LUGOD Meeting

May 6, 2003

IBM and Linux

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Linux Evangelist
IBM Americas Linux Impact Team

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Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

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Agenda

IBM's Commitment to Linux
- OSS, Focus Areas
- IBM HW, SW, SVCs

Linux in the Marketplace

Linux at IBM
- "we're eating our own cooking"

Linux on the IBM @server platforms

Who's Using Linux
- customers running their businesses on Linux

What's hot with Linux
- client strategy
- Grid computing
- autonomic computing

IBM's Commitment to Linux

IBM Supports Linux 100%

IBM Linux Mission - a $1 Billion Commitment and Counting

- Mission: Accelerate maturation of standard, architecture-independent Linux into Enterprise
  - Or "Make Linux Better!"
- Extend value-net of System vendors, Linux companies, and existing Linux open source community to drive improvements back into Linux
- Linux Technology Center
- Linux Integration Center
- Linux Porting Centers
- Linux Distributor Partnerships
- Linux ISV Partnerships
- Linux Center of Competence
- IBM Product brands retain
  - Responsibility for platform or software specific enablement (unique device drivers, service processors, hardware RAS enablement....)
  - Product port, enablement, distribution, etc.
  - Linux solutions (HW + Linux (from one of the distros) + HW-dependent Linux elements (from one of the distros) + MW + apps + services) including full system test
  - Identification of Linux technical requirements --> Linux Technology Center

Member of the Linux Community

- IBM well accepted by the Linux community
- Linux Technology Center
  - 250+ Developers worldwide
  - 70+ active Open Source projects
  - 80% of IBM's contributions are accepted
- IBM engineers leading enterprise Linux focus
  - Deeply involved in v2.5 and 2.6 of Linux kernel development
  - Motivated community to focus on addressing scalability and threading issues
  - Defect support for a set of core Linux packages
  - Led formation of Linux Test Project to validate reliability, robustness, and stability of Linux distributions
  - Key participant and contributor to "Carrier Grade Linux" project

Experiences with the OSS Community

- **Open source developers and traditional software developers have the same goals**
  - Quality, high-performance, serviceable software that solves real customer problems
- **Developers trained on proprietary SW can successfully become effective OS developers (hundreds of proof points)**
- **Linux community is enthusiastic about making Linux a mission-critical OS and supporting the necessary Enterprise features**
  - Scalability, security, reliability, serviceability, performance, availability, manageability, standards, ...
- **IBM is an accepted peer and partner in the Linux development community**
- **The OS community includes all of us**

Comprehensive IBM Linux Investments

Application Development

- Eclipse
  - Open source IDE framework
- WebSphere Studio
- Speedstart
- developerWorks
- Linux hubs in US, Korea

Porting & Prototyping

- Linux Integration Center
  - Technical consulting, proof of concepts, benchmarks
- Linux Porting Centers
- Linux CoC for Finance
  - NYC, London
- Linux for Service Providers Lab
- Global e-business Solutions Center

Enterprise Linux

- Linux Technology Center
  - "Help make Linux better"
- Open Source Development Lab
  - Enabling Linux and Linux-based applications for data center and carrier-class deployment

Comprehensive Product Enablement

- eServer Platforms
- IBM Middleware
- IGS Services
- on demand Linux services

IBM Linux Distribution Partnerships

- IBM Does Not Sell Their Own Linux Distribution
- Worldwide premier partnerships for hardware, software, services, solutions and marketing
- Product and/or geography based partnerships with other selected Linux Distribution companies

Premier Partnerships

Linux Distributors Combine their Power

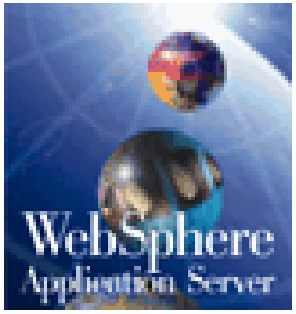
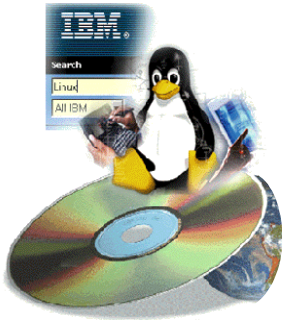
UnitedLinux = Open Industry Consortium

- Concept:
  - Binary-compatible Linux distribution, branded "UnitedLinux"
  - Initial Members: Caldera, SuSE, Turbolinux, Conectiva
    - Open to others
    - "IBM will continue to support Red Hat Linux across its key hardware, software and services offerings, it will also fully support UnitedLinux, which will make it easier than ever before to create a wide variety of Linux-based solutions for any size e-business," Steve Mills, IBM senior vice president SWG"

- Business Model:
  - Linux distributors add software and services on top of UnitedLinux.
  - Linux distributors maintain brand names with "UnitedLinux Inside"
  - UnitedLinux promotes the brand, issue memberships, certifications, pay royalties, manages requirements
  - SuSE acts as UnitedLinux systems integrator

- Implementation:
  - Cross-platform support for all IBM @server platforms, key middleware
  - Worldwide language support, standards based (e.g. LSB 1.1, LI18NUX)

IBM Focus Areas

Hardware	Software	Services	Alliances	Open Source
			CALDERA SuSE turbolinux redhat	
Servers Desktops	**All Major Applications**	**Support And Training Consulting**	**Distributor Partnerships**	**Code Contributions Technical Resources**
zSeries, pSeries, iSeries, xSeries, ThinkPads, NetVista, Blades	**WebSphere, Domino, DB2, Tivoli, VisualAge Java, MQ Series, ViaVoice, Connectors, Rational**	**Education Porting TCO Studies Redbooks, Supportline, Consulting Services OnDemand Client Desktop LSW**	**Distributors Caldera, Red Hat, SuSE, Turbolinux, United Linux**	**AlphaWorks DeveloperWorks LTC, LIC, OSDL, LCoC, LCDS, LIT, LSW**

IBM's Commitment to Linux

IBM Services for Linux

Managed Operations

Clusters
- Support Line
- x1300 Installations
- OEM Procurement
- Hardware Setup
- Software Installation

Training
- 5 languages; 20 countries
- All eServers
- Web-based and classroom
- Cluster workshops - New!

Middleware Enablement
- DB2
- WAS
- MQSeries
- ISV's
- QuickStarts

Web Hosting
- xSeries
- zSeries Linux
- e-Sourcing coming '02

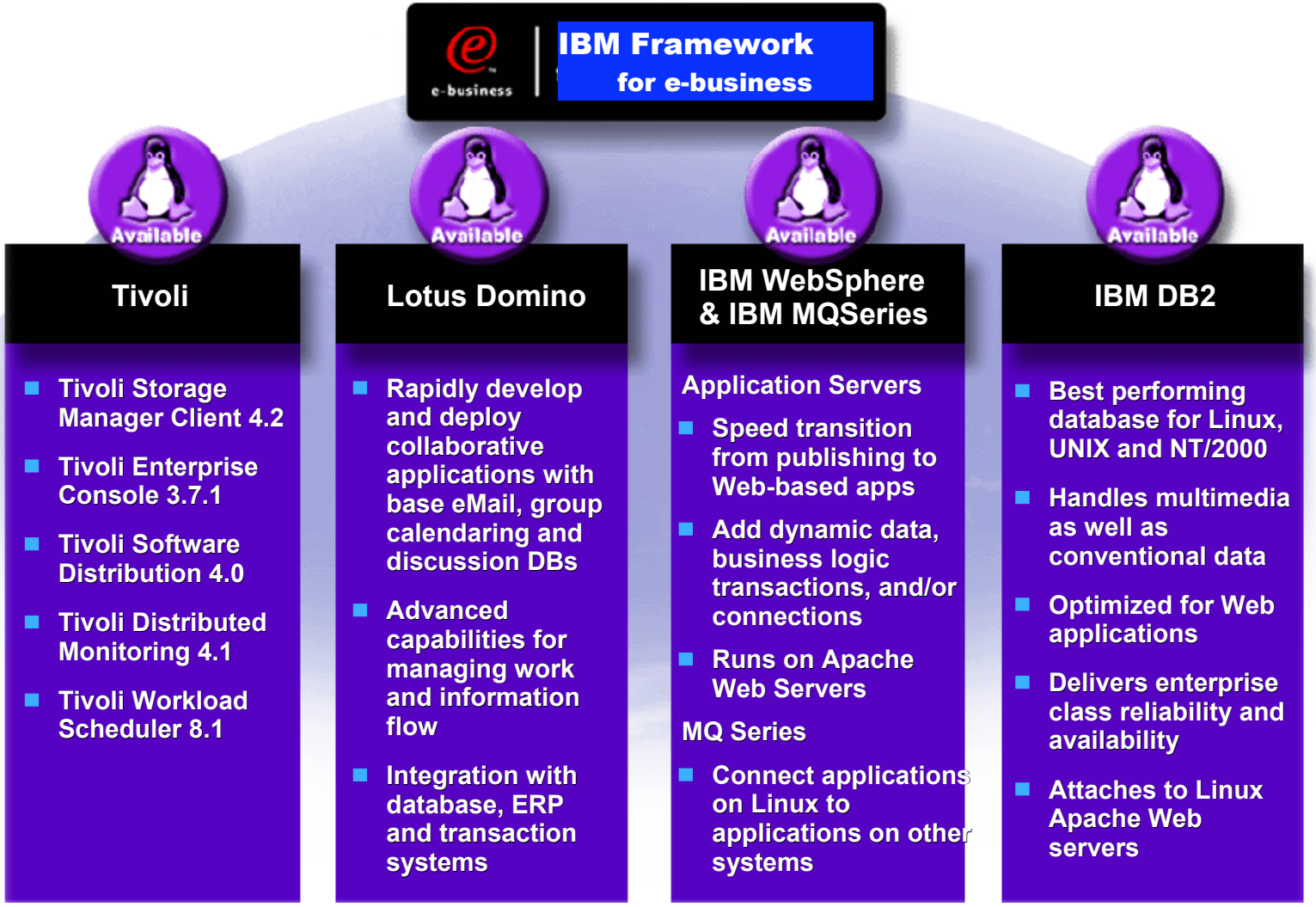
Technical Support
- Support Line
- Account advocate
- Advanced Support
- All eServers including clusters
- 24/7

