IBM @server iSeries

Linux - Myth or Reality
Linux is The Game Changer

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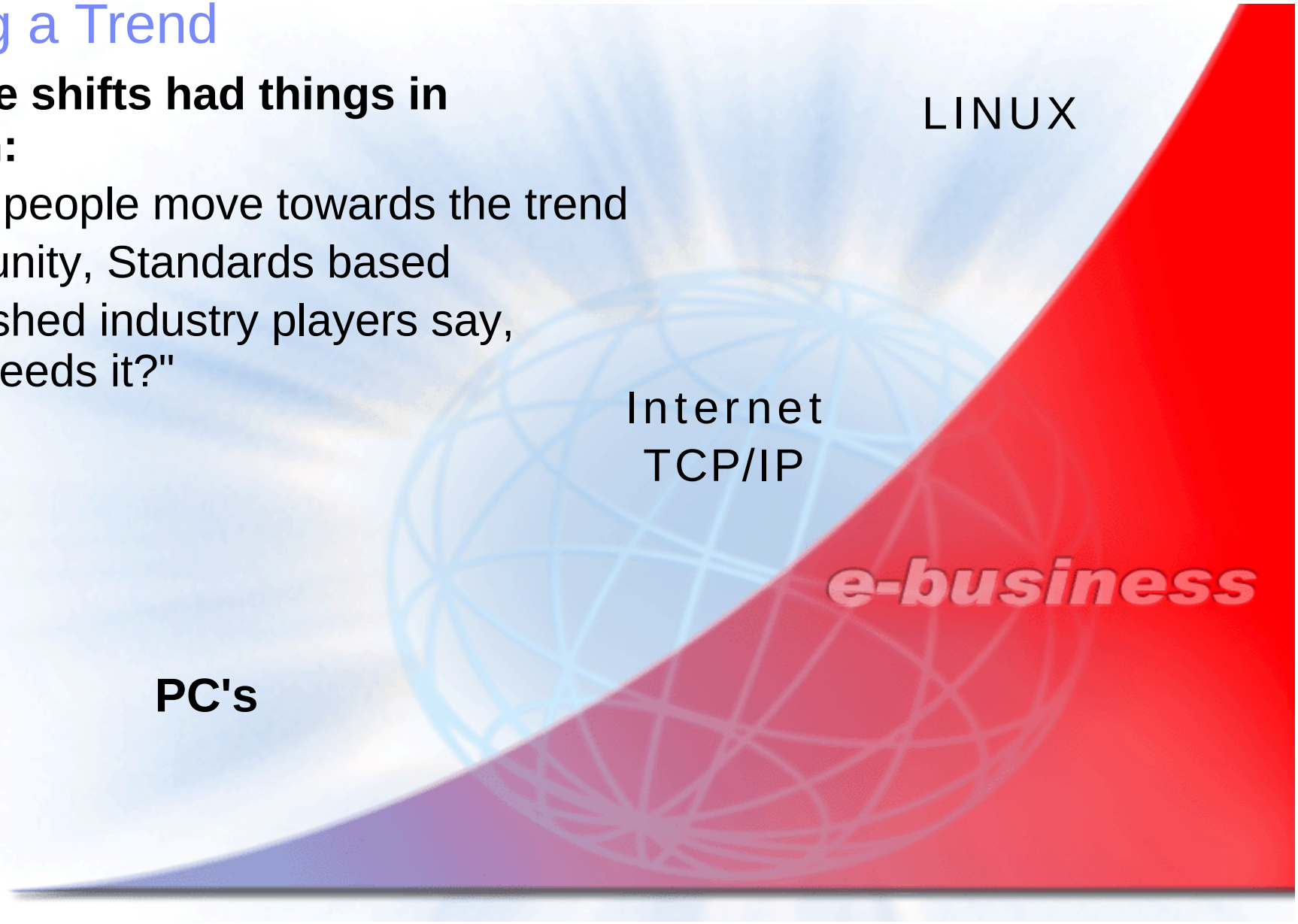
What is Linux

- UNIX-like operating system developed by Linus Torvalds
- Developed / tested by the Open Source community
  - 12 Years old
  - Highly disciplined / structured
  - High quality
  - Secure
  - Stable
- Packaged and shipped by distributors
  - United Linux
  - Caldera
  - Red Hat
  - SuSE
  - Turbolinux
  - Other regional distributors (Red Flag, Connectiva, Mandrake, etc...)

Finding a Trend

The three shifts had things in common:

- $$ and people move towards the trend
- Community, Standards based
- Established industry players say, "Who needs it?"



Linux Momentum

Linux will become the dominant server operating system in the United States by 2005.

Stacey Quandt, Giga, Business 2.0, June 17, 2002

Linux will have a "breakout year" in 2002. Now it seems clear that Linux has become a viable alternative for enterprise use.

IDC, January 2002

By 2006, Linux will be a key foundation for a strategic, cross-development-platform environment, accelerating Unix server consolidation, while creating a powerful alternative to Windows .NET.

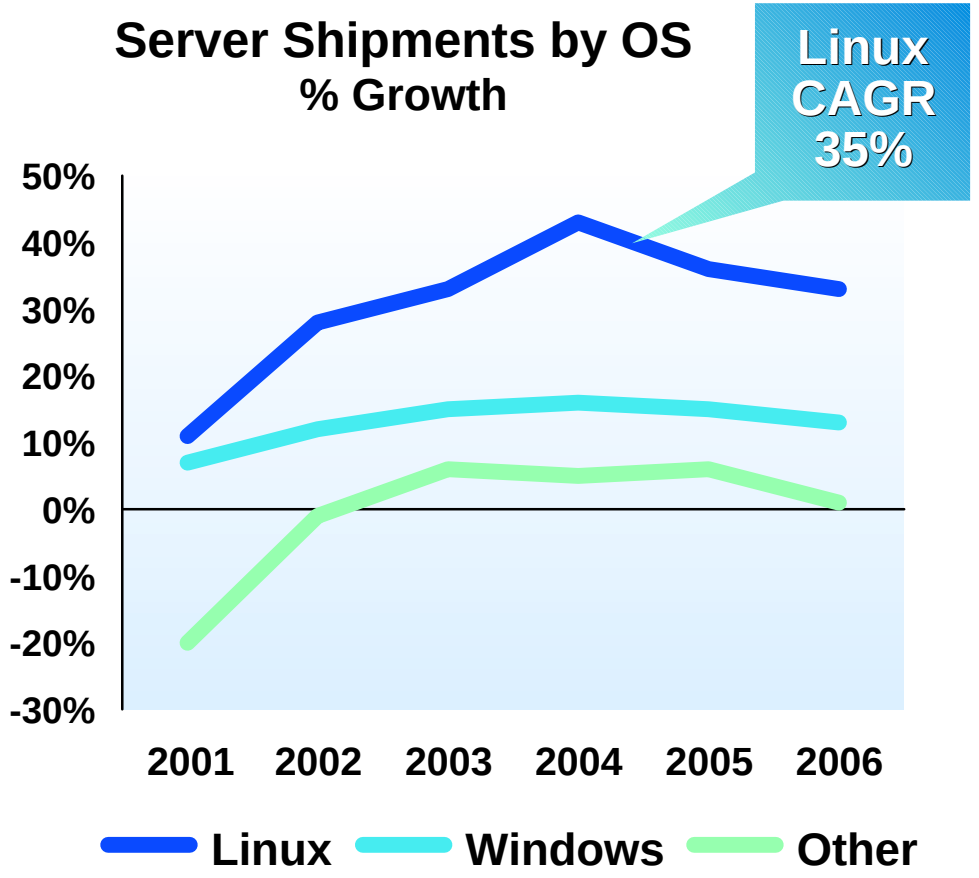
Gartner, May 2002

"It's going to be almost 30 times cheaper to run and maintain" (than Sun systems)

