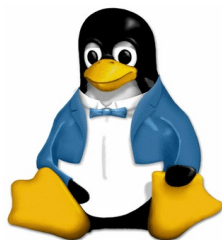


Migrating and Consolidating Windows or Unix Workloads to Linux on POWER and OpenPower



Ron Gordon, Linux on POWER
gordonr@us.ibm.com

Key Factors Driving Linux Implementations

I don't want to sacrifice any performance and be sure I am making a strategic decision!!!

Why accept lower levels of security and reliability when I can provide higher levels of service to my customers?

I don't want to be locked into any single operating system, platform, or solution technology. It's about choices.

Why pay more when you can get the same or better function for less with more flexible licensing?

e-Infrastructure - Mail / Messaging

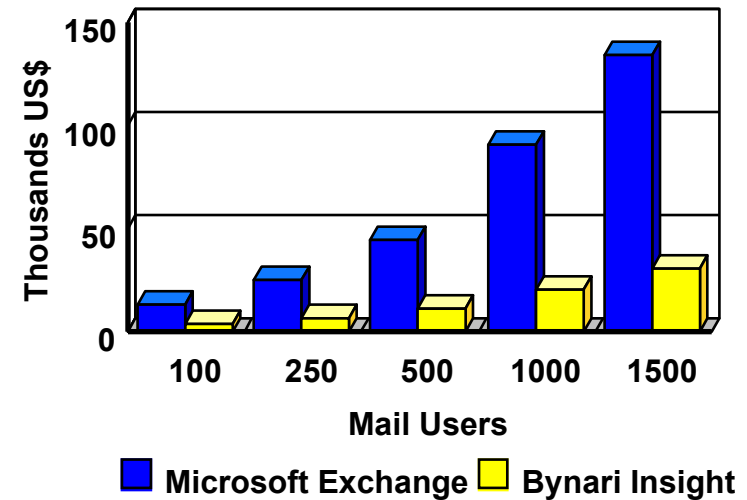
Simple, robust, scalable, cost effective, and reliable collaborative Mail Server

Linux Mail / messaging Solution

- ❑ Microsoft Exchange alternative/replacement
- ❑ Compatible with wide variety of mail clients, including Microsoft Outlook
- ❑ Multi-platform support
- ❑ Significantly lower cost - up to 70% savings
- ❑ Proven Linux security & virus protection
- ❑ Supports Microsoft, Internet, and Open Source APIs

Up to
70%
savings

Bynari Insight vs Microsoft Exchange
Mail Server Costs



As shown by Bynari in a 2003 analysis

bynari



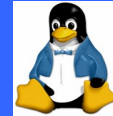
SENDMAIL

Should I Move to Linux or Stay on Windows?

Consider Windows if:

- 1) Windows security or licensing costs not a critical factor.
- 2) Use only Windows-based applications such as Exchange Server and SQL Server.
- 3) Have invested primarily in Windows skills and has little or no Linux/Unix skills.
- 4) I am a total Windows shop

Consider Linux if:



- 1) Looking for ways to reduce licensing costs
- 2) Desire a more reliable environment
- 3) Uncomfortable with recent security exposures in Windows
- 4) Would like to reduce the number of different architectures and operating systems.
- 5) Have or will create Linux/Unix skills

.....and when you choose Linux, which platform is best??

Which Platform....Intel based or POWER based?

Decision criteria for Linux server selection:

- **Application selection** -- is the application enabled for multiple Linux distributions
- **Application characteristics** -- capacity, performance, transaction rates, I/O, floating point, integer
- **Encumbent system** -- do you prefer to run on your existing strategic platform for skills reasons
- **Reliability** -- application availability requirements
- **Integration** -- how do you plan integration, on single system or multiple architectures
- **Virtualization** -- dedicated system or virtual servers
- **Device Requirements** -- are all devices supported as needed
- **TCO** -- does solution offer favorable total cost of ownership



