# Implementation of Red Hat Linux on z: User Experiences at Isracard

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**Tuesday, March 1, 2011**

**Session Number 8256**



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# Agenda

- **Introduction**
- Why (z)Linux?
- Chronological road to production
- Some tools
- Observations
- Questions

# What you won't hear today

Why Virtualization and Consolidation are good

TCO, ROI, TCA (well, maybe a little)

Linux kernel

Bash

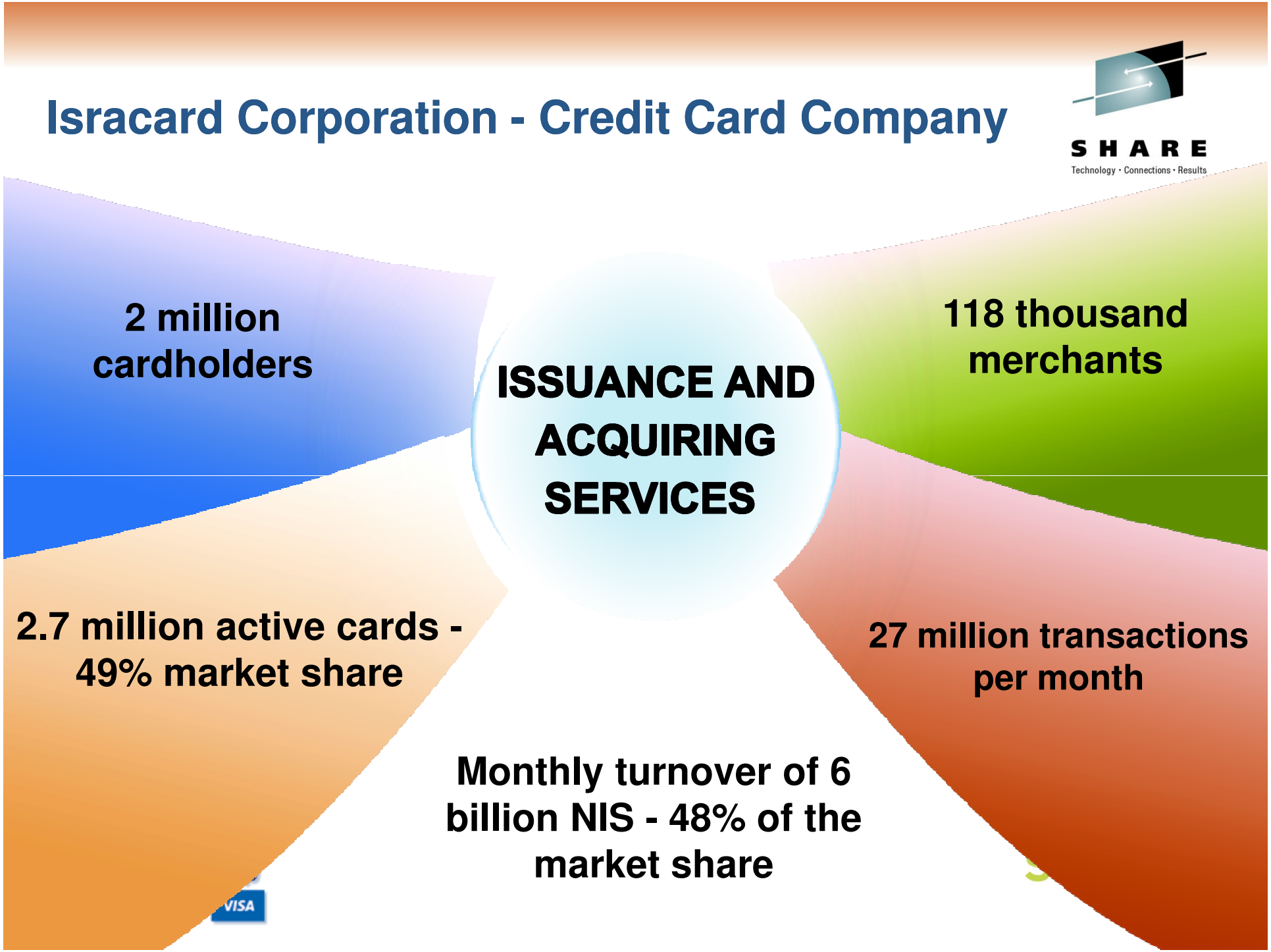
rpm's

LVM

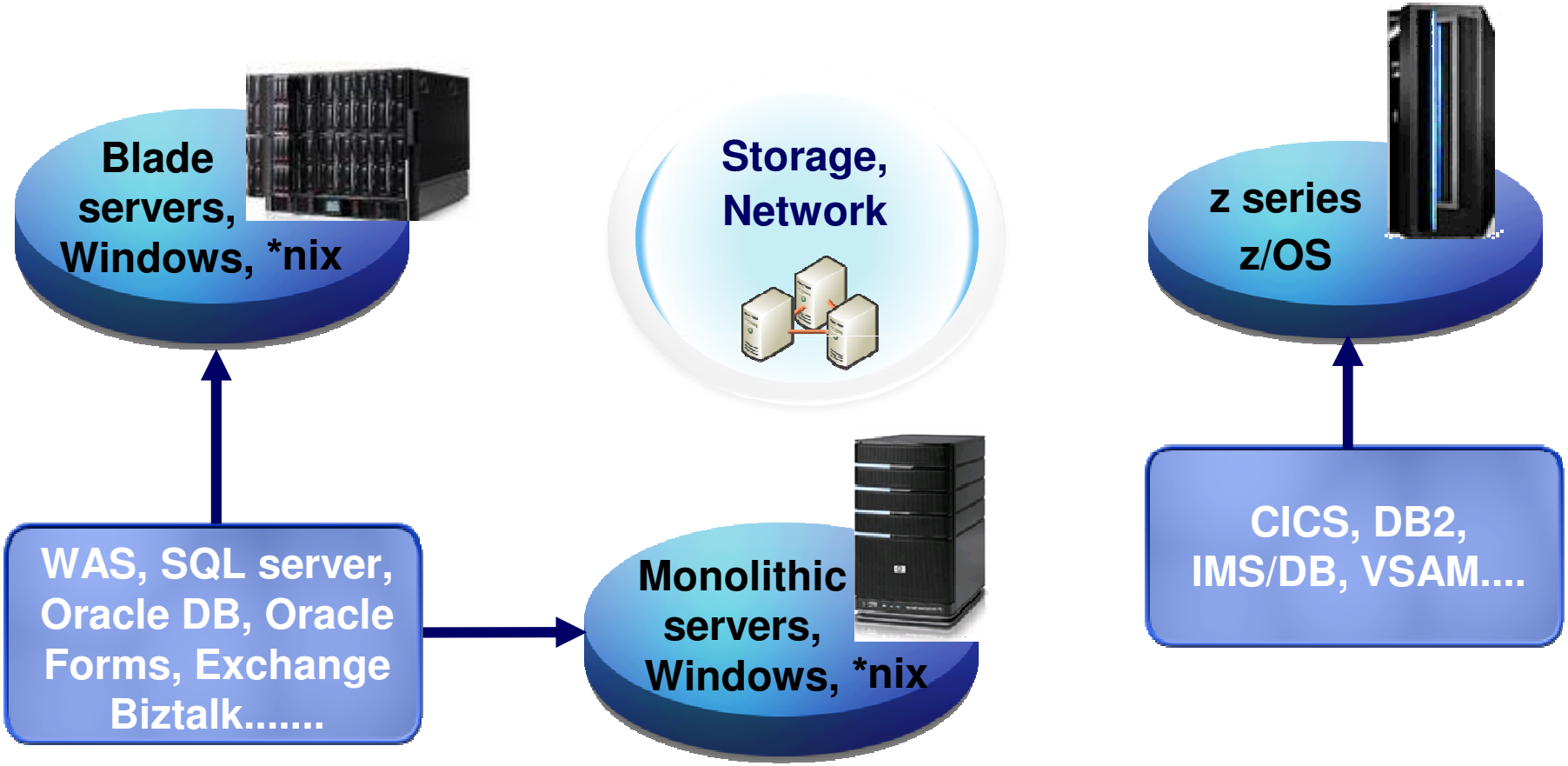
# What you *will* hear today

- ✓ Why we consolidated and virtualized
- ✓ Why zLinux was a good choice for us
- ✓ How we are doing it
- ✓ The potholes along the way(and how we fixed them or bypassed them)
- ✓ Which applications were ported and our plans for the future
- ✓ Our toolbox
- ✓ Decisions that we might have taken(or not taken) if we had seen this presentation before we started
- ✓ How to implement zLinux at smaller shops

