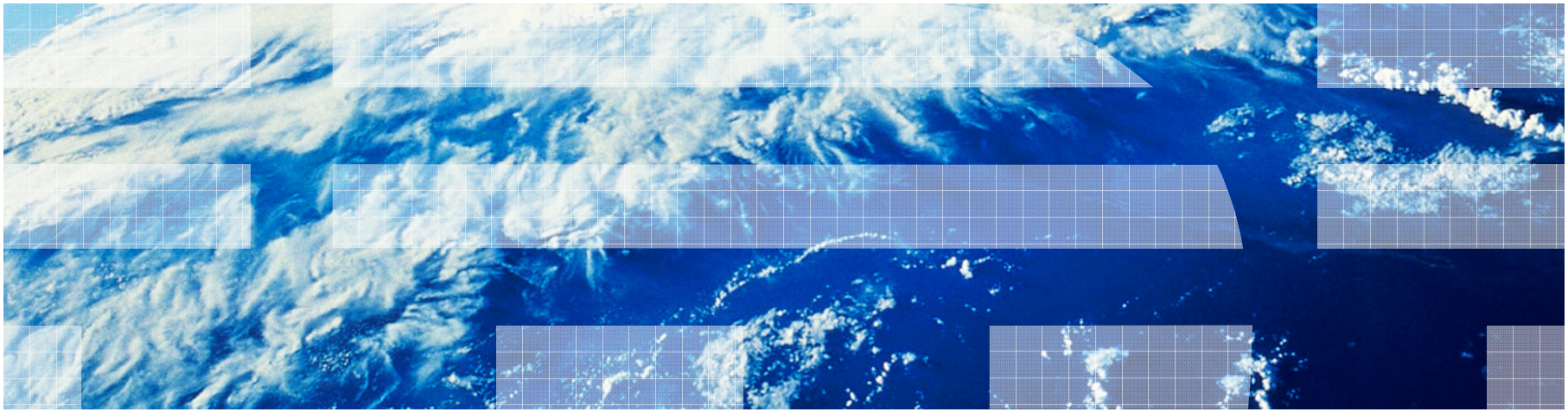
Ray Sun (rjsun@us.ibm.com) – Tivoli Product Management and Strategy

May 2010

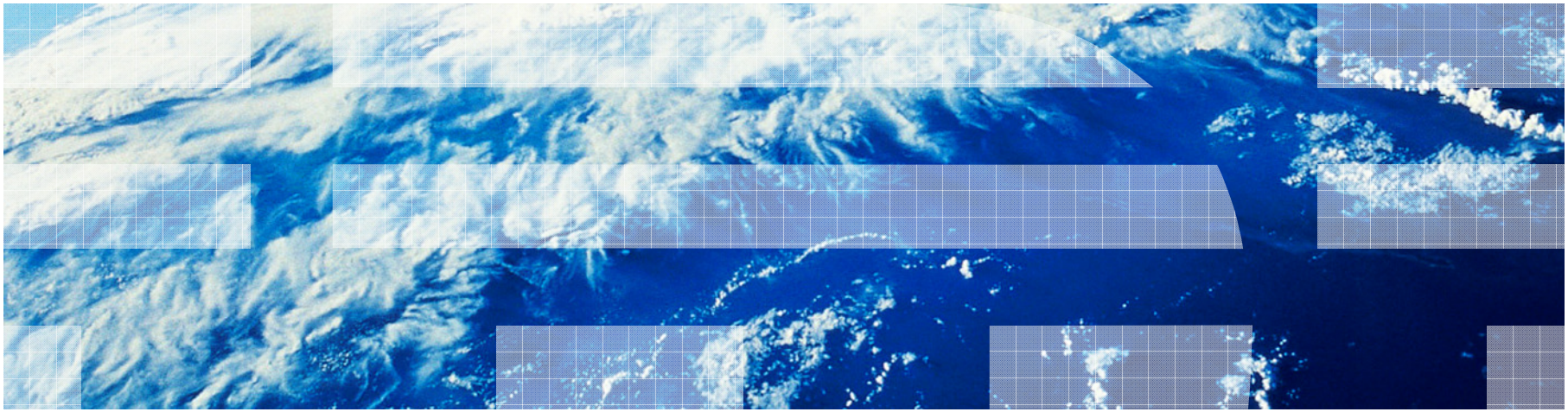
# Managing Mission Critical Workloads on Linux on System z



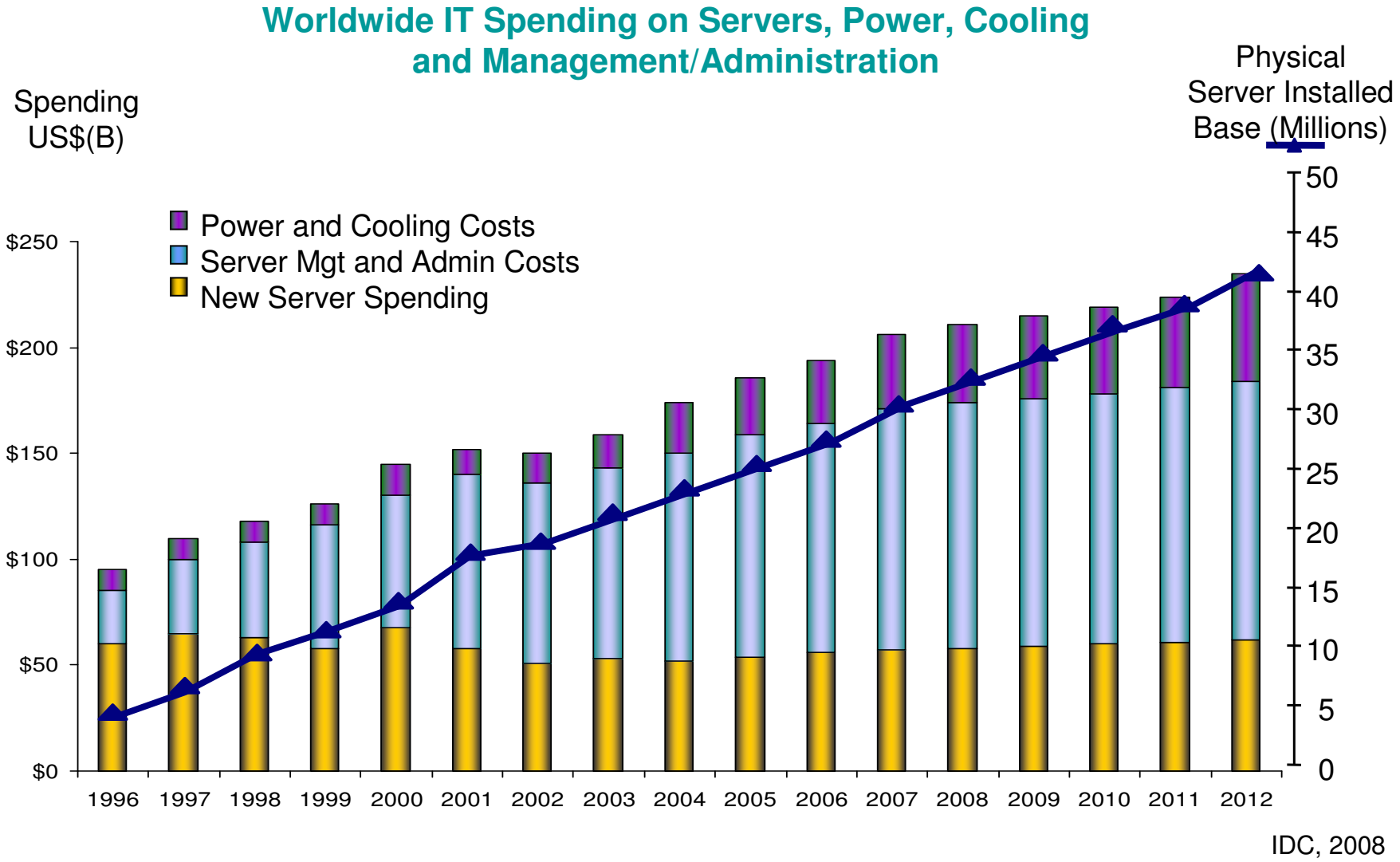
# Today's Agenda

- Addressing IT Challenges
  - IBM
- Best Practices for Managing a Virtualized Environment
  - StreamFoundry
- Solutions for Managing a Virtualization
  - IBM
- Best Fit Applications for a Virtualized Environment
  - IBM
- Implementing Management Solutions
  - Pirean

# Addressing IT Challenges

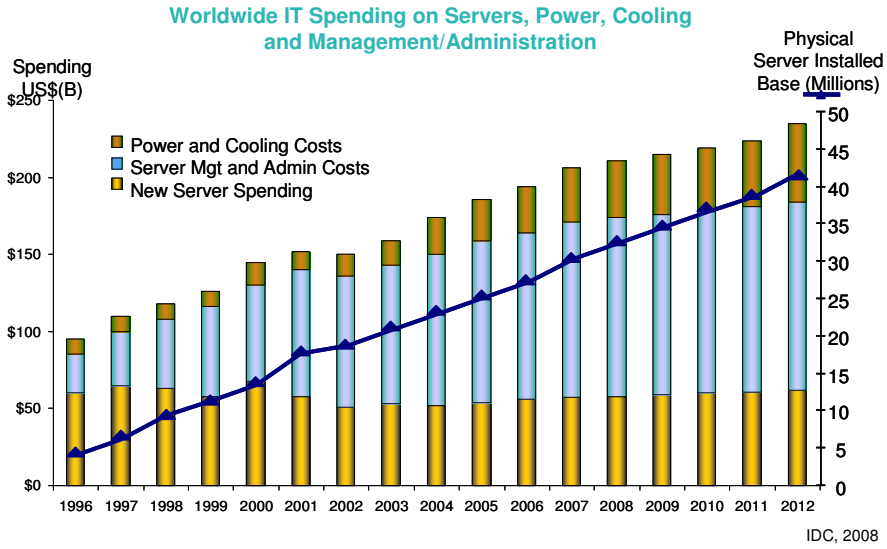


# Annual Operating Costs Are Out Of Control



# Businesses face challenges today

- Lost business opportunity because IT too slow to react. Lack of agility
- Long deployment timelines for new systems (weeks/months+)
- Many people involved in the process, high cost & complexity
- Many steps are manual and prone to error
- Huge up front investment for new infrastructure
- Server sprawl
- Low utilization
- Costly compliance, auditing, and security patching

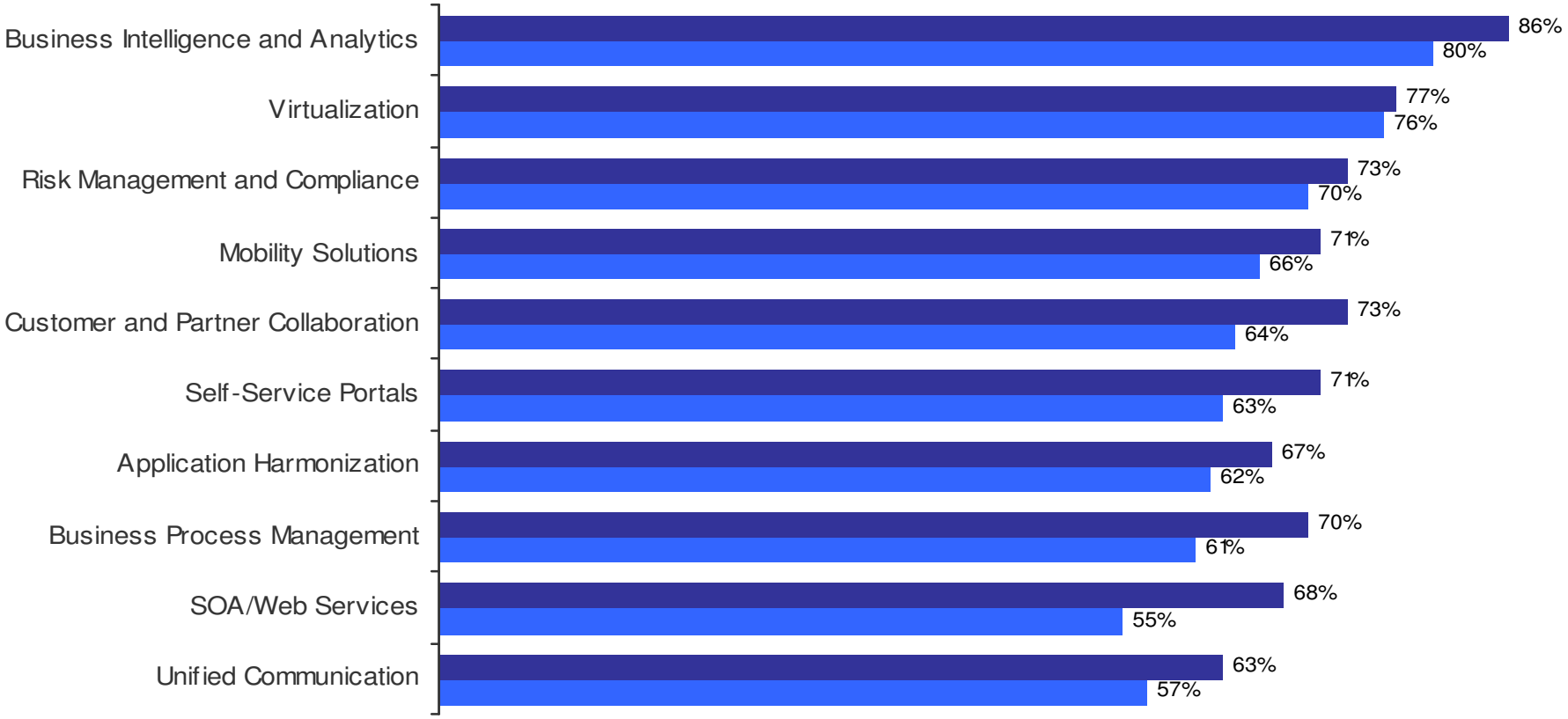



IDC, 2008

# Innovation is not limited to IT solutions: Business-oriented plans rank high among CIOs' visions of enhancing competitiveness

**Ten most important visionary plan elements**

*Interviewed CIOs could select as many as they wanted*

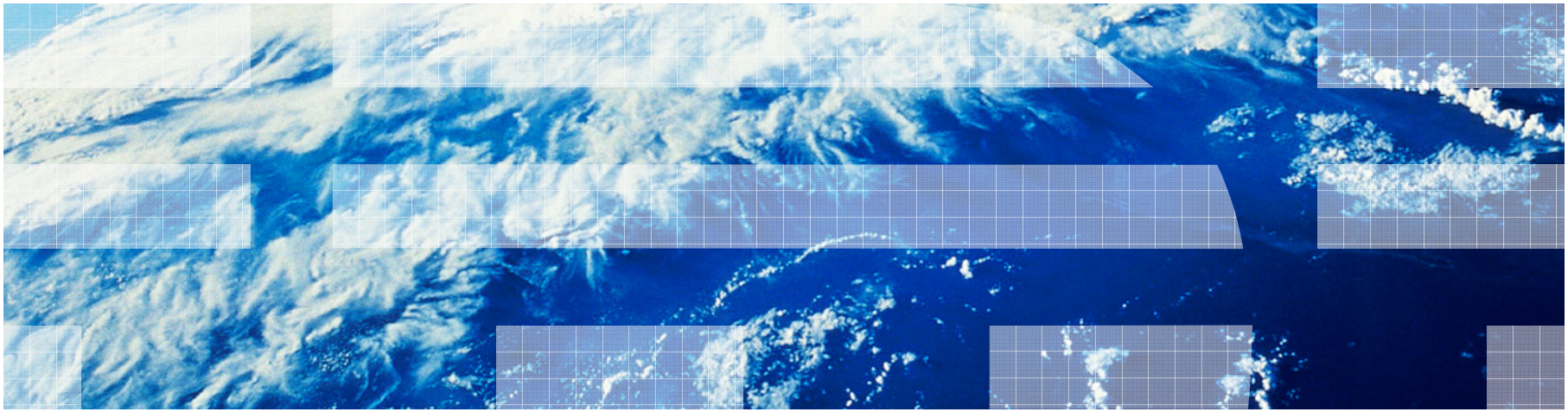



Source: IBM Global CIO Study 2009; n = 2345

# What Is The Solution?

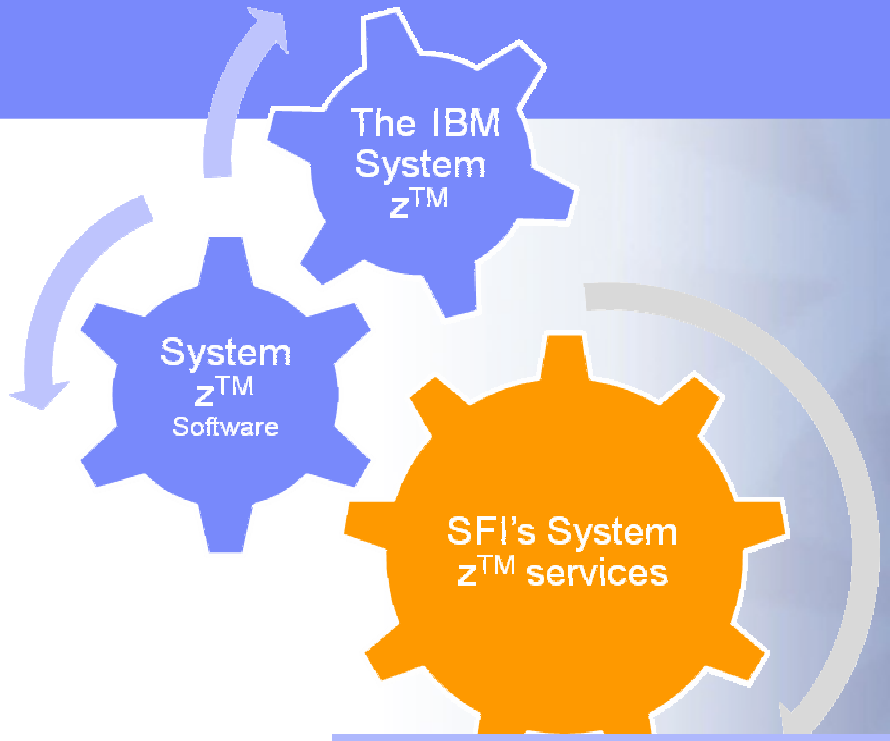
- Reinvent the data center to build a more dynamic infrastructure
  - Take Cost Out
    - Virtualization and consolidation
  - Reduce Energy Consumption
    - Green Data Center
  - Reduce Labor Costs
    - Simplified Administration

# Best Practices for Managing a Virtualized Environment



# StreamFoundry, Inc.
# IBM Mainframe Software Services

The IBM System z10™




Putting the zip back into the 'z'

ON DEMAND BUSINESS

Streamfoundry
Managing Process More Efficiently

**Marc Heimlich**
heimlich@streamfoundry.com
**617.455.5449**

IBM Business Partner


## – Why SFI?

- A company focused on Mainframe Software Solutions
- 100% Success Rate
  - Consultants average 20 plus years experience from Fortune 50 and/or IBM
- An official sub to IBM Lab Services and Software Migration Project Office
  - Plan
  - Design
  - Implement
  - Upgrade
  - Health Checks
  - On-going system monitoring, programming and administering

## – SFI's Linux on System z Practice led by David Kreuter

- Over 10 years of experience in the space
- **Awarded 2007 SHARE Award for Excellence – Province of Quebec**
- Proven dollar savings in driving server consolidation and workload optimization

# Optimizing the Mainframe environment through sensible services

- **SFI's Service Categories**
  - Life extension
  - Clean-up
  - Applications
  - Modernization
  - On-going support

# SFI's various levels of support

Streamfoundry
System z™ Software Services

Automation

Process Engineering

•Sys Programming

Integration

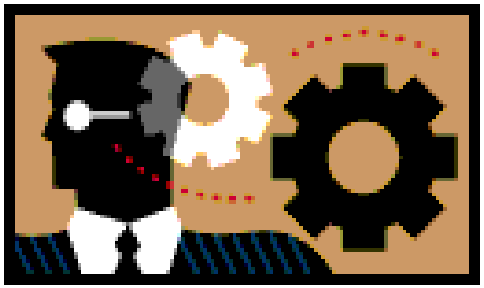
Virtualization

Optimization

Web Services

Consolidation

| | |
|---|---|
| 1 | "*Ask the Mainframe software expert*" blog<br>www.streamfoundry.com<br>No charge! |
| 2 | Fixed rate phone support to address general questions |
| 3 | Fixed rate remote support*<br>24 x 7 |
| 4 | Dedicated remote support*<br>24 x 7 |
| 5 | Dedicated on-site support*<br>TBD (Requirement driven) |



*Customer remote access required



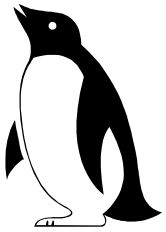
**Rates are subject to change based on customer requirements.

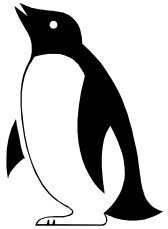
# Linux on z Assessment and Recommendation


## Applications/Infrastructure

- **SFI's Mainframe Software Savings Series…**
  - Can your enterprise lower the cost of the current z/OS environment by using Linux on System z?
  - Which workloads are appropriate to migrate to Linux on System z?
  - What software, how many IFLs (Integrated Facility for Linux), how much memory, what network schemes, and how much disk storage are necessary?
  - How many Unix and Wintel servers can be consolidated?
  - What are appropriate roll-out strategies?


# SFI's *Blue Print* Linux on System z Architecture Services





**David Kreuter**

**SFI's Resident Linux on System z Expert**

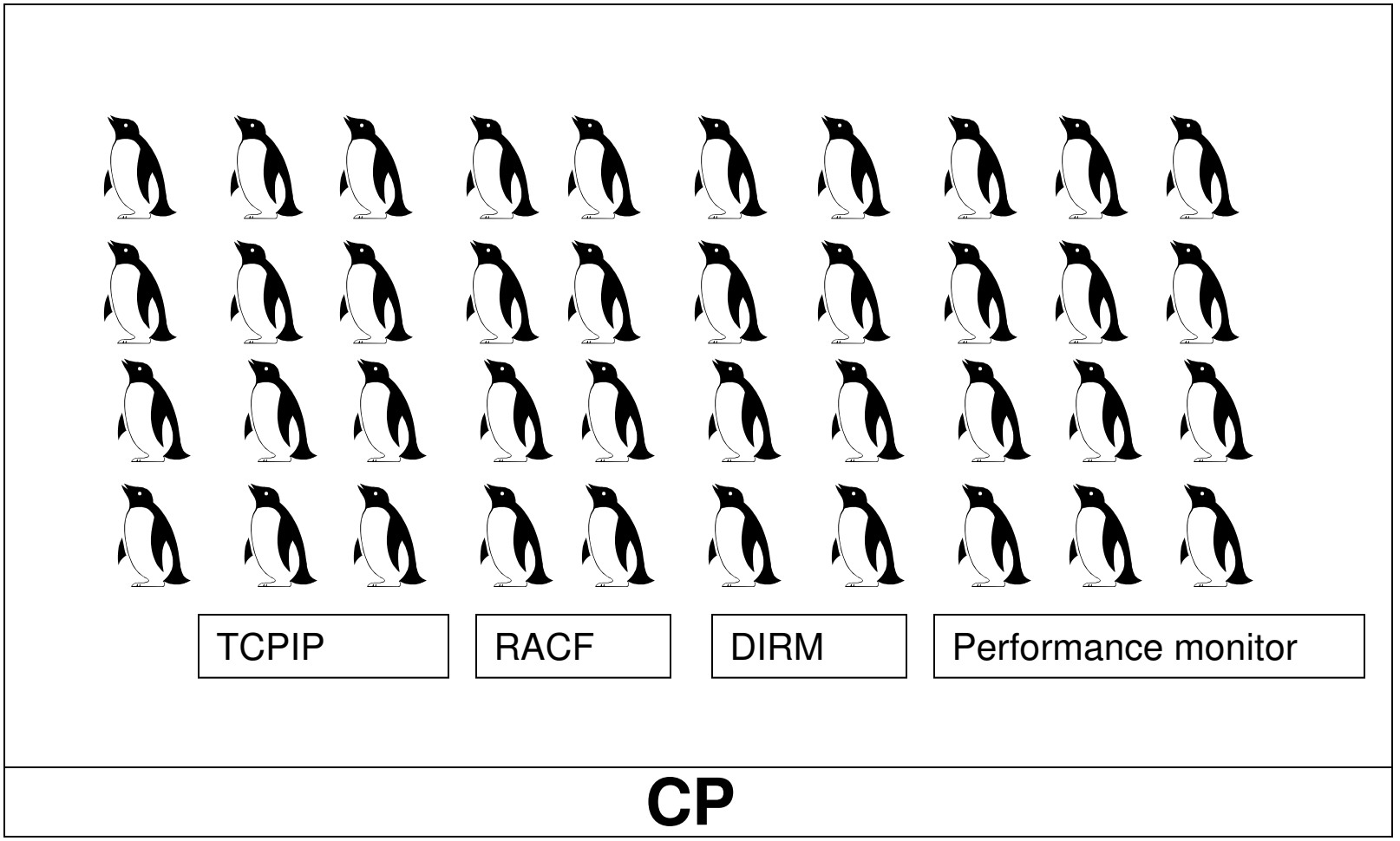
# Why Linux on System z?

- **Potential for cost savings by reducing software licensing costs**
- **Servers in a box**
- **Networks in a box**
- **Green energy**
- **Large scale virtualization benefits the organization**
- **High ratio of servers to systems personnel**

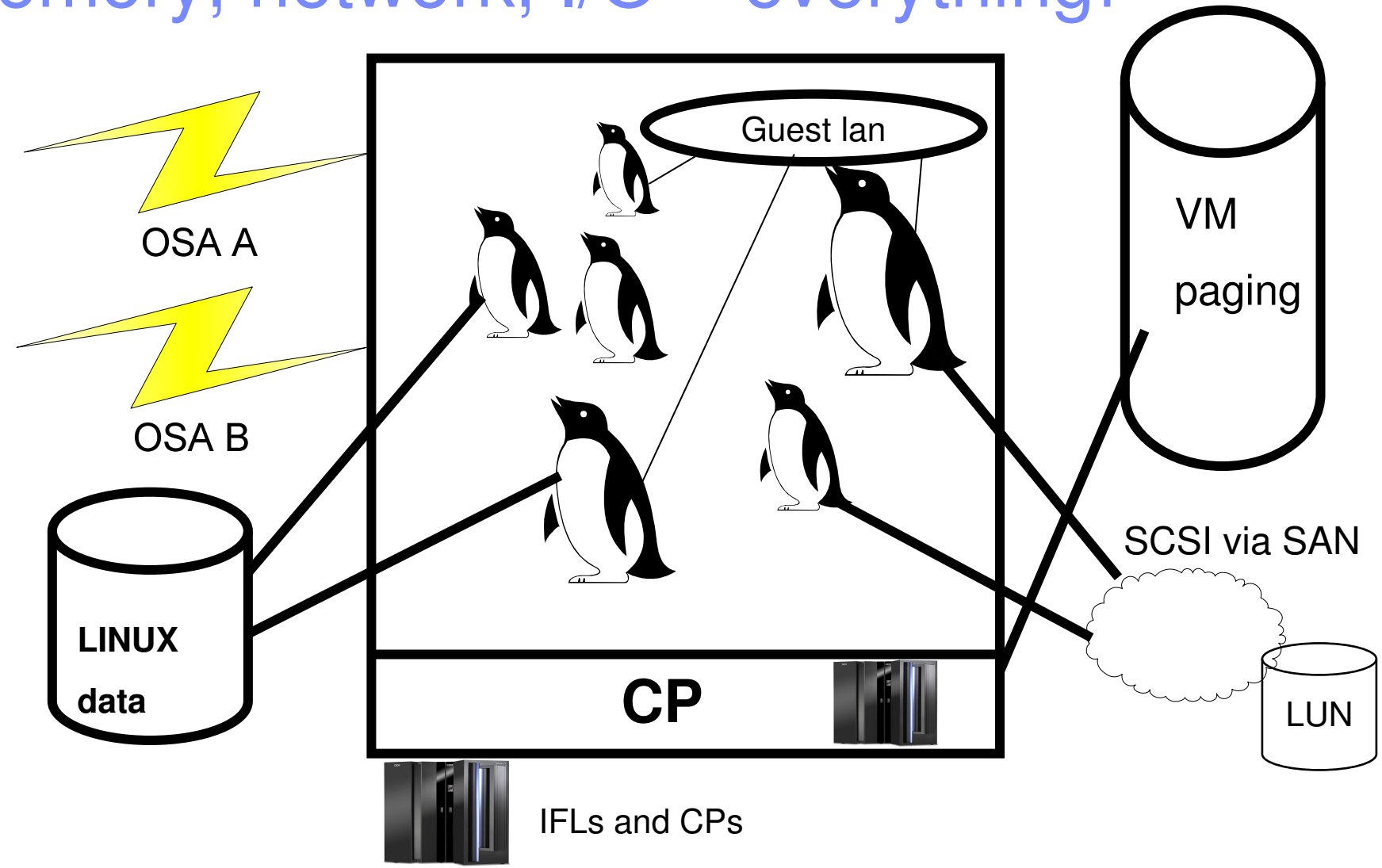
# Objectives

- **Colonizing with Linux Virtual Machines**
- **Value proposition**
- **A great place for networking and data**
- **Strategies for using z/VM and Linux on System z**
- **Networking and data architectures**
- **Customer workloads**
- **Hints and Tips**
- **Best Practices**

# Linux colonies on z/VM

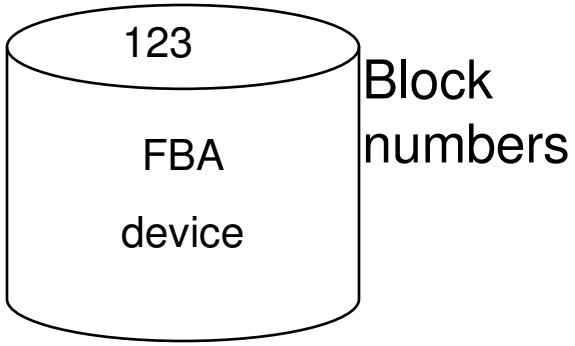


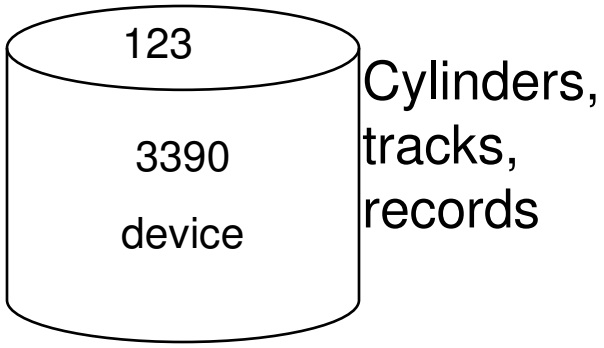
# Intensive Resource Sharing: CPU, memory, network, I/O – everything!

