

LIRIS Blue Academy 2007-2008

Linux – A Strategic Choice ?

An initiative from L.I.R.I.S. and IBM Belgium

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LIRIS Blue Academy Program 2007-2008

- Opening Session: Business Development in Virtual Worlds – November 13, 2007 [19:00-20:30] (HOG 00.50)
 - Philippe Borremans, Business Development Executive
- LINUX – November 26, 2007 [16:00-18:00] (HOGM 00.74)
 - Ludwig van den Bergh, Technical Director Systems and Technology Group
 - Björn Mantels, Linux Product Services Professional
- Innovation with IT – November 29, 2007 [9:00-11:00] (VHI 02.29)
 - Jacques De Kegel, Sensor & Actuator Solutions Leader BeNeLux
- Service Oriented Modeling and Architecture – December 12, 2007 [11:00-13:00] (VHI 00.41)
 - Bert Peeters, Senior IT Architect
 - Eric Michiels, Senior IT Architect
- Secure Logistics – December 17, 2007 [16:00-18:00] (HOGM 00.74)
 - Jacques De Kegel, Sensor & Actuator Solutions Leader BeNeLux
- Proof Of Technology: Software Design and Construction Lab – February 18, 2008 [9:00-17:00] (IBM Forum Evere)
 - Wim Drossaert, Consulting IT Specialist
- Setting Up and Optimizing Business Processes in HR – March 20, 2008 [9:00-11:00] (VHI 01.29)
 - SAP
- Unified Communications – April 21, 2008 [11:00-13:00] (HOGM 01.74)
 - Alain Verheyden, ISV Alliance Manager
 - Maarten Raeymaekers, IT Specialist

The Business Value of Linux

Ludwig Van den bergh

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Open Source Software Advantage

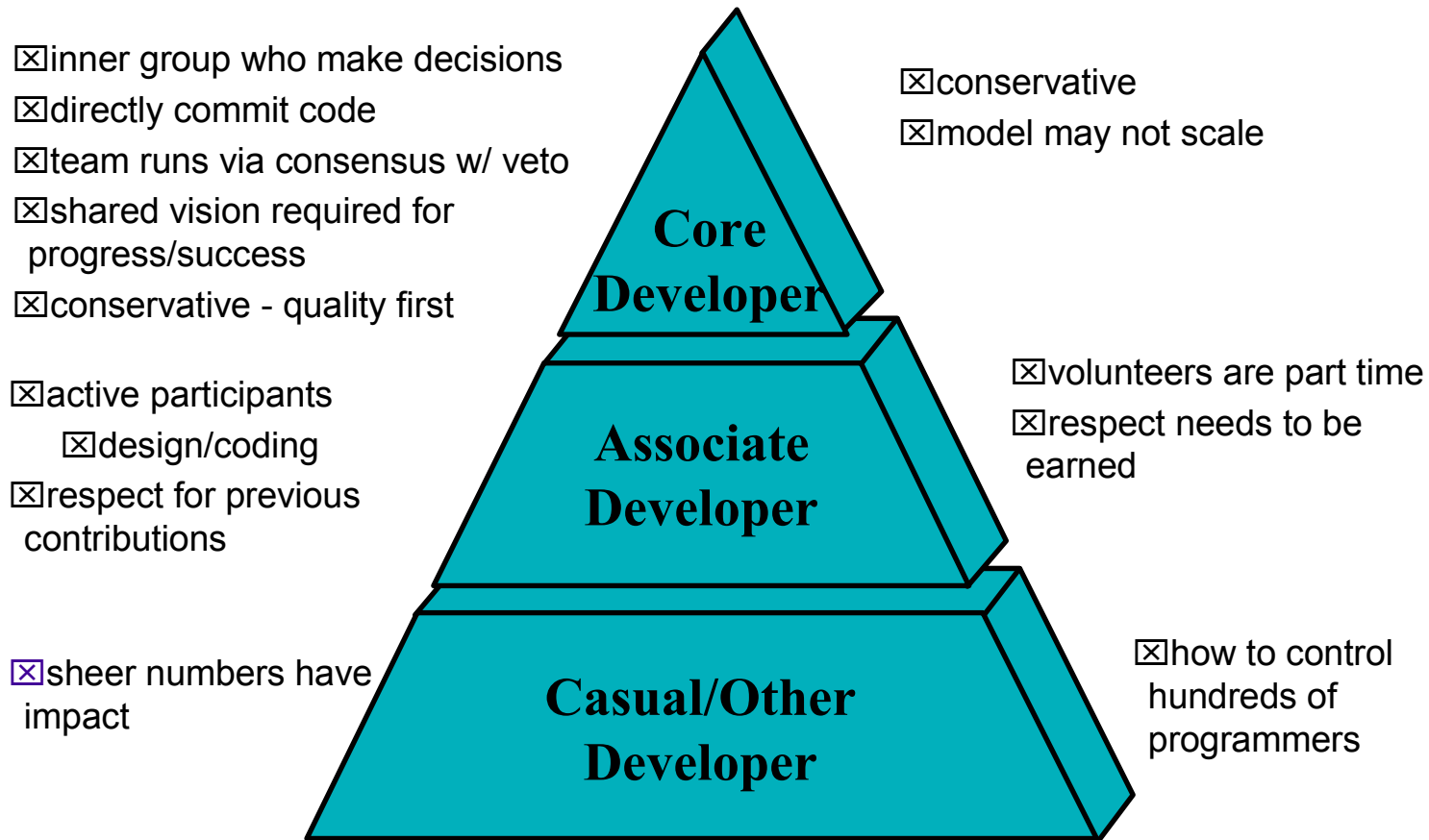
■ Open-Source software

- ▶ software -- *with* source code -- available on the Internet for unrestricted distribution under an open-source license
- ▶ participatory community debugs, enhances, and maintains the source code
- ▶ high quality, secure code

