Linux – zSeries

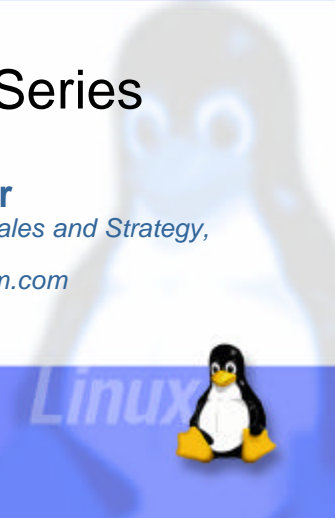**Bill Reeder**
zSeries Linux Sales and Strategy,
206-587-2152
breeder@us.ibm.com

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CUoD	HiperSockets	OS/390*	VTAM
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DB2 Universal Database	IMS, IMS/ESA*	PR/SM	z/OS
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Accept

For the next generation of e-business.

IBM @server zSeries

Linux Runs on virtually EVERYTHING…

xSeries iSeries zSeries pSeries

Notebooks

Clusters

Desktops

Linux

Tivo

POS

Gaming

PDAs

Intel Servers

HP

Blades Sun
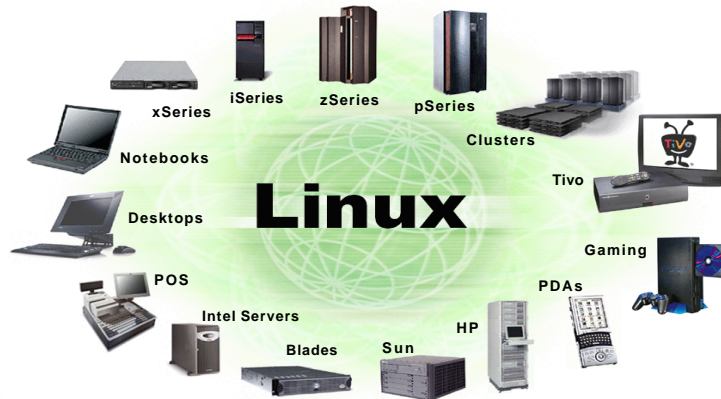
Linux Application Environments

IBM zSeries and S/390 Compute Capacity Worldwide

MIPS shipped

1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001

Growth Areas   Traditional

% Volume

	1996	1997	1998	1999	2000	2001
Traditional	99	95	75	60	50	40

e-business + Business Intelligence + ERP and Applications + Server Consolidation → Online and Batch
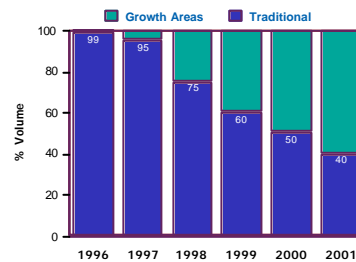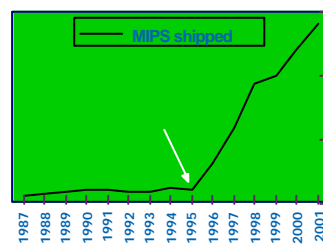
IBM @server zSeries
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IBM Market Research
February 2001

Slide 1

Linux on zSeries
Typical Architecture for an On Demand Business

Hipersockets

| z/VSE | z/VSE | z/OS | z/OS | Linux | Linux | Linux | Linux | CMS | CMS | | Linux | Linux | Linux | Linux | Linux | Linux | | Linux |

| z/VM | z/OS | z/VM | Linux |

| LPAR | LPAR | LPAR | LPAR |

| CP0 | CP1 | CP2 | CP3 | CP4 | CP5 | LN0 | LN1 | LN2 |

Standard Processor Engines   **IFL Engines**

zSeries Server z990

Slide 2
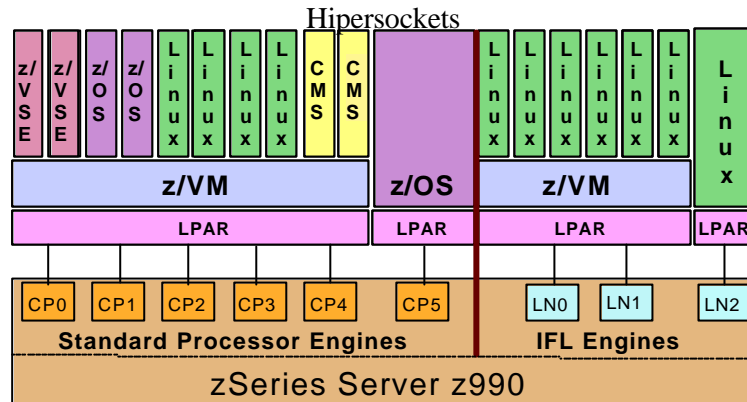
Flexible and Robust Linux Installation

zSeries *(up to 30 partitions)*

VM ⟷ •Tape

•Prod •1   •Prod •2   •31Bit   •64 Bit   •NSA

Examples of Prod Servers
•DB2
•Oracle WebSphere
•Apache
•eMail
•Firewall
•File/Print
•BEA

| Srv1 | Srv2 | Srv3 | Srv4 | Srv5 | ... | Dev1 | Dev2 | Firewall |

| OSA 1 | OSA 2 | OSA3 |

Interne

3
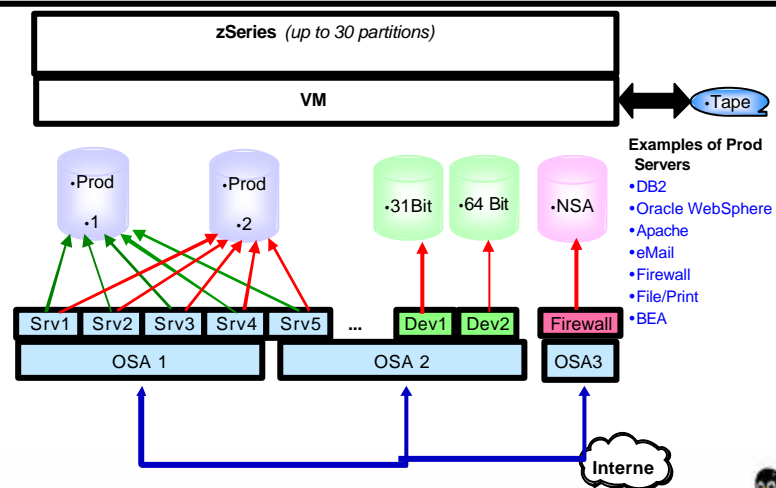
Unique Value of IFL

- IFL Price has remained constant

- IFLs move with upgrades

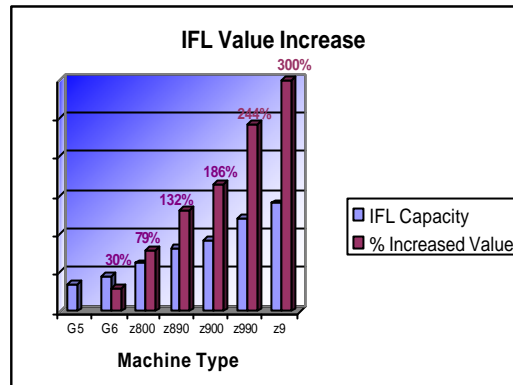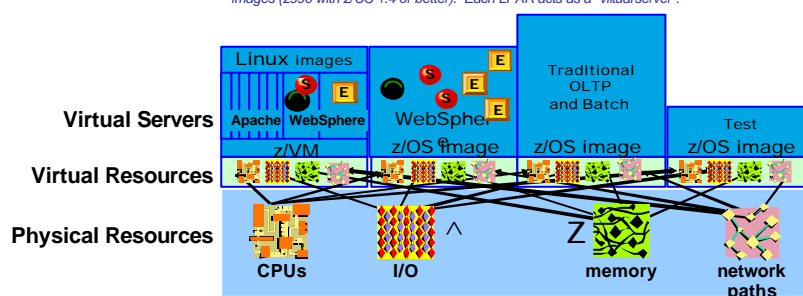- 30% more capacity!!!