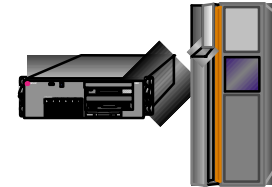
Platform Characteristics

^ xSeries



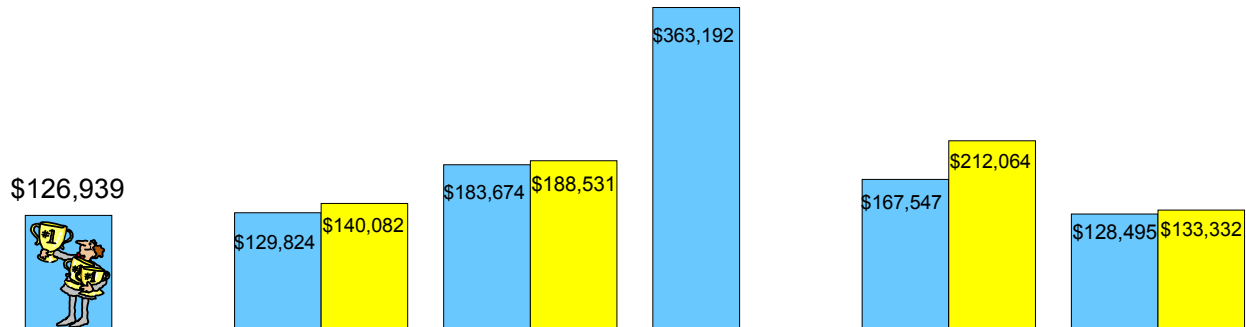
- Primarily 32-bit
- Evolving 64-bit
- Windows or **Linux**
- Real memory to 32GB
- Scalability to 16 way
- Growth by scale-out
- Virtualization via software

^ pSeries



- 64-bit proven architecture
- Ability to run 32-bit or 64-bit applications
- AIX or **Linux**
- Supports scale-up and scale-out
- Large memory capabilities – to 1 TB
- High scaling – to 32 way
- Hardware virtualization engine
- Defined future growth path
- Very high reliability characteristics
- Very high performance capabilities
- **Surprisingly low TCO**

Linux on POWER – the best choice

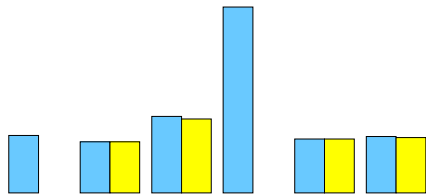


- **Linux on p650 provides the lowest TCO**
 - 290% less cost than Sun
 - 60% less than IA-32 Windows cluster & 13% less than IA32 Cluster with Linux
 - 30% less than clustered Itanium2 systems and 3% less than single Itanium2 SMP
- **PLUS the highest Quality of Service**
 - Uniques On-Demand features for dynamic growing enterprises
 - Expandability for p650 much greater than Itanium – POWER family, memory, disk, etc
 - Significantly higher reliability than Intel – cost of downtime not included
 - Hypervisor for p650 superiority to VMWare or clusters – more efficient
 - p650 also delivers the lowest \$ per operations/sec by over 10%
 - TCO advantages only get better with POWER5 and other future products

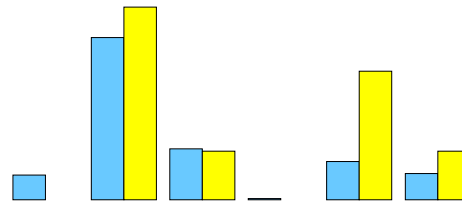
TCO Study by Robert Francis Group

February 2004 – 3 year analysis – Enterprise Workloads

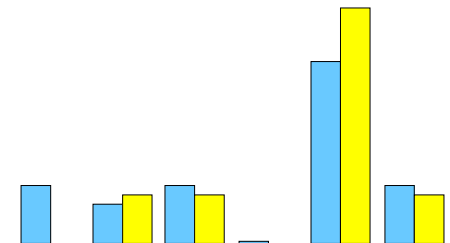
p650 is 3x lower priced than Sun - initial p650 h/w cost comparable to other platform solution costs



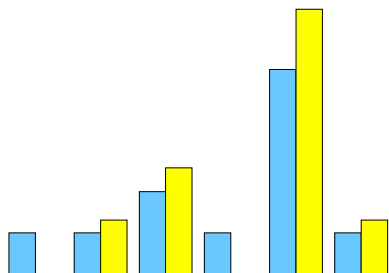
HP x86 systems require VMWare for partitioning - \$0 for p650



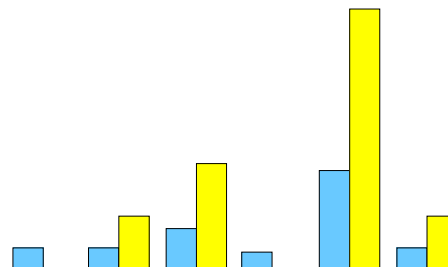
Cost for cluster support is 4-5x p650



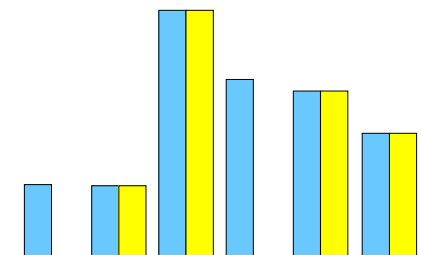
Cost for administering Windows cluster is 6-7x p650



