Linux and Open Source: The View From IBM

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Manager – System z9 and zSeries Operating Systems
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Linux and Open Source: The View from IBM Session 9200

- Linux and Open Source are game-changing technologies. Jim will provide a review of Linux and Open Source from IBM's point of view covering:
  - Overview, Value and Marketplace: A brief update on Linux and Open Source and the value to customers
  - Usage: How Linux and Open Source are being used by customers today and our view of the future
  - IBM and Open Source: How IBM is using Open Source software internally and IBM involvement in the Open Source community
Open Computing
The Principles of Open Computing

- Permit interoperability by using published specifications for APIs, protocols, and data and file formats
- The specifications must be published without restrictions that limit implementations, or require royalties or payments*

Open Computing

Open Standards  Open Architecture  Open Source

* other than reasonable royalties for essential patents
Adaptability is vital

- “It is not the strongest of the species that survives, nor the most intelligent; it is the one that is most adaptable to change.”
  – Charles Robert Darwin (1809-82)
Open Computing Policy Roadmap

1. Insist on open standards as a matter of policy... be pragmatic about it
2. Focus on interoperable ICT systems
3. Avoid procurement of proprietary, non-open standards based solutions
4. Evaluate Open Source solutions on equal footing with commercial solutions
5. Reject mandates or preferences based on development model
6. Insist on open File formats
7. Adopt open computing as an underlying philosophy

*Insist on openness, but make pragmatic business oriented decisions based on features, training cost, availability of skill, interoperability and value for money*
Open Source
Open Source Software
www.opensource.org

- Software whose source code is published and made available to the public
  - Community develops, debugs, maintains
  - “Survival of the fittest” – peer review
  - Generally high quality, high performance software
  - Superior security – on par with other UNIXes
- Often built by community
- Redistribution rights
- May be a reference implementation of an open specification

- Examples of Open Source Software:
  - Apache – web server
  - Eclipse – application development
  - Gnome – desktop environment
  - Mozilla – browser/mail/calendar
  - OpenOffice – productivity suite
  - Perl – language
  - Samba – file/print
  - SendMail – mail server
  - Tomcat – application server
Five principles of Open Source Software

1. Licensees are free to use Open Source software for any purpose whatsoever
2. Licensees are free to make copies of Open Source software and to distribute them without payment of royalties to a licensor
3. Licensees are free to create derivative works of Open Source software and to distribute them without payment of royalties to a licensor
4. Licensees are free to access and use the source code of Open Source software
5. Licensees are free to combine Open Source and other software

Source: Larry Rosen – Open Source, Open Standards Conference – September 15, 2004
Can OSS co-exist with Commercial Software?

- Most OSS licenses allow combination and distribution of OSS and Commercial source code under a commercial license
- Some commonly encountered OSS Licenses (BSD, MIT, X11, Apache) don’t require modifications to original OSS to be published upon redistribution
- GPL allows commercial applications to be built on top of Linux to remain commercial
  - Application can be licensed under commercial license of choice
  - No need to disclose source code of such applications
- LGPL Libraries can be dynamically linked to arbitrary commercial code
  - No requirement to release commercial code under LGPL
- Decision to use OSS is just another business decision
- License terms need to be understood before beginning to work with OSS
Why does IBM consider Open Source important?

- **Can be a major source of innovation**
  - Innovation can happen anywhere – any time
  - Development through “open communities” leads to potentially broad ideas and creativity

- **Community Approach**
  - Internet has changed how enterprises address technical innovation
  - Shapes IBM technical leaders thinking and approach to broad collaboration

- **Good approach to developing emerging standards**
  - Popular Open Source projects can become de facto / open standards
  - Wide distribution/deployment

- **Enterprise customers are asking for it**
  - Increase choice and flexibility – adoption/use of Open Source can reduce time to market
  - Example – want Linux to be part of an overall, vendor-supplied and supported total solution
Apache has Become the Standard Web Server

news.netcraft.com

- Totals for active servers across all domains
- As of August 1, 2005
  - Apache
    - Sites: 22,195,711
    - Share: 69.97%
  - Microsoft IIS
    - Sites: 7,171,595
    - Share: 22.61%
Freedom of Choice

- “Free software is a matter of liberty, not price. To understand the concept, you should think of free as in free speech, not as in free beer.”
  – Richard Stallman, Free Software Foundation

- “It is not about Free. It's about Freedom. The freedom to collaborate. The freedom to innovate.”
  – Nick Donofrio, IBM

- “Free software is only free if your time is worth nothing”
  – Chris Pratt, IBM Canada

Open Source
Linux Overview, Value, and Marketplace
What is Linux?