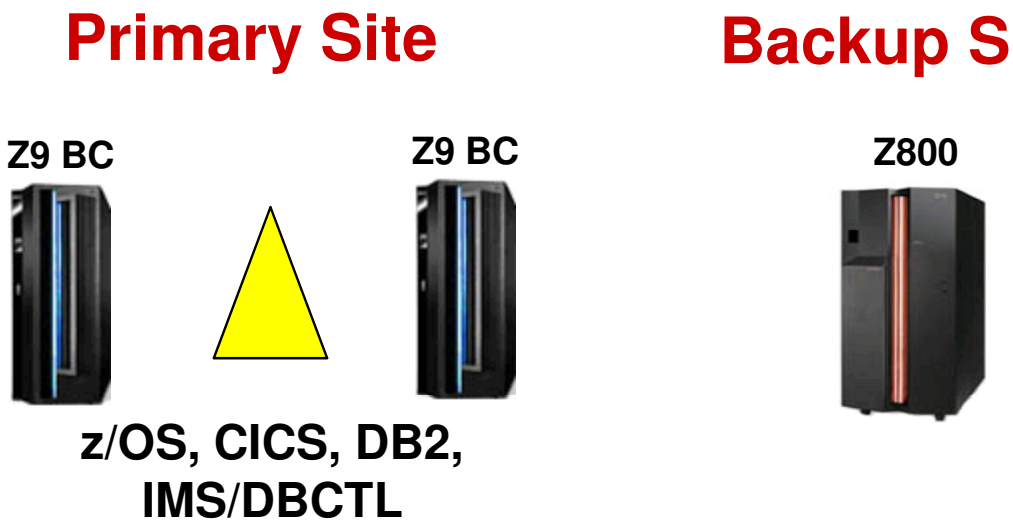
# Isracard Corporation - Credit Card Company



# Isracard Before Consolidation



# DR Infrastructure before consolidation (3Q08)



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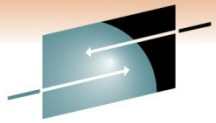
# The consolidation trigger

- Until recently, all core business was on z/OS - hence the distributed systems were not available at the backup site
- Core business on distributed systems - management decision to have them at backup site as well
- Backup site floor space and environmentals are very restricted
- We already have a mainframe at the backup site, so zLinux will not take up any floor space/power/cooling
- Servers that can not go to zLinux will be consolidated on VMware and blades



# TCO: A Range of IT Cost Factors – Often Not Considered

- *Availability*
  - High availability
  - Hours of operation
- *Backup / Restore / Site Recovery*
  - Backup
  - Disaster Scenario
  - Restore
  - Effort for Complete Site Recovery
  - SAN effort
- *Infrastructure Cost*
  - Space
  - Power
  - Network Infrastructure
  - Storage Infrastructure
  - Initial Hardware Costs
  - Software Costs
  - Maintenance Costs
- *Additional development/implementation*
  - Investment for one platform – reproduction for others
- *Controlling and Accounting*
  - Analyzing the systems
  - Cost
- *Operations Effort*
  - Monitoring, Operating
  - Problem Determination
  - Server Management Tools
  - Integrated Server Management – Enterprise Wide
- *Security*
  - Authentication / Authorization
  - User Administration
  - Data Security
  - Server and OS Security
  - RACF vs. other solutions
- *Deployment and Support*
  - System Programming
    - Keeping consistent OS and SW Level
    - Database Effort
  - Middleware
    - SW Maintenance
    - SW Distribution (across firewall)
  - Application
    - Technology Upgrade
    - System Release change without Interrupts
- *Operating Concept*
  - Development of an operating procedure
  - Feasibility of the developed procedure
  - Automation
- *Resource Utilization and Performance*
  - Mixed Workload / Batch
  - Resource Sharing
    - shared nothing vs. shared everything
  - Parallel Sysplex vs. Other Concepts
  - Response Time
  - Performance Management
  - Peak handling / scalability
- *Integration*
  - Integrated Functionality vs. Functionality to be implemented (possibly with 3rd party tools)
  - Balanced System
  - Integration of / into Standards
- *Further Availability Aspects*
  - Planned outages
  - Unplanned outages
  - Automated Take Over
  - Uninterrupted Take Over (especially for DB)
  - Workload Management across physical borders
  - Business continuity
  - Availability effects for other applications / projects
  - End User Service
  - End User Productivity
  - Virtualization
- *Skills and Resources*
  - Personnel Education
  - Availability of Resources

Routinely Assessed Cost Factors



# Why (z)Linux?

- ✓ Total Cost of Ownership
  - Oracle is the go/nogo
  - We found that the break even point is 1 BC = 1 IFL with 32GB
- ✓ Server Management is easier (see CSL-WAVE later on)
- ✓ Built-in DR
- ✓ RASSS
  - Reliability, Availability, Security, Stability, Scalability
- ✓ Performance
- ✓ Close to the core business

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# The kickoff

- IFL + 8GB storage on 'try and buy'
- Install z/VM 5.3
- Choose Redhat distro 5 over SUSE
  - Local support
  - IBM indifferent
  - A few RH servers on x86
  - Same price
- Easy wins chosen as trial
  - Compuware/iStrobe (Tomcat app)
  - Tivoli Enterprise Portal (Java)
  - IBM HTTP Server(IHS) + Websphere Application Server(WAS) +CICS Transaction Gateway(CTG) - Internet site(more later)

# The Trial succeeds - time to make some decisions and do some work (1/2)

## Products

- CSL-WAVE for provisioning and management
- TSM agent installed for backups
- BMC/ControlM agent for scheduling
- CA-UNICENTER for availability monitoring
- Omegamon/VM for performance monitoring
- Tivoli System Automation

## Architecture

- We purchased an IFL for our second z9 – thinking 'mainframe availability'
- All disks are CKD/FICON

# The Trial succeeds - time to make some decisions and do some work (2/2)

## Education

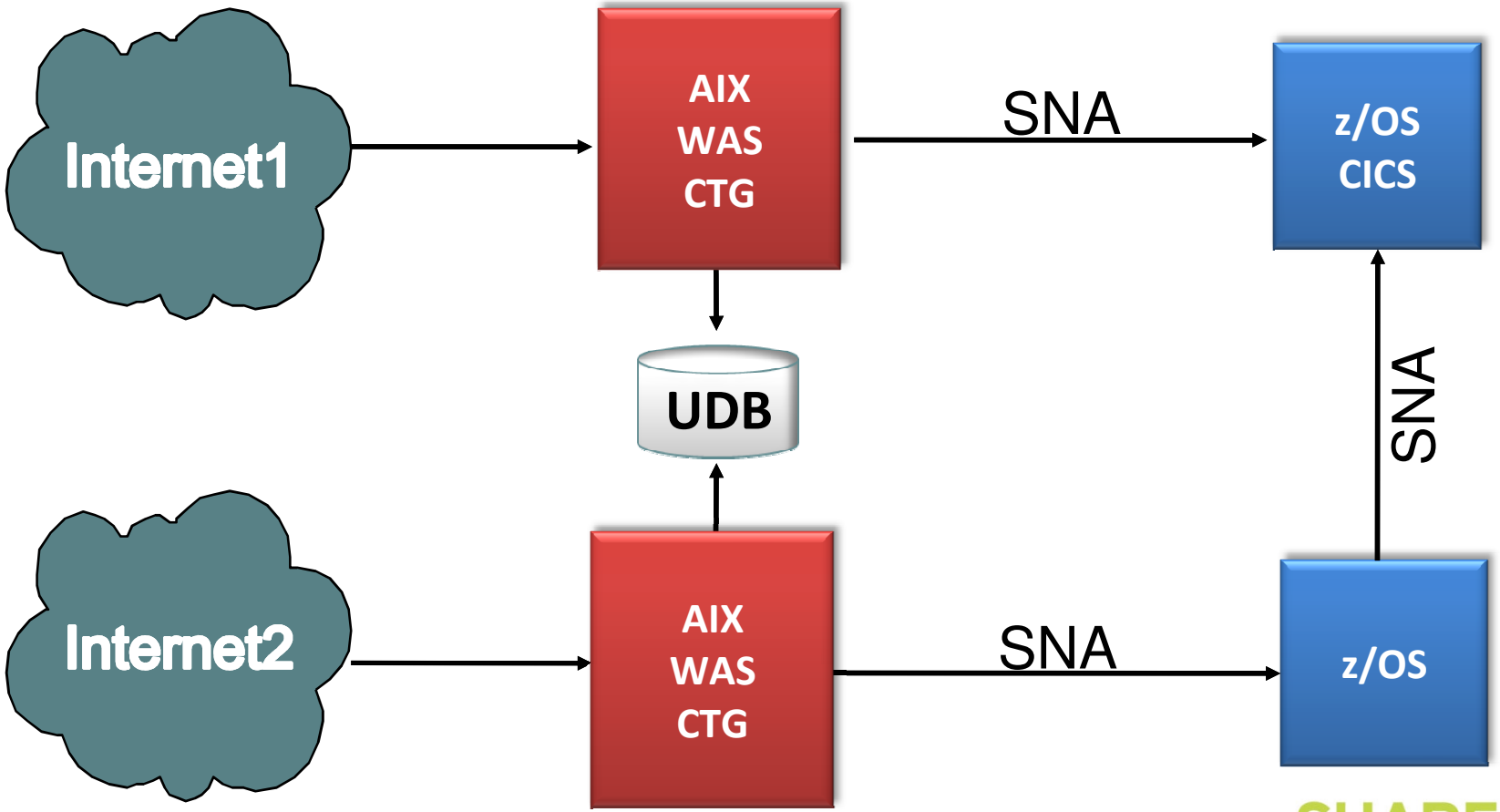
- In-house Linux course given to system support (mainframe and distributed), security, operations and DBAs

## First application to migrate chosen

- Isracard's Internet site which allows cardholders to view statements, inquire account details and manage stars (our loyalty program)

