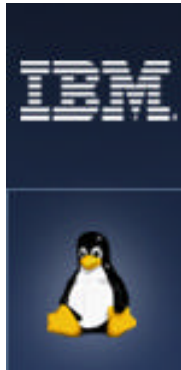● **INTRODUCTION**

Migrating UNIX Workloads to Linux on xSeries Intel-based Servers and Blades

OBJECTIVES:

Highlight Linux market trends

Describe the advantages of Linux in a current Unix environment

Identify target workloads and migration planning

Describe the migration services options

Discuss porting considerations and resources

Identify the IBM hardware strengths and server offerings

Cover customer successes with migration to Linux on xSeries

SPEAKERS:

Carol Carson, Program Director, xSeries Linux
   carson82@us.ibm.com
Sam Docknevich, Linux National Practice Leader
        samd@us.ibm.com
Mark Murphy, Linux Solutions Specialist
        markm1@us.ibm.com

Linux® Is…

- a *UNIX-like OS* supported on all IBM eServers, the IBM Software portfolio, and the IGS services portfolio

- often deployed where UNIX® could be used and/or as a replacement for Microsoft Windows® Servers, Microsoft NT® Servers – also New Development.

- based on freely available open source code components but commercial users deploy enterprise Linux *distributions* from IBM Linux partners e.g., Red Hat® and Novell/SuSE®, for a fee (based on system type and size)

- a fundamental and indispensable part of IBM's technology and on-demand strategy
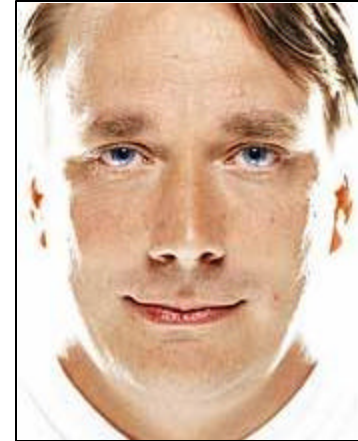
"Hello everybody… I'm doing a (free) operating system (just a hobby, won't be big and professional…)."

Linus Torvalds, creator of Linux, from the first Internet announcement on August 25, 1991

2

Why move to Linux? Because it makes sense. Listen to what this customer had to say…

"The xSeries systems running Linux enable us to meet and exceed our SLAs with 99.9 percent availability, providing an unbeatable value that will continue to drive down our costs."

And –

"The scalable architecture of the xSeries has really helped us stretch our IT dollars. Plus, in a hosted environment like ours, you must have flexibility and the ability to expand--with the xSeries, we have a clear growth path."
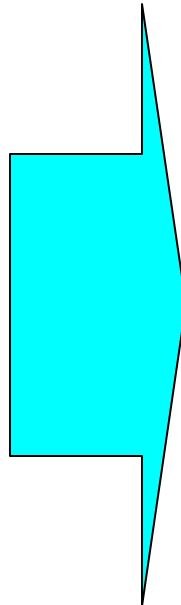

DETERMINE worked closely with IBM to develop a solution that has the potential to help control costs.

--Jamie Taylor, CTO, DETERMINE Software

Tux goes to Work: Linux makes "News"

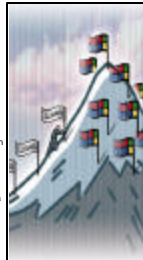**Experience shows that successful Linux migrations incorporate a planned approach to conversion, support, and operational issues**

- **How do I get started**
- **What are good workloads to migrate?**
- **How do I secure my Linux systems?**
- **How do I manage my Linux systems?**
- **What applications should I convert and how do I do it?**
- **How do I deliver improved response time and availability with Linux?**
- **How do I select a Linux distribution and get the support I need?**
- **What are the options to remaining with my current desktop strategy?**
- **How do I maintain 5 Nines uptime with Linux as I do with other OSs now?**
- **What else do I need to consider?**

Strategy   Design   Pilot   Production   Support
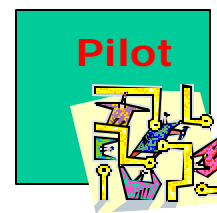
The Linux Adoption Cycle

5

Experience shows that successful Linux migrations incorporate a planned approach to code conversion and testing

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Preliminary Assessment	Detailed Assessment	Code Conversion	Testing	Code Deployment

Preliminary Assessment
- Determine feasibility of porting application code

Detailed Assessment
- Using a static copy of the source code to be converted, perform a detailed assessment required for the porting

Code Conversion
- Tools-based approach to complete code conversion to Linux on xSeries

Testing
- Perform regression tests against customer baselines to ensure ported application performs identically under Linux as it did in source environment

Deployment
- Deploy converted code in customer environment

6

Migration Workloads

From simplest to more complex (in general):

- File/print infrastructure
- Security/directory infrastructure
- Mail server
- Database serving
- Web serving and applications
- Messaging
- Enterprise Resource Planning (ERP)
- Business Intelligence

Start with something simple: File and print

Internet

Firewall

SAMBA

File/Print Server

HTTP Server

Clients

DNS/DHCP

Message Server

Message Broker
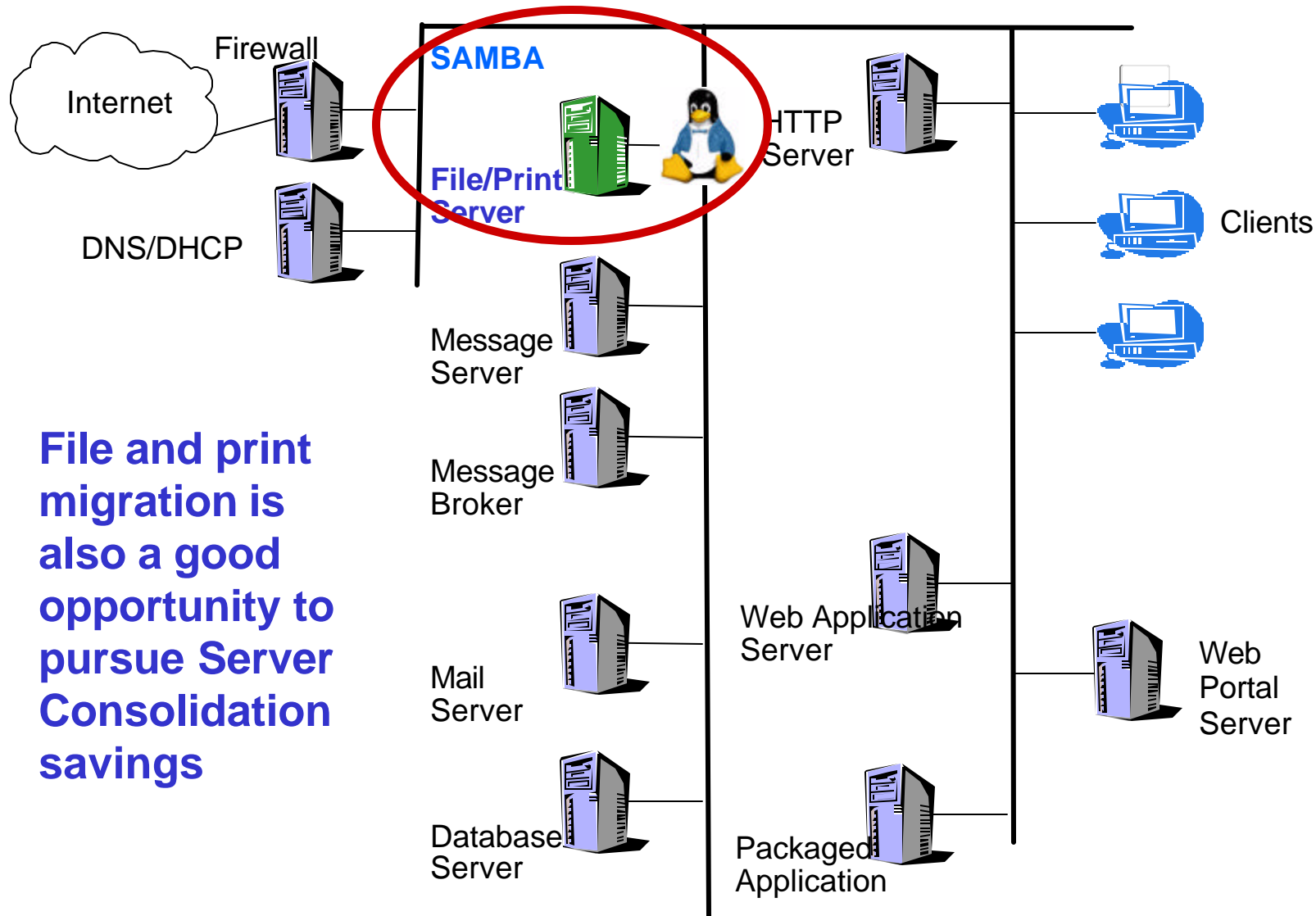
File and print migration is also a good opportunity to pursue Server Consolidation savings