- A “UNIX-like” Operating System that is community developed with the source code being readily available
  - Robust functionality and scalability
  - Solid stability and security
  - Lightweight and modular

- Operates on virtually any platform
  - server or client

- Generally acquired on a support subscription basis from Linux Distribution Partner (LDP): Novell or Red Hat
Linux Standard Base
www.freestandards.org

- LSB supporters include AMD, Dell, HP, IBM, Intel, Novell's SUSE LINUX, and Red Hat
- This groundswell of support is significant as it promises to keep Linux from forking and going the way of proprietary systems in the past
- Because of the reduced costs for software vendors writing to the Linux, adoption of the LSB will also result in an increase in the number of applications written to the operating system
What is a Linux Distribution?
Linux Adoption and Acceptance

- Reports from:
  - Gartner
  - Deutsche Bank
  - Forrester
  - IDC
  - DH Brown
  - Goldman Sachs
  - Bloor Research
  - Wall Street
  - IBM
  - Many others ...

- Articles in:
  - Business Week
  - Financial Times
  - Many others ...

- All very positive ...
Why Linux is Important to Customers

- Linux is about choice and flexibility
- Linux is secure
- Linux is reliable
- Linux drives business goals
  - Reduce costs
  - Simplification
  - Improve application service levels
  - Promotes innovation
  - Internally change business process and drive contribution to business
  - Generate revenue

Source: IDC Directions 2005
Linux Server Market Continues to Grow

- 11th consecutive quarter (1Q05) of year-to-year double-digit growth
  - Linux server revenue exceeded $1.2B in quarterly revenue, 10.3% of overall quarterly server revenue – an all-time high
  - Year-to-year revenue growth of 35.2% and unit shipments up 31.1%

Source: IDC Worldwide Quarterly Server Tracker and Forecast, June, 2005
Linux Continues to Deliver Cost Benefits

- Linux is 40% less expensive than a comparable x86 based Windows solution
  - Based on a 3-year period of ownership for a system supporting 100,000 operations per second on the SPECjbb benchmark

Operating System TCO for Enterprise J2EE

Source: Robert Frances Group: TCO for Application Servers Study, August, 2005
Linux capabilities and value have evolved and expanded

**Linux is free**
- Better TCO than Unix
- Better TCO than Windows
- Migrate to commodity hardware
- Use as a bargaining chip
- Pluck the low hanging fruit

**Linux is mature**
- Drives innovation
- Provides choices
- Enables consolidation
- Facilitates simplification
- Reduces IT costs
- Results in business advantage

**Linux runs on x86**
- Works but not enterprise ready
- Used in non-critical areas
- Good infrastructure solution

**Linux runs on multiple architectures**
- Up to 16 way SMP support
- Unix-like features and enhancements
- Proven reliability, availability and stability
- Used for mission critical applications
- Runs ERP applications and databases

Fact: Linux is not implemented because it is cool nor as a religious experience
Fact: Linux is a facilitator of Business Solutions and / or IT initiatives
How are Customers Adopting Linux

- Much of the early Linux adoption is replacing proprietary UNIX as Linux offers UNIX-like features and platform independence with lower cost of ownership.
- Linux is replacing Microsoft servers due to choice, attractive cost of ownership, and enhanced security.
- New workloads are being added to gain the full benefits of platform and vendor flexibility, low cost of ownership, solid security, and solid reliability.
Legal Issues?

- 50 million civil law suits were filed in US state and federal courts in 2003
- Novell/SUSE and Red Hat provide coverage
  - Novell/SUSE: http://www.novell.com/licensing/indemnity/
  - Red Hat: http://www.redhat.com/software/rhel/assurance/
- Discussion and analysis of the “legal” issues around Linux
  - http://www.groklaw.net

“Since day one, the IBM strategy in the SCO Group lawsuit has been to defend against the SCO Group's unfounded claims vigorously in court. Our belief is that the best way to deal with the SCO Group campaign is where it can truly be resolved – in court.”