■ Linux

- ▶ Linux distributions are an "open source" based operating system, distributed freely, with it's underlining kernel source code openly published.
- ▶ "Linux provides a common, stable [scalable] and inexpensive Unix [style] operating system across a multitude of platforms, hence lowering overall costs ... "

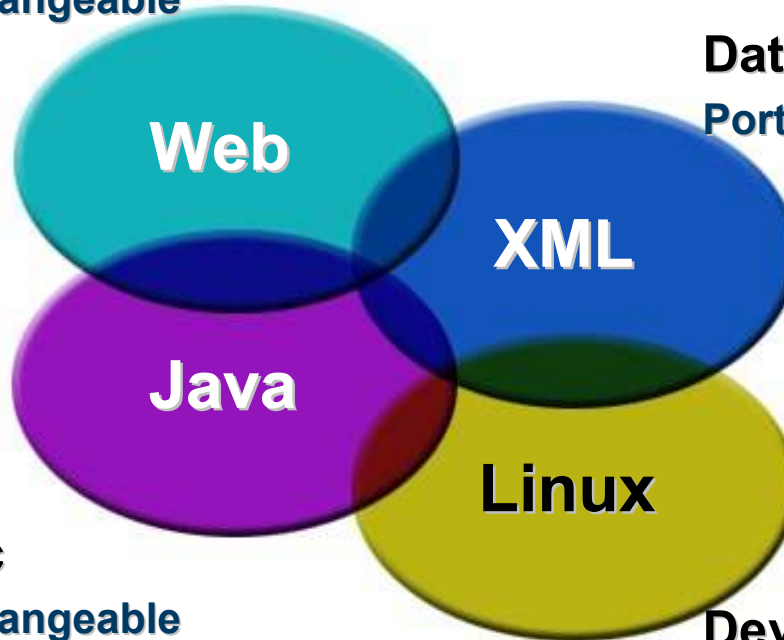
Open Source Software Advantage



Open platform

Presentation/Access

Portable & Interchangeable



Data/Documents

Portable & Interchangeable

Business Logic

Portable & Interchangeable

Development &
Operating
Environment
Open & Portable

Linux is everywhere



IBM Server Hardware for Linux

Natively **xSeries, iSeries, pSeries & zSeries**

As guest in a partition **pSeries, iSeries & zSeries**
(Scales up to 15/32 partitions)

As guest under VM **zSeries**
(Scalability unlimited - tested 80.000)

As guest under VMWare, XEN **xSeries**

IBM Software for Linux - www.ibm.com/software

- BookManager BookServer for Linux*
- Data Replication Solution
- DB2
 - ▶ Connect
 - ▶ DataPropagator
 - ▶ Everyplace
 - ▶ Universal Database
 - ▶ XML Extender
- Domino
- Host On-Demand
- Network Dispatcher
- Net.Data
- Object REXX
- REXX Family
- Screen Customizer
- SecureWay On-Demand Server
- SecureWay Wireless Software
- techexplorer Hypermedia Browser
- Tivoli ADSM Client
- Tivoli Storage Manager (formerly ADSM)
- ViaVoice for Linux *
- VisualAge
 - ▶ Developer Domain
 - ▶ VA for Java
 - ▶ VisualAge Pacbase
- WebSphere
 - ▶ Application Server
 - ▶ Edge Server
 - ▶ Homepage Builder
 - ▶ Host Integration Solution
 - ▶ Host On-Demand
 - ▶ Performance Pack Cache Manager for Multiplatform
 - ▶ Site Analyzer
 - ▶ Transcoding Publisher

ISVs Adopting Linux: more than 4.000



<http://www8.software.ibm.com/solutions/isv/igssg.nsf/searchgui1/?OpenForm>

Why should customers be interested in Linux ?

