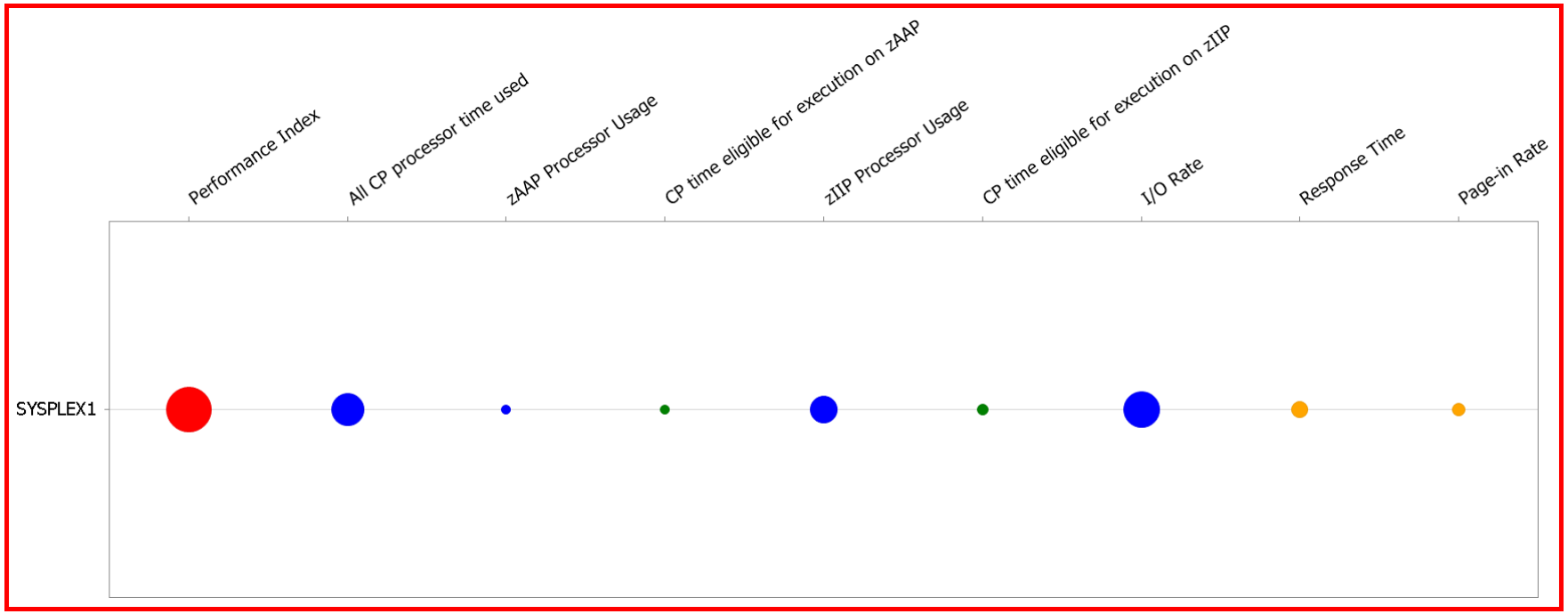
The DSS Performance Summary provides an overview of the DSS performance. The charts on the top row show the I/O rate and z/OS response time components, the charts on the bottom row show more detailed performance information as measured by RMF and/or computed by IntelliMagic Vision from measurements.



