Service Management: the Next Step after the Basics of Performance & Tuning

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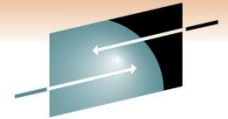**IBM Tivoli for System z**

zNorman@us.IBM.com
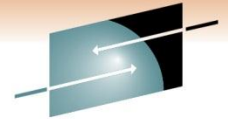
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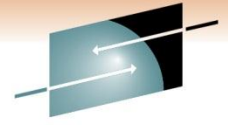- Observations and Recommendations are solely the opinion of the author.

Abstract

- Today's System z and zEnterprise Server mainframes running z/OS are the most tunable business computing platform ever created. Building on more than four half decades of hardware and software innovation, not only is it the least expensive environment to run your IT workload, but as it keeps getting more functional and affordable. You may already know the benefits of Performance and Tuning; and with this sessions, you can learn how the follow-on piece of Service Management can play in an even more efficient business environment. This session reviews some of the basics of Performance and Tuning, and offers insights into Service Management concepts, allowing you to provide more value to your business.

Overview

- Mainframe environments continue to grow and become more complex at a rapid pace
- System z Hardware and associated peripherals are challenging for most customers
- Keeping Up with z/OS (z/VM, Linux for System z) technology is time consuming
- The number of IT professionals maintaining these platforms has generally not grown
- Many customers don't realize all the moving parts of their mission critical applications
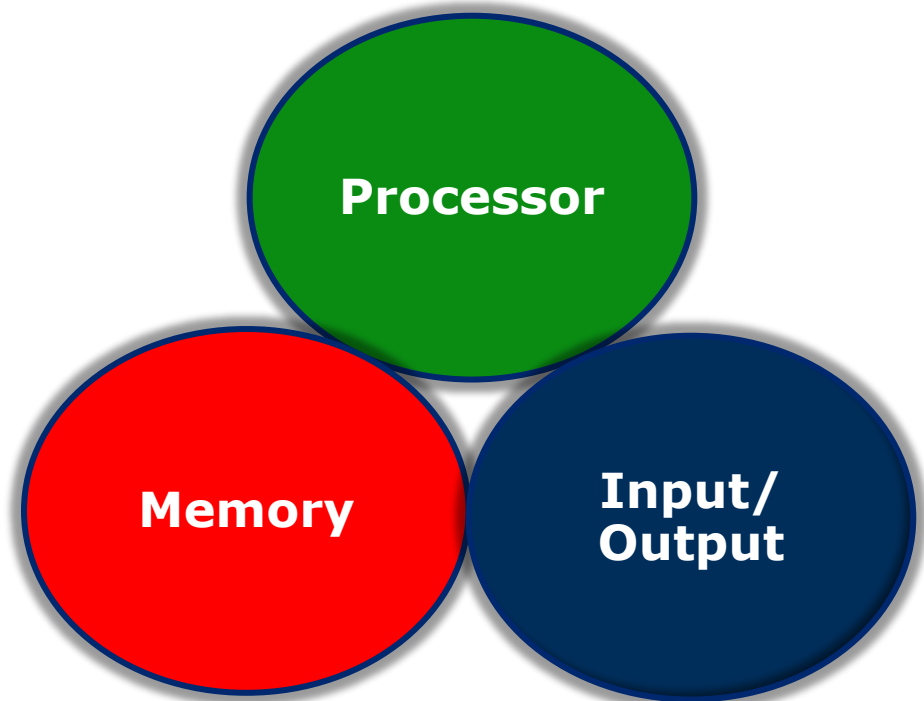- Many customers don't really know what is causing service levels to miss their goals

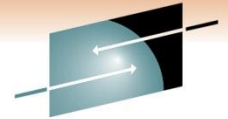**Service Management: the Next Step after the Basics of Performance & Tuning**
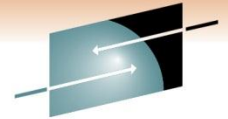
Agenda

- Review of the Elements of Performance
- Blast from the Past: CFIA
- Who Uses Service and Monitoring Information?
- Monitoring Views
- Q&A

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The Elements of Performance
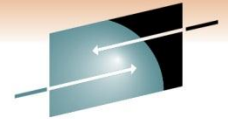
- There are only 3 Elements of Performance
  - Processor
    - General Purpose Engine
    - Coupling Facility Engine
    - zAAP Engine
    - zIIP Engine
    - Crypto Engine
    - Appliances
  - Memory (Paging)
    - Real Storage
    - 64-bit Architecture
  - Input/Output
    - Peripheral Devices
    - Coupling Facilities
    - Communications Devices
    - Security Devices

Processor

Memory

Input/Output

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Perceived Performance

- There are many performance metrics available to indicate how well the 3 elements of performance are doing
  - CPU busy
  - CPU time
  - Paging
  - I/O rate

- Service Level Agreements typically use something like these as a measure for success
  - Number of transaction per second
  - xx% of specific application business operation completed in yy seconds
  - All jobs updating application's xx database must complete by 3am

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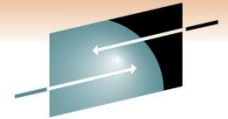
Performance Metrics

- All metrics are interesting
- Some are good; some are not so relevant
- Performance metrics should relate to in-place Service Level Agreements
- Throughput might be key
  - In a widget factory, the number of widgets manufactured per hour is critical