Free of charge Operating System

Good in systems resource utilization

Application Scalability - write once, deploy many

Based on open (and published) standards

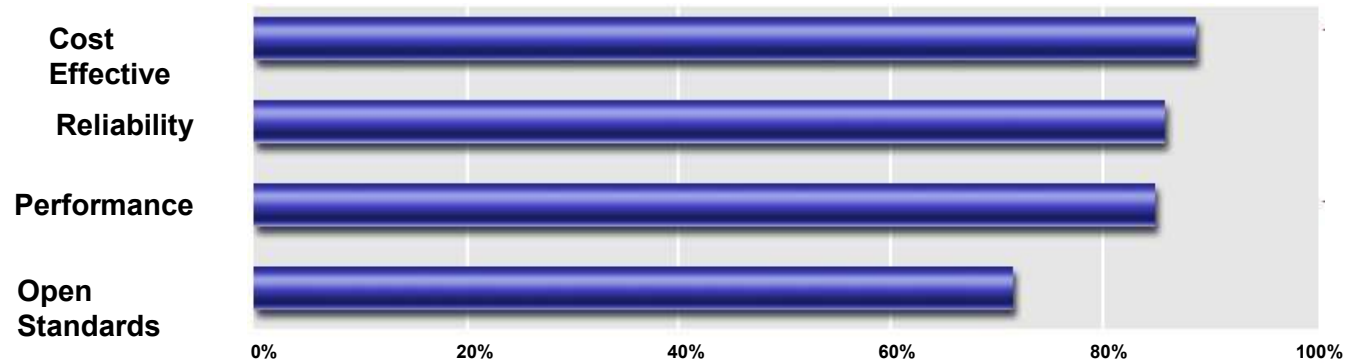
Enourmeous in-flow of skills

New applications

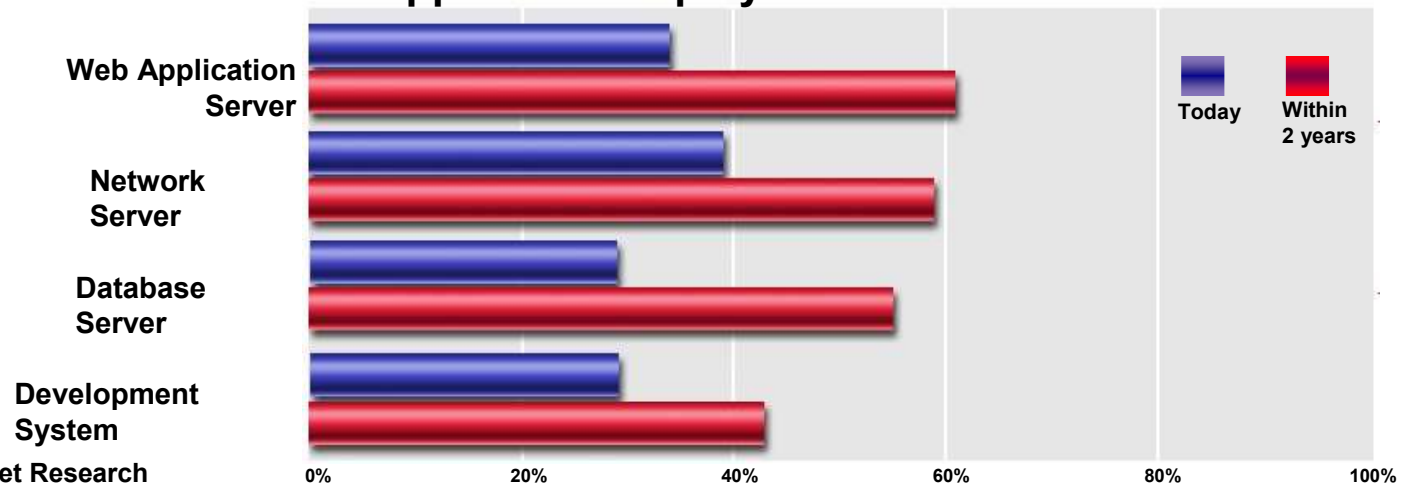
Its capabilities to consolidate workload on fewer/larger engines