Mail Server

Web Application Server

Web Portal Server

Database Server

Packaged Application

More infrastructure: Security and/or directory services

Firewall

Internet

DNS/DHCP
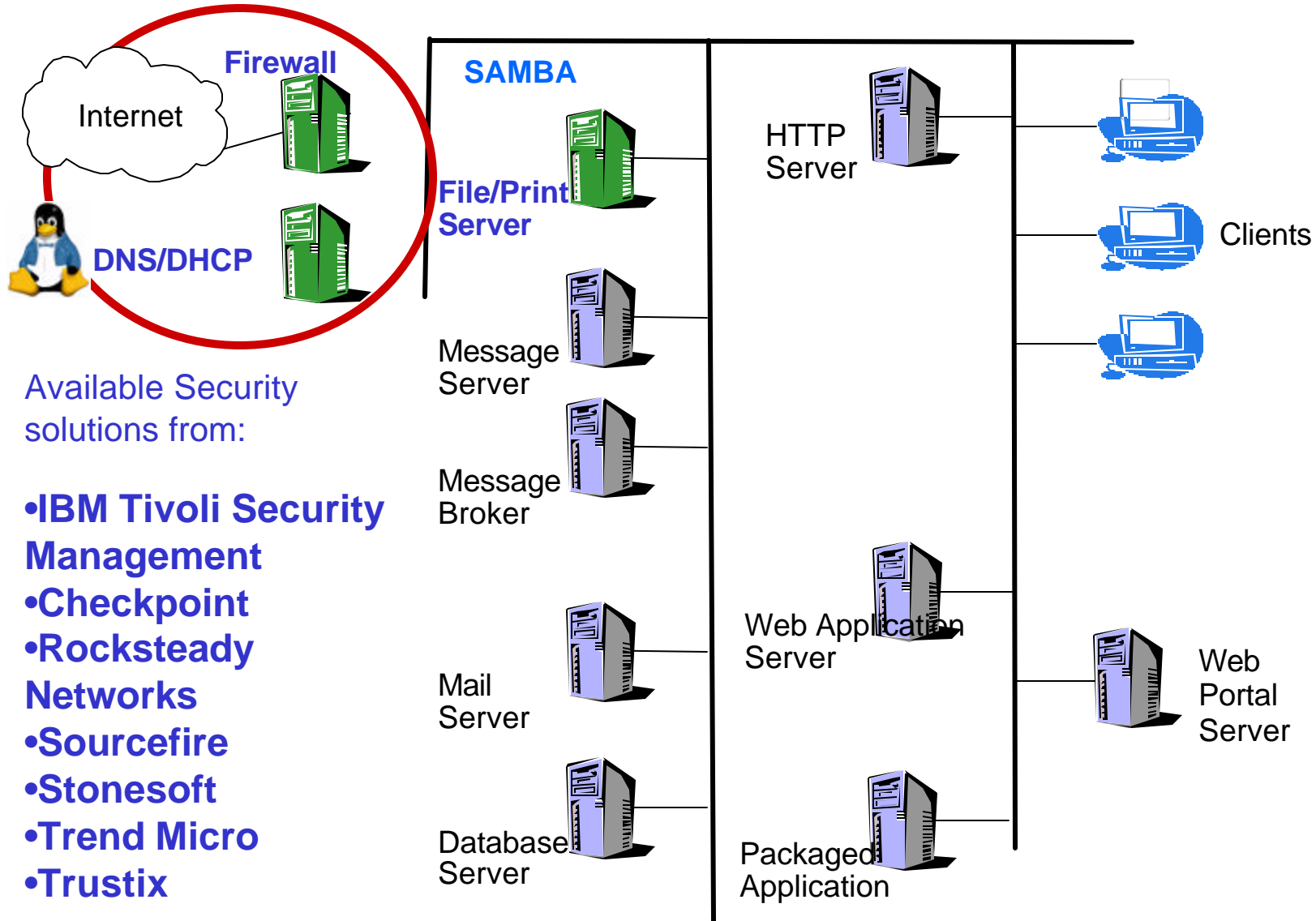
Available Security
solutions from:

- **IBM Tivoli Security Management**
- **Checkpoint**
- **Rocksteady Networks**
- **Sourcefire**
- **Stonesoft**
- **Trend Micro**
- **Trustix**

SAMBA

File/Print Server

Message Server

Message Broker

Mail Server

Database Server

HTTP Server

Web Application Server

Packaged Application

Clients

Web Portal Server

Ibm.com/security

Target workload: Mail server

Firewall

Internet

DNS/DHCP

SAMBA

File/Print Server

Message Server

Message Broker

Available Mail server solutions from:

- **Lotus Domino**
- **Sendmail**
- **Postfix**
- **Bynari**

Ibm.com/linux/solutions

Mail Server

Database Server

HTTP Server
Apache/IBM HTTP Server

Clients

Web Application Server

Packaged Application

Web Portal Server

10
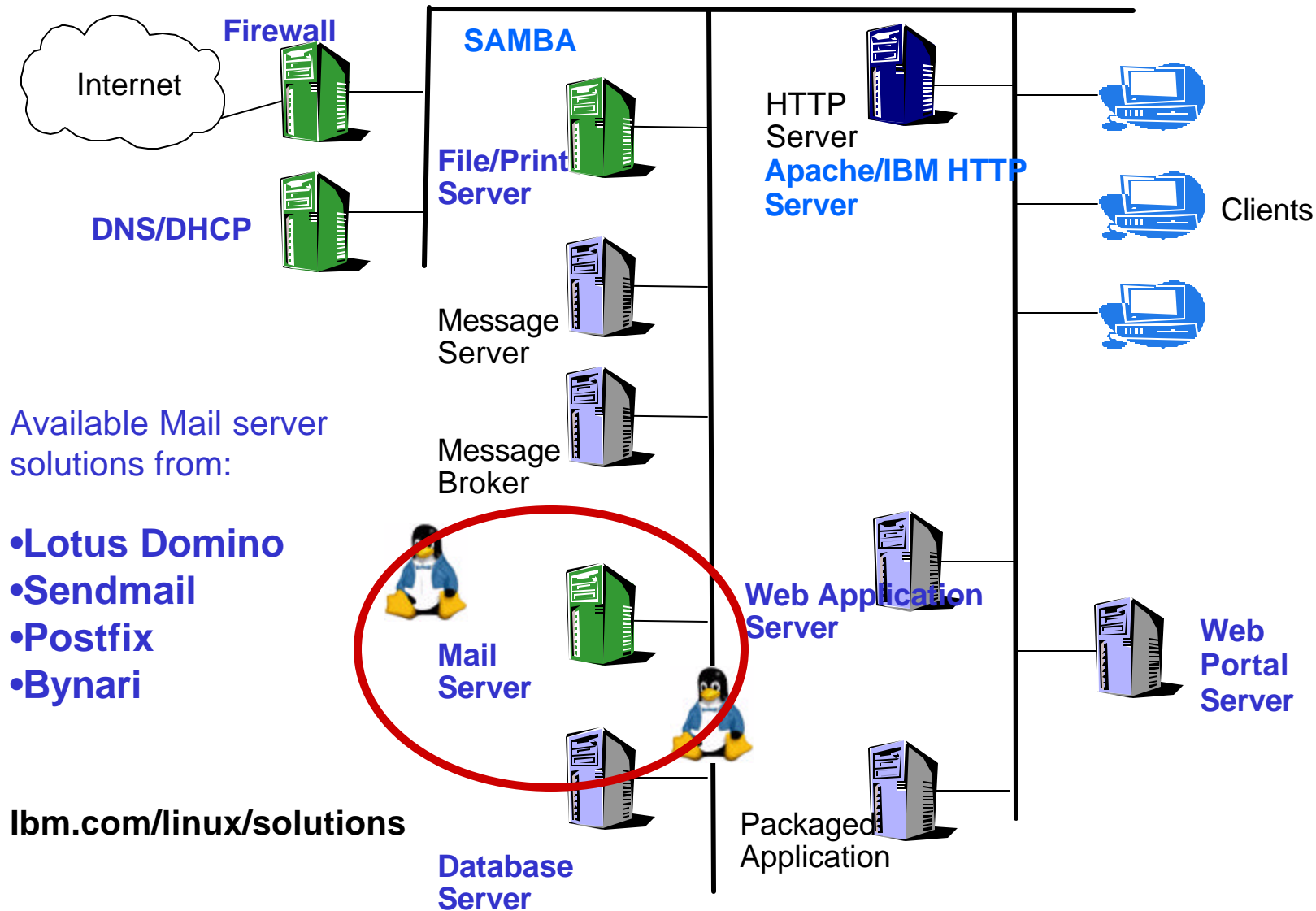
Target workload: Database serving

Firewall

Internet

DNS/DHCP

SAMBA

File/Print Server

Message Server

Message Broker

Mail Server

Database Server

HTTP Server
Apache/IBM HTTP Server

Web Application Server

Packaged Application

Clients

Web Portal Server

"Our Oracle Financials software and database run faster on the BladeCenter than on the Sun Enterprise 3000. In fact, with the 2.6 GHz processors of the BladeCenter, they scream."