Workload Consolidation
- File/Print, Webserving
- Bynari, Sendmail coming '02
- Linux Solution for e-Business
- Application Porting
- Solaris to Linux Migration

IBM's Products and Services for Linux

- zSeries
- xSeries
- iSeries
- pSeries
- NetVista
- POS
- Thinkpad
- Intellistation
- Clusters
- WebSphere Commerce Suite
- Blades
- WebSphere Application Server
- Storage Systems
- WebSphere MQ
- Open Source Consulting
- Lotus Domino
- Workload Consolidation
- Tivoli Storage Manager
- Solaris to Linux Migration
- IBM JVM
- on demand Linux Services
- DB2 Universal DataBase (UDB)
- Grid Consulting

IBM Framework for eBusiness Product Portfolio



www.ibm.com/linux/software

Application Focus Areas

Financial / Insurance Services
- Risk management
- Branch banking
- Payments

Communications
- Web & e-commerce infrastructure
- Carrier Grade Linux
- Digital content creation

Industrial
- Upstream petroleum
- Computer Aided Engineering
- Electronic Design Automation

Education / Government / Lifesciences
- GRID computing
- Lifesciences bioinformatics
- Higher education

Distribution / Retail
- Point of Sale
- Kiosk and store operations

Linux in the Marketplace

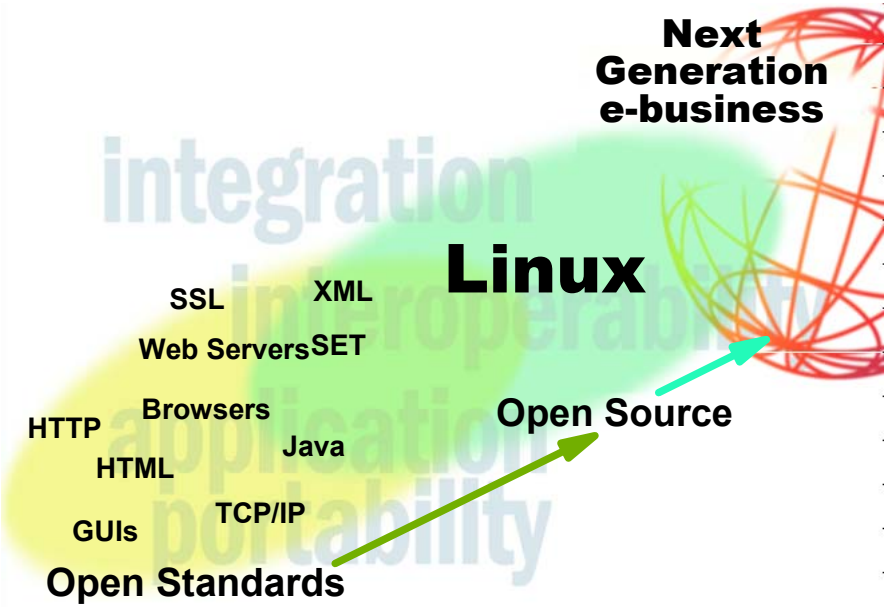
Next Generation e-business

More connectivity, more devices

- Data transaction servers
- Web application servers
- Appliance servers
- Pervasive devices

Next generation e-business

- Technology advances
- Increased integration
- Business innovation
- Standards and open source



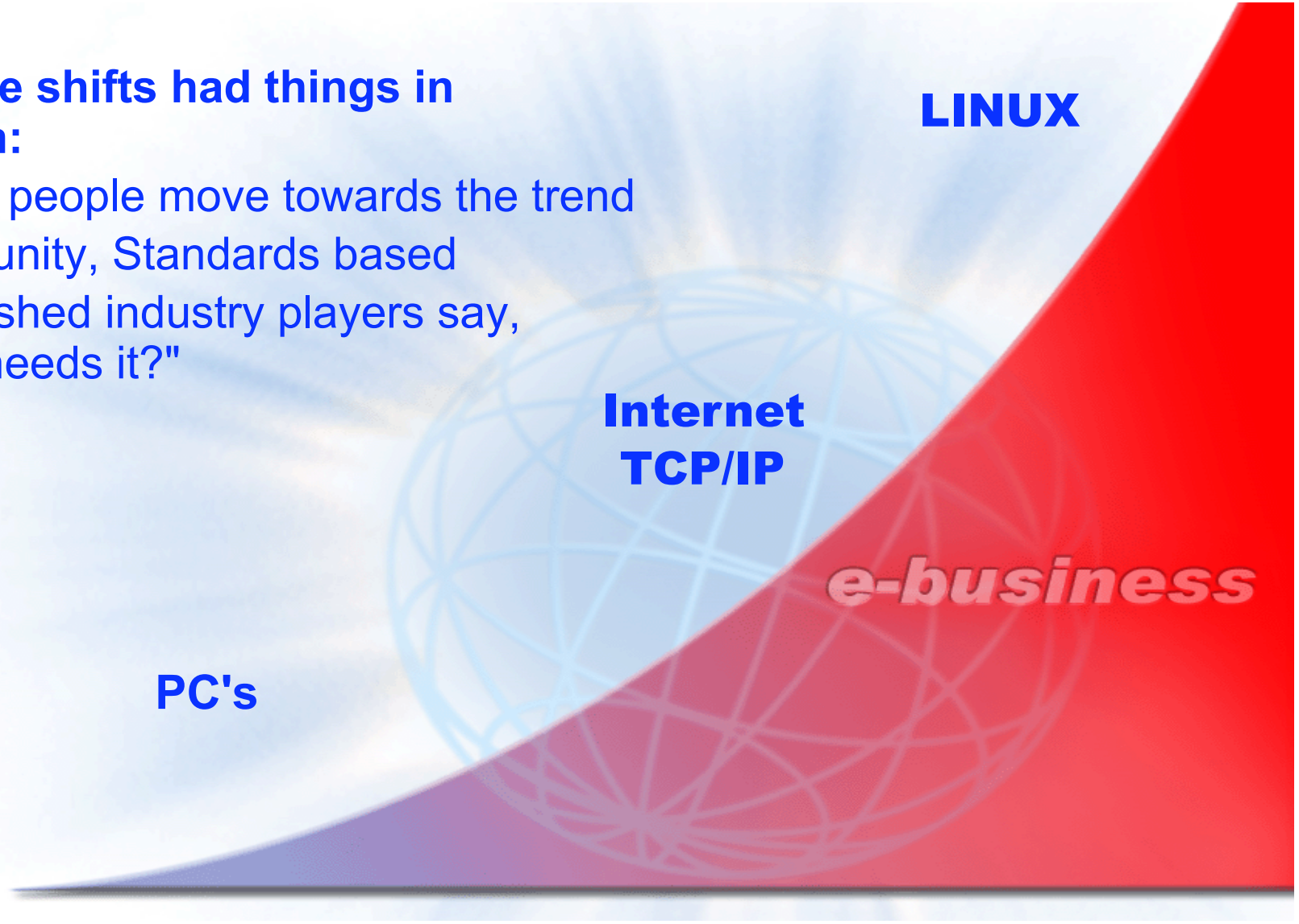
"Linux will do for applications what the Internet did for networks"