Linux and the Customer

Linux Value Factors

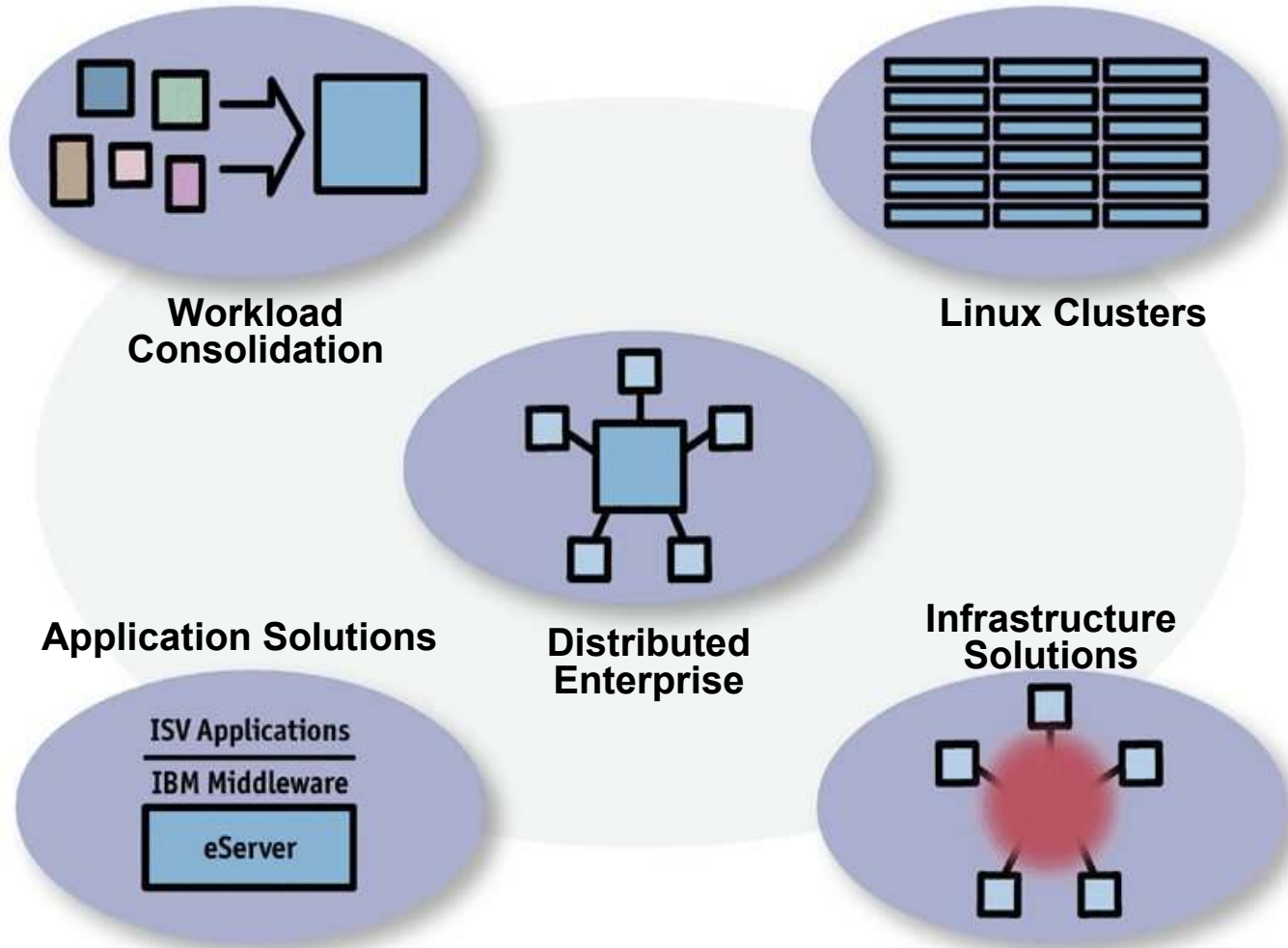


WW Linux Application Deployment



Source: IBM Market Research

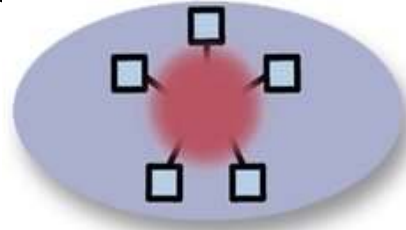
How Customers are Deploying Linux



Infrastructure Solutions

■ Infrastructure Servers

- ▶ File/Print
- ▶ Web/Application
- ▶ Application dev.
- ▶ Content/Caching
- ▶ Security



■ Advantages:

- ▶ Low cost
- ▶ Highly reliable
- ▶ Turnkey
- ▶ Rapid setup
- ▶ Innovative packaging

■ Infrastructure Software

- ▶ DB2 Universal Database
- ▶ Domino collaboration
- ▶ Tivoli Systems Management
- ▶ MQSeries messaging
- ▶ WebSphere Family for application development

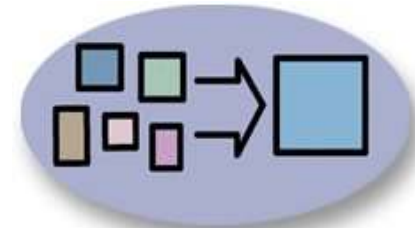
■ Advantages:

- ▶ Scalable
- ▶ Open standards
- ▶ Industry proven

Consolidate Workloads Across the Organization

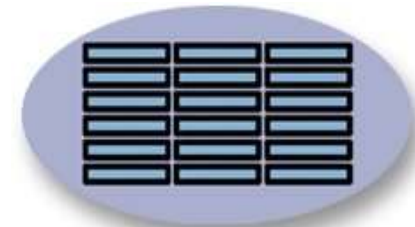
Simplified Infrastructure with IBM and Linux

- Workload Consolidation
 - ▶ Replace many with few
 - ▶ Optimize assets
- Advantages:
 - ▶ Reduce costs
 - ▶ eServer proven reliability
 - ▶ Virtualize servers
 - ▶ Dynamically manage workloads
 - ▶ Enabled across all eServer products



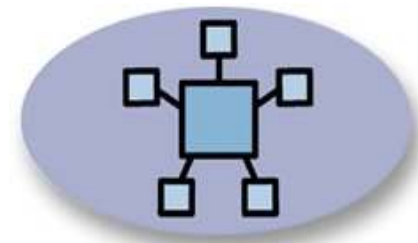
Linux Clusters

- Clusters with Linux:
 - ▶ Computationally intensive workloads
 - ▶ High performance computing
 - ▶ Horizontal scalability
- Advantages:
 - ▶ Supercomputing performance at "mass market" prices
 - ▶ Choice of eServer architecture
 - IA 32, IA 64, or PowerPC
 - ▶ IBM factory installed and delivered



Replicate Function Across the Enterprise

- Distributed solutions with Linux:
 - ▶ Geographically dispersed
 - ▶ Serve more customers or employees
- Advantages:
 - ▶ Low cost, small footprint eServer
 - ▶ High reliability and stability
 - ▶ Secure
 - ▶ Easily replicated
 - ▶ Centrally managed
 - ▶ IBM worldwide support and implementation



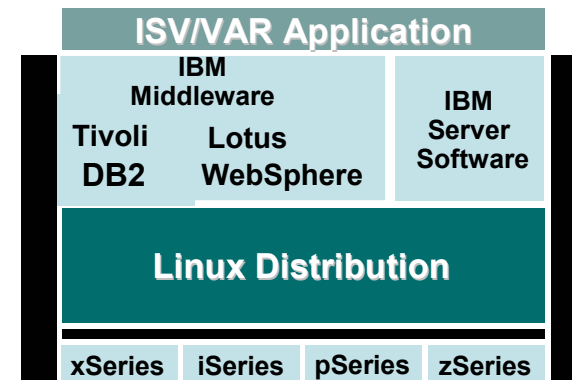
Application Solutions

■ IBM Business Partner and ISV Solutions

- ▶ Enable e-business initiatives
- ▶ Deliver industry vertical applications
- ▶ Leverage Business Partner and ISV expertise

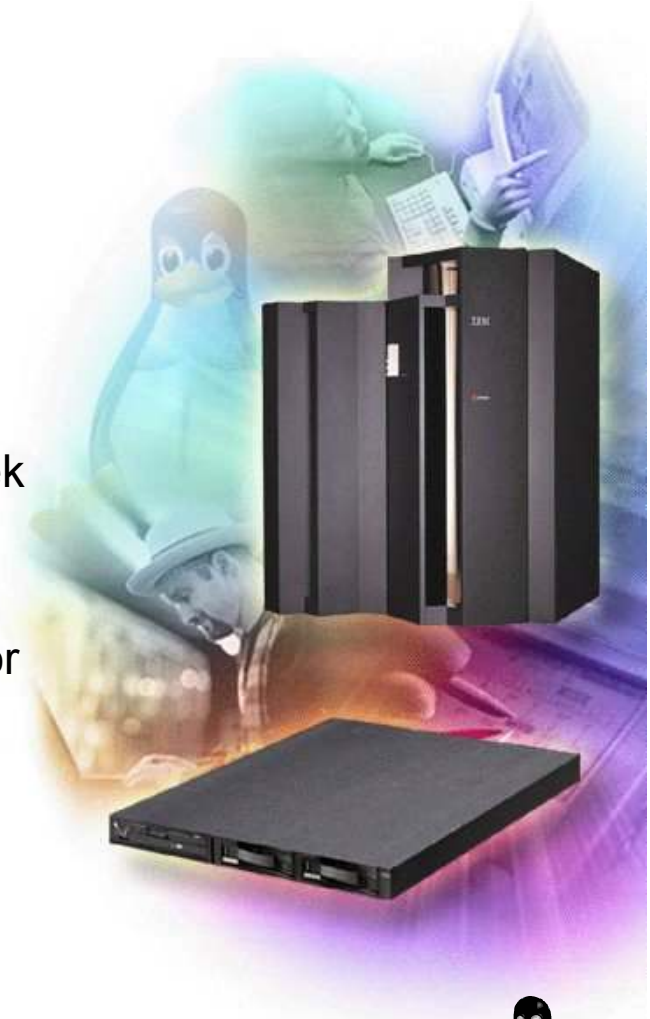
■ Advantages:

- ▶ Bundled eServer / IBM middleware / ISV application
- ▶ Low cost
- ▶ Optimized solutions
- ▶ Reduced implementation time



Linux @ IBM

- 1100+ servers WW
- Internal Linux Projects:
 - ▶ www.ibm.com/linux & w3.ibm.com/linux
 - redundant xSeries Linux servers
 - ▶ Intranet search engine
 - xSeries servers; Inktomi search engine
 - ▶ IGS Internet Vulnerability Security Scanning
 - 61 xSeries scanning 30k IP addresses/ week
 - ▶ Performance monitoring
 - 24 xSeries servers
 - 75% fewer Linux servers than NT servers for same workload
 - ▶ IBM Global e-Mail Anti-virus Management
 - xSeries scans incoming/outgoing mail for viruses
 - ▶ 300mm Wafer Manufacturing Equip. Control
 - Much more reliable than Win2000
 - 159 xSeries; 300-400 by year end



Linux@IBM

- Mega consolidation project
 - IBM is consolidating more than 3,900 distributed servers onto just 33 System z mainframes running Linux. **This will drive HUGE savings beginning this year... including an 80 percent reduction in energy consumption over five years.**
- System z is the coolest server in the green DataCentre

IBM's Contribution to Linux

- 250+ developers worldwide
- 70+ active projects
- **Significant contributions to 2.4 and 2.5 kernel:**
 - Scalability
 - Scheduler
 - Security
 - Serviceability
 - Internationalization
 - Journaled Filesystem
 - Cluster Management
 - System Management
 - Network security
 - Networking
 - POSIX Threading
 - Reliability
- **Trusted, valued members of the Linux Community**
 - Linux Standards Base
 - Free Standards Group
 - Linux Internationalization
 - Linux Test Project
 - Open Source Development Lab
 - Linux ATM Project
 - Linux Token Ring Project
 - USAGI (IPV6) Project
 - GNOME Foundation
 - KDE League



Linux Enablement - IBM Global Services

www.ibm.com/linux/services

Boeblingen

Montpellier

WW Porting Centers

- \$200M investment in the open source operating system during the next 4 years across Europe
- Development centers will provide workshops and technical support services aimed at helping Linux developers design and code their applications;
- Linux testing capabilities - using S/390, RS/6000, NUMA, AS/400 and Netfinity platforms
- Linux performance tools to evaluate reliability and performance.
- Proof of concept, Migration, Porting, Remote Testing

Warsaw

Hursley

Stuttgart

Paris

Budapest

Greenock

Professional Services

- Comprehensive enterprise services for Linux
 - ▶ Infrastructure consulting and planning
 - ▶ Open Source consulting
 - ▶ Installation
 - ▶ Configuration
 - ▶ Application enablement
 - ▶ Integrated solutions portfolio

Education & Training

- Full portfolio of courses:
 - Via classroom - 13,
 - Via web - 13
- Available in 20 countries
- Available in 5 languages
- Linux server operators and end-users, including Linux basics, awareness for managers, system administration, and e-business
- How-to (Redbooks) for Linux
- Linux Professional Institute (LPI) sponsor for certification

Service & Support

- One-stop prime shift or full shift (24 X 7) enterprise level support
- Support for major Linux distributions
- Toll-free Phone & electronic access
- How-to & defect-level support
- Netfinity & S/390 servers
- Account Advocate, Advanced Support and Consult Line service options



More Information...

▪ IBM Linux sites:

- ▶ www.ibm.com/linux
 - Links to IBM Linux & open source sites
 - ☒ [IBM Hardware/Software/Service/Support for Linux](#)
 - ☒ [IBM Alliances / Linux distribution partner's sites](#)
 - ☒ [IBM Open source contributions](#)
- ▶ www.ibm.com/developerWorks
 - Comprehensive online resource for the developer community
 - ☒ [Linux zone](#)
 - ☒ [Open source zone](#)
 - ☒ plus [Java](#), [XML](#), [Security](#), [Web architecture zones](#)
- ▶ www.ibm.com/software/casestudies
 - Use search word "Linux"
- ▶ <http://www.redbooks.ibm.com>

▪ Linux Web Sites

- ▶ [Apache](#)
 - <http://www.apache.org>
- ▶ [Linux Clusters](#)
 - <http://www.beowulf.org>
 - <http://www.steeleye.com>
- ▶ <http://www.linux.org>

▪ Key applications

- ▶ http://www.redhat.com/marketplace/channel_software.html
- ▶ <http://www.linuxplanet.com/linuxplanet/reviews/200/1/>
- ▶ <http://home.xnet.com/~blatura/linapps.shtml>
- <http://www.linuxapps.com/>

What is Linux ? What are its possibilities ?