– Bob Samson – Vice President, System Sales, IBM
## Linux 2.6 Kernel

<table>
<thead>
<tr>
<th>Major kernel internal overhauls for robustness, performance, scalability</th>
<th>Scale UP: Large SMP &amp; NUMA</th>
<th>Scalable APIs</th>
<th>Native Architecture Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ VM, Scheduler, NUMA topology, Filesystem and block IO</td>
<td>▪ 16 CPU xSeries</td>
<td>▪ Futexes</td>
<td>▪ IBM Power</td>
</tr>
<tr>
<td>▪ HT, SMT support</td>
<td>▪ 16-32 CPU pSeries/iSeries</td>
<td>▪ epoll</td>
<td>▪ IBM zSeries</td>
</tr>
<tr>
<td>▪ 64 GB memory support</td>
<td>▪ 16 CPU zSeries</td>
<td>▪ Direct IO and Async IO</td>
<td>▪ AMD x86-64</td>
</tr>
<tr>
<td>▪ Max users/Groups 64K – 4 billion</td>
<td>Common Hot Plug infrastructure for</td>
<td>▪ Large Page APIs</td>
<td>▪ Intel EM64T</td>
</tr>
<tr>
<td>▪ PIDs/processes 32K to 1 billion</td>
<td>▪ PCI</td>
<td>▪ NPTL</td>
<td>▪ Intel IA64</td>
</tr>
<tr>
<td>▪ 16 TB filesystems, 1 million devices</td>
<td>▪ Devices</td>
<td>▪ NUMA APIs &amp; Topology</td>
<td>▪ And all 2.4 based architectures</td>
</tr>
<tr>
<td></td>
<td>▪ CPUs</td>
<td></td>
<td>New networking protocols</td>
</tr>
<tr>
<td></td>
<td>▪ USB and Firewire Security</td>
<td>▪ Distributed Filesystem Support</td>
<td>▪ SCTP, IPv6, Mobile IPv6, DHCPv6</td>
</tr>
<tr>
<td></td>
<td>▪ Policy based security architecture</td>
<td>▪ IRQ &amp; Scheduling Affinity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>▪ New security policies – SELinux, etc.</td>
<td>▪ Enhanced file system support</td>
<td></td>
</tr>
</tbody>
</table>

**Security**

- Policy based security architecture
- New security policies – SELinux, etc.
Performance improvements

Web serving on 2.4 and 2.6

Web pages served

Millions

0 10 20 30 40 50 60

2.6.0

2.4.18

IBM xSeries Netfinity 8500R 8681-7RY with 8 Pentium III-700MHz

Six times performance improvement!
IBM alliances with Linux distribution partners

- **Novell**
  - SUSE Linux Enterprise Server
    - Certified at Common Criteria EAL4+ and COE

- **Red Hat**
  - Red Hat Enterprise Linux
    - [www.redhat.com/software/rhel/](http://www.redhat.com/software/rhel/)
    - Certified at Common Criteria EAL3+ and COE
    - In evaluation for EAL4 certification in 2005

- **Support for all IBM server products**

- **Service available from IBM or distributors**
Linux Usage
Taking Linux Mainstream

**Early adopters**
Technology-centric

- NetGen, Supercomputing, Universities
- Scalability
- Security
- Availability
- Reliability

**Mainstream**
Business-centric mainstream users

- Core business
- Pervasive
- Emerging ASOs
- Retail/Distribution - Industrial
- Finance/Insurance
- Life sciences
- Small and medium business
- Service provider

Timeline:
- 1997
- 1998
- 1999
- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
“Traditional” view of Linux fit is outdated
Linux fits everywhere!
Linux is Moving Rapidly From Edge of Network into the Data Center

Source: IDC Directions 2005

Linux Servers Will Shift Their Workload Mix

Linux Servers Revenue by Workload

Source: IDC Directions 2005
Linux Evolution to Mainstream
Companies Started with Infrastructure Implementations

- Firewall
- File / Print
- Web Server
- e-mail

New York State Assembly
Delta
Merrill Lynch
Thornton Maple Leafs
Greenpeace
DTCC
Lehman Brothers
Moore Wallace
ASPCA
The College of New Jersey
Marist College
Linux Evolution to Mainstream

*Database and Compute Intensive Applications Were Next*

- Database Applications
- e-Commerce
- Branch Automation
- Software Development
Linux Evolution to Mainstream
Building on Success, Enterprise Applications Followed

- Mission-critical
- Industry Applications
- Data Warehouse
- ERP, CRM, SCM
- HPC Clusters / GRID
Linux Evolution to Mainstream
Companies Looking for New Options to Leverage Linux