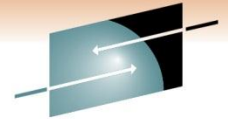# What We Are Really Trying to Determine

- Delays and Degradation
  - What's holding up the Application
  - What's holding up the Operating System
  - What's holding up the Network (/Cloud)
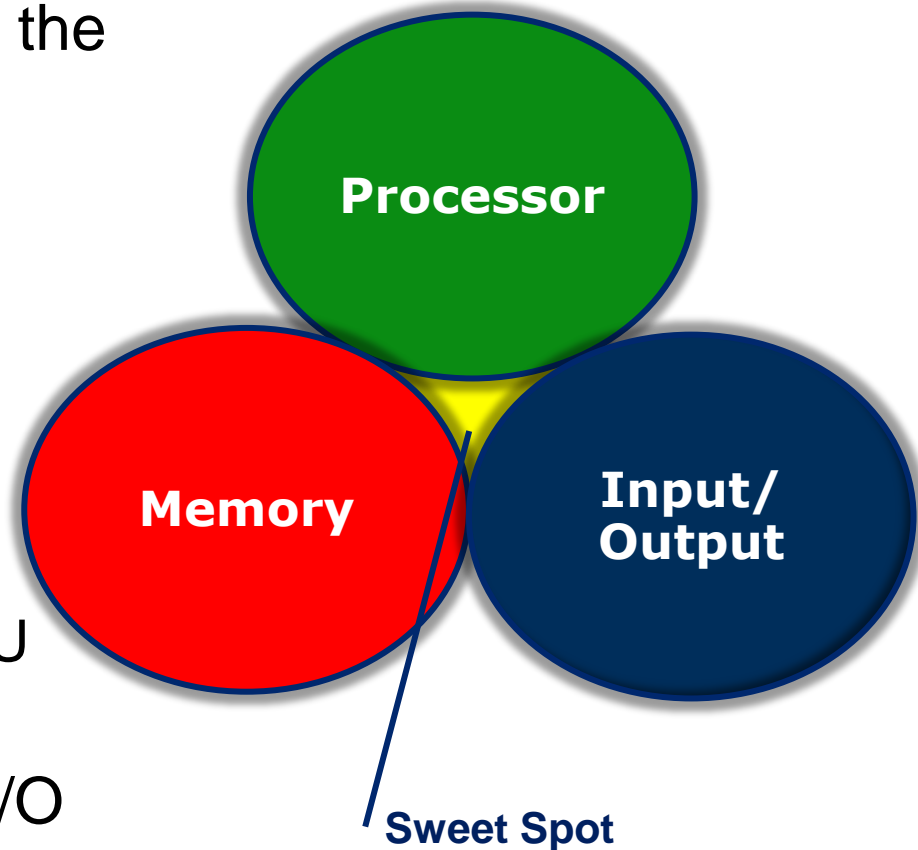 - What's holding up the End-User
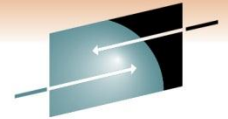
What's our course of action?

- Performance comes in 2 flavors:
  - **External**, environmental opportunities
    - There are many knobs to turn at the operating system level
    - There are many opportunities with the infrastructure components
  - **Internal** application opportunities
    - There many be coding opportunities
    - There may be I/O avoidance opportunities
    - There are specific solutions to help identify application inefficiencies

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Why bother with any of this?

- Tuning efforts help optimize the balance of our 3 elements
- Use Memory to improve I/O
- Use Memory to improve Processor utilization
- Avoid I/O to optimize Processor utilization
 - There are no "roll-over" CPU minutes
- Use Processor to optimize I/O

Processor

Memory

Input/Output

Sweet Spot

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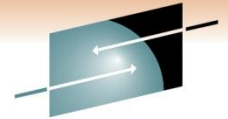
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CFIA

- Component Failure Impact Analysis
- Decades ago, used to identify all the moving parts in the Data Center as they related to the Business Processes
- Ultimately showed Vulnerabilities or lack of Availability
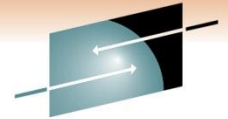- Worked for Small Environments

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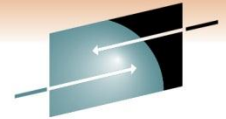
CFIA Example

	CICS PROD	CICS DEV	IMS PROD	IMS DEV	Fin Batch	Retail Batch	Dev Batch	DASD Mngmnt	TSO
CPU	X	X	X	X	X	X	X	X	X
Chan0	D	D	D	D	D	D	D	D	D
Chan1	D		D		D 12.1.4	D 12.1.5		D	
Chan2	D		D		D	D		D	
Chan3		D		D			D	D	D
Chan4		D		D			D	D	D
Memory	D	X	D	X	D	D	X	X	D
CTLR1	D		D		D	D			D
CTLR2		D		D			D	D	D
NCP1	X	X	X	X	X	X	X	X	X
Tape58x	D	D	D	D	D	D	D	D	D

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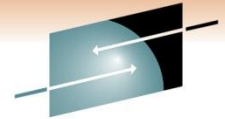
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CFIA Challenges