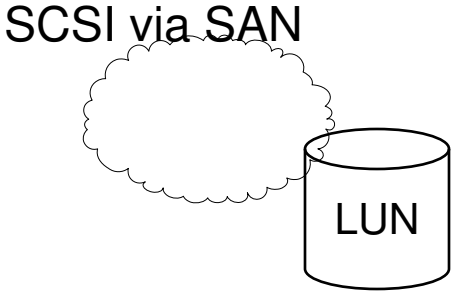


# z/VM: The storage friendly place to park your data

- **Support conventional ECKD disk**
- **And FBA disk**
- **And SCSI disk**

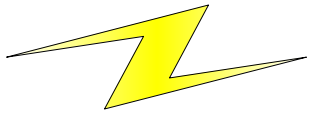


# Removing Mythology from IBM Mainframe Network Devices

- **Hipersocket's and OSA's are mainframe networking devices**
  - Real devices
- **z/VM virtualizes networks with guest lans and vswitches**
- **Real and virtual play well together**

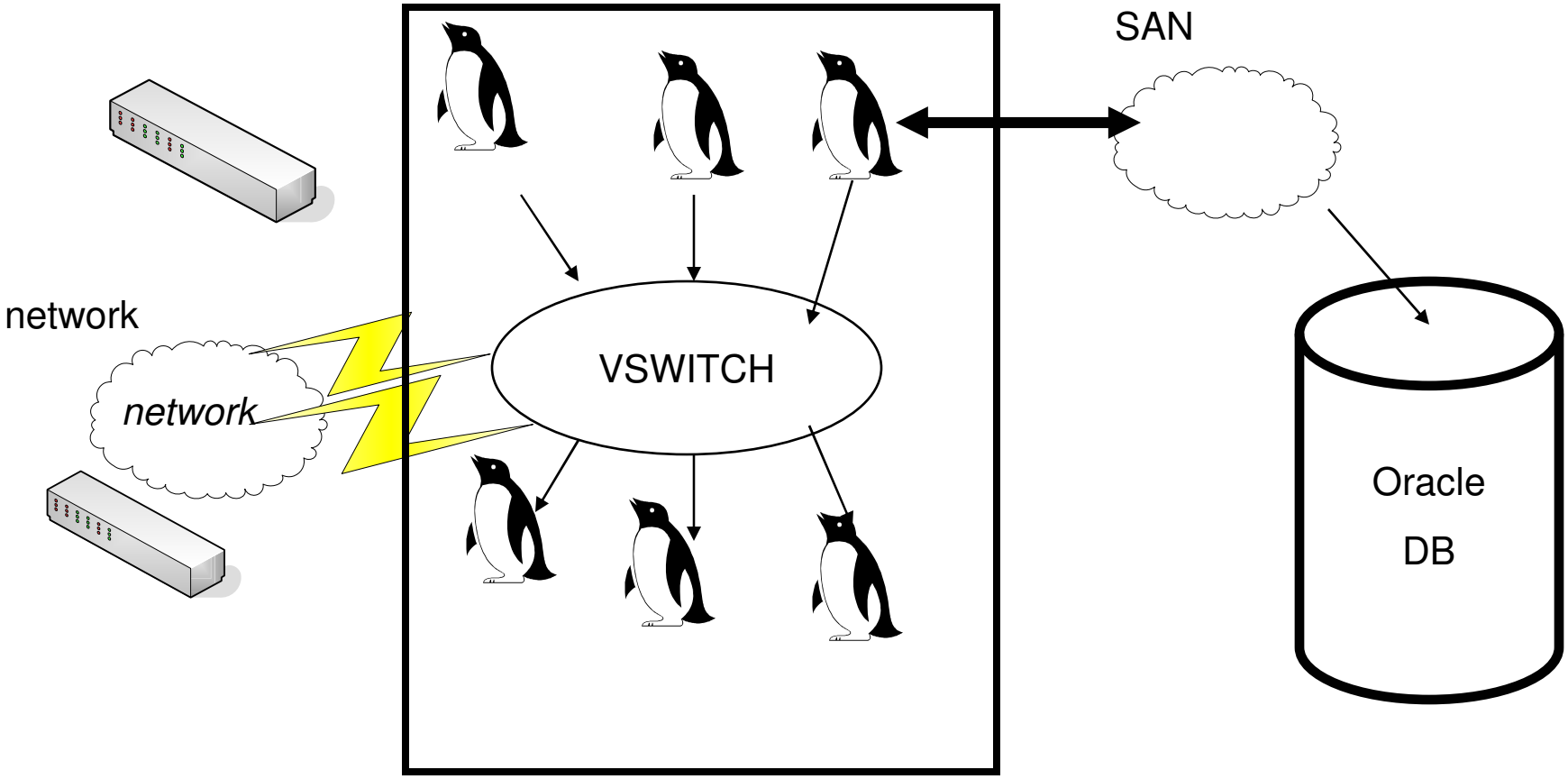



- *Connects the mainframe to the network. Cost feature.*
- *OSA ports operate independently of each other.*
- *Support for up to 4096 VLANs for Linux.*

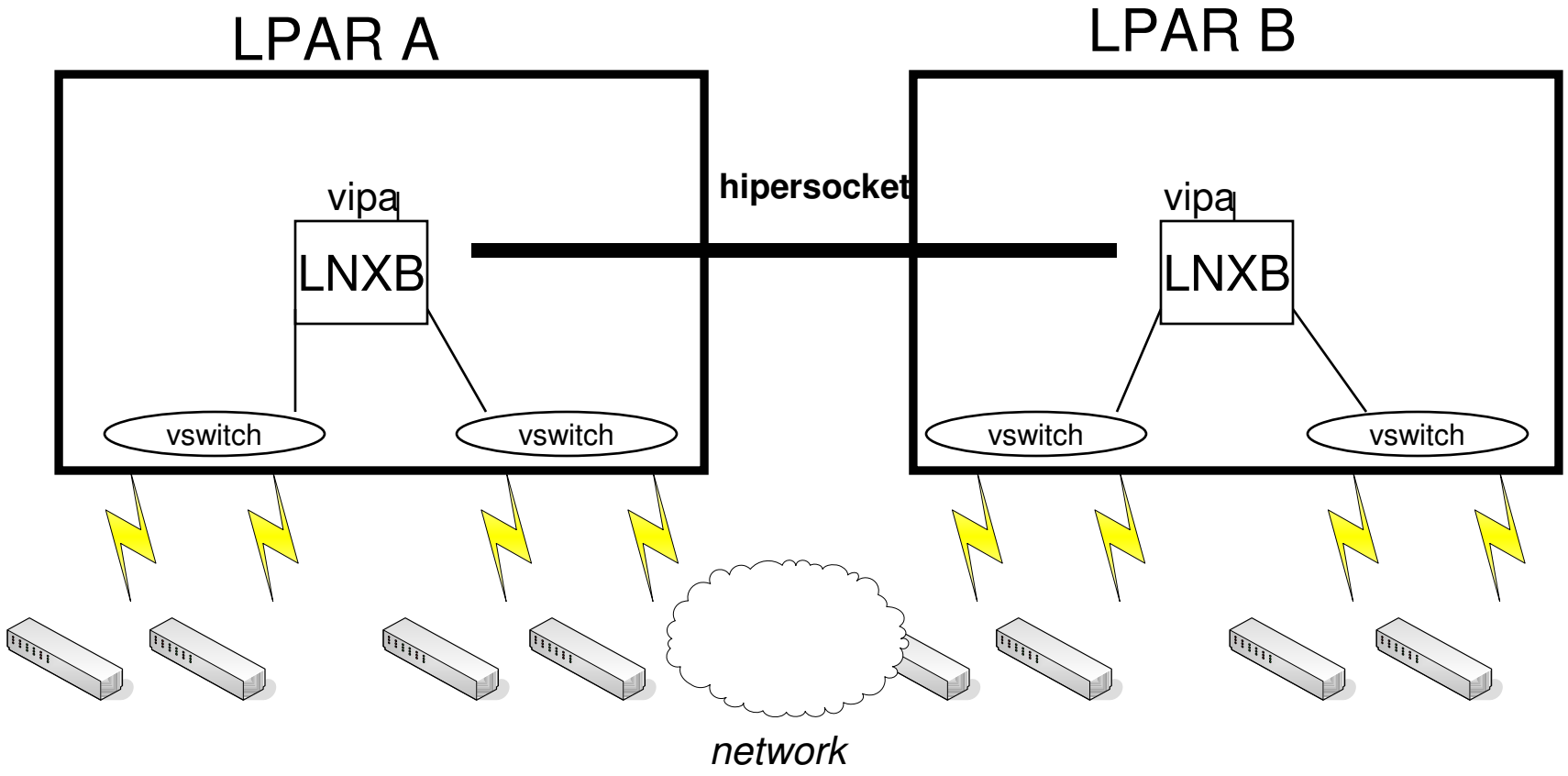
**Hipersocket**

- *Hipersockets provide an internal CEC network. They are high speed and high volume networks. They do not connect outside the box. Hipersockets are supported by z/OS, z/VM and Linux.*
- *Hipersockets are included in System z mainframe.*

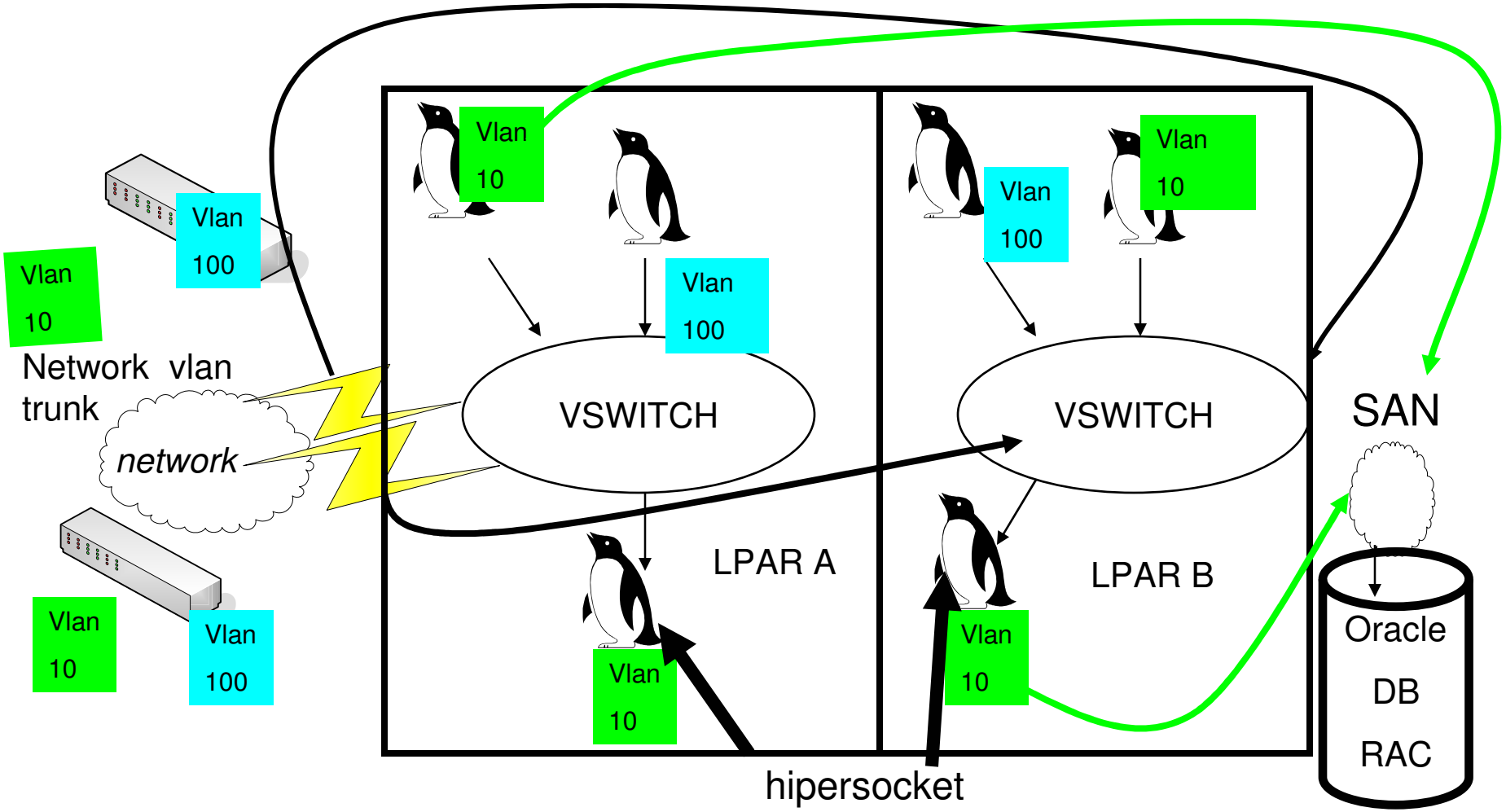
# z/VM LPAR with Linux Oracle Servers. Data is on FCP SAN. Vswitch network (built in redundancy)



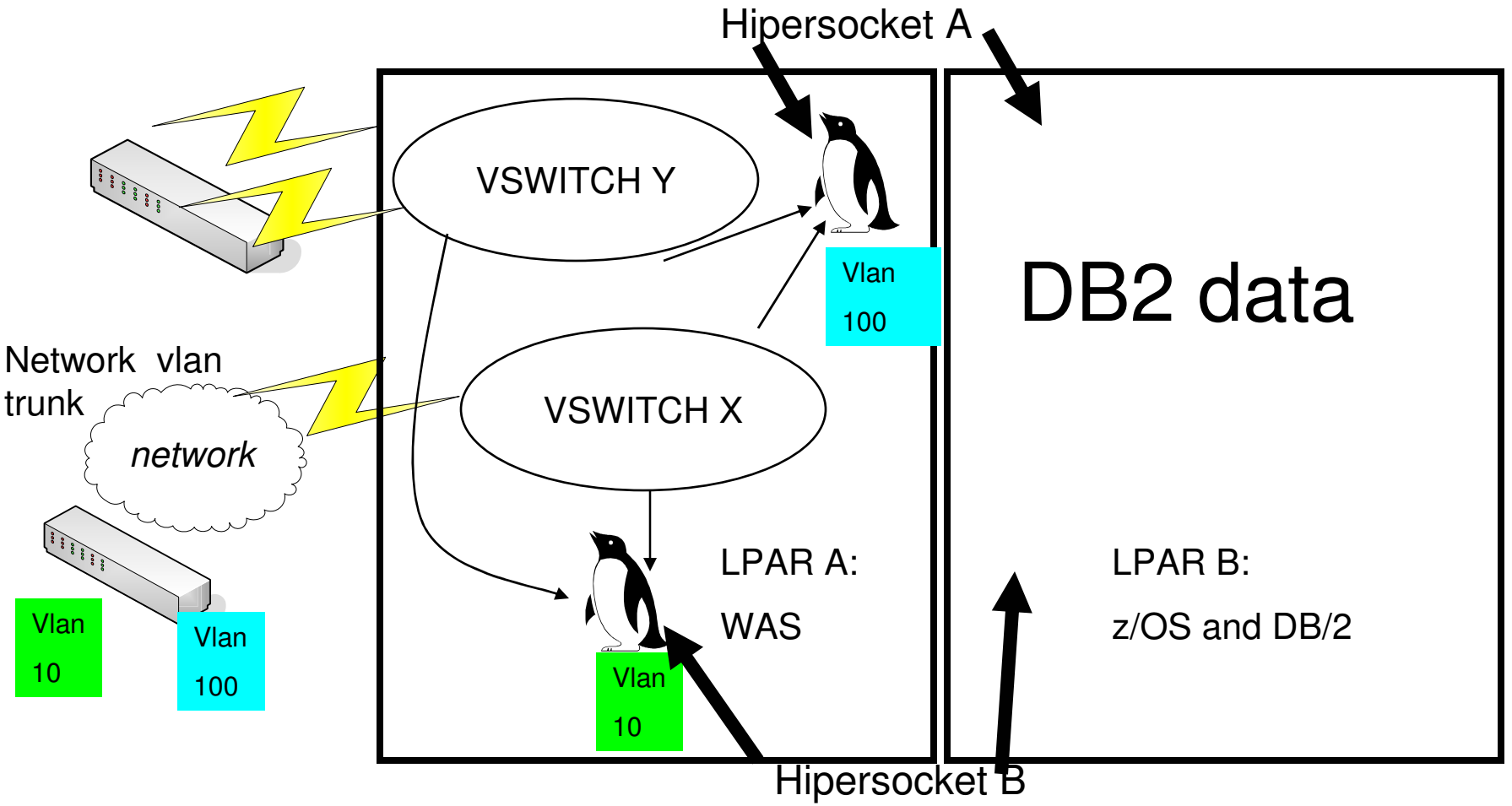
*•Linux machines have four interfaces: two on vswitches, one on hipersocket and one vipa dummy. Using OSPF through Quagga network losses are announced and other paths and routing used. Heartbeat software in the application will also notice outage.*



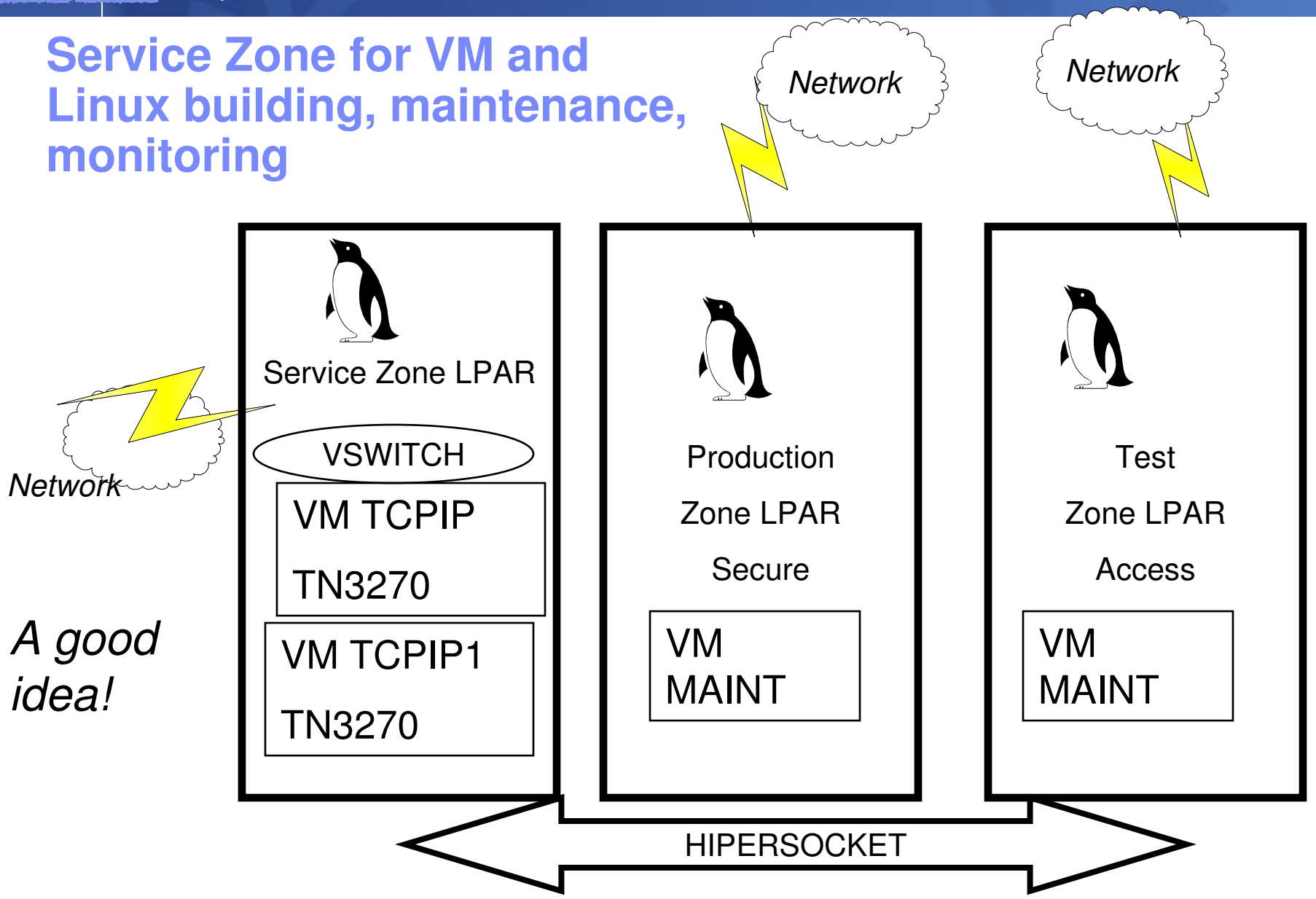
# z/VM LPARs with vswitches,vlans and hipersocket. Shared OSAs and ORACLE RAC on the SAN.
# Creates a nice maintenance window method.



One z/VM LPAR with WAS in LPAR “A” connecting to the cloud. LPAR “A” connects to LPAR “B” over hipersocket to get the z/OS DB/2 data. WAS Linuxen with multiple vswitches. Failures noticed by OSPF. Uses MQSeries and DB2/Connect.

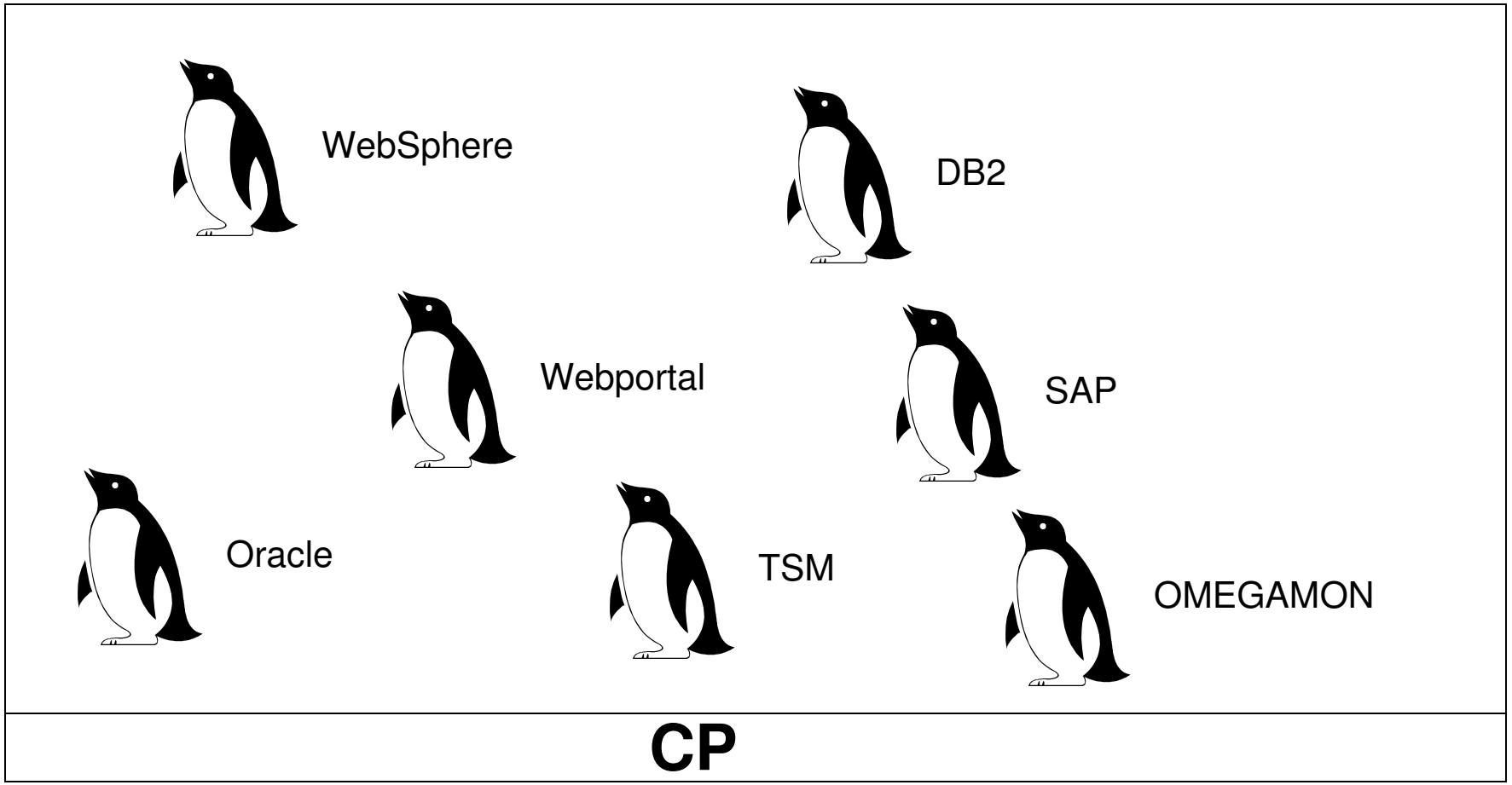


# Service Zone for VM and Linux building, maintenance, monitoring



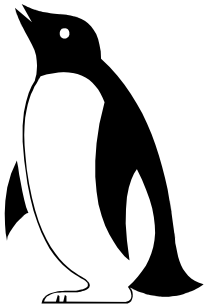

*A good idea!*

# What are the customers doing?



# Client profiles

1. **Large government service bureau**
2. **Police force**
3. **Software as a Service company**



# Client profiles: Government Service Bureau

- **IT service provider for many government offices (125)**
  - *Going back several years:*
    - Existing mainframe shop
    - 5 z890 + 1 z800 + 1 G5 on the floor on 3 sites
    - 1 z9/EC dedicated to Linux on z/VM
    - 450+ physical servers (750+ logical) (HP, SUN, pSeries, …)

*Before Linux on System z*

# Government Service Bureau: Current Configuration

- **1 z10 BC mainframe with 4 IFLs (~ 3000 MIPS)**
- **5 LPARs**
  - Oracle/DB in LPAR with 3 IFLs
  - WAS
  - Service Zone
  - Lab Zone
- **Over 40 different networks**
- **Software**
  - z/VM v.5.4 +
  - SLES9 SP3 Oracle 10gR1
  - SLES10 SP1 Oracle 10gR2
  - CA products (Automation, Scheduler)

*With Linux on System z*

# Government Service Bureau: Lessons Learned and What We Know

- **Reduction in software license costs saved substantial money!**
- **System z with Linux and z/VM can support different workloads in same CEC (Oracle, WEB)**
- **Business as usual for the DBA's and Web administrators – platform appears agnostic**
- **Supports many isolated networks**
- **Service zone is a great idea**
- **Great tools in CMS**


# Software as a Service Company

## System z timeline

*Pondering, Planning, Considering*

*Dell, Linux, Windows Shop. No mainframe!*

*Architecture, Planning, Installation, Testing*

*z9 BC and DS6800 on floor*

JAN

2007

2008

JUNE

*Production*

*4 IFLs*

*16Gb*

*Oracle Servers on z/VM and Linux*

2009

*3 IFLs 24Gb*

2010

# Software as a Service Company

**Lesson learned**

## Reduced from 4 to 3 IFLs

- ***Workload reduction?***
- ***Workload redeployment to other platforms?***
- ***Decrease in transaction rates?***
- ***Decrease in database size?***

- *No! Workload, transactions and database size increased*
- *Memory increased to accommodate new workload*
- *The application was tuned!*

# Software as a Service Company

## Hardware Configuration

z9 BC model R07-A01

3 IFLs
2096-A01

24Gb

DS6800

15 Tb

TS3400 Tape Library

# Software as a Service Company

## Software Suite

z9 BC model R07-A01

3 IFLs

24Gb

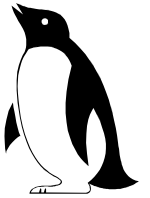
z/VM 5.4

++ tools: systems management, automation, deployment, and monitoring

Linux SuSE SLES 10

Oracle 10G EE

# Software as a Service Company



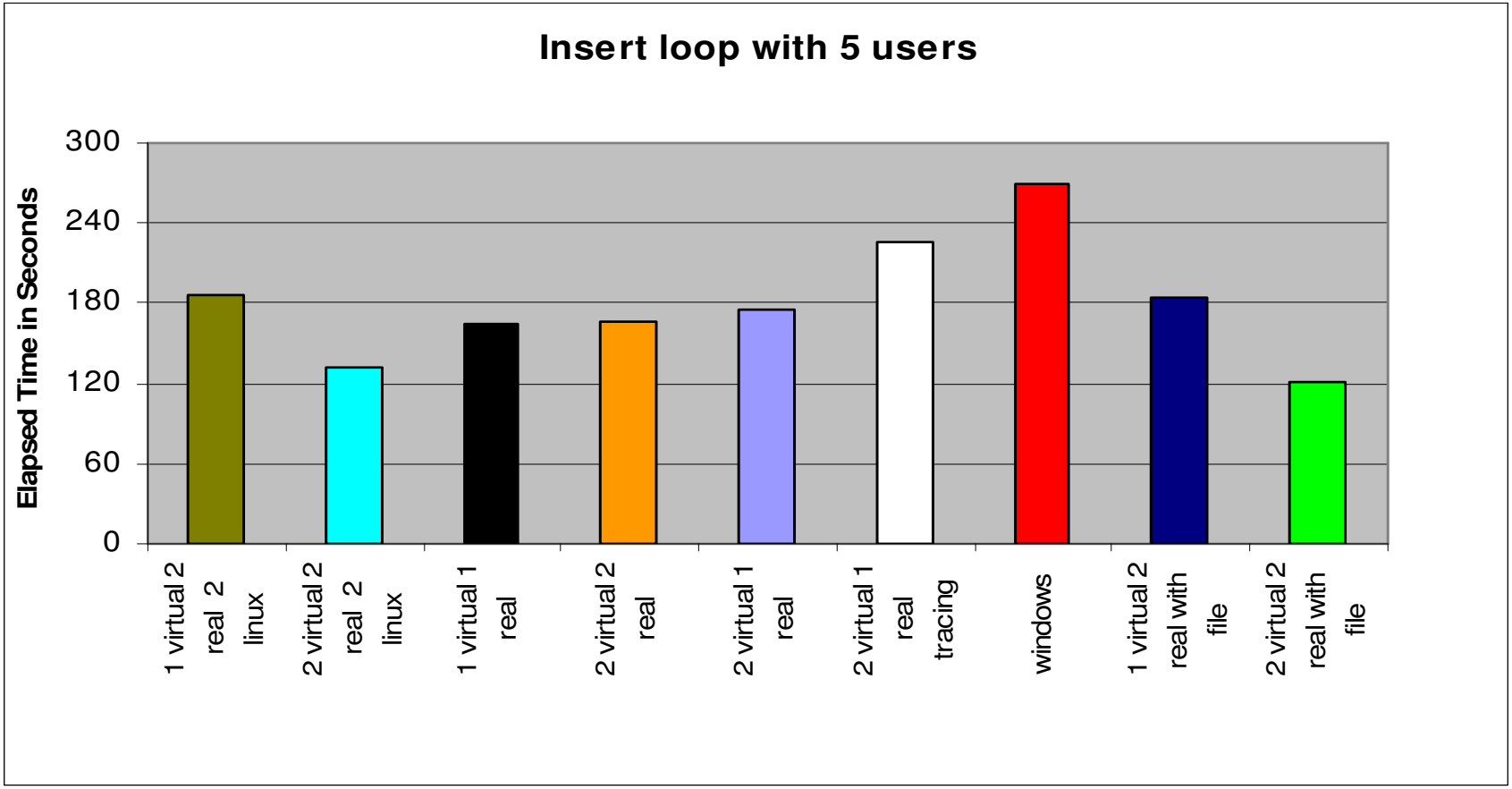
## Best practices

- **Use a performance monitor**
  - The IBM Performance Toolkit
  - Generating daily csv format files used for analysis and reporting
- **Using DIRMAINT for directory and storage management**
- **Use the z/VM wrapper: CMS tools.**
- **Using small locally written automation and remote control tools**

# Client Profile: Major Police Force

- **Will deploy Oracle on z10BC 2 IFL machine with z/VM, SuSE SLES Linux, and Oracle in 2010**
- **Completed study in early 2009 with sample scripts executing in Windows compared to System z.**
  - Performed on z/890 with two IFLs
  - Windows machine was a 4 way.
- **Most scripts performed better on System z**
  - Exception was a long running script.
    - *in production z/10 will handle CPU intensive work better than the z/890.*
  - System z performed better than windows on insert and delete loop tests with multiple users.

# Client Profile: Major Police Force: Comparison Report of Record Insert



# Common hint and tip: Must have a network integration plan

- **How existing networks connect with new z/VM and Linux networks.**
- **Routed or flat topologies – or both –**
- **Network redundancy**
- **Fail over**
- **Securing access to the mainframe networks**
- **Establishing administration only network**
- **Which personnel responsible for maintaining network configurations in z/VM and Linux stacks.**

# Common hint and tip: Success strategy: Must have an architecture

- **Architecture document includes:**
  - Hardware and software details including model numbers, versions, MIPS, storage sizes.
  - Recommendations for z/VM and Linux automation tools and performance monitoring methods.
  - Detailed design documents.
  - Network deployments focusing on OSA, guest lan, vswitch and hipersocket strategies.
  - Security strategy.
  - Planned future growth and capacity plan.
  - Application deployment strategy.
  - Backup/restore and disaster recovery strategy.

# Common Best Practices: Memory and Swapping

- **Calibrate Linux virtual machine size so it consists memory adequate for kernel and application workload but do not overcommit caching memory:**
  - Do not size virtual machine too high - wasting precious resource
  - Do not self defeat! This is a heavily shared environment
- **Define multiple swap disks on virtual disk space:**
  - Cascading priority
- **Set swap size to be around 50% of virtual machine size**
  - *usually*

# So … What do we know now? What have we learned?

- **System z provides opportunities for vertical and horizontal server growth.**
- **Must calibrate virtual machine storage size**
  - Almost always smaller then in distributed environment
- **Plan for swapping but avoid in most cases.**
- **Must use a performance monitor:**
  - You paid for it must know how the resources are being utilized
- **Must keep z/VM and Linux safe and secure**
  - Linux security is … Linux security
  - Secure the z/VM environment with RACF

# Common Lessons Learned: Best Avoided

- **Vendor documentation and recommendations often not optimized for System z.**
  - Creates confusion with personnel new to System z
- **Overzealous Proof of Concept Deliverables**
  - Don't attempt to test everything in the house – just choose a room
- **Executive scope creeping**
  - Have a sponsoring manager interested in your success

# Wrap Up

- **System z virtualization benefits**
- **Strategies for using z/VM and Linux on System z**
- **Networking and data architectures**
- **Customer workloads**
- **Hints and Tips**
- **Best Practices**

# SFI's All-Stars

- **Experts in their craft**
  - Steve Gorman – CICS, DB2 SDSF and ACF2
  - Rob Zenuk – CICS and DB2
  - Peter Enrico – Capacity, Performance and Reporting
  - Russ Evans – CICS Web Services
  - David Kreuter – Linux on System z & z/VM
    - ** 2007 SHARE Award for Excellence
  - Dave Jones – z/VM System Programmer
  - Henrik Sandin – TWS & TDS
  - Dave Bernheisel – OMEGAMON
  - Paul Scaglione – System Automation
  - Dan St. Cyr – Parallel Sysplex Expert – Installed the very first PS @ Verizon (Nynex)
  - Tom Conley – Storage Expert

# Conclusion – SFI adds value!

## SFI's Software Services

- Hire one consultant and access the knowledge of the entire Mainframe Software industry
- Short and/or long-term assignments
- Deliverables done correctly the first time in a fraction of the time
- 100% customer satisfaction

Streamfoundry
Managing Process More Efficiently

# Welcome comments or questions

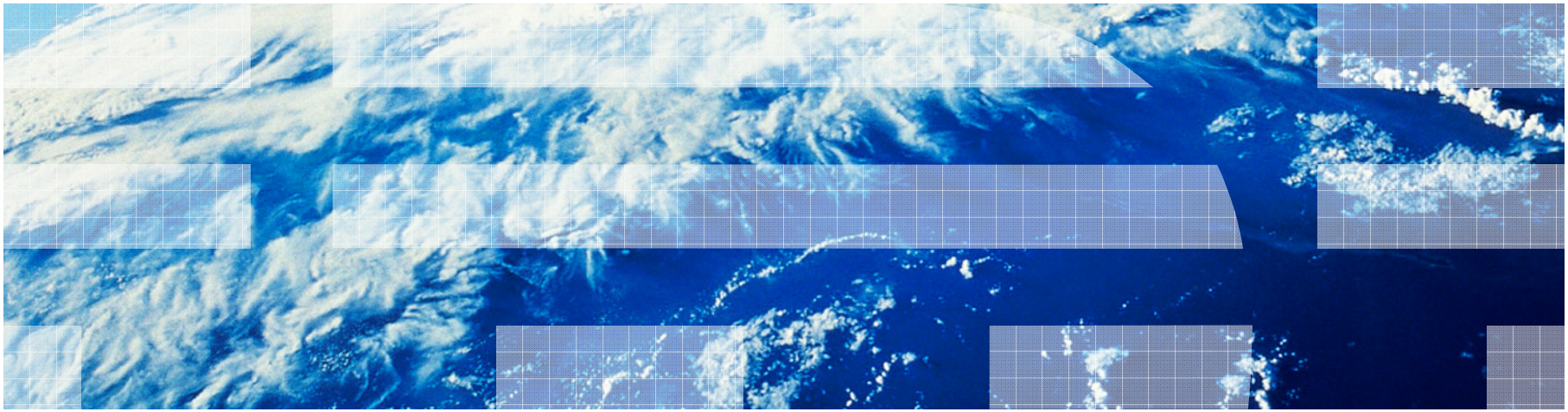

We appreciate your support.