Björn Mantels

An initiative from L.I.R.I.S. and IBM Belgium

Objectives

- To understand what a Linux distribution is
- To explain what Open Source stands for and how it differs from commercial software
- To explain the benefits and the potential risks of Open Source software
- To show what possibilities Linux has today and in the not so distant future

Feel free to interact

Topics

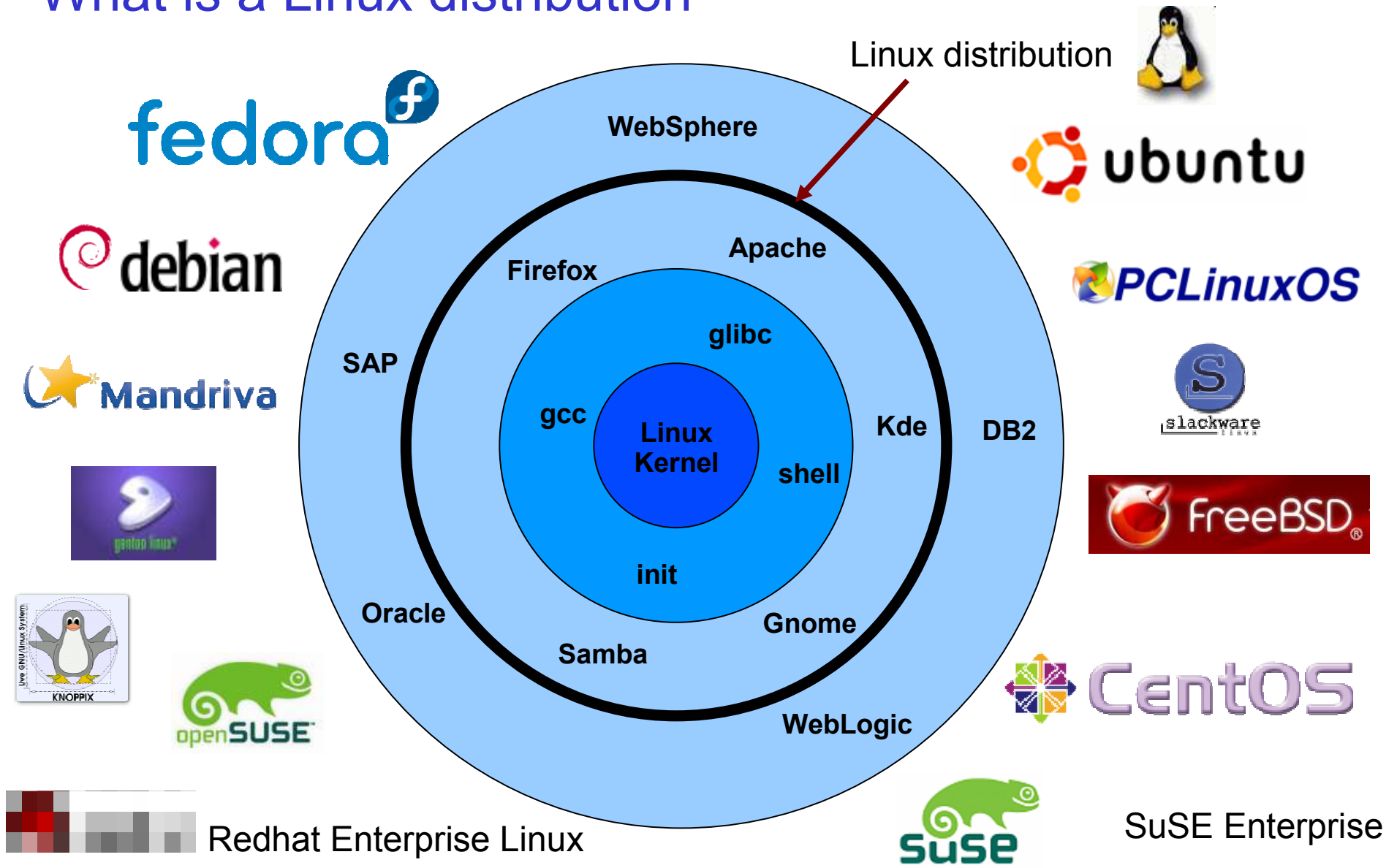
- What is a Linux distribution ?

- What is Open Source ?
 - Origin
 - GPL
 - Other licenses
 - Examples
 - Why use it
 - Support
 - Issues

- Possibilities of Linux
 - Why using Linux ?
 - Applications
 - Security
 - Virtualization
 - Desktop

 - Linux @ work

What is a Linux distribution



What is Open Source

- General term for software of which the source code is freely available.
- The availability of the source code allows that everyone can make changes to the software.
- The license determines whether software is Open Source.
- GPL is the most used, but not the only Open Source license.
- Other examples of licenses : Apache, Perl, Mozilla, BSD, MIT, ...
- Open Source Initiative : <http://www.opensource.org>
- Basic premise is Freedom (Vrijheid), not Free (Gratis)

The origins of Open Source

- Originally computers came with the software needed to use them because the hardware was very expensive. That software was also delivered in source form.
- In the 70's UNIX was born at AT&T Bell labs. In the beginning it was sold in source form. At the end of the 70's commercial UNIX systems became available but included only binary software.
- The academic world who used the sources from UNIX as a educational and research tool reacted against this. This was the start of different Open Source initiatives.
- In 1975 the first BSD UNIX was distributed.
- In 1983 the GNU project was officially started by Richard Stallman. This project also created the GPL to use as a license for the software the project would create. The aim of GNU is to create a Free UNIX system.
- In 1991 the Linus Torvalds creates the first version of Linux.
- The growth of the Internet and Open Source goes hand-in-hand.