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

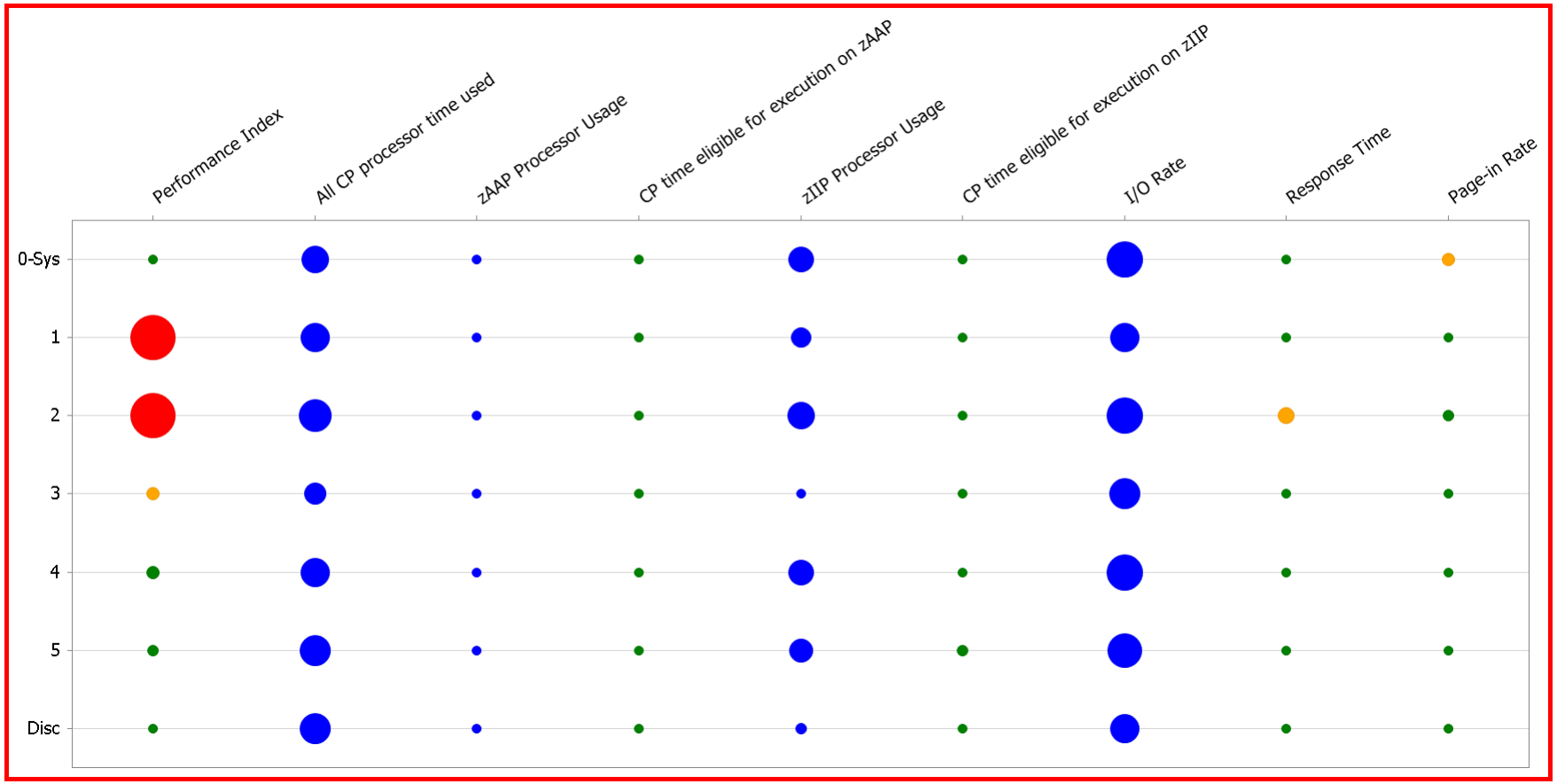


31 service classes * 96 intervals = 2,976 intervals to analyze

WLM Dashboard by Importance [rating: 2.38]