Josh Levine

Chief Administrative Officer and President,

e*Trade Technologies

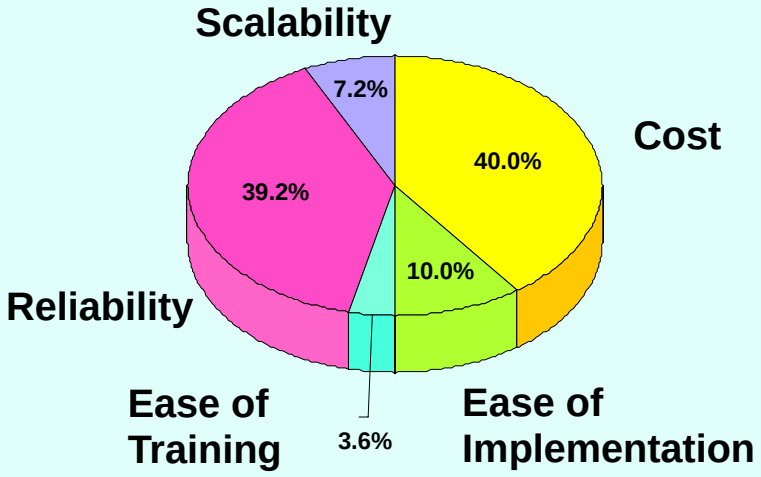


IDC, Enterprise Server Fundamentals, March 2002

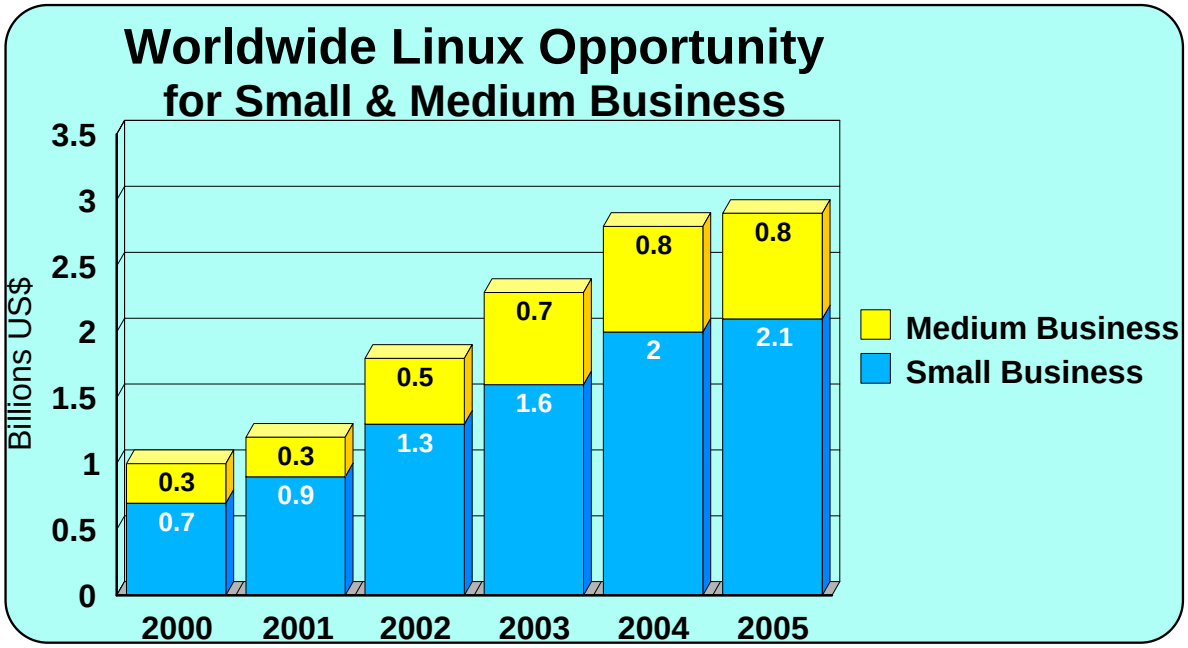
What is causing the migration to Linux?

- ✓ **Hardware upgrade costs**
- ✓ **Reduced or no license fees**
- ✓ **No vendor lock-in**
- ✓ **Reliability/Availability**
- ✓ **Choice of technical support and service provider**
- ✓ **Remote management**

Most Influential Factors in Moving to Linux *



Worldwide Linux Opportunity for Small & Medium Business



"Linux Has Gone Mainstream: Are You Up to It?"**

Linux server revenues

- $1.5 billion in 2000
- $2.5 billion in 2002
- Grow to a $15 billion by 2007

Today

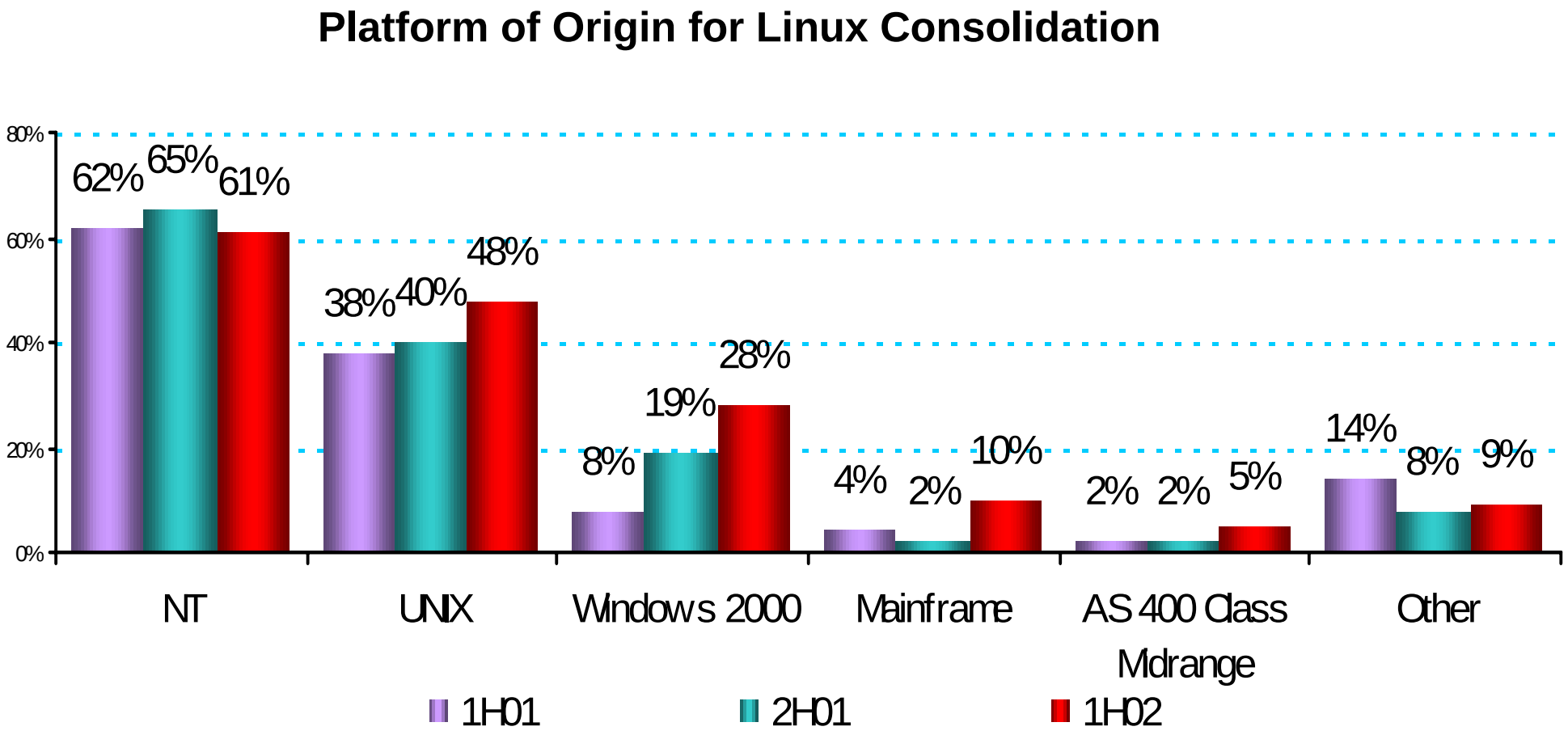
- 20 million+ Linux users
- 30% of the Web server market