Cost for applying security patches is 4-5x for Windows and over 10x for Clusters



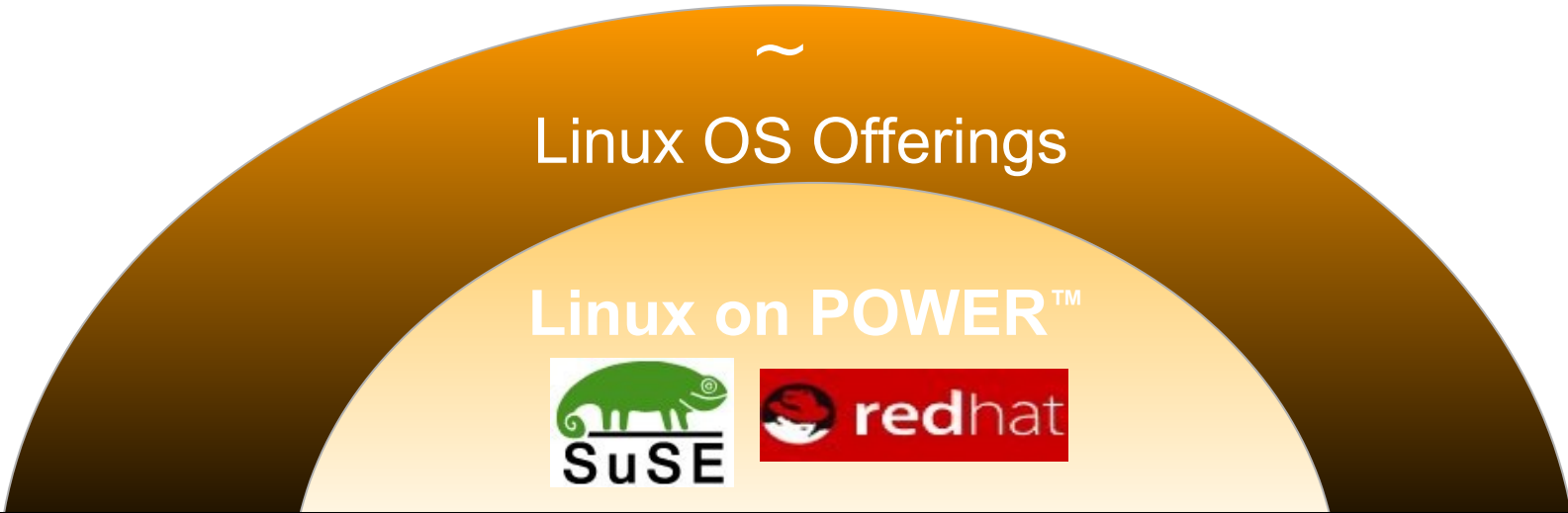
p650 power, cooling, floor space 2-3x less than others



IBM ~ Linux OS offering umbrella



Linux



IBM ~
xSeries®



IBM ~
BladeCenter™
HS20 / JS20



IBM ~
OpenPower



IBM ~ i5 /
iSeries™



IBM ~ p5 /
pSeries®



IBM ~
zSeries®

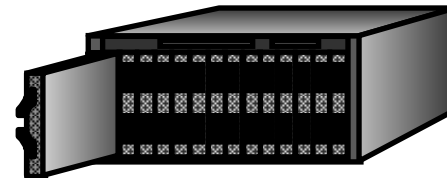
JS20 POWER-based Blade - LINUX

High-volume Linux on POWER product

- **Power-based blades add the value of POWER4 to BladeCenter**
 - f New Entry price point for POWER
 - 64-bit POWER at IA32 price
 - f Leadership price/performance
 - f 64-bit Linux capability
- **POWER-based blades reinforce BladeCenter value**
 - f Integration
 - f Low management and operational costs
- **Power-based blade has leadership performance with new VMX technology**
 - f JS20 Beats Itanium by a Factor of 6 on LSBench

\$2,699
64-bit
POWER at
IA32 price

Power Blade
1 BladeCenter
slot



BladeCenter
7 EAI x 17.5"W x
28"D

Introducing the IBM ~ OpenPower™

Family of entry IBM POWER5™ systems tuned for the Linux OS

FEEL THE POWER OF LINUX.