Marc Heimlich, VP, Sales & Marketing

StreamFoundry, an IBM Business Partner

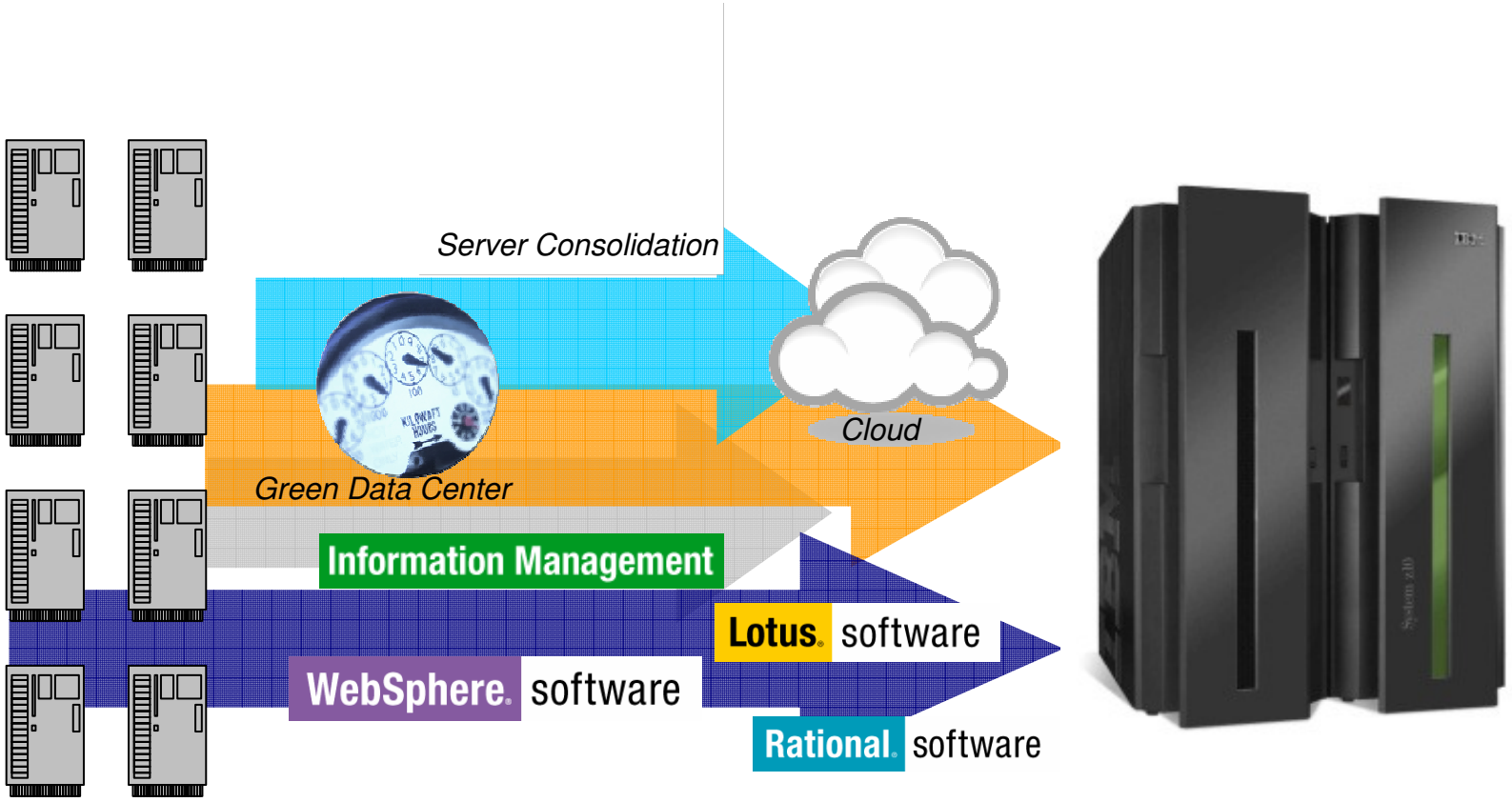
heimlich@streamfoundry.com or 781.272.4307

# Solutions for Managing Virtualization



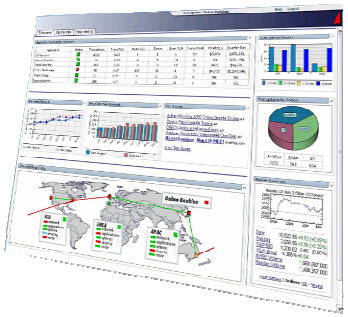
# Moving Workload to System z

Why do clients move workloads to System z?




But, how do you manage this new environment? Tivoli. software

# IBM Service Management
## Enabling quality service delivery and business innovation



**Visibility**:
*See your Business*

***Respond faster and make better decisions***

**Control**:
*Manage your Business*

***Manage risk and compliance***

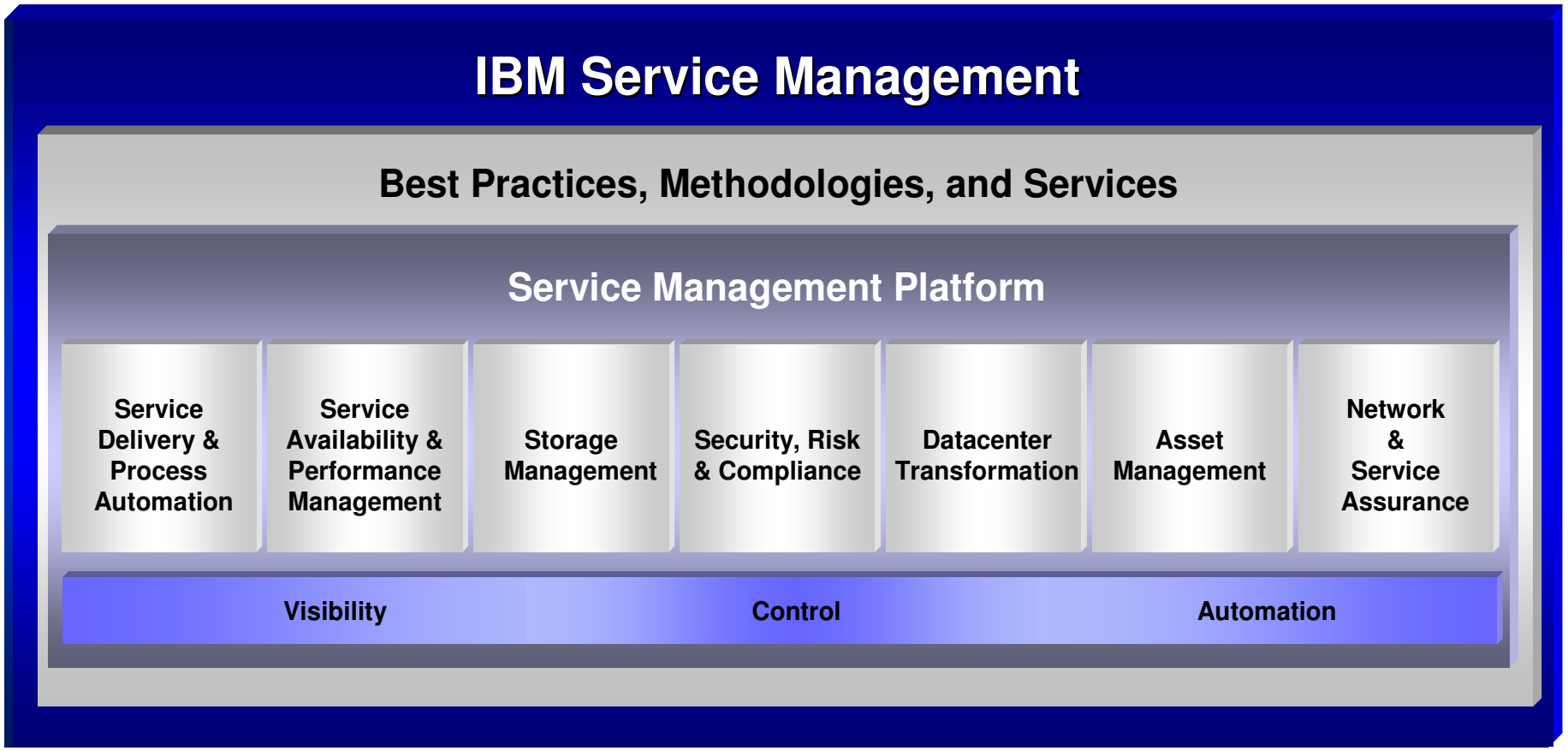
**Automation**:
*Improve your Business*

***Lower costs and build agility***

# Simplify Service Management
# Increase Return on Investment with Differentiating Value from IBM

- Align IT objectives with business objectives
  - Visualize service delivery and incident impact on line of business and key performance indicators
  - Automatically map application and IT infrastructure to line of business
- Enforce ITIL management processes
  - ITIL-based process automation solutions with common workflow engine and data platform
  - Standardize management processes and institutionalize best practices
- Eliminate multiplicity of service management solutions
  - Integrated, end-to-end process automation solutions that span the mainframe and distributed systems
  - Leverage best practice and standardize management processes enterprise-wide
- Break down silos
  - Integrate enterprise-wide processes, and reduce the frequency and impact of failed customer interactions

# Service Management

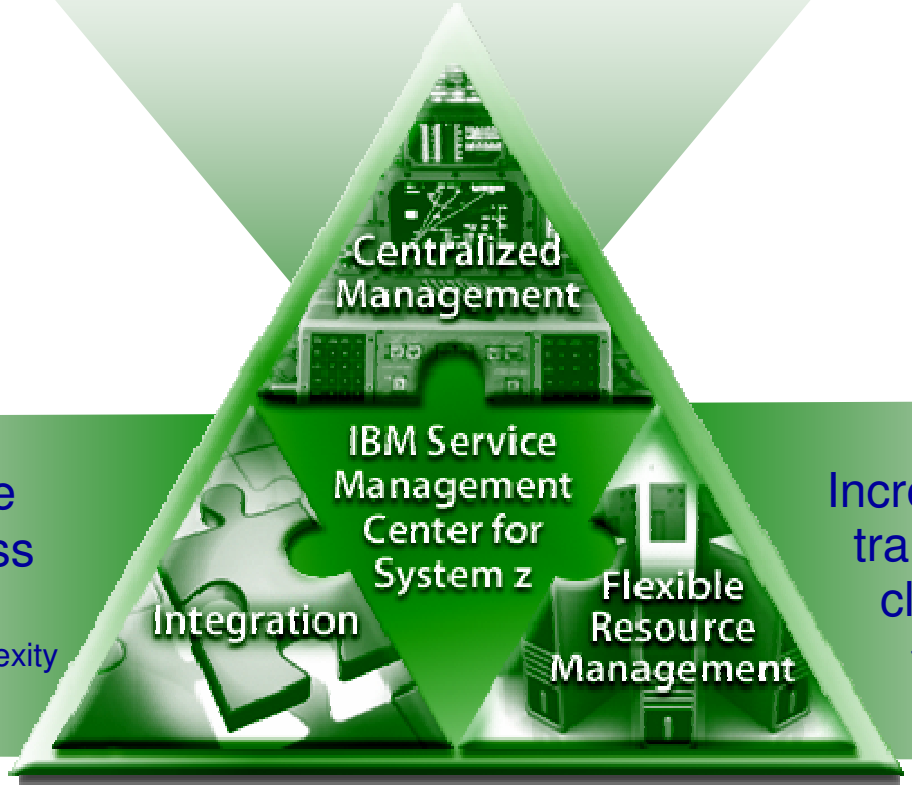


# IBM Service Management Center for System z

*A Service Management and Best Practices Model for System z Clients*

## Manage your enterprise from System z

– Enables System z as the Strategic Platform of Choice for managing the enterprise




## Integrate across service management & business delivery processes

– Improve visibility, reduces complexity and cost, increases efficiency

## Incremental roadmap to transform to a green and cloud infrastructure

– Further realize cost savings, Increase flexibility and efficiency

# Swiss Re - Reaching the Pinnacle of Mainframe Management

## Client Needs:

- Move from a siloed, manual approach in managing key IT processes to an end-to-end service management model in which IT processes are standardized, automated and aligned with business needs
- Tremendous pressure to meet the rapid growth due to acquisitions without increasing the budget

## Solution:

- Centralized and proactive health based performance management across mainframe and distributed environments
- Automatically identifies and fixes performance issues
- Fully automated deployment solution

## Client Benefits:

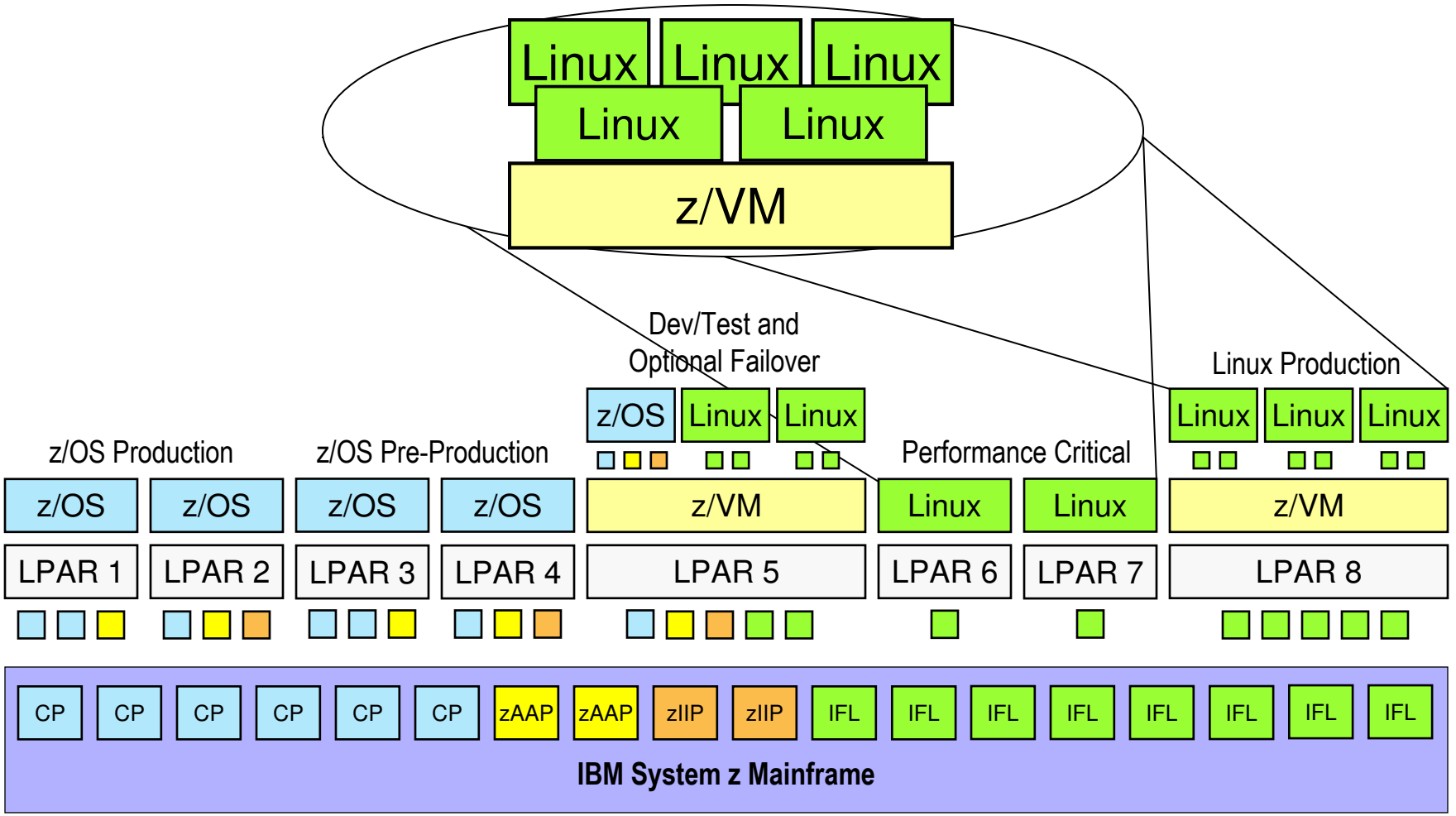
- Able to accommodate the 300% growth in the past few years with the same budget
- Reduced problem resolution time from several days to less than one day
- Cut number of unsolved problems to virtually zero
- Achieved 99.999% availability of mainframe environment *while* cutting operating costs
- Developers can forecast new infrastructure requirements, communicate them to IT staff and gain approval early in the process to avoid unnecessary delays

***Industry:*** *Insurance*

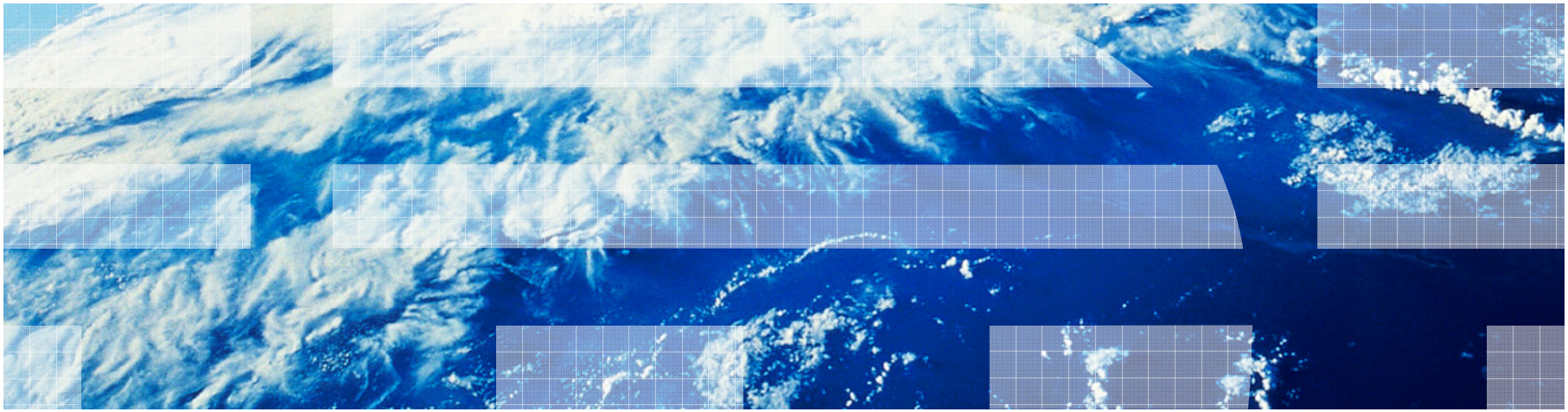
*" IBM is the only company covering the whole scope we wanted to address, from business process design to application development to operational infrastructure. Because Tivoli Provisioning Manager software can be integrated in the planning process and applications can be deployed automatically without manual intervention, we can improve staff productivity and accelerate deployment times "*

**- Heinrich Waldhier, director of global processes, IT, Swiss Re**

# z/VM and Linux on System z



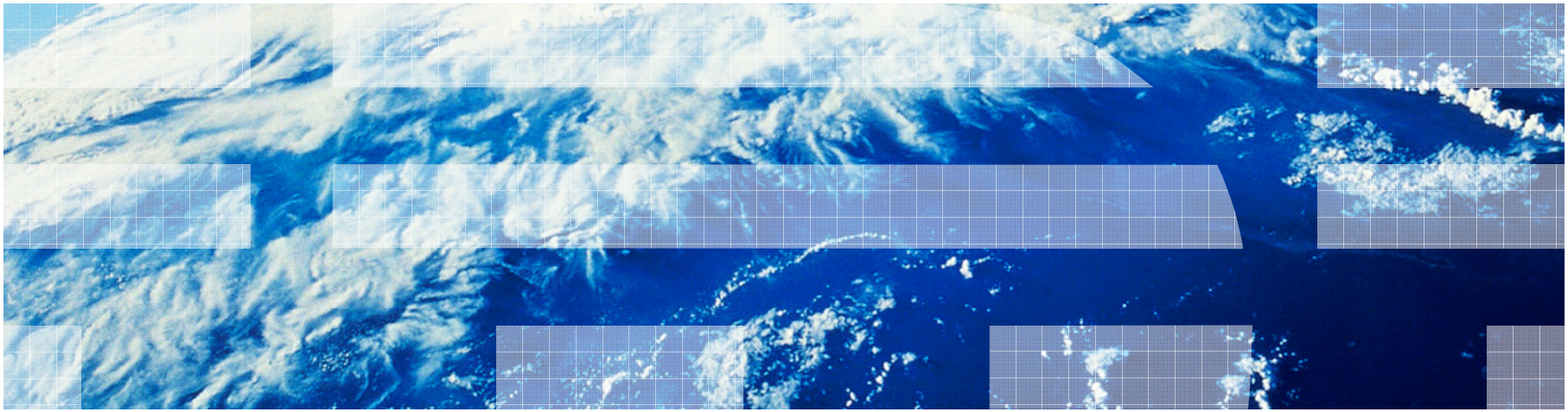
# Basic Requirements



# Core Systems Management Disciplines

- Security
- Asset Management
- Monitoring
  - Availability
  - Performance
  - Event Management
- Automation
  - Application Automation
  - Operational Automation
- Other
  - Storage Management
    - Backup/Archive
  - Discovery

# Security



# The world is riskier than it used to be…

**Massive insider breach at DuPont**
*February 15, 2007*
*By: Larry Greenemeier*

**TJX data breach: At 45.6M card numbers, it's the biggest ever**
*March 29, 2007*
*By: Jaikumar Vijayan*

COMPUTERWORLD

**Blackberry outage widespread**
*February 14, 2007*
*By Marcia Walton*

CNN

**Black Friday Turns Servers Dark at Walmart, Macy's**
*November 25, 2006*
*By: Evan Schuman*

eWEEK

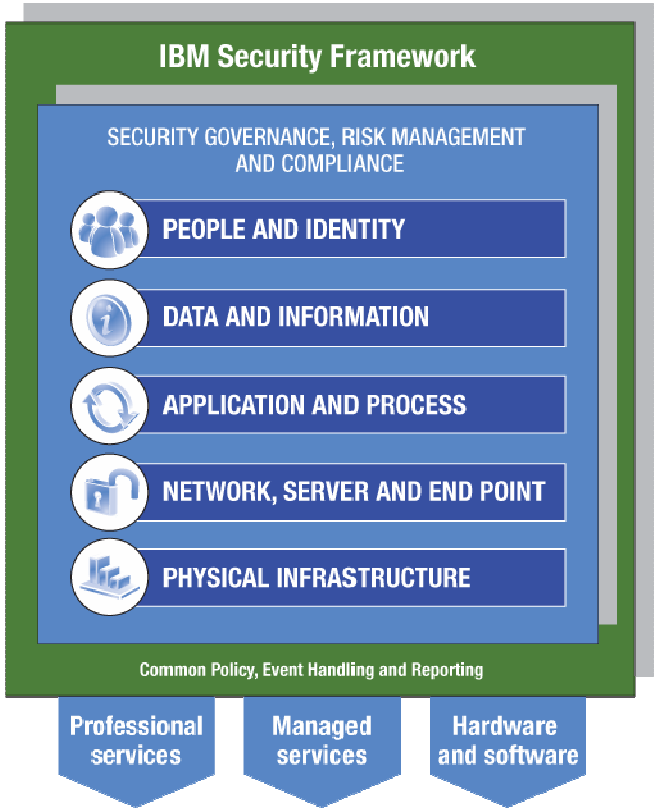
**Bill would punish retailers for leaks of personal data**
*February 22, 2007*
*By Joseph Pereira*

THE WALL STREET JOURNAL.

# What is at risk?

- Your Brand
- Intellectual Property
- Legal and Regulatory Exposures
- Your Customer Information
- Customer Confidence
- Cost of Remediation
- Business Disruption
- Your Job

# IBM Tivoli Security delivering on the IBM Security Strategy




## Tivoli Security Solutions

### Identity and Access Assurance

- Reduce cost and risk by easing the onboarding and offboarding of users, reporting on user activity and ongoing certification

### Data & Application Security

- Protect business information & reputation by safeguarding data in use or at rest

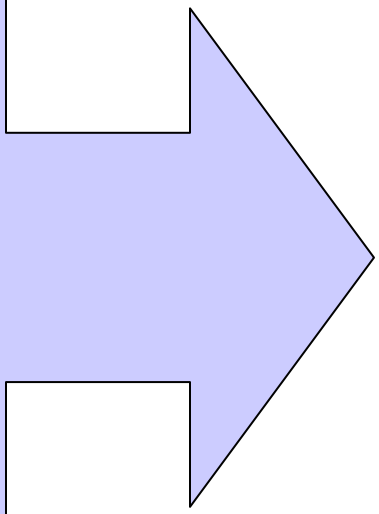
### Security Management for System z

- Improve mainframe security administration & enable integrated mainframe & distributed security workloads

# Identity and Access Assurance

## Tivoli Capabilities

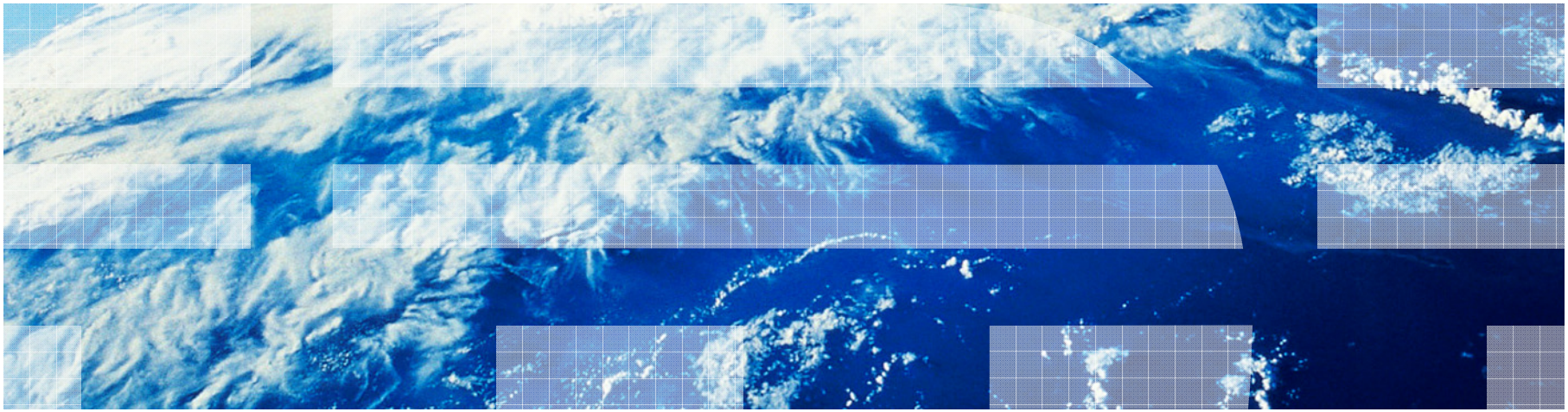
- User provisioning & role management
- Unified single-sign-on
- Privileged user activity audit & reporting
- Directory and integration services
- Log Management
- Self-service password reset
- Identity Assurance / Strong authentication management



Benefits:

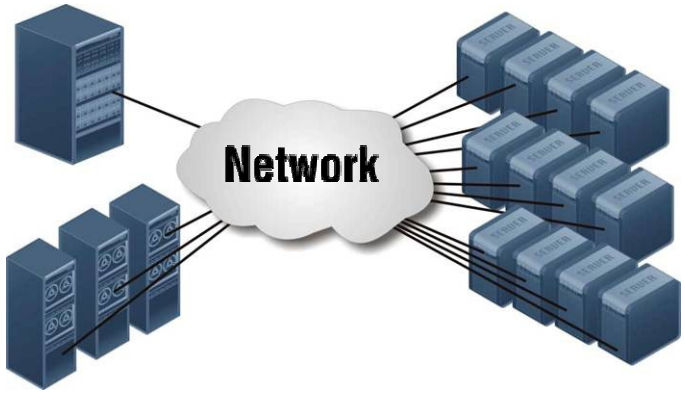
- Reduce help desk operating expenses
- Comply with regulations
- Improve user productivity
- Reduce risk from privileged insiders
- Respond quickly to business initiatives (e.g. new applications, M&A, restructuring)

# Asset Management

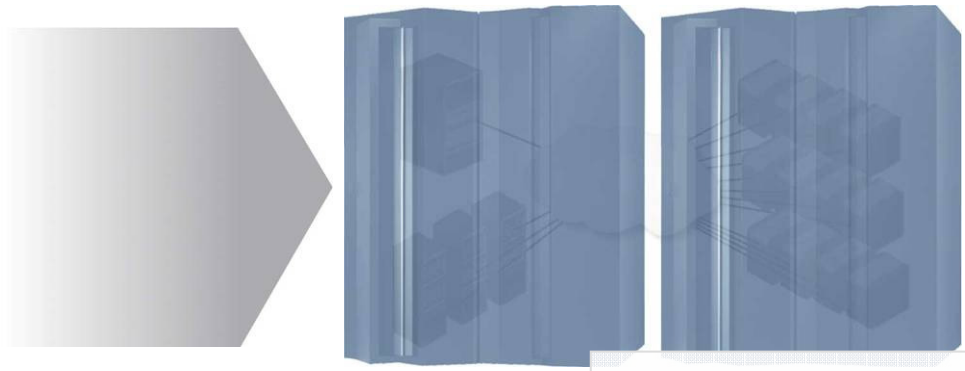


# Virtualization: Significant advantages / new challenges

***From Dedicated Systems, Storage, Applications . . .***




***. . . to Shared Virtualized Environments and SOA***



***Dilemma solved with TUAM!!***

***Advantage:***

More simple to account for with a spreadsheet – one machine, one workload, and one cost center

***Challenges – Resources are highly underutilized which means:***

Paying more for hardware and software

Unnecessarily high energy costs

Using more real estate than required

More assets that are harder to track, manage, and maintain

Inflexible to varying peak in demand

***Advantages:***

Better utilization of existing resources so future investments can be deferred

More cost effective – hardware, software, energy, staff, and floor space

More responsive to differing peak loads

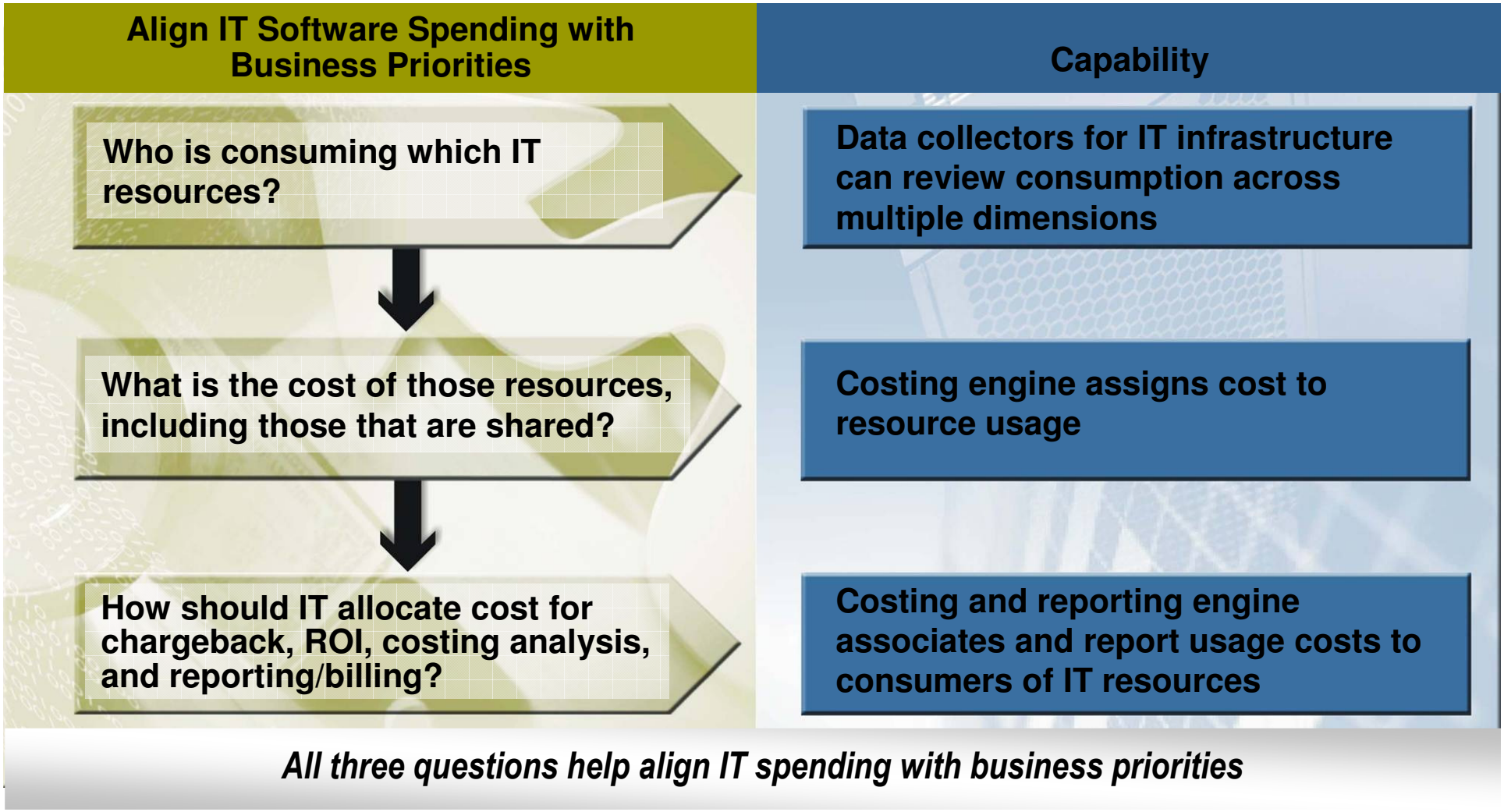
***Challenges:***

How to allocate costs

Prove to the users they're getting what they deserve

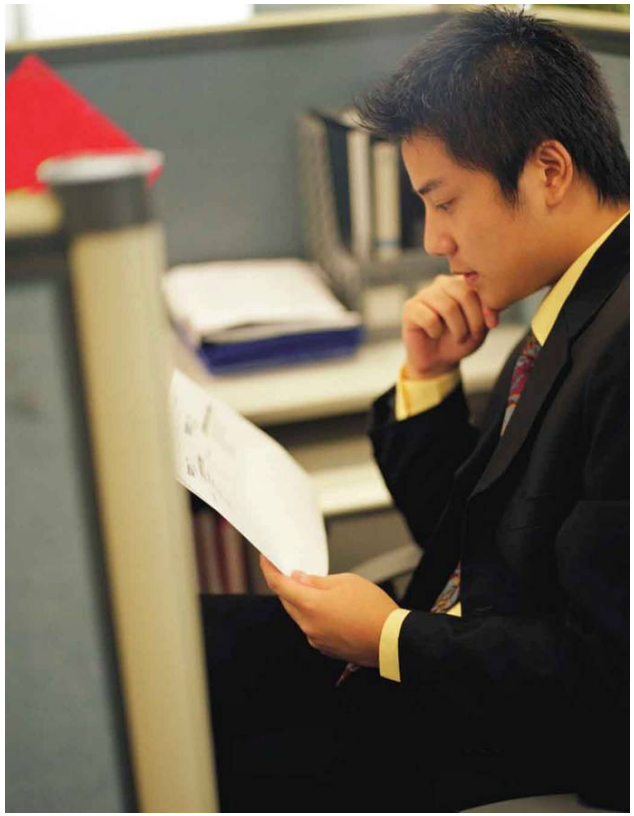
# What is needed to do Usage & Accounting?