The origin of GPL

- The GPL was created to make sure the software of the GNU project was Free software.
- Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:
 - The freedom to run the program, for any purpose (freedom 0).
 - The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.
 - The freedom to redistribute copies so you can help your neighbour (freedom 2).
 - The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

The GNU General Public License

- It uses the Copyright system to make sure that the source code will always be available.
- Also called copyleft because it does not restrict the use of the software.
- The basic rules :
 - The source code must be freely available
 - You are allowed to make changes to the software
 - You have to publish your changes if you distribute your changes
 - You are allowed to copy the software
 - You are NOT allowed to change the license.

Other Open Source licenses

- GPL'ed software is called Free Software
 - Not only software from the GNU uses the GPL
- More liberal Open Source licenses
 - BSD, MIT, Apache, Mozilla, ...
 - Allows the software to be embedded in software with other licenses
 - Most of these licenses include statements to protect the projects name
- More restrictive licenses
 - CPL, CDDL, IBL, SPL, ...
 - Usually modifications of the GPL by commercial enterprises to give them more control over the software.
- Most projects tend to use one of the big licenses.

Examples of Open Source software

- The Linux kernel
- The GNU project
 - Emacs (text editor on steroids)
 - GCC (GNU Compiler Collection)
 - GLIBC (GNU C library)
 - Gnome (GNU Desktop environment)
 - ...
- Internet software
 - Apache, Sendmail, Bind, dhcpd, PHP, ...
- Desktop software
 - Mozilla, Firefox, OpenOffice.org, Evolution, The GIMP, ...
- And many, many more ...

Why use Open Source software

- Open Source software allows that :
 - Everyone can help to a project
 - Everyone can find the source of bugs
 - Everyone can repair bugs
 - Everyone can extend the project to their personal needs
- The result is rapid development
- Everyone can be you, a volunteer, someone who gets paid, a company, a government, ...
- Open Source goes closely together with Open Standards, although it's not the same

Support of Open Source software

- Open Source software adds a extra support channel : the community.
- The community is the collection of people that create, test, debug, use, document, ... a Open Source project.
- Interaction with the community is usually done over the Internet through mailing lists, forums and chat channels.
- Since the Internet is indexed by search engines one can Google through the knowledge of all these communities.

- Commercial support for Open Source software is available from different vendors :
 - The big IT enterprises: IBM, HP, Sun, Dell, ...
 - Open Source companies : Red Hat, Novell, Ubuntu
 - Specialized or local companies
- You are not tied to 1 vendor for your commercial support.

Issues with Open Source software

- Certain recent development can restrict its use and growth
- Digital Rights Management (DRM)
 - Best known when used with media (iTunes, WMV, DVD, ...)
 - Almost all DRM implementations are closed and proprietary.
 - It is used to deny certain of the freedoms that are basis for the Open Source movement
 - Also restricts the expected customers rights
- Intellectual Property (IP) legislation
 - Software Patents
 - Used as a threat against Open Source because going to court costs money.
 - Again restricts the freedom of software (e.g. MP3, GIF, JPEG, ...)
 - Digital Millennium Copyright Act (DMCA)
 - Restrict the circumvention of copyright protections
 - Example: It is illegal to watch a DVD with Open Source software in the US

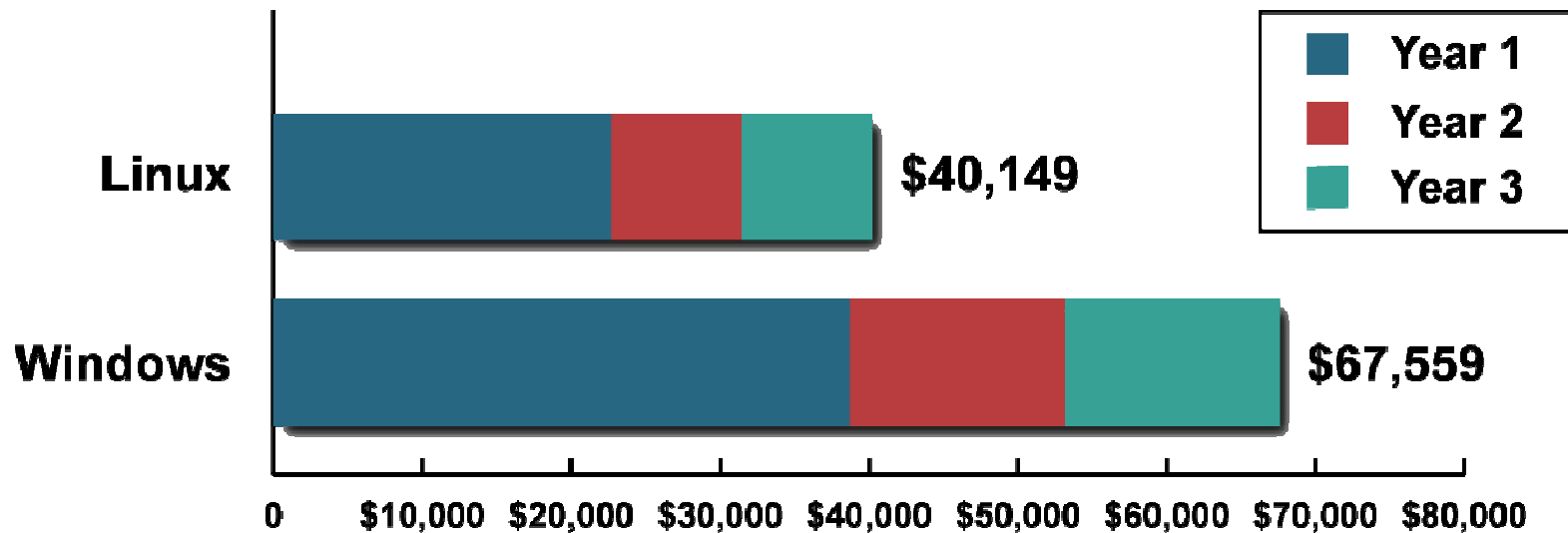
Possibilities of Linux

- For what can Linux be used today and tomorrow ?
 - In short : Anything done today on other platforms or with other software can be done today with Linux and other Open Source software.
- Linux is about choice and flexibility
- Linux is secure, reliable, scalable
- Linux drives business goals
 - Reduce costs
 - Improve application service levels
 - Promotes innovation
- Linux is excellent path to a Service Oriented Architecture/flexible datacenter