Introducing the IBM eServer™ OpenPower™ system. With this server you can have it all. Power Architecture™ technology and the Linux® operating system. Outstanding reliability features and 64-bit computing. This is what you've been waiting for. A server specifically optimized for Linux. It's a pure's dream. It's instant stride into the Linux revolution. And it's an affordable way to adopt Power Architecture technology on demand. Join the movement at www.ibm.com/europe

IBM

eServer



OpenPower systems keep business-critical applications up and running

OpenPower provides improved performance, reliability and stability

Tuned for Linux OS means improved performance

Linux supports and takes advantage of unique POWER5 features (simultaneous multi-threading, First Failure Data Capture, HW based virtualization)

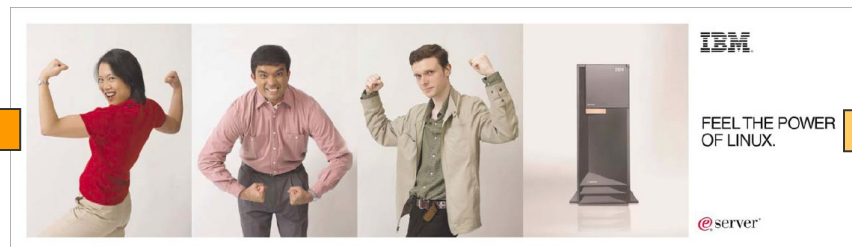
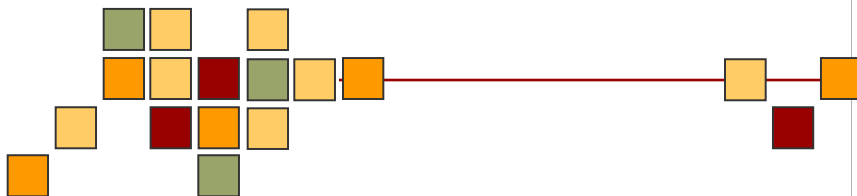
New features introduced in POWER5 to run better on Linux (instruction/data cache coherency, faster data lock acquisitions)

POWER5 platform provides flexibility and stability

Evolutionary roadmap
Decade of experience
Runs 32-bit and 64-bit applications

Robust reliability, availability and serviceability (RAS) unique to Linux on POWER5

First Failure Data Capture
Dynamic Processor Deallocation¹
LPAR error containment
Service processor
DDR and IBM Chipkill™ memory
Error-correcting code (ECC) memory



pSeries Linux RAS --- a major differentiator

1. Linux RAS for IBM pSeries white paper and Service
2. Serviceability toolkit

https://techsupport.services.ibm.com/server/Linux_on_pSeries

Reliability/Availability Features (see Linux RAS whitepaper)	Power Linux	Intel	Comments
• Automatic First-Failure Data Capture and diagnostic fault isolation capabilities	Yes	No	Used by Error Log Analysis Tool
• Self-healing internal POWER4™ processor array redundancy	Yes	No	ECC, bit steering, memory scrubbing, etc
• Industry-first PCI bus parity error recovery	Partial	No	Kernel panic - partition vs. system down
• Scrubbing and redundant bit-steering for self-healing in main storage	Yes	Yes	IA64 not as robust
• ECC and Chipkill™ correction in main storage	Yes	Yes	
• Fault tolerance with N+1 redundancy, dual line cords, and concurrent maintenance for power and cooling	Yes	Yes	
• Predictive failure analysis on processors, caches, memory, I/O and DASD	Yes	Yes	IA64 does not have predictive analysis of I/O
• Processor run-time and boot-time deallocation based on run-time errors (Dynamic Processor Deallocation and Persistent Processor Deallocation)	Partial	No	pLinux has boot-time processor and memory deallocation; no run-time deallocation
• Fault avoidance through highly reliable component selection, component minimization and error mitigation technology internal to chips	Yes	No	
• Concurrent run-time diagnostics based on First-Failure Data Capture for power, cooling, and I/O subsystems	No	No	pLinux concurrent diag targeted for 4Q'04
• Service Processor is a separate, independent processor that provides hardware initialization during system IPL, operation monitoring of environmental and error events	Yes	Yes	IA64 SP is not as robust as pSeries