- zAAP follows same model

- Distributed model over same time:
  - 2 Technology Refreshes (New Hardware)
  - 2 System migrations

IFL Value Increase

300%

247%

186%

132%

79%

30%

- IFL Capacity
- % Increased Value

G5 G6 z800 z890 z900 z990 z9

Machine Type

Linux

---

zSeries virtualization technology

Processor Resource/System Manager (PR/SM) enables Logical Partitioning (LPAR); system resources can be shared among up to 30 isolated images (z990 with z/OS 1.4 or better). Each LPAR acts as a "virtual server".

Linux images

Virtual Servers

Apache WebSphere   WebSphere   Traditional OLTP and Batch   Test

z/VM   z/OS image   z/OS image   z/OS image

Virtual Resources

Physical Resources

^   Z

CPUs   I/O   memory   network paths

- Resource virtualization is the basis for extreme flexibility and autonomic behavior
- Multiple images concurrently share all physical resources
- Resources delivered as required, without intervention, according to business weightings
- New OS images can be started without affecting ongoing work

As a virtual server system, zSeries can run a diverse, changeable combination of workloads with a single set of shared system resources ... more work is processed within a single server without over-configuring for complementary peaks

Linux

What Makes Best Fit

- Leverage classic strengths of the zSeries
  - 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

Best Fit

- WebSphere MQ Series
- DB2 Connect
- CICS Transaction Gateway
- IMS Connect for Java
- Web Logic/WebSphere and JAVA applications development
- Applications requiring top end disaster recovery model
- ComServer and Communications Controller for Linux
- LDAP security services
- IBI Web Focus

WebSphere MQ Series a Great Consolidation Move

- WebSphere MQ Series is almost always deployed on distributed platforms
- MQ is being used in conjunction with legacy mainframe applications.
- Moving MQ from the distributed environments to Linux zSeries
  - Bringing the queue closer to the source data
  - Performance leveraging HiperSockets
  - Shortening processing throughput, and the overall management of the data flow from end to end
  - Reducing the number of places one needs to go for troubleshoot.
    - Additional savings and performance benefits can be realized if the application being communicated to with MQ is also located on the same platform, such as Web Sphere, and Apache applications.


B2B Message Hub

- **Single MQ V5.3 guest (SLES8 - 512MB) for 3 apps**
  - SIAC notifications to ML
  - Won bakeoff against MQ on Solaris
    - 833 messages per second (vs. 325 mps on Sun)
- **OCS App - In Production**
  - Nightly notification for trade close
- **IDCE App - In Production**
  - Intraday Trade Clearing
- **IDCO App - Slated for YE' 03 Production**
  - Amex Options
  - 50+ Users - 3000 messages per hour
- **Next Steps**
  - MQ with SLL - crypto support via the PCICA card
  - Implement MQ monitoring and chargeback

DB2 Connect, Closer to the Data

- DB2 Connect is almost always deployed on distributed platforms
- DB2 Connect is usually being used in conjunction with legacy mainframe applications.
- Moving DB2 Connect from the distributed environments to Linux zSeries
    - Bringing the queue closer to the source data
    - Performance leveraging HiperSockets
    - Shortening processing throughput, and the overall management of the data flow from end to end
    - Reducing the number of places one needs to go for troubleshoot.
        - Additional savings and performance benefits can be realized if the application being communicated to with DB2 Connect is also located on the same platform, such as Web Sphere, and Apache applications
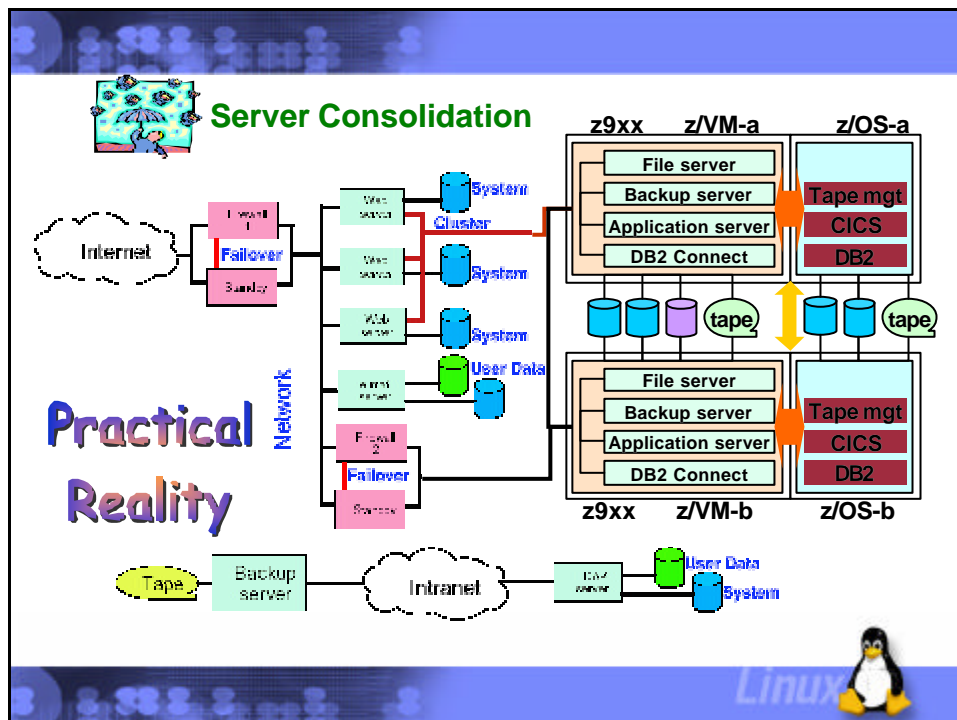
CICS in a hybrid World z/OS and Linux

- CICS Transaction Gateway (CTG) is generally used to web enable traditional CICS applications
- Performance benefits can be realized if the application being communicated to with Transaction Gateway is also located on the same platform, such as Web Sphere, and Apache applications.
- Other benefits are leveraging existing business logic while adding web browser front ends along with adding required end-user functionality.

IMS Connect, Web without a Re-Write

- IMS Connect for Java can connect to IMS Connect running under z/OS to access existing IMS applications.
- Performance benefits can be realized if the application being communicated to with IMS Connect is also located on the same platform, such as Web Sphere, and Apache applications.
- Other benefits are leveraging existing business logic while adding web browser front ends along with adding required end-user functionality.

Web Logic/WebSphere Development in a Virtual World

- WebSphere and JAVA applications development platform
- Developer generally develops on their own platform
- testing and modifications are generally done in a server environment.
- Developers can be given multiple virtual servers to perform iterative testing while troubleshooting or enhancing the application.
- Using the zVM Mini-disk images with several Linux guests mounting to the same image, the customer knows that the developers are all using the same versions of the Kernel, and keep problems from creeping into the development process.
- Centralization of the development servers in a global development process making virtual machines are available around the clock.
- Customers whose bulk CPU intensive work is at a fixed time of the day can easily utilize the non busy CPU times of the day for development work.
- Rapid Application deployment platform is accomplished by rapidly deploying and purposing Linux Virtual machines to satisfy a business requirement that is shorter than the normal procurement process, in order to satisfy a business requirement.

