Linux and Open Source – A World View

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9200 – Linux and Open Source – A World View

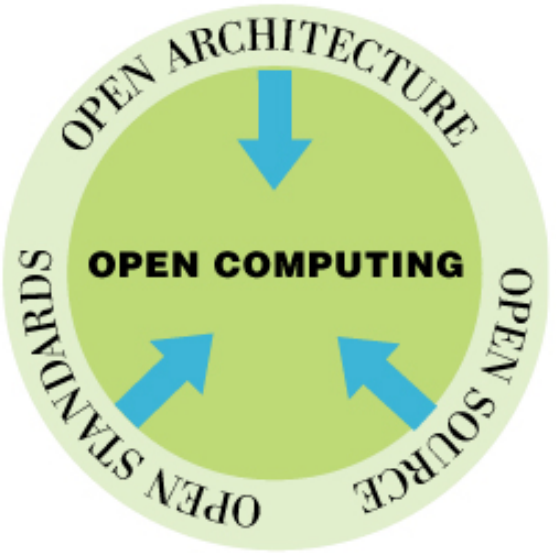
- **Linux and Open Source in general continues to see substantial growth around the world**
- **This session covers what is new over the last year in Open Standards, Open Source, and Linux**
- **Jim will provide a wide-ranging review, including such topics as Open Document Format, Novell SLE10 and Red Hat RHEL5, and the creation of the Linux Foundation**

Topics

- **Linux and Open Source Overview**
- **Community**
- **Open Standards**
- **Virtualization**
- **Linux Distributions**
  - Novell SUSE Linux Enterprise 10
  - Red Hat Enterprise Linux 5
  - Oracle Unbreakable Linux
  - Ubuntu
- **Linux and Open Source on the Web at IBM**

The Principles of Open Computing

- **Open standards:**
  - Promoting interoperability by using open published specifications for APIs, protocols and data and file formats
- **Open architecture:**
  - Building loosely coupled, flexible, reconfigurable solutions
- **Open source software:**
  - Promotes standards
  - Leverages community development and collaborative innovation



Linux and Open Source Overview

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 UNIX systems
- **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
  - Firefox – browser
  - OpenOffice.org – productivity suite
  - Perl – language
  - Samba – file/print
  - SendMail – mail server
  - TCP/IP – networking

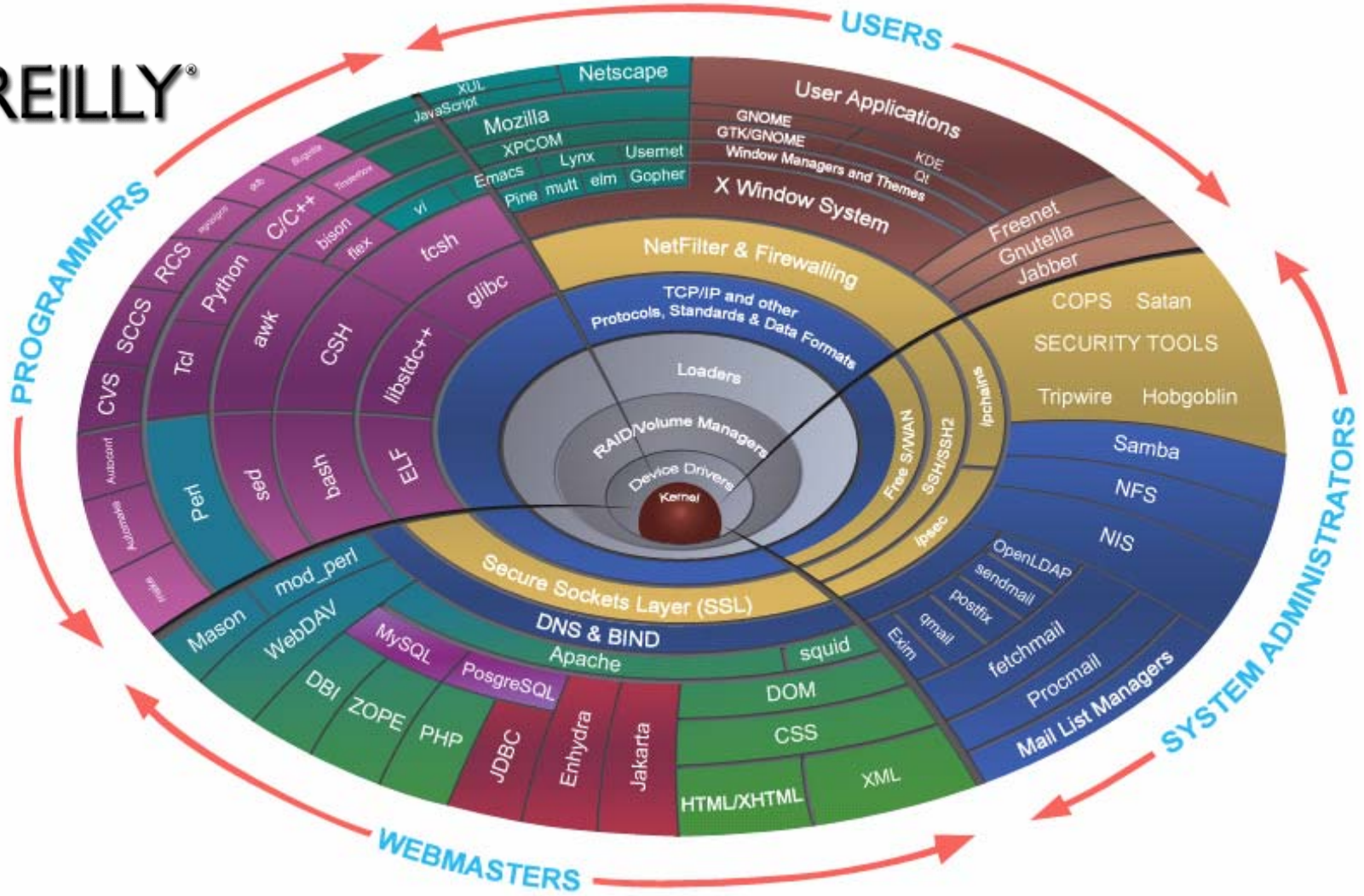
Why is Open Source important?