Logical Partitioning

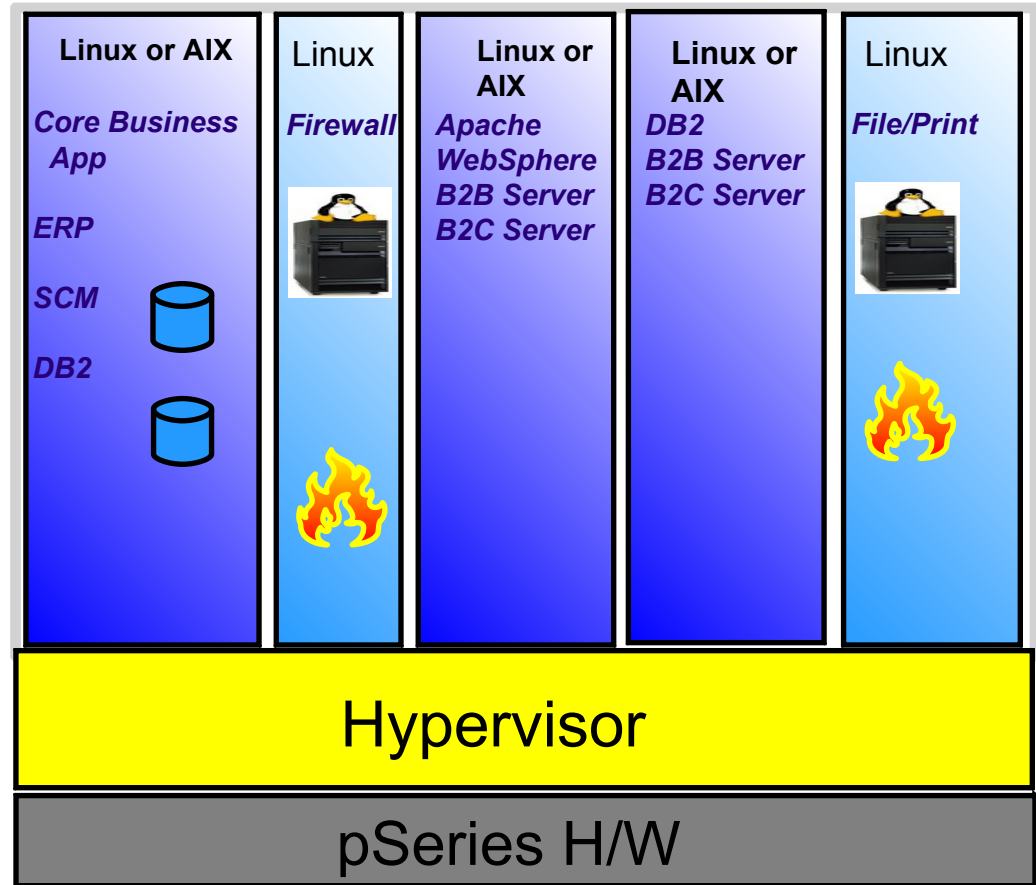
Multiple instances of AIX and/or Linux can run in different partitions