Forces Driving Linux Acceptance

- Flexibility
- Open standards
- Distributed development / collaboration
- Price/performance
- Lack of license fees
- Lack of vendor lock-in

*Source: TechRepublic survey, 2001
**Source: Giga Information Group June 2002
***Source : IDC, GMV, Gartner Group

Linux Market

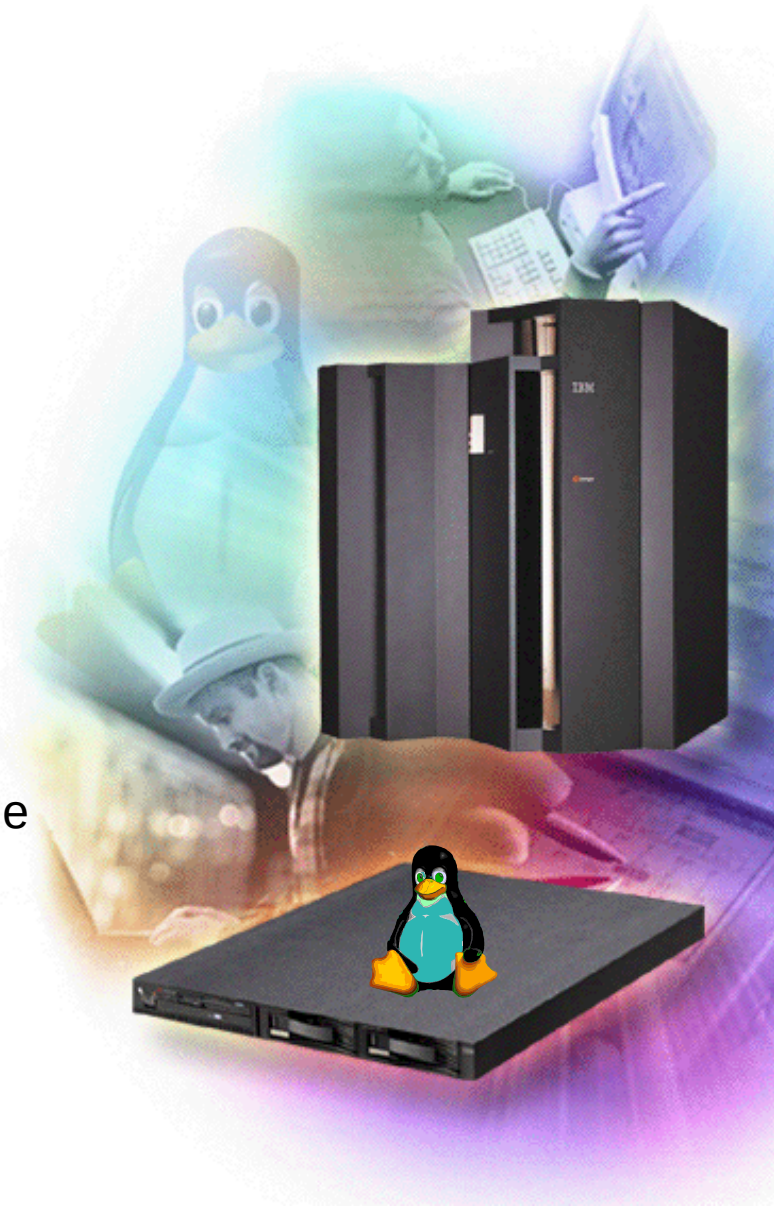


Server Brand Image Tracking: 2Q02 G7 Countries

Linux @ IBM

A Commitment to Linux across the Entire Business

- 1500+ Servers WW
- Internal Linux Projects:
  - www.ibm.com/linux & w3.ibm.com/linux
    - redundant Linux servers
  - Intranet search engine
    - Inktomi search engine
  - IGS Internet Vulnerability Security Scanning
    - 30k IP addresses/ week
  - Performance monitoring
    - 75% fewer Linux servers than NT servers for same workload
  - IBM Global E-mail Anti-virus Management
    - scans incoming/outgoing mail for viruses
  - 300mm Wafer Manufacturing Equip. Control
    - Much more reliable than Win2000



IBM Linux Hardware

zSeries

xSeries

Storage Systems

pSeries

iSeries

Network Station

Linux Cluster

Thinkpad

Point of Sale

Intellistation

IBM @server Family Supports Linux

@server zSeries:

- Many Linux servers on a single HW platform (thousands)
- Unmatched scalability
- Large applications portfolio
- Simplified Systems Management
- Runs native, in an LPAR or on VM
- zSeries - 64 bit & 31-bit
- Reduced cost of ownership

@server xSeries

- X-architecture innovation
- OS freedom of choice
- Affordable, Scalable, Reliable
- Appliances
- Rack-optimized servers
- Clusters (1300):
  - Integration and testing of IBM & OEM
  - Speed to market
  - xSeries rack optimized servers

@server iSeries:

- Reliable / Scalable
- Up to 31 Linux Partitions
- Integration with OS/400
- Resource sharing and management
- I/O Flexibility

@server pSeries:

- Native Linux 32-bit & 64-bit
- Linux Virtual Servers on @server p690
- Linux affinity on AIX 5L
- I/O Bandwidth and RAS
- Multiplatform flexibility

IBM Software for Linux

Java Development kit

WebSphere Site Analyzer

Network Dispatcher

SecureWay Wireless Software

WebSphere Host On- Demand

WebSphere Commerce Suite

Performance Pack Cache Manager for Multi-platform

WebSphere Application Server

WebSphere Homepage Builder

ViaVoice Dictation

DB2 Universal DataBase (UDB)

Application Server

VisualAge for Java

Tivoli Storage Manager

WebSphere MQ

Lotus Domino

Linux by Numbers

Some Proof Points

- 15 - 20 percent of new server OS shipments
- 31 Linux partitions supported on an IBM eServer iSeries
- 45 percent of new servers expected to ship with Linux on Intel by 2006/07
- 67 IBM software products running on Linux
- 250 developers in the IBM Linux Technology Center
- 4,200 Linux applications developed in five months using IBM software
- 4,600 Linux customers in service engagements
- 4,700 Business Partners supporting IBM Linux-enabled software
- 400,000 Linux developers around the world
- 24,000,000,000 dollar industry-wide opportunity over the three years ending in 2004

In fact, Microsoft sees Linux as its biggest threat. The firm's approach to the software can best be described as schizophrenic. It has declared Linux to be a cancer, technically inferior to Windows, and even downright un-American. And no wonder - Analyst firm Goldman Sachs' recent report called "Fear the Penguin" is just one of many that point to Linux' popularity and threat to Microsoft.