- **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 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

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 and Red Hat dominant in NA

What is a Linux distribution?



Linux capabilities 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

1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

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

Linux runs on multiple architectures
- Up to 256 way SMP support
- UNIX-like features and enhancements
- Proven reliability, availability and stability
- Used for mission critical applications
- Runs ERP applications and databases

Linux server growth continues to outpace all other platforms

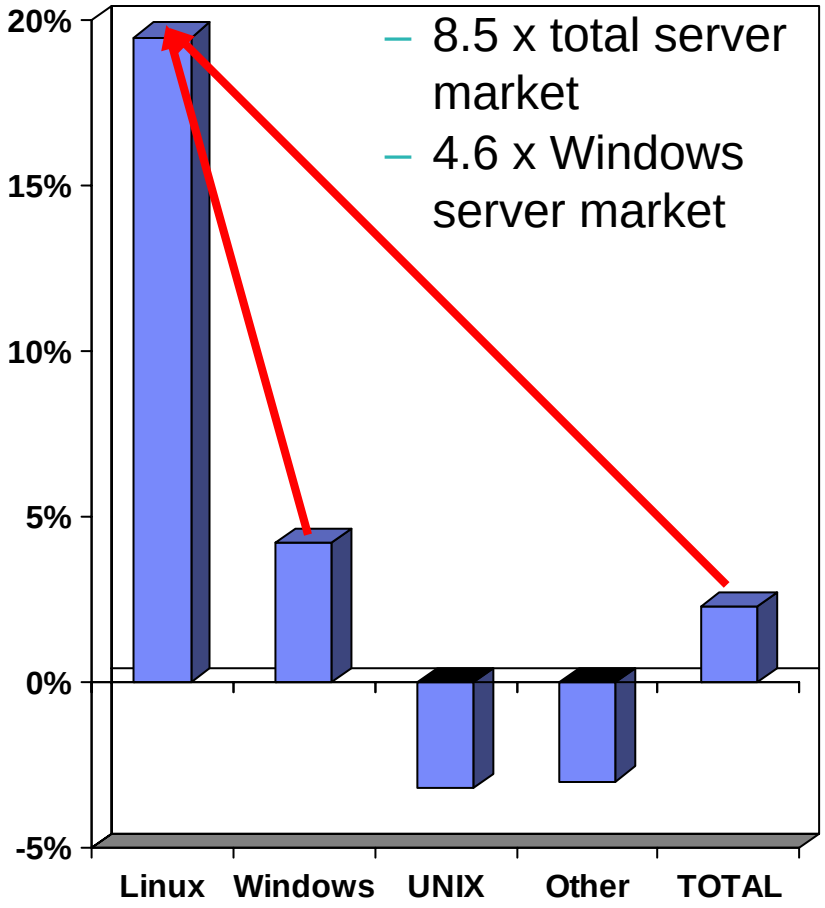
Worldwide Server Revenue

All vendors –year to end 3Q2006

Family	Revenue	Revenue Growth	Unit Growth
Linux	$7,671M	19.5%	31%
Windows	$19,001M	4.2%	12%
UNIX	$16,023M	-3.2%	-4%
Other	$9,677M	-3%	-22%
	$52,372M	2.3%	13%