--Paul Williams, Paul Williams, Director of Information Technology, The Chronicle Herald

Oracle application benchmark: xSeries x445 drives 18368 users with .59 second avg. response

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Take the next step with Web Infrastructure

Firewall

Internet

DNS/DHCP

SAMBA

File/Print Server

Message Server

Message Broker

Mail Server

Database Server

HTTP Server
Apache/IBM HTTP Server

Clients

Web Application Server

Packaged Application

Web Portal Server
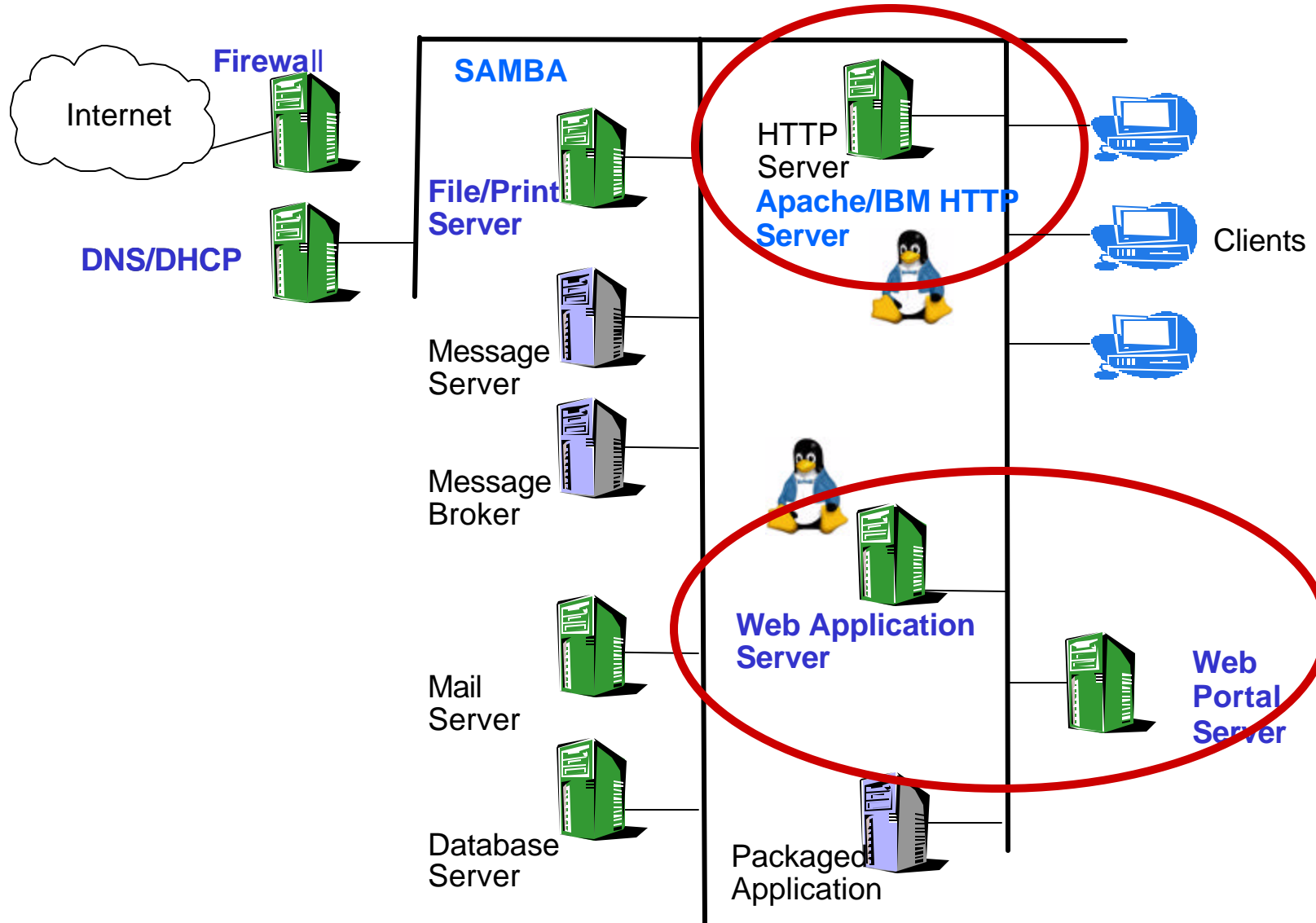
E*TRADE

Business Objectives

- ✍ **Reduce cost, improve performance, guarantee scalability**
- ✍ **With 10,000 concurrent users and four million accounts, E*Trade's success depends on its ability to provide superb customer service**

Solution/Benefits

- ✍ **Replaced UNIX servers with IBM xSeries 330 servers running Linux**
  - ✍ **Tier 1 - Web Application Server**
  - ✍ **Tier 2 - Tuxedo Servers Tier**
- ✍ **IBM Global Services for prototyping, porting and support services**
- ✍ **Millions of dollars in savings**

E✳TRADE

Get it all with Power E✳TRADE℠

You Can Also Switch Your Messaging Infrastructure

Firewall

Internet

DNS/DHCP

SAMBA

File/Print Server

WebSphere MQ

Message Server

WBI MB

Message Broker

Mail Server

Database Server

HTTP Server
Apache/IBM HTTP Server

Clients

Web Application Server

Packaged Application

Web Portal Server
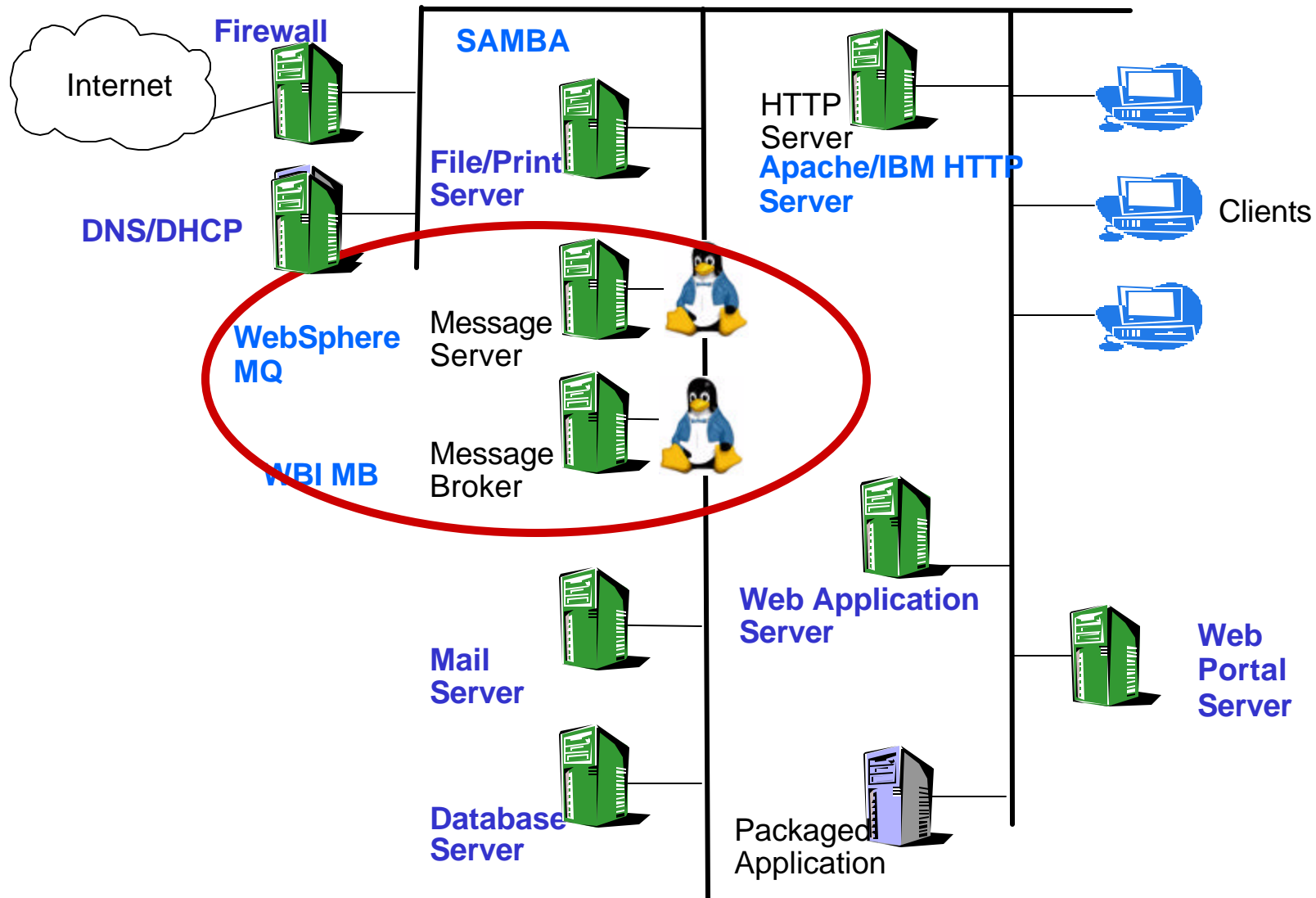
Target workload: Enterprise Resource Planning (ERP)

Internet

Firewall

DNS/DHCP

SAMBA

File/Print Server

WebSphere MQ

Message Server

WBI MB

Message Broker

Mail Server

Database Server

HTTP Server **Apache/IBM HTTP Server**

Web Application Server

Packaged Application

Clients

Web Portal Server

(SAP, Peoplesoft, Oracle Apps)

Over 6500 Linux-based applications developed for IBM software!