- Works in small non-complex configurations
  - Todays Data Centers do not look like example
  - More CPs, More Channels, More Controllers
  - Built-in Redundancy and Failover
- Does not consider multi-platform applications
- Business Processes may use more moving parts
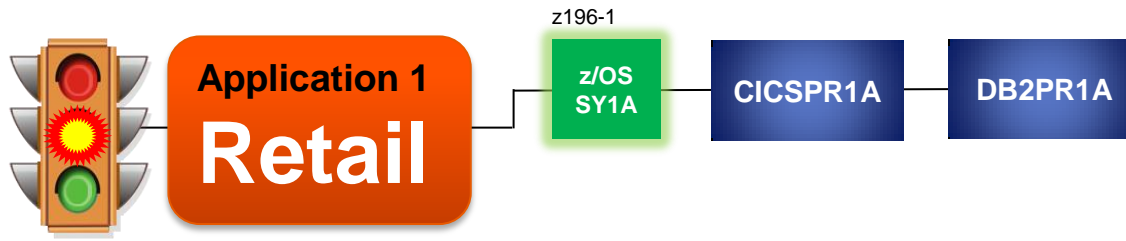- Business View is more relatable to those using the data and for other automated processes
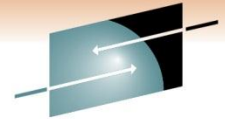
Better View of Application Performance

- Mission Critical Applications use more Services in the environments

- Business Views showing those Services used is more Relatable

- Business Views provide more unified and concise data for the levels of viewers needing it
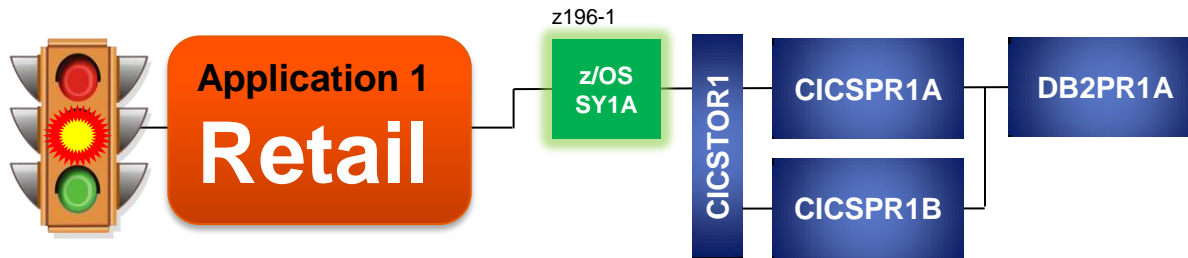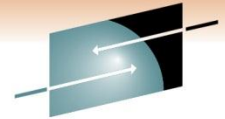
Business Views of Services