- Industry-specific Desktops
- Server Managed Clients
- Pervasive / Embedded Devices
Open Source in the Public Sector World-Wide

- **European Commission**
  - The IDA Open Source Observatory

- **German Federal Ministry of the Interior**
  - Migration Guide
  - [http://www.kbst.bund.de/Anlage303807/pdf_datei.pdf](http://www.kbst.bund.de/Anlage303807/pdf_datei.pdf)

- **Denmark Board of Technology**
  - Open-source software in e-government

- **Canada Open Source Study**
  - Open Source Business Opportunities for Canada's ICT Sector

- **Defense R&D Canada**
  - Free and Open Source Software
IBM and Linux
IBM Linux Investments

Linux Partners
EAL2 2003
EAL3 2004
EAL4 2005

Software
DB2 1999
WebSphere 2000
Tivoli 2001
Lotus 2001
Rational 2003

Servers
xSeries 1998
zSeries 1999
Cluster and Power 2001
BladeCenter 2002
OpenPower and BlueGene 2004

Open Source Contributions
1998 to 2004
2005

Patents
2005

Business Partners

Linux Services
1999

Chipshopper
2005

Linux Technology Center 1999

Linux White Papers and RedBooks

Open Source Development Lab 2000

ibm.com/linux

Ready for IBM @server®
with Linux®
IBM eServer Application Advantage for Linux

- ISVs achieve portability via standards
- Rigorous testing apps then porting assistance
- Attain IBM Ready for eServer with Linux mark
- ISV support is backed by IBM for porting-related customer problems on target platforms
- First of a kind offering

- Provides assurance that IBM stands behind your choice of ISV application on IBM eServer platforms
- Helps grow the number of Linux applications on your platform of preference
- Encourages application conformance to standards, important in emerging Linux landscape
- Helps accelerate the maturation of Linux by facilitating more cost-effective choices for mission-critical, high-end environments
IBM Linux Technology Center

IBM well accepted by the Linux community
- 600+ developers world-wide

IBM engineers leading enterprise Linux focus
- Deeply involved in Linux kernel development
  - Linux on POWER and zSeries
- Motivated community to focus on addressing scalability and threading issues
- Defect support for a set of core Linux packages
- Key participant and contributor to the OSDL
IBM Open Source Contributions

- **IBM participates in over 130 Open Source projects**
  - Apache, PHP, CIFS, Samba, Geronimo, …

- **IBM projects contributed to Open Source include:**
  - Secure Mailer (as Postfix)
  - Andrew File System (as OpenAFS)
  - Eclipse (integrated development environment)
  - Cloudscape (to Apache as Derby database)
  - Research Hypervisor and Secure Hypervisor (to Xen)
  - Jikes (Java compiler)

- **500+ patents into a “patent commons” to help drive innovation and future software development**
Linux at IBM

Industries and solutions

Industries

IBM offers solutions to help improve overall performance and flexibility to increase sales and enhance customer satisfaction. Regardless of your industry, implementing solutions quickly can help you stay on track:

Select your industry:

IBM Telecommunications Industry: Realizing the promise of next generation services revenue

Featured Solution

- The largest media company in eastern Switzerland needed to set up a powerful, cost-effective operating environment for SAP systems in order to achieve high availability for applications and servers.

By using SAP, SuSE Linux, SteelEye LifeKeeper for Linux and IBM eServer xSeries 455, the media giant was able to create a modern economic platform providing much faster data preparation, faster online processes and room for growth.

- More solutions
- View our business partner solutions

Library

Customer testimonial

- GDK

Migration

Migration to Linux can save thousands in lower...
Open source

Resources for open source development and implementation

Updated 09 Aug 2005

Top story

Understand Geronimo's deployment architecture
The Geronimo deployment model has emerged as a single homogeneous framework, successfully integrating dozens of technologies. Tour it with Srinath Perera. More>

Advanced PHP V5 objects: Get introduced to more advanced and design-oriented features, including object types, which allow for the decoupling of system components, creating reusable, extensible, scalable code. (Articles)

Building and filling out templates with Python and Cheetah: Cheetah templates are easy to understand and maintain. Learn how to generate any kind of text-based content with Python scripts and Cheetah templates. (Articles)

Profiling and optimizing Ruby code: Discover how to profile and optimize Ruby code with RubyInline and ZenOptimize, two tools that make this process easier. (Education)

Integrate third-party components into Geronimo: Learn how Geronimo’s unique GBeans feature lets you integrate third-party open source applications into its infrastructure. (Articles)