Dr. Irving Wladawsky-Berger

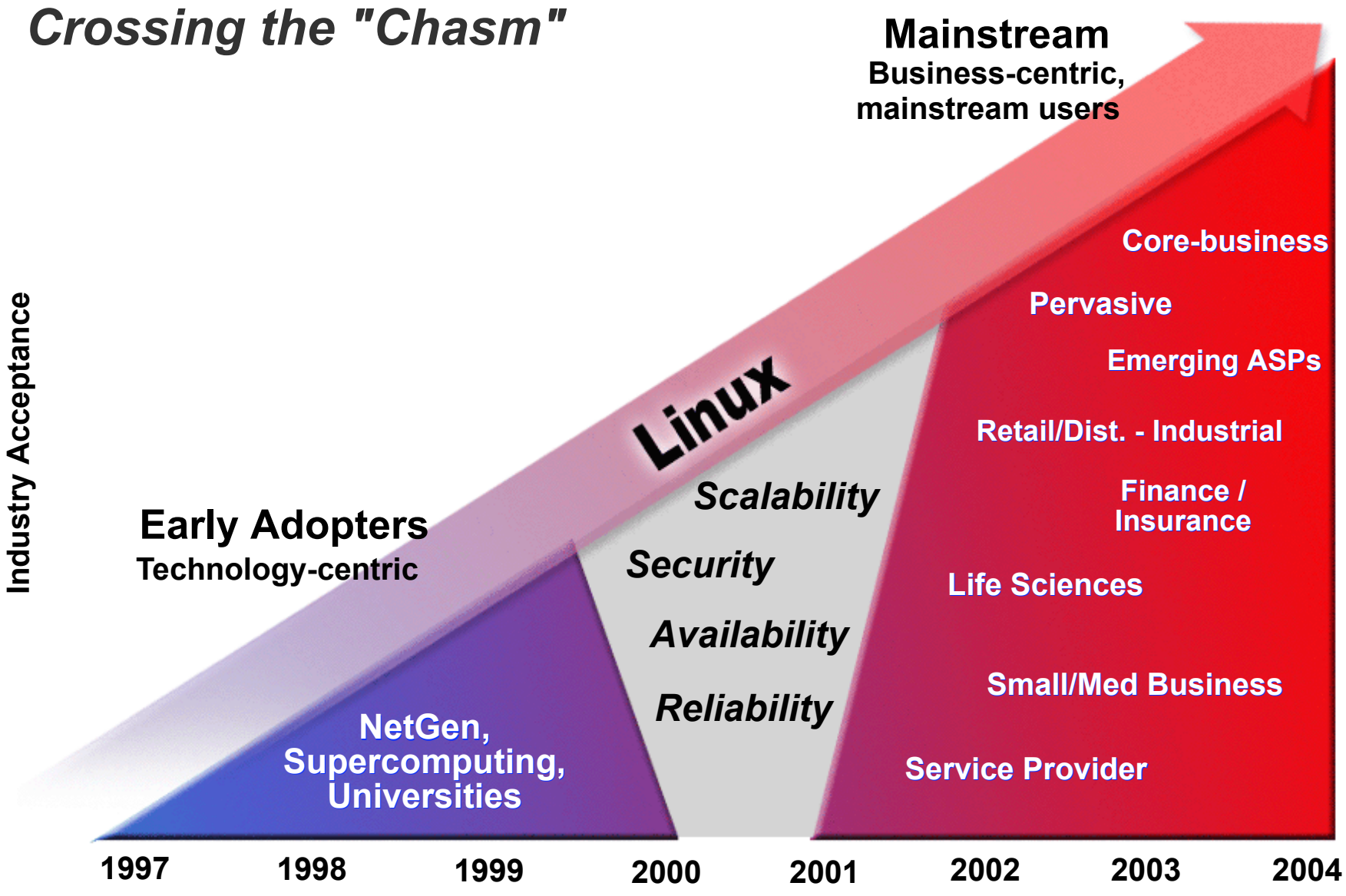
Finding a Trend

The three shifts had things in common:

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



Market Evolution



Linux Momentum

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

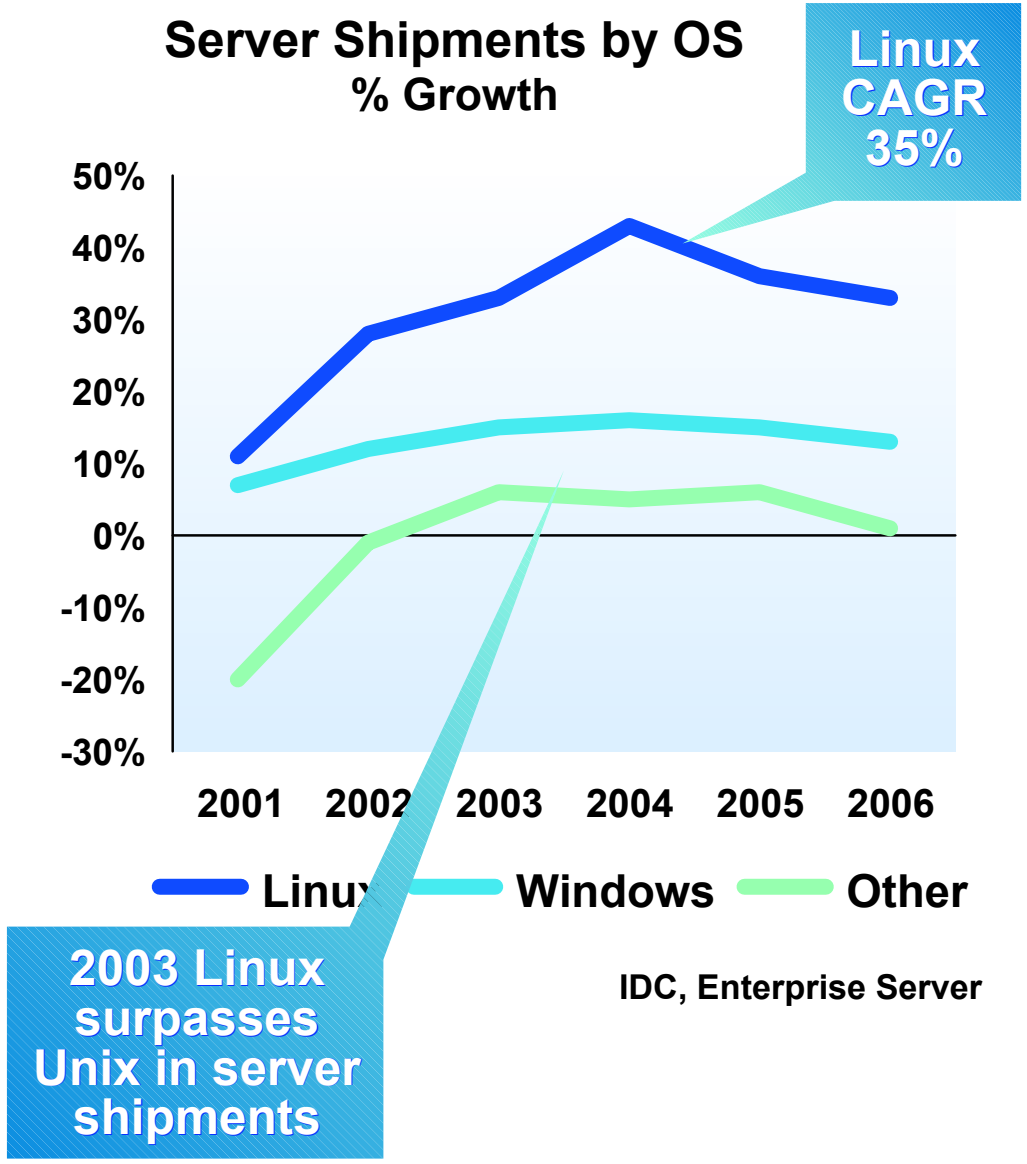
Stacey Quandt, Giga, Business 2.0,

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

IDC, Dan Kusnetzky

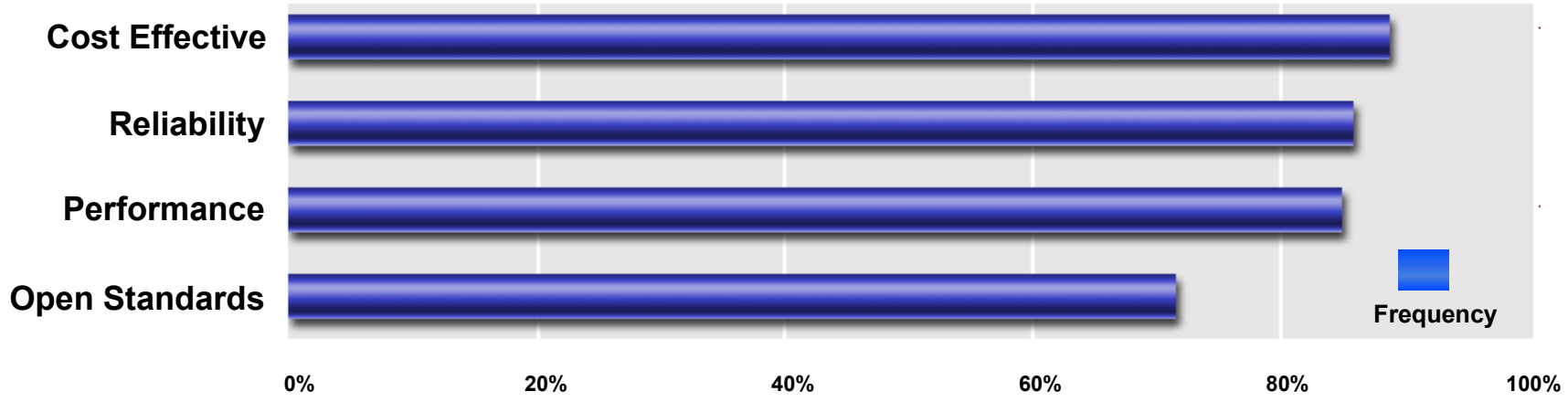
By 2006, Linux will be a key foundation for a strategic, cross-development-platform environment, accelerating Unix server consolidation, while creating a powerful alternative to Windows .NET.

Gartner



Linux and the Customer

Linux Value Factors



Source: IBM Market Research 2001

Customer Activity Evolution

2000

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

2001

- S&TC Clusters
- Infrastructure consolidation
- e-commerce
- Replicated (e.g Kiosks, in-store)
- Embedded devices
- Client in emerging mkts

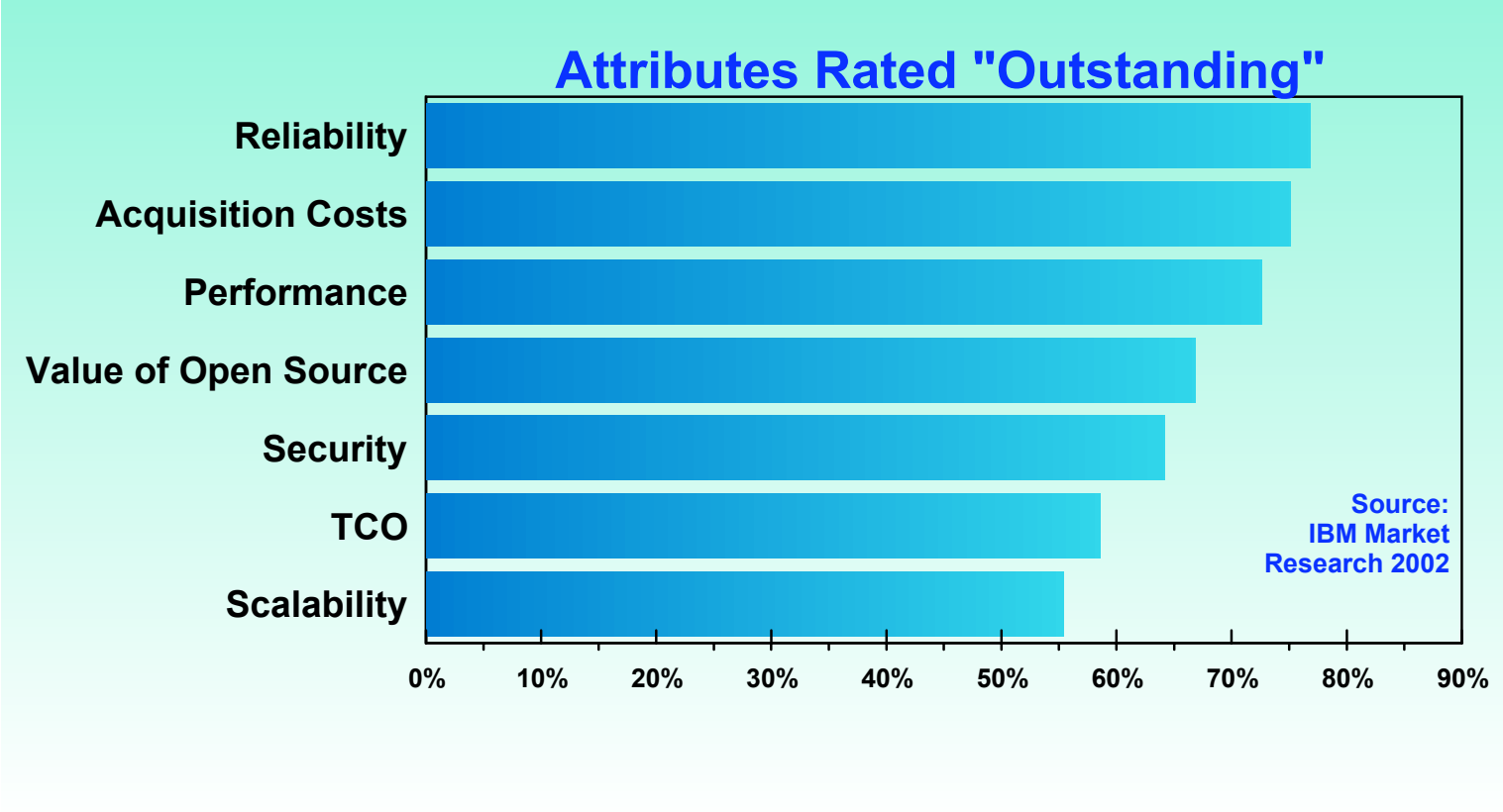
2002

- Commercial clusters
- Application Development and consolidation
- General business applications
- Expanding client & embedded apps (e.g. Telco network)

Source: IBM & Secondary Research

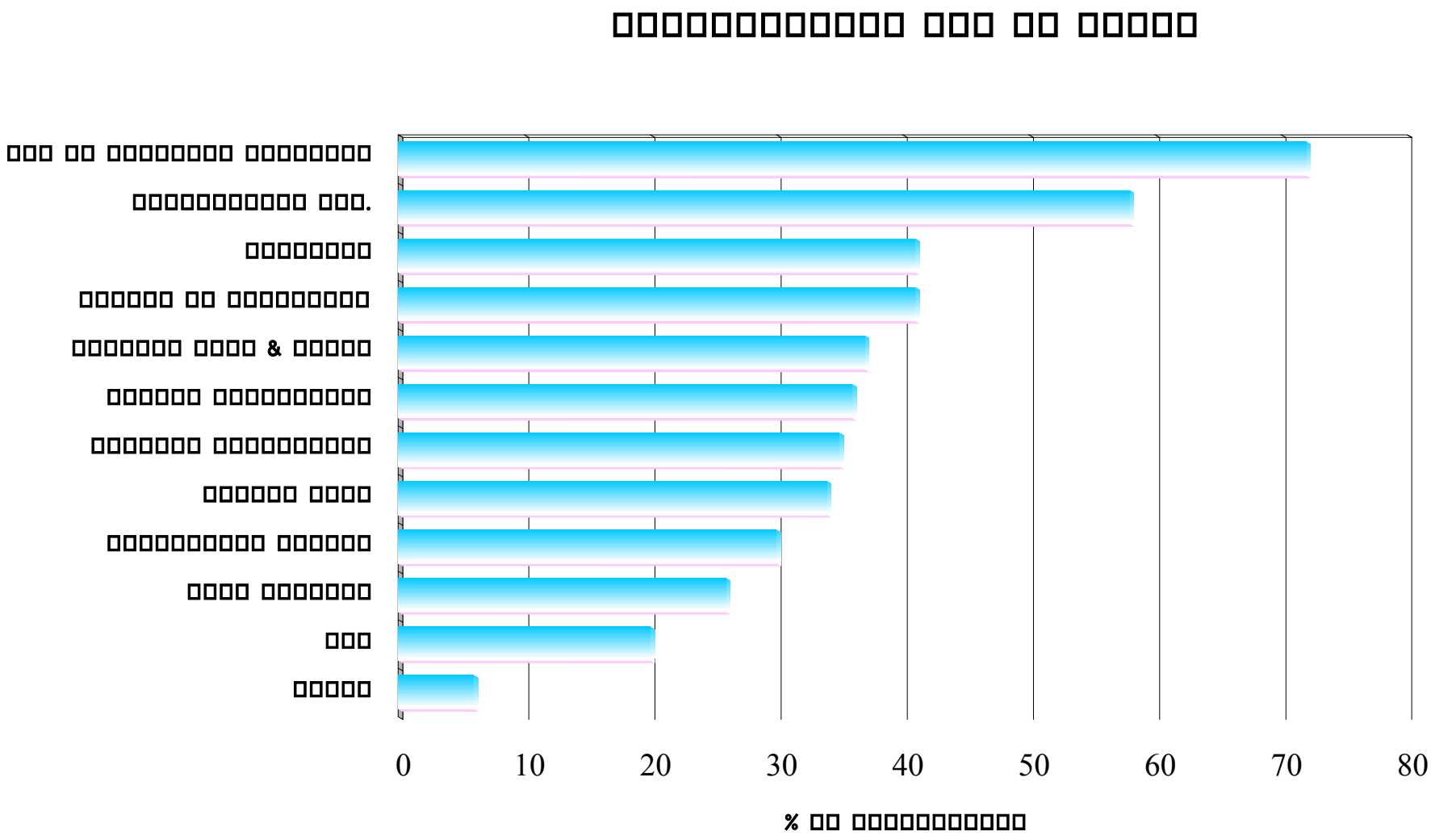
Linux... More than Just Cost

Question: Based on what you have seen or heard so far with Linux, how would you rate Linux on the following aspects?