IBM Uses Linux

Transforming IBM's IT infrastructure - $10M+ in Savings

- 2,000+ Production Servers WW
- www.ibm.com/linux & w3.ibm.com/linux
  - ƒ redundant xSeries Linux servers
  - ƒ TSM Client & Tivoli Monitoring Agent
- Intranet search engine
  - ƒ xSeries servers; Inktomi search engine
  - ƒ TSM Client & Tivoli Monitoring Agent
- IGS Internet Vulnerability Security Scanning
  - ƒ 100 xSeries scanning 30k IP addresses/ week
- Performance monitoring
  - ƒ 75% fewer Linux servers than NT servers for same workload
- IBM Global e-Mail Anti-virus Management
  - ƒ xSeries scans incoming/outgoing mail for viruses
- 300mm Wafer Manufacturing Equip. Control
  - ƒ Much more reliable than Win2000
  - ƒ 174 xSeries; 200-300 by year end
- Workstation Asset Management Applications
  - ƒ 4 Linux zVM Guests on zSeries server
  - ƒ Variable workload / on demand capacity
- 200+ z/VM Virtual Servers
  - ƒ Application Development
  - ƒ Mission Critical Applications
- Web Content Management System
  - ƒ DB2 on Linux
  - ƒ zSeries

ComServer fulfilling SNA Requirements

- ComServer helps to solve a problem with customers that are still using 3745 and 3746 front end processors.
- As of May 2004, we are able to support TN3270, hosting as well as LU 0,1,2 and 6.2 SNA communications.
- ComServer code and gain valuable experience with the product.

Communication Controller for Linux (CCL) includes much of the NCP, SNI and partner communications code that will help customer retire their old front end processors.

- Reduces leased line costs since charges for SNA traffic are up to 7 times more expensive than IP traffic.
- Function like 3270 emulation and host access can be moved to run under Linux with WebSphere Host Access Transformation Services (HATS) and WebSphere Host on Demand (HOD), simplifying the overall host access schema.
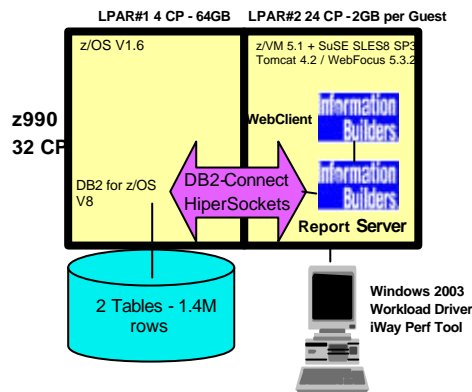

LDAP Security and zSeries a Great Fit

- LDAP security services fit very well running under Linux zSeries.
- OPEN LDAP is included with commercial Linux distributions
- Tivoli Identity Manager (TIM) and Tivoli Access Manager (TAM) provide excellent LDAP functionality for users and applications.
- Using the zSeries architecture customers can create a robust 24x7 LDAP infrastructure to keep applications authenticating to LDAP working and available.

IBI Web Focus, Best Fit zSeries Linux

Benchmark Architecture

LPAR#1 4 CP - 64GB   **LPAR#2 24 CP -2GB per Guest**

z/OS V1.6

z/VM 5.1 + SuSE SLES8 SP3
Tomcat 4.2 / WebFocus 5.3.2

**z990
32 CP**

WebClient

Information Builders

DB2 for z/OS V8

DB2-Connect
HiperSockets

Information Builders

Report Server

2 Tables - 1.4M rows

**Windows 2003
Workload Driver
iWay Perf Tool**

Benchmark Results - Performance

- *zSeries sets record for best performance of any hardware platform!*
  - ƒ includes most UNIX and Intel vendors
- Case-in-point: SunFire 6800
  - ƒ 1 GHz engine / 32 GB Memory
  - ƒ SunOne App Server + Oracle DBMS
  - ƒ zSeries Average Response Times is less than **one-tenth** that of Sun
    - Based on the zSeries high performance architecture
      - Hipersockets - insures best data access/transfer
      - L1/L2 Cache - consistently keeps engines busy

	2 CP	4 CP	8 CP	16 CP
UNIX	28.49	15.41	9.17	7.68
z990	2.46	1.56	0.855	0.494

Average Response Time (seconds) for 3000 row data retrieval

New York City Police Department

- Creating three reporting applications using WebFOCUS
- Data for each application will be inputted via WebFOCUS from the individual Police Precinct with all data and the application stored on the zSeries
  - Stop and Frisk – track who was stopped and why
  - Criminal Auto Impounding (how, when, and why an automobile was used in a crime)
  - OmniForm – an arrest and complaint system
  - Production completion scheduled for Summer 2005

Web Focus Business Value

Factors In TCO - Websphere Server Consolidation

- 20 Web Servers running @ 10% peak busy on Sun 20 SPARC II CP's
- All peaks are concurrent
- 4:1 HA Configuration = 5 HA Servers (& Engines)
- z990 will run DOUBLE the web workload as compared with Sun
- 25 Sun engines consolidate onto a SINGLE z990 engine @ 100% busy

THEREFORE -

✓ 1 CP instead of 25
✓ 1 software seat instead of 25
  ✓ wripple effect for maintenance & support
✓ Occupancy costs dramatically reduced
✓ No additional cabling costs
✓ Centralized Staffing Model

Monthly Cost of Servers - Customer Study
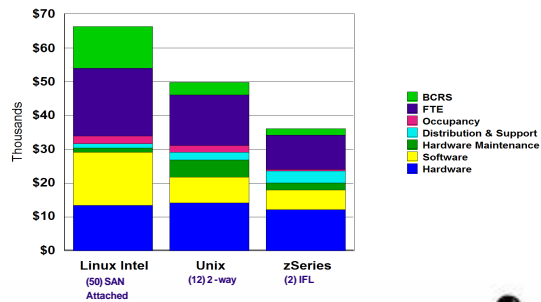
Oklahoma Department of Human Services (OKDHS)

- Needs:
  - Generate reports that verify compliance with federal regulations and program requirements
  - Track of thousands of cases
  - Address federal reporting requirements
  - Reports needed:
    - Child Protective Service (CPS) Investigations
    - Permanency Planning Cases
    - Adoption Cases
    - Court Information
    - Client Demographic Information
    - Resource Information (Foster Homes, Day Care, Adoption Homes, Group Homes, etc.)
    - Worker Assignment Information.

OKDHS Solution

- Initially, all reporting from the KIDS database was developed using Information Builders' FOCUS on an HP-UX platform. These legacy reports were generally run once per month and printed in hardcopy form, with no provision for dynamic filtering or sorting.
- In 2003 it became apparent that OKDHS needed to enhance these reporting capabilities so they could deliver more timely and dynamic reports.
- The KIDS database and legacy reports migrated to a virtual Linux machine running on an IBM Z-990 mainframe, then used WebFOCUS to run the existing reports on the new platform.
- 2,000 users inside and outside the firewall

Harris County, Texas

- Runs its criminal and civil justice applications, as well as numerous other non-justice on the zSeries
- The county consolidated multiple servers onto a single platform, improving stability and simplifying data backup and recovery operations.
- WebFOCUS supports an increasing number of county users' reporting needs, enabling them to produce substantive, graphical reports from data housed on the mainframe – without having to request IT assistance or intervention.