AIX is not required to run Linux

Linux supports static partitioning

Supported Systems

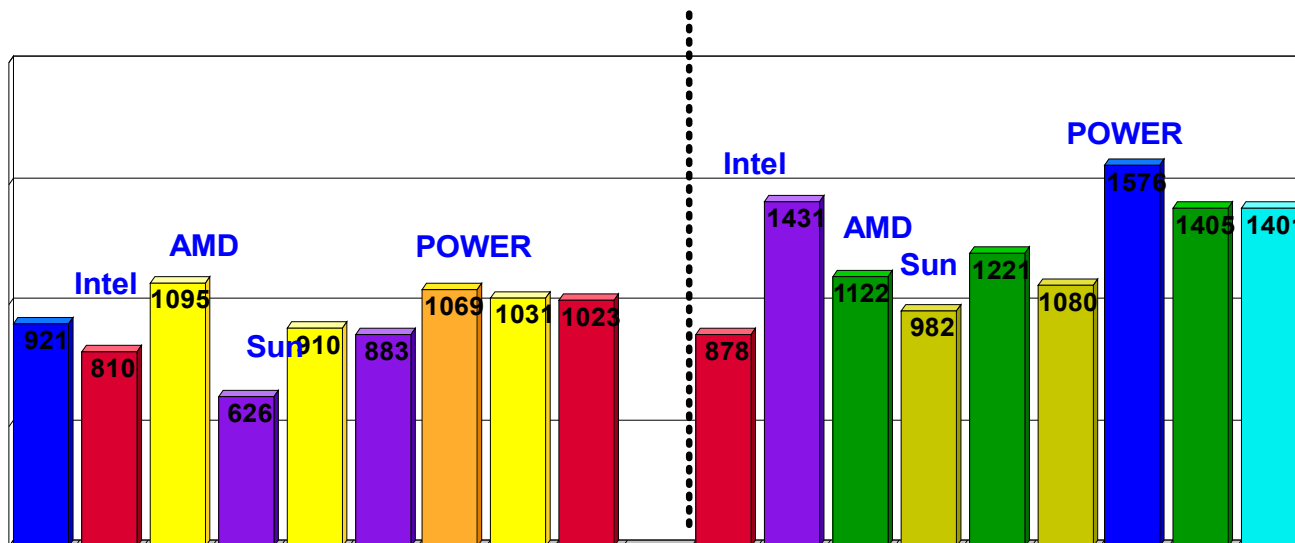
- p630
- p650
- p655
- p670
- p690



- Next generation Hypervisor on POWER5 is greatly enhanced to shared resources, virtual I/O, sub processor partitioning, and work load manager support

Performance Comparisons - IA-32/IA-64/AMD/SPARC vs. POWER

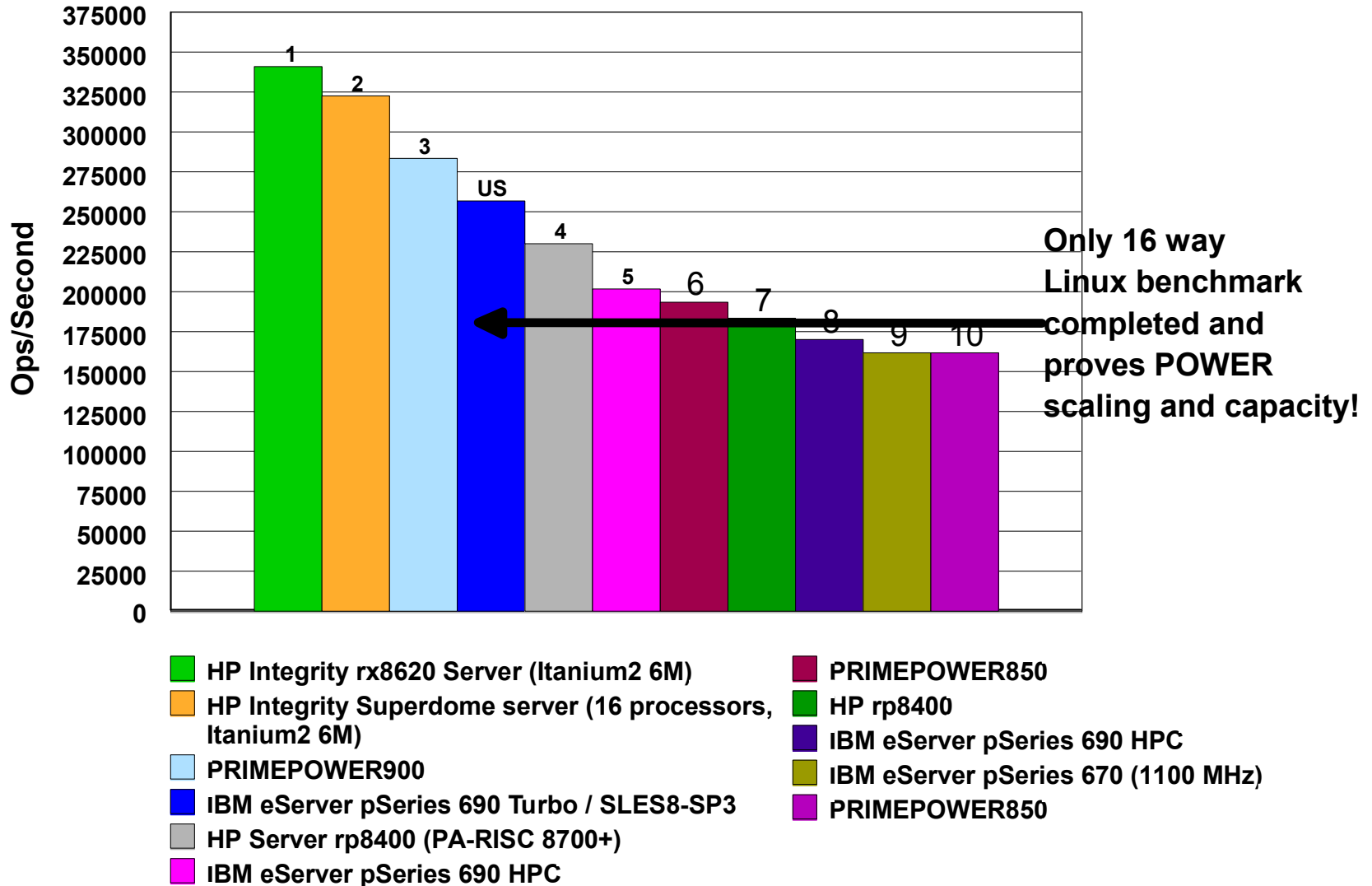
Linux on pSeries performance significantly better than Sun - more balanced in performance than IA-32 and IA-64 - near equivalent to AIX 5L and almost equal whether LPAR or single SMP mode