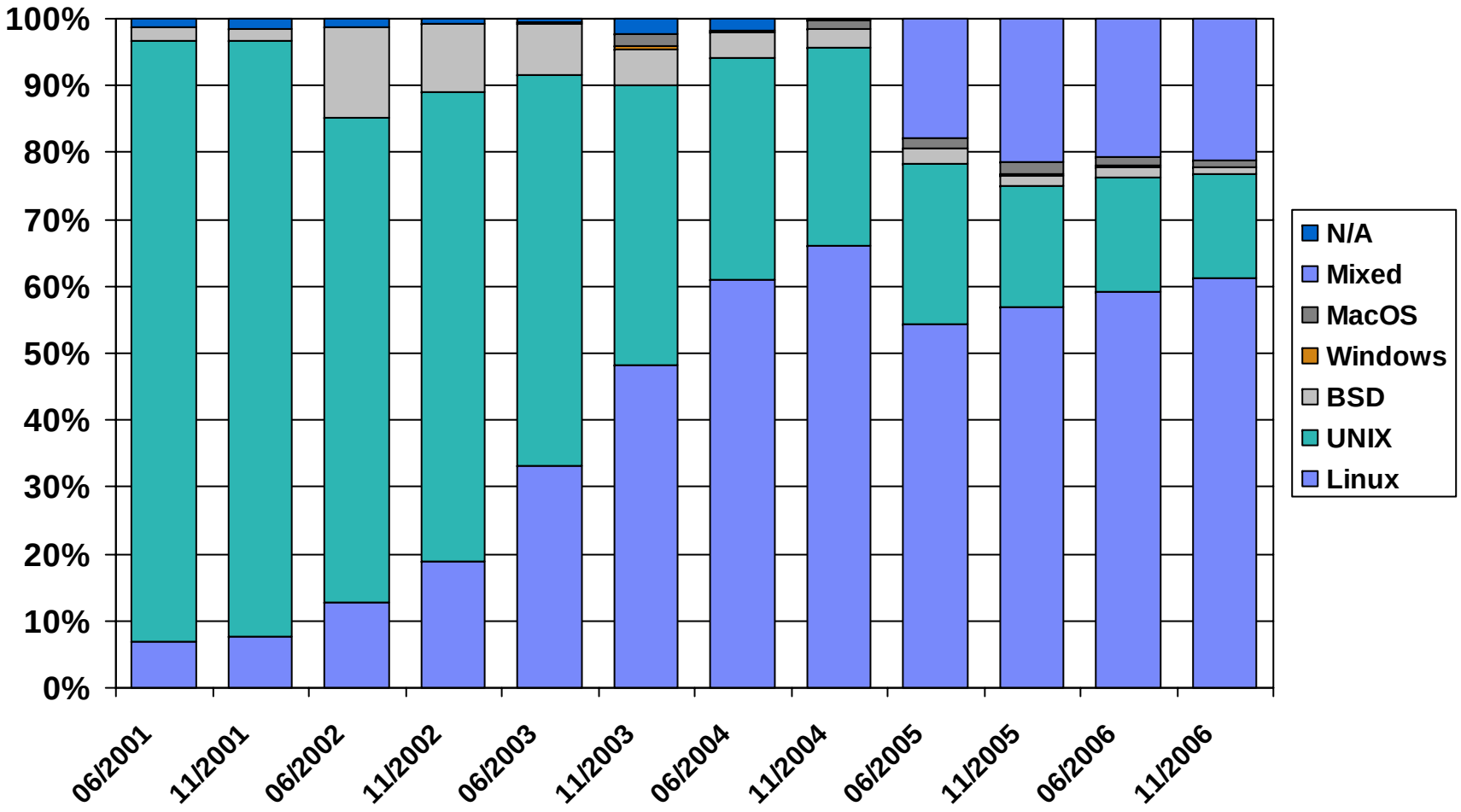
Source: Gartner Group, 4Q06

- **Linux growth is:**
  - 8.5 x total server market
  - 4.6 x Windows server market