What Makes Good Fit
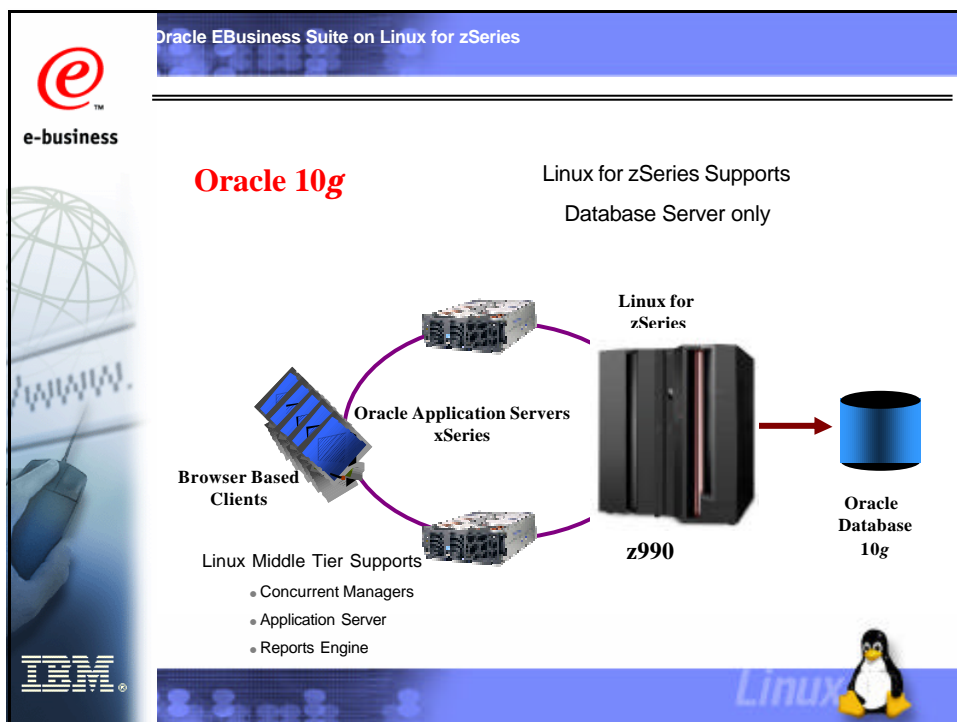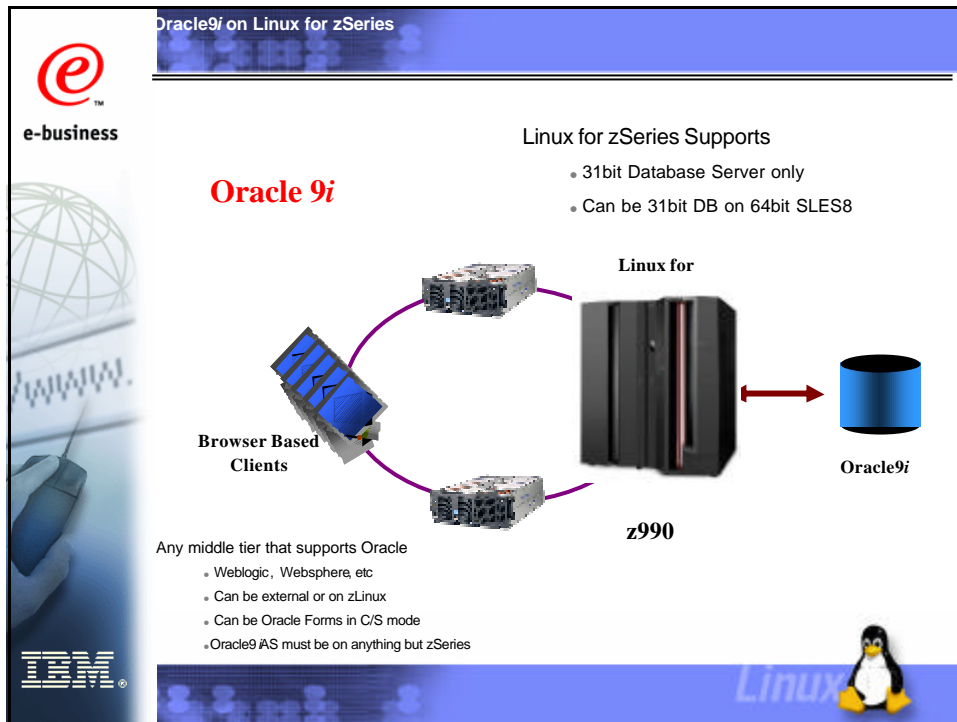
- Evaluate server choices
  - Correct application availability,
  - Supporting applications,
  - Total Cost of Ownership (TCO)
  - Politics within the organization.
  - Porting issues
  - Shortening end to end path length for applications
  - Collocation of applications
  - Consolidation of applications from distributed servers
  - Reduction in network traffic
  - Simplification of support model

Good Fit

- Oracle Database
- UDB (DB2)
- Informix, (IDS)
- WebSphere Application Server (WAS)
- Apache web serving
- SAMBA
- SAP
- Network Infrastructure, FTP, NFS, DNS etc..,
- E-Mail solutions
- SAP

e-business

Oracle 9*i*

Linux for zSeries Supports
- 31bit Database Server only
- Can be 31bit DB on 64bit SLES8

Linux for

**Browser Based
Clients**

Oracle9*i*

z990

Any middle tier that supports Oracle
- Weblogic, Websphere, etc
- Can be external or on zLinux
- Can be Oracle Forms in C/S mode
- Oracle9 *i*AS must be on anything but zSeries

IBM.

Linux

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e-business

Oracle 10*g*

Linux for zSeries Supports
Database Server only

**Linux for
zSeries**

**Oracle Application Servers
xSeries**

**Browser Based
Clients**

**Oracle
Database
10*g***

Linux Middle Tier Supports
- Concurrent Managers
- Application Server
- Reports Engine

z990

IBM.

Linux

UDB with zSeries Linux

- UDB (DB2) 8.2 a64bit version running on Linux zSeries.
- Most of the UDB that is running is done supporting Web Sphere applications.
- Growth here will continue as more ISV's beginning to support UDB running under Linux zSeries as a supported platform.
- If quality of services require functionality under z/OS, such as DB2 data sharing and Sysplex, then consider keeping or moving the database to DB2 z/OS.

WebSphere Application Server

- Distributed architecture model, with the advantage of being close to legacy data .
- zSeries Linux is an excellent place to move customers that have been running WebSphere on other platforms.
- Customers considering running WebSphere on Linux are generally trying to leverage the uptime and disaster recovery capabilities of the mainframe environment.

NYC Campaign Contribution Tracking Database

SAMBA File and Print Consolidation

- Customers have migrated more than 2TB of data to SAMBA
- SAMBA can authenticate to
  - Microsoft's Active Directory (AD
  - LDAP
  - Linux password file.
- SAMBA can be used as just a simple access method for people like developers to move files into a server directory

  Some may say they don't want to run SAMBA because they have "made a Microsoft decision" and that Microsoft structure will be the source for file and print serving. SAMBA can cooperate in that structure, and if for political/business reasons they don't want to use it for file serving, they should still use it as an easy file access method.
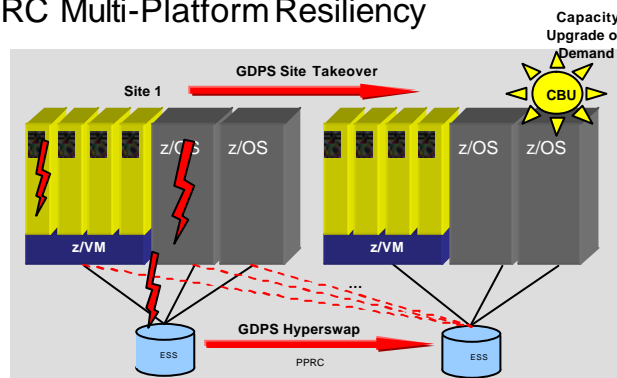
HyperSwap Support...
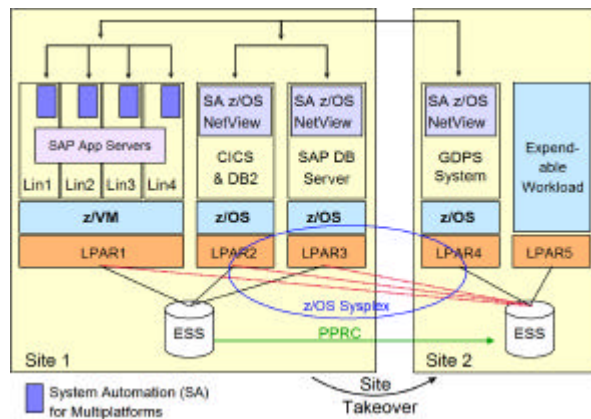
- Designed for customers with distributed applications
  - SAP application server running on Linux for zSeries
  - SAP DB server running on z/OS
- Coordinated, near-continuous availability and DR solution for z/OS, Linux guests, and z/VM
- Uses z/VM HyperSwap function to switch to secondary disks
- Sysplex support allows for site recovery if needed

GDPS/PPRC Multi-Platform Resiliency

✓ Coordinated near-continuous availability and DR solution for z/OS and Linux guests running under z/VM
  - *Valuable for customers with distributed applications*
    - *SAP application server running on Linux for zSeries*
    - *SAP DB server running on z/OS*
✓ Planned and Unplanned Reconfigurations

zSeries Linux as Infrastructure

- Network Infrastructure components come with the Linux Distributions
  - FTP
  - NFS,
  - DNS etc..,
- Infrastructure workloads are generally minimal, yet they are critical to the business.
- Advantage hosting these services from Linux zSeries are
  - Availability of the hardware
  - Disaster recovery capabilities, and the a
  - Ability to host these critical workloads

Collaboration and e-Mail on zSeries

- E-Mail solutions are a good solutions, however there are often large political barriers to making a change.
- IBM Domino 6.5 server is an excellent and scaleable solution Clients can be
  - Traditional Notes Client
  - Outlook Client support
  - Web client support
- ISV's e-mail and collaboration solutions
  - Samsung
  - Stalker
  - Bynari
  - Sendmail which is included with the distributions an e-mail only sendmail solution.