ibm.com/linux/solutions

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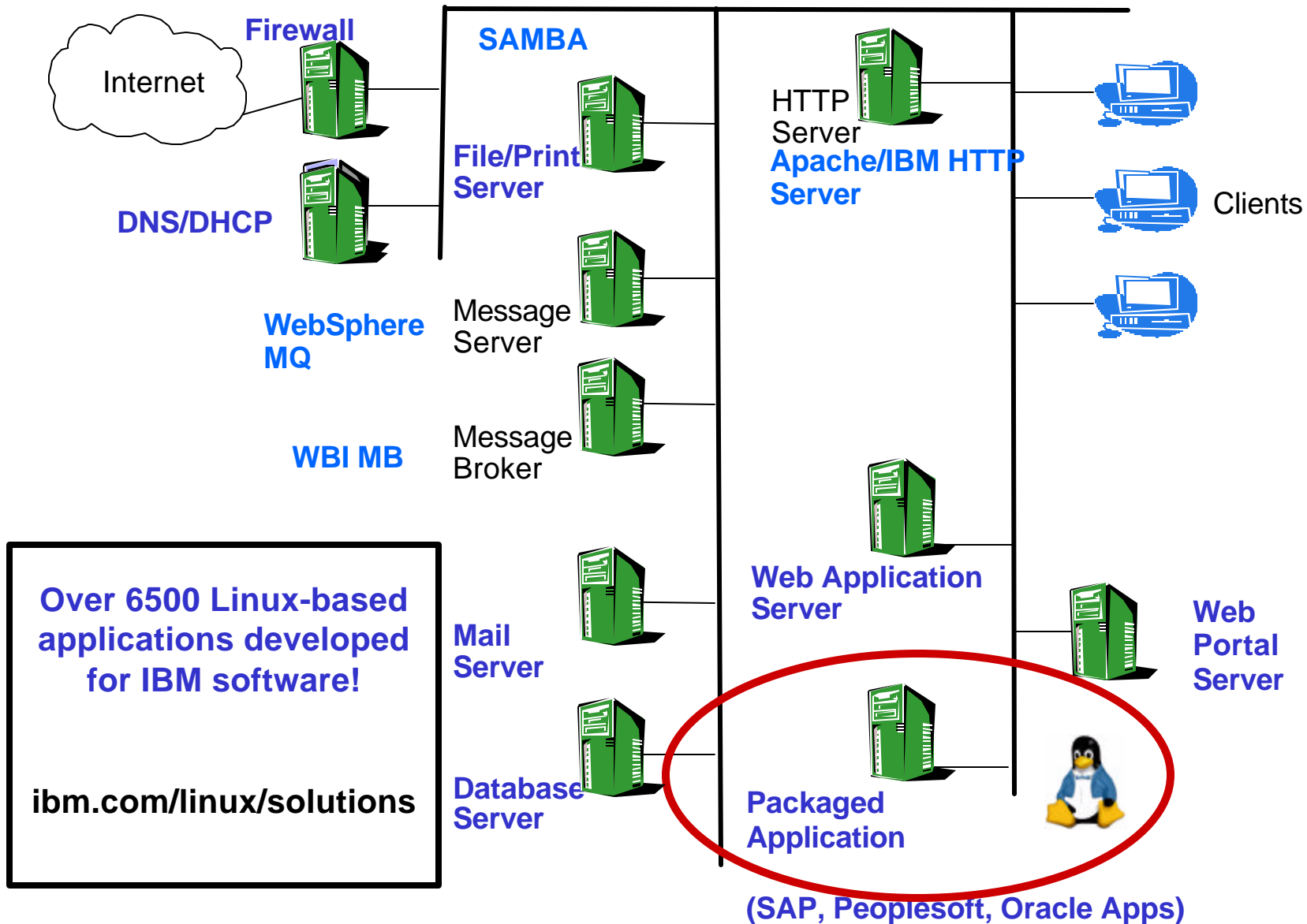
Lehman Brothers

- **Business Objectives**
  - ✍ **Reduce costs**
  - ✍ **Optimize IT environment for business critical e-trading, derivative and risk applications**

- **Solution/Benefits**
  - ✍ **Utilized IBM services to port from UNIX to Linux**
  - ✍ **Replaced UNIX servers with IBM xSeries 335 servers**
  - ✍ **20-30% reduction in UNIX servers, resulting in $7-10 million savings**
  - ✍ **xSeries scalability allows growth at a lower cost than other vendors**
 - ✍ **25% performance increase allows faster customer service**

LEHMAN BROTHERS

Strategy

Design

Pilot

Production

Support

☞**Linux Strategy Workshop**
☞**Grid Innovation Workshop**
☞**TCO/ROI Studies**
☞**Linux Design Mini-Workshops**
☞**Linux Readiness Assessments**

☞**Application Portfolio Review**
☞**Server Consolidation Study**
☞**Linux Security Services**
☞**Proof of Concept**
☞**Technical training services**
☞**Design Workshops: Security, Management, Performance, etc.**

☞**Pilot engage-ments**
☞**Pilot to Production Readiness Assessment**
☞**Pilot to Production Deployment**

☞**Systems Migration: Infrastructure**
  ☞**Site/rollout services**
  ☞**Systems management services**
  ☞**Cluster services**
  ☞**Performance services for Linux**
☞**Systems Migration: Applications**
  ☞**Porting**
  ☞**Application development**
☞**Linux Virtual Services**

☞**Support Line for Linux**
☞**Support Line for Linux Clusters**
☞**LDP alliances – Red Hat, Novell SUSE**
☞**Advanced Support**
☞**On Site Engineering and Technical Support**

IBM Linux Services to help you enable your enterprise

Companies in all industries are implementing Linux… not just thinking about it – so how can you gain YOUR share of the benefits of Linux implementation?

- **If you are new to Linux…**
  - A Linux briefing, customized to the specific business issues of your industry, can help explain the benefits of Linux to your key stakeholders and build a consensus to support its implementation

- **If you are just getting started with the implementation of Linux…**
  - A Linux Strategy Workshop will assist you in developing a high level Linux implementation plan and help build consensus in both IT and the business

- **If you have specific Linux technical issues to resolve…**
  - A series of Linux Design Mini-Workshops focused on key IT and business issues such as security, performance, and systems management will help you accelerate your Linux deployment

- **If you want to understand how ready you are for Linux deployment…**
  - A Linux Readiness Assessment provides a benchmark of the status of your ability to support and management a Linux deployment and a Linux production environment
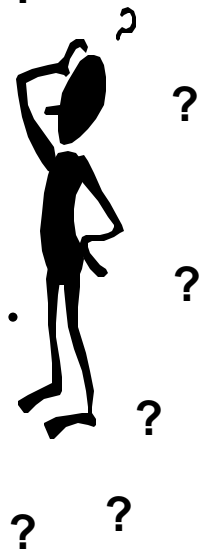
Working together, a Linux Strategy Workshop can help you develop an integrated strategy for implementing Linux and Open Source

1
High-level Linux Strategy
 … with recommendations that may be used right away

2
Linux Initiatives
 … defined and agreed upon based on business & IT goals

3
Action Plan
 … provides phases with supported milestones and timelines

**4**
Linux Knowledge
 … increases awareness and mindset

5
Validation
 … demonstrates the advantages of Open Source solutions

✍ **If you are just getting started with the implementation of Linux…**

Linux Design Mini-Workshops can accelerate your Linux implementation and business advantage…

Select from topics where IBM can bring it's "best practices" Linux experience to help you reduce risk and accelerate implementation

- ✍ **Linux TCO/ROI Analysis**
- ✍ **Linux Distribution Selection and Support**
- ✍ **Linux Security**
- ✍ **Linux Systems Management**
- ✍ **Application and Platform Selection**
- ✍ **Application Porting and Migration**
- ✍ **Alternative desktops, clients and workstations**
- ✍ **Linux High Availability**
- ✍ **Linux Mail Options: Server**
- ✍ **Special Topics: Point of Sale, Embedded Linux, High Performance Computing**

POSITION

ASSESS / PLAN

DESIGN

IMPLEMENT

RUN
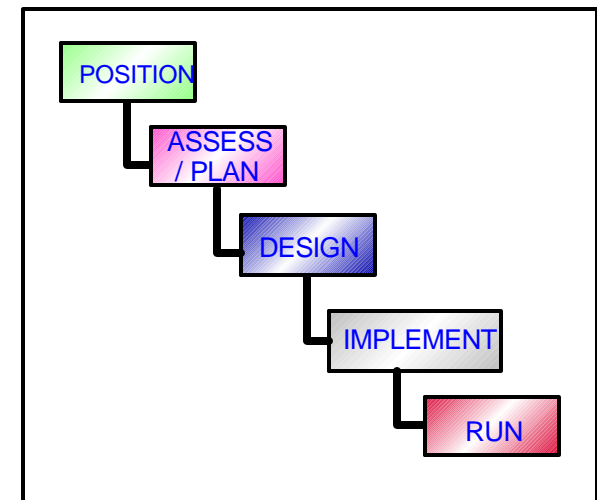
✍ **If you have specific Linux technical issues to resolve…**

A Linux Readiness Assessment provides a benchmark on your ability to support a production Linux environment

IT Operations and Support must have the tools, processes, and skills required to ensure Linux stability, availability, and reliability

- **How effectively can I secure my Linux systems?**
- **How efficiency can I manage my Linux systems?**
- **How effectively can I manage my Linux distributions?**
- **How should I support my Linux applications and systems?**
- **Can I deliver acceptable response time and availability with Linux?**
- **Can I maintain 5 Nines uptime with Linux as I do with other OSs now?**
- **What tools, processes, and skills do I need to support my Linux deployment?**

1 – 4 Week Customized Timeframe

✍ **If you want to understand how ready you are for Linux deployment …**

What about applications I've developed and ported? Will my application continue to work on Unix?