***Three variables to the equation***



# Tivoli Usage Accounting Manager capabilities can help realize immediate benefits

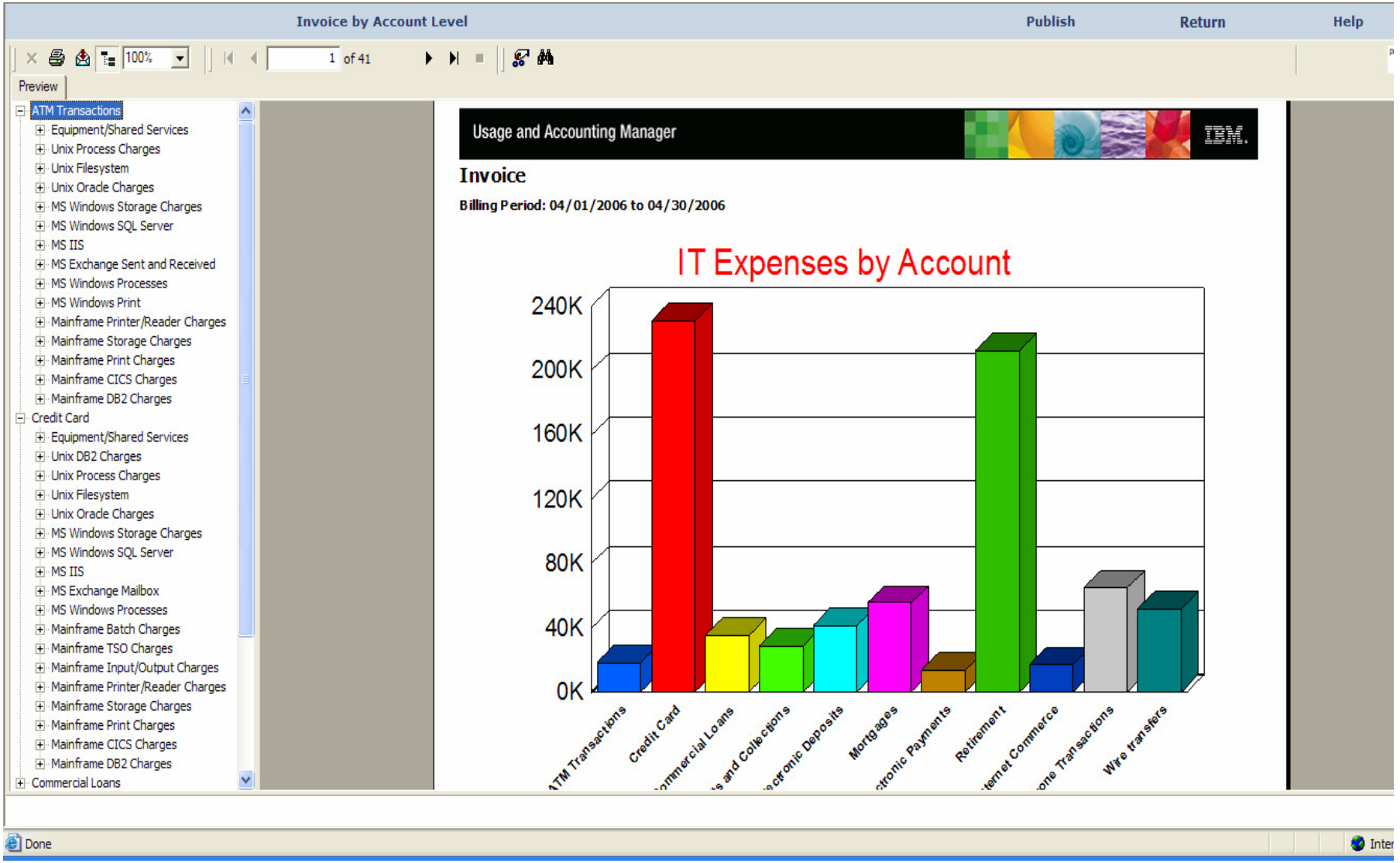
- Increase Client (Business Units) Satisfaction
  - **Real Usage = Accurate Reporting**
  - **Accountability = Improved services**
  - **Alignment between Business and IT costs**
- Lower Infrastructure Cost
  - **Reduced server sprawl**
  - **Higher utilization**
  - **Rationalization of resources**
- Continued Infrastructure Improvement
  - **Understanding costs can lead to managing costs**
  - **Usage comparisons can lead to more effective investments**



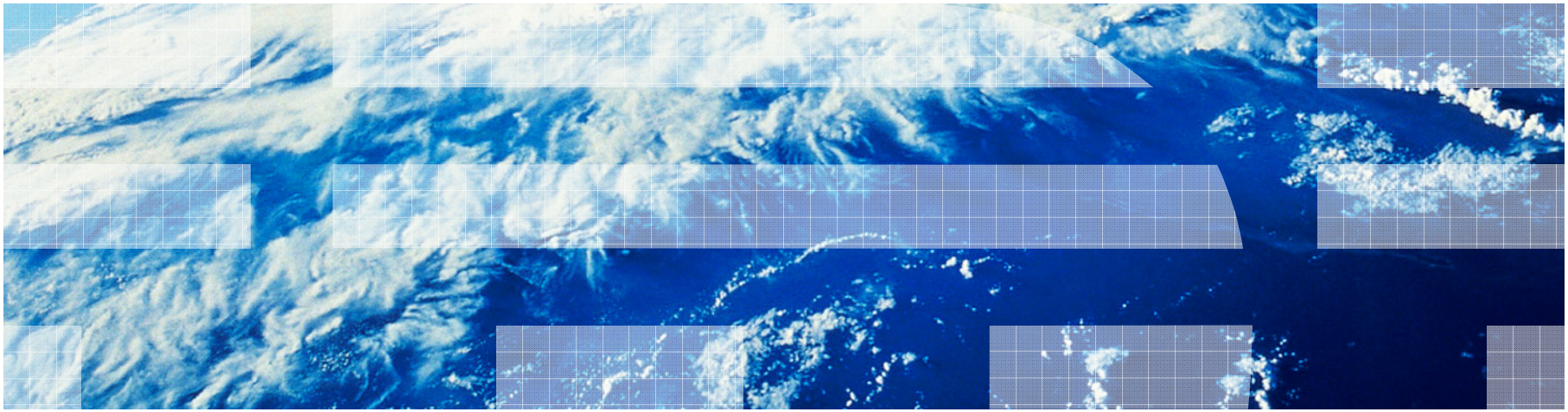
**When running a business, nothing matters more than knowing how much something costs.**

***You can't manage what you don't measure!***

# Tivoli Usage and Accounting Manager

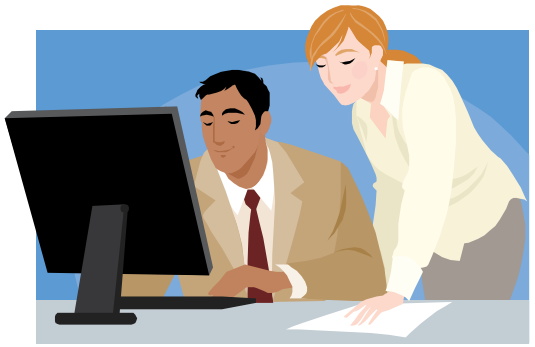


# Availability & Performance Management



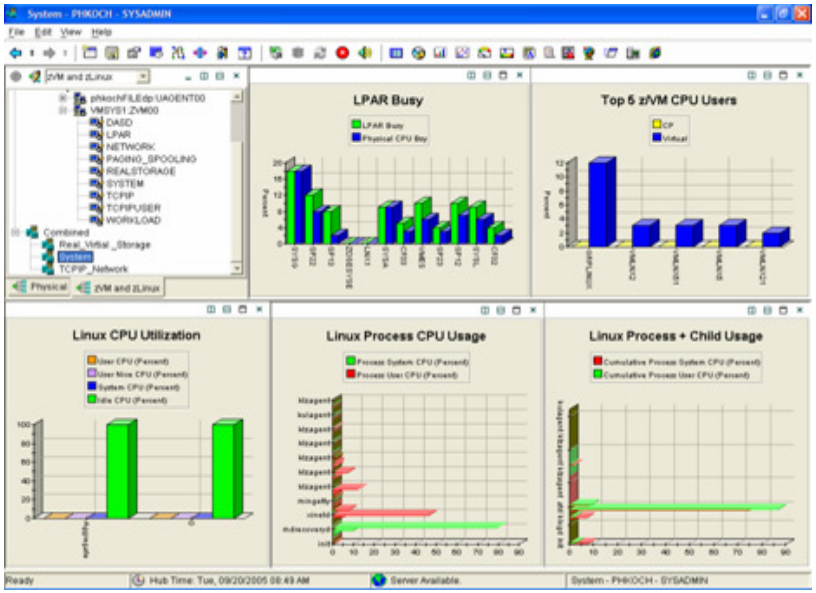
# What Should Performance Management Provide?

- Problem identification and isolation
- Alerting and notification
- Automation
- Historical trends
- Relationship to applications
- Event correlation
- Problem tracking
- Flexibility



# OMEGAMON XE on z/VM and Linux

- Monitors z/VM and Linux on System z
- Provides workspaces that display
  - Real time and historical views
  - Overall System Health
  - Workload metrics for logged-in users
  - Individual device metrics
  - LPAR Data
- Composite views of Linux running on z/VM
- Single workstation to view alerts and perform situational analysis
- Leverages the VM Performance Toolkit
- Integration:
  - z/VM and Linux in common view
  - Enterprise monitoring in a single view
  - Dynamic Workspace Linking



# Metrics required to Manage z/VM and Linux

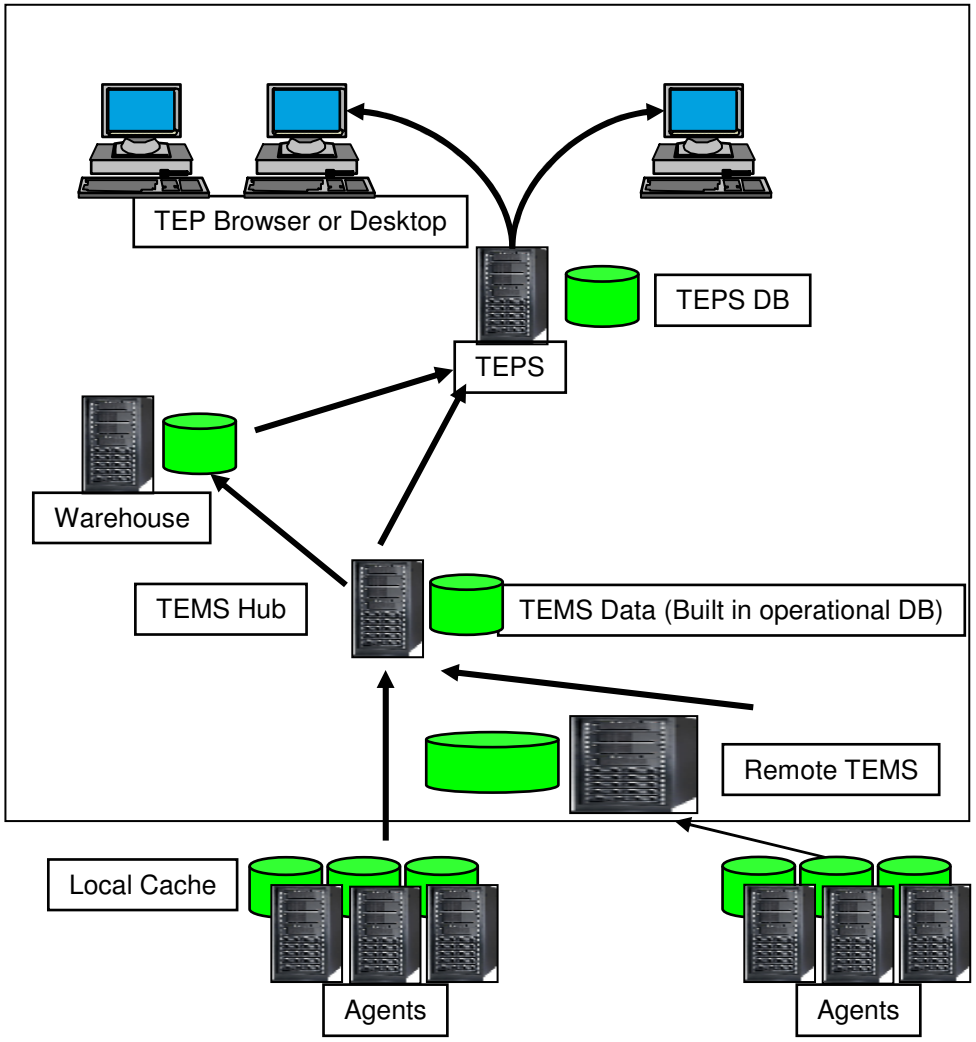
## z/VM

- Processors
- SYSTEM Utilization
- Workload (z/VM User ID)
- LPAR Utilization
- PAGING and SPOOLING Utilization
- DASD
- Minidisk Cache
- Channels
- CCW Translation
- REAL STORAGE Utilization
- NETWORK Utilization (Hiper Socket and Virtual Switch)
- TCPIP Utilization – Server
- TCPIP Utilization - Users

## Linux

- Linux OS
- System Information
- Process
- Users
- Disk Usage
- File Information
- Network

# TMS/OMEGAMON XE Architecture Overview

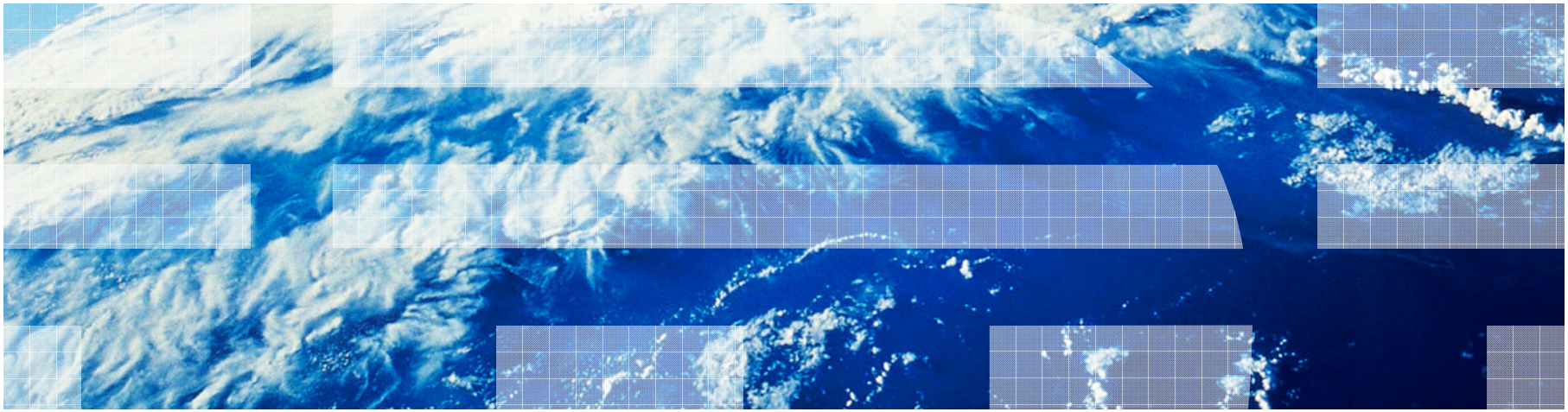



Key:

TEP – Tivoli Enterprise Portal
TEPS – Tivoli Enterprise Portal Server
TDW – Tivoli Data Warehouse
TEMS – Tivoli Enterprise Monitoring Server
TEMA – Tivoli Enterprise Monitoring Agent

**Monitoring Infrastructure**

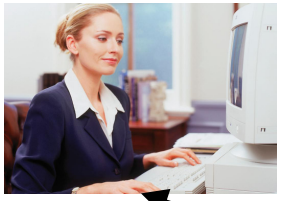
# Automation Using Operations Manager for z/VM



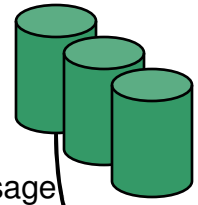
# Operations Manager for z/VM

**Increase productivity**
- Authorized users view and interact with monitored virtual machines without logging onto them
- Multiple users view/interact with a virtual machine simultaneously

**Improve system availability**
- Monitor virtual machines and processes
- Take automated actions based on console messages
- Reduce problems due to operator error



- View & interact with consoles
- View spool files



Monitor spool usage

Console monitoring

Service Virtual Machine being monitored

Operations Manager for z/VM

Take action

Service Virtual Machine being monitored

Console monitoring

Schedule tasks

**Automation**
- Routine activities done more effectively with minimal operations staff
- Schedule tasks to occur on a regular basis

**Integration**
Fulfill take action requests from OMEGAMON XE on z/VM and Linux

# Monitor Service Machine Consoles

Operations Manager

Test Data
TEST Message 1
TEST Message 2
TEST Message ?
…

OPERATOR
OPER Message 1
OPER Message 2
OPER Message 3
…

LINUX
LNX Message 1
LNX Message 2
LNX Message 3
…

TCP/IP
TCP Message 1
TCP Message 2
TCP Message 3
…

syslog data
slog Message 1
slog Message 2
slog Message 3
…

Data space 1
TEST Message 1
**TEST Message 2**
…

Data space 2
OPER Message 1
**OPER Message 2**
…

Data space 3
LNX Message 1
LNX Message 3
…

Data space 4
TCP Message 1
TCP Message 2
…

Data space 5
slog Message 1
slog Message 2
slog Message 3
…

Data space 6
OPER Message 1
LNX Message 1
LNX Message 2
TCP Message 1
slog Message 1
slog Message 2
TEST Message 1
OPER Message 2
…

Daily log
DIRM Message 1
LNX Message 1
LNX Message 2
TCP Message 1
DIRM Message 2
TCP Message 2

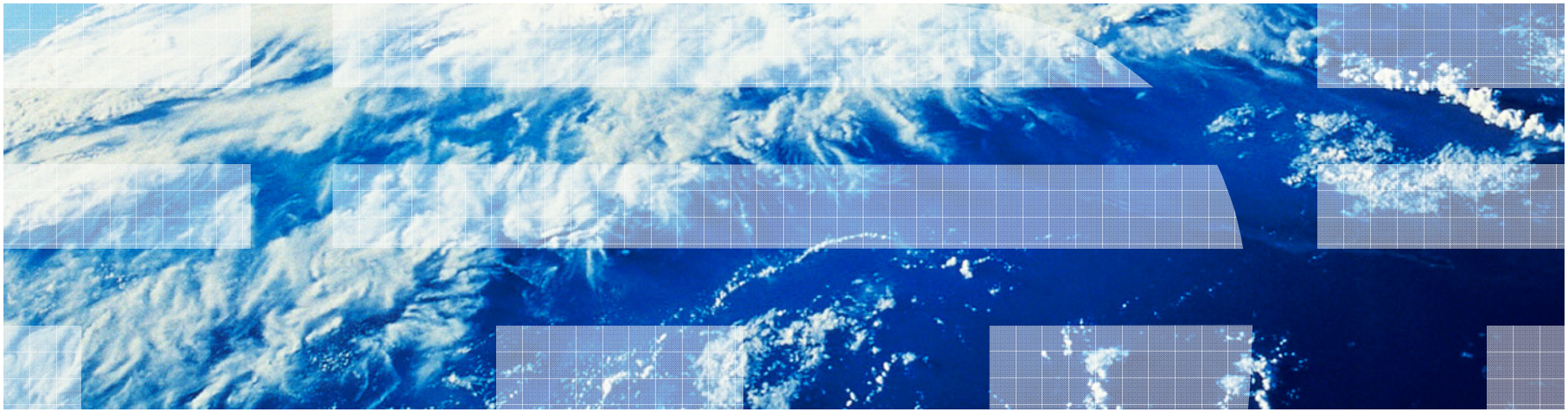
# Monitor Service Machines & Guests

- Define rules to
  - Scan console messages for text matching
    - Includes column, wildcard, and exclusion support
    - Optionally restrict to specific user ID(s)
  - Take actions based on matches
- Multiple rules can apply to one message
  - Rules processed in order of definition in the configuration file
  - FINAL option available to indicate no additional rules should be evaluated

# Adjusting Resources for a Linux Guest

- Virtual CPU consumption is high for a Linux guest
- Detect the alert
  - Automation receives the message
- Action is triggered by a rule in Operations Manager
- Operations Manager issues CP commands to tune the guest
  - SET QUICKDSP
  - SET SHARE
- Ability to monitor the output is key

# Backup & Recovery

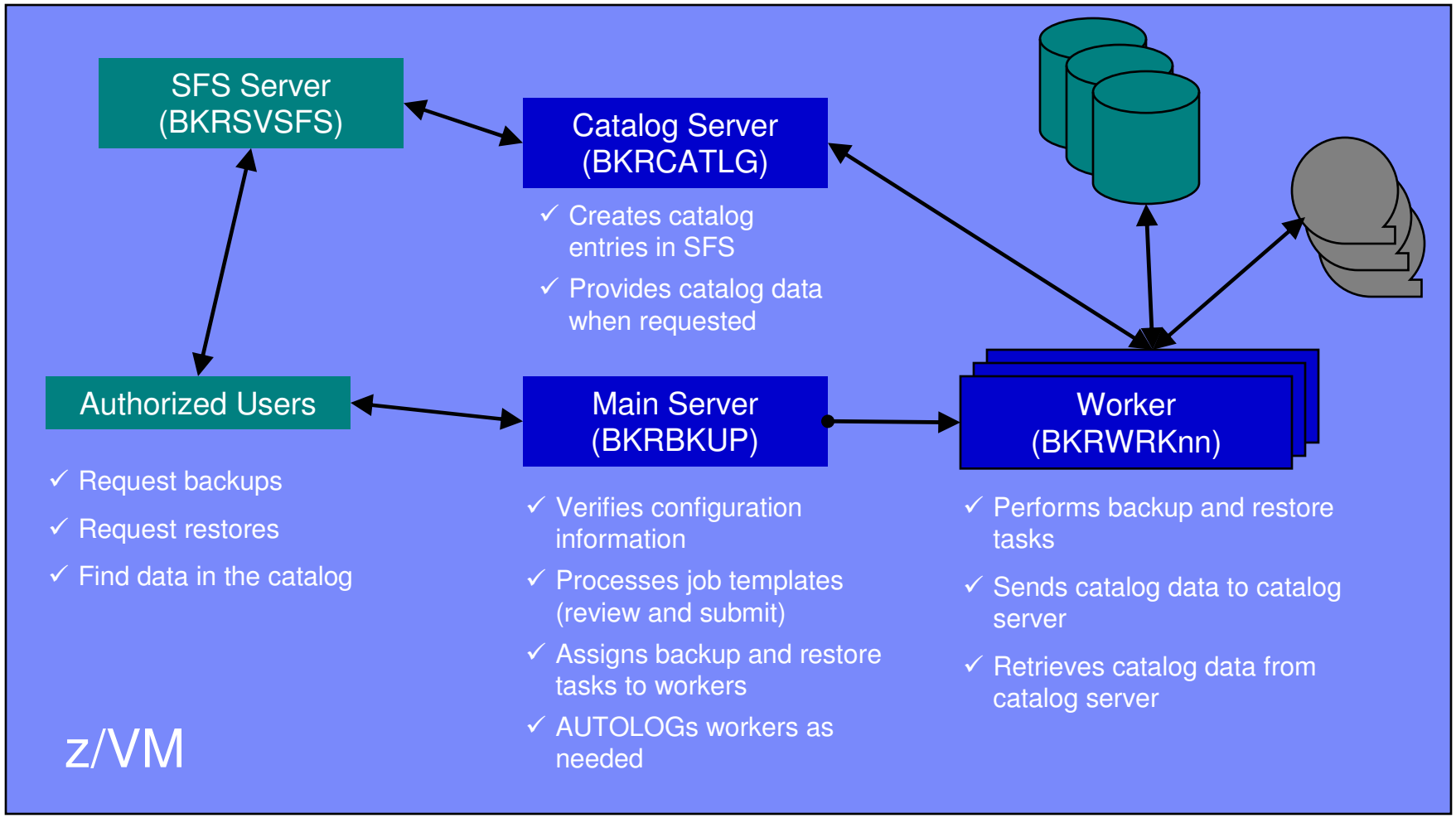


# Backup and Restore Manager for z/VM - Product Overview

- Backup
  - Requested by administrators
  - Full or incremental
  - Flexible selection of disks and files to back up
  - Review job before submitting for backup
  - Catalog housed in Shared File System
- Restore
  - Performed by users for their own data
  - Extending to other users available via exit
  - Performed by administrators for any data
  - Selection of data to restore
    - Full screen interface or commands

- **Integration with Tape Manager for z/VM**
- **Optional compression of data during backup**
  - **Call your own compression algorithm**
  - **Use IBM provided routine**
- **Encryption exits available**
  - **Call your own routine**
  - **Use IBM or other vendor written routine**

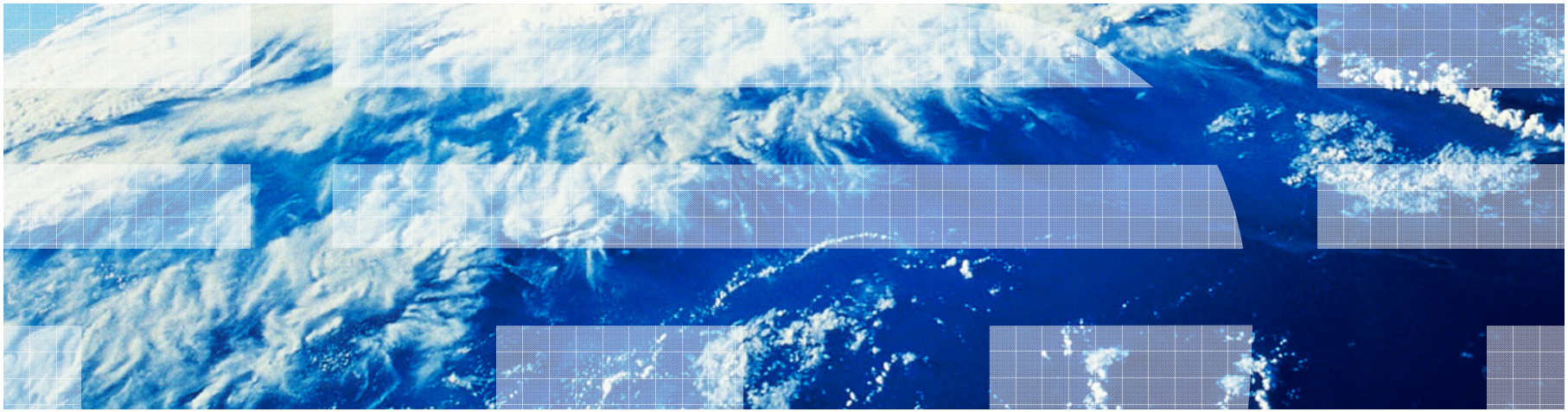
# Backup and Restore Manager Service Machines



# Backup and Restore Manager for z/VM - Summary

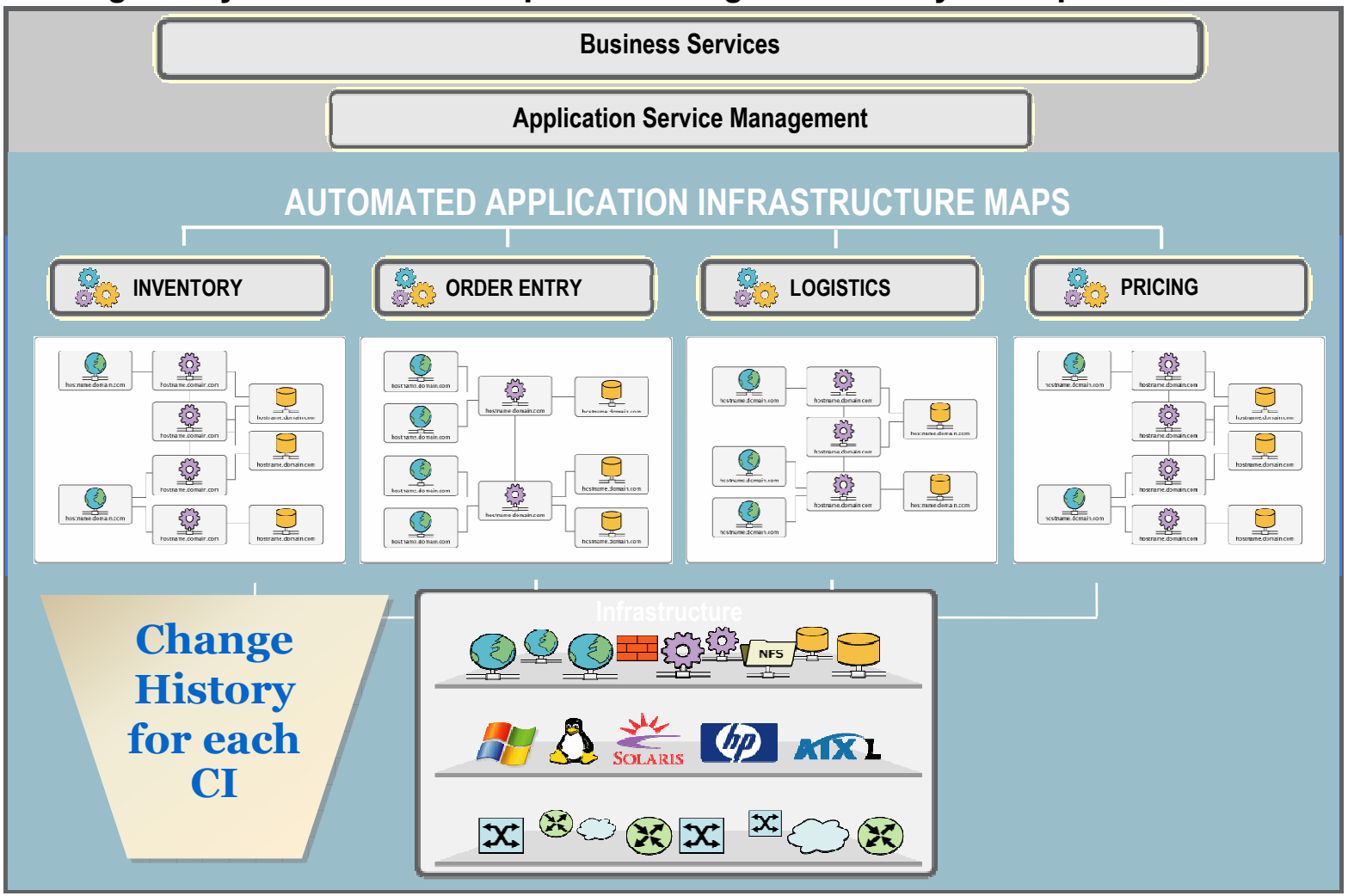
- Use Backup and Restore Manager to
  - Perform file-level backups of z/VM data
  - Perform image level backups on non-z/VM guest data
  - Perform disaster recovery backups of entire system
  - Easily find and restore data as needed
  - Manage retention of backup data