Domino for Linux on System z9 and zSeries
Deutsche Bahn chose Linux as the strategic server platform

- **Data volume Lotus ® Domino™**
  - 120 MB average mail file size per user
  - 7.3 TB total size of all mail files (w/o Cluster)
  - 320 GB total size of all data bases (w/o Cluster)
- **Data volume IBM CommonStore**
  - ~64 million objects (swapped out attachmants)
  - ~10 TByte swapped out from mail files
  - Compensates mail file growth of ~170 MB per user
- **Data volume Mail / Fax**
  - ~350,000 internal mails per day
  - ~200,000 external mails per day
  - ~ 11,000 BKU Fax per day
  - ~ 10,000 mass-Fax per day

- **Linux on System z9 and zSeries is a highly scalable platform for Domino**
  - 2,500 concurrent active users in 1 DPAR, 1,800 users had been required
  - Up to 3,000 mails per 15 minute
  - Average response time < 1 s (also for very - heavy users)
  - 2 IFLs not on full capacity (70% in average, 95% on peeks)

- **"Our mission at DB Systems is to develop and deliver an efficient and economical IT service for German railways. Linux is a key element in our strategy, and the smooth process of migrating our mainframe-based Lotus Notes system is a clear sign that this major project will be successful,"** says Detlef Exner, Director of IT Production for DB Systems.*
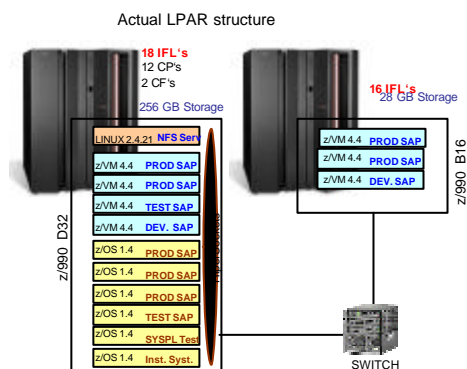
* **ibm.com**/industries/travel/doc/content/news/pressrelease/1262953106.html

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SAP Application Server with Linux on zSeries
Turning a vision into reality: Endress+Hauser InfoServe

- **Consolidation of SAP Application Servers – why ?**
  - Scale to numerous servers
  - Efficiently share system resources
  - Balance workloads and resources according to business priorities
  - Rapid provisioning of configured new servers
  - Tight integration with existing workloads and data
  - Improved security and systems management
  - High availability
  - High performance in Batch processing using HiperSockets
  - Optimization of disaster recovery – only one platform
  - Readily available skills for application and system development and administration

Actual LPAR structure

18 IFL's
12 CP's
2 CF's
256 GB Storage

LINUX 2.4.21 NFS Serv
z/VM 4.4 **PROD SAP**
z/VM 4.4 **PROD SAP**
z/VM 4.4 **TEST SAP**
z/VM 4.4 **DEV. SAP**
z/OS 1.4 **PROD SAP**
z/OS 1.4 **PROD SAP**
z/OS 1.4 **PROD SAP**
z/OS 1.4 **TEST SAP**
z/OS 1.4 **SYSPL Test**
z/OS 1.4 **Inst. Syst.**

z/990 D32

16 IFL's
28 GB Storage

z/VM 4.4 **PROD SAP**
z/VM 4.4 **PROD SAP**
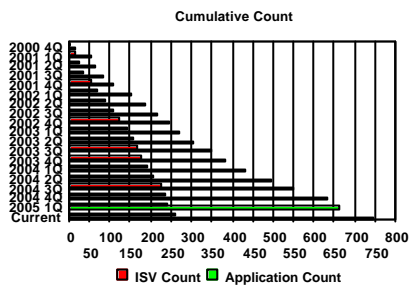z/VM 4.4 **DEV. SAP**

z/990 B16

SWITCH

ibm.com/software/success/cssdb.nsf/CS/DNSD-6ARDZV?OpenDocument&Site=eserverzseries

ISV's supporting Linux on zSeries

Now listing 266 ISV's with 752 applications!

http://ibm.com/servers/eserver/zseries/solutions/s390da/linuxproduct.html

Cumulative Count

ISV Count ■ Application Count

Lattwein

Dingus

ABAS Software AG

SANCHEZ

ACUCORP

SCALIX

CIO Update: IBM Aims to Make Mainframe Linux More Than a Niche Offering

"*Linux on the IBM mainframe has gone from being a novelty (a free download generating no revenue) to a product that IBM reports contributed 18 percent to 2004 zSeries hardware revenue. The growing number of applications supported by zSeries Linux has spurred growth, as has enhanced price/performance.*"

Gartner Research, 25 May 2005, John R. Phelps, Mike Chuba. G1282117

Potentially Difficult Candidates

- ISV and IBM applications that have not yet ported their application to run on Linux on zSeries
- Applications that by design run at VERY High sustained utilization which I will define here as >95%.
- Stand-Alone single applications as the only zSeries Linux 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 zSeries.
- 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).

Questions ????

IBM Grid Products - IBM eServer

- **Each platform provides unique Grid value**
    - ƒ **Linux supported across all platforms**
    - ƒ **xSeries for Intel workloads, dense Blade packaging (clusters)**
    - ƒ **pSeries for RISC workloads, scalability, partitioning, workload management, clusters**
    - ƒ **iSeries for OS/400® workloads, robustness, scalability, partitioning**
    - ƒ **zSeries for high availability, on demand Grid engines via virtualization (dynamic partitioning), policy-based workload management, memory speed access to backend data and transaction resources, Linux consolidation TCO**

- **All platforms provide a path to Grid**
    - ƒ **Globus Toolkit available on all platforms**
    - ƒ **Grid ISVs support select xSeries, pSeries and zSeries environments**

- **All platforms positioned for the On Demand future**
    - ƒ **OGSA to be packaged on all platforms**
    - ƒ **Leveraging WebSphere Web services cross-platform capabilities**

IBM Uses Linux

Transforming IBM's IT infrastructure - $10M+ in Savings

- 2,000+ Production Servers WW
- www.ibm.com/linux & w3.ibm.com/linux
  - ƒ redundant xSeries Linux servers
  - ƒ TSM Client & Tivoli Monitoring Agent
- Intranet search engine
  - ƒ xSeries servers; Inktomi search engine
  - ƒ TSM Client & Tivoli Monitoring Agent
- IGS Internet Vulnerability Security Scanning
  - ƒ 100 xSeries scanning 30k IP addresses/ week
- Performance monitoring
  - ƒ 75% fewer Linux servers than NT servers for same workload
- IBM Global e-Mail Anti-virus Management
  - ƒ xSeries scans incoming/outgoing mail for viruses
- 300mm Wafer Manufacturing Equip. Control
  - ƒ Much more reliable than Win2000
  - ƒ 174 xSeries; 200-300 by year end
- Workstation Asset Management Applications
  - ƒ 4 Linux zVM Guests on zSeries server
  - ƒ Variable workload / on demand capacity
- 200+ z/VM Virtual Servers
  - ƒ Application Development
  - ƒ Mission Critical Applications
- Web Content Management System
  - ƒ DB2 on Linux
  - ƒ zSeries

Collaboration and e-Mail on zSeries

- E-Mail solutions are a good solutions, however there are often large political barriers to making a change.
- IBM Domino 6.5 server is an excellent and scaleable solution Clients can be
  - Traditional Notes Client
  - Outlook Client support
  - Web client support
- ISV's e-mail and collaboration solutions
  - Samsung
  - Stalker
  - Bynari
  - Sendmail which is included with the distributions an e-mail only sendmail solution.