• You don't have to make a choice between Linux and Unix

• You will likely be replacing non-portable practices with more portable ones

You don't have to make a choice
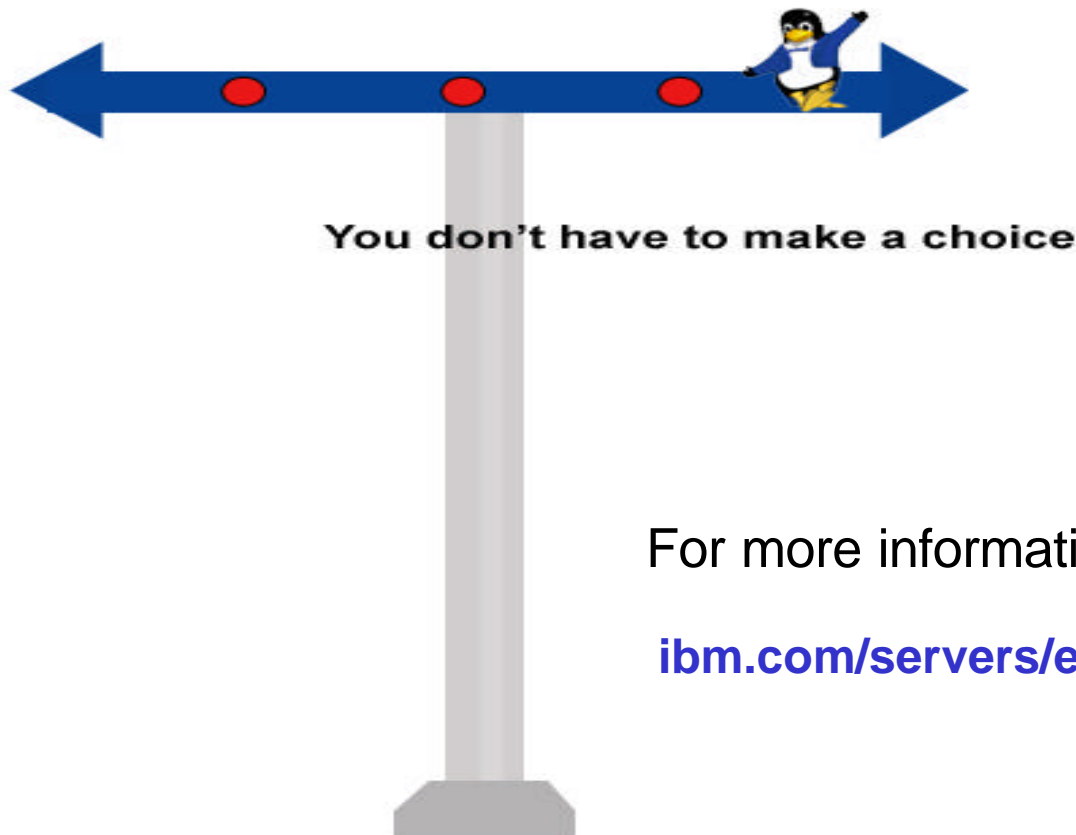
For more information:

ibm.com/servers/esdd/articles/porting_linux

General Unix to Linux Application Migration Rules

- Unix to Linux migration is easier than Windows to Linux
- Business applications designed to run on UNIX make a fairly simple port – particularly Java-based applications
- C/C++ applications are also a fairly simple port
  - Require standard development tool chain – libraries, compiler/build/debugger
  - Need to manage data handling from UNIX to x86-based server

- Scripts are simple if they use objects, files and devices that are common for UNIX and Linux

Additional resources for developers:
  - Migrating from Solaris to Linux on Intel, an online course
  - "Technical guide for porting applications from Solaris to Linux, version 1.0" at ibm.com/servers/esdd/articles/porting_linux
  - "Unix-to-Linux Migration: An Introduction", Nathan Thomas, Red Hat, http://www.redhat.com/solutions/info/whitepapers/#LinuxMigration

Where do you want to start?

To learn more about how IBM can assist you in determining your future directions with Linux, please contact:

Sam Docknevich
Linux National Practice Leader
ITS US, IBM Global Services
(781) 895-2569(office and fax)
(508) 380-6803 (cell and pager

US West/Central	US NE/SE	Clusters
Jeff Gibbs	Peter Kastrinelis	Tim Strickland
(O) 602-357-4360	(O) 781-895-2357	(O) 316-266-7049
(C) 623-910-6514	(C) 617-974-8999	(C) 620-629-5247

Build and test your application on Linux for xSeries

- Porting UNIX applications to Linux can be a simple task

- IBM provides Linux-ready servers

Linux is readily available

Where are UNIX Deployments Going to?

Q: Considering your use of UNIX, is the reason for decreasing its use because your organization is consolidating, replacing or you no longer need this one?


DK
3%

Other
13%

No longer need
10%

Consolidating
41%

Replacing
33%
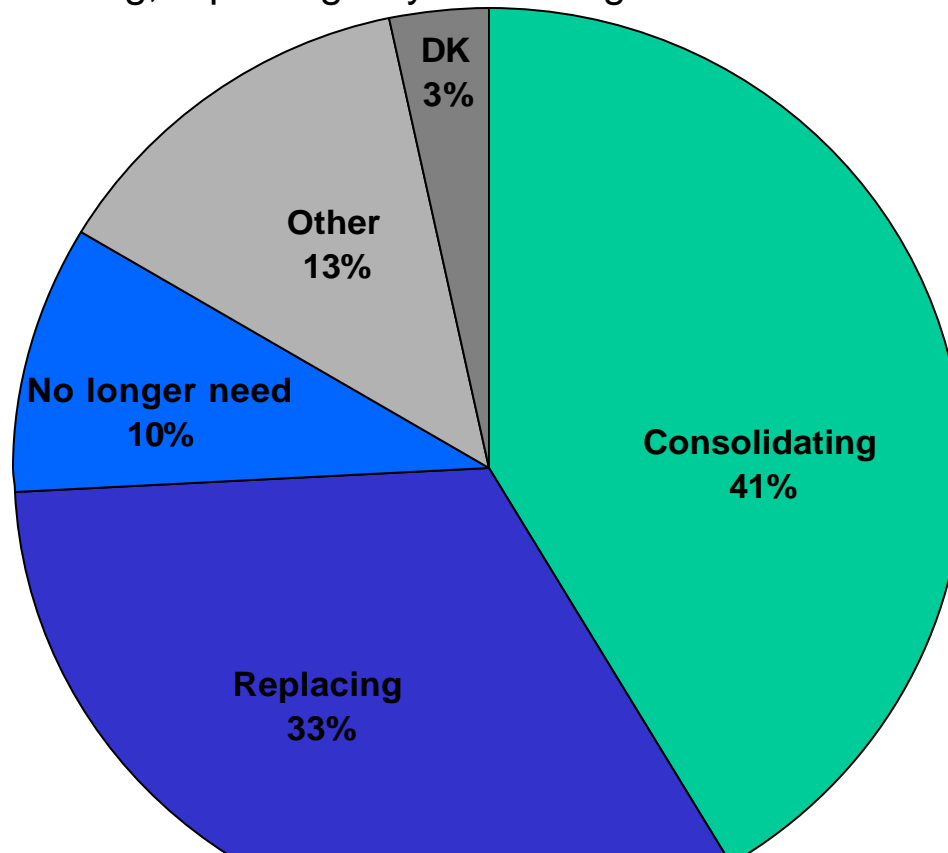
"Consolidation" is a major focus. Along with "Replacement", represents 74% of drivers to migrate from Unix

Source: IDC, 2004
Unix to Linux Software Multiclient Study

26

Linux Most Frequently Replaces Unix

Q: What will [Unix] be replaced by?

Linux most likely target, but Windows remains a migration platform for others
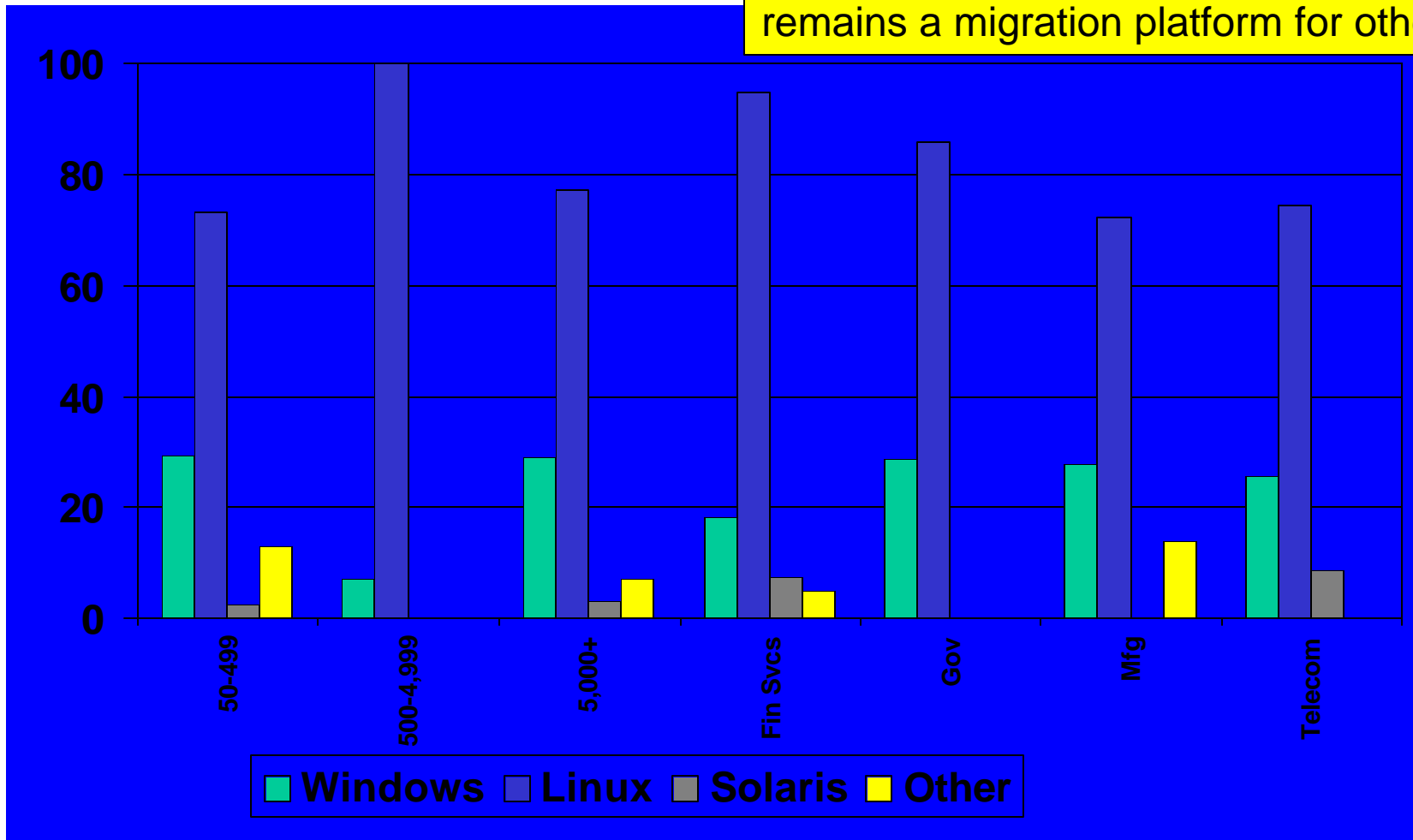
Source: IDC, 2004
 Unix to Linux Software Multiclient Study