# Internet - the first real application to migrate

## *The old picture*

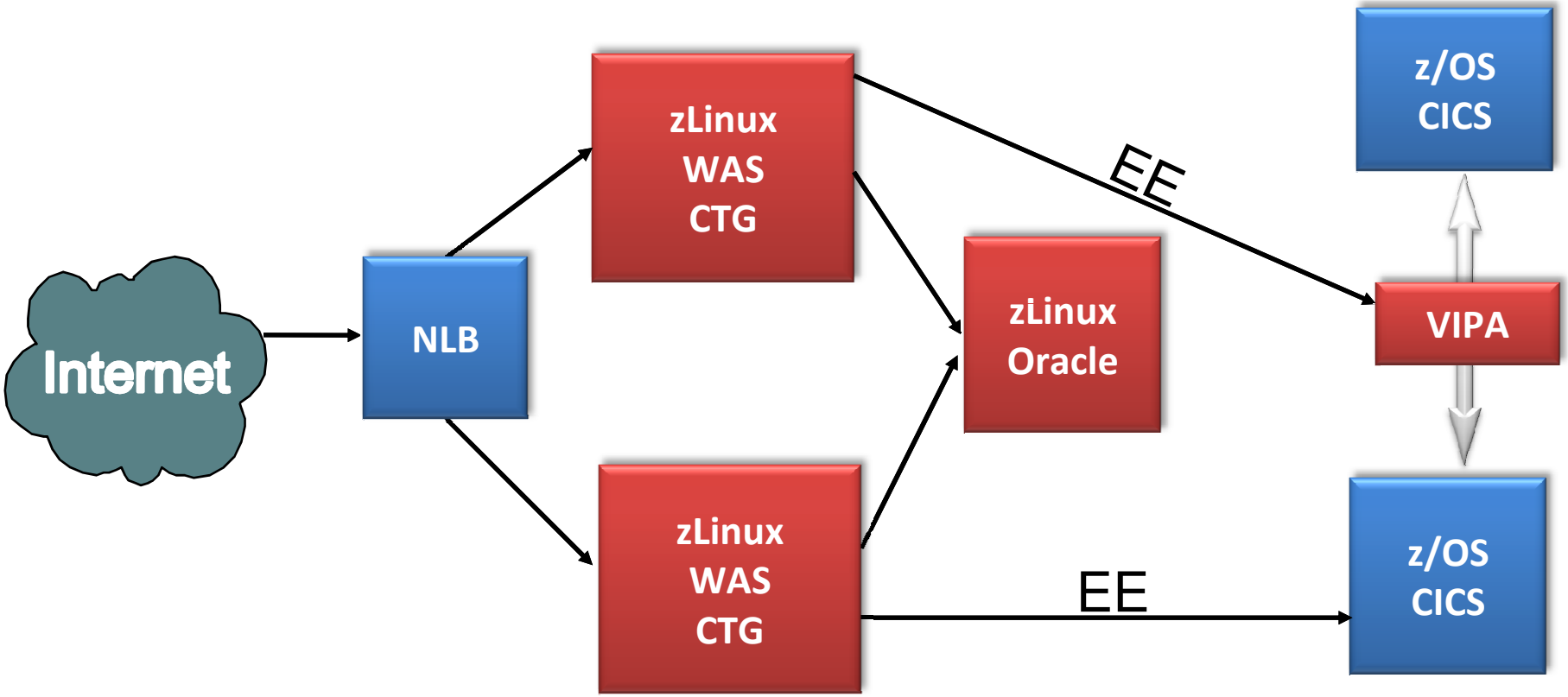


# Things that needed to be done

- ✓ Upgrade WAS (Websphere Applicaton Server)
- ✓ Change Application
- ✓ Change protocol from SNA to Enterprise Extender(EE)
- ✓ Change UDB to Oracle(DBA decision)
- ✓ Provide for high availability and load balancing
- ✓ Disaster recovery support
- ✓ *We would have done all of the above anyway*

# Internet - the first real application to migrate

## *The NEW picture*




*Went live in October 2009*

# Who crashed my penguin party?

# Oracle challenges

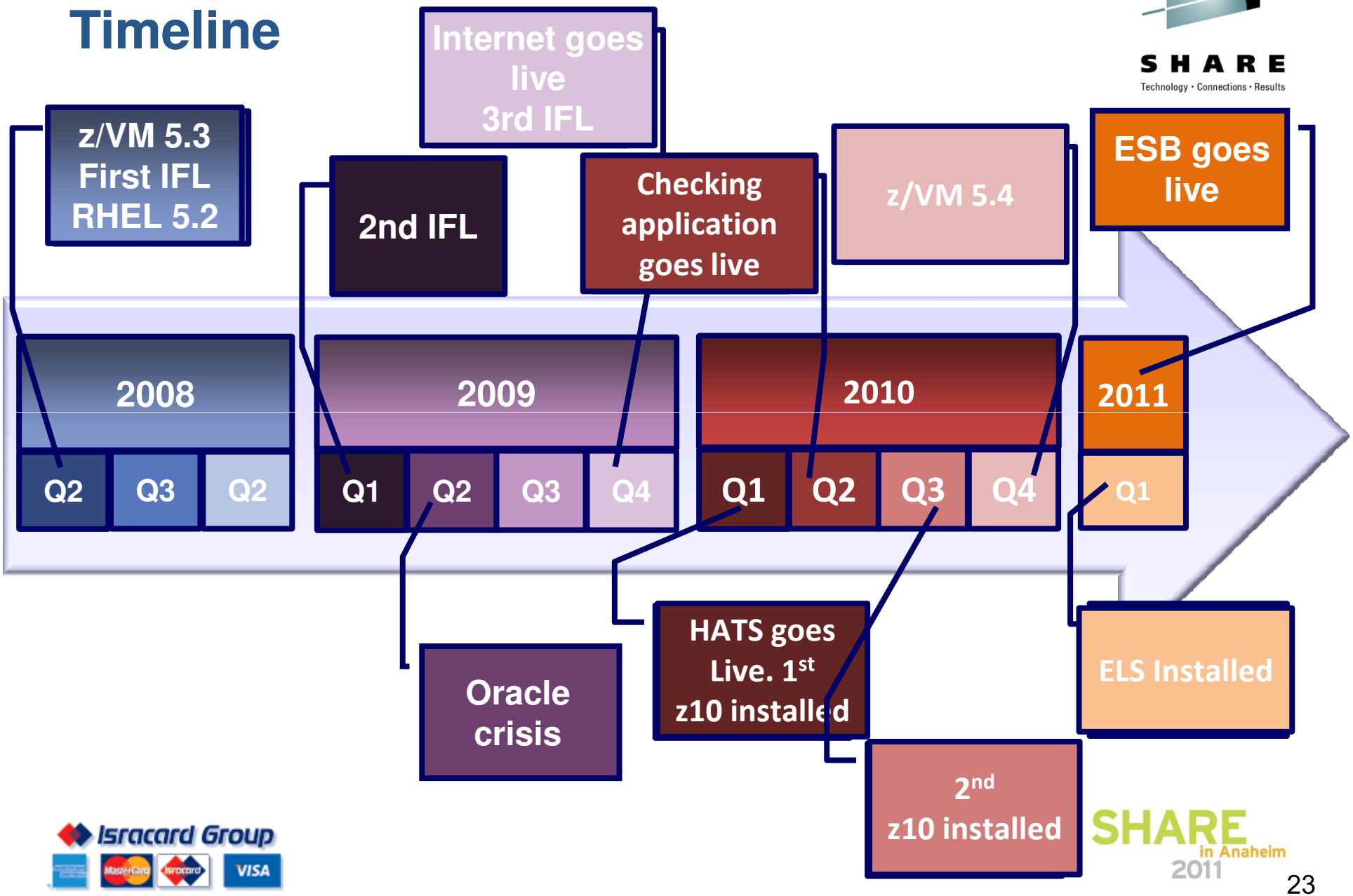
- We started testing Oracle based applications
- Performance was lousy
- RAC did not work
- At first , 10g was not supported with 5.2
- Almost stopped the entire project
- Brought in IBM help
  - Dave Simpson – zLinux Oracle DBA
  - Used ORION as a benchmarking tool(can be downloaded from Oracle)

| IOS | OLTP | DSS |
|---|---|---|
| Hitachi/CKD/Ficon | 52 | 1297 |
| XIV/SCSI/FCP | 696 | 8818 |