Note: Includes responses from 500 Linux users

Linux Momentum Building ...



Source: IBM Market Research

Software Developers Adopting Linux

Linux at IBM

"We're eating our own cooking"

"But most unique about the Linux Web site is its brand-new pair of redundant, load-balanced, xSeries servers flawlessly running IBM's first-ever GWA production Web hosting environment from Southbury. Yes, that's right, our Linux site is running Apache server on Red Hat Linux."

Linux Value Summary for IBM

Financial Value

- Replace outdated OSs with little additional capital.
- Selectively enables use of less expensive Intel hardware.
- Consolidate multiple server images on single H/W box without rearchitecture.
- Operating system is "free".

Technical Value

- Opportunity to quickly replace outdated servers OS's.
- Opportunity to deliver feedback for product improvement to open source community and IBM product development.
- Scalable OS that begins lower on the H/W scale than AIX.
- Intel box modernization alternative to Windows NT/2000.

Staffing Value

- Embracing "hot" technology attracts best technical talent.
- College I/T students deeply involved with Linux.
- Additional technical skill path alternative to NT to retain top talent.

Marketing Value

- Demonstrate that we use what we sell.
- Leverage internally-developed Linux skills in services marketing opportunities.
- Enables selling IBM solutions as alternative to Microsoft/Sun/HP.

Internal IBM Linux Projects

Web Infrastructure

Linux Portal

Web Content Management System

Advanced Search Engine

e-Workplace Development Environment

Intranet Forums

e-Workplace Special Events

IBM Customer Order Web Portal (planned)

Internal IBM Linux Projects

Security

- Security Assessments
- Virus Detection
- Storage Architecture Security Directory
- e-mail Anti-Virus Scanners

Monitoring

- Performance Monitoring
- Asset Monitoring
- Operations: e-hosting and network management

Internal IBM Linux Projects

File Serving

- File & Print Servers

Manufacturing

- Microelectronics Wafer Mfg. & Test
- Electronic Design Automation
- Test Engineering
- Manufacturing Line Kiosks
- Software Development
- Open Source Bazaar

IBM Internal Linux Projects

Research

- Blue Gene Supercomputing Project
- Oceano Web Hosting Utility

IBM's Linux Watch
Technology Demonstration At Linux World

Communications
Pager
E-mail

PDA functions
Calendar
To do

Interface
Touch screen
Roller
Wireless IR and RF

Future development
High resolution screen
Wireless internet services

Linux @ IBM - Summary

A Commitment to Linux across the Entire Business
$10M+ in Savings

- **Over 2,000+ production servers WW**
- **100 customers, 30,000 internal users**
- **Linux on xSeries: Security, Performance monitoring,Web serving, File serving, www.ibm.com/linux**
- **Linux on zSeries: Collaboration -replacing worldwide VM forums, 180+ VM guest images and 14 LPAR images**

Linux on the IBM @server

Linux on IBM Hardware

IBM @server family

- **zSeries**
  - Legendary quality of service, security and scalability
  - Industry leading virtual partitioning for z/OS and Linux
- **iSeries**
  - Robust application integration and integrated operating system
  - High levels of security
- **BladeCenter™**
  - Highly manageable, modular infrastructure
  - Shared resources for business continuity
  - Performance density

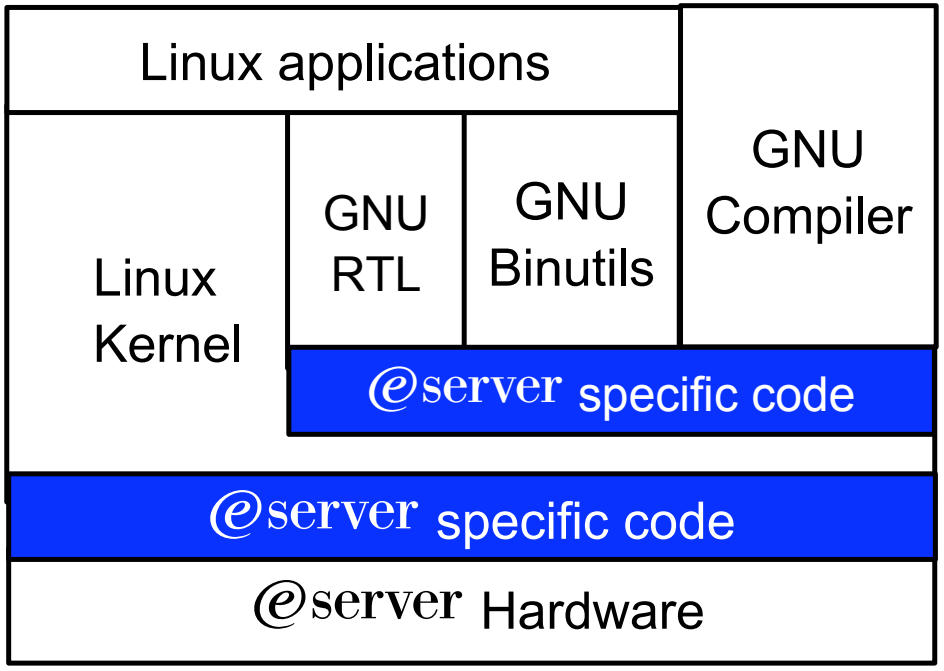
- **Clusters**
  - Price and performance leadership in both UNIX and Linux environments
- **xSeries**
  - End-to-end portfolio on Intel processors
  - Revolutionary Enterprise X-Architecture technology for Intel
- **pSeries**
  - Outstanding performance and reliability
  - Uncompromising UNIX and Linux enablement

What Is Linux for @server?

Runs native, in an LPAR and/or as a virtual guest

Pure Linux, an ASCII environment

Exploits IBM @server hardware
- 32 and 64 bit
- Floating Point
- Cryptography
- High Speed transport to traditional applications and data



High performance clusters with pSeries, xSeries and zSeries

Flexible virtualization on zSeries

Not a replacement for but
Inter-operates with traditional @server operating systems on same or separate footprint

Industry's Broadest Linux Server Line

Linux for @server xSeries

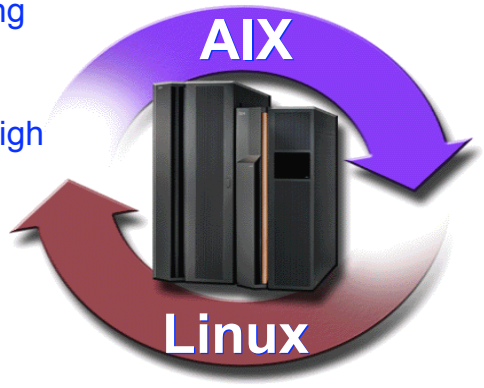
The Point of Entry - Where Industry Standards Meet Enterprise Capabilities

Appliance Servers	Scalable Web Application Servers	General Purpose Servers	Data and Transaction Servers
xSeries 100 • *web servers* • *NAS servers*	**xSeries 330** **xSeries 340** • *rack optimised* • *Clusters* • *Linux-ready*	**xSeries 220, 350, 370, 380** • *price/performance* • *High Availability* • *X-architecture* • *Clusters*	