For z/OS Sysplex ID 'SYSPLEX1' by Importance

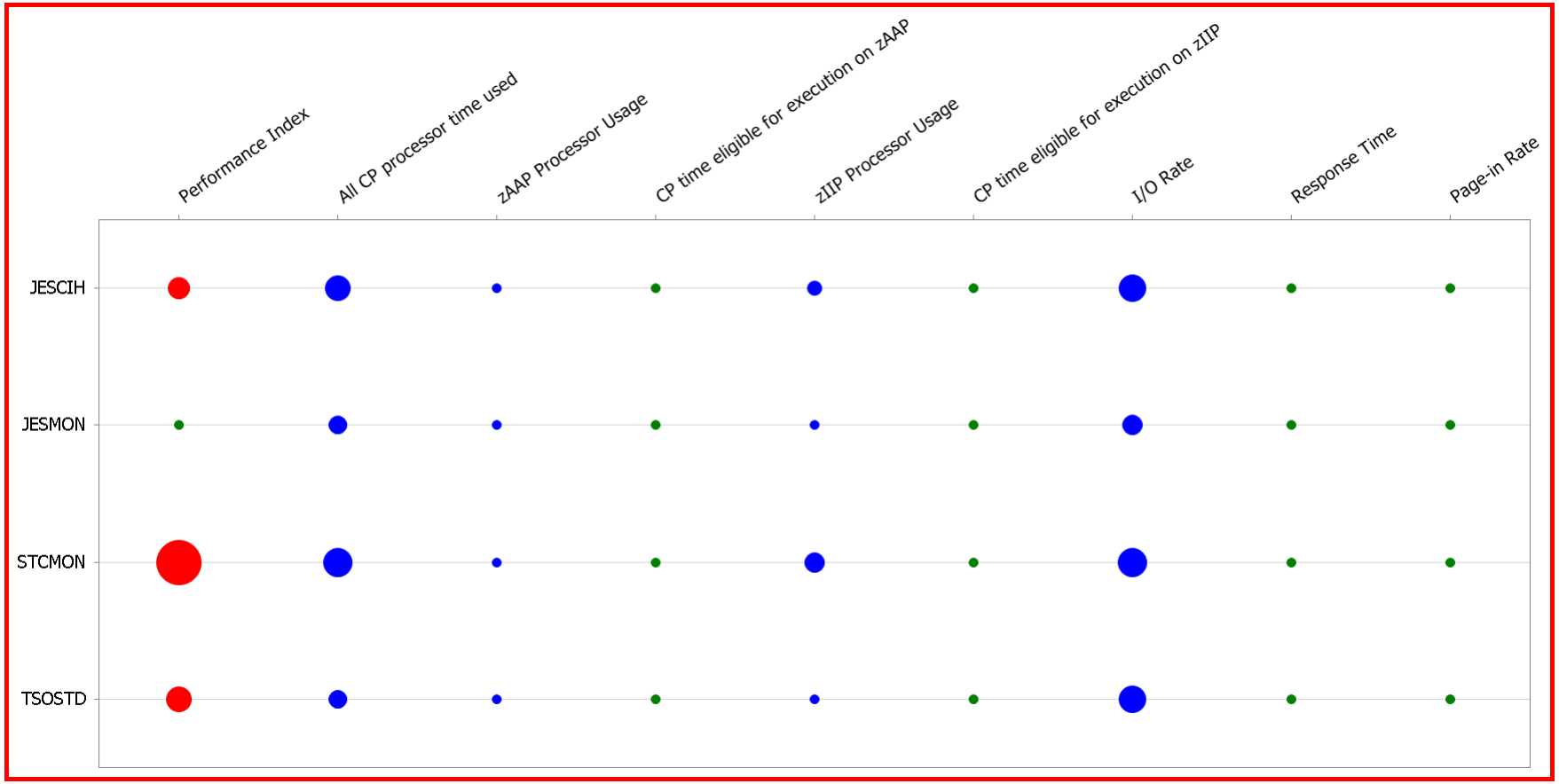
Rating based on Service Class Period Statistics data using Service Class Period Thresholds



WLM Service Class Dashboard [rating: 2.38]