# Other Service Management Disciplines



# TADDM's Configuration Auditing provides the changes

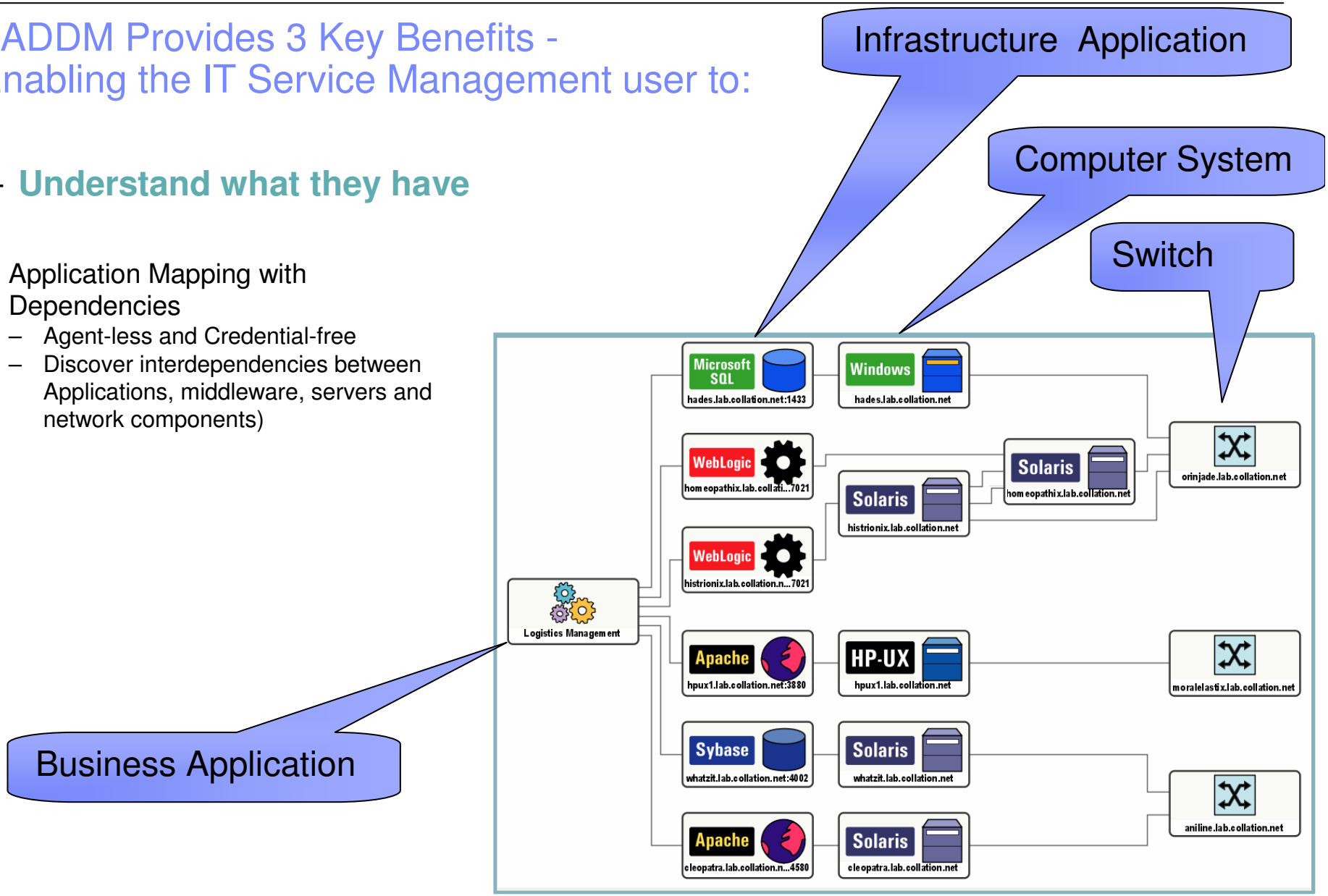
**Together you can see the impact of changes…across your dependencies**



# TADDM Provides 3 Key Benefits - Enabling the IT Service Management user to:

– **Understand what they have**

- Application Mapping with Dependencies
  - Agent-less and Credential-free
  - Discover interdependencies between Applications, middleware, servers and network components)



# TADDM Provides 3 Key Benefits - Enabling the IT Service Management user to:

## Learn how their CIs are configured *(& changing over time)*

- Configuration Auditing
  - Tracks changes in applications
  - Depicts that information on the map
  - Depicts that information thru reports

Automatically tracks changes on all CIs & attribute values over time…

Application

| Type | Component | Change | Date | Attribute | Old Value | New Value |
|---|---|---|---|---|---|---|
| Apache | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | appDescriptors | | /usr/local/apache/appd |
| Apache | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | appDescriptors | | /usr/local/apache//app |
| ApacheWebContainer | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | ApacheWebContainer | /usr/local/apache/ | /usr/local/apache |
| ApacheWebContainer | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | ApacheWebContainer | 15 | 20 |
| ApacheWebContainer | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | ApacheWebContainer | 88 | 100 |
| ProcessPool | homeopathix.lab.collati | Updated | 12/04/2004 15:01 PST | homeopathix.lab.collati | /usr/local/apache//bin | ./httpd -d /usr/local/a |

# TADDM Provides 3 Key Benefits - Enabling the IT Service Management user to:

## Determine if it is compliant

- Compliance
  - Compare configuration to "reference master"
  - Compare to your standard policy

Comparing two instances of an Apache Web Server to the reference master

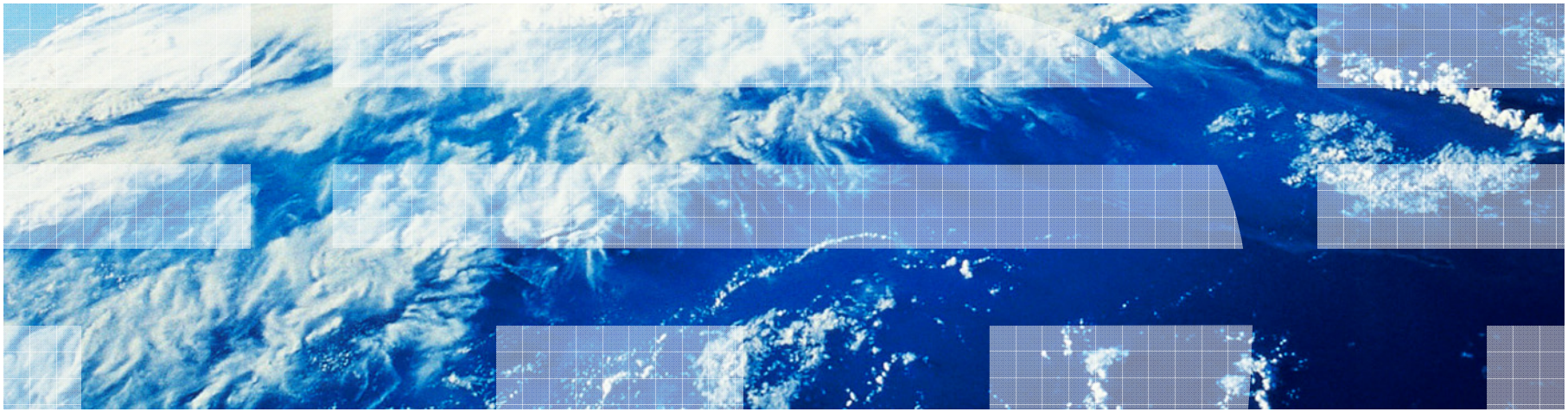
Values in red and blue are policy violations

| | hpux1.lab.collation.net:4880 - Version:Current | utah.lab.collation.net:4880 - Version:Current | utah.lab.collation.net:3880 - Version:Current |
|---|---|---|---|
| Primary SAP | | | |
| Listening Port | 4880 | | 3880 |
| Product Version | Apache/1.3.26 (Unix) | Apache/1.3.9 (Unix) | |
| Process Pools | | | |
| Hpux1.lab.collation.net:4880 | | | |
| Arguments | /opt/apache13/bin/httpd -d /opt/apache13 -R /opt/apache13/l... | /home/jwang/apache/apache_1.3.9/bin/httpd -d /home/jwang... | /home/jwang/apache/testserver4/bin/httpd -d /home/jwang/a... |
| Product Name | Apache/1.3.26 (Unix) | Apache/1.3.9 (Unix) | |
| Config Contents | | | |
| Httpd.conf | | | |
| Permissions | -rwxr-xr-x | -rw-r--r-- | -rw-r----- |
| Last Modified | [Not Set] | 04/15/2004 22:24 PDT | 02/24/2005 16:33 PDT |
| Size | 37404 | 31660 | 36609 |
| Checksum | +8MD5CmmRS7Ea6eNtx+npQ== | bKbFu12LwsAWsQkboI8sAg== | GVzu+7w4L+HvhaNxKuMMOw== |
| Containers | | | |
| Apache Web Container | | | |
| Keep Alive Timeout | 15 | 55 | |
| Max Spare Servers | 10 | 20 | |
| Virtual Hosts | | | |
| Hpux1.lab.collation.net:4880 | hpux1.lab.collation.net:4880 | [Not Set] | [Not Set] |
| Spartakis.lab.collation.net:3880 | [Not Set] | | spartakis.lab.collation.net:3880 |
| Spartakis.lab.collation.net:4880 | [Not Set] | spartakis.lab.collation.net:4880 | |
| Shannon.unixpeople.com:4880 | [Not Set] | shannon.unixpeople.com:4880 | |
| Server Root | /opt/apache13 | /home/jwang/apache/apache_1.3.9 | /home/jwang/apache/testserver4 |
| Max Clients | 150 | 50 | |
| Timeout | 300 | 500 | |
| Max Keep Alive Requests | 100 | 50 | |
| Score Board File | /opt/apache13/logs/httpd.scoreboard | /home/jwang/apache/apache_1.3.9/logs/httpd.scoreboard | |
| PID file | /opt/apache13/logs/httpd.pid | /home/jwang/apache/apache_1.3.9/logs/httpd.pid | |
| Start Servers | 5 | 8 | |
| Min Spare Servers | 5 | 10 | |
| Name | hpux1.lab.collation.net | utah.lab.collation.net | utah.lab.collation.net |

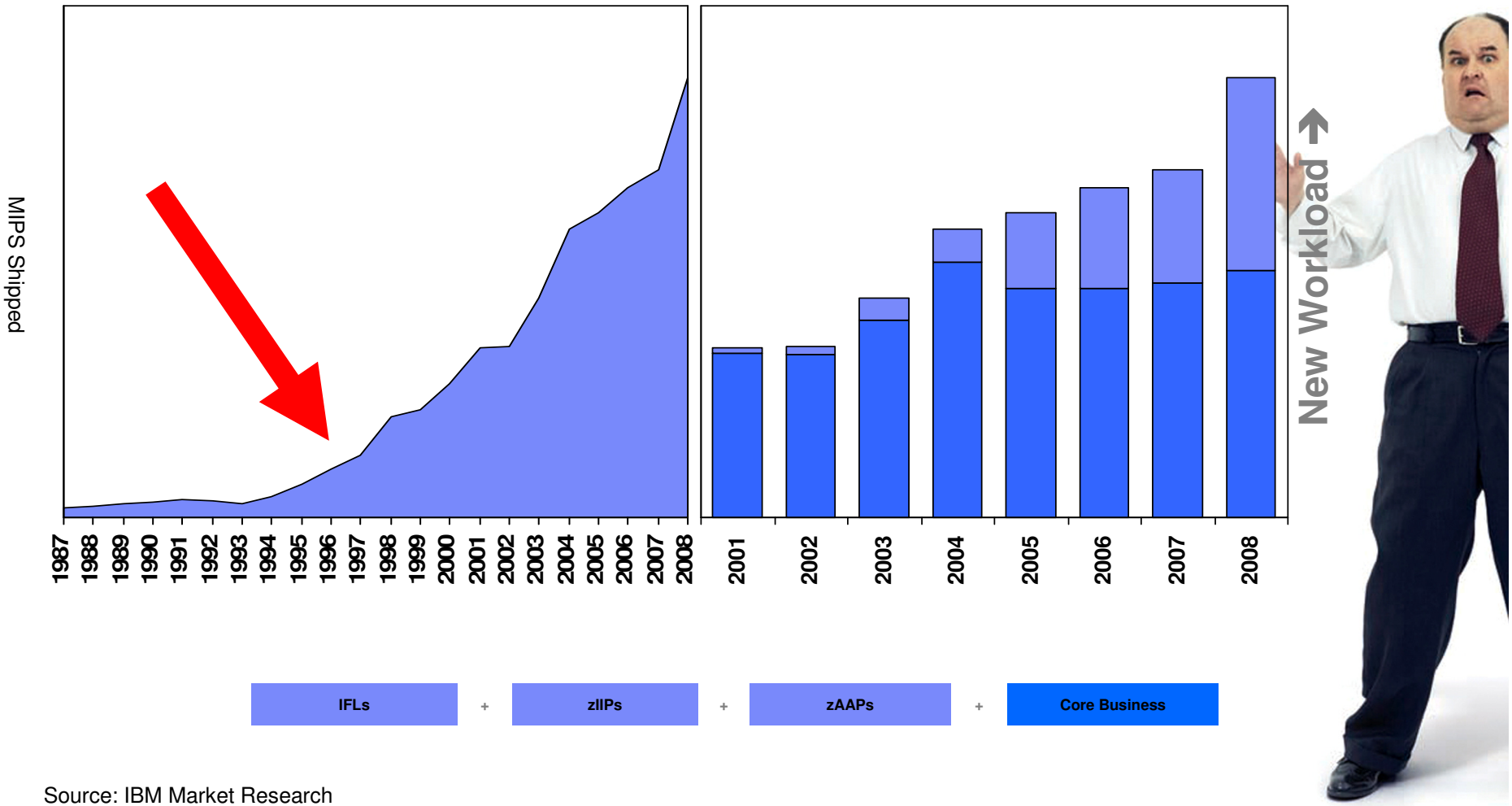
# Core Systems Management Disciplines

- Security
- Asset Management
- Monitoring
  - Availability
  - Performance
  - Event Management
- Automation
  - Application Automation
  - Operational Automation
- Other
  - Storage Management
    - Backup/Archive
  - Discovery

# Best Fit Applications for a Virtualized Environment

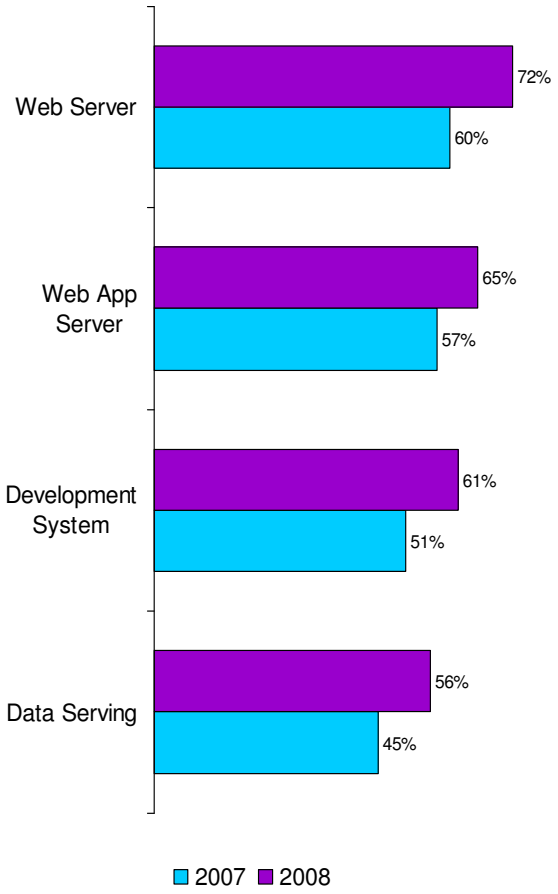


# IBM System z Workload Growth Worldwide




Source: IBM Market Research

# What are Linux users running on an Enterprise Linux Server?




## Surveys indicate customers use:

- Web Serving
- Web Application Serving
- Data Services
- Systems Development

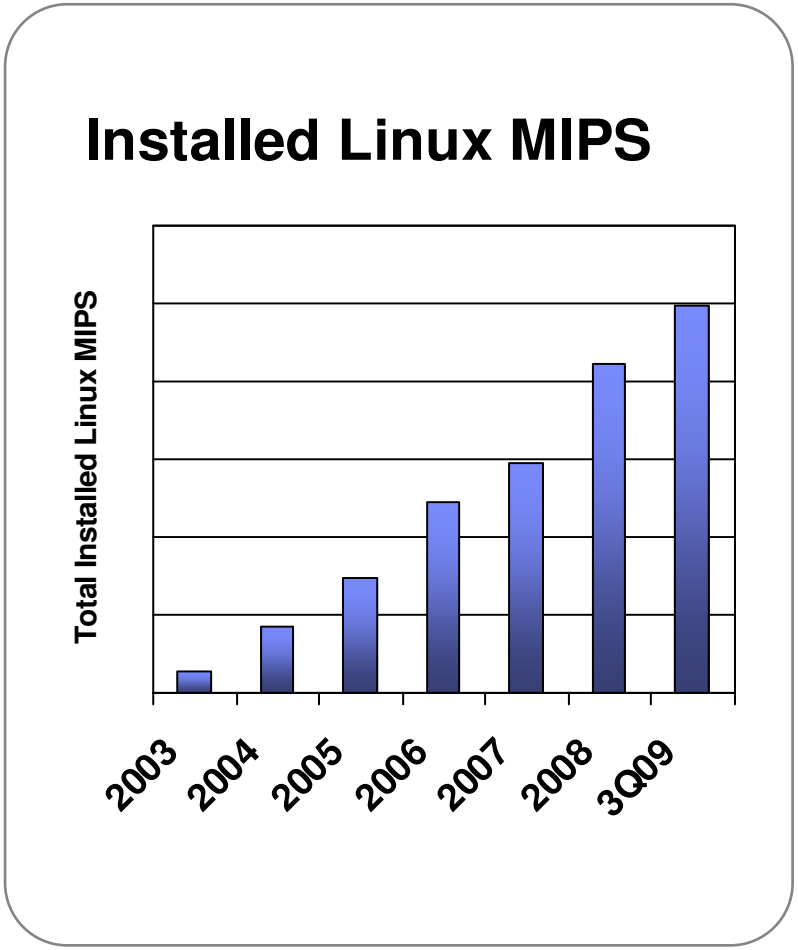
## "Best Fit" Workloads for Enterprise Linux Servers:

- **Web Application Servers:** WebSphere Application Server
- **Email and collaboration:** Domino™, Web 2.0
- **Data services**: Cognos®, DB2, Oracle, Informix®, Information Server, Information Builders WebFOCUS
- **Business critical ISV applications**: e.g. SAP
- **Development of WebSphere and Java™ applications**
- **Virtualization and security services**
- **Business connectors**: WebSphere® MQSeries®, DB2® Connect, CICS® Transaction Gateway, IMS™ Connect for Java®
- **Network Infrastructure**: FTP, NFS, DNS, etc. and Comm Server and Communications Controller for Linux, CommuniGate Pro (VoIP)
- **Applications requiring top end disaster recovery model**

Source: IBM Market Intelligence

# Client adoption drives Linux success
# Installed Linux MIPS at 50% CAGR*

- The momentum continues:
  - Shipped IFL engine volumes increased 62% from 3Q07 to 3Q09
  - Shipped IFL MIPS increased 100% from 3Q07 to 3Q09
- Linux is 16% of the System z customer install base (MIPS)
- 70% of the top 100 System z clients are running Linux on the mainframe
- >3,000 applications available for Linux on System z

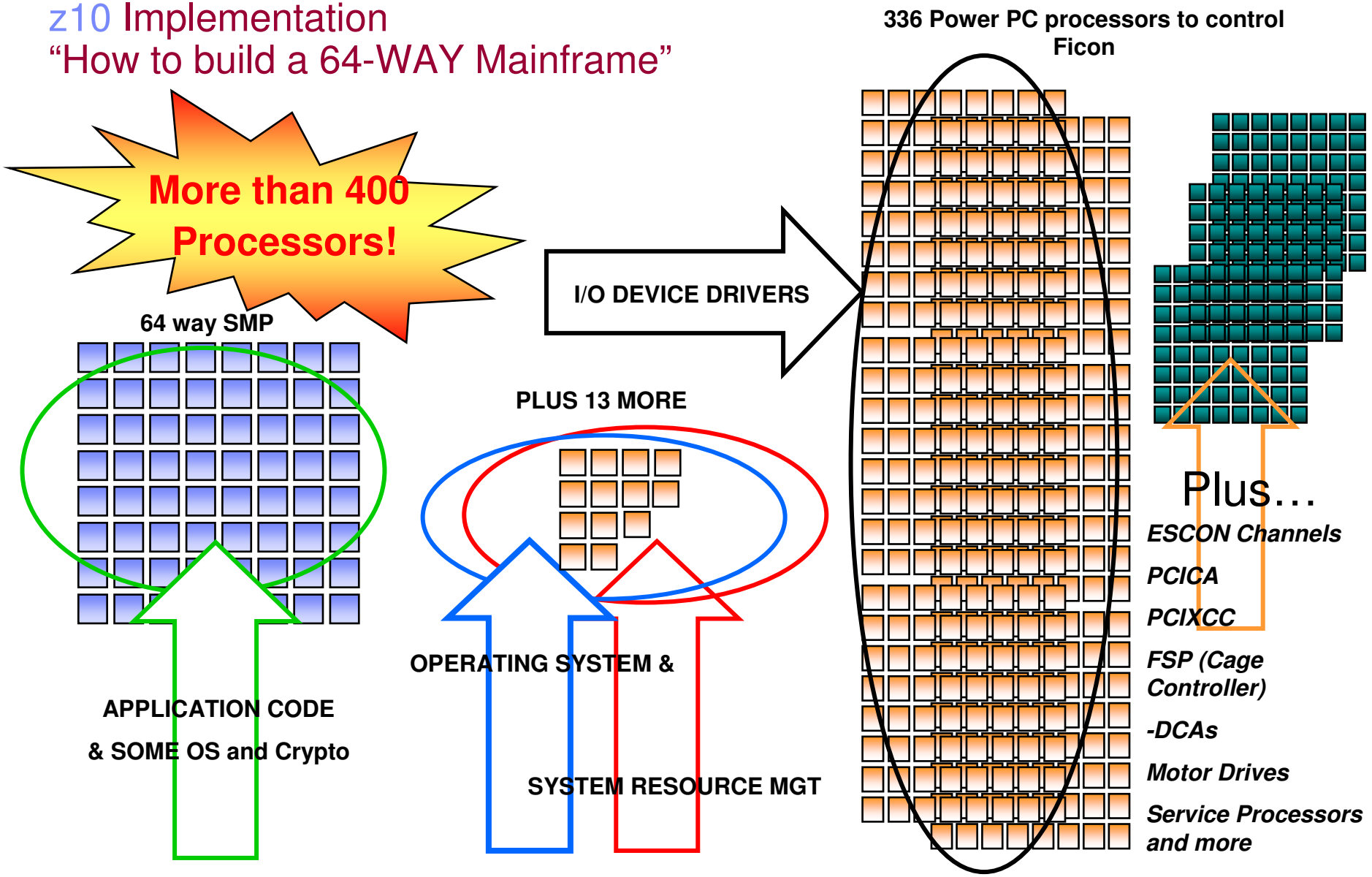



* Based on YE 2004 to YE 2008.

# What z10 brings to Linux Customers

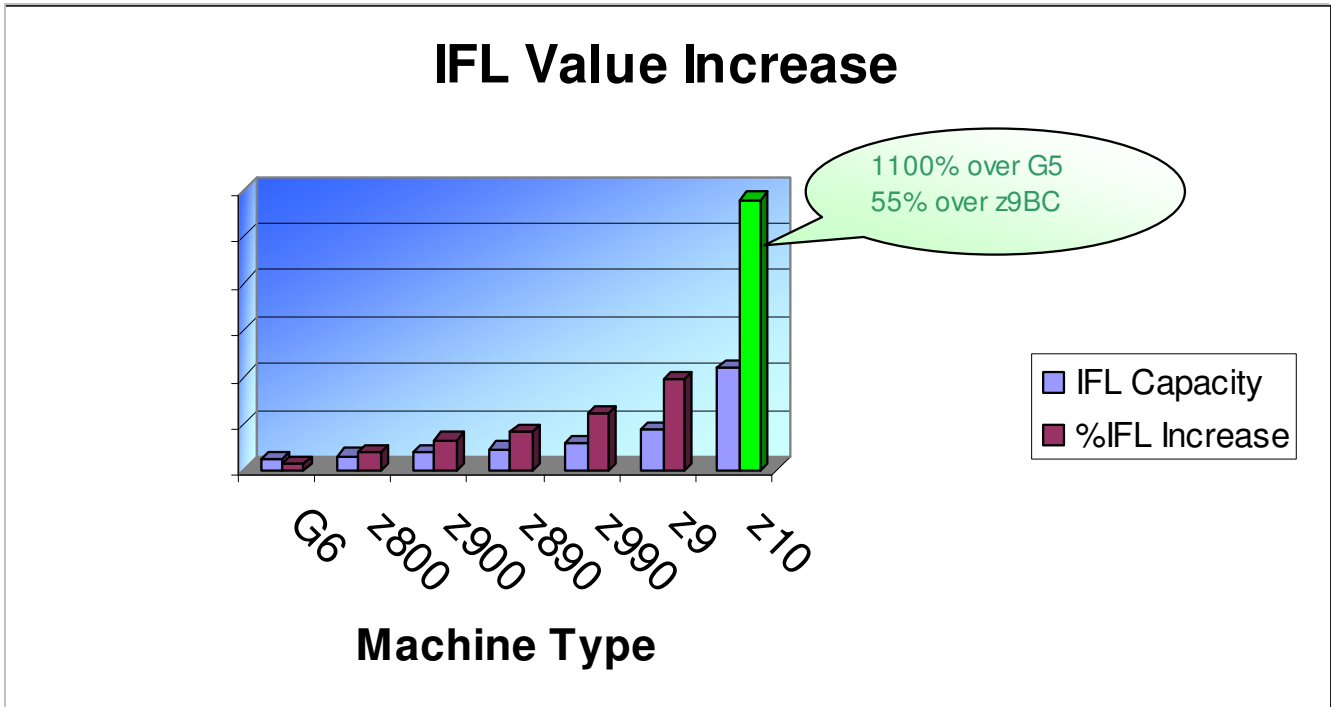
- 4.4 GHz… Quad Core Processor Up to 64 IFLs
- Up to 1.5 TB memory
- Large Page Support
- Hardware Decimal Floating Point
- Just in Time Deployment for capacity offerings – permanent and temporary
- 6.0 GBps HiperSockets
- SCSI IPL
- OSA-Express3 10 Gbps
- HiperSockets Layer 2 Support

# z10 Implementation
## "How to build a 64-WAY Mainframe"



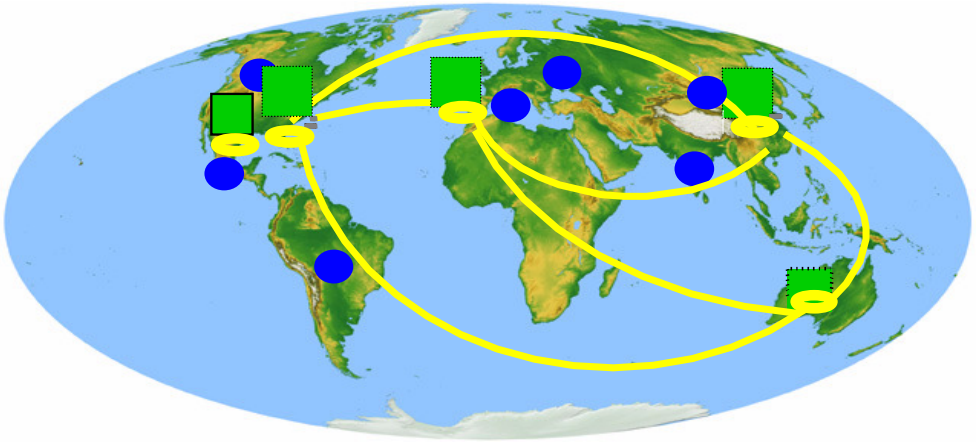
# Unique Value of IFL, zAAP and zIIP

- 55% more capacity from previous generation!!!
- IFL, zAAP and zIIP Price has remained constant
- Customer upgrading to new machine can migrate IFL, zAAP and zIIP to new machine
- Specialty Engines run at FULL speed even on sub-capacity machines



# IBM's Transformation: An Ongoing Journey

## IBM Strategic Delivery Model



Global Resources
Strategic IGA location
Strategic Web location for IGA
Ethernet and Power9 Networks

TECHNOLOGY

| IBM Metrics | 1997 | Today |
|---|---|---|
| CIOs | 128 | 1 |
| Host data centers | 155 | 7 |
| Web hosting centers | 80 | 5 |
| Network | 31 | 1 |
| Applications | 15,000 | 4,700 |

## Tactical and operational efficiencies

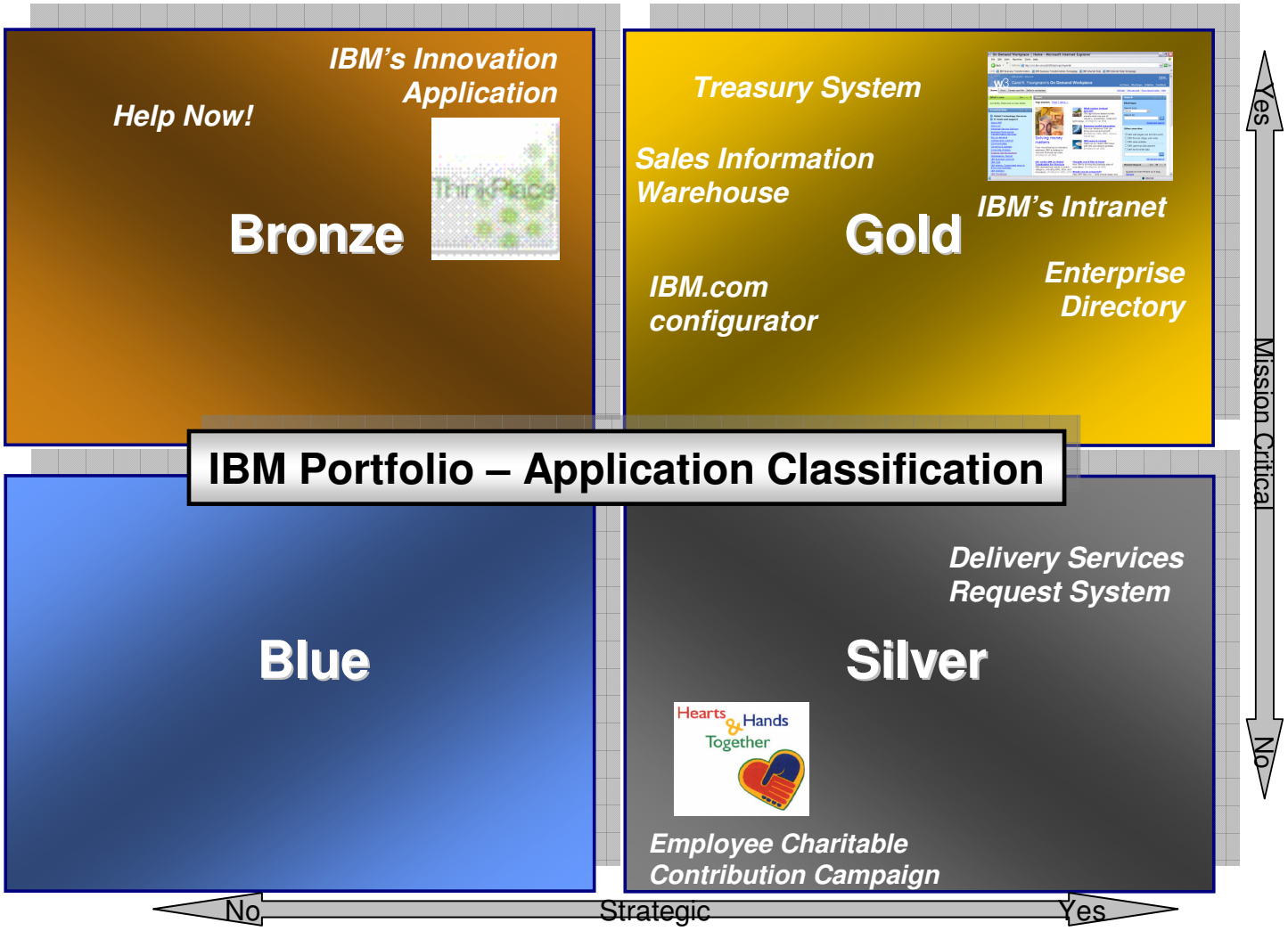
- Consolidation of infrastructure
- Application consolidation/reduction
- Global resource deployment
- Enterprise end-to-end architecture optimization

# Applications moving to System z tend to be strategic and mission critical

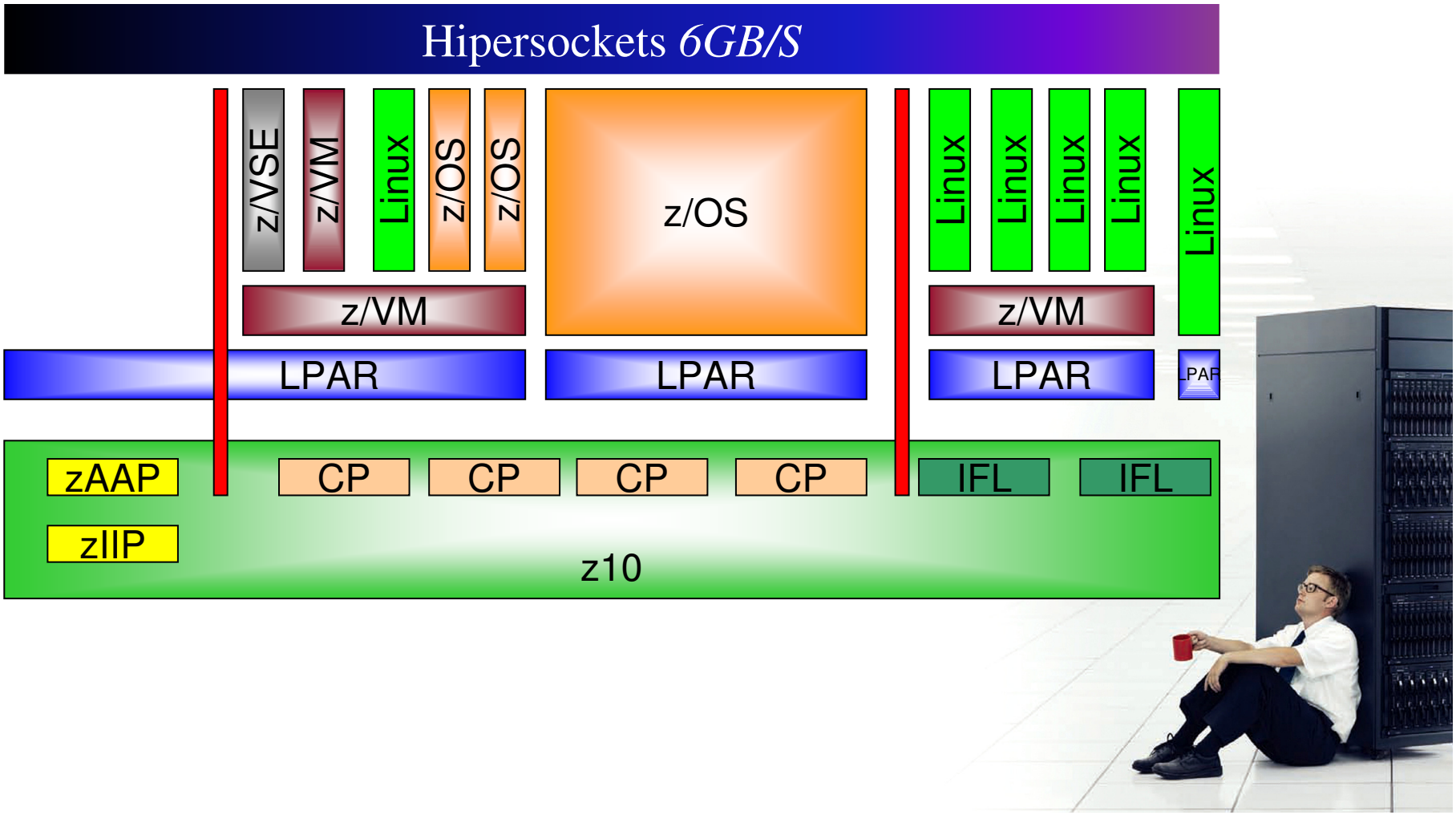
Application View

- Includes all business units, a cross-section of business functions
- Most are internally developed web and domino- based
- Tend to be complex with multiple servers and interfaces
- Almost 50% of initial applications are classified as “Gold”