Linux and Supercomputing

www.top500.org



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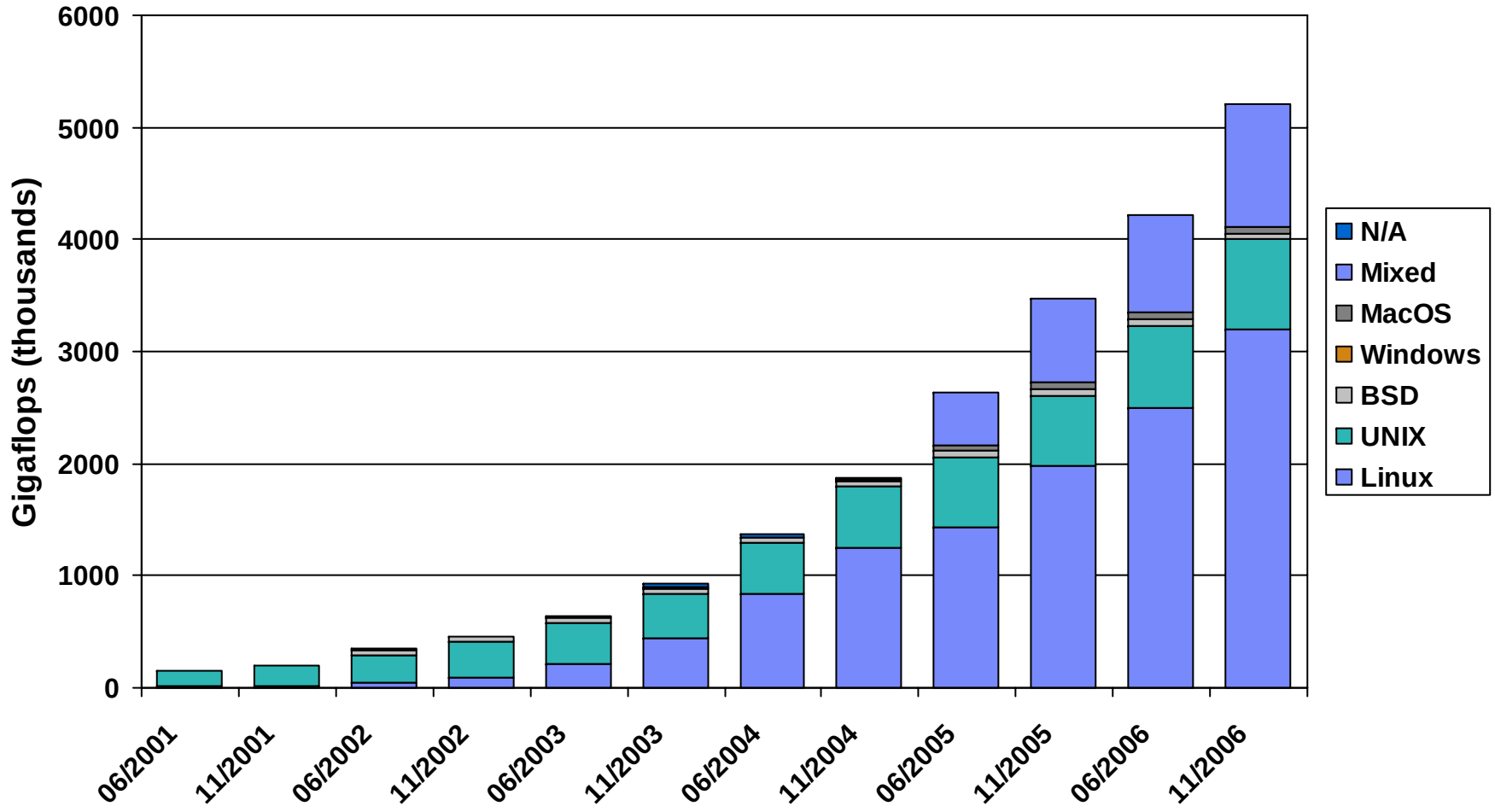
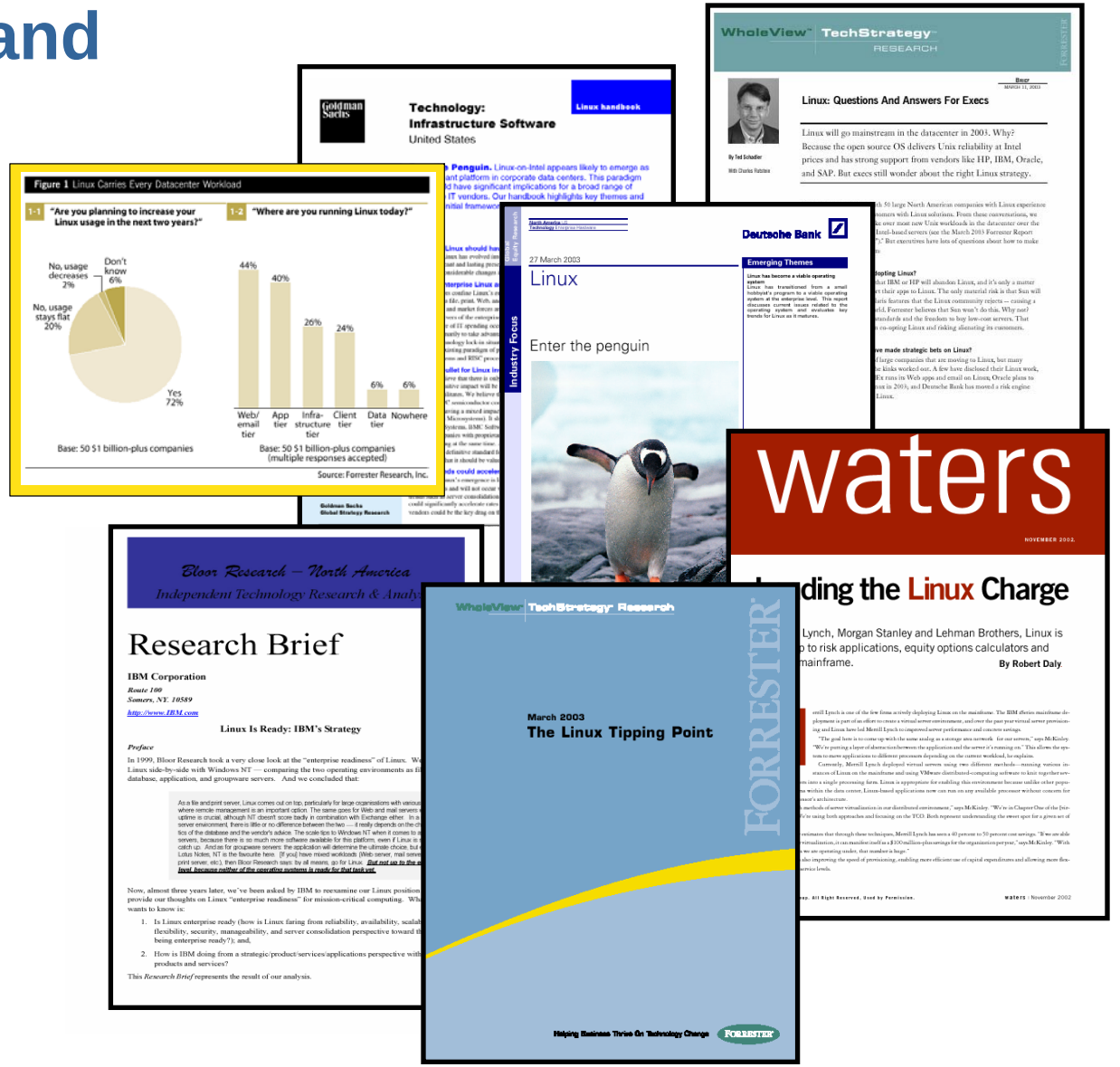