Discover Python, Part 3: Explore the Python type hierarchy: Python does not include a special data type to handle a single character. Learn about

Top project resources
- Apache Derby
- Apache Geronimo
- Eclipse
- PHP
- More projects

Spotlight
- New Apache Geronimo support offering
- Developing on open standards databases
- Webcast: Using PHP with XML and Web Services for rapid Web development
IBM developerWorks for Linux

LPI exam 101 prep: Hardware and architecture
These study guides will let you take the exams with confidence. Start with hardware and architecture now, and we’ll continue to guide you through the required material in upcoming tutorials. More>

Hacking the Linux 2.6 kernel, Part 2: Making your first hack: Add a feature, fix a flaw, or just have fun tinkering with operating system source code. This tutorial gets you on your way with kernel organization, system calls, kernel modules, and crafting patches. (Education)

Hacking the Linux 2.6 kernel, Part 1: Getting ready: Learn the best ways to acquire kernel source, how to configure and boot your new kernel, and how to use the printk function to print messages during bootup. Hack and be free. (Articles)

Assess system security using a Linux LiveCD: The four LiveCDs in this roundup -- Auditor, Whoppix, Knoppix-STD, and PHLAK -- pop into your CD drive, boot up, let you scan for problems, and then they're gone without a trace. (Articles)

Build a wireless ISP on Linux: Taking the next step beyond a wireless router doesn't have to be nightmare. Shell scripts, Linux, and easy-to-buy equipment help keep it simple. (Articles)

Get started with Zend Core for IBM on Linux: Connecting to a
BPEL Tracking for Tivoli Monitoring for Transaction Performance

This is an add-on to Tivoli Monitoring for Transaction Performance (TMTOP) to support correlating business workflows with IT end-to-end transaction flows. More.

BPEL Tracking for Tivoli Monitoring for Transaction Performance: An add-on to Tivoli Monitoring for Transaction Performance (TMTOP) to support correlating business workflows with IT end-to-end transaction flows.

Service Management Connectors for WebSphere Studio Application Monitor: An add-on to WebSphere Studio Application Monitor (WSAM) that supports Information Technology Infrastructure Library (ITIL) change management and capacity management processes.

Faces for Laszlo: A technology that makes use of multiple emerging technologies for rich Internet applications, resulting in a rich user experience on the browser. (This is an ETTK technology.)

IBM iSeries Navigator System Management Plug-in for SAP: An iSeries Navigator plug-in that provides simple management tools for a SAP system.

RSS Feeds XML
The IBM Migration Station

ibm.com/developerworks/ondemand/migrate/linux.html

Migration station

Overview | Database | App server | Java | Linux | Lotus

- Migrate from x86 Linux to multi-platform Linux
- Migrate from Solaris to Linux
- Migrate from Windows to Linux
- Migrate from Windows/.NET to Java
- Migrate from OS/2 to Linux
- Migrate to IBM middleware on Linux
- IBM migration resources for partners and ISVs

The resources on this page will help you port your applications from Windows™, Solaris, and OS/2® to run natively on Linux® on x86-based, POWER™-based, and zSeries® systems. The information here also covers porting from Windows to Java™ and porting and migrating x86-based Linux apps to Linux on multiple other hardware platforms, including IBM® eServer™ pSeries®, iSeries™, and zSeries systems. Those looking to transition their networking and application infrastructures to Linux from other operating systems will find migration resources to assist with the process.

- Migrate from x86 Linux to multi-platform Linux

Porting to Linux on pSeries, iSeries, and zSeries

Do your Linux apps need more power? Learn how to port and optimize your x86 Linux applications to run on IBM eServer pSeries, iSeries, and zSeries systems.

More resources
- Product documentation
- Migrating and developing new applications for Linux
- Developer resources for an on demand world
- Building better software faster with the IBM Software Development Platform
- Globalizing your e-business

Document options
- Print this page
- E-mail this page

Build applications
- With DB2
- With Linux
Linux: Transforming IBM's IT infrastructure
Providing Key Business Solutions