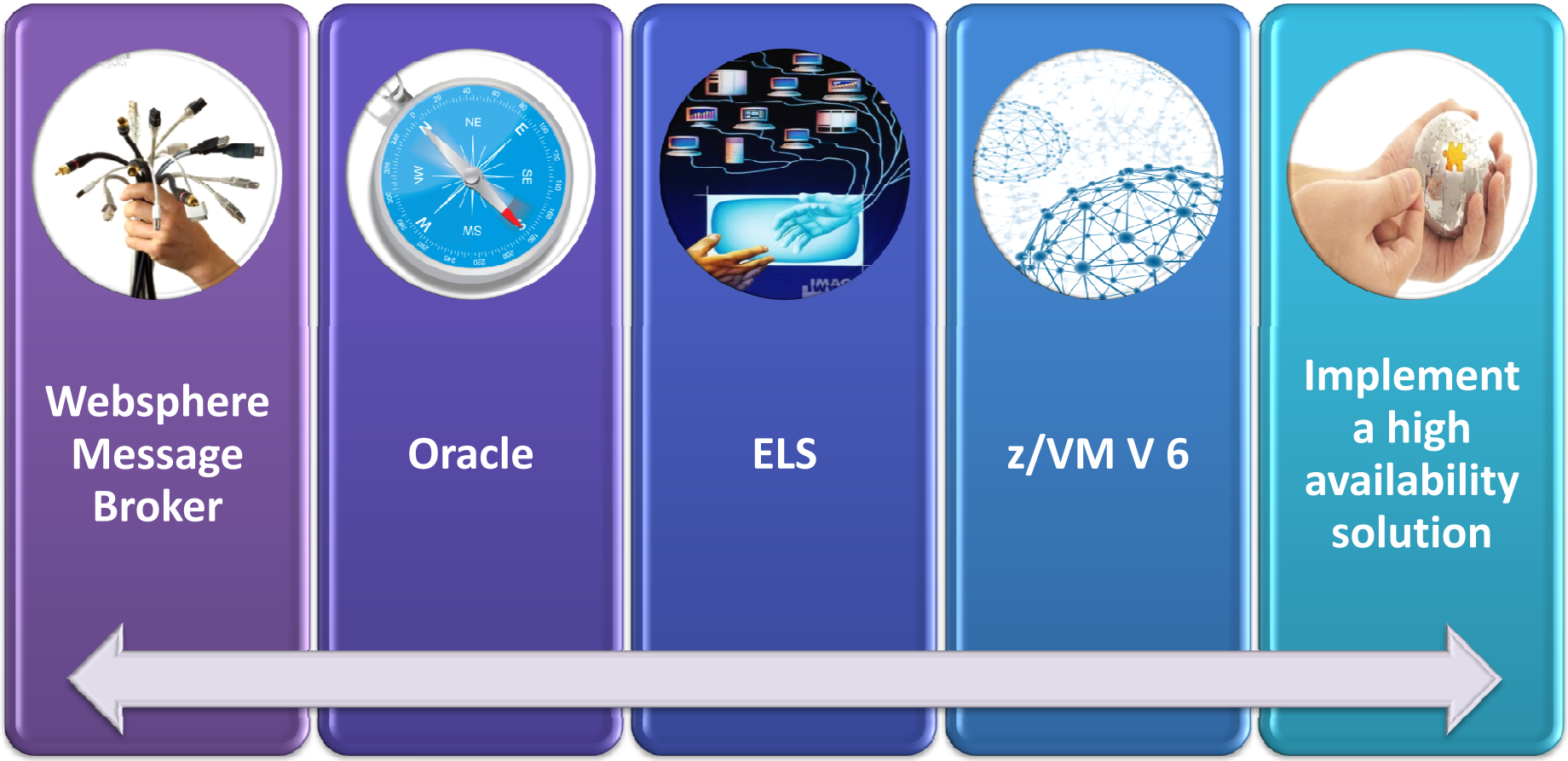
# Oracle challenges - partially resolved

- Got RAC to work, but scrapped it
- Moved Oracle Databases from Hitachi / CKD / FICON to IBM / XIV / SCSI / FCP
- Binaries/OS remain on CKD
- All production will be on one z9/z10 with two IFLs (this was revised, see later on)
- Oracle High availability will be active/passive based
- A big remaining challenge – batch conversions from windows(a general Linux problem , not z related) – partially solved by leaving a 'Batch Machine' on Windows

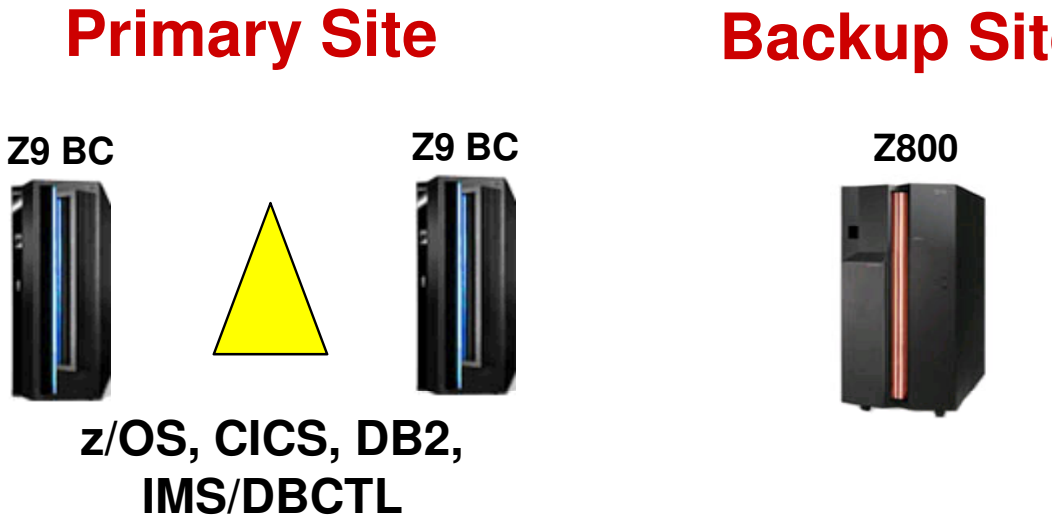
# Timeline


Internet goes live 3rd IFL
z/VM 5.3 First IFL RHEL 5.2
2nd IFL
Checking application goes live
z/VM 5.4
ESB goes live
2008
2009
2010
2011
Q2
Q3
Q2
Q1
Q2
Q3
Q4
Q1
Q2
Q3
Q4
Q1
Oracle crisis
HATS goes Live. 1st z10 installed
ELS Installed
2nd z10 installed

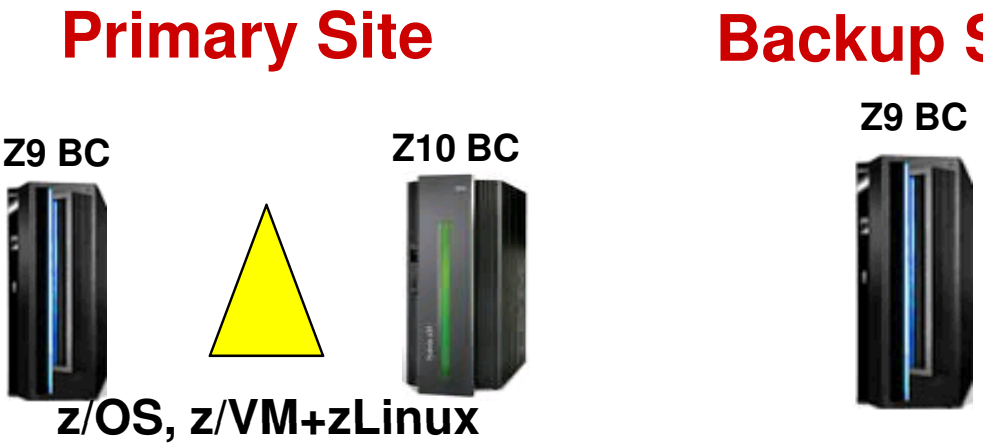
# Plan for 2011



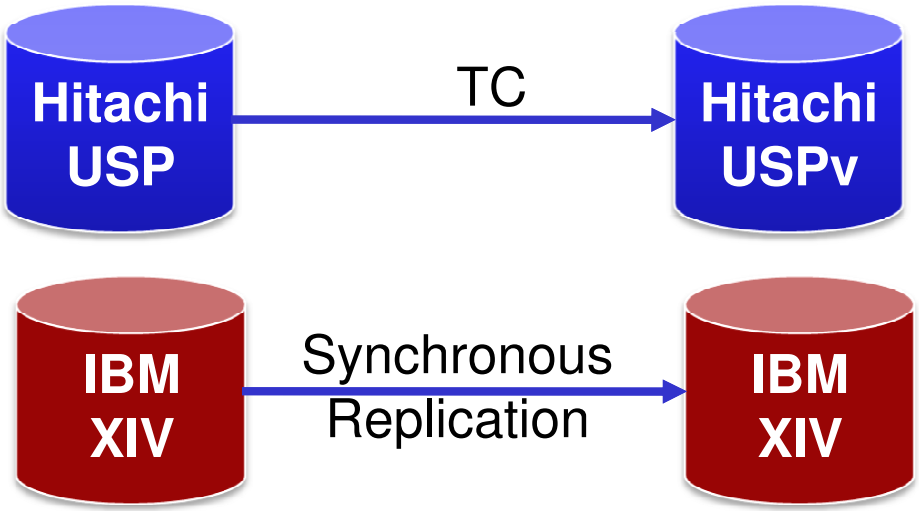
# DR Infrastructure before consolidation (3Q08)



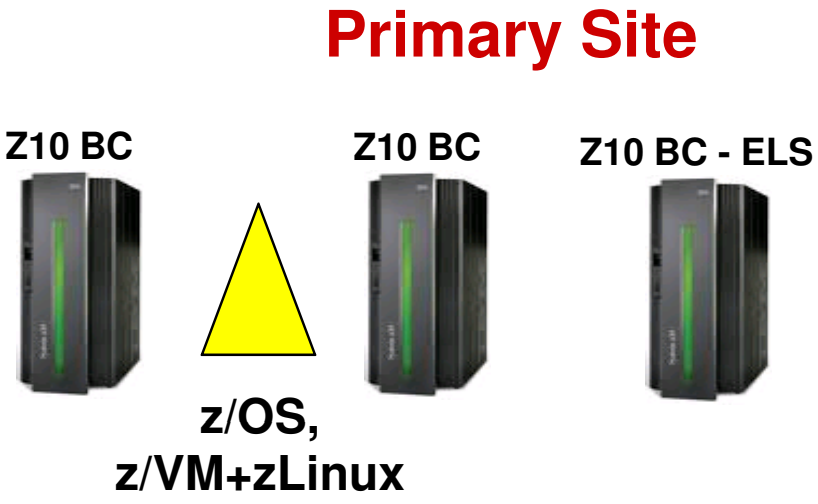
# DR Infrastructure after consolidation (3Q10)