Linux adoption and acceptance

- **Reports from :**
  - Gartner
  - Deutsche Bank
  - Forrester
  - IDC
  - DH Brown
  - Goldman Sachs
  - Bloor Research
  - Wall Street
  - IBM
- **Articles in :**
  - Business Week
  - Financial Times



Community

The Linux Foundation

linux-foundation.org

- **The LF is a nonprofit consortium dedicated to fostering the growth of Linux created by a merger of the Open Source Development Labs and the Free Standards Group**
- **The LF promotes, protects and standardizes Linux by providing unified resources and services needed for open source to successfully compete with closed platforms**

The Linux Foundation

- **Technical collaboration**
  - The Linux Standard Base and its certification and testing programs deliver interoperability between applications and the Linux platform
  - The LF also hosts a number of technical workgroups that are solving key issues facing Linux including printing, accessibility, desktop interfaces and application packaging
- **Protection and Promotion**
  - The LF protects the future of Linux by employing key Linux developers like Linus Torvalds so they can maintain independence while working full time to improve Linux
  - The LF also offers legal protection services for developers to safeguard the future of Linux

Linux Standard Base

The Linux Foundation

- **The LSB delivers interoperability between applications and the Linux operating system**
  - Currently all major distributions comply with the LSB and many major application vendors, like MySQL, RealNetworks and SAP, are certifying
  - The LSB offers a cost-effective way for application vendors to target multiple Linux distributions while building only one software package
  - LSB certification of distributions results in more applications being ported to Linux and ensures that distribution vendors are compatible with those applications
- **Session 0104 The Linux Standard Base: Its importance and how it affects ISVs and Customers on Wednesday at 6:00 PM in room C37**

Fedora Core

fedora.redhat.com

- **Fedora Core is an RPM-based Linux distribution, developed by the community-supported Fedora Project and sponsored by Red Hat**
- **It aims to be a complete, general-purpose operating system that contains only free and open source software**
- **Fedora Core is derived from the original Red Hat Linux distribution, and it is intended to replace the consumer distributions of Red Hat Linux aimed towards home users**
- **Support for Fedora comes from the greater community (Red Hat staff work on it, but Red Hat does not provide official support for Fedora)**
- **New releases of Fedora come out every six to eight months**
- **RHEL branches its releases from versions of Fedora Core**

openSUSE
opensuse.org

openSUSE™

- **openSUSE is a community project, sponsored by Novell, to develop and maintain a general purpose Linux distribution**
- **After acquiring SUSE Linux in January 2004, Novell decided to release the SUSE Professional product as a 100% open source project, and as of January 2007 the current stable release is openSUSE 10.2**
- **openSUSE provides, beyond the distribution, a web portal for community involvement**
  - The community assists in developing openSUSE collaboratively with representatives from Novell by contributing code through the open Build Service, writing documentation, designing artwork, fostering discussion on open mailing lists and in Internet Relay Chat channels, and improving the openSUSE site through its wiki interface
- **It is one of Novell's stated goals to market openSUSE as the best, easiest distribution for all users**

Open Standards

OpenDocument Format for Office Applications

- ODF is a document file format used for describing electronic documents such as memos, reports, books, spreadsheets, charts, and presentations
- This standard is based upon the XML format originally created and implemented by the OpenOffice.org office suite
- OpenDocument is an OASIS standard (706 pages) and a published ISO and IEC International Standard referred to as ISO/IEC 26300:2006
- The Opendocument standard meets the common definitions of an Open Standard, meaning the specification is freely available

OpenDocument Format for Office Applications

- **The most common file extensions used for OpenDocument documents are:**
  - .odt for word processing (text) documents
  - .ods for spreadsheets
  - .odp for presentations
  - .odg for graphics
  - .odf for formula, mathematical equations
- **Office applications utilizing ODF include OpenOffice.org, Sun's Star Office, KOffice, and IBM's Workplace and Hannover (aka Notes 8) productivity tools**

Office Open XML

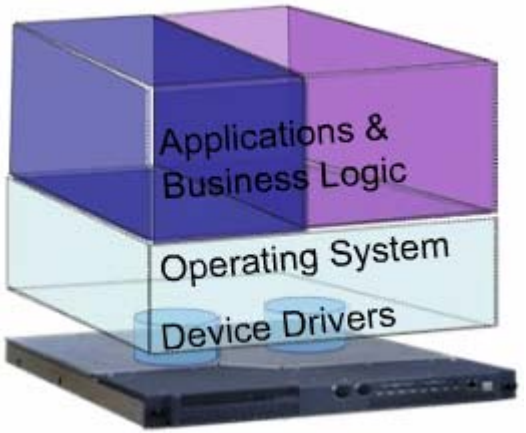
- OOXML is a file format specification for the storage of electronic documents such as memos, presentations, and spreadsheets
- The specification was developed by Microsoft for its Microsoft Office product suite and was standardized by Ecma International as Ecma 376 in December 2006 (6000 pages!)
- Microsoft stated that its primary goal was backward compatibility with existing documents and full support of the feature set of Microsoft Office
- Office Open XML has been the subject of considerable controversy in the computing industry