For z/OS Sysplex ID 'SYSPLEX1', for Importance '1' by Service Class

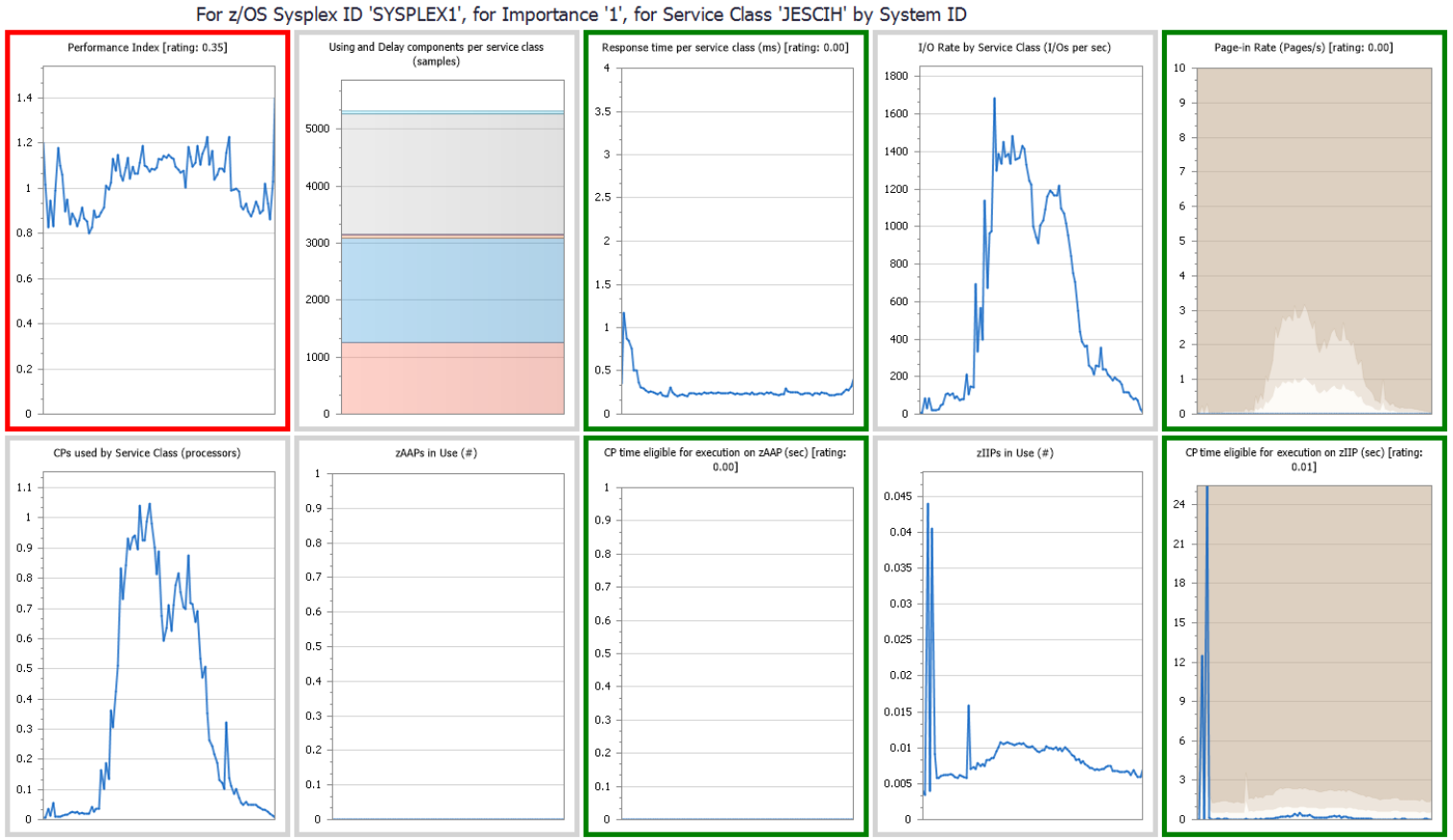
Rating based on Service Class Period Statistics data using Service Class Period Thresholds



Service Class minicharts

The service class dashboard shows the performance index (less than 1 is good, more than 1 means exceeding WLM response time target), the response time profile for each service class, the I/O response time and the total I/O rate for these service classes. Use the response time components chart to determine whether processor or I/O improvements are most likely to help performance.

The charts on the bottom row show the CP processor usage (TCB, SRB), and the total CP, zIIP and zAAP usage by workload. If there is significant zIIP or zAAP workload running on CPs, the charts showing that will have a yellow or red frame.