Application 1
Retail

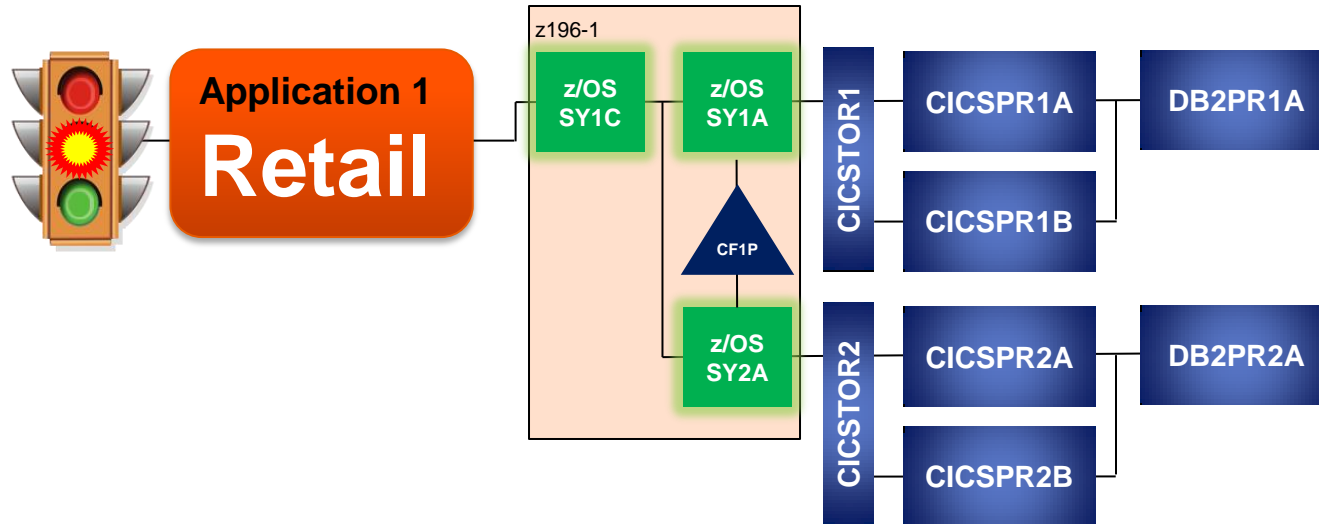z196-1

z/OS SY1A

CICSPR1A

DB2PR1A

➢ **A simple Business Application**

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Business Views of Services

z196-1

Application 1 **Retail**	z/OS SY1A	CICSTOR1	CICSPR1A	DB2PR1A
			CICSPR1B	

➤**A simple Business Application grows**

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Business Views of Services

> A simple Business Application grows and grows

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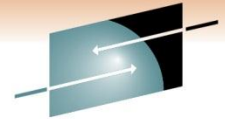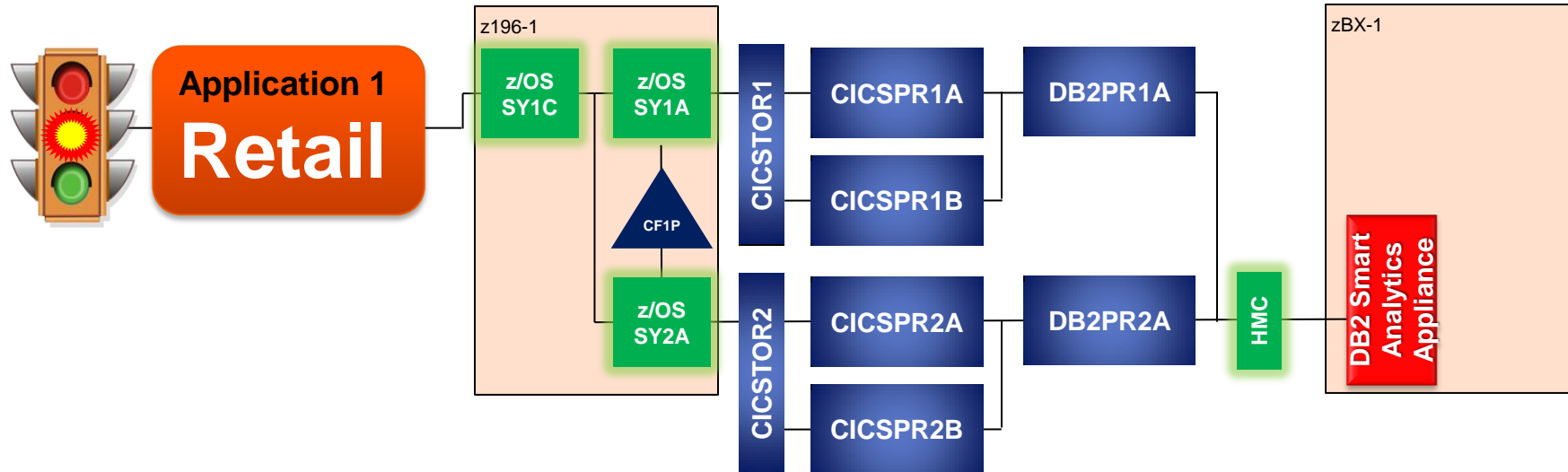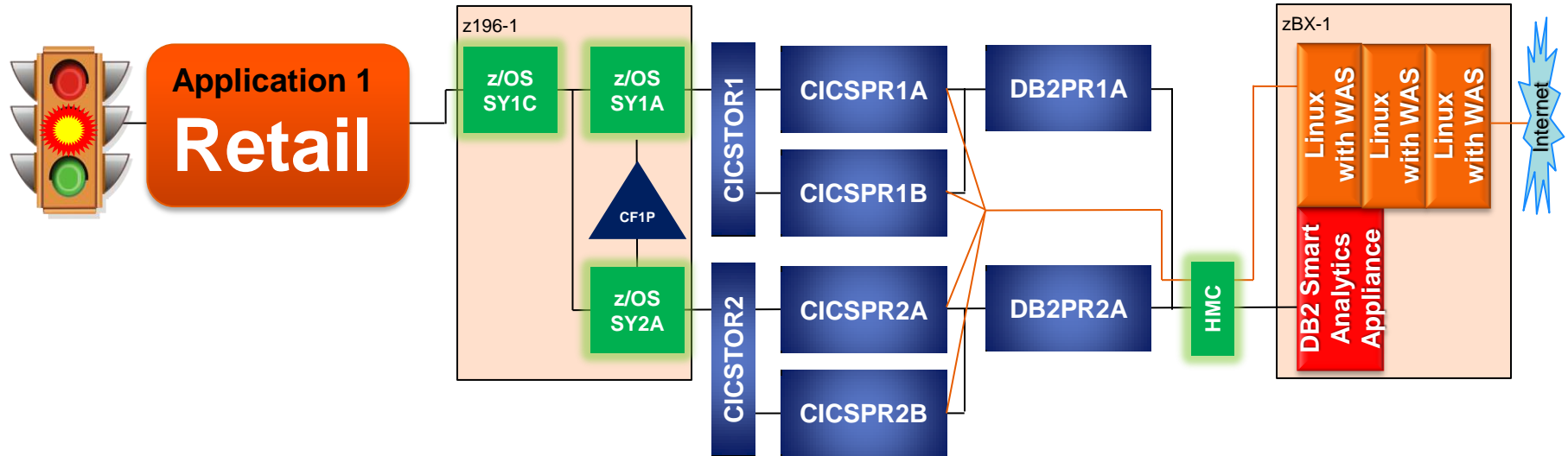
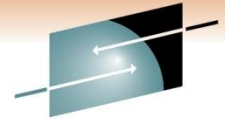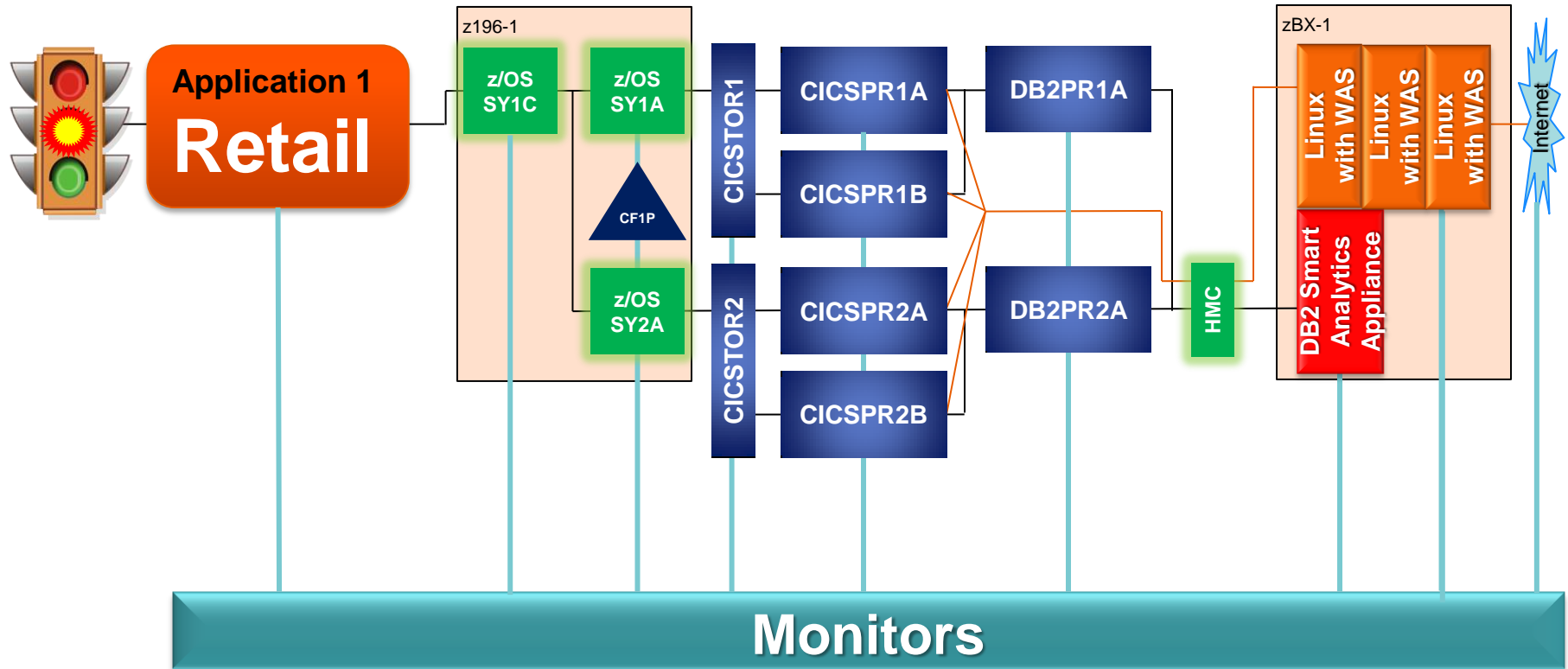# Business Views of Services