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Banca Popolare di Milano

"Our main goal was to integrate all of our channels so we could have a single view of our customers. Channel integration gives us a competitive advantage because we can be more reactive to business demands and cut the cost of implementing and maintaining the system."
– Clive Whincup, CIO, Banca Popolare di Milano

CICS
IBM Business Consulting Services
IBM Integrated Technology Services
IMS
Tivoli Access Manager for Business Integration
Tivoli Monitoring
WebSphere Application Server
WebSphere Portal Enable
zSeries Servers

Deutsche Bank - Germany
Web Portal on z/Linux established as the e-business interface for all applications

Business Objectives

- **Improve the scalability** of IFTWeb portal application that was initially developed on Windows NT platform
    - IFT Web portal provides access to legacy applications and databases

Solution and Benefits

- Migrated IFTWeb portal application to Linux on z/Series and Websphere Application Server
- The new IFTWeb intranet application now provides:
    - Browser interface to legacy applications
    - International online funds transfer
    - Interbank expense claims
- Leverages existing mainframe infrastructure
- Reduced Total Cost of Ownership
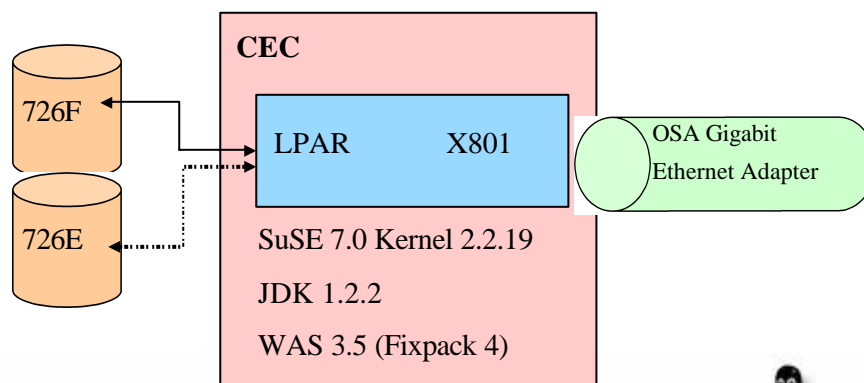- Significantly improved scalability

Deutsche Bank ☑

Deutsche Bank

Linux on zSeries Sample Configuration

2064.1C6 – 2 CP, 1GB MS

CEC

726F

726E

LPAR   X801

OSA Gigabit Ethernet Adapter

SuSE 7.0 Kernel 2.2.19

JDK 1.2.2

WAS 3.5 (Fixpack 4)

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Deutsche Bank

Architecture IFTWeb-OUR

Linux/390

HTTP
Server

HTTP

WAS

JMS

MQ Client

MQM

OS/390

CICS

DB2

MQ Server
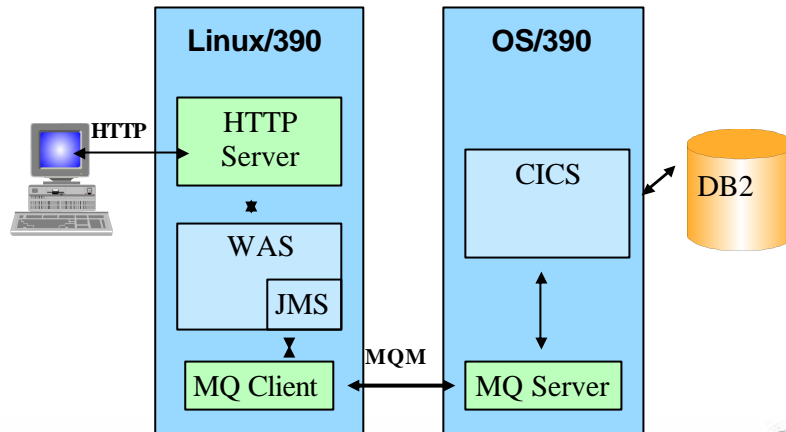
Deutsche Bank

Architecture NetTrader

Linux/390

HTTP
Server

HTTPS

WAS

CCF

CTG Client

TCP/IP

OS/390

CICS

DB2

dbTrader
Data

CTG Server
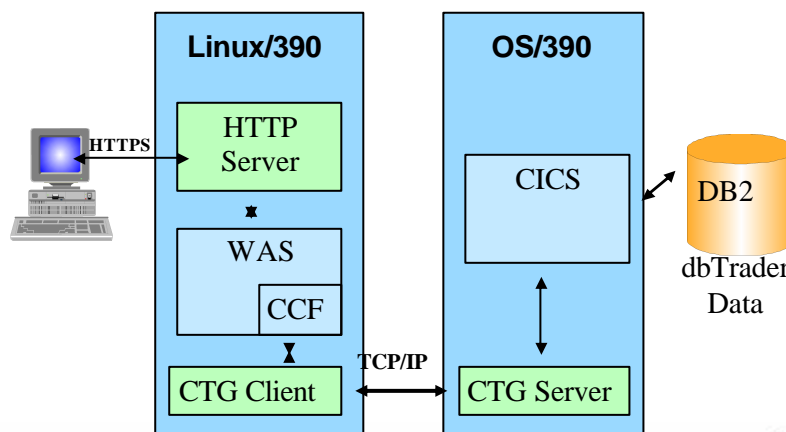
Deutsche Bank Hybrid zSeries
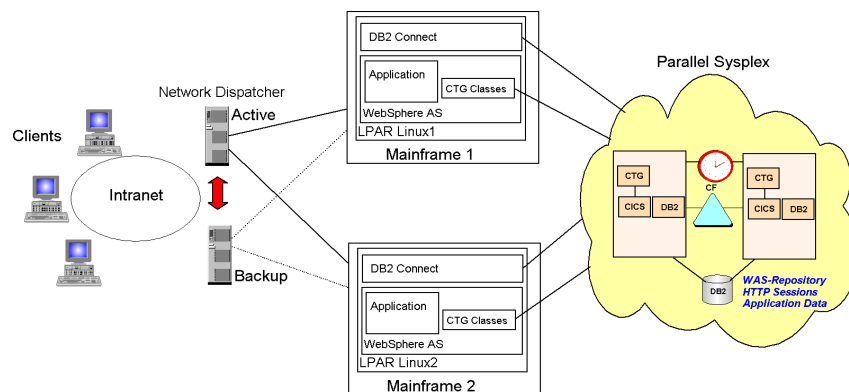
Hewitt LLC

Linux and Grid - zSeries and BladeCenter

Challenge:
Create Grid Computing environment to:
- Contain expenses for CalcEngine valuations
- Maintain or improve availability, response time and scalability
- Ensure personal-data security
- Capitalize on existing application code and z/OS Sysplex CICS Calling Environment
- Enable smooth and orderly migration

Solution:
Grid Computing environment includes:
- IBM eServer zSeries® server
- IBM eServer BladeCenter™ servers
- Linux Red Hat v8.0
- Business Partner: DataSynapse GridServer

Technology Benefits:
- Efficiently uses of the combined processing power of their heterogeneous environment
- Experienced an immediate 10% faster response time with the first application deployment
- Open architecture enables Hewitt to easily deploy additional applications
- Increased processing speed reduced cost per transaction