VMware, Windows, Linux



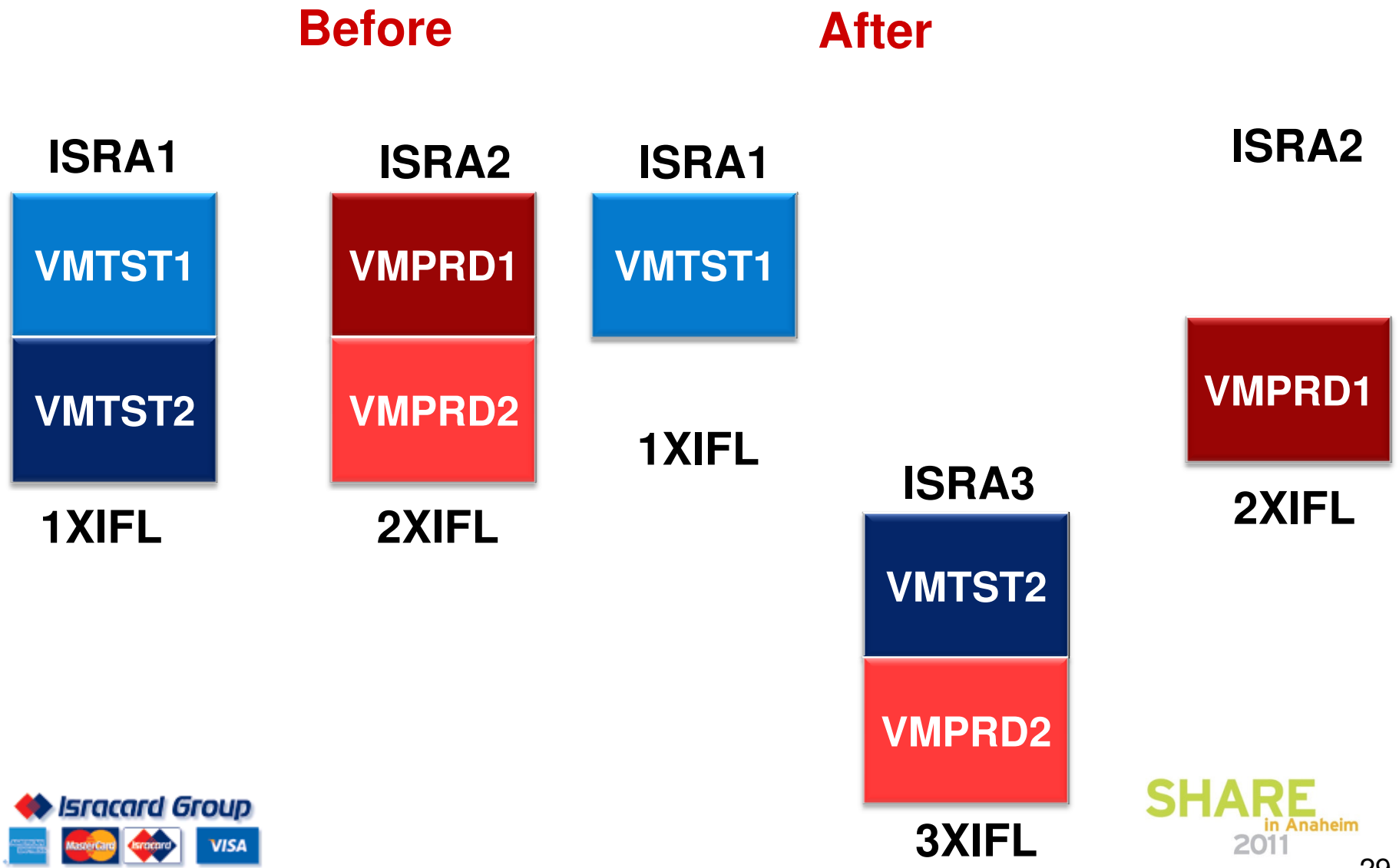

# Planned DR Infrastructure (1Q11)



# Enterprise Linux Sever (ELS)

- Series Z with IFLs only - specially priced
- Business Class machines have only 10 engines (this is true for the zNext BC as well)
- 2CPs + 2 ICFs + 1 ZIIP + 2 IFLs = 7 CPUS
- What about growth and CBU/CoD?
- **Good:** No ELS at DR. We will use CBUs on existing z10
- **Bad:** no Hipersockets

# ELS


Before
After
ISRA1
VMTST1
VMTST2
1XIFL
ISRA2
VMPRD1
VMPRD2
2XIFL
ISRA1
VMTST1
1XIFL
ISRA3
VMTST2
VMPRD2
3XIFL
ISRA2
VMPRD1
2XIFL

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# CSL - WAVE


## A provisioning tool

- Clone new images
- Allocate resources (disks, network interfaces, memory)

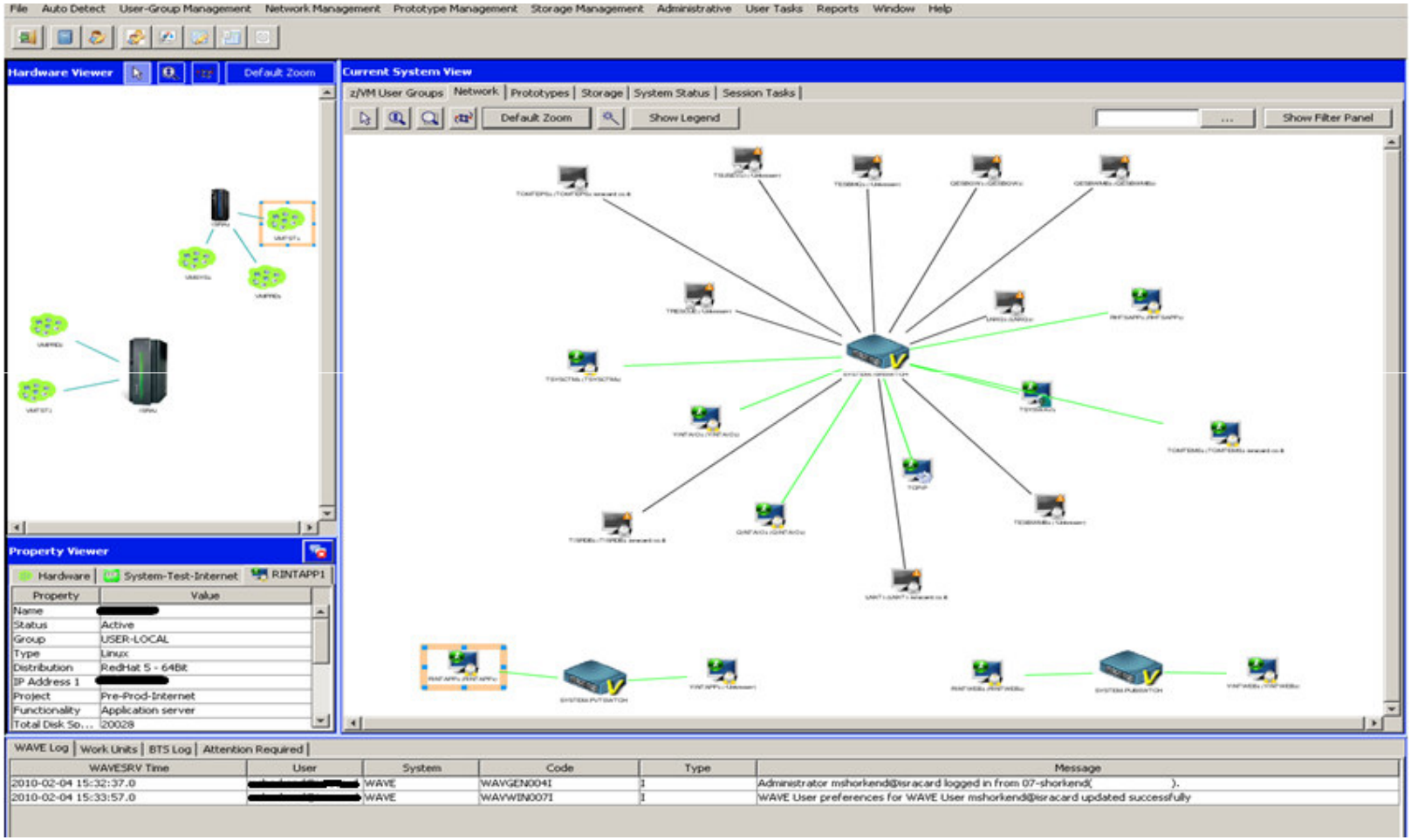
## A management tool

- Activate/ Deactivate images
- Access (even if no network)
- Reports
- Automation