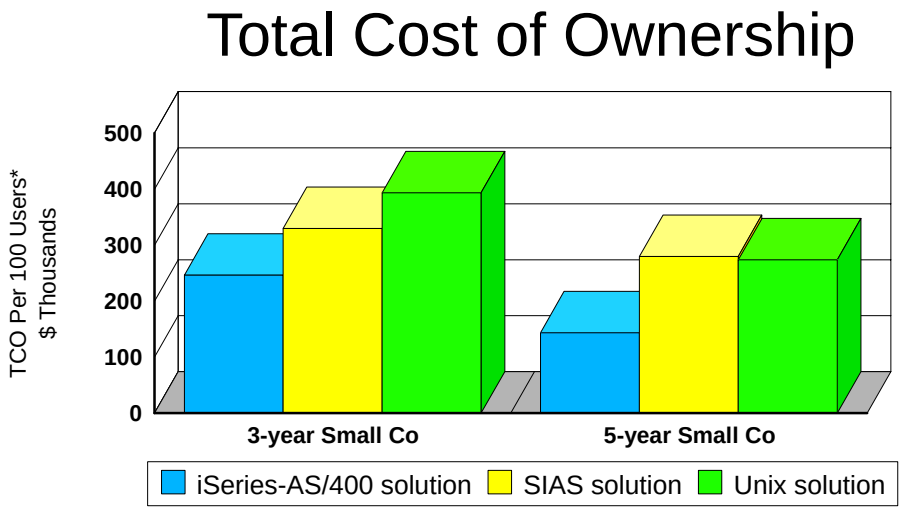
Why iSeries

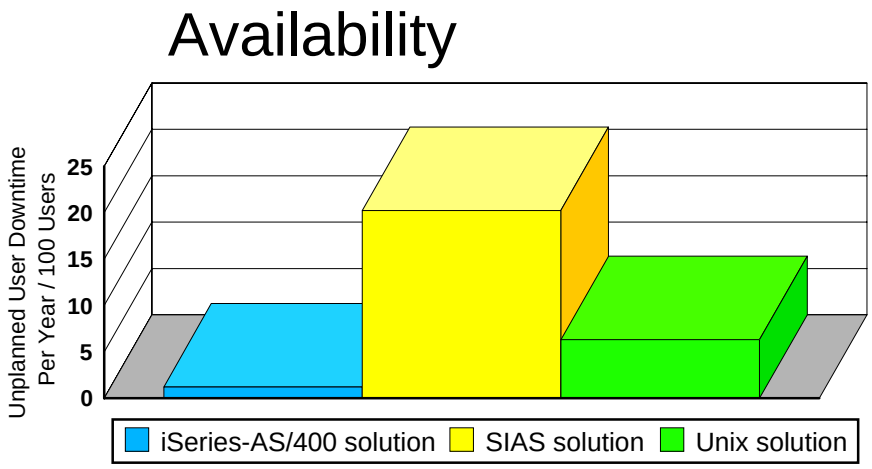
Low Total Cost of Ownership*

- iSeries: 3.5 servers per IT staff
- Unix: 2.2 servers per IT staff
- SIAS: 1.3 servers per IT staff

Low Unplanned Downtime*

- iSeries: 0.24 hours per month
- Unix: 1.00 hour per month
- SIAS: 2.70 hours per month



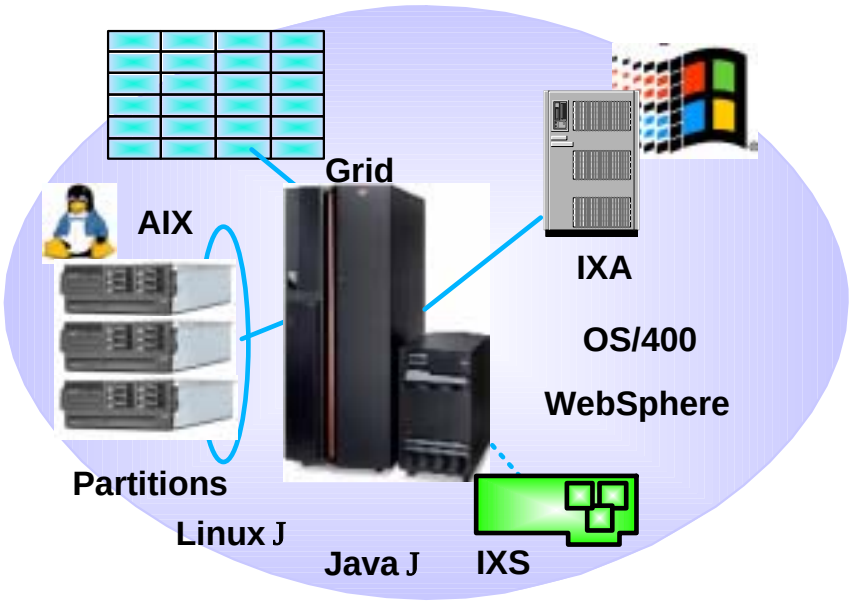


Integrated Solution

- Application Flexibility: Windows, Linux, infrastructure services
- Innovative Technology: Virtual storage, logical partitions, enterprise management

* Source: Server Cost of Ownership in ERM Customer Sites, A Total Cost of Ownership Study IDC Cost Ownership, Sept. 2001
http://www-1.ibm.com/servers/eserver/iseries/conslt/pdf/idctco.pdf
SIAS = Standard Intel Architecture Servers