Business Benefits:
- Reduced operational costs improves competitiveness in their industry segment
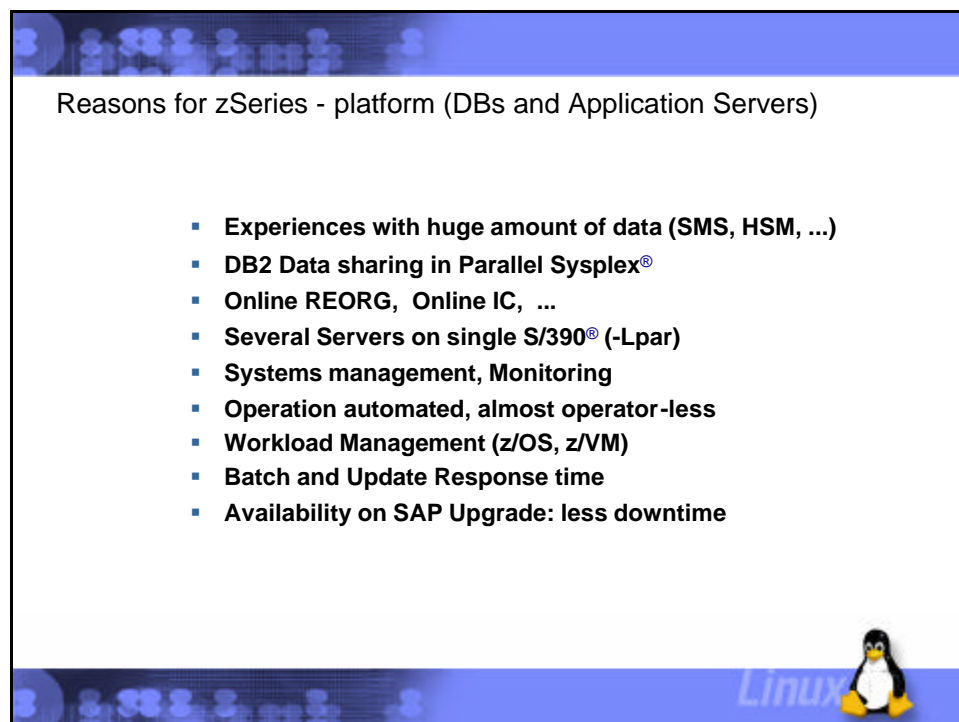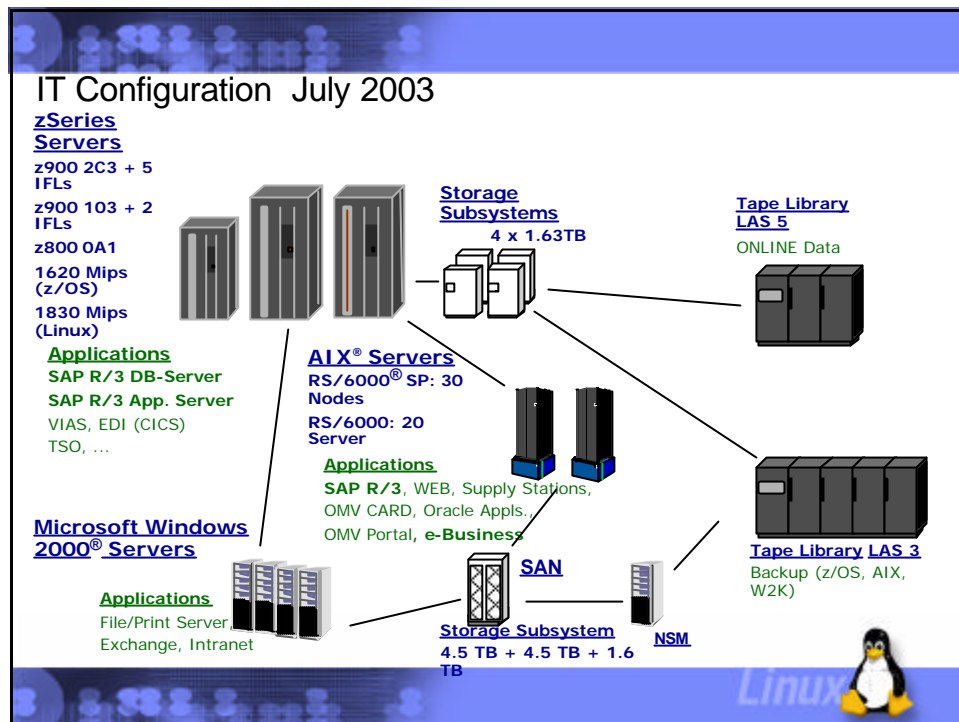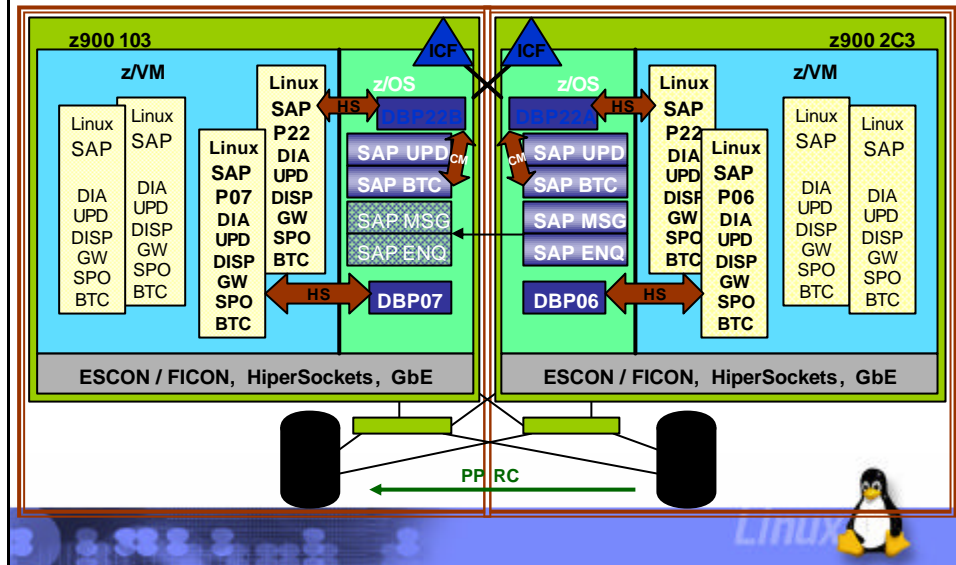
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IT Configuration   July 2003

zSeries Servers

z900 2C3 + 5 IFLs
z900 103 + 2 IFLs
z800 0A1
1620 Mips (z/OS)
1830 Mips (Linux)

Applications
SAP R/3 DB-Server
SAP R/3 App. Server
VIAS, EDI (CICS)
TSO, ...

Microsoft Windows 2000® Servers

Applications
File/Print Server,
Exchange, Intranet

Storage Subsystems
4 x 1.63TB

AIX® Servers
RS/6000® SP: 30 Nodes
RS/6000: 20 Server

Applications
SAP R/3, WEB, Supply Stations,
OMV CARD, Oracle Appls.,
OMV Portal, **e-Business**

SAN

Storage Subsystem
4.5 TB + 4.5 TB + 1.6 TB

NSM

Tape Library LAS 5
ONLINE Data

Tape Library LAS 3
Backup (z/OS, AIX, W2K)

Reasons for zSeries - platform (DBs and Application Servers)

- **Experiences with huge amount of data (SMS, HSM, ...)**
- **DB2 Data sharing in Parallel Sysplex®**
- **Online REORG, Online IC, ...**
- **Several Servers on single S/390® (-Lpar)**
- **Systems management, Monitoring**
- **Operation automated, almost operator-less**
- **Workload Management (z/OS, z/VM)**
- **Batch and Update Response time**
- **Availability on SAP Upgrade: less downtime**

SAP R/3 Final System Configuration on z/OS and Linux on zSeries

Economic Effects

- High Availability: **SYSPLEX, Data Sharing**
- Disaster Recovery: **GDPS, PPRC**
- Many SAP R/3 instances: **Resource Sharing**