- 3,000+ Production Servers Worldwide
  - 25,000 Clients
- IBM.com/linux and w3.ibm.com/linux
  - Supports 320,000+ employees worldwide
- IBM’s Application Hosting Environment’s HTTP workload
  - Blade servers running in North America and EMEA
- IBM’s Special Events Infrastructure – Wimbledon, The Ryder Cup, The US Open
  - Linux clusters in Raleigh, Boulder, and St. Louis.
- IGS Internet Vulnerability Security Scanning
  - Scanning 30k IP addresses/week
- Web Fountain Data Mining Service
  - A development environment of over 300 Linux servers
  - A production environment of over 500 Linux servers
- IBM Global e-Mail Anti-virus Management
  - Scans incoming/outgoing mail for viruses
- 300mm Wafer Manufacturing Automation and Equipment Control
  - Increased reliability over Windows 2000
  - 200+ production Linux servers
3044 Linux Servers in Production at IBM
At start of 2Q2005
Intranet – “On Demand Workplace” at IBM

- Expense reports take 60% less time, 80% less cost
- Consolidating news sources saved in excess of $2 million
- People finder – over one million hits a day
  - 64% of employees use it at least once a week
  - 50+ applications use the same directory
- E-Meetings and instant messaging saves IBM over $4 million/month
- HR portal
  - 90% satisfaction rate
  - Over 90% employees registered health benefits here last year, saving IBM over $1 million
- Worldjams, jukeboxes, personalized news, discussion forums
- Workplace application development runs on Linux on zSeries
- IBM realized over $400 million in cost avoidance in 2002 with over 40% of classes moved online
- IBM forums run on Linux on zSeries
IBM Servers and Linux
ibm.com/eserver/linux

- IBM System z9 and zSeries
  - Hundreds of Linux servers
  - Integration using z/VM with z/OS, z/VSE, and z/TPF

- IBM eServer iSeries / i5
  - Up to 254 Linux partitions
  - Integration with i5/OS

- IBM eServer pSeries / p5
  - Up to 254 Linux partitions
  - Linux affinity in AIX 5L

- IBM eServer OpenPower
  - Up to 40 Linux partitions
  - Linux-only server

- IBM eServer xSeries
  - Freedom of choice in operating systems

- IBM eServer 326 (AMD)
  - High performance computing

- IBM eServer Clusters
  - Component integration
  - Speed to market

- IBM eServer Blades
  - High density servers
  - Integrated components
  - Even more freedom of choice
IBM Software and Linux

ibm.com/software/linux

- Solutions available across all product lines
  - WebSphere – middleware, application server, e-business, and infrastructure software
  - DB2 – database software
  - Lotus – collaboration and messaging software
  - Tivoli – system and storage management software
  - Rational – software development tools

- Over 350 IBM software products available today on Linux

- Linux editions of software products are available the same day as all other platforms

- Primary software solutions to be available on Linux
# IBM software product availability matrix

**ibm.com/linux/matrix**

## IBM @server® xSeries

<table>
<thead>
<tr>
<th>DB2 Data Management Software</th>
<th>Version - Release</th>
<th>Hardware</th>
<th>Kernel/Distribution</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 Administration Client</td>
<td>8.2</td>
<td>xSeries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## IBM @server® zSeries

<table>
<thead>
<tr>
<th>Tivoli software</th>
<th>Version - Release</th>
<th>Hardware</th>
<th>Kernel/Distribution</th>
<th>Sources</th>
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<tbody>
<tr>
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</tbody>
</table>

## IBM @server® pSeries

<table>
<thead>
<tr>
<th>WebSphere software</th>
<th>Version - Release</th>
<th>Hardware</th>
<th>Kernel/Distribution</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>WebSphere Application Server</td>
<td>5.1.1</td>
<td>pSeries</td>
<td>Red Hat Enterprise Linux 3 Update 1, SUSE Linux Enterprise Server 8 SUSE Linux Enterprise Server 8 SP3 SUSE Linux Enterprise Server 9</td>
<td>Supported Platforms</td>
</tr>
</tbody>
</table>
IBM Global Services and Linux

- High performance cluster integration services
- Enhance your e-business with Linux solutions
- SupportLine for Linux - unmatched 24x7 remote support
  - Fast and accurate problem resolution
  - Helpful, skilled IBM services specialists to supplement your internal staff
  - Electronic support and problem submission that saves you time and allows you to track open support issues
- Middleware enablement services for Linux
- IBM e-business Hosting
- IBM Technical Training

Get trained for the hot jobs.
Linux training from IBM.
Summary
Next Steps

- Familiarize yourself with Linux
- View Linux as a valid alternative for IT systems
- Incorporate open source software development into IT strategies
- Look at Linux to see how it can lower costs, increase reliability and security, and improve service

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ibm.com/vm/devpages/jelliott
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