> A simple Business Application grows and grows, gets more complex
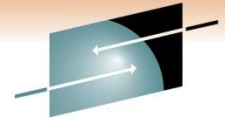
Business Views of Services

> A simple Business Application grows and grows, gets more and more complex

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Business Views of Services

> A simple Business Application grows and grows, gets more and more complex, and requires more End-to-End Monitoring points

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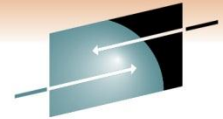
Business Views of Services

> A simple Business Application grows and grows, gets more and more complex, and requires more End-to-End Monitoring points, and Infrastructure Service Management
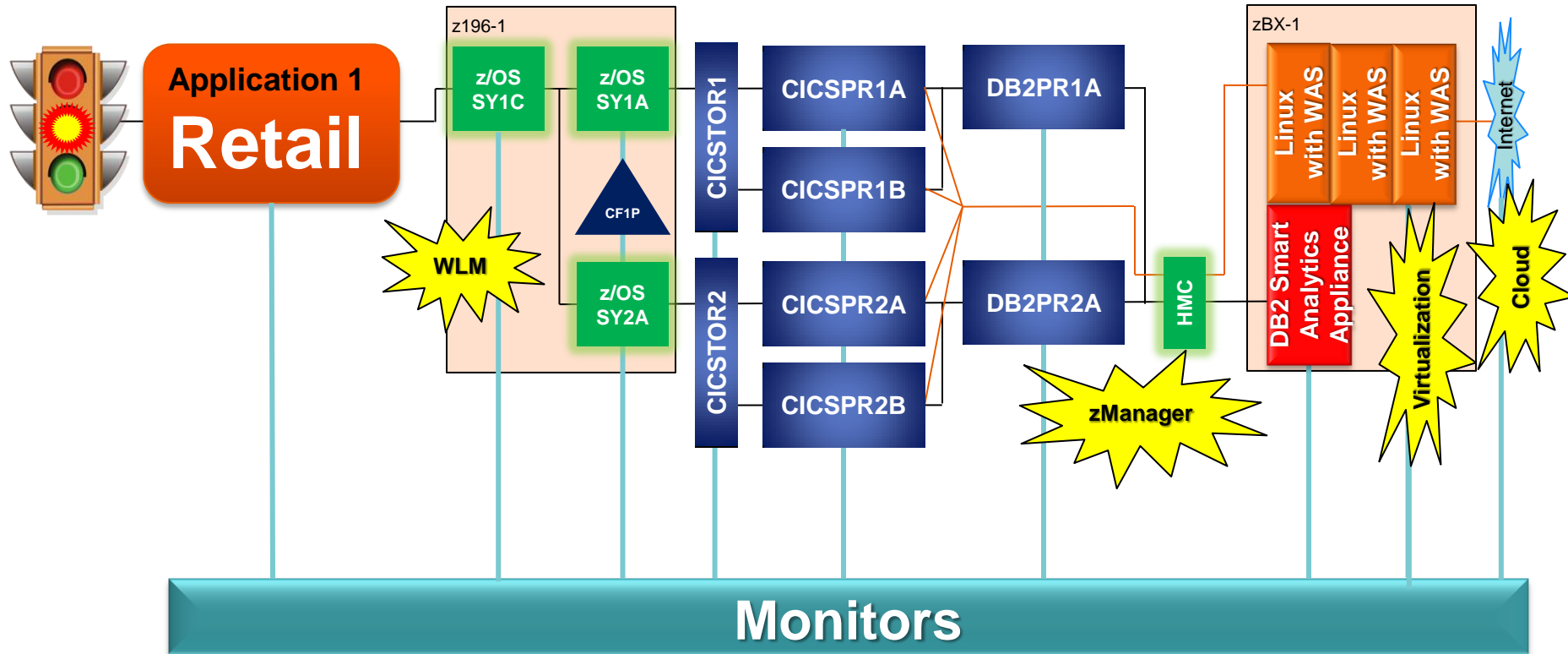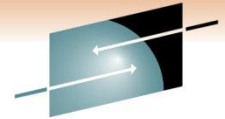
Relevant Views of Performance