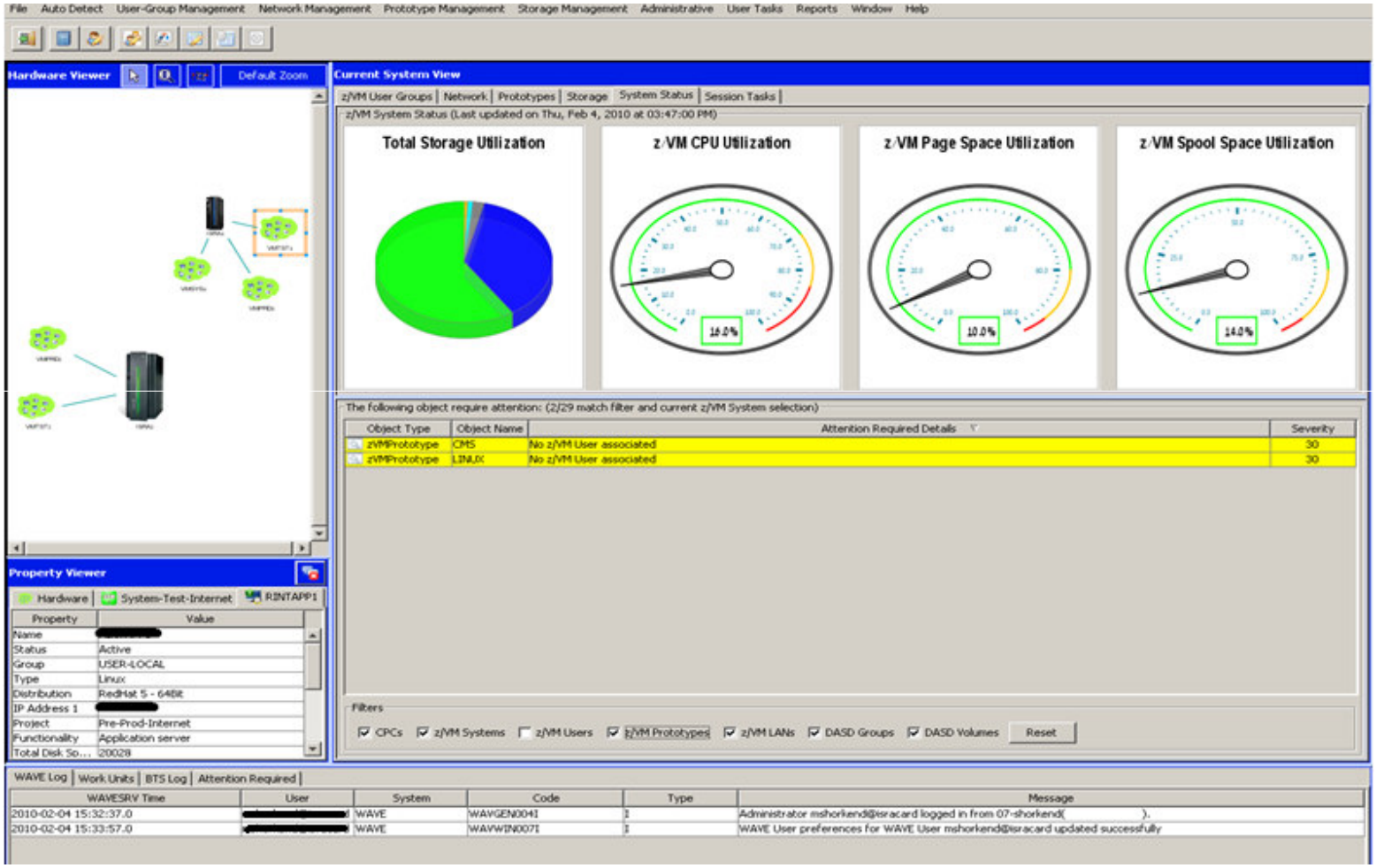
## Basic Health checking

- CPU utilization
- Disk space running out

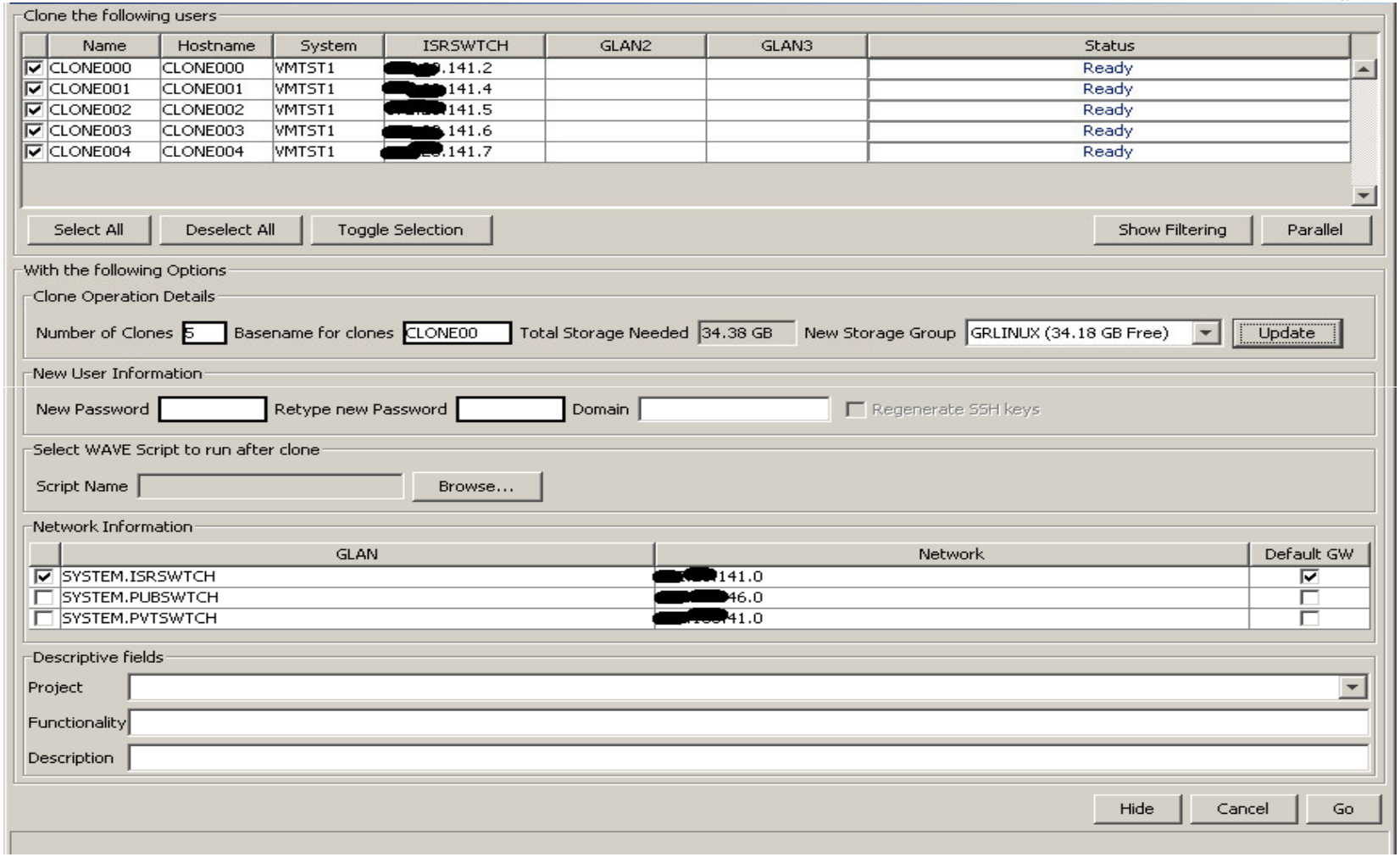
# CSL - WAVE (1/4)


File Auto Detect User-Group Management Network Management Prototype Management Storage Management Administrative User Tasks Reports Window Help
Hardware Viewer
Default Zoom
Current System View
z/VM User Groups Network Prototypes Storage System Status Session Tasks
Default Zoom
Show Legend
Show Filter Panel
Property Viewer
Hardware System-Test-Internet RINTAPP1
Property Value
Name [redacted]
Status Active
Group USER-LOCAL
Type Linux
Distribution RedHat 5 - 64Bit
IP Address 1 [redacted]
Project Pre-Prod-Internet
Functionality Application server
Total Disk So... 20028
WAVE Log Work Units BTS Log Attention Required
WAVESRV Time User System Code Type Message
2010-02-04 15:32:37.0 [redacted] WAVE WAVGEN0041 1 Administrator mshorkend@isracard logged in from 07-shorkend( ).
2010-02-04 15:33:57.0 [redacted] WAVE WAVWIN0071 1 WAVE User preferences for WAVE User mshorkend@isracard updated successfully