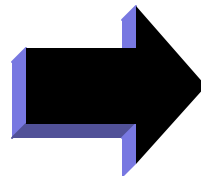QB8-Unix Base: Respondents replacing Unix
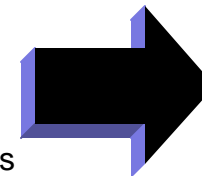
Simplification…

…Requires Breakthrough Technologies

Windows Servers

Netware Servers

Networking

Management Servers

Linux Servers

Storage

Windows Server

Networking

Storage

Virtual Servers, Storage, Networks

Virtualization

Servers

Storage
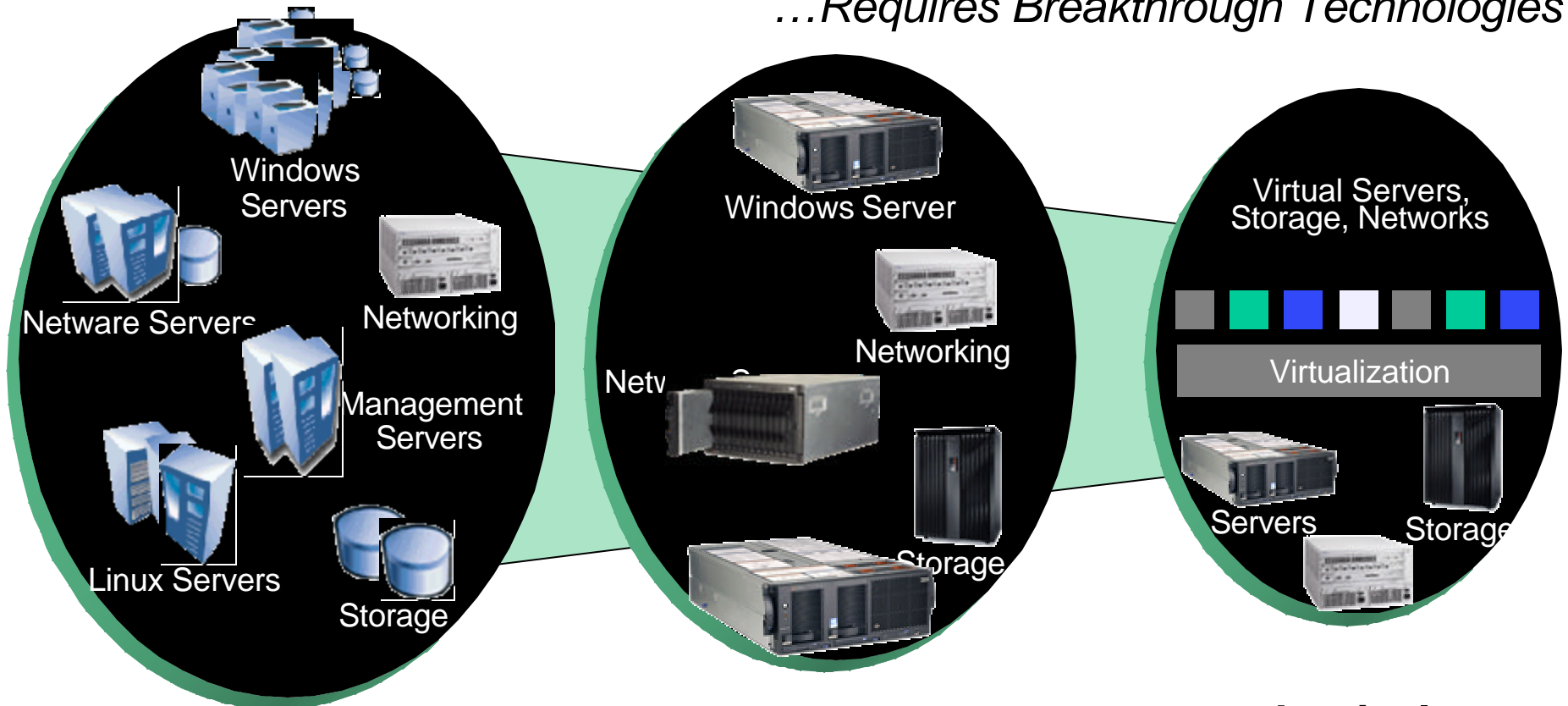
Complex

- ✍1 workload per server
- ✍Disparate mgmt tools
- ✍Manual provisioning

Physical Consolidation

- ✍Fewer servers and licenses
- ✍Disparate management tools
- ✍Labor intense provisioning

Logical Simplification

- ✍Systems managed as one
- ✍Multiple OSs per server
- ✍Rapid provisioning
- ✍Automatic workload mgmt

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xSeries Value Proposition

- **Investment in innovation**
  - Technology leverage
  - On demand
  - Driving industry standards
  - Power of choice

- **Mainframe inspired technologies deliver lower TCO**
  - Leadership price/performance due to Enterprise X-Architecture
  - Pay as you grow modular computing strategy

- **Reduced IT costs via award-winning systems management capabilities**
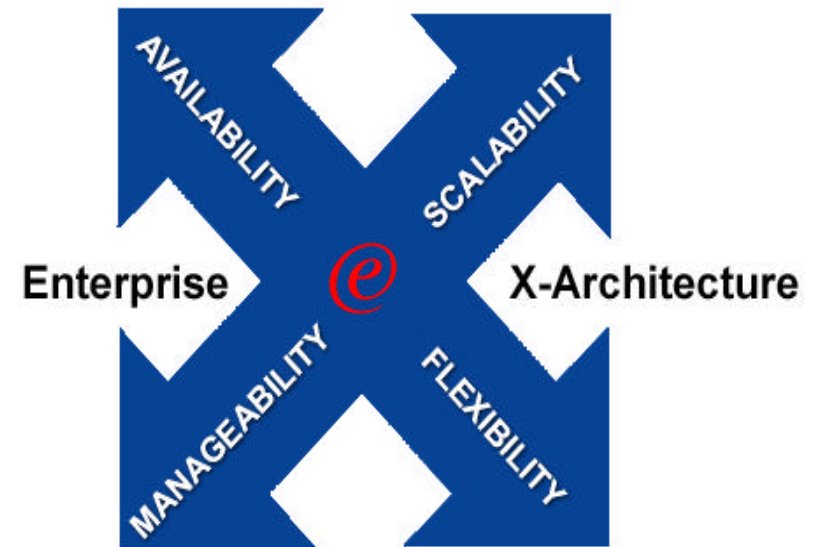
Mainframe-inspired Technologies
Enterprise X-Architecture Delivers Lower TCO

Processor
- Hyperthreading
- Scale-Up Systems
- Physical & Logical Partitioning
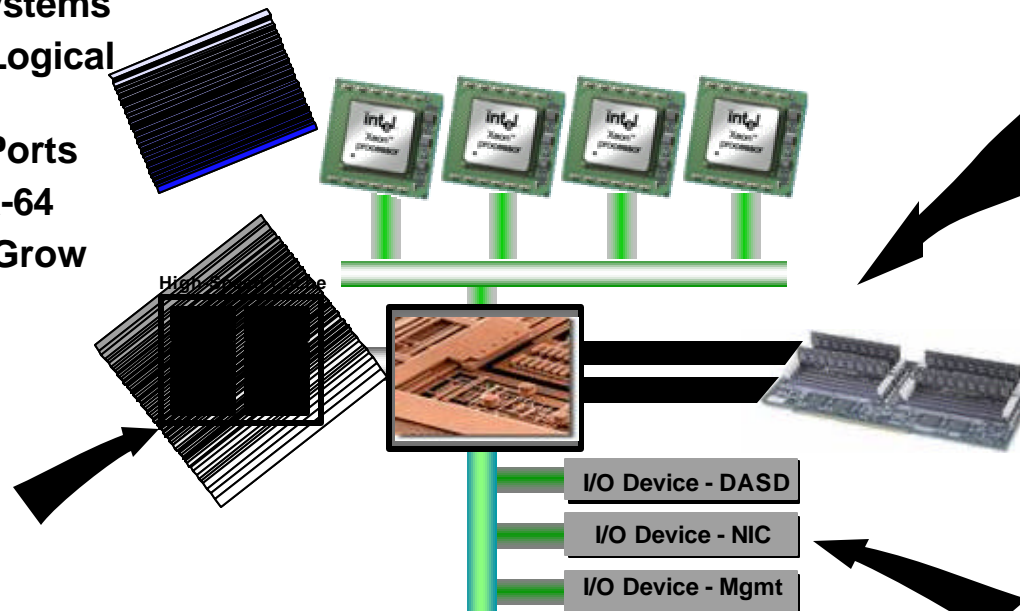- Scalability Ports
- IA-32 and IA-64
- Pay as you Grow

Memory
- Memory Mirroring
- Native Chipkill
- Redundant Bit Steering
- Highest Memory Bandwidth Available
- Scrubbing