- 4 Levels
  - System Programmer, Performance Consultant View
  - Operations Monitoring View
  - Helpdesk Monitoring View
  - Business Unit View

More Diagnostic Detail Component Specific

More Service Management Oriented Application Specific

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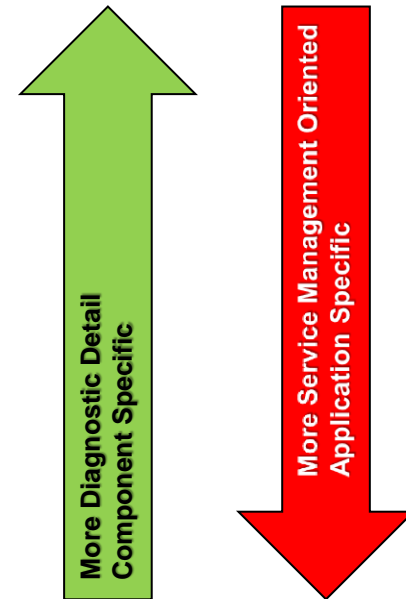
System Programmer, Performance Consultant View
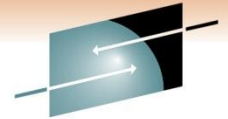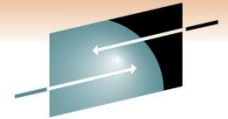
- Sysplex, Specific Key Indicators of Performance
- Both Vertical and Horizontal Scopes
- Which Rules of Thumb/Industry Standards are being exceeded?
- Most amount of Detail
- Toolkits
- Alerts generated for Continuous Exceptions
- Data collected for Performance Management Reporting

Operations Monitoring View

- Data Center View of the Sysplex, Logical Partitions, Operating System Environments, Subsystems, and Application Environments
- Useful as Heartbeat or Speedometer
- Vertical Scope within a Hardware Footprint
- Horizontal Scope within an Application
- Which Threshold Levels are not being met?
- Which Components' Exceptions will impact SLAs?
- Medial amount of Detail
- Alerts generated for Continuous Exceptions
- Data collected for Trending Reports

Helpdesk Monitoring View

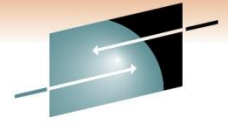- Data Center View of the Critical Applications
- Useful as Heartbeat or Speedometer
- Horizontal Scope
- Which Threshold Levels are not Being Met?
- Which Components' Exceptions will impact SLAs?
- Predict Near Future
- Medial Amount of Detail
- Alerts Generated for Continuous Exceptions
- Data Collected for SLA Reporting