Source: www.spec.org

Top 10 Published 16-way SPECjbb2000 Results

from <http://www.spec.org>





File and Print Solution

Brings new levels of performance on real-world workloads

NetBench: OpenPower 720 beats AMD and exhibits extraordinary scalability

Challenges addressed

- UNIX servers aging
- Microsoft Windows NT support disappearing
- Servers underutilized
- Server sprawl
- Inflexible infrastructure

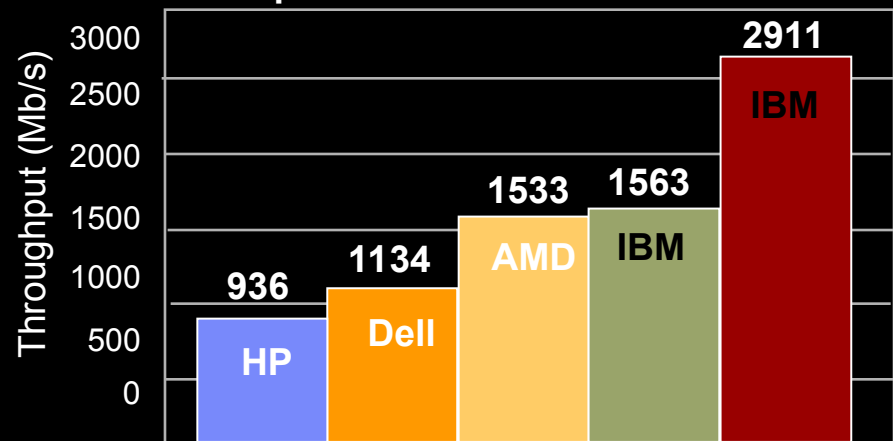
Business Value

- Exceptional performance
- Large # of files, users
- Superior consolidation
- Fewer servers to manage

Deploy with confidence

- Tested and qualified
- Sized for capacity planning
- Key challenges addressed
- IBM and partner support

NetBench® Results for Windows vs. Linux on OpenPower 2-and 4-CPU¹



Published Configurations

- HP Proliant DL 380 G# (Pentium® 4, 2.8 GHz x 2CPUs) Windows 2003
- Dell PowerEdge 2650 (Pentium 4, 302 GHz x 2CPUs) Windows 2003
- AMD (Opteron, 2.2 GHz x2CPUs) Windows 2003
- IBM ~ OpenPower (POWER5, 1.65 GHz x 2CPUs) SLES9
- IBM ~ OpenPower (POWER5, 1.65 GHz x 4CPUs) SLES9

Migration Consideration: Application Support

- Key application areas that apply to Windows Migration to POWER:

- ✓ File and Print Solutions => Samba 3
- ✓ Web Serving and Web Application Serving => Apache, Websphere App Svr, TomCat, JBoss
- ✓ Security/Firewall => Kerberos 5, SUSEfirewall2, StoneSoft
- ✓ Caching/Proxy => Squid, Websphere (integrated)
- ✓ Database => DB2, Oracle (developer release), MySQL
- ✓ Directory => Directory Server 5.1, OpenLDAP
- ✓ Commerce => Websphere Commerce Suite, eOneGroup
- ✓ Mail => OpenOffice, SendMail, Bynari Insight Server

- ✓ Commercial Solutions:

<http://www-1.ibm.com/servers/eserver/linux/power/apps/all.html>

Migration Approaches to Linux on pSeries:

- If you already have IBM pSeries installed, you can utilize the partitioning capability of the servers to consolidate your workloads onto these servers using Linux.
 - **Simplify the IT infrastructure and reduce cost.**

- If you are running mission critical applications on NT or Windows, you should consider running these applications on Linux on POWER based servers (IBM pSeries or BladeCenter JS20) so you can enjoy the RAS of the enterprise platform in a lower price.
 - **Simplify the IT infrastructure and increase the reliability**

Migration Decisions

For server consolidation opportunities, consider a scale up or scale out solution with JS20 or pSeries models with virtualization engine. This will allow you to run AIX and Linux workloads side by side.