- Software cost: **NALC, eNALC, Linux (z/VM)**
- HW cost: **Resource Sharing**, **IFLs**
  Efficient use of Hardware:
  WLM, z/VM for Linux

- Operational costs: **Minimal staff for 7X24,**
  Simple Systems Management,
  Low costs for ongoing changes and projects

Slide 1

IBM

zSeries
- I/O intensive application
- Application needs "mainframe features"
- Large number of parallel servers (horizontal)
- Most advanced workload management

pSeries
- 64-bit performance (e.g. floating point, large memory)
- Single server multiple applications
- Linux and AIX configurations
- Cluster Scalability

Linux Virtual Services
- on demand capacity
- Fast deployment
- No capital expense
- Pay for what you use

Introducing the Next Utility.
@ business on demand.

xSeries
- Leading low to mid-range price/performance
- Cluster scalability
- Linux and Windows environments

325 Servers
- AMD Opteron
- model 240 = 1.4 GHz
- model 242 = 1.6 GHz
- model 244 = 1.8 GHz
- model 246 = 2.0 GHz
- model 248 = 2.2 GHz TBA

BladeCenter
- Scale out and clustered solutions
- Shared infrastructure with no single point of failure
- Flexible architecture supports range of servers - Intel, PowerPC
- Integrated management
- POWER, Intel, AMD

iSeries
- Small or medium business
- Fully integrated solution (hardware, software, networking)
- Infrastructure consolidation
- Easy administration / operation

Linux

Slide 2

IBM
IBM Cross Platform Software Portfolio

Software Development	e-Business Integration	Integrated Information Infrastructure	Human Productivity	Business Impact Management
Rational software	**WebSphere** software	**DB2** Information Management Software	**Lotus.** software	**Tivoli** software
Requirements & Analysis Rational Suite AnalystStudio Rational RequisitePro Rational Rose Family Rational XDE Family	**Foundation and Tools** WebSphere Application Server WebSphere Edge Server IBM VisualAge WebSphere Studio (Family) Websphere Business Components	**Database and Tools** DB2 Universal Database DB2 for zOS & OS/390 Informix Dynamic Server (IDS) Informix DataBlades Informix 4GL	**Messaging and Wireless** Domino Notes Family: ✓ Notes ✓ iNotes ✓ MobileNotes	**Configuration & Operations** Tivoli Configuration Manager Tivoli Workload Scheduler Tivoli Remoe Control Tivoli Data Exchange Tivoli Provisioning Manager
Visual Modeling & Devel. Rational Suite DevelopmentStudio Rational Rose Family Rational XDE Family Rational PurifyPlus Family: ✓ Rational Purify ✓ Rational Quantify ✓ Rational PureCoverage	Composer WebSphere Host Integration (Family) IBM Fault Analyzer IBM File Manager IBM Application Monitor IBM Debug Tool **Reach and User Experience** WebSphere Portal Server	DataJoiner DataPropagator DB2 DataPropagator DB2 Tools IMS DB/DC IMS Tools for OS/390 **Business Intelligence** DB2 OLAP Server	Domino Everyplace Access Domino Everyplace Enterprise **Advanced Collaboration** WebSphere Portal Server ✓ Lotus Collaboration components Lotus Discovery Server	Tivoli Orchestrator **Performance & Availability** Tivoli Service Level Advisor Tivoli Web Site Analyzer Tivoli Business Systems Manager Tivoli Enterprise Console Tivoli Tivoli NetView Switch Analyzer
Automated Testing Rational Suite TestStudio Rational Robot Rational TeamTest Rational PurifyPlus Rational TestManager Rational Test RealTime Rational ClearQuest	WebSphere MQ Everyplace WebSphere Transcoding Publisher WebSphere Commerce Suite WebSphere Voice Server WebSphere Personalization WebSphere Everyplace	DB2 Intelligent Miner for Data DB2 Intelligent Miner for Text DB2 Intelligent Mining Scoring DB2 Warehouse Manager Query Management Facility Informix XPS Red Brick Warehouse	Domino Extended Search QuickPlace Sametime Lotus Workflow Domino.Doc **eLearning** Lotus LearningSpace Lotus LearningSpace Forum	Tivoli NetView for TCP/IP Performance Tivoli NetView Performance Monitor Tivoli Monitoring **Security** Tivoli Identity Manager Tivoli Access Manager Tivoli Risk Manager Tivoli Privacy Manager
Team Unifying Platform: Project Management ✓ Rational RequisitePro ✓ Rational ProjectConsole ✓ Rational Unified Process ✓ Rational soDA ✓ Rational TestManager Software Configuration Mgmt ✓ Rational ClearCase Family ✓ Rational ClearQuest Family	**Business Integration** WebSphere Business Integration for Industries WebSphere Interchange Server WebSphere Business Integration Modeler WebSphere Business Integration Monitor WebSphere MQ WebSphere MQ Integrator Broker WebSphere MQ Workflow WebSphere Event Broker WebSphere Data Interchange Server WebSphere Business Connection WebSphere Business Integration Adapters	**Content Management** IBM Content Manager ✓ On-Demand ✓ CommonStore ✓ VideoCharger IBM Enterprise Information Portal		Tivoli Intrusion Manager **Storage** Tivoli Storage Manager Tivoli Storage Manager for SAN Tivoli Storage Resource Manager Tivoli SANergy Tivoli Storage Manager for Mail Tivoli Storage Manager for Hardware Tivoli Storage Manager for Database Tivoli Storage Manager for Applications TSM for Space Manager Tivoli Storage Network Manager

Windows	Linux	AIX	Solaris	HP-UX	OS/400	OS/390	z/OS

Reference Accounts

- **Universidade Nova de Lisboa ,** a top Portuguese university, has tapped the z890 running Linux to power its application for academic management, providing students, teachers and administrative staff with real-time access to all academic information. The University is migrating from an Intel platform to the zSeries running Novell/SuSE SLES8, tapping a storage area network including a global storage system with one enterprise storage server and a backup tape unit.

- ·   **Cepromat,** an IT provider for the Brazilian state of Mato Grosso, uses its z890 to manage the import and export of the State's agricultural product s. The z890 centralized the State's critical applications including legacy and new Java applications running DB2 on Linux for zSeries, to help decrease software costs, and increase reliability and security. The solution was sold though IBM business partner Ação Informatica.

- **Royal Canadian Mounted Police,** Canada's national police service, uses z/OS on z890 to run administrative and police systems that require 24/7 reliability and scalability in order to share information with other Canadian police services, the FBI, Interpol and other law enforcement agencies. With Tivoli Storage Manager, the z890 serves as the on demand hub for the RCMP's back-up and disaster recovery services for other servers. Through the use of z/OS.e and the implementation of z890 processors the RCMP will realize a substantial decrease in its annual software and processor maintenance costs.

Reference Continued

- ·**University of Miami**, one of the largest private research universities in the southeast U.S., is running its z890 with an Integrated Facility for Linux engine (IFL) processor for high availability applications such as university administrative tasks, and healthcare and other academic research. The university is running multiple instances of Linux Novell/SuSE SLES8 under the z/VM operating system with the intention of consolidating its applications from Dell servers. The university estimates to save $600,000 over the next five years with the z890. PSR, a Canton, Massachusetts-based IBM business partner worked with the University on this project.

- ·**Montreal Informática**, a Brazilian service provider, uses a z890 for running all sorts of IT solutions including managing the web portal for selling "smart tickets," used in Brazil public transportation for individual citizens and businesses alike. The z890 supports the entire Smart Tickets sales cycle – selling credits via the Internet and also evaluating the card's usage in buses in the state of Rio de Janeiro. The solution relies on Java applications running on zAAP and WebSphere, and the business partner was INGRAM

- ·**The Brazilian Institute of Geography and Statistics**, a public institution providing information on civil society and public interest, uses their z890 with Linux to calculate and disseminate critical government statistics. The new z890 is attached to an IBM TotalStorage Enterprise Storage Server 750.

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