Linux for @server pSeries

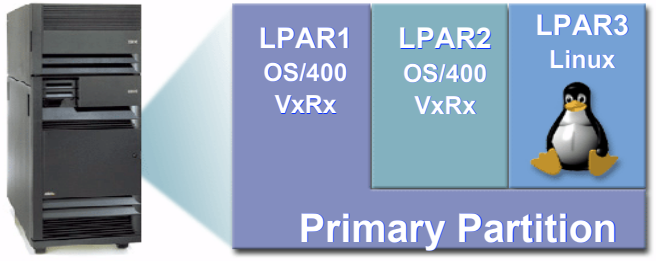
The Point of Integration - Where Linux Meets UNIX

- Native Linux 32 & 64
- Power3 / Power4 Floating Point Performance
- I/O Bandwidth and RAS
- Scientific & Technical, High End Clusters
- Toolbox for Linux Applications



Linux for @server iSeries

The Point of Coexistence - Where Linux Complements Integrated e-business Solutions



- Linux in a partition
- Integrates new ebusiness applications

Linux for @server zSeries

The point of consolidation - Linux Ascends to the Mainframe

- Pure Linux OS
- Exploits zSeries hardware
- Scalable, protected partitions
- Shared infrastructure
- Reduced cost of ownership

Basic @server comparison

	pSeries	iSeries	zSeries LPAR	zSeries z/VM
Total Partitions / Maximum Linux Partitions	16/16	32/31	15/15	Hundreds to thousands
Server Deployment	Possible reconfg of LPARs	Possible reconfig of LPARs	Possible reconfig of LPARs	Virtual server build only - no reconfig required
Optimization	Compute intensive / Floating point	Commerical small / medium business	Large scale servers I/O intesive (e-mail)	Large numbers light to moderate load servers
Resource Sharing	None	Virtual (shared) or dedicated I/O	Shared CPU & I/O	Complete virtual sharing
Dynamic Reconfiguration	Future	Yes, OS/400 Only	Yes (Requires z/OS or z/VM)	Yes
Interpartition Communication	Physical Ethernet	Virtual LAN	HiperSockets	IUCV / VCTC HiperSockets
OS Required	None	OS/400	None	z/VM

Operating System Selection - Where Linux Fits Best

- **Where Linux Works Best**
  - On Intel architecture for traditional workloads
  - On iSeries, pSeries and zSeries when many servers are needed
  - For cost-sensitive environments
  - For high availability applications
  - For environments where open standards are crucial (e.g. governments)
  - Where the application is available on Linux and not on other platforms

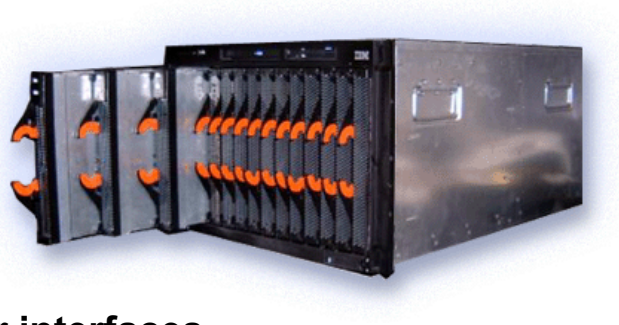
Positioning of IBM Operating Systems

- **zOS**
  - High-volume transaction processing and data acquisition/management
  - Top-end, mission critical core business applications
- **zVM**
  - hundreds or thousands of Linux servers
  - fast, easy server on demand
  - application development and testing
- **OS/400**
  - Transaction processing
  - Ease-of-use, low total cost of ownership
  - Integrated system
  - Many third-party line of business applications available
- **AIX and Linux Affinity Toolkit**
  - High-end, high-performance industrial-strength Unix
  - Best-of-both-worlds with AIX + the AIX integrated Linux affinity toolkit to run Linux applications

IBM Blade Center

The Technology That Outperforms

- **Performance Density**
  - 2X density of existing 1U rack solutions
  - Latest, highest performance Intel processors
  - Comprehensive set of storage alternatives
- **Affordable Availability**
  - Unprecedented redundancy
  - No single point of failure = 24x7 availability



- **Network Integration**
  - Integrated Ethernet Switch = increased density
  - Simple management of switches with Common Director interfaces
- **Modular Scalability**
  - Ideal platform for "Scale Out" enterprise applications
  - Power/packaging/cooling designed with room to grow
  - Infiniband ready = investment protection

Linux for xSeries

Rapid Deployment with Confidence

- Linux Certification and Support Programs across 4 Linux Distributions
- Installation, Setup and Configuration Support for Linux Operating Systems
- 24 X 7 Direct Telephone and e-mail Support from IBM HelpCenters

IBM ServerProven Program

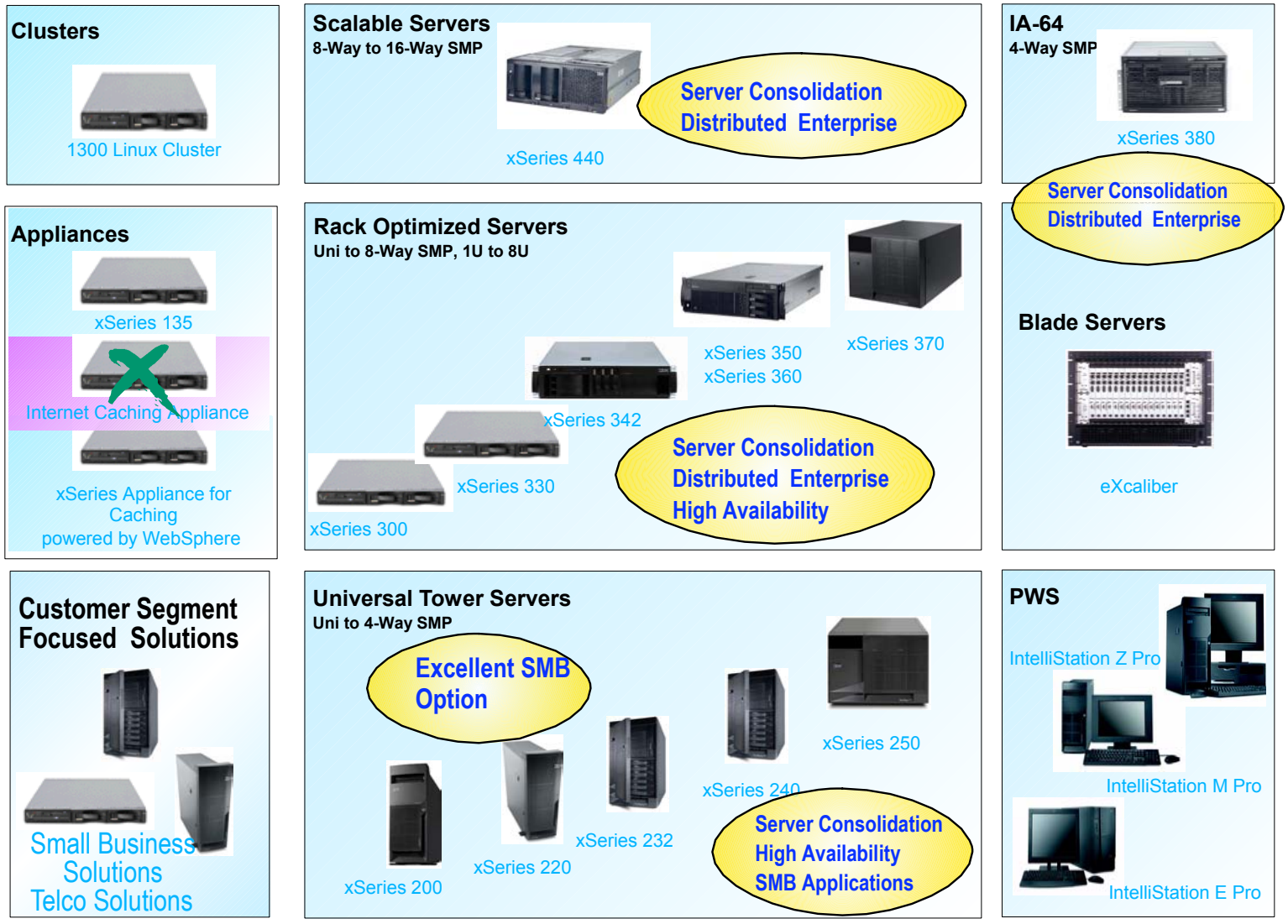
- Tested and Validated Configurations for all xSeries Servers
- Ensure maximum performance and functionality
- Install quickly, start up easily and run reliably
- Easily identify a business application validated on IBM Servers
- Validated, optimized and documented solutions
- Includes non-IBM hardware, OS and middleware
- IBM Director