- **Consider a pilot on a segment of your infrastructure to get comfortable with migrating Linux. Consider using the OpenPower 720 box as a low cost entry point**
- **Infrastructure, such as File and Print is typically the best first step for Linux.**
- **Leverage the IGS Linux Application Center – Linux application porting**
- **Consider utilizing the IGS Linux Migration Practice**
- **Take advantage of the skilled IBM partners for porting or migration help.**

IBM Global Services and IBM Business Partners Can Help in all Aspects of your Linux Solutions

Cluster/Integrations



Migrations



Classroom and Web-based training



Managed Operations



Project Management



Installation, Enablement



24x7 Technical Support



Workload Consolidation



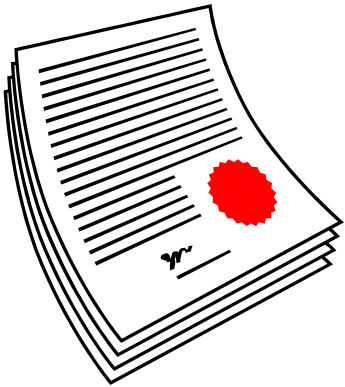
Web Hosting

Getting Started - Migrating to Linux from Windows or UNIX

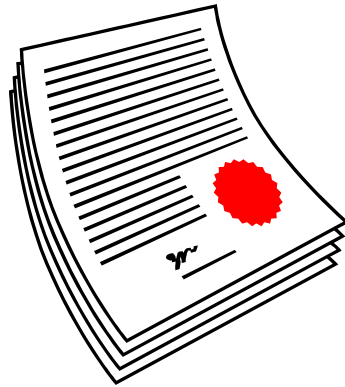
- **Speed Start your Linux Applications**
 - Learn about the similarities and differences of Windows and Linux
 - Receive free software and assistance with getting started
 - Attend no charge classes
 - Development workshops in person or online
 - Test applications / do Proof of Concepts
 - Get a free T-shirt once your application is done!
- **Apply today at: <http://www.ibm.com/developerworks/speed>**
- **Get ADDITIONAL IBM HELP with the Linux Integration Center (LIC)**
 - Works with customers and partners to deliver deployable proof of concepts
 - Contact your IBM rep to learn more



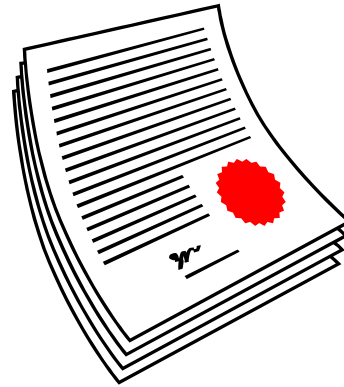
More Information:



Linux on pSeries
Overview



Linux RAS of
IBM pSeries



Robert Francis
Group TCO
Paper



Applications
For Linux on
POWER

www.ibm.com/eserver/pseries/linux

www.ibm.com/power

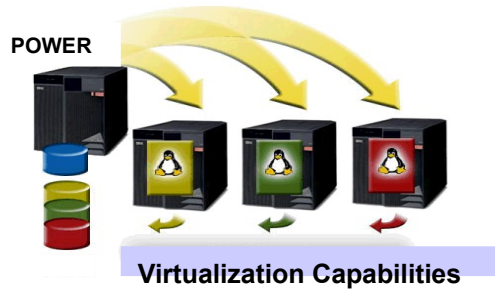
www.ibm.com/eserver/openpower

SUMMARY

Migration/Consolidation to Linux on pSeries

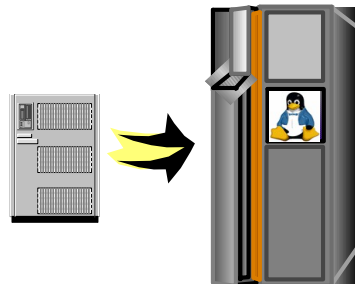


POWER



- When you need capacity
- When you need performance
- When you need choice
- When you need high performance virtualization
- When you need high reliability

..... all at a low cost



Choose Linux on pSeries,
OpenPower and JS20!

What Are Your Next Steps?

- **Marketing Programs**
- **Questions**