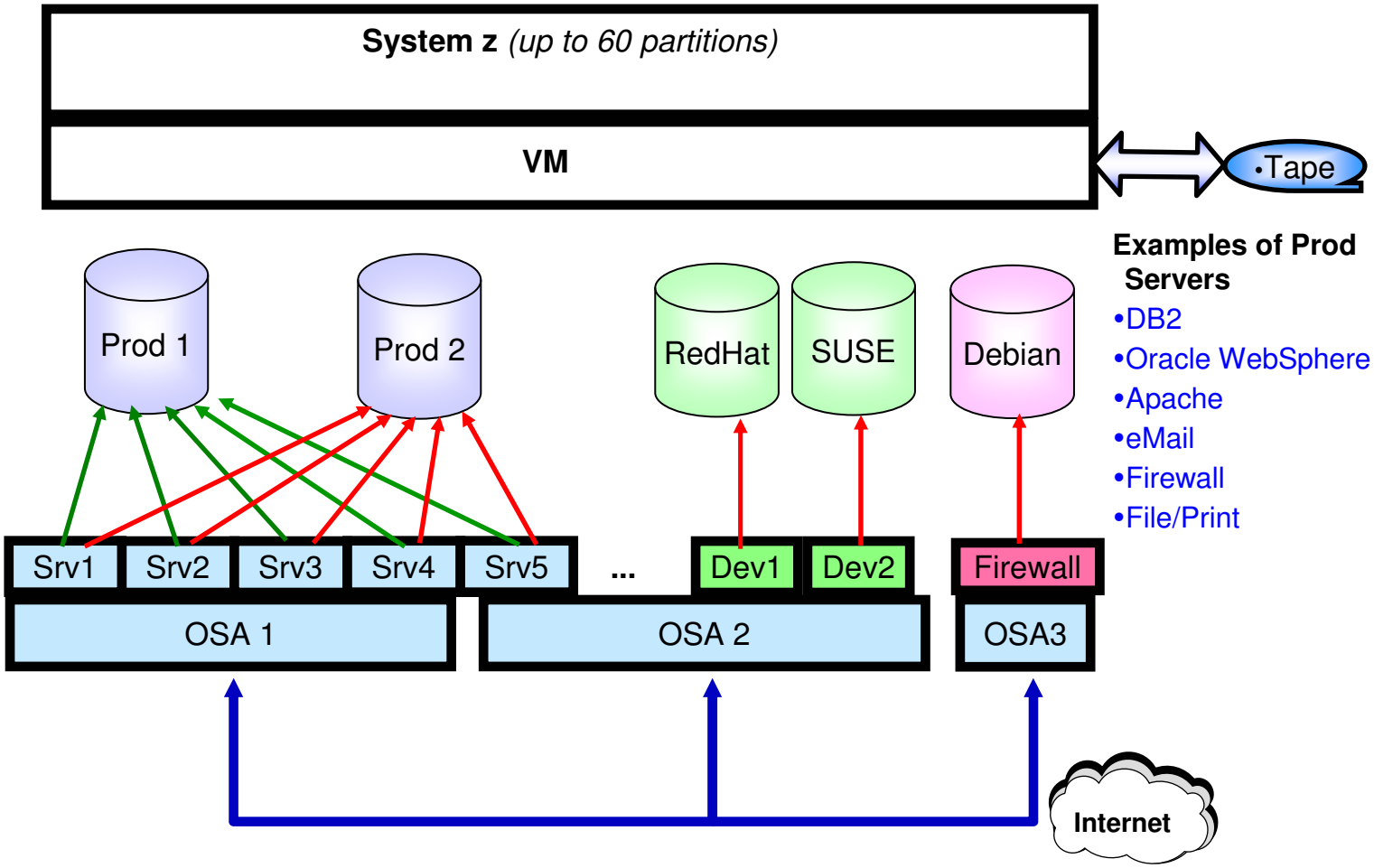
***http://ecm.bluehost.ibm.com/success/iga.htm***



# Linux for System z Choices

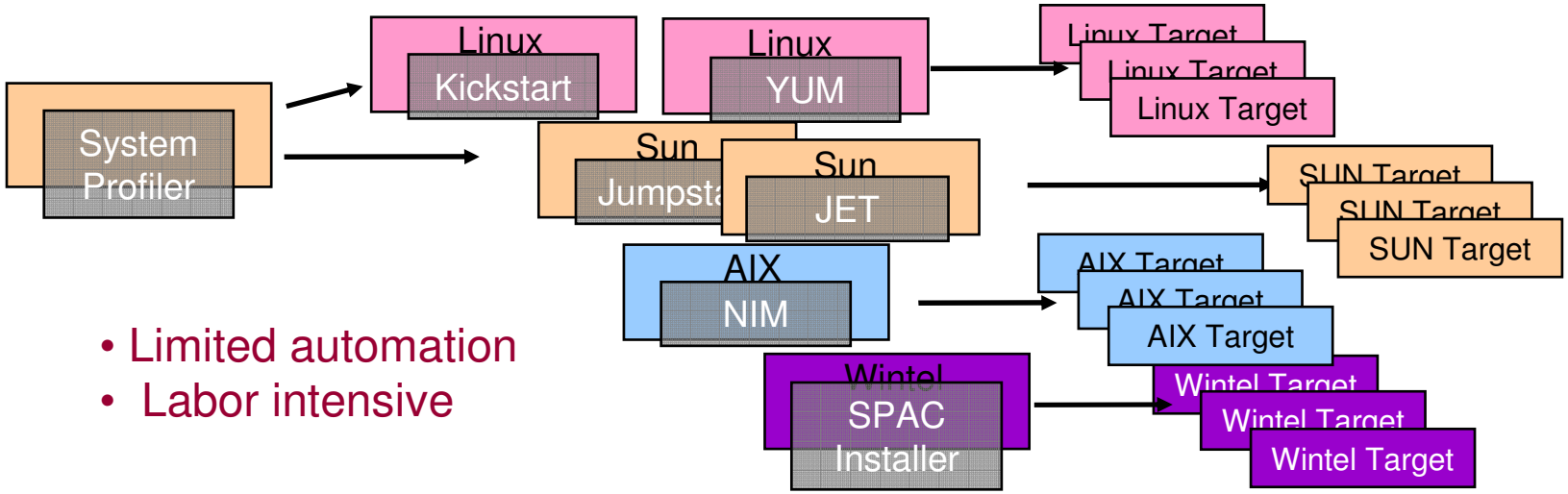


# *Flexible and Robust Linux Installation*



## *Extreme Virtualization and Server Management Leadership*

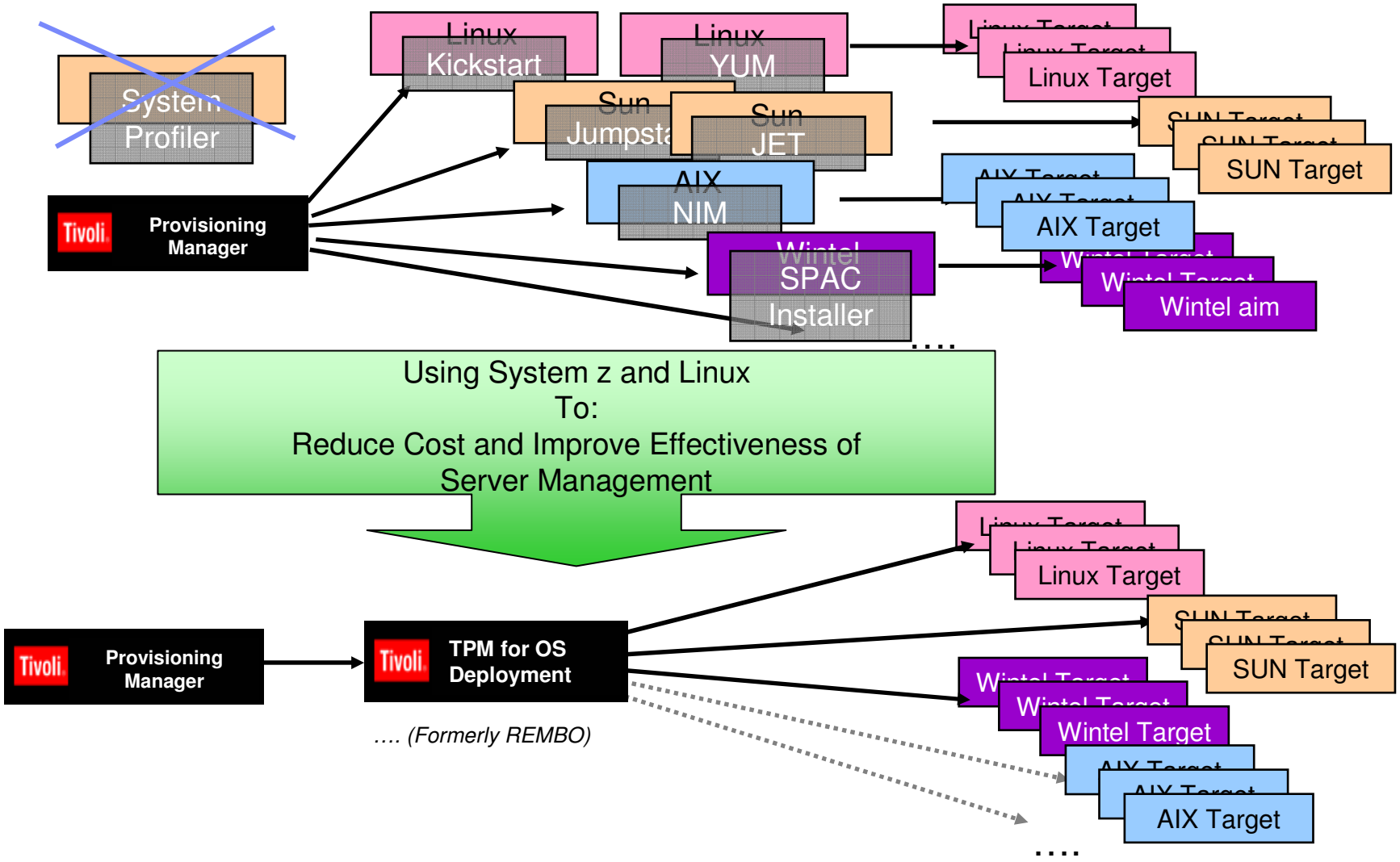
- 32% of Server farm for distributed servers are for administration , managing and provisioning servers
  - Real Customer example.. Managing 37,300 servers world wide would take 26 IFLs on a z990.



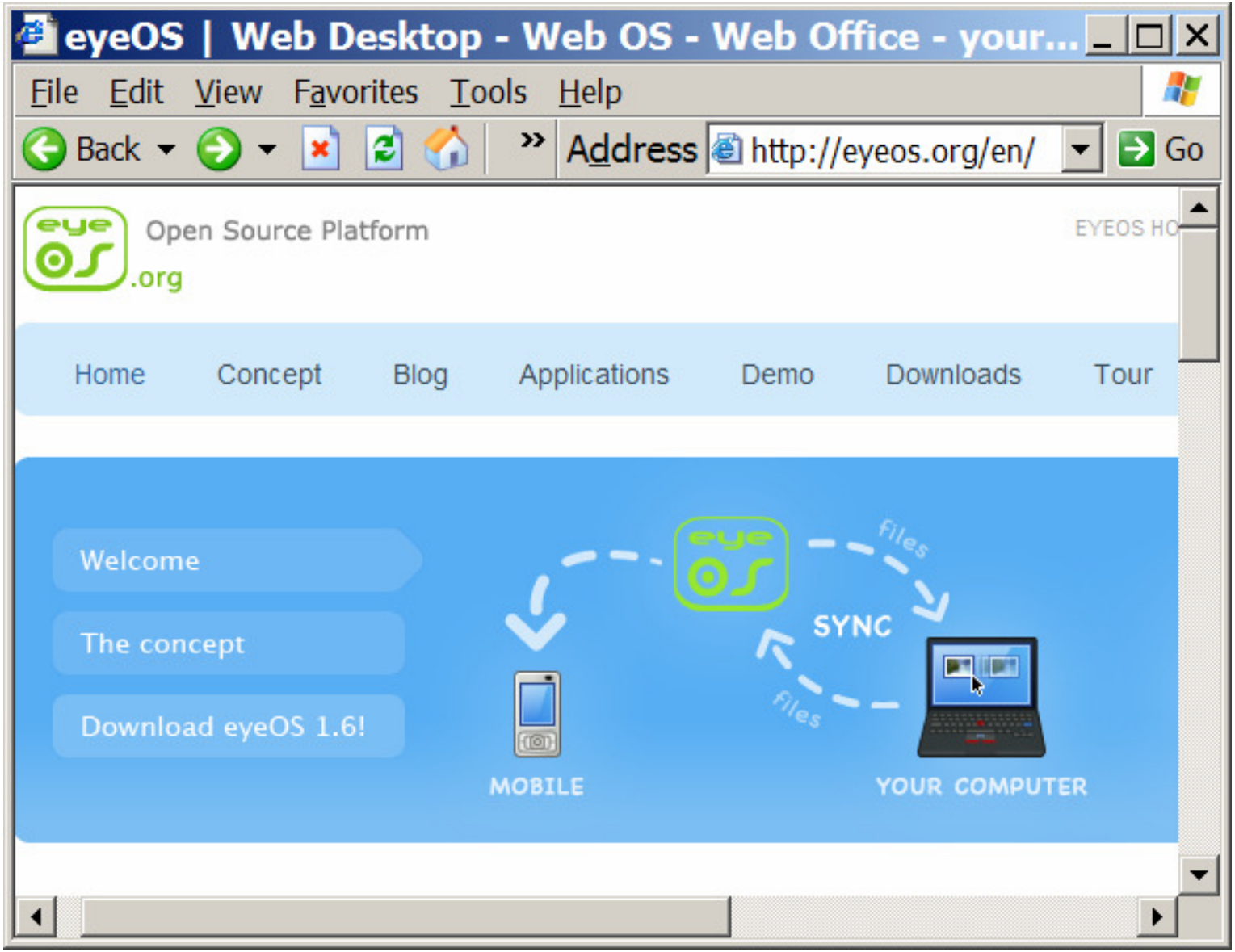

- Limited automation
- Labor intensive

***Local Implementation (per site)***

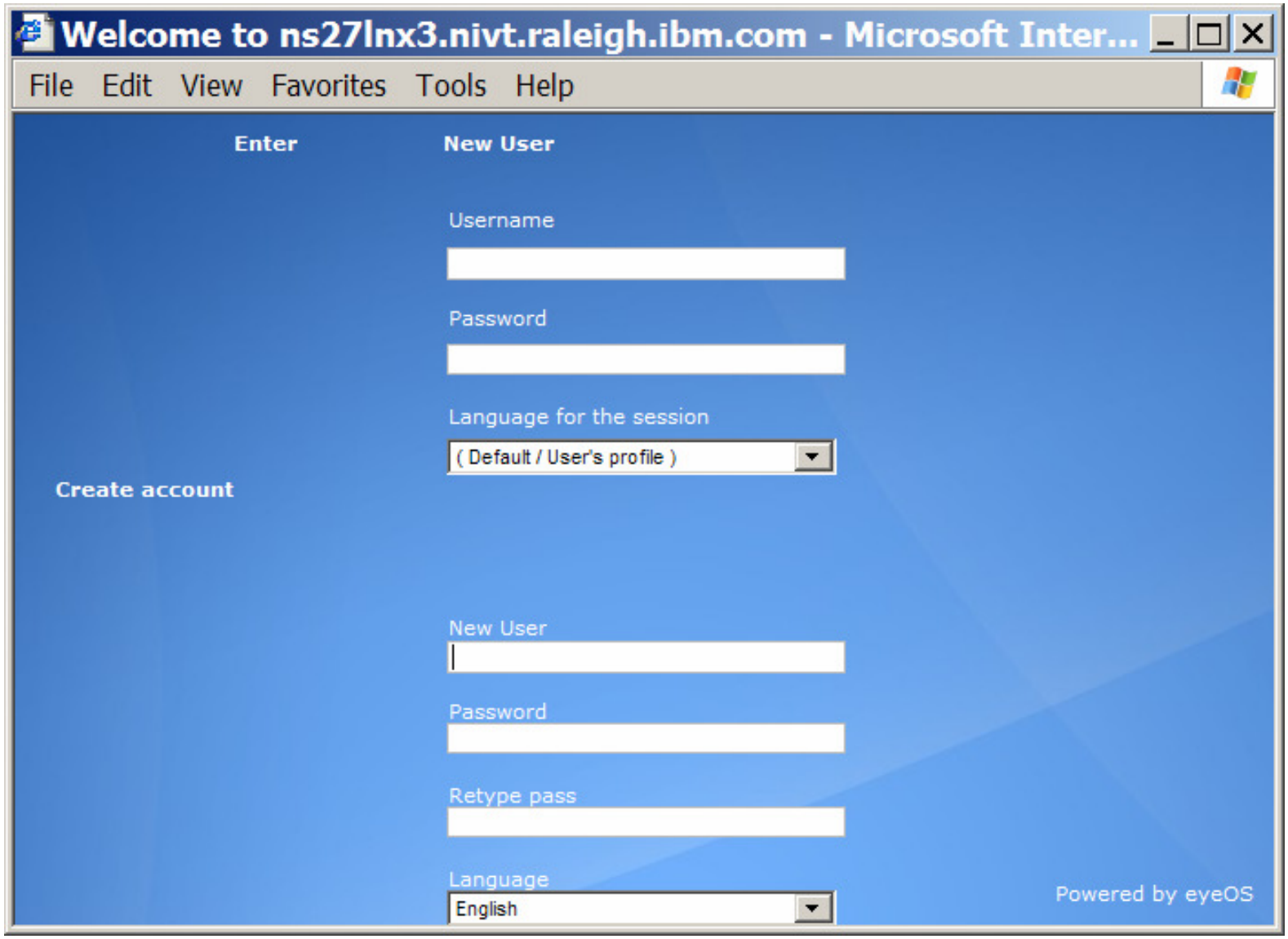
# Phase one simplification and administrative cost reduction



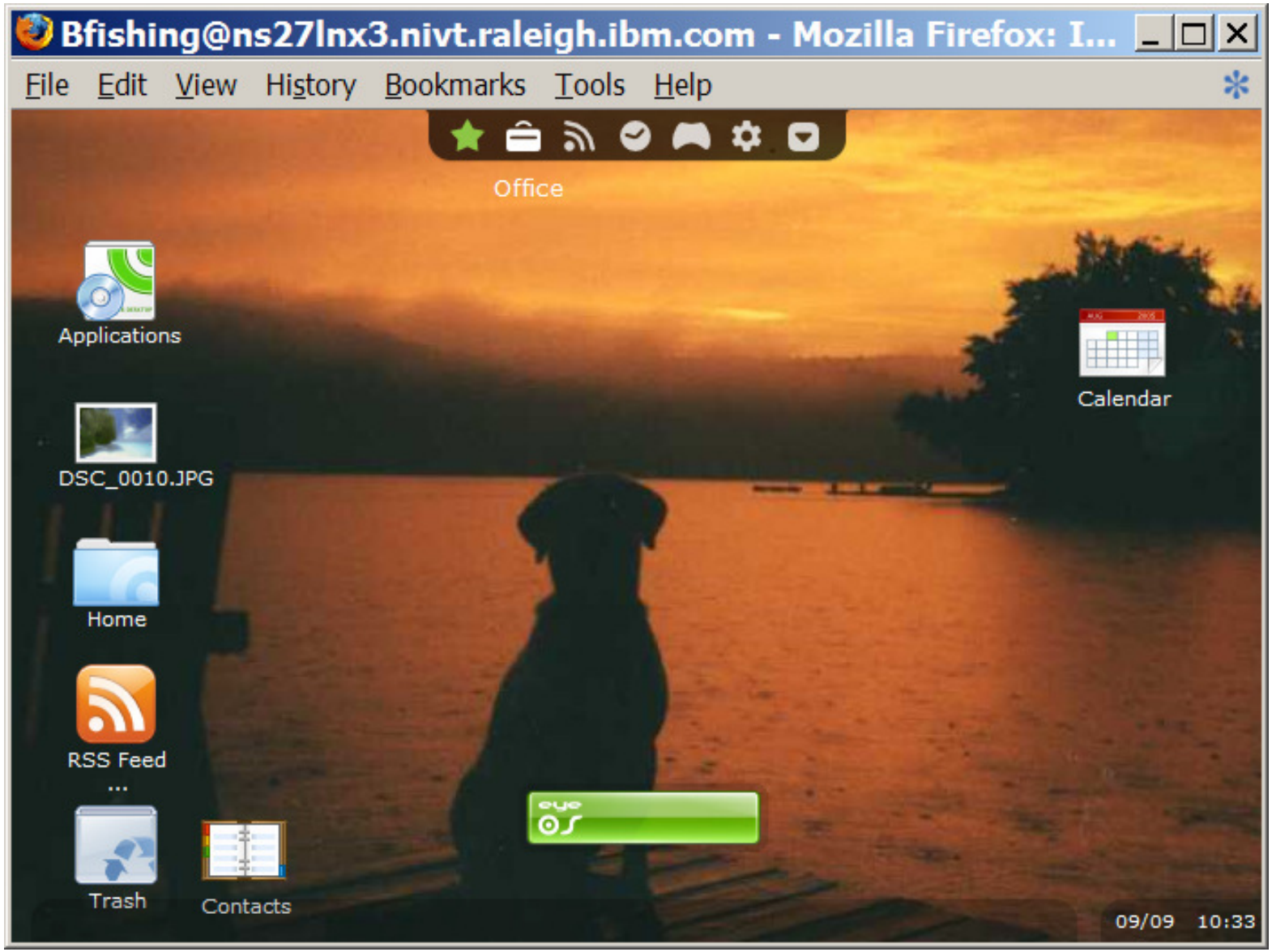
# eyeOS hosted on System z



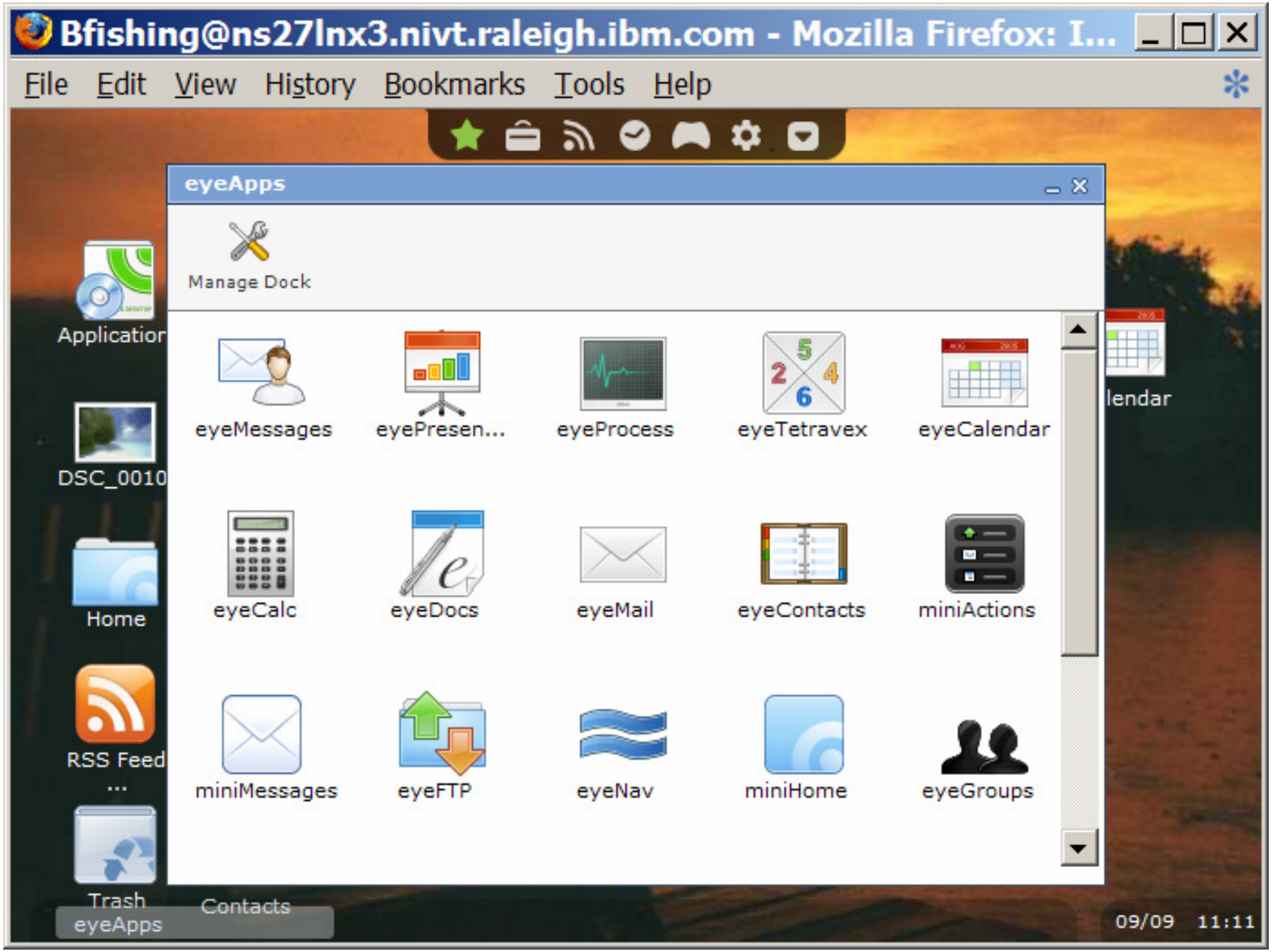
# Logon screens follow accepted interface rules