iSeries in an on demand world



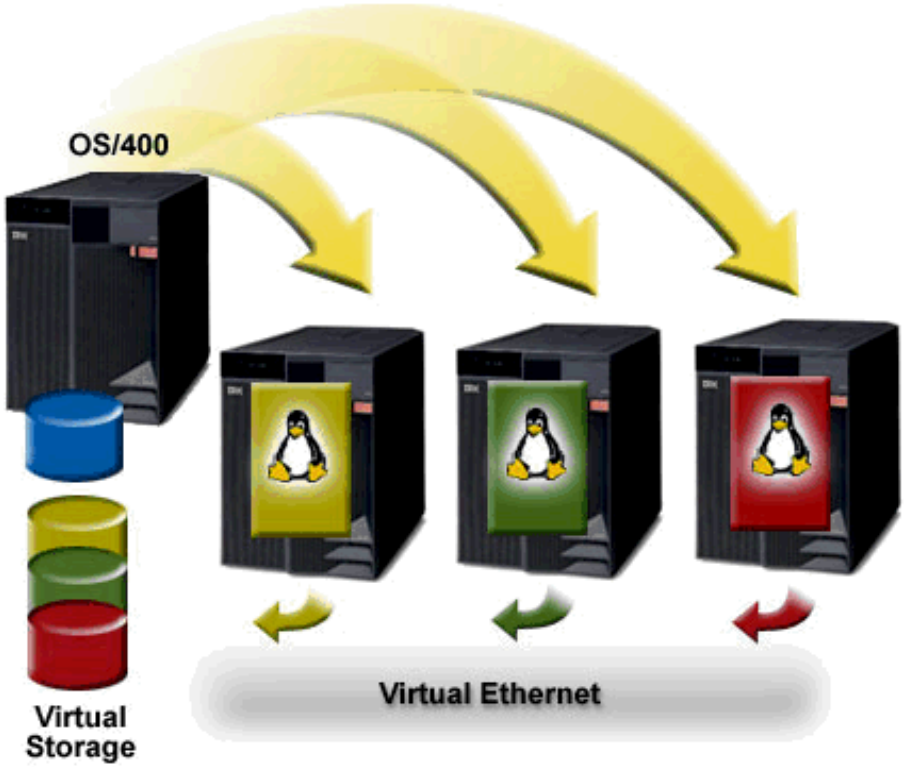
- **Award Winning Linux J Implementation -**
  - **Best of Show - LinuxWorld 2001**
- **Superior Java J Performance -**
  - **#1 in VolanoMark Benchmark**
- **Leading Domino iNotes Performance -**
  - **#1 in NotesBench iNotes Benchmark**
- **Lowest Total Cost of Ownership -**
  - **IDC Study of Medium ERP customers**
- **Highest Systems Availability -**
  - **IDC Study of Medium ERP customers**

iSeries On Demand Operating Environment

The world of business is changing in the on demand world, it makes sense to ***consider a server versatile and flexible enough to change*** along with it. Running multiple operating systems simultaneously (including Linux J and Windows) as your business evolves, the ***iSeries has the flexibility to thrive in any environment and can run practically any application.***

Linux on iSeries

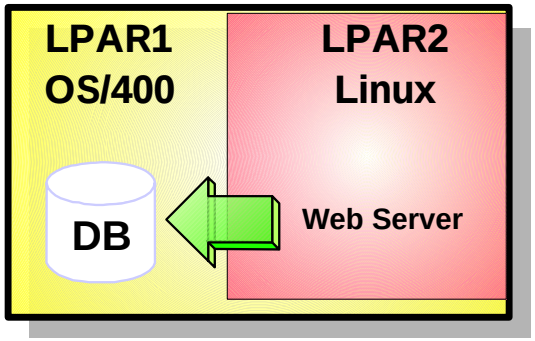
- On Demand Virtualization
  - Shared processor support
  - Dynamic resource movement
  - Virtual Storage
  - Virtual Ethernet
- Integration
  - Application
  - Management

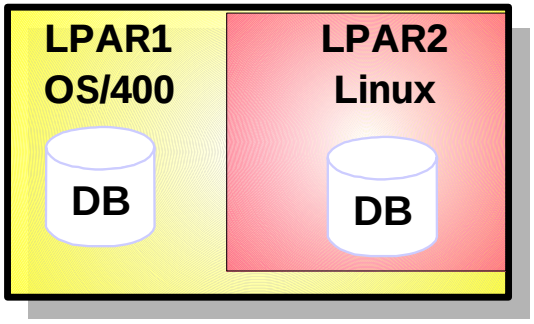


www.ibm.com/eserver/iseries/linux

Linux for iSeries

- Consolidation
  - Replace Windows or Linux Infrastructure servers
  - Run multiple Linux servers in partitions
  - Consolidation Lowers Cost of Computing
- Integration
  - Extend OS/400 applications with Linux Applications
  - Run Linux applications on same server as OS/400
  - Integration Lowers Cost of Computing
- Application Flexibility
  - Leverage Linux LOB application portfolio
  - Run Linux applications on iSeries
  - Flexibility Lowers Cost of Computing





Linux Distributors

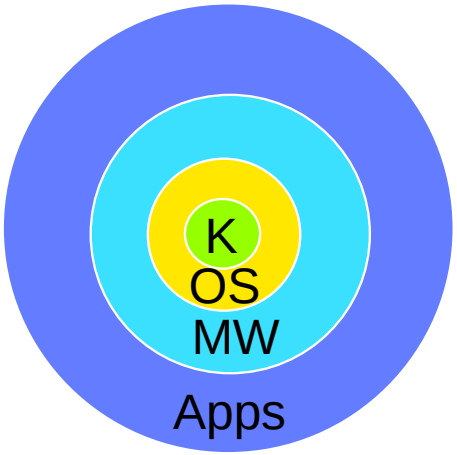
- Use PowerPC Linux kernel
- Add 100s of Operating System, Middleware, and Application components
- Add iSeries integration features
- Create Installation Documentation

Functions included in Typical Distribution

Functions	Key Middleware and Applications
Web Serving	Apache, Tomcat
Mail Server	SMTP(postfix), POP3, IMAP, Sendmail MTA
Print Server	Samba
File Server	Samba, NFS
Proxy Server	Squid
Security	NetFilter firewall, VPN, OpenSSL
Name server	DNS, DHCP, WINS, FTP
Directory	OpenLDAP
Database	MySQL, Postgres
Languages	C, C++, PHP, Pearl
Desktop	KDE, Gnome

The things that most people are using Linux for come with the distribution

Distribution



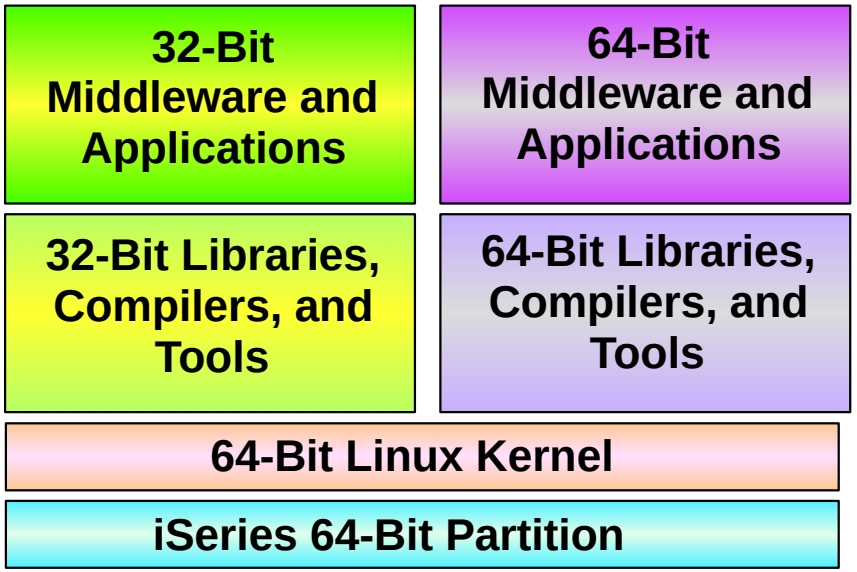
Kernel +
Operating System +
Middleware +
Applications =
Distribution