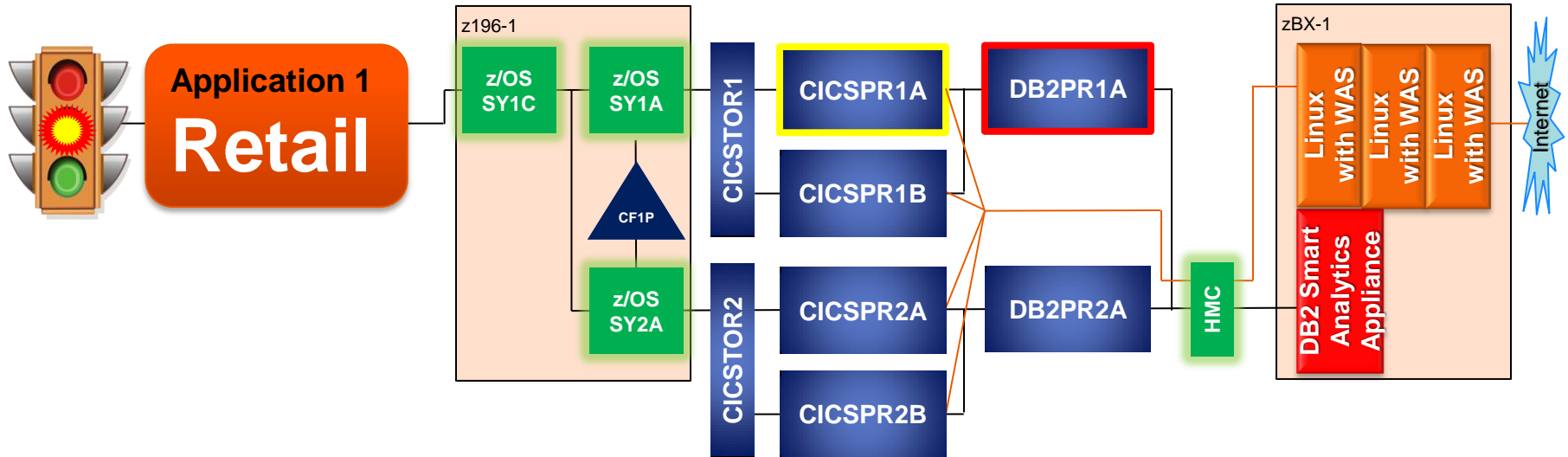Service Management: the Next Step after the Basics of Performance & Tuning

Business Unit View

- Service Level Commitments
- Horizontal Scope Across Critical Application Environments
- Which Service Levels are not Being Met?
- Predict Near Future
- Least Amount of Detail
- Alerts Generated for Continuous Exceptions
- Data Collected for SLA Trends Report

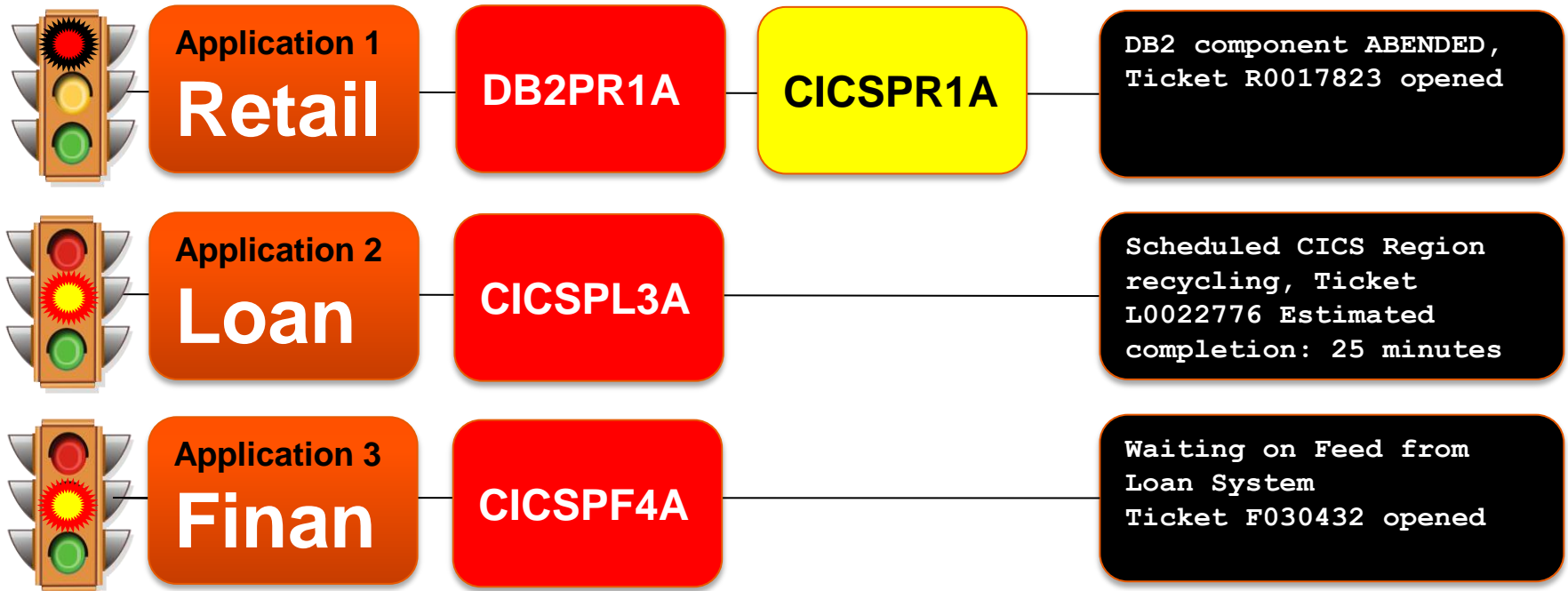# System Programmer, Performance Consultant Monitoring

Application 1
Retail

z196-1
z/OS SY1C
z/OS SY1A
CF1P
z/OS SY2A

CICSTOR1
CICSPR1A
CICSPR1B

CICSTOR2
CICSPR2A
CICSPR2B

DB2PR1A
DB2PR2A

HMC

zBX-1
Linux with WAS
Linux with WAS
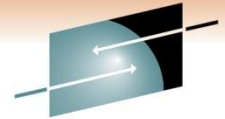Linux with WAS
DB2 Smart Analytics Appliance
Internet

```
Application severely degraded
Transaction response time reduced
DB2 component ABENDED, Ticket R0017823 opened
Estimated time for correction: 15 minutes
```