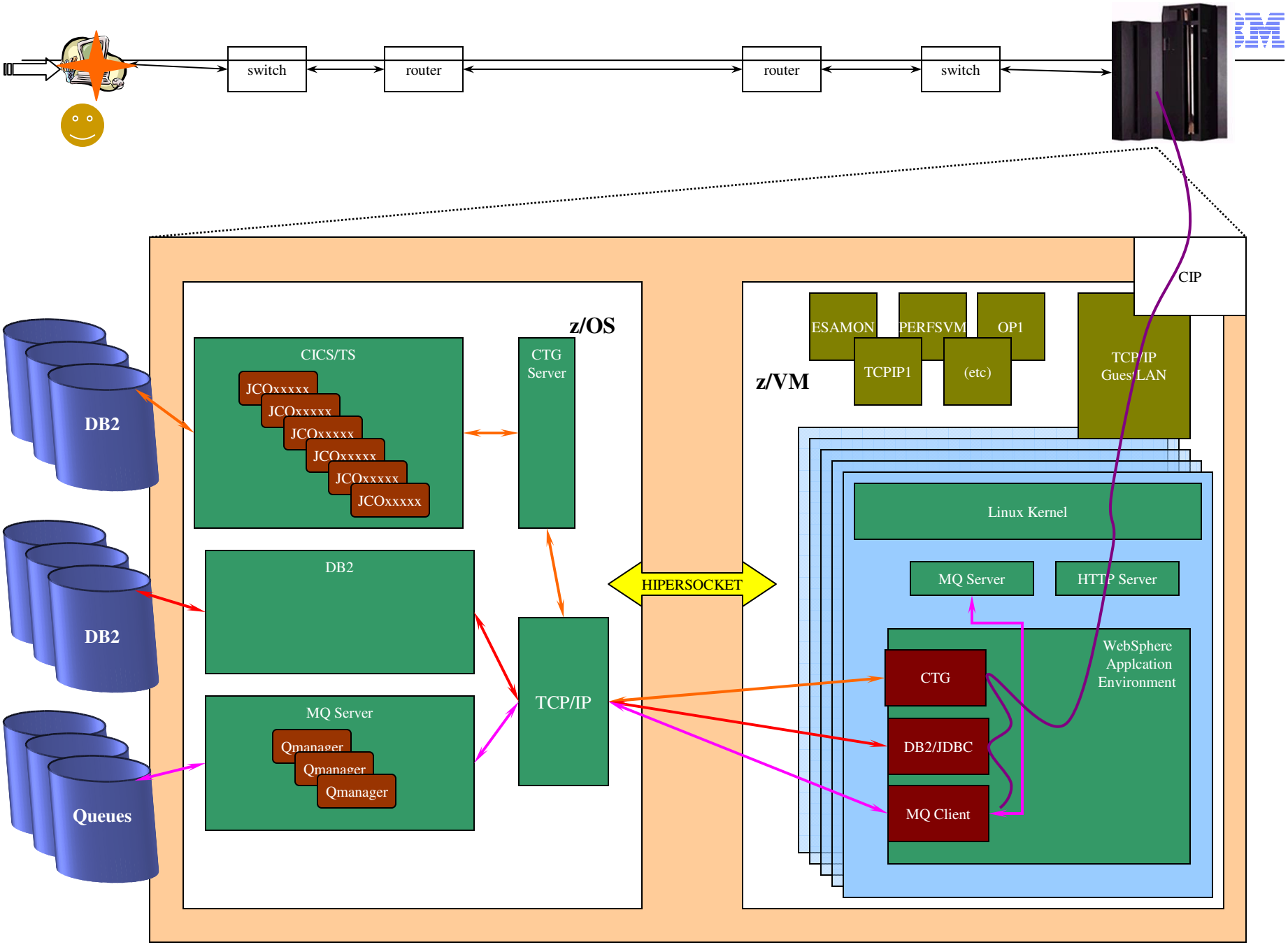


# Customize it just like your home PC

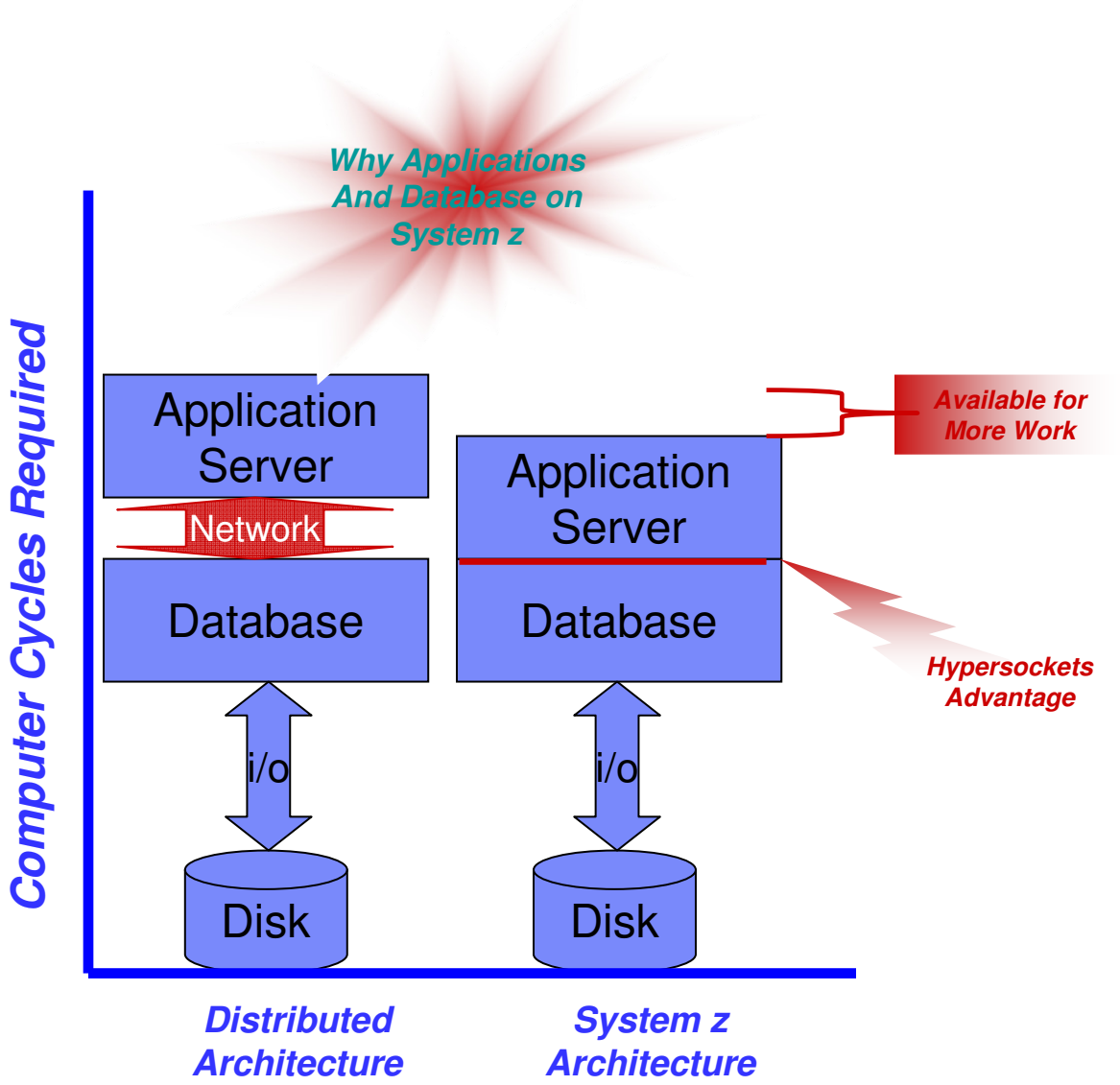


# And all your tools are here





# Application Layer Performance




**ISV Application Server Options**

- ✓ **WebSphere**
- ✓ **IBI Web Focus**
- ✓ **SAP**
- ✓ **INFORMS**
- ✓ **Java**

# What Makes Best Fit

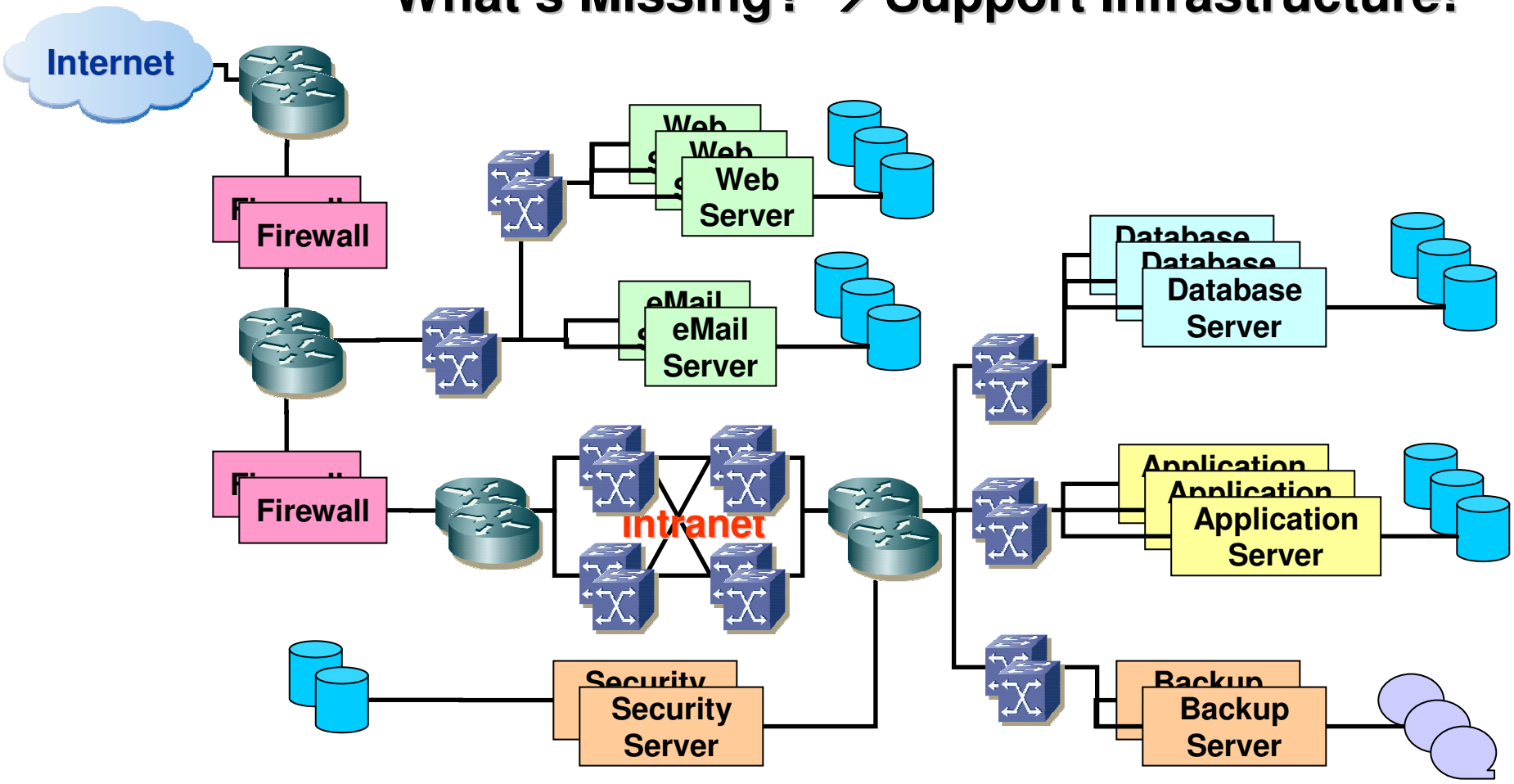
- Leverage classic strengths of the System z
  - High availability
  - High i/o bandwidth capabilities
  - Flexibility to run disparate workloads concurrently
  - Requirement for excellent disaster recovery capabilities
  - Security
- Shortening end to end path length for applications
  - Collocation of applications
  - Consolidation of applications from distributed servers
  - Reduction in network traffic
  - Simplification of support model
- Consolidation Effect
  - Power requirements
  - Software costs
  - People Costs
  - Real Estate
  - Workloads requiring EXTREME Flexibility

# Best Fit Application Workloads

- WebSphere MQ Series
- DB2 Connect
- CICS Transaction Gateway , IMS Connect for Java
- SAP
- WebSphere and JAVA applications development
- WebSphere Application Server (WAS), Portal
- Domino
- Network Infrastructure, FTP, NFS, DNS etc..,
- Oracle Database
- Applications requiring top end disaster recovery model
- ComServer and Communications Controller for Linux
- Virtualization and Security Services
- InfoSphere/Cognos
- Communigate Pro (VoIP)

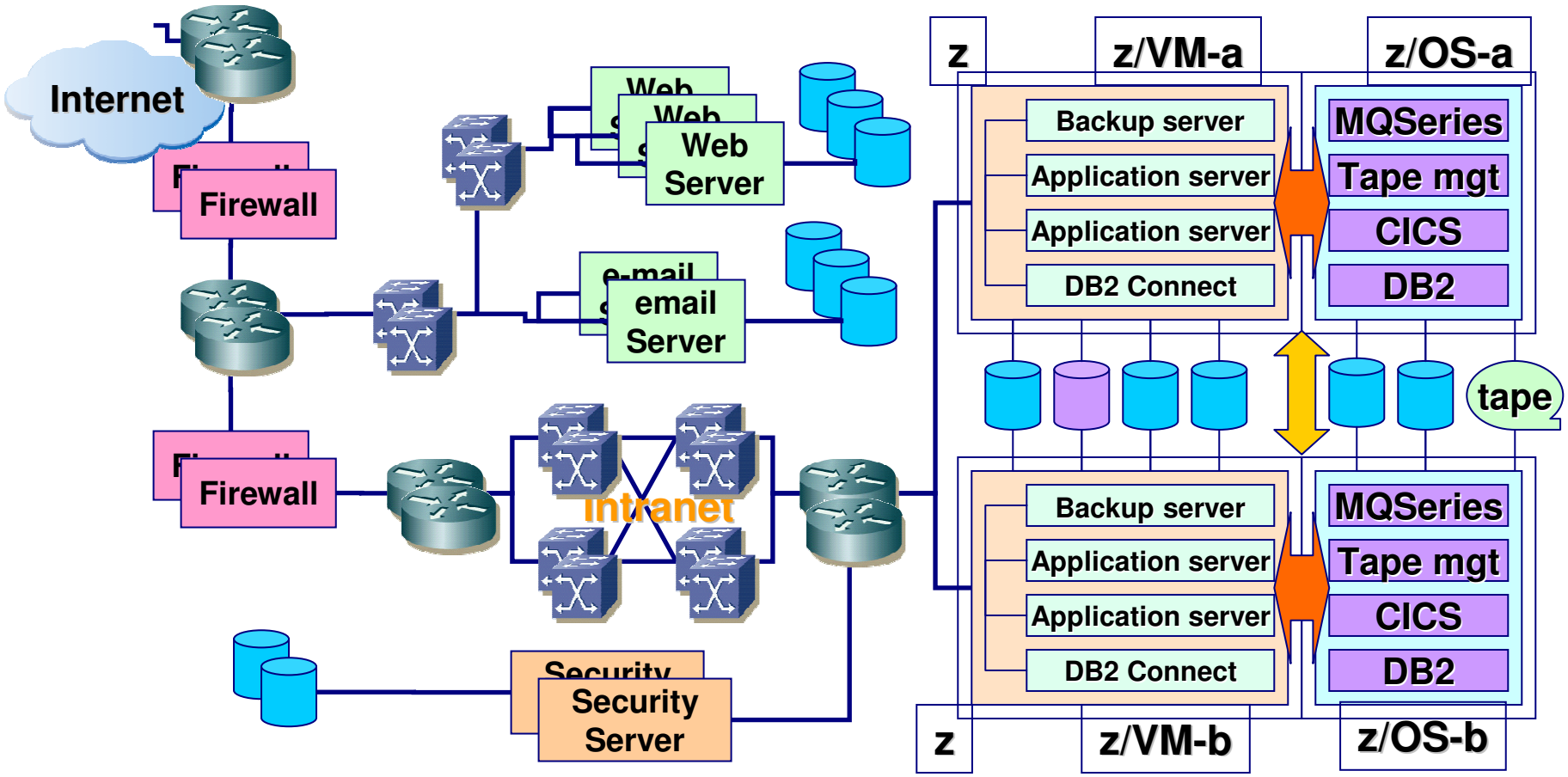
# Infrastructure Reduction

## What's Missing? → Support Infrastructure!



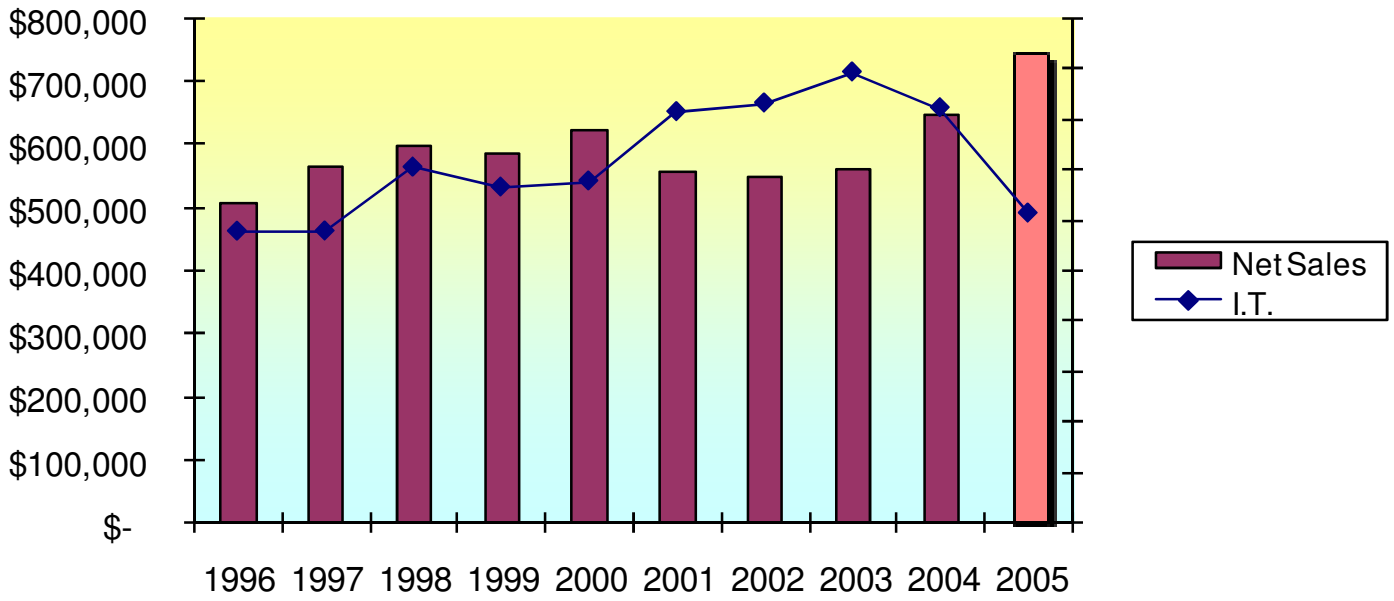

## This configuration contains 50+ levels of infrastructure

# Reduce Infrastructure with Linux on System z



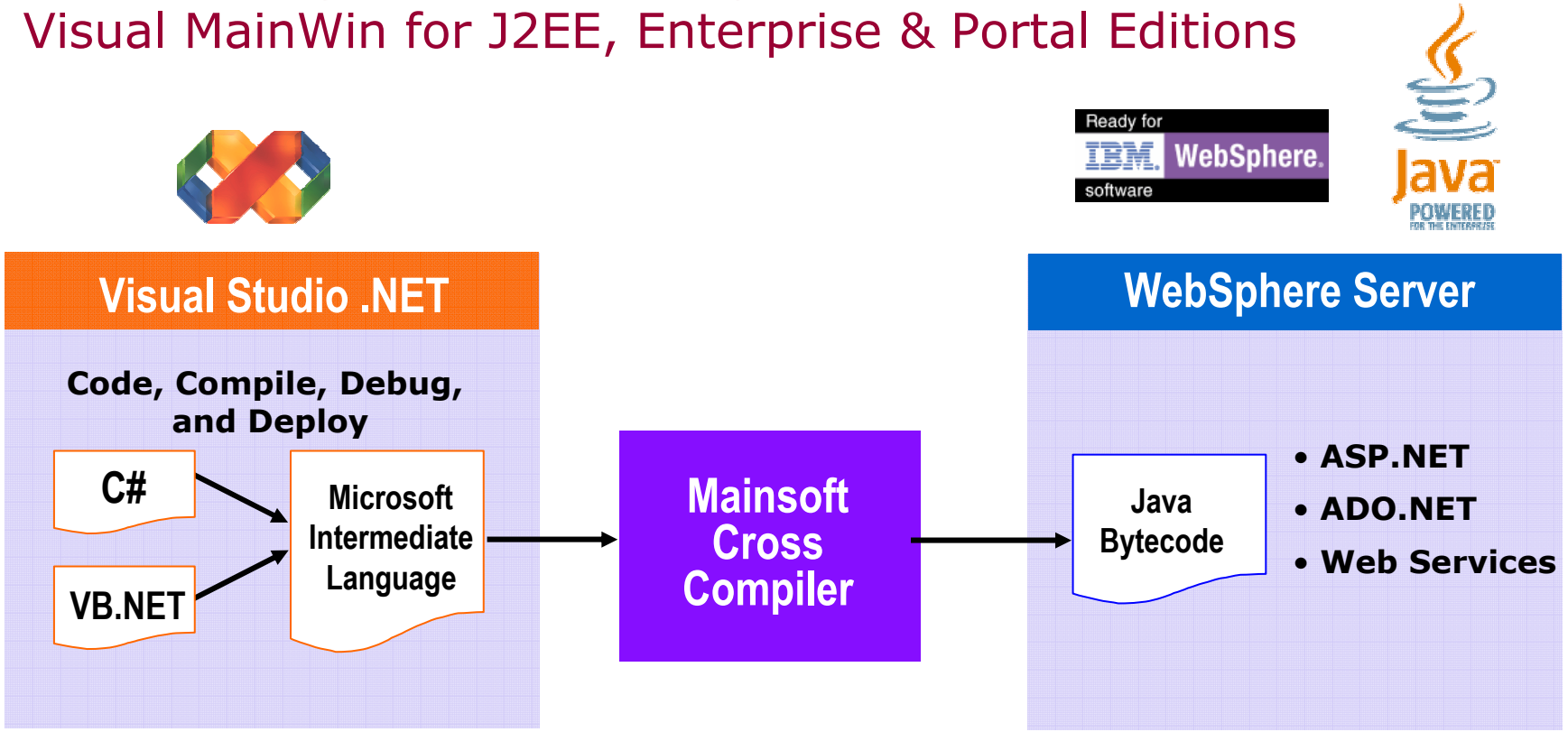

**In this configuration, 14+ levels of infrastructure have been eliminated**

# Net Sales vs. I.T. Percentage of Sales SAP Customer



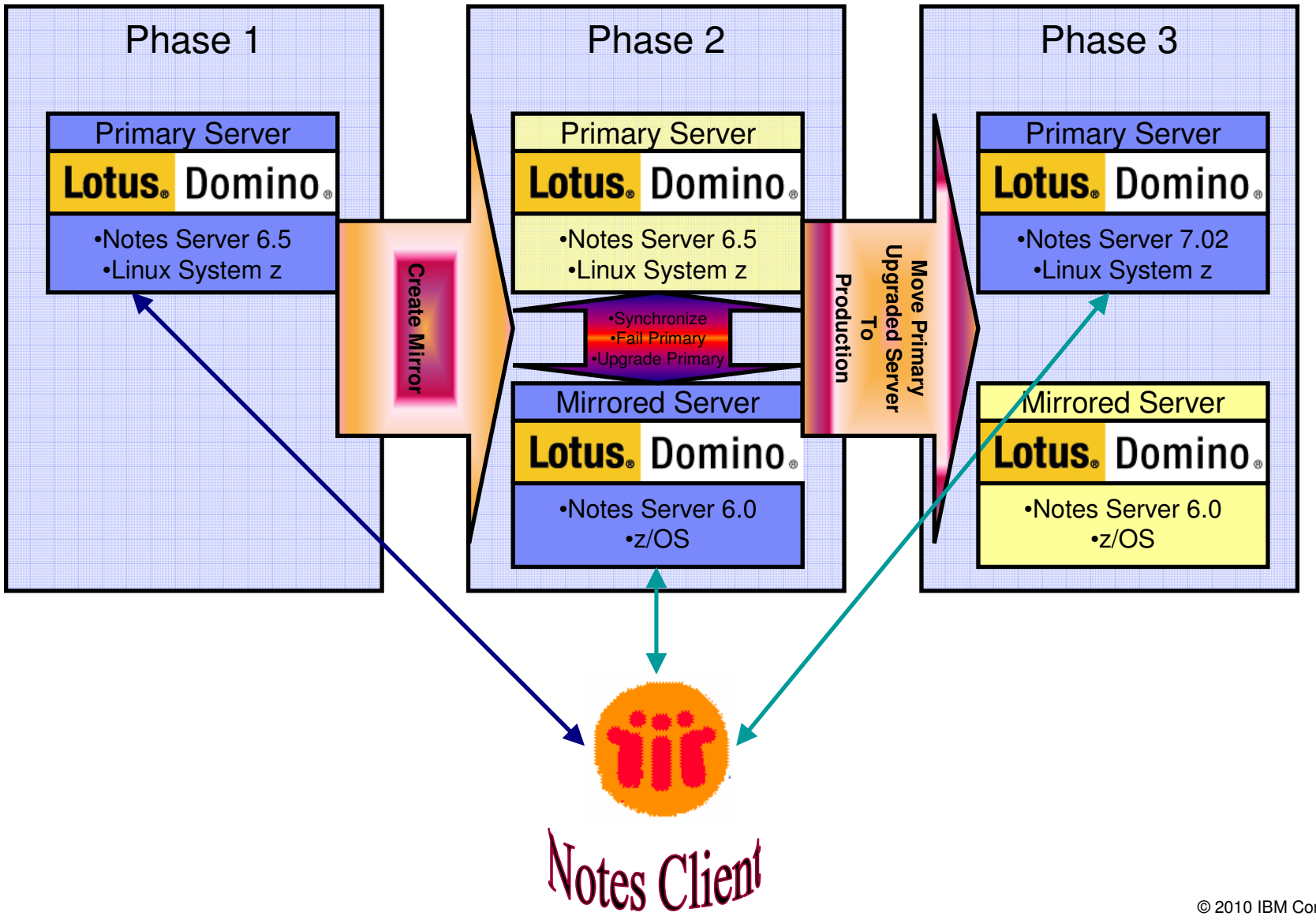
# Enabling Technology

## Visual MainWin for J2EE, Enterprise & Portal Editions

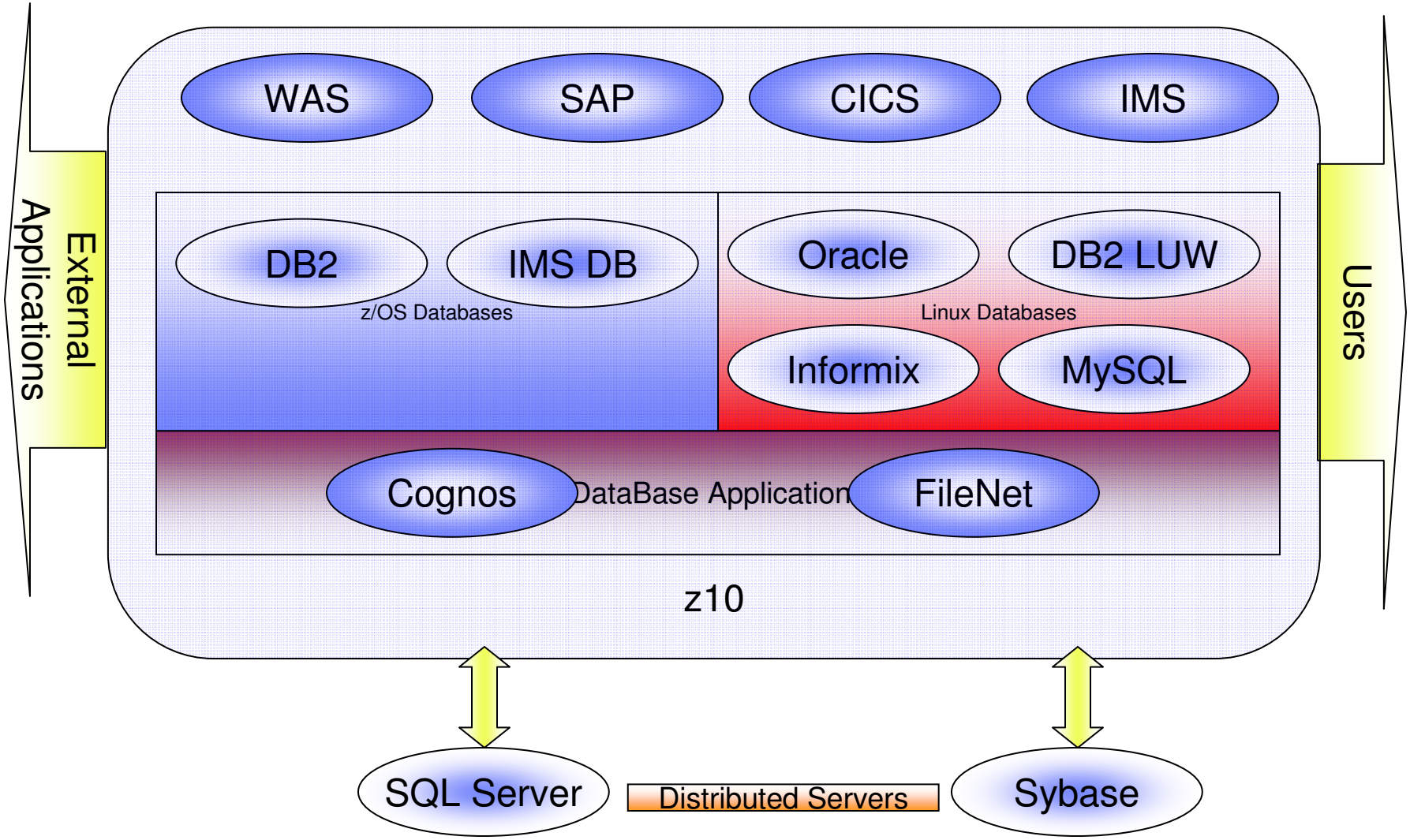



Mainsoft software has been validated on System z & other eServer platforms.

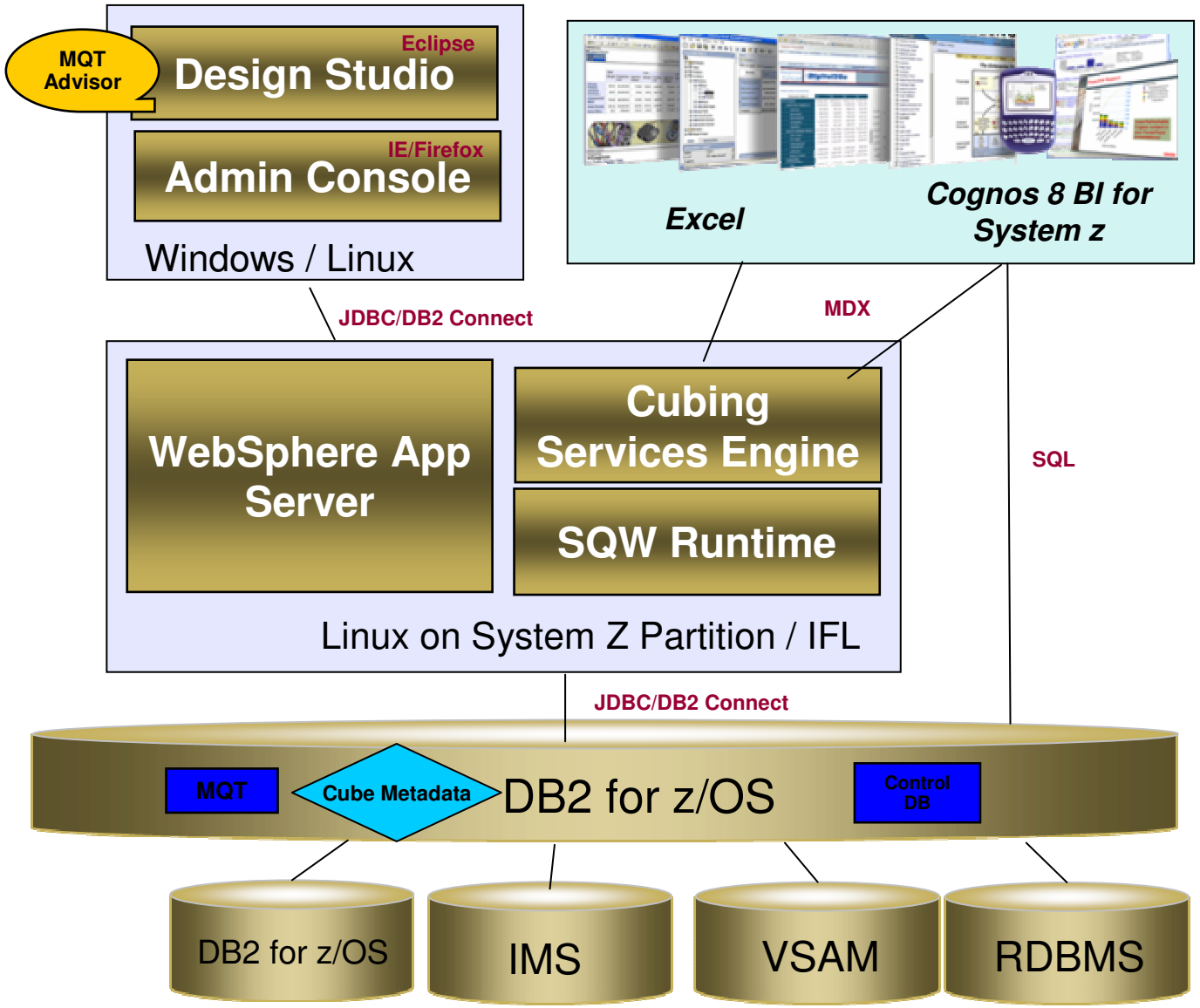
# Domino for Linux on System z, Imagine the Possibilites



# System z THE Database and Warehouse Engine



# InfoSphere Warehouse on System z




**Client Layer**

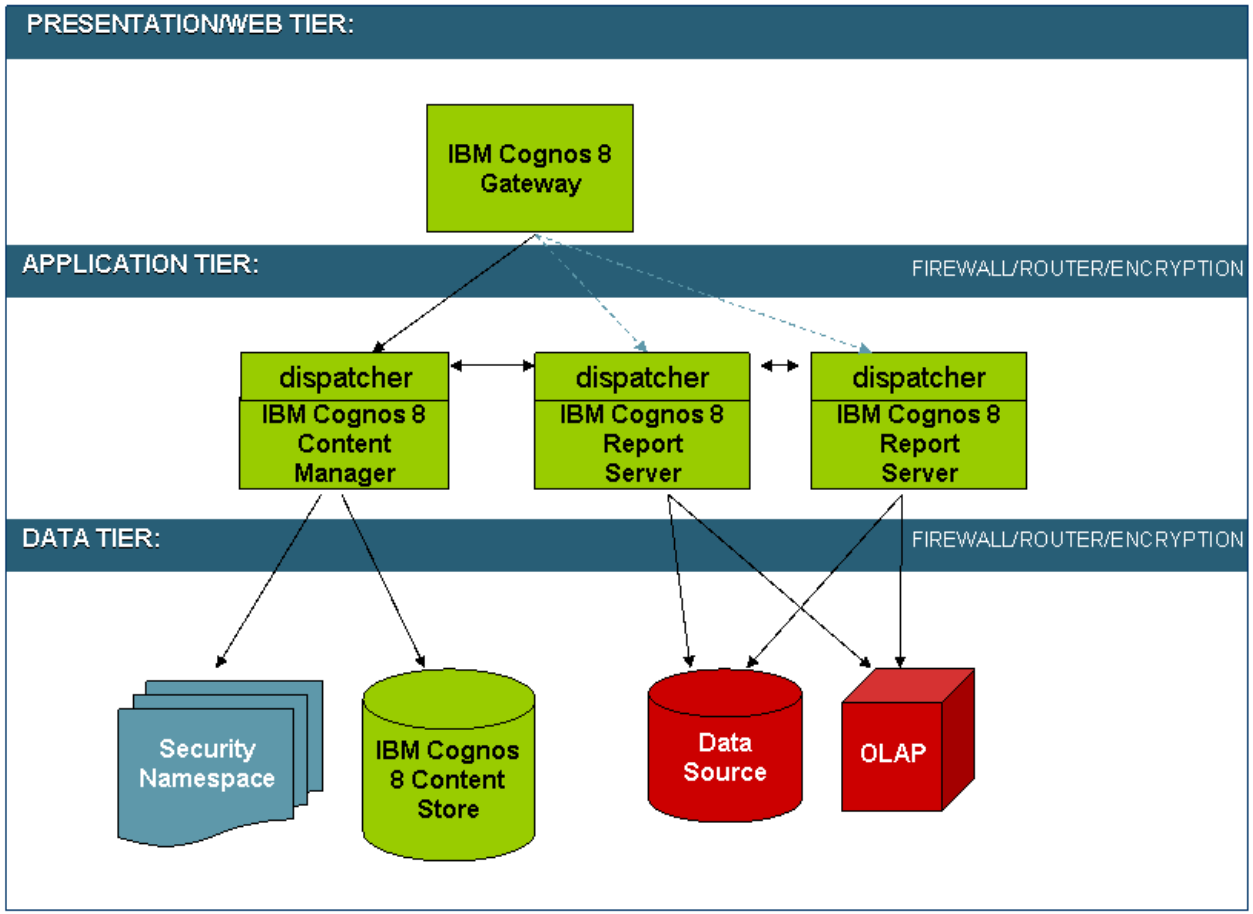
- Design and admin client
- BI / Reporting tools and apps

**Application Server**

**Data Warehouse Server**

**Source Systems**

# IBM Cognos 8 BI Architecture



# What Makes Good Fit

- Evaluate server choices
  - Correct application availability,
  - Supporting applications,
  - Total Cost of Ownership (TCO)
  - Politics within the organization.
  - Porting issues
- Shortening end to end path length for applications
  - Collocation of applications
  - Consolidation of applications from distributed servers
  - Reduction in network traffic
  - Simplification of support model
- Consolidation Effect
  - Power requirements
  - Software costs
  - People Costs
  - Real Estate
  - Workloads requiring EXTREME flexibility

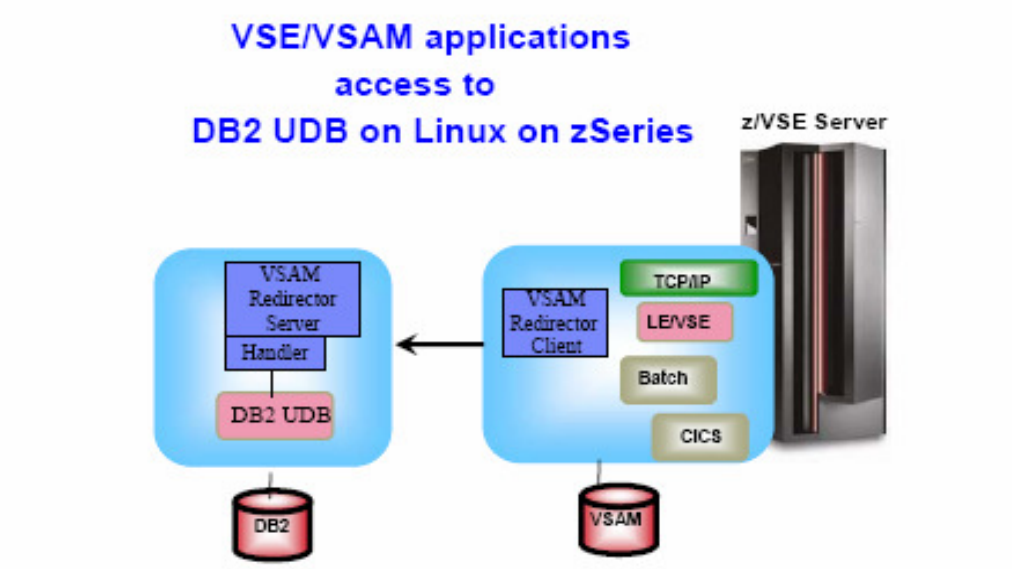
# Good Fit Application Workloads

- DB2 (LUW)
- Informix, (IDS)
- Apache web serving
- SAMBA
- TIM/TAM (LDAP Services)
- TSM
- Existing Linux Workloads

# DB2, Imagine the Possibilities on Linux for System z

UDB 8.1
UDB V8.2
DB2 V9.1 Native XML

- Spatial Extenders
- Archive Expert
- Test Database Generator
- Net Search Extender



# Potentially Difficult Candidates

- ISV and IBM applications that have not yet ported their application to run on Linux on System z
- Applications that by design run at VERY High sustained utilization which I will define here as >95%.
- Stand-Alone single applications as the only Linux for System z applications
- Applications that are to internally sensitive to try and move

  http://www-1.ibm.com/servers/eserver/zseries/os/linux/apps/all.html
- This URL is a link to the IBM software running and supported to run under Linux on System z.