Linux Distributions for iSeries

- SuSE
  - SuSE Linux Enterprise Server 8
    - 64-bit kernel, 64 and 32-bit applications
      - Available December, 2002
- Turbolinux
  - Turbolinux Enterprise Server 8 for iSeries
    - 64-bit kernel, 64 and 32-bit applications
      - Planned Available March 2003
  - Turbolinux Server 7 for iSeries
    - 64-bit kernel, 32-bit applications
      - Available, April 2002
- Red Hat
  - Red Hat Linux 7.1 for iSeries (64-bit)
    - 64-bit kernel, 32-bit applications
      - Available, January 2003

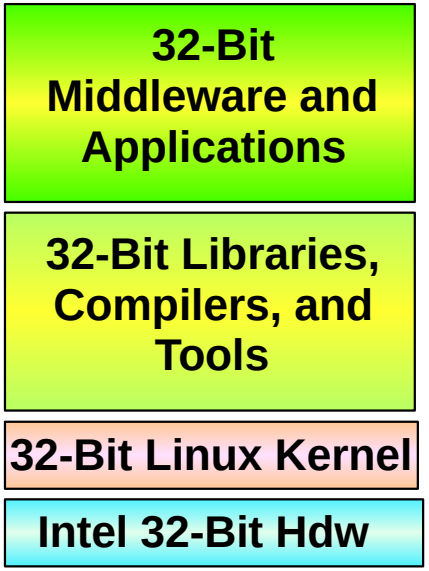
64-Bit Linux on iSeries

64/64 Linux Environment



- 64-Bit kernel supports 64 and 32 bit applications
- 64-Bit applications can leverage large address spaces and memory
  - Memory - 256 GB available on iSeries
  - Addressability - 2 TBs

Intel 32 Linux Environment



- 32-Bit kernel supports 32 bit applications
  - Memory: 4 GB is practical limit
  - Addressability - 3 GB

Linux on iSeries: Key Solutions

Included with Distributions

- Samba - file server
- Apache - web server
- Squid - proxy server
- DNS/DHCP
- MySQL - database
- ...

Open Source

- Tomcat - web application server
- OpenOffice - office suite
- ...

ISVs

- Symantec - Enterprise Firewall
- eOne - Commerce
- Sage - ERP Application Suite
- Bynari - mail server
- MAPICS - ERP
- Dimensional Insight - BI
- Vision Solutions - HA
- Cybozu - workgroup

More http://www-1.ibm.com/servers/eserver/iseries/linux/apps.html

iSeries and Windows Environment

90+% of iSeries customers also have Windows™ servers

Windows servers typically used for infrastructure applications

Number of Windows servers continues to grow, along with management costs

Number of NT Servers in iSeries Accounts

Number of Servers	% of Customers
1-5	57%
6-10	14%
11-20	10%
21-200	17%
201+	2%

IBM IT Trends Survey - 4Q 2001, 100-999 Employee Site Data

Infrastructure Solutions

Existing infrastructure workloads

Functions	Key Middleware and Applications
Web Serving	Apache
Mail Serving	POP3, IMAP, Sendmail MTA
Print Server	Samba
File Server	Samba, NFS
Proxy Server	Squid
FTP Server	w-ftpd
Firewall	NetFilter
DHCP	dhcpd
DNS	bind
Languages	C, PHP, Pearl, Java

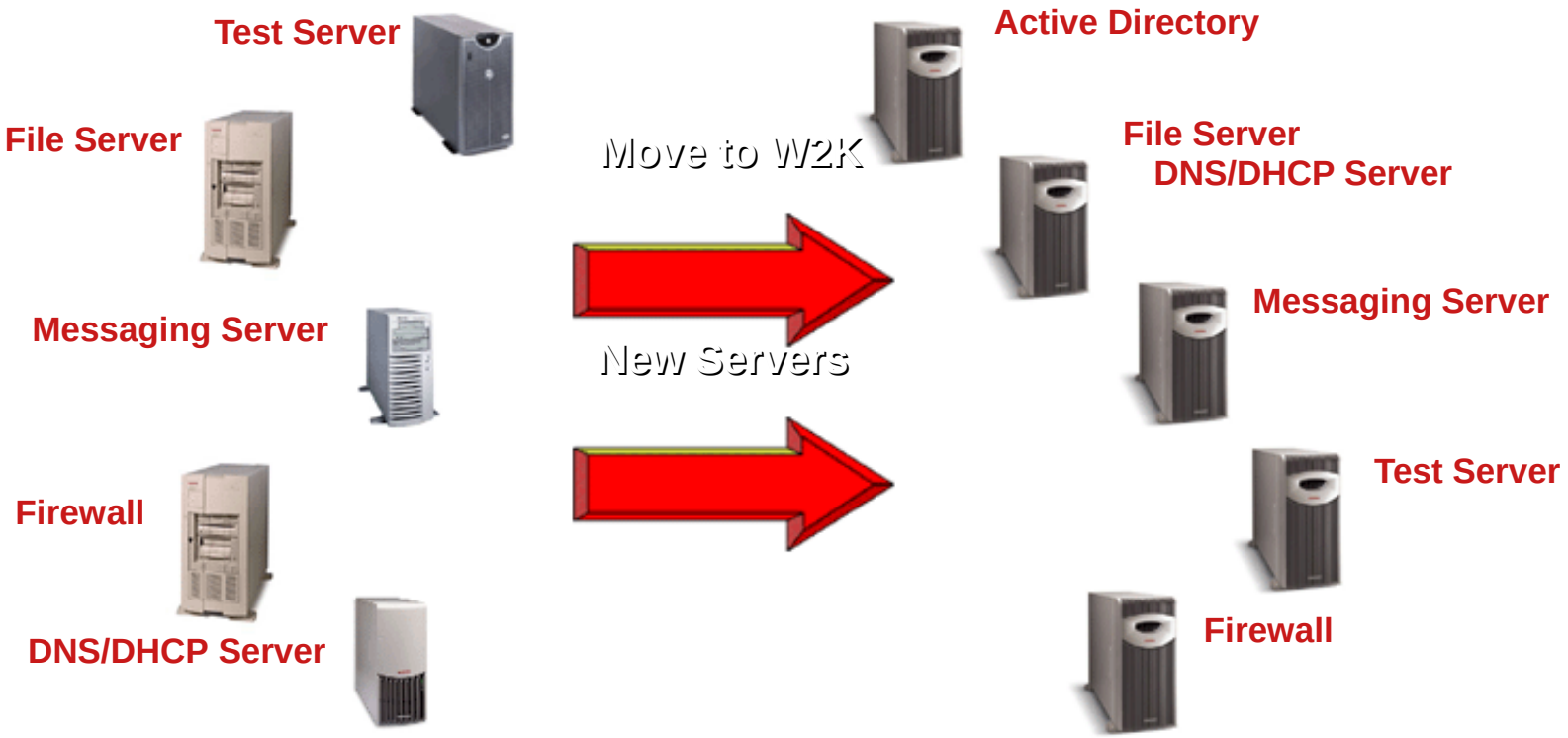
Optimise hardware resources

	Peak-hour Utilization	Prime-shift Utilization	24-hour Period Utilization
Mainframes	85-100%	70%	60%
iSeries	80-98%	70%	60%
UNIX	50-70%	10-15%	<10%
Intel-based	30%	5-10%	2-5%

Source: IBM Scorpion White Paper: Simplifying the Corporate IT Infrastructure

The Microsoft/Intel Dilemma

Ever-faster hardware, but systems management issues STILL remain



- Customers STILL have multiple servers to maintain
- Environment is STILL complex and constantly changing
- New applications STILL typically require new servers