Linux delivers cost benefits

- Linux is 40% less expensive than a comparable x-86 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: <http://www-1.ibm.com/linux/whitepapers/robertFrancesGroupLinuxTCOAnalysis05.pdf>

Linux security

- Virusses
 - None existent because of UNIX type separation of user rights.
 - Anti-virus software does exist to run on systems that communicate with Windows systems.
 - 60 000 known Windows viruses <-> 40 known for Linux
- Security updates
 - Less issues in Open Source software because of the development model.
 - If issues are found, fixes are available much faster then in the commercial world.
 - Most Linux distributions include easy to use update systems.
- Pluggable Authentication Modules (PAM)
 - Central authentication system in Linux, based on modules.
 - Allows any Linux application to be connected to different identity and rule back-ends.
- SELinux and AppArmor
 - Very deep going Access Control systems in the Linux kernel

Open Source applications

- The Internet runs on Open Source software :
 - Apache : web server
 - Sendmail : mail server
 - Bind : DNS server

- Almost all type of standard network services are supported (DHCP, LDAP, SMB, CIFS, NFS, ...)

- There are large numbers of Open Source projects available on the Internet that cover almost any kind of application

Virtualisation

- Usermode Linux (UML)
 - Run a Linux kernel as a normal user mode process
 - Good for testing
 - Issues with accessing external hardware
- QEMU
 - Emulator that allows you to emulate different kinds of CPU's
 - Slow because of emulation
- Xen
 - Open Source hypervisor (small piece of software that allows multiple OS's to run on 1 piece of hardware)
 - Uses paravirtualisation to achieve very good performance
 - Supported by the large vendors
- Kernel-based Virtual Machine (KVM)
 - Uses a Linux kernel as a hypervisor
 - Requires Virtualization support of the CPU

Linux High Availability

- HACMP for Linux
 - IBM

- HA-Linux (heartbeat)
 - SuSE Enterprise Server
 - Redhat Enterprise Linux

- And more ...

Linux on the desktop

- The Software stack needed for Desktop usage is reaching maturity
 - Freedesktop
 - X.org
 - Gnome
 - KDE
 - XGL/AIXGL
 - HAL-DBUS-Hotplug
- Desktop Applications for most uses are also available and mature
 - Firefox, Evolution, OpenOffice.org, PDF viewers, Plugins, ...
- The one remaining big issue is hardware support
 - Chicken-and-egg problem
 - Also hampered by Microsoft's domination of the desktop
 - Device manufacturers need to start providing GPL drivers or fully open their specifications
 - System integrators need to choose supported devices

Linux in action @ IBM

- Monitoring : Nagios
- Infrastructure : DNS, Mrepo, LDAP, Socks
- Reporting : Awstats, MRTG
- Application server : Tomcat, WAS,
- Database server : Mysql, IBM DB2, Oracle

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 & creativity
- **Community** Approach
 - Internet has changed how enterprises address technical innovation
 - Enterprises engaging early on
 - Shapes IBM technical leaders thinking & 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 & 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
- Linux = **flexible**

Q & A

More information

- IBM SW for Linux matrix <http://www-03.ibm.com/linux/matrix/>
- IBM Linux whitepapers <http://www-03.ibm.com/linux/whitepapers/>
- Fedora <http://fedoraproject.org/>
- Ubuntu <http://www.ubuntu.com/>
- OpenSuSE <http://www.opensuse.org/>
- Debian <http://www.debian.org/>
- Knoppix <http://www.knoppix.org/>
- Slackware <http://www.slackware.com/>
- Gentoo <http://www.gentoo.org/>
- FreeBSD <http://www.freebsd.org/>
- Mandriva <http://www.mandriva.com/>
- GNU <http://www.gnu.org/philosophy/free-sw.html>
- Opensource <http://opensource.org/>
- Distrowatch <http://distrowatch.com/>
- Open Office <http://www.openoffice.org/>
- Linux security <http://www.linuxsecurity.com/>
- Linux Documentation Project <http://tldp.org/>
- Linux HA <http://linux-ha.org/>

Thank
you

Backup slides – not used

What is Linux

- A Operating System
- A UNIX implementation
- Not derived from UNIX
- But inspired and compatible with it
- Started by Linus Torvalds
- Multi platform
 - Intel, AMD, PowerPC, SPARC, MIPS, Alpha, xScale, ARM, S/390,...
- Open Source
 - GPL License
- The name Linux is used both for the Kernel as for a distribution.

Why IBM & Linux

- IBM is committed to Linux and Open Source since 1998
- Why did IBM made that decision ?
 - Open Standards (Java, XML, SOAP, Linux, ODF, ...)
 - Hardware independence
 - On Demand Business and SOA
- What Linux offerings does IBM have ?
 - Support of Linux on ALL our hardware platforms
 - Linux is a Tier 1 OS for our software products
 - Worldwide network of Linux specialists in our Services division
 - The Linux Technology Center (LTC)

Hardware support

- Linux runs on the smallest to the largest hardware and everything in between :
 - Mobile phones, PDA's, routers, DVR's, PlayStation, GPS, ...
 - Intel, AMD and PowerPC processors
 - Large UNIX systems (POWER, Alpha, SPARC, Itanium, ...)
 - Mainframes
 - Super Computers (73,4 % top500.org clusters use Linux)
- Hardware support for servers is not a issue
- Hardware support for desktops is a problem