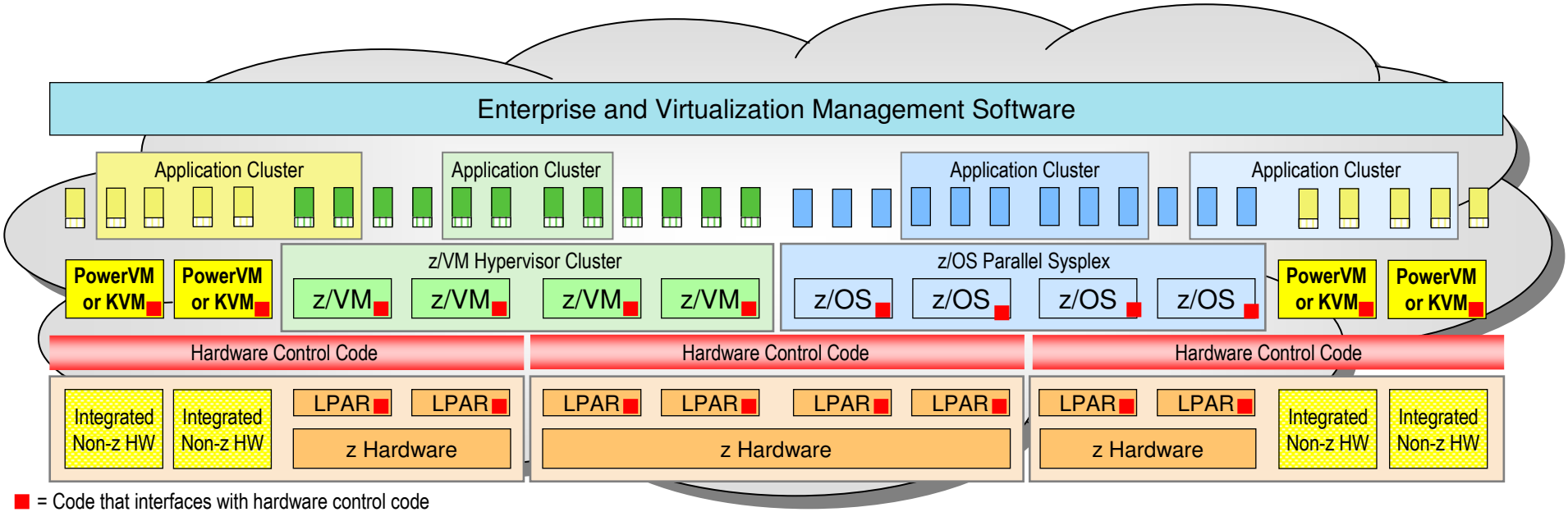
  http://www-1.ibm.com/servers/eserver/zseries/os/linux/software.html
- Call and ask if the software is not on one of the two lists above. Call Jeff Noel (POK), Ray Smith (POK), or Bill Reeder (Seattle).

# System z ISV Ecosystem as of 1Q 2009

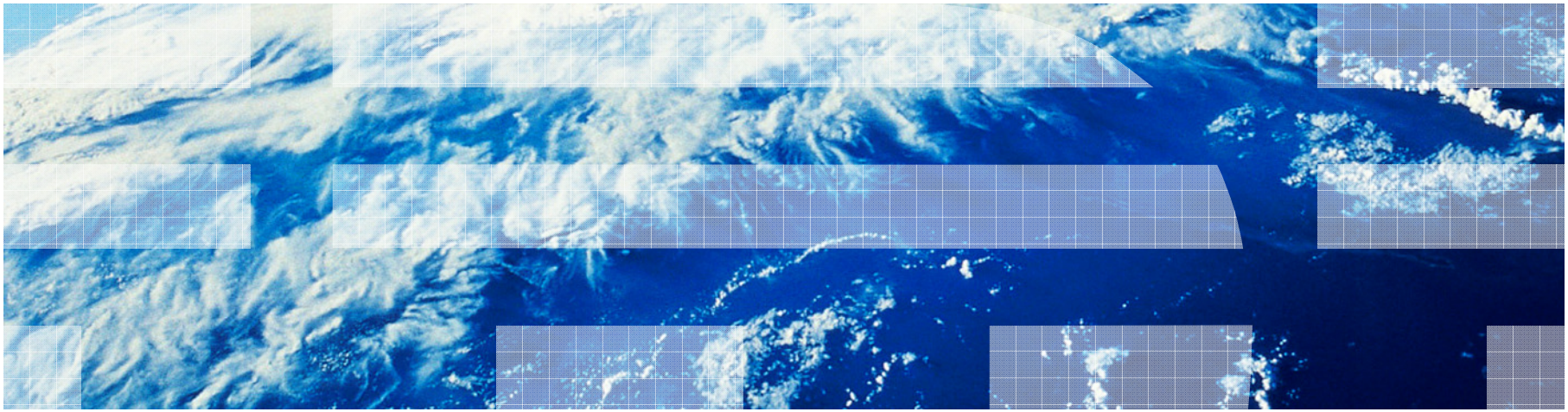
- Over 6,000 applications, from over 1,600 ISVs enabled on the System z platform
  - **Over 2,000 applications on z/OS 1.8 and above**
    - ✓ **More than 3,800 for all z/OS releases**
  - **Over 2,900 applications on Linux on z**
    - ✓ **More than 500 new Linux applications added in 2008**
      - **Represents 18% growth from 2007**
    - ✓ **Over 150 already added in 2009**

# IBM Multi-Architecture Virtualization
# Federated Hypervisor Support with System z
## Enabling "Fit for Purpose" Application Hosting

- System z futures: hosting a federation of platform management functions, including:
  - Resource monitoring
  - Workload management
  - Availability management
  - Image management
  - Energy management
- Integrates with hardware management and virtualization functions
- Controls hypervisors and management agents on blades
- Open integration to enterprise-level management software



# Implementing Management Solutions



PIREAN
Together We're Smarter.

# INTEGRATED SERVICE MANAGEMENT

# INTRODUCTIONS

PIREAN
Together We're Smarter.

- The technology you've heard about today presents amazing opportunities, from cost savings and efficiencies through sustainability.
  - but to realize it's true potential you must consider the management of your infrastructure and the applications you run end-to-end.

- IT Service Management has matured considerably over recent years – our approach encapsulates traditional Service, Security and Storage management.

- Based on our experiences, we're here to talk about best practice methods for realizing an end to end IT Service Management vision for your organization.

- With years of experience to draw on, we'll talk about real world examples of how you make the journey to an ITIL aligned Service Support and Delivery model.

- Our goal?  To take you from a reactive, disjointed service to an integrated 'Smarter' model.

**Organizations embark on this journey everyday, and you don't have to go it alone - experience matters, learn from others and partner with experts.**

# STARTING PRINCIPLES

PIREAN
Together We're Smarter.

- Best practice looks the same, whatever the organization.
- Look to industry experience and best practice to build a solid approach:
  - ITIL for how IT services are to be delivered and supported;
  - COBIT to address what needs to be controlled and how it is to be measured.
- ITIL provides an industry recognized framework for best practice while COBIT helps us to measure the success of your transformation.
- Benchmark where you are today, and use this to demonstrate your progress.
- Successful governance ties IT's goals to those of the business – make sure you have business buy-in and communicate.

**Take a pragmatic approach…**

**•Projects aren't always about enterprise wide change. You can introduce best practice on a project by project basis. New infrastructures and business services are a great place to start.**

**•Start with the new, and extend the reach of your best-of-breed platform across existing and new services.**

**•Bring together the legacy, distributed and datacenter under one platform…**

**•… and easily extend to new services, including virtualization and cloud.**

**•Leverage your platform to introduce new and support existing business processes.**

**•Engage the business, they'll soon realize your strategy helps to drive their agenda for change!**

# CONSIDERATIONS

***A successful organization is built on a solid framework of data and information. To meet the goals of the business you must effectively manage the union between business processes and information systems.***

- Successful IT Service Management projects are delivered in phases - understand the big picture, but don't try and eat it whole.
- Focus on what delivers the most value to you and your organization, and deliver it in a strategic way.
- Engage the business, understand both business and technology drivers - use this to validate your strategy and delivery routes.
- Define a program for change made up of work packages – translate the business requirements to a delivered technical solution.
- Deliver value quickly, target prominent pain points and areas where improvement can be quickly demonstrated.

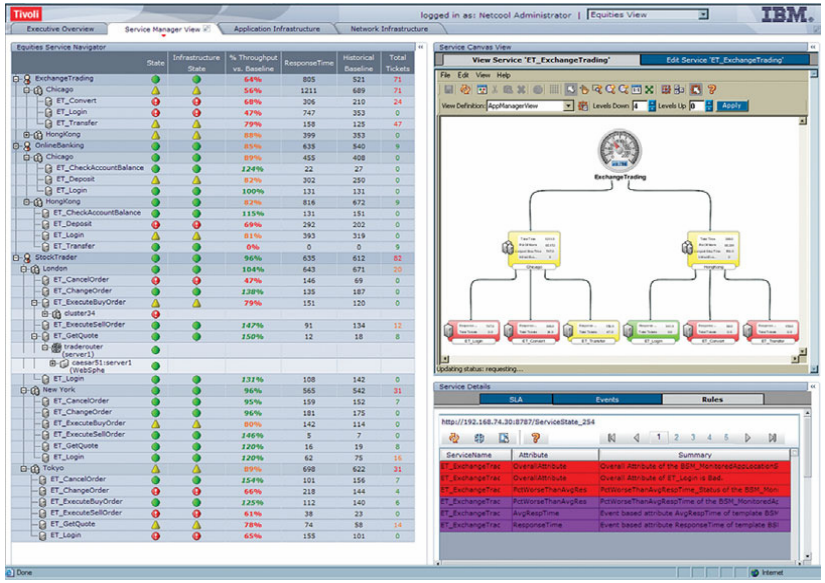
# MAKING SENSE OF COMPLEXITY

PIREAN
Together We're Smarter.

Looking at the technologies outlined today the simplification, consolidation and centralization of your infrastructure is more achievable than ever before.

IBM has delivered the platform and applications you need for a best of breed IT infrastructure.

**Improving your infrastructure helps to make your business run better – but you want it to run smarter.**




**IT Service Management Challenges we see every day:**

- **The Operations Lifecycle, runbook automation and applying business process to technology;**
- **Understanding and cataloguing IT Assets;**
- **Centralizing control and integrating systems;**
- **Managing Change and Configuration Management;**
- **Detecting and responding to Incidents and Problems;**
- **Automating processes to improve service delivery;**
- **Securing the infrastructure; and**
- **Proactively managing SLA's.**

PIREAN
Together We're Smarter.

# THAT SOUNDS GREAT, BUT WHO'S REALLY DONE THIS?

# OUR SERVICE MANAGEMENT APPROACH

PIREAN
Together We're Smarter.

## Let's talk about four real world examples…

1. CMC Markets — A Global Market Maker
2. First Data — The World's largest Merchant Processing provider
3. UK GOVERNMENT — The home of ITIL
4. AVIVA — The World's 5th Largest Insurer

**… and how each one of these organizations overcame the challenges you see today.**

PIREAN
Together We're Smarter.

# CMC MARKETS

## A GLOBAL MARKET MAKER

# OVERVIEW

PIREAN
Together We're Smarter.

**Business Drivers**

***Building a new global infrastructure, using technology to gain competitive advantage and to extend market reach.***

- Moving from a legacy infrastructure to a new worldwide datacenter model.
- Systems must handle unpredictable load driven by market movement.
- Measure and report the performance of the infrastructure, from the customer's point of view.
- Understand the true impact of an incident, manage problems and their impact on the business.
- Verify availability and Performance of Key Services.

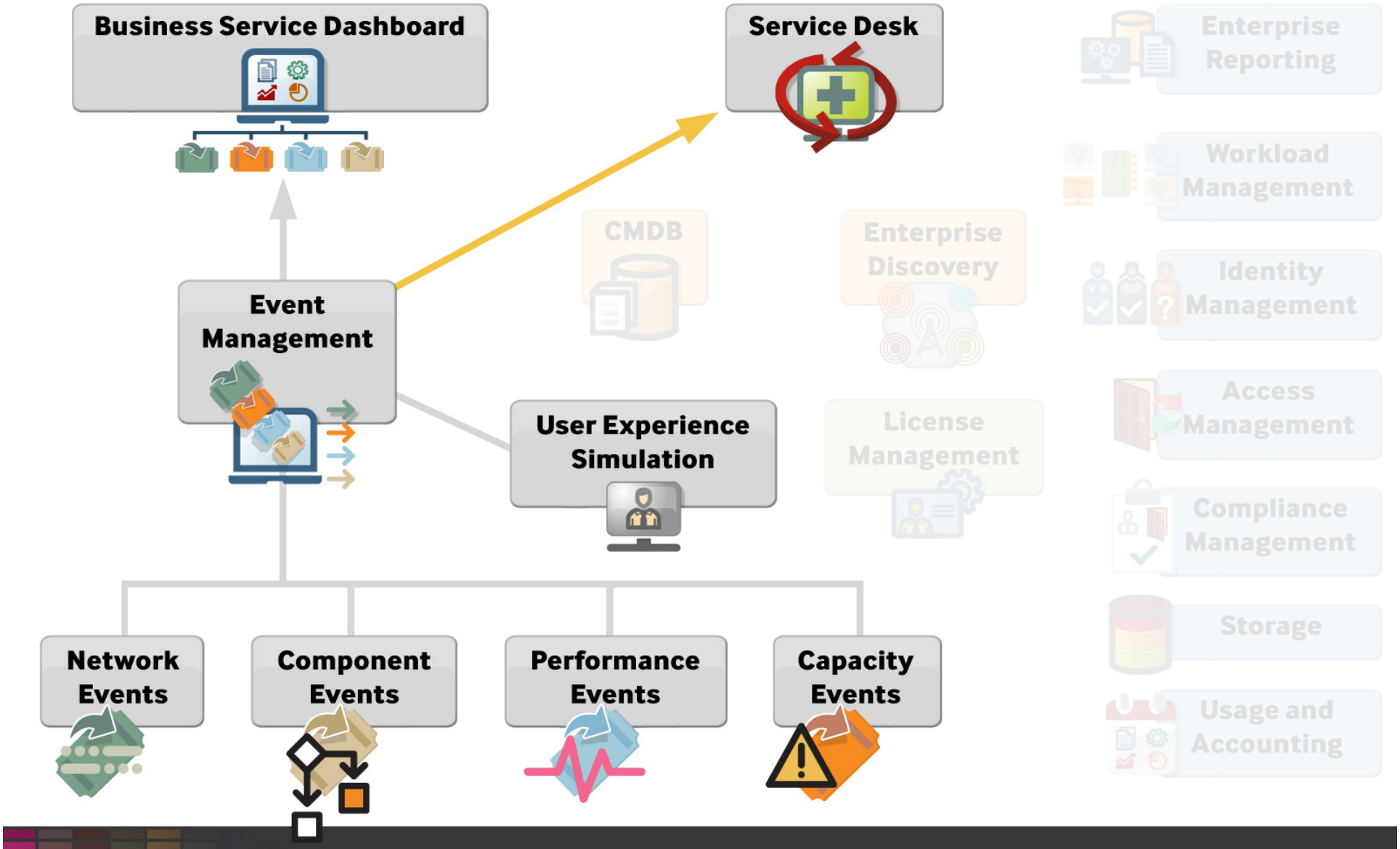
**The Solution…**

- A collection of worldwide datacenters, all built on IBM hardware and monitored by Tivoli Software.
- Provided the ability to monitor with immediate visibility all aspects of infrastructure and business services
- We now simulate users interacting with key application and web based services from all over the world – measuring response time and the ***true*** customer experience.
- We delivered an intelligent business dashboard and centralized operations to a single operations hub.
- We provided closed loop integration – driving everything via the Service Desk.

CMC Markets

# CMC MARKETS AND IBM TIVOLI SOFTWARE

PIREAN
Together We're Smarter.



# BUSINESS BENEFITS

PIREAN
Together We're Smarter.

•We moved from a legacy estate to a best of breed IBM datacenter model.

•Through visibility of the IT Infrastructure, it's performance and capacity management CMC Markets are now able to tune their infrastructure to cope with spikes in demand as they happen.

•The new platform provides the scalability, capacity and extensibility to support trading worldwide, 24x7x365.

**Competitive advantage? CMC Markets made millions of dollars in one day when the competitors stopped trading due to high demand and their inferior Infrastructures failed.**

PIREAN
Together We're Smarter.

# FIRST DATA
## MERCHANT PROCESSING

# OVERVIEW

PIREAN
Together We're Smarter.

**Business Drivers**

***Gain a detailed understanding of deployed systems and the relationships between them***

- Move IT infrastructure management from point monitoring towards a defined set of business views, representing customer experience.
- Consolidate management for a mix of vendor packages, and a proprietary CMDB.
- Integrate with the production Service Desk to extend existing business processes.
- Automate discovery across the IT estate, and link the systems and applications to the business services they provide.
- Tune the Service Management platform to prioritise and report on financial penalties associated with SLA's.

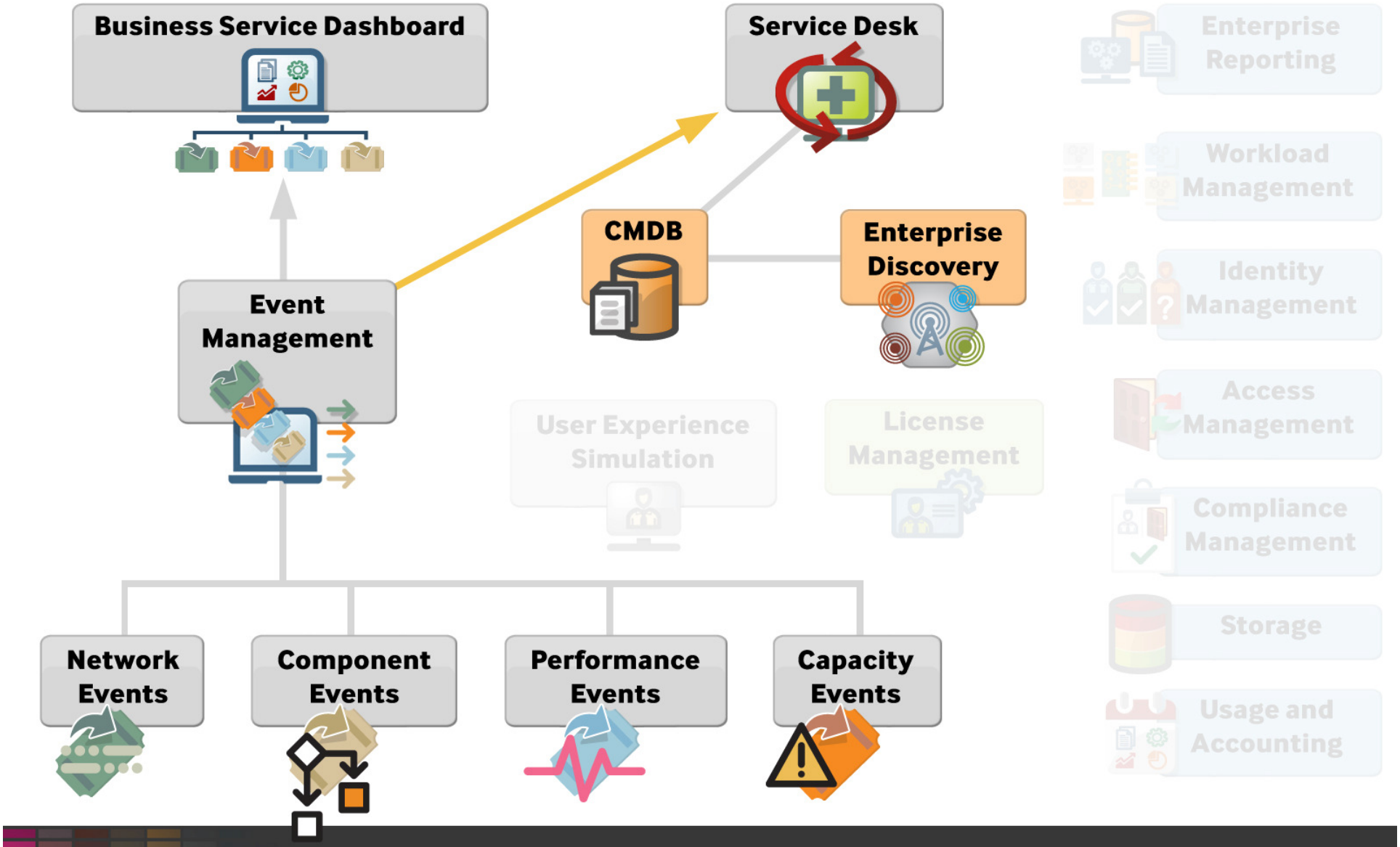
**The Solution…**

- Discovery – what's out there.
- Change – If something changes, we want to know and link it back to a Change Record.
- Visualization – implementing a Subway map of Business Services, ensuring outages down the line could be mitigated through rerouting.
- Diagnostics – supporting drill down to the components behind the service, dynamically updated through discovery.
- Dashboarding – providing real time SLA views and predicatively reporting breaches.

First Data

# FIRST DATA AND IBM TIVOLI SOFTWARE

PIREAN
Together We're Smarter.



# BUSINESS BENEFITS

PIREAN
Together We're Smarter.

•Introduced a business service view of operations.

•Provided a better understanding of the impact of Change on business services.

•Provided a visibility of outages in a business context – not just 'what went wrong?', but 'what did it mean to the business?"

•Drove service improvements from a customers perspective.

•Ensured incident and problems were identified, prioritised and solved before they impact SLAs.

•Reduced costs through a better inventory of services and components.

**The bottom line? Faster resolution of incidents and problems, more powerful root cause analysis and strict change and configuration management.**

PIREAN
Together We're Smarter.

# UK GOVERNMENT

## THE HOME OF ITIL

# OVERVIEW

PIREAN
Together We're Smarter.

**Business Drivers**

***Automate internal processes through the realisation of ITIL and gain control over the impact of change on business services***

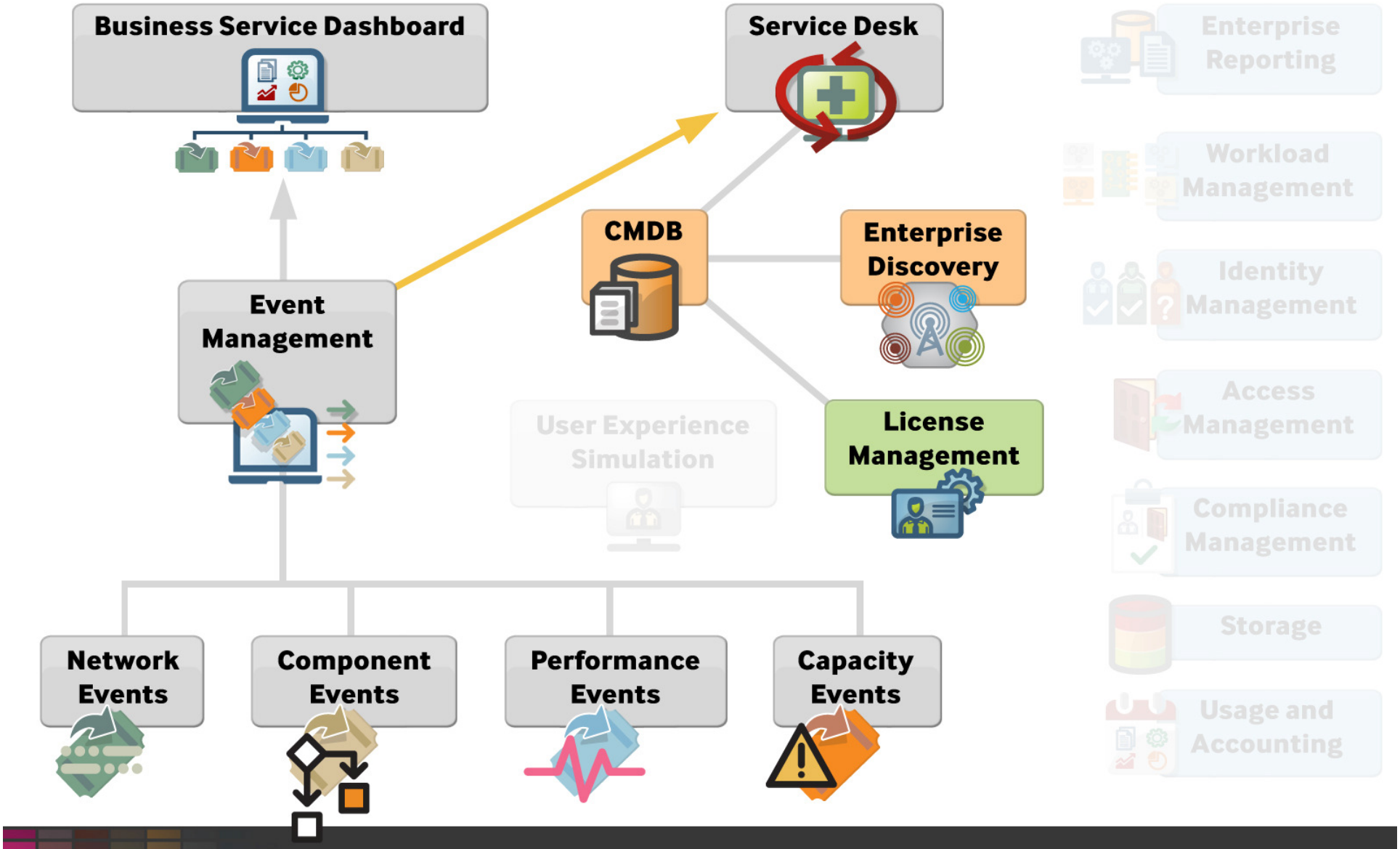
- Significant Service Management Challenges.
- Processes were documented and ***assumed*** to be in use.
- Struggling with Change and Configuration management.
- No accurate view of the IT estate.
- No integration between HR and Service Desk.
- No integration between people and assets.
- Limited KPI reporting .
- Time consuming SLA management.

**The Solution…**

- Automate discovery and change management.
- Introduce structure and control through workflows.
- Integrate Incident, Problem, Change and Configuration Management.
- Provide a business dashboard, with a subway map of key services.
- Compliment the Service Desk and Business Dashboard with a 'What Changed?' view – a view of all changes outside of change control.

# UK GOVT AND IBM TIVOLI SOFTWARE

PIREAN
Together We're Smarter.



# BUSINESS BENEFITS

PIREAN
Together We're Smarter.

•Integrated end-to-end realisation of ITIL aligned Incident, Problem, Change and Configuration Management.

•Provided a better understanding of the impact of Change on business services.

•Provided a visibility of outages in a business context – not just 'what went wrong?', but 'what did it mean to the business?"

•Moved on to reduce the load on the service desk through user self-service.

**What does it mean for citizens? Better service … faster resolution of incidents and problems, more powerful root cause analysis and strict change and configuration management.**

PIREAN
Together We're Smarter.

# AVIVA

## THE WORLD'S 5TH LARGEST INSURER

# OVERVIEW

PIREAN
Together We're Smarter.

**Business Drivers**

***Leverage the eCommerce platform to drive new business lines and reduce support and operational cost.***

- Refreshing Aviva's eCommerce platform with new IBM technologies.
- Reduce the time taken to bring new applications into production.
- Standardise and automate the deployment process.
- Define and enforce service levels for key components.
- Implement a best practice, repeatable performance and availability management solution.
- Improve the efficiency of support and maintenance.

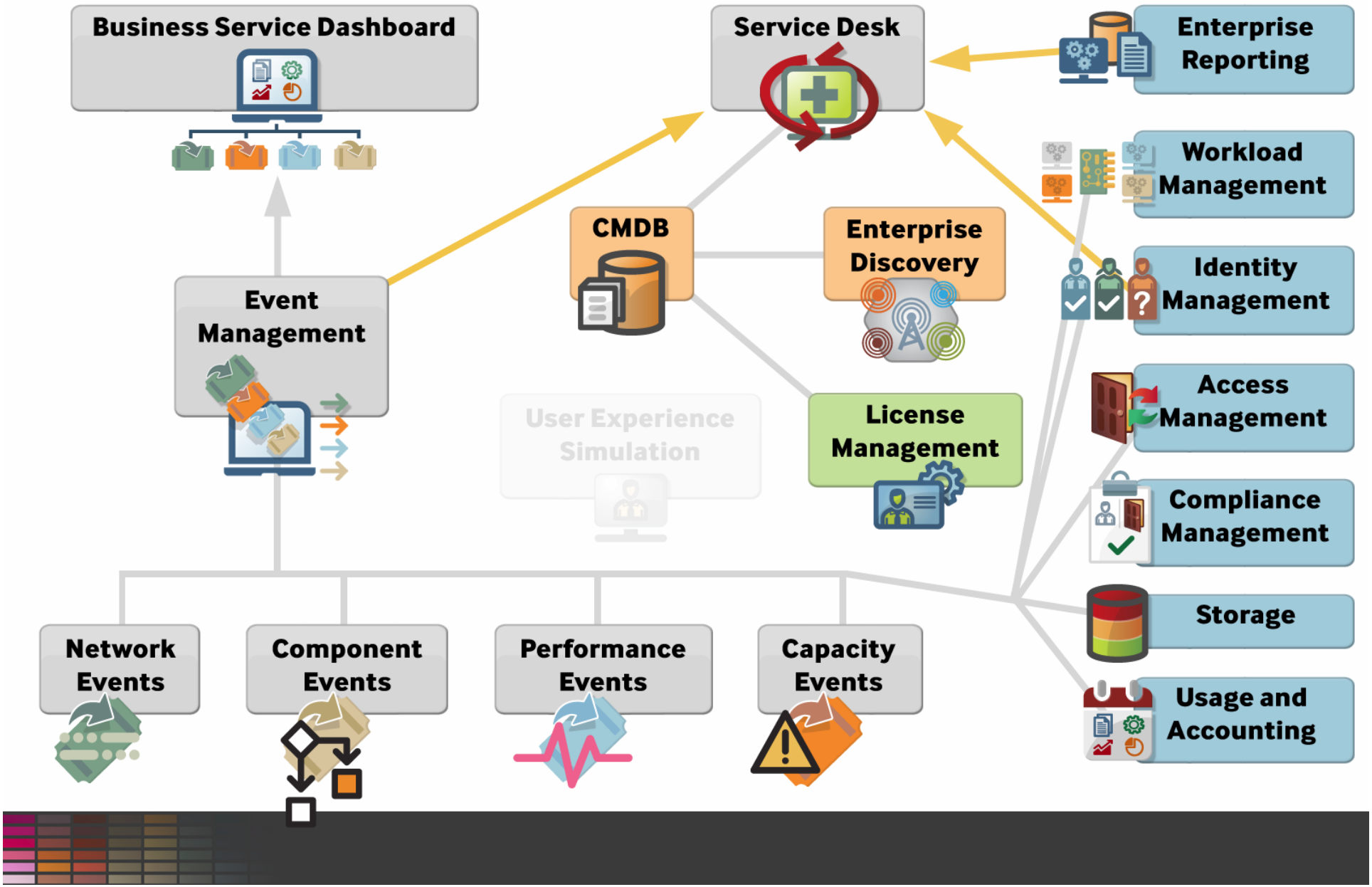
**The Solution…**

- Automated build and provisioning, from software to user provisioning and self service.
- Enable rapid, repeatable environment and application builds.
- Provide for detection of non-automated changes ("drift").
- Provide a business view of impact of failures, affect on services and potential breaches of SLAs
- Improve capacity reporting, issues are identified before they begin to impact on the service.

AVIVA

# IBM TIVOLI SOFTWARE - INTEGRATED VIEW

PIREAN
Together We're Smarter.



# BUSINESS BENEFITS

PIREAN
Together We're Smarter.

•Meantime to delivery of business functionality in reaction to market changes reduced from months to weeks.

•Service availability moved to 99.9%.

•Utilization of infrastructure increased from 25% to 75% without loss or degradation of service, reducing infrastructure investment needs by 50%.

•Standardization and automation of management and delivery processes provides consistency and reduces organizational support needs and resources.

**Real world benefits? Faster delivery, greater flexibility, less downtime and the capability to add capacity and new services on demand.**

PIREAN
Together We're Smarter.

# FINAL THOUGHTS

# BRINGING IT TOGETHER

PIREAN
Together We're Smarter.

- No matter whether you're tackling a legacy or green field estate – the problems and approach is always the same.
- Build on best practice and learn from others experiences.
- Technology alone is not the answer, engage your business users and keep delivering.
- Communicate your progress.
- An integrated portfolio is essential, interoperability accelerates delivery and removes pain.

PIREAN
Together We're Smarter.

# ABOUT PIREAN

# ABOUT PIREAN

PIREAN
Together We're Smarter.

**A strategic partner for the delivery of IT Service and Security Management solutions with a reach across Business Consultancy, Technology and Outsourcing.**

**With AAA Accreditations across the IBM Tivoli Software portfolio we are recognized worldwide as industry leaders - delivering best of breed, smarter, solutions on IBM Tivoli Software.**

2010 MOST ACCREDITED* IBM TIVOLI BUSINESS PARTNER IN THE WORLD

*Source: IBM, based on AAA accreditations for IT Service Management and Security

*"As of March 10, 2010, Pirean are the most accredited Tivoli business partner in the World."*

IBM

Pulse2010
The Premier Service Management Event

**Winner 2010 – Best IT Service Management Solution**

IBM Beacon Awards 2009 Finalist

**Finalist 2009 – Outstanding Service Management Tivoli Award**

Pulse 2008

**Winner 2008 – Business Partner Innovation Award**

PIREAN
Together We're Smarter.

# ANY QUESTIONS?

# Summary