Scenario #1 - 5 Intel Servers - Current Environment

Windows Application Server

Windows Application Server

Customer Environment

- 5 Different servers
- Must move to Windows 2000
- Growing operations costs and limited staff
- Poor availability
- Multiple, inconsistent backups
- Ageing capacity in a variety of places
- Servers coming off maintenance
- No test environment
- Cuts to IT Budget

File Server

DNS/DHCP Server

File Server

Scenario #1 : 5 Intel Servers - Price Comparison

Option A: 4 New Compaq Servers

File Server
DNS/DHCP

Test Server

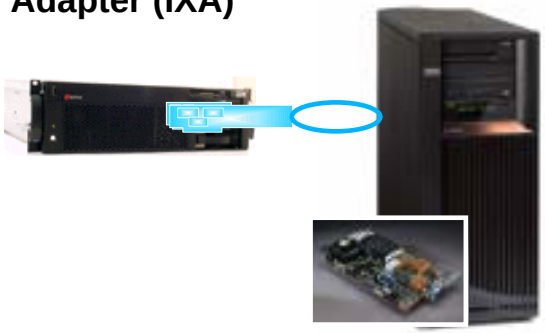
File Server

Windows
Application
Server

Option B: iSeries and xSeries

Windows Application Server (2w)

xSeries 360 & Integrated
xSeries Adapter (IXA)



iSeries
Model 270

File Server
DNS/DHCP

1 GHz Integrated
xSeries Server

DNS/DHCP
File Server
(Test Server)

Server Consolidation Scenario

- Customer Scenario:
  - Five Infrastructure Intel Servers Installed
  - Customer facing increased complexity and outages
  - Servers coming off of maintenance

(4) HP ProLiant Servers

(2) HP ProLiant DL360G2
1 processor
1 GB Memory
Tape
(5) 17 GB Drives /ea.
(2) HP ProLiant DL360G2
2 processors
2 GB Memory
Tape
(5) 17 GB Drives/ea.

Windows Server Software
Win2K Servers(4)
Win2K Clients (100)
Upgrade Protection
Limited Support *

~~$76,704~~

New iSeries with xSeries

iSeries 800 Value
300 CPW
(1) IXS
(2) IXA
(2) xSeries x235
Dual Processor
2GB Memory
Standard Edition
OS/400
DB2 UDB for iSeries

Windows Servers Software
Win2K Servers (2)
Win 2K Clients (100)
Upgrade Protection
Limited Support*

$70,707

New iSeries w/ Linux Partition Solution

iSeries and Linux LPAR
i810
1470 CPW
2 GB Memory
(12) 17GB Drives

SW Standard Package
OS/400
DB2 UDB for iSeries

SuSE SLES 8

$56,726

Better Price Plus:

- Centralized Storage Management
- Operations Simplified
- Outages Reduced
- Dynamic Resource Allocation (LPAR)
- Reduced SW costs (open source)
- Simple Server Duplication
- Higher Availability with Test Partitions

* Microsoft support - 3 calls/yr per server

Source: www.hp.com and www.microsoft.com on 1/3/03

Scenario #1 : 5 Intel Servers

Before

- ✗ Multiple servers to maintain
- ✗ Constant change increasing complexity
- ✗ Growing operations costs, limited staff
- ✗ Poor reliability experience

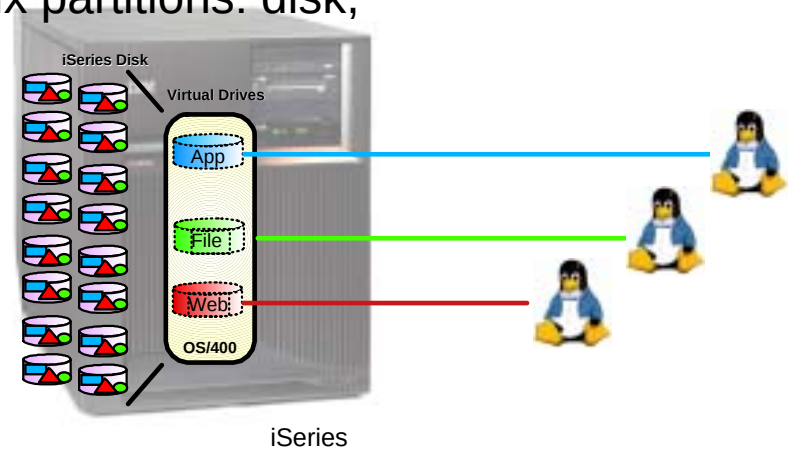
After

- ✓ Operations simplified
  - ★ Flexible, centralised storage management
  - ★ Integrated User administration
  - ★ Leverage iSeries operations
- ✓ Outages reduced
  - ★ iSeries backup and recovery
  - ★ Test environment reduces impact of change

Linux on iSeries Advantages

- Run multiple Linux images on one Server
  - Up to 31 Linux partitions
- Dynamic Resource Movement
  - 1/100th of a processor
  - Virtual storage spaces
  - Capacity Upgrade on Demand
- Storage Virtualization
  - Linux shares resources with OS/400 and other Linux partitions: disk, tape, CD, DVD
  - Simple to duplicate servers
- Virtual Ethernet for safe/fast communications
  - Up to 16 networks under the covers
- Linux to OS/400 Application Integration
  - ODBC and JDBC access to DB2/400
  - Samba and NFS for file access
- Management Integration
  - LPAR and Storage