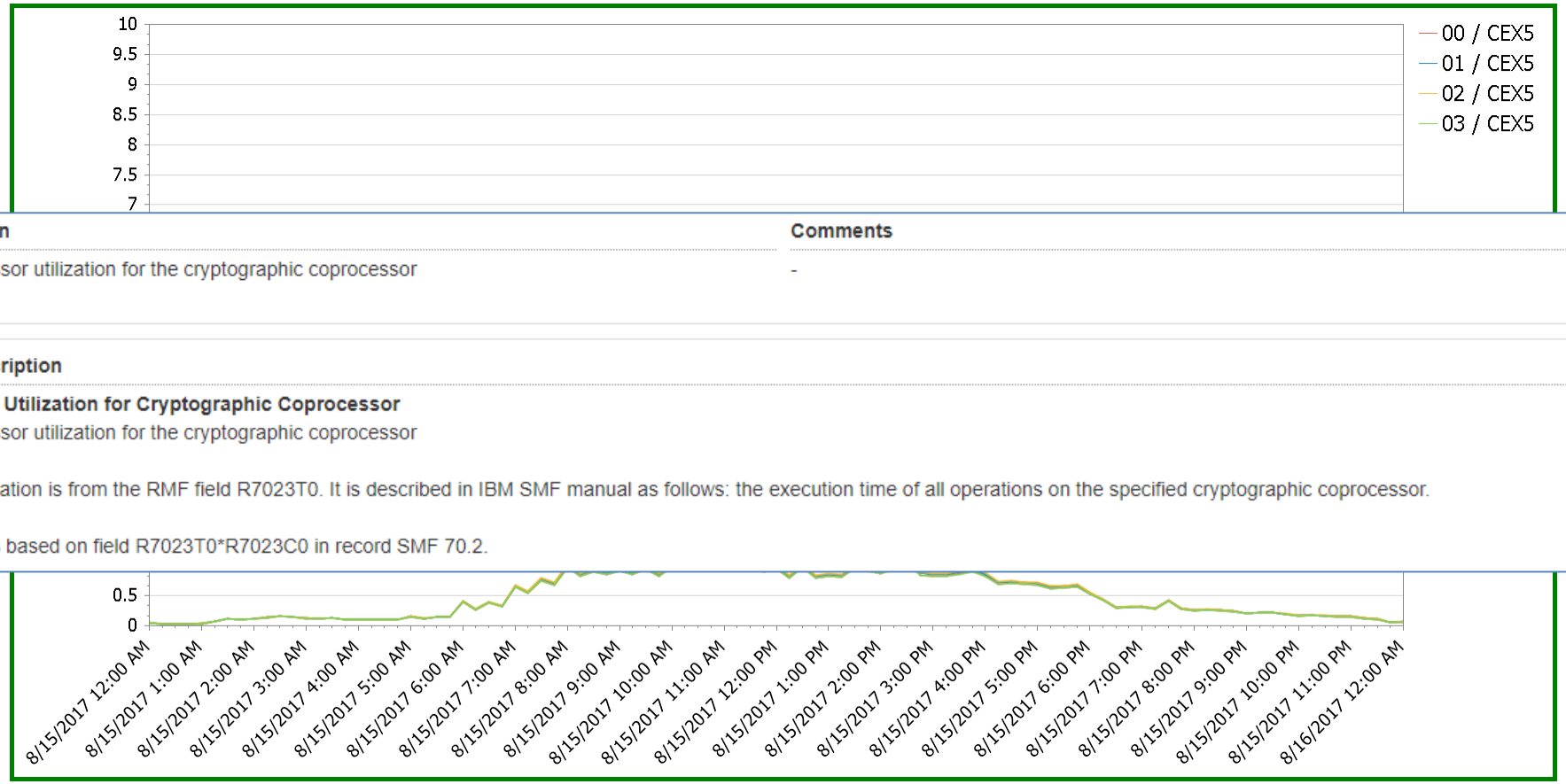


Best Practice 8

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



Description	Comments
The processor utilization for the cryptographic coprocessor	-

Field Description

Processor Utilization for Cryptographic Coprocessor
The processor utilization for the cryptographic coprocessor

This information is from the RMF field R7023T0. It is described in IBM SMF manual as follows: the execution time of all operations on the specified cryptographic coprocessor.

This field is based on field R7023T0*R7023C0 in record SMF 70.2.

Exception Tables

TCP/IP and UDP Health

for all TCP/IP by Sysplex ID

Add to: Collected | My Dashboard | Favorites | Edit report

Last 1 day 1/15/2019 12:00 AM - 1/16/2019 8:04 PM
interestgroup **IGT**, **All Sysplexes**, **All shifts**

Key	Variable	Rating Type	Rating	Observation
PRODPLEX	Receive Discarded	Error	0.14	There are more received packets discarded than expected.

Description	Comments
	-

Best Practices

for z/OS Application Infrastructure Availability in 2019

You need a solution that

1	Is interactive
2	Predicts problems and is prescriptive
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4	Compares and highlights changes
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IntelliMagic

Questions?

Thank you for attending

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