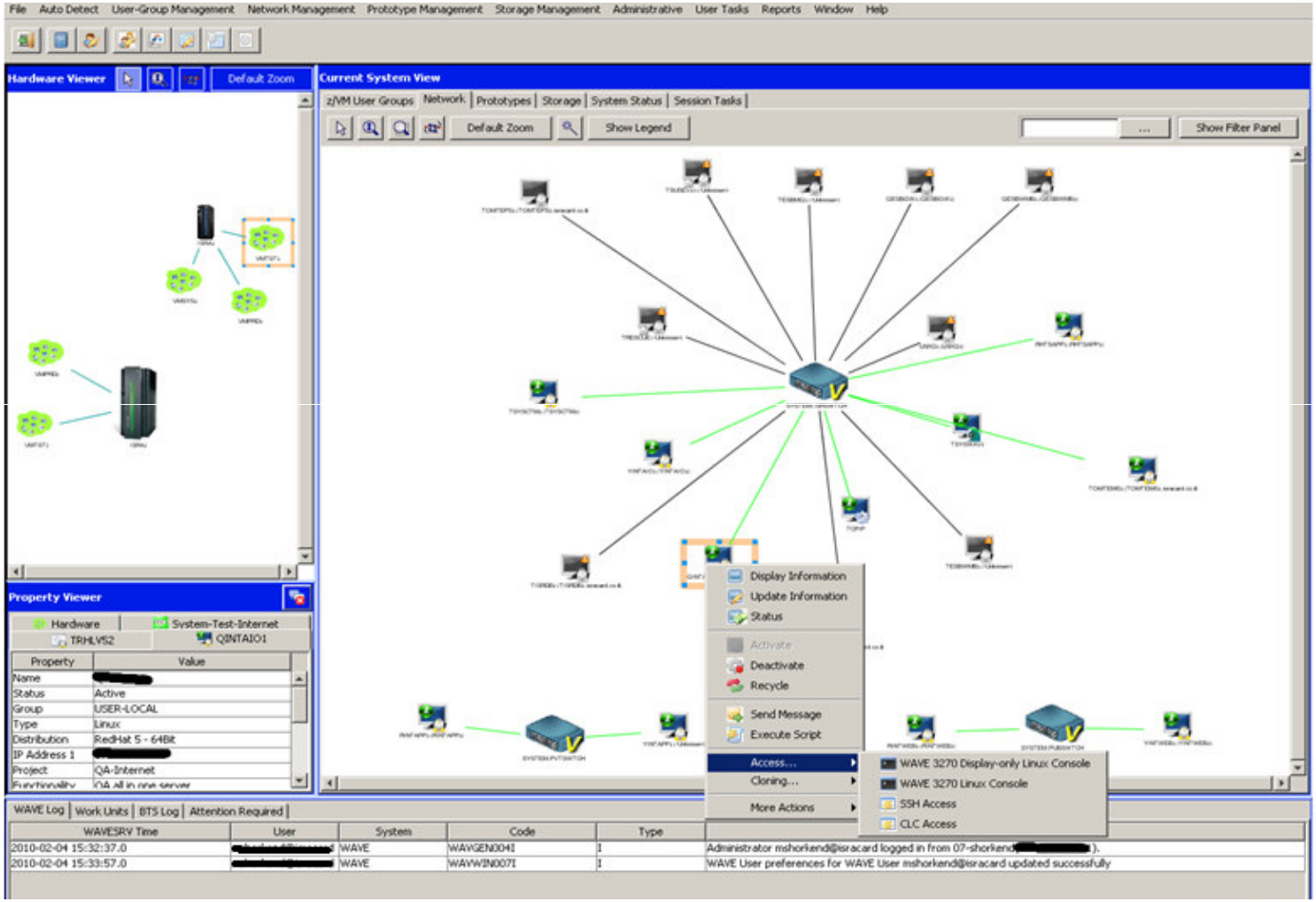
# CSL - WAVE (2/4)


File Auto Detect User-Group Management Network Management Prototype Management Storage Management Administrative User Tasks Reports Window Help
Hardware Viewer
Default Zoom
Current System View
z/VM User Groups | Network | Prototypes | Storage | System Status | Session Tasks
z/VM System Status (Last updated on Thu, Feb 4, 2010 at 03:47:00 PM)
Total Storage Utilization
z/VM CPU Utilization
z/VM Page Space Utilization
z/VM Spool Space Utilization
16.0%
10.0%
14.0%
The following object require attention: (2/29 match filter and current z/VM System selection)
Object Type | Object Name | Attention Required Details | Severity
zVMPrototype | CMS | No z/VM User associated | 30
zVMPrototype | LINUX | No z/VM User associated | 30
Property Viewer
Hardware | System-Test-Internet | RINTAPP1
Property | Value
Name
Status | Active
Group | USER-LOCAL
Type | Linux
Distribution | RedHat 5 - 64Bit
IP Address 1
Project | Pre-Prod-Internet
Functionality | Application server
Total Disk Sp... | 20028
Filters
CPCs | z/VM Systems | z/VM Users | z/VM Prototypes | z/VM LANs | DASD Groups | DASD Volumes | Reset
WAVE Log | Work Units | BTS Log | Attention Required
WAVESRV Time | User | System | Code | Type | Message
2010-02-04 15:32:37.0 | WAVE | WAVGEN0041 | I | Administrator mshorkend@isracard logged in from 07-shorkend( ).
2010-02-04 15:33:57.0 | WAVE | WAVWIN0071 | I | WAVE User preferences for WAVE User mshorkend@isracard updated successfully

# CSL - WAVE (3/4)


Clone the following users
Name
Hostname
System
ISRSWTCH
GLAN2
GLAN3
Status
CLONE000 CLONE000 VMTST1 .141.2 Ready
CLONE001 CLONE001 VMTST1 141.4 Ready
CLONE002 CLONE002 VMTST1 141.5 Ready
CLONE003 CLONE003 VMTST1 141.6 Ready
CLONE004 CLONE004 VMTST1 141.7 Ready
Select All
Deselect All
Toggle Selection
Show Filtering
Parallel
With the following Options
Clone Operation Details
Number of Clones 5
Basename for clones CLONE00
Total Storage Needed 34.38 GB
New Storage Group GRLINUX (34.18 GB Free)
Update
New User Information
New Password
Retype new Password
Domain
Regenerate SSH keys
Select WAVE Script to run after clone
Script Name
Browse...
Network Information
GLAN
Network
Default GW
SYSTEM.ISRSWTCH 141.0
SYSTEM.PUBSWTCH 46.0
SYSTEM.PVTSWTCH 41.0
Descriptive fields
Project
Functionality
Description
Hide
Cancel
Go