High Speed Cache

I/O Device - DASD
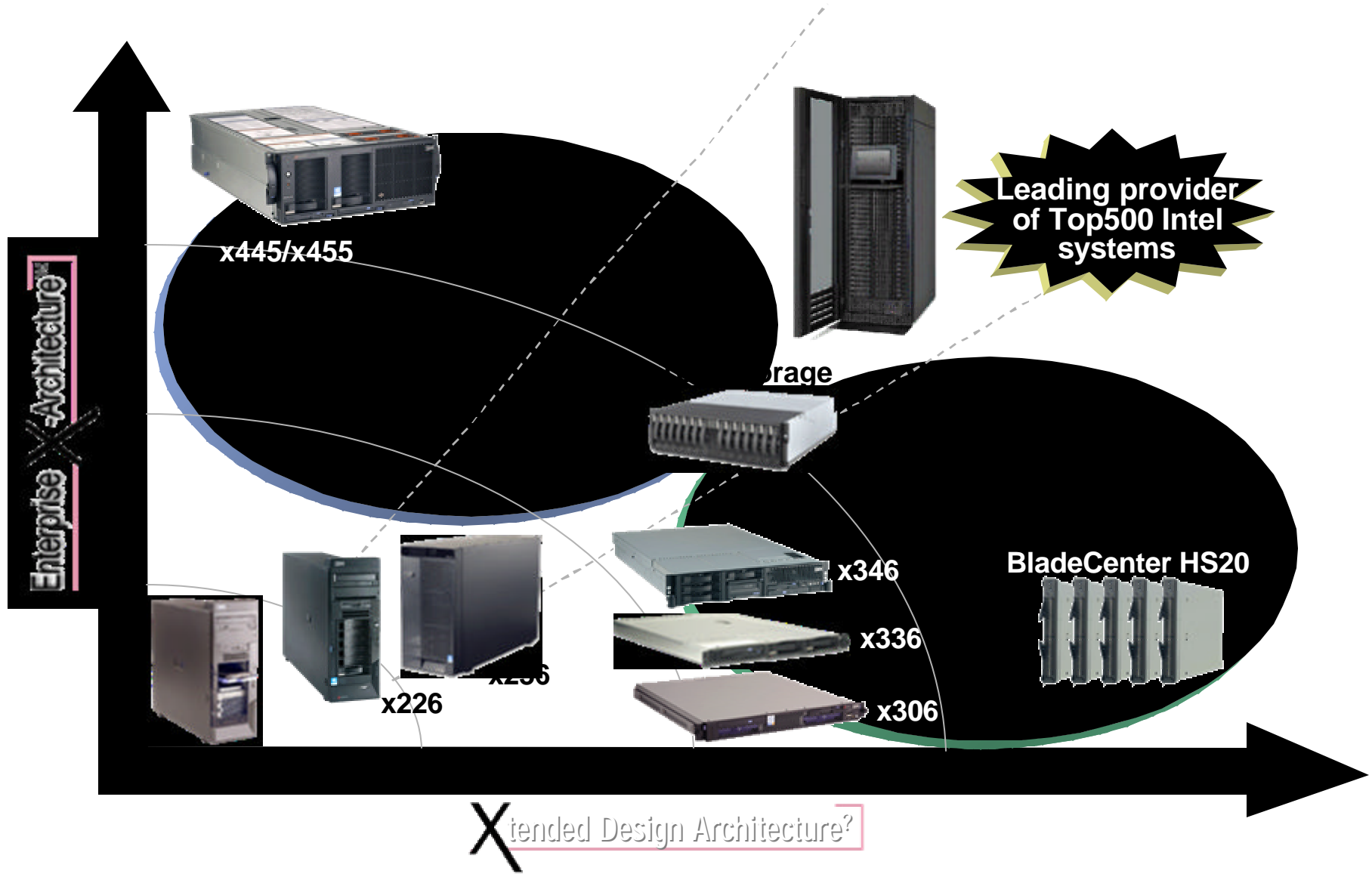
I/O Device - NIC

I/O Device - Mgmt

Cache
- High-Performance L4 System Cache
- 32 MB or 64 MB per SMP Exp Module

Input/Output (I/O)
- Remote I/O
- High Performance PCI-X

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IBM eServer xSeries Portfolio

Enterprise X-Architecture™

Leading provider of Top500 Intel systems

x445/x455

Storage

x346

x336

x306

x226

x236

BladeCenter HS20

Xtended Design Architecture²

BladeCenter Delivers IT Integration

Storage   **Applications**

IBM BladeCenter

INTEGRATED · VIRTUALIZED · AUTONOMIC · OPEN

Servers   **Networking**
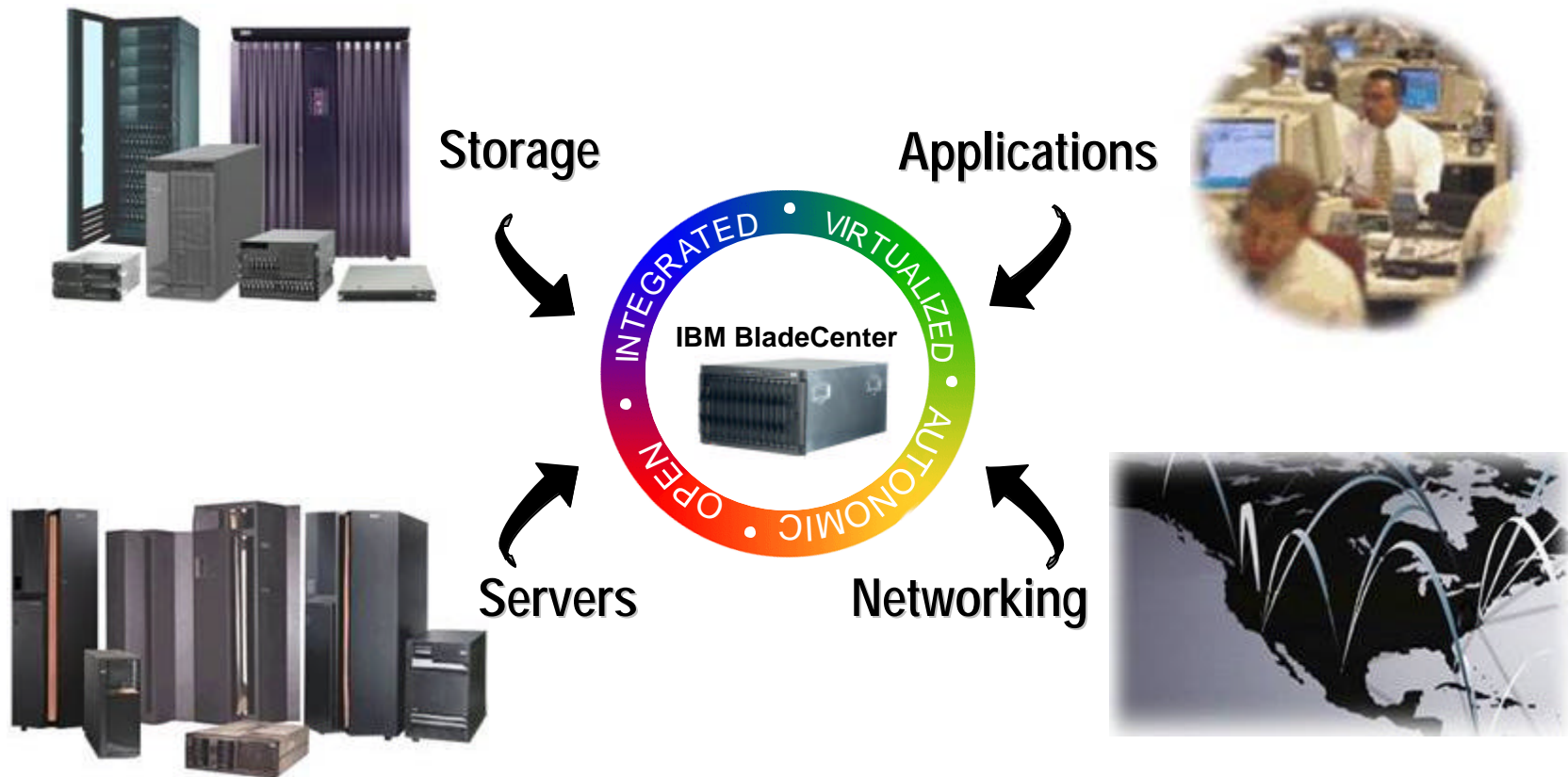
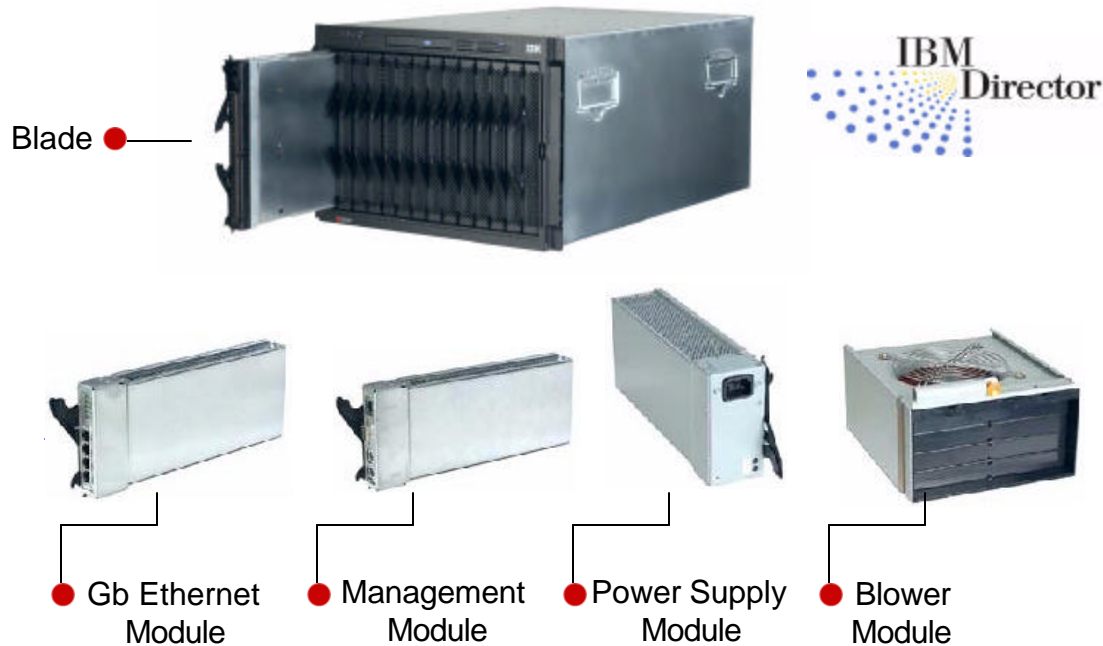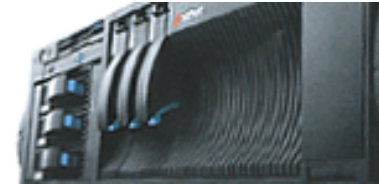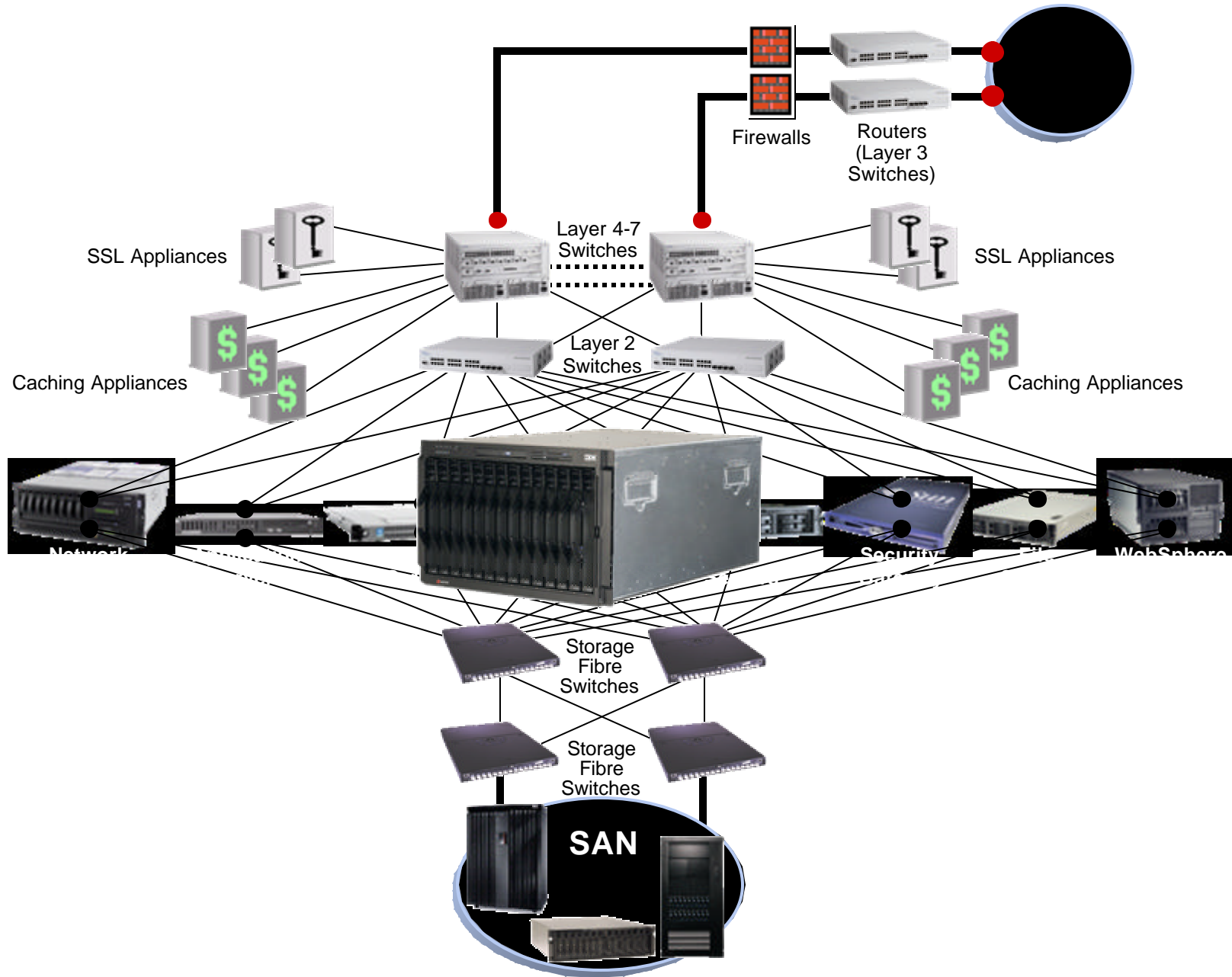*Integration can help dramatically reduce infrastructure costs*