Xen – Enterprise Grade Open Source Virtualization

To learn more about Xen, view the 10 minute webcast at xensource.com/media/xen/player.html

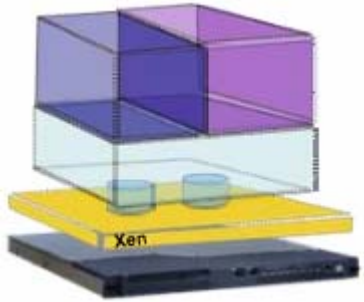
Problem: Success of scale out

- One application per server – with resulting low utilization rates <15%
- Inability to scale resources for applications needing more resources during busy periods
- “Operating system + application” provisioning model takes a top-down view of the infrastructure
- Expensive to maintain, power, cool
- Inflexible



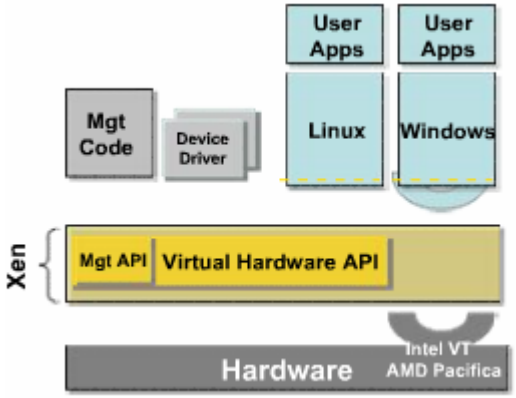
Along came Xen

- Xen decouples operating system software and applications from the underlying hardware
- Virtual servers enable consolidation, improve utilization and lower cost of management
- Live Relocation enables a running virtual machines, including all states, to be moved in ~50ms



Inside Xen, and why it's so cool

- **Xen: A para-virtualizating hypervisor**
- **Virtualizes (only) the base platform**
  - CPU
  - MMU and memory
  - Low level interrupts
  - On Intel VT and AMD-V this is provided by the hardware
- **Small, efficient, trusted code base**
- **Guest operating system co-operates with Xen**
- **Near native performance**
- **Supports native Linux devices drivers**
- **Separates the driver from the guest**
- **No separate maintenance schedule**
- **Runs on x86_64, IA64, Power5**



Xen 3.0 Community Release

- **Base feature set**
  - Up to 32-way SMP guest operating systems
  - Support for all operating systems via hardware virtualization on Intel VT and AMD-V processors
  - x86_64 support for both AMD64 and EM64T
  - PAE support for 32-bit servers with more than 4GB memory
  - Superb performance – typically 0.1% to 5% overhead
  - Runs all operating systems (Windows and legacy Linux via Intel VT and AMD-V
- **Other projects underway**
  - Sun Solaris x86 on Xen (Solaris 10 roadmap)
  - IA64 (HP)
  - Power5 (IBM)
  - SPARC port (Sun)

Novell SUSE Linux Enterprise 10

Novell

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novell.com/products/server/

SUSE® Linux Enterprise Server 10

Novell®

- **The Platform for the Open Enterprise**
  - State of the art Linux
  - Virtualization energized
  - Application security
  - Systems management
  - Integration and interoperability
  - Broad hardware support

Major Areas of Investment

SUSE Linux Enterprise Server 10

Novell®

- **Virtualization**
  - Xen 3 for SMP, PAE and 64-bit CPUs
  - Server Consolidation, Compatibility
  - Scheduled Maintenance
- **Deployment and Management**
  - CIM Providers and Improved YaST
  - Pattern Deployments
- **Security**
  - Application Security, EAL4+
  - Network Detection, Monitoring
  - Secure Encapsulation with Xen
- **Performance and Scalability**
  - 1024 CPUs, 10+TB Memory
- **New Hardware and Update Drivers**
  - x86, x86-64, ia64, ppc, ppc64 and s390x
  - New Storage, Network, Graphics drivers
  - Hotplug Improvements
- **Storage Foundation**
  - Clustered File System OCFS2, EVMS
  - HA with Heartbeat 2 (to 16 nodes)
  - NFS v4
  - iSCSI Target and Initiator
  - DRDB for Disaster Recovery

Complete Server Functionality

SUSE Linux Enterprise Server 10

Novell®

- **File and Print Services**
  - Samba 3 with improved integration into Windows environments (authentication against Active Directory)
  - NFS v4
  - CUPS
  - Apple File Protocol (AFP) - NetATalk
  - Support for Linux, UNIX, Windows and Macintosh clients
- **Mail Services**
  - SMTP / Postfix
  - IMAP / Cyrus
  - SASL
- **Security**
  - SUSEFirewall
  - ClamAV Anti-Virus Protection
  - Snort
  - VPN with FreeS/WAN
- **Middleware Services**
  - Apache Web Server 2.2.0 and scripting support (PHP5, PERL, Python, Ajax, Ruby on Rails, etc.)
  - Java Runtime Environment 1.4
  - Geronimo (Java Application Server)
  - Tomcat
  - Mono® 1.1