➢ **Most Amount of Detail, Component Failure Impact with related Alert**

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Operations Monitoring

	Application 1 **Retail**	**DB2PR1A**	**CICSPR1A**	DB2 component ABENDED, Ticket R0017823 opened
	Application 2 **Loan**	**CICSPL3A**		Scheduled CICS Region recycling, Ticket L0022776 Estimated completion: 25 minutes
	Application 3 **Finan**	**CICSPF4A**		Waiting on Feed from Loan System Ticket F030432 opened

➢ **Increased Amount of Detail, Service Level Commitments Status with related Component Status and Alert**

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Helpdesk Monitoring
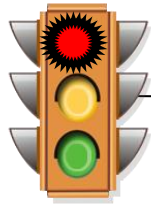
Application 1
Retail

```
Application severely degraded
Transaction response time reduced
DB2 component ABENDED, Ticket R0017823 opened
Estimated time for correction: 15 minutes
```

Application 2
Loan

```
Application degraded
Transaction response time normal
Scheduled CICS Region recycling, Ticket L0022776 statused
Estimated time for completion: 25 minutes (out of 30)
```
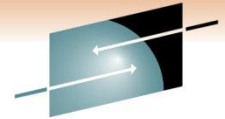
Application 3
Finan

```
Application not impacted
Waiting on Feed from Loan System
Ticket F030432 opened
Estimated time for completion: not determined
```

> **Less Amount of Detail, Service Level Commitments Status with related Component Status**

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Business Unit View

Application 1
Retail

Application 2
Loan

Application 3
Finan

Application 4
ATM

Application 5
Card

Application 6
Order

Application 7
HR

Application 8
eBiz

Application 9
Call

➤ **Least Amount of Detail, Service Level Commitments Status**

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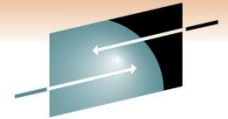
Operational Requirements

- Monitor Availability
- Monitor Service Levels on a Daily Basis
- Monitor Components for Potential Impacts to SLAs
- Anticipate Near-term Future
- Advise Interested Parties of Application Conditions
- Take Appropriate Corrective Action
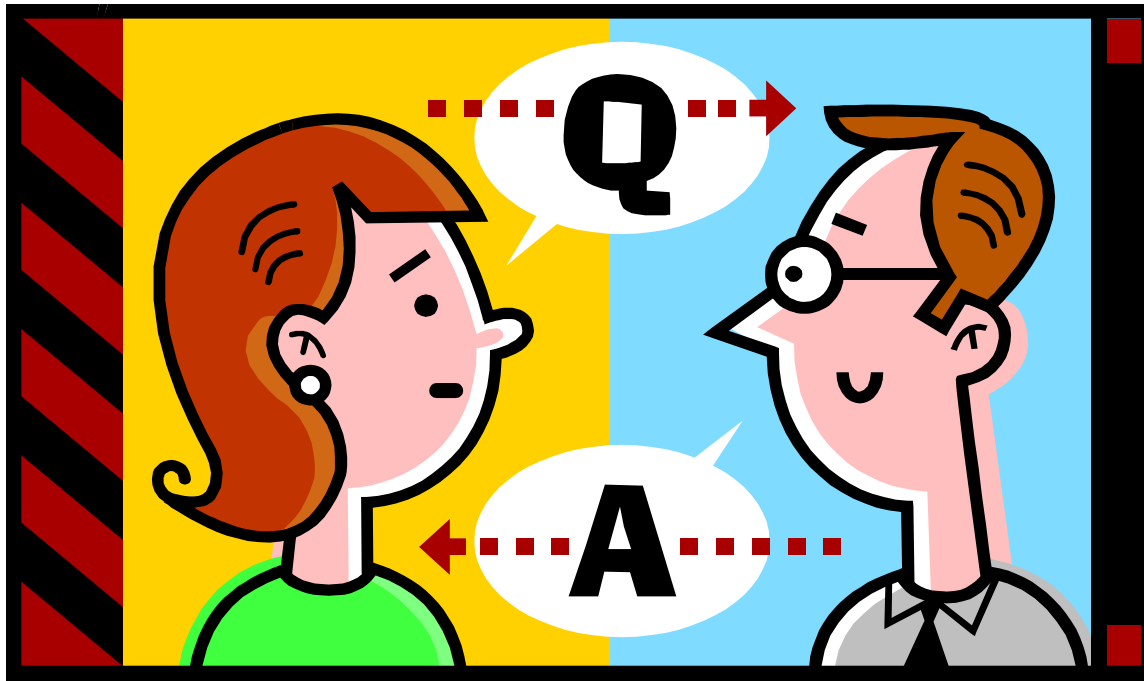- Create Helpdesk Issues
- Log Actions

Conclusion

- IT Environments have become very large and complex
- There is increased interaction with Mainframe Applications and Distributed Platforms
- The amount of Monitoring Data from all of the Application Components is too large to manage without Service Management
- Integrating Service Management into Performance Monitoring and Reporting is key to the ability for IT to mange our Business
- Increase Automation and Autonomic Processes are crucial to the success of our Business
- After Basic Performance and Tuning, Service Management must be incorporated into our current Performance Practices
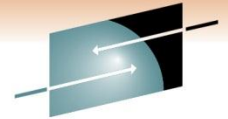
Q&A

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Thank You!

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