IBM Cluster Architecture and Design

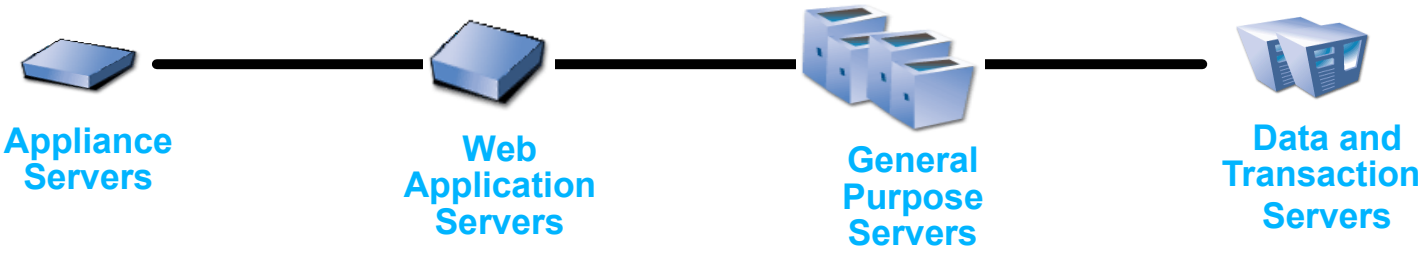
IBM Integrated Platform for ebusiness

Distributed, remote @server implementations

xSeries: Broad Product Line Support for Linux



Linux on @server xSeries & Netfinity



xSeries 100
- Web servers
- Network Attached Storage servers

xSeries 330
xSeries 340
- Rack optimized
- Clusters
- Linux-ready

xSeries 200's
- Price/Performance
- High Availability

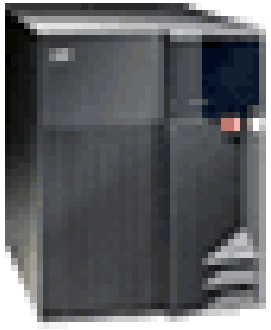
Netfinity 6000+
- X-architecture
- Clusters

- **The X-architecture for a Linux deployment**
  - Systems Management with IBM Director for Red Hat Linux
  - ServeRAID
  - Hot swap hard file, power supply
  - Hot Add , hot swap ultrabay

Linux on @server pSeries

The Point of Integration - Where Linux Meets UNIX

- **Native Linux for RS/6000 (32-bit)**
  - Telco: pSeries 640: 5U Rack - NEBS Level 3 compliant
  - ISP: B50 rack mountable servers
  - Scientific: 43P Model 150, 170, 270
- **Native Linux for pSeries (64-bit)**
  - Developing 64-bit Linux port for POWER RISC
  - 4Q01: pSeries 640, pSeries 620/660
- **Exploit Power3/Power4 Floating Point, 64-Bit Performance, I/O Bandwidth and RAS**
- **Applications:**
  - Telco NEBS
  - Number crunching
  - High I/O bandwidth
  - Coexist with AIX



AIX Toolkit for Linux Applications

- **AIX Toolbox for Linux Applications in AIX**
  - Linux source compatibility
  - Integrated to take advantage of enterprise reliability, availability, scalability, and manageability features
  - Popular "Linux - GNU" tools, utilities, look & feel on AIX
- **ISV**
  - Develop on Linux, deploy on AIX
  - Popular "Linux - GNU" tools, utilities, look & feel on AIX
- **Business Partners**
  - Develop custom value added applications for clients
- **AIX Users**
  - Ability to start with small Linux/Intel servers, and scale up with AIX
  - Consolidation of emerging Linux applications on existing AIX systems to reduce cost of ownership

pSeries Characteristics

- **Compute intensive performance**
  - Exploit POWER3/POWER4 Floating Point and 64-Bit Performance
- **Application Flexibility**
  - Scientific & Technical, High Performance, Commercial
  - 32-bit moving to 64-bit
  - Run Linux applications in an LPAR or use the AIX Toolbox for Linux applications to recompile
  - Optimize Linux applications with AIX back ends
- **Server Consolidation**
  - Up to 16 logical partitions
- **Resource Sharing**
  - Any resource can be dedicated to any partition
  - pSeries Linux on p690 will support 1-4 CPUs
  - I/O Support (RIO, Ultra SCSI III, CD-ROM, 10/100 Mb Ethernet, Gigabit Ethernet, Fibre Channel)
  - Inter-partition communication via network adapters

- **Results:**
  - High performance
  - Flexible
  - Exploit Linux through AIX5L or on Linux in an LPAR

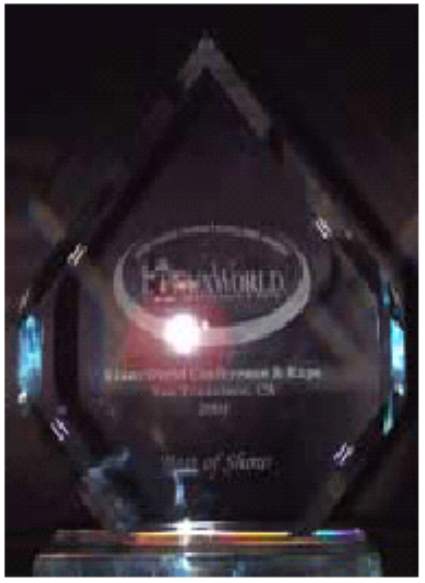
Linux and iSeries

What does Linux Bring to iSeries

- Applications
  - ebusiness infrastructure
  - New generation of web-based applications
  - Provides flexibility and choice of environment
  - Ease delivery of open source components
- Resources and Skills
  - Leverage virtual world-wide development team
  - Broad skill base to deliver iSeries solutions
  - Leverage other IBM investments in Linux

What does iSeries Bring to Linux

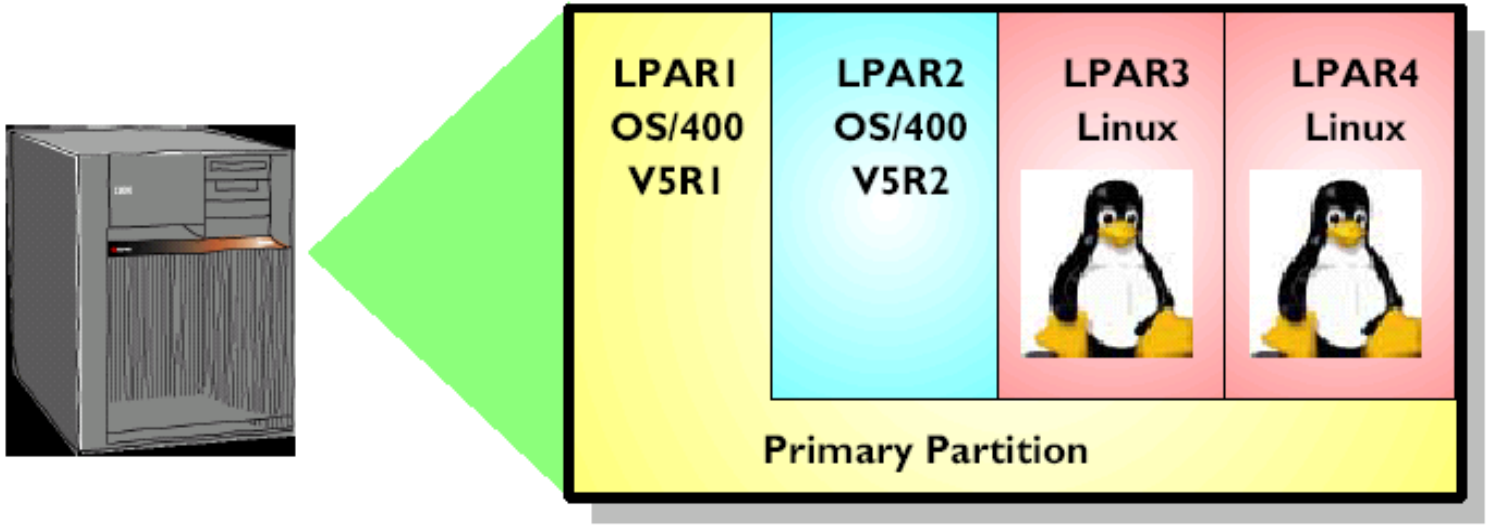
- Ability to consolidate multiple Linux servers
- A reliable, scalable server to run Linux
- Resource sharing and management
- Integration with OS/400
- Low Cost of Ownership



IBM eServer iSeries Wins "Best of Show"
LinuxWorld
San Francisco, CA August 28-30

Linux on iSeries

Linux on iSeries



Consolidate up to 31 Linux servers on one iSeries server

- Linux runs in iSeries logical partition
- Move processor, memory, and I/O resources between partitions
- Supported with V5R1 or V5R2 on iSeries Model 270, 820, 830, 840, 890

I/O Flexibility

- Virtual - Linux shares OS/400 managed disk, tape, CD-ROM, and LAN resources
- Direct - Linux owns I/O resources