BladeCenter Solutions

Industry-leading highly dense server form factor

- Intelligent management tools
- Innovative modular technology
- Open application architecture and simplified deployment

Blade ●———

Gb Ethernet
Module

Management
Module

Power Supply
Module

Blower
Module

Firewalls Routers
(Layer 3
Switches)

Layer 4-7
Switches

SSL Appliances SSL Appliances

Caching Appliances Caching Appliances

Layer 2
Switches

Network Security WebSphere

Storage
Fibre
Switches

Storage
Fibre
Switches

SAN

34

Simplify your Infrastructure

- Less cables
- Less components
- Better heat/cooling technology
- Easier deployment
- Faster installation
- Ease of management
- Efficient hydro use
- Integrated switch technology

Better infrastructure….. Reduced TCO

IBM BladeCenter HS20 and HS40 are powered by Intel® Xeon™ Processors

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A few last hardware considerations

Do I need any drivers? How will I know Linux works with my hardware?

IBM eServer xSeries and BladeCenter are certified for key Linux
 distributions

- •**Red Hat Enterprise Linux**

- •**SUSE Enterprise Linux from Novell**

 http://www.pc.ibm.com/us/compat/nos/matrix.shtml

Linux factory preloads are available

Downloads and drivers

BIOS updates, drivers, software updates, and fixes

 IBM: www.ibm.com/pc/support/site.wss/

IBM Linux Value

- Technical Support
- WW Competence Centers

Worldwide Porting Centers

Linux Technology Center

Linux Sales Specialists

Linux Whitepapers and Redbooks

Linux Integration Center
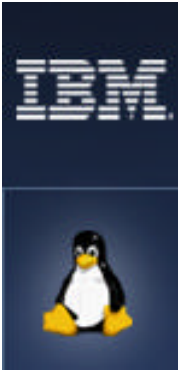
OSDL

Products

Linux Enabled Business Partners

Linux Services

www.ibm.com/linux

Get Started Today!

- Many companies are migrating from Unix to Linux on xSeries and BladeCenter -- for good reason

- Porting to Linux can be extremely straightforward

- The tools you need are readily available

- IBM eServer xSeries and BladeCenter are excellent choices for running Linux

Next--customer experience migrating from Unix to Linux

Cendant Overview

$18B Travel and Hospitality Company
Owns such companies as:

- Avis
- Budget
- Century 21
- Coldwell Banker
- ERA
- Sotheby's International Realty
- Days Inn
- Howard Johnson
- Knight's Inn

- Ramada
- Super8
- TraveLodge
- Villager
- Fairfield Resorts
- RCI
- Wright Express
- Galileo
- Thor
- CheapTickets.com

Cendant Travel Distribution Services (TDS)

- Challenge
  - Existing proprietary Unix environment was becoming increasingly expensive and difficult to run and maintain
- Solution
  - Port mission critical "Fares" application from proprietary Unix to Linux
  - Red Hat Enterprise Linux AS/ES (2.1 and 3)
  - IBM xSeries: x440, x445, x330, and BladeCenter
- Benefits
  - "We will reduce IT expenditures by 90%"
  - "IBM xSeries and Linux provide us a sustainable 99.999% availability while handling 300-400 transactions per second"
  - "By standardizing the architecture, we have reusable components that allow us to rapidly develop and deploy new services and applications to meet our customers' needs to be competitive in the market place"
    - Robert Wiseman, CTO Cendant Travel Distribution Services

Enterprise Services Platform

Enterprise Services Platform

High-Performance

Java 2 Platform, Enterprise Edition

WebSphere - JBoss

Redhat Linux Enterprise AS

IBM x440
4 CPU (2.8 GHz Intel Processors)
8+ GB RAM
2x36 GB Storage

Standard

Java 2 Platform, Enterprise Edition

Apache Tomcat

Redhat Linux Enterprise ES

IBM Blade Servers
2 CPU (2.8 GHz Intel Processors)
4+ GB RAM
1 x 40 GB Storage

Service Infrastructure

Security			Messaging	Directory	Transactions	Service Level Management
Identity Server	Policy Server	SAML	JMS	LDAP	X/Open XA Compliant	

Challenges Overcome

- Obtaining "C" Level Buy In
- Hardware Platform Selection
- In 2003, Cendant Pushed the Limits of the 2.2 Kernel
- In 2004, Cendant Continues to Push the Limits of the 2.4 Kernel

Why Cendant Chose IBM

- IBM's Complete Commitment to Linux across Hardware, Software and Services
- Responsiveness to Cendant
- Access to Deep Linux Skills
- 24/7 support for RedHat Enterprise AS and ES
- Linux Porting Services
- Linux Training / Education
- Simplified acquisition of Linux subscriptions