# of Processors in Server	Maximum # of Linux Partitions*
1	9
2	19
4 and >	31

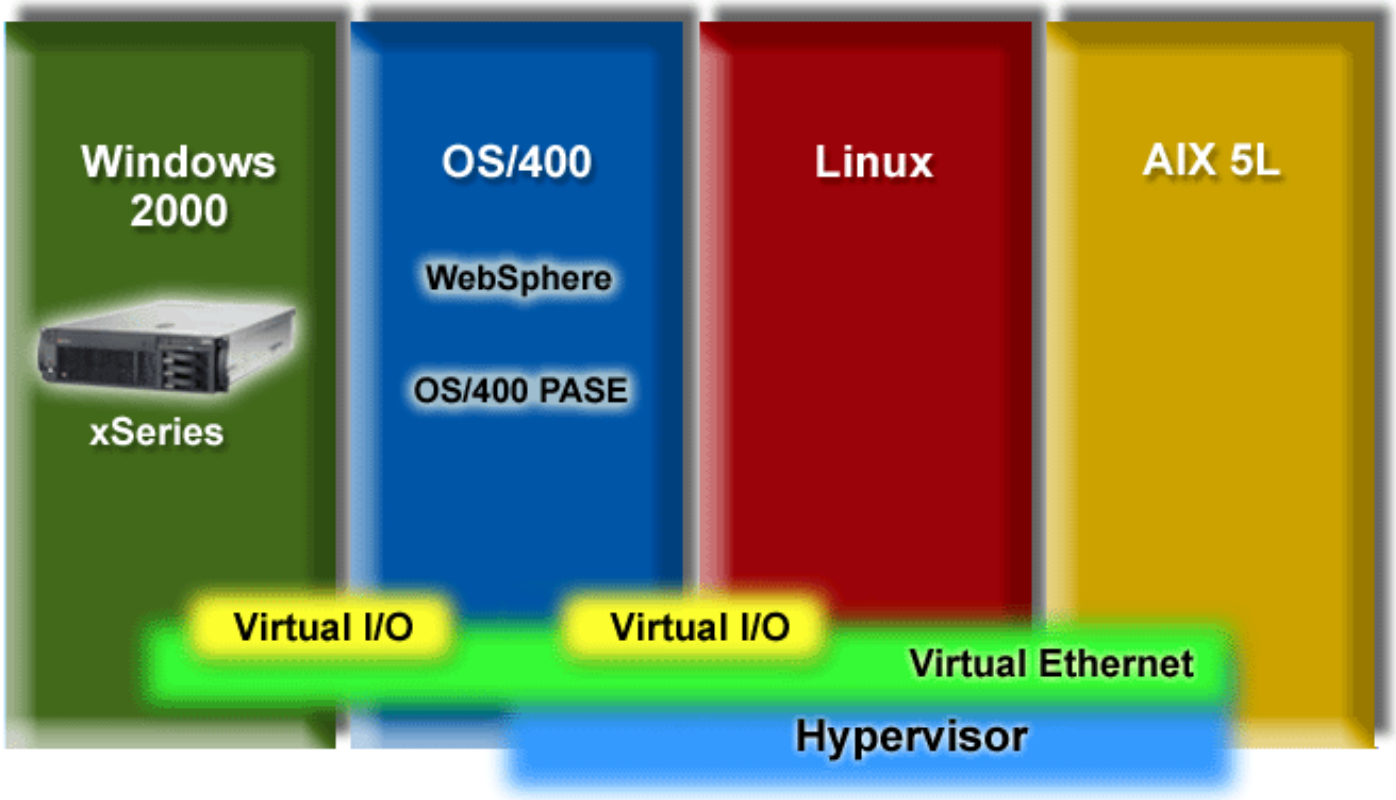


Why use an iSeries Server to Consolidate to Linux

What if Linux on iSeries could:

- ✓ **Save one server outage a year**
  - With virtual disk support, customers can test changes on exact copies of their production servers, reducing the impact of change
- ✓ **Save one from buying "extra" disk space and RAID adapters on each standalone PC server**
  - All the disk resources are centralised on the iSeries. Each Linux partition is given what they need.
- ✓ **Save one from buying tape drives for each standalone PC server**
  - Each of the Linux partitions can utilise the high speed iSeries tape
  - Linux backups can be consolidated with OS/400 backups and policies
- ✓ **Save one from losing a file due to inconsistent backup policies**
  - OS/400 backup procedures can be extended to Linux servers
- ✓ **Save one from travelling to the server to reboot it**
  - OS/400 can be used to restart the Linux server from any PC
- ✓ **Save one from buying too much capacity**
  - Processor, memory, and I/O resources can be independently moved between partitions
- ✓ **Save one money by using Open Source software**
  - Many popular infrastructure applications and middleware are available via open source

iSeries Server Consolidation



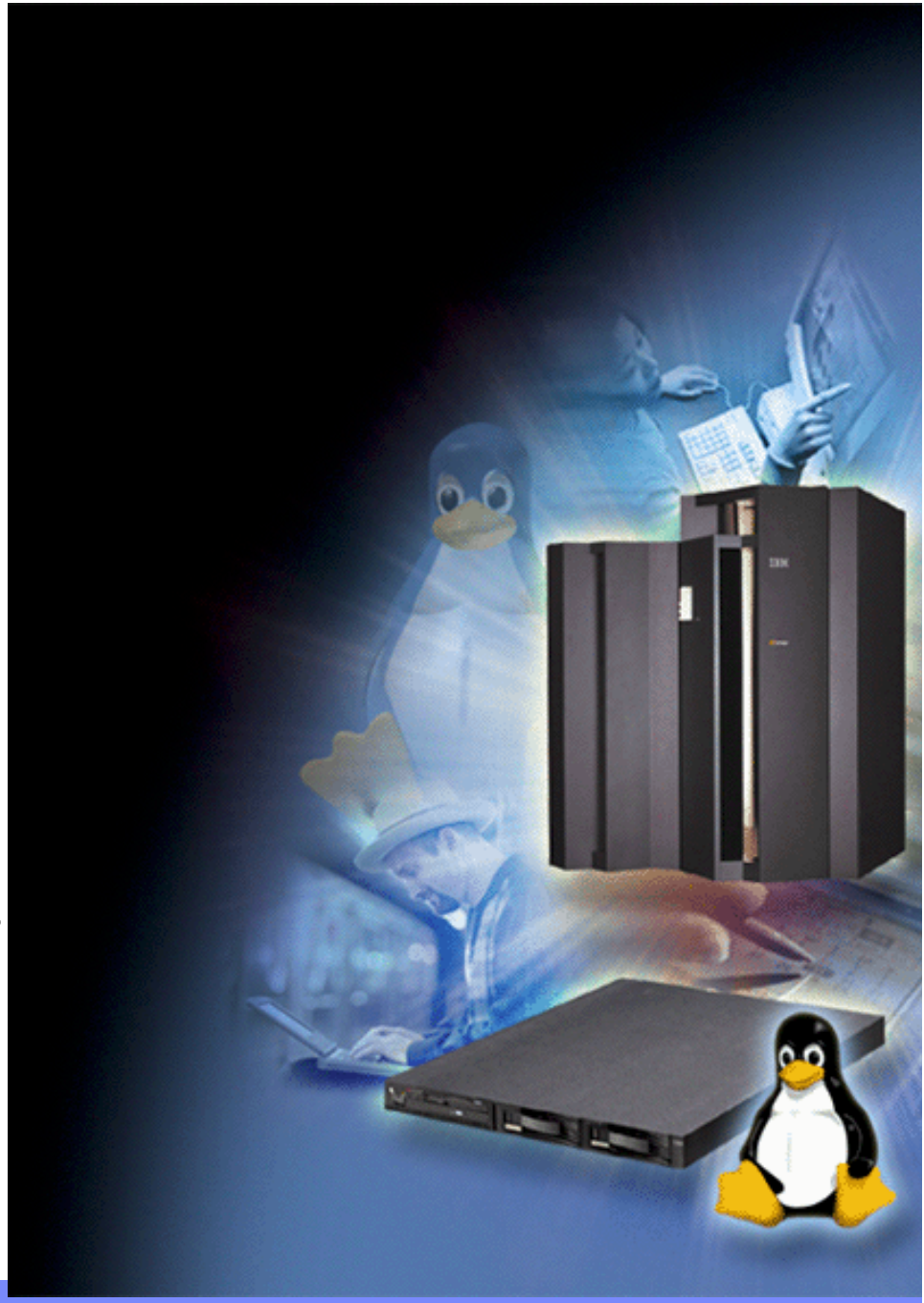
"IBM's iSeries minicomputers provide its customers with perhaps the best overall platform for server consolidation."

ENTmag.com Server Consolidation Primer http://entmag.com/news/print.asp?EditorialsID=5626 12/9/02

***Statement of Direction: This presentation contains IBM plans and directions. Such plans are subject to change without notice.**

Linux in Summary

- Reduces customer costs
- Increases freedom of choice
- Fosters innovation
- Promotes a culture of open standards
- Rewrites the rules for operating systems



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e-business logo	OS/400	eServer
IBM	xSeries	

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