Hardware support

SUSE Linux Enterprise Server 10

Novell

- **CPU**
  - Available on IBM System x (xSeries), System z (zSeries), BladeCenter, POWER, System p (pSeries) and System i (iSeries)
  - Support and optimizations for the latest CPU technology, including Virtualization (VT, Pacifica) and Multi-core.
- **Updated drivers for:**
  - Storage (RAID, SAS, SATA, Multipathing, Fibrechannel)
  - Networking (including support for I/OAT and Wireless)
  - Platform management (IPMI) and Power management
  - Graphics, Audio, Bluetooth and USB devices
- **Hotplug**
  - Hotplug improvements through Hardware Abstraction Layer
  - Persistent device naming
- **Scalability**
  - Support for 10+ TB Memory, 12000 SCSI LUNs and up to 1024 CPUs

SUSE Linux Enterprise Desktop 10

Novell

- **Exciting New Desktop and Tools**
  - Usability with improved Menus
  - Beagle, f-spot, Banshee, Tomboy
- **OpenOffice.org 2.0+ Novell Edition**
  - Improved Format Interoperability
  - VB Macros Support
  - Performance Improvements
- **Deployment and Management**
  - Thin Client including Diskless
  - Central Management and Deployment
  - Desktop Lockdown
- **New Hardware Support**
  - iPod, Cameras, USB Storage
  - IPMI and Power Management
  - Video Acceleration
  - Plug-n-Play
- **Interoperability**
  - Microsoft Active Directory
  - Novell eDirectory™
- **Multi-Media Support**
  - Support Audio / Video Formats
  - Clean Intellectual Property

Red Hat Enterprise Linux 5

redhat.com/rhel/details/servers/

Session 9217 The Virtualization Cookbook for Red Hat Enterprise Linux 5 on Thursday at 4:30 PM in room C24

Hardware support

Red Hat Enterprise Linux 5

redhat.

- **Support and optimization for contemporary multi-core and HT processors**
- **Updated and expanded drivers for core system devices:**
  - Networking (including Infiniband via OpenIB stack, and wireless)
  - Storage
  - Graphics
  - Audio
  - Power management
- **Support for networking offload technologies**
  - Intel I/O Acceleration Technology (I/OAT)
- **Expanded local disk and network kernel crash dump device support**

Virtualization
Red Hat Enterprise Linux 5

- **Major technology targeted for delivery in RHEL 5 is system virtualization**
- **A deployable virtualized environment requires multiple collaborating technologies:**
  - Server/operating system virtualization with Xen (integrated into kernel and operating system platform)
  - Storage virtualization with Red Hat Global File System
  - System management, resource management, provisioning with Red Hat Network
  - Application environment consistency with non-virtualized environments
- **Benefits:**
  - Dramatic lowering of TCO
  - Disaggregation of applications, servers, and storage
  - Always on, continuous availability – Operational scalability

Security
Red Hat Enterprise Linux 5

- **Enforces fine-grained policies via kernel-enforced mandatory access controls**
- **An additional level of protection against security exploits**
- **Limits the scope of security vulnerabilities**
- **Expanded SELinux targeted policy coverage**
  - Now provides coverage for 80+ core system services, versus 11 in Red Hat Enterprise Linux 4
- **Binary code protection**
  - Execshield enhancements provide additional armoring against most common kinds of security exploits
  - Core packages built with new FORTIFY_SOURCE GCC option which implements run-time bounds checking to prevent buffer overflow exploits

Identity Management
Red Hat Enterprise Linux 5

- **Native support for identity management in conjunction with Red Hat Directory Server and Red Hat Certificate System**
- **Integration of identity and certificate management capabilities with Red Hat Enterprise Linux and community applications**
  - Addition of Enterprise Security Client (smartcard support)
  - Centralized key management for core desktop applications
    - System login, web browser, email, SSH
- **Integration of certificate-based security and kerberos infrastructure via PKInit**
- **Enables centralized management of users and rights**
- **Enables “Single Sign-On” user experience**

Storage
Red Hat Enterprise Linux 5

redhat.

- **NFSv4 Improvements**
  - More complete implementation of the specification
    - Delegation (aka lease), increased client caching
    - Server migration (failover)
  - Improved security integration
    - Kerberos authentication
    - 2 different encryption options, header-only and payload
  - Performance improvements – delegation, cachefs integration
- **iSCSI Software Target**
- **I/O Performance Improvements**
- **Enhanced GFS layered product**

Oracle's Unbreakable Linux

Canonical's Ubuntu Linux

Oracle Unbreakable Linux

- **Announced with great fanfare at Oracle OpenWorld in October 2006**
- **What is it?**
  - Support program for Linux
  - Linux distro “cloned” from RHEL 4 (or Centos?)
  - Platforms – x86 and x86-64 ONLY
- ***IBM is not contemplating support of UBL by any IBM products***

Ubuntu on the desktop

ubuntu.com/desktop

- **Ubuntu offers you a complete Linux-based operating system, including all the major applications you need to play and work**
- **The base system and all included software is free, and support is available from the community or by professional support providers**
- **Desktop simplicity**
  - When you start the system for the first time you are greeted by a desktop that is unusually clean and tidy
  - The default theme is designed to be easy on the eye
  - But Linux is inherently flexible; you can customise the look and behaviour of the desktop in a range of ways, from simply changing the default theme to selecting a different desktop environment altogether