Standard Linux from Leading Distributors: SuSE, Turbolinux, and Red Hat

- Based on a 2.4, 64 and 32-bit PowerPC kernel

e-business Implementation Types for Linux on zSeries

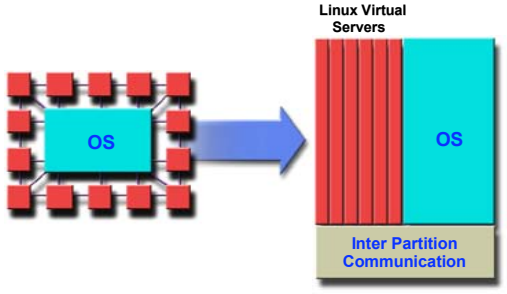
Server Consolidation

Infrastructure Servers Consolidation

Intel based, file, proxy, firewall, DNS

Distributed applications servers

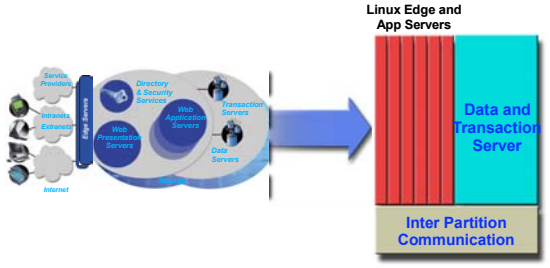
Unix based, Sendmail, Oracle



Application Integration

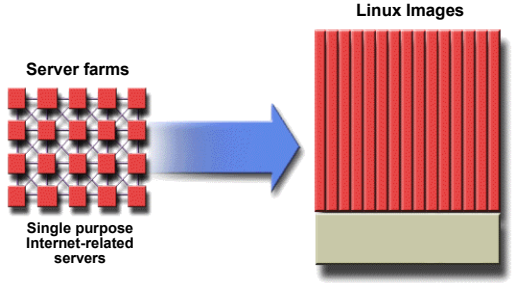
Consolidation of middle tier Unix servers

Leverage z/OS data server back-end



Server Hosting

Web hosting, messaging, e-mail



IBM Middleware for Linux for zSeries

Connectors

- DB2 Connect™, Version 8.1; MQSeries® clientVersion 5.2, MQSeries server (beta)
- CICS® Transaction Gateway, Version 4.0; IMS™ Connect, Version 7

WebSphere Family

- WebSphere® Application Server Advanced Edition, Version 4.02
- Including Java™ Development Kit, Version 1.3.0 & JIT
- WebSphere Personalization, Version 3.5
- WebSphere Commerce Suite, Version 5.1
- WebSphere Host on-Demand, Version 5.0.3

Data Management

- DB2 Universal Database™, Version 8.1
- DB2® Intelligent Miner™ Scoring, Version 8.1
- DB2 Net Search Extender, Version 8.1

Tivoli

- Tivoli Storage Manager Client 4.2
- Tivoli Enterprise Console 3.7.1
- Tivoli Software Distribution 4.0
- Tivoli Distributed Monitoring 4.1
- Tivoli Workload Scheduler 8.1

Future

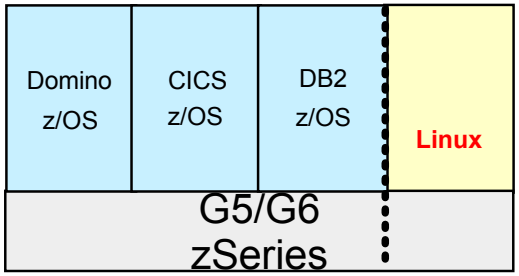
- Tivoli Storage Manager Server
- Tivoli Business Systems Manager 2.1
- Tivoli Manager for SAP R/3 App Server
- Tivoli Policy Director 3.8
- Tivoli Inventory 4.2

IBM S/390 & zSeries Integrated Facility for Linux

Example 1

Business As Usual

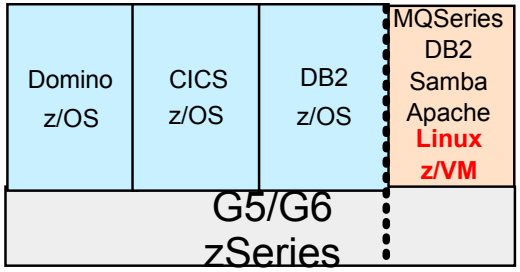
Typical z/OS environment on a 3-way processor



Example 2

Add IBM zSeries Integrated Facility for Linux engines

Traditional environment price remains the same
Cost of IBM zSeries Integrated Facility for Linux and Linux distribution



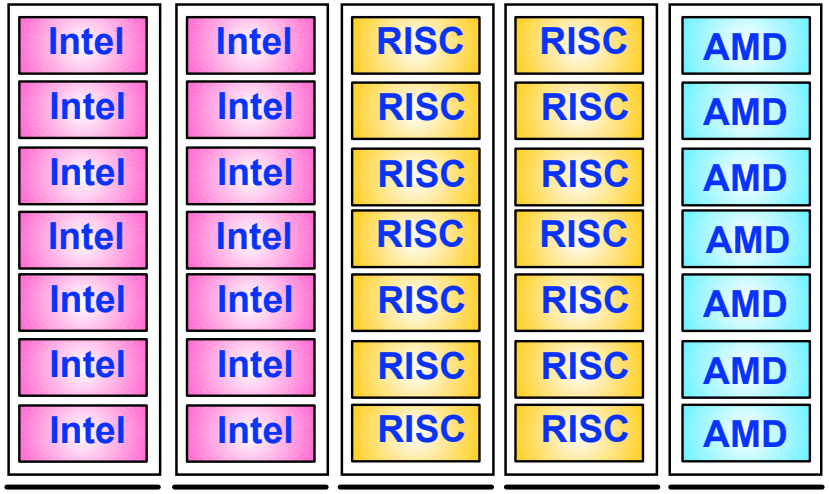
Example 3

Add IBM software for Linux on zSeries

Traditional environment price remains the same
Cost of IBM zSeries Integrated Facility for Linux, Linux distribution, z/VM, and IBM middleware (e.g. MQSeries and DB2 Connect)

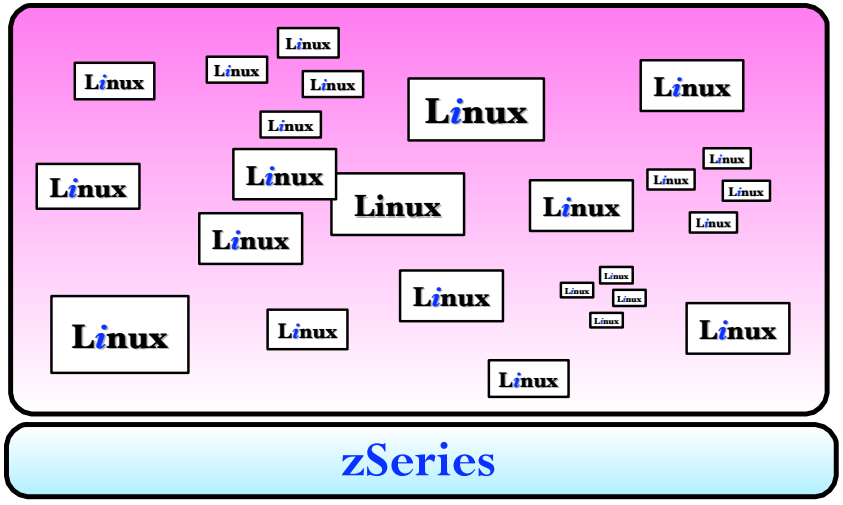
A dramatic impact to the bottom line

Traditional Server Farm



- Discrete servers incur incremental expense for hardware, maintenance, power, cooling, floor space
- Connectivity requires kilometers of cables
- Time to deploy new servers requires days at best
- High availability ensured by spares and re-boots
- 100% continuous availability is cost prohibitive

Server Farm and Network in a Box



- Reduce costs without sacrificing server autonomy
- Pooled physical resources
- Virtual, high-speed, inter-server connectivity
- Deploy new servers on-demand
- Architecture designed for high availability
- Mainframe infrastructure & practices, i.e. comprehensive disaster recovery, continuous availability

. . . more value with zSeries

Intangible, inherent values

- Mainframe serviceability
- Mainframe reliability
- Productivity: ease of management of a large population of servers based on a common logical image
- Maintain one application per server; business reqmnt, ISV reqmnt
- Speed to deploy new servers for development, test and production
- Integrated, high speed connection to legacy S/390 applications
- Integrated, high speed connection to z/OS
- Practiced, proven disaster recovery

Environmental considerations