# CSL - WAVE (4/4)


File Auto Detect User-Group Management Network Management Prototype Management Storage Management Administrative User Tasks Reports Window Help
Hardware Viewer
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Default Zoom
Show Legend
Show Filter Panel
Property Viewer
Hardware
System-Test-Internet
TRHLV52
QINTAIO1
Property
Value
Name
Status
Active
Group
USER-LOCAL
Type
Linux
Distribution
RedHat 5 - 64Bit
IP Address 1
Project
QA-Internet
Display Information
Update Information
Status
Activate
Deactivate
Recycle
Send Message
Execute Script
Access...
Cloning...
More Actions
WAVE 3270 Display-only Linux Console
WAVE 3270 Linux Console
SSH Access
CLC Access
WAVE Log
Work Units
BTS Log
Attention Required
WAVESRV Time
User
System
Code
Type
2010-02-04 15:32:37.0
WAVE
WAWGEN0041
1
Administrator mshorkend@isracard logged in from 07-shorkend
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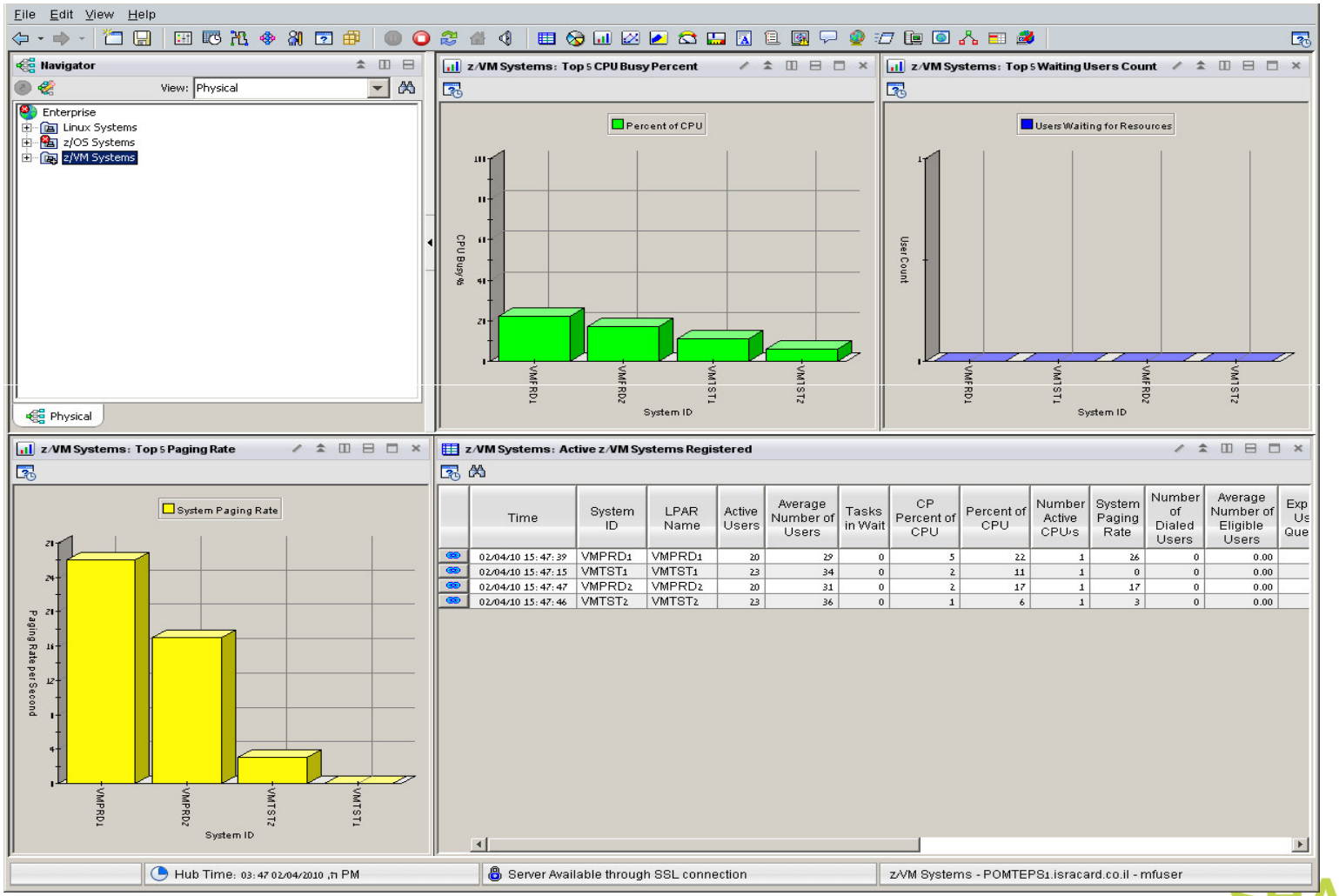
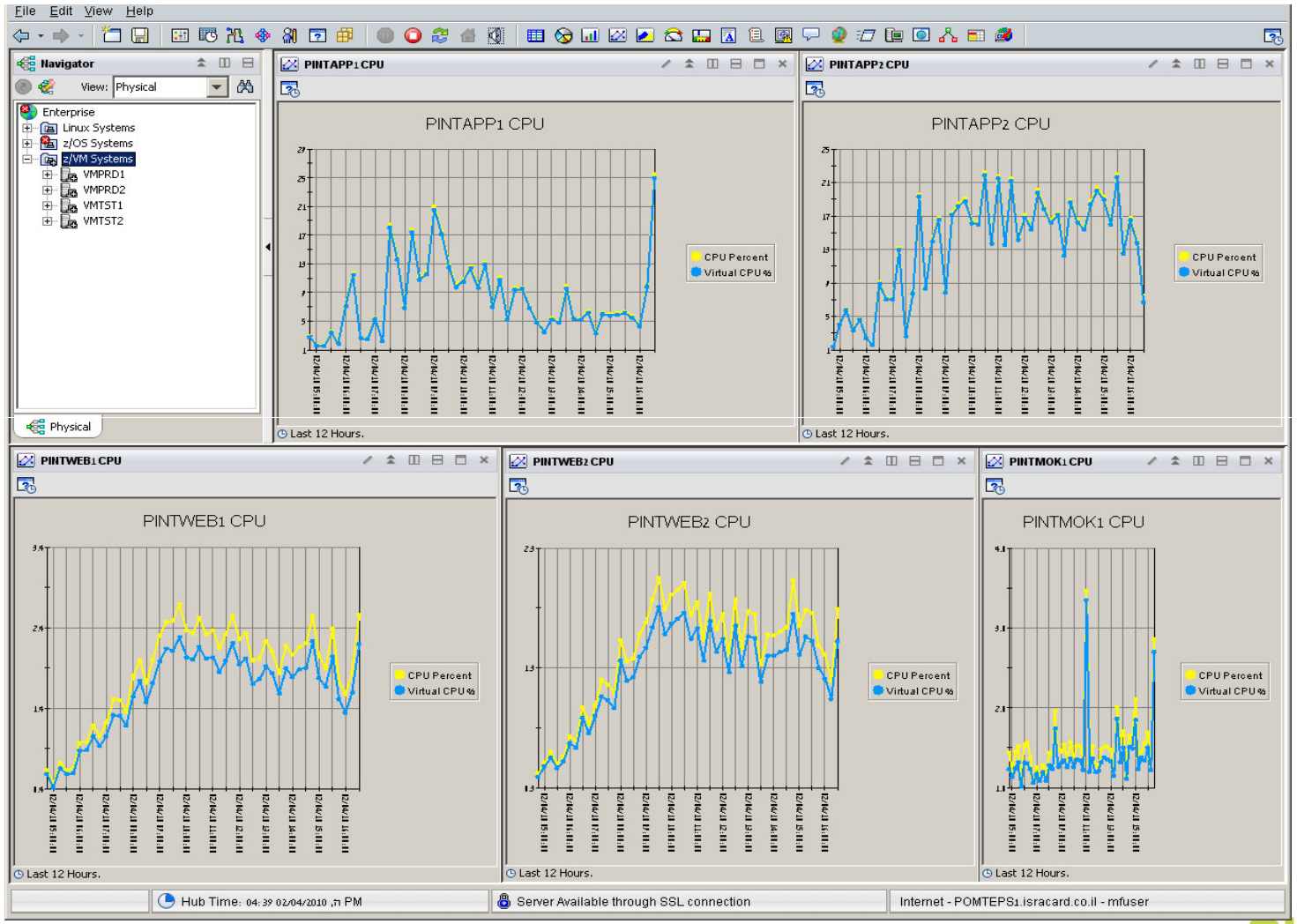
WAVE
WAWWIN0071
1
WAVE User preferences for WAVE User mshorkend@isracard updated successfully

# TEP and Omegamon/VM (1/2)



# TEP and Omegamon/VM (2/2)



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# Some general observations (1/2)

- **Different versions of RH for different software**
  - *would you keep z/OS 1.9 for DB2 8 and z/OS 1.11 for CICS/TS 4.1?*
- **Bleeding edge at times**
  - *Certification - not always there*

    *We are still waiting for Oracle 11g certification*
  - *Sometimes we had to wait for software to be written*
  - *Not all software is supported on z*
- **Hipersockets – we have not found a justification for it (yet)**

# Some general observations (2/2)

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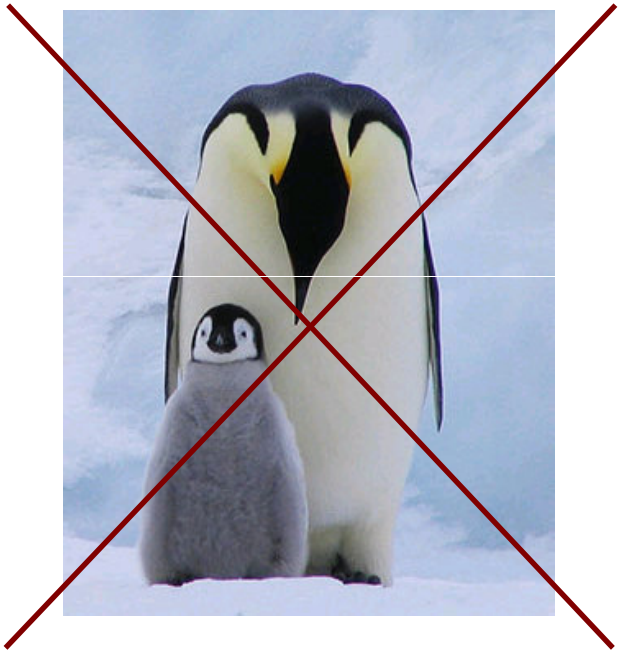
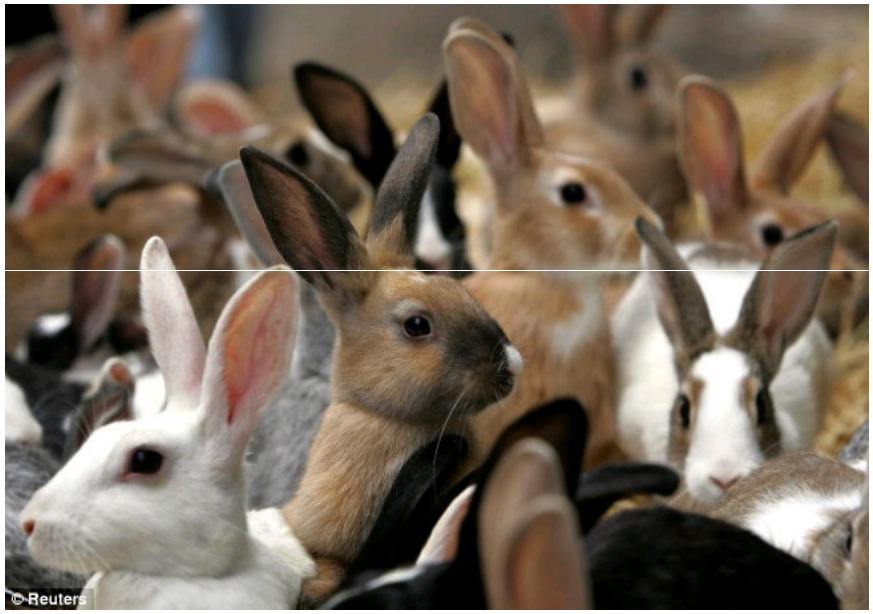
Technology · Connections · Results

- **Managerial issues**
  - *Is it Mainframe or Distributed? -* ***Try to avoid turf wars!***
  - *Project management*
  - *You need a full time z/VM expert -* ***at least at the beginning***
  - *DBAs do not like virtual platforms -* ***Educate, Educate, Educate***
- **Business Class Issues**
  - *Processor power -* ***Most TCO studies were performed for EC***
  - *Total number of CPUs = 10 -* ***Forced us to go to ELS (Enterprise Linux Server)***

# They multiply





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# Questions ?