Ubuntu on the server

ubuntu.com/server

- **Built on the solid foundation of Debian — known for its robust server installations — the Ubuntu Server Edition has a strong heritage for reliable performance and predictable evolution**
- **Ubuntu Server Edition provides a well-integrated platform for deploying a new server with any of the standard internet services: mail, web, DNS, file serving or database management**
- **Automatic LAMP (Linux, Apache, MySQL and PHP)**
  - In about 15 minutes, the time it takes to install Ubuntu Server Edition, you can have a LAMP server up and ready to go
  - The LAMP option saves the trouble of installing and integrating each of the four separate LAMP components
- **Supported architectures**
  - x86
  - AMD64
  - UltraSPARC T1
  - PowerPC and POWER5

Linux and Open Source on the Web at IBM

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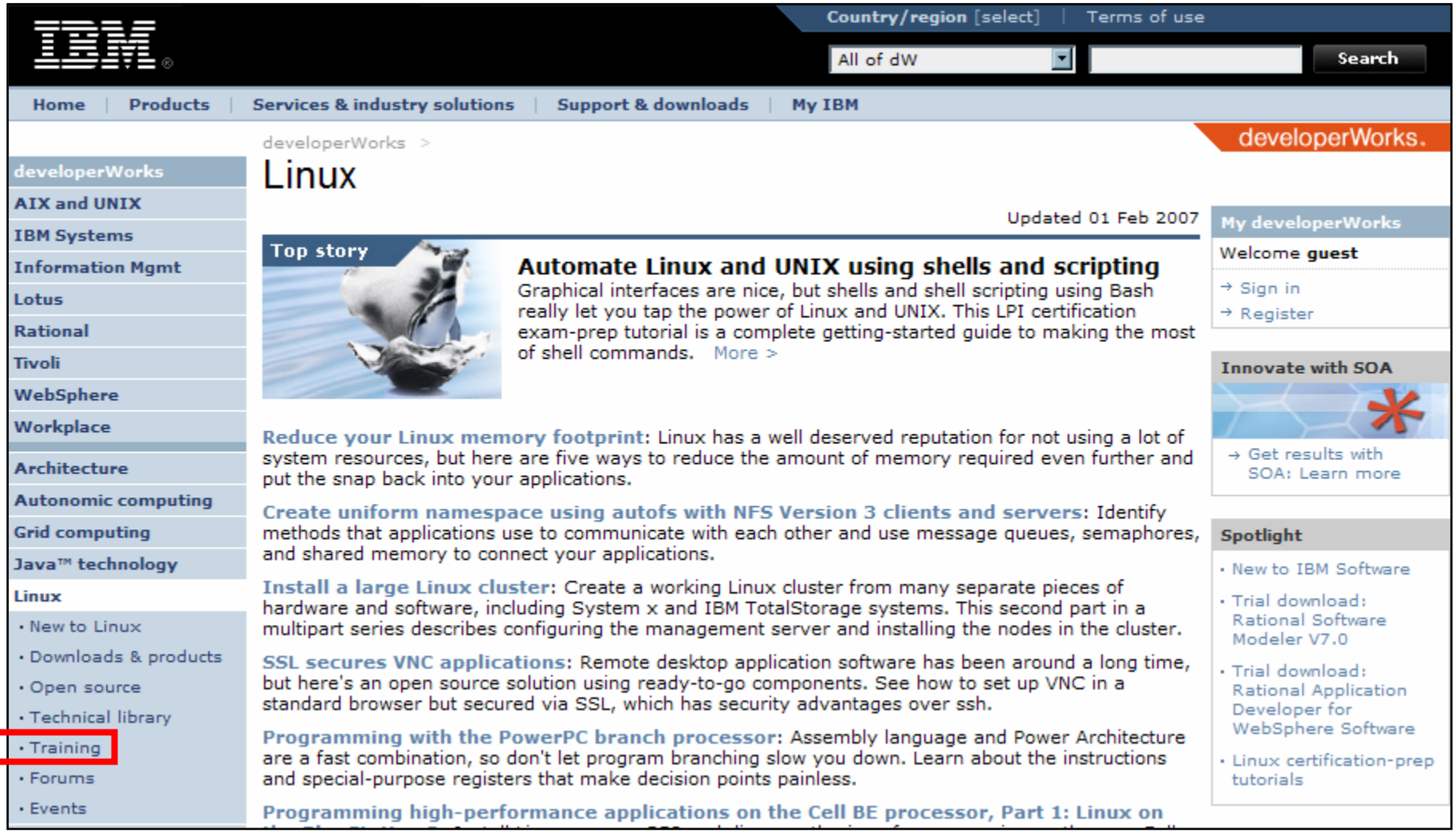

IBM Redbooks
ibm.com/redbooks/linux

What next?

- Familiarize yourself with the facts
- Establish an Open Policy
- Align to Open Standards
- View Open Source and Linux as valid alternatives for IT systems
- Make decisions based on business value; not hype and hope!
- Be prepared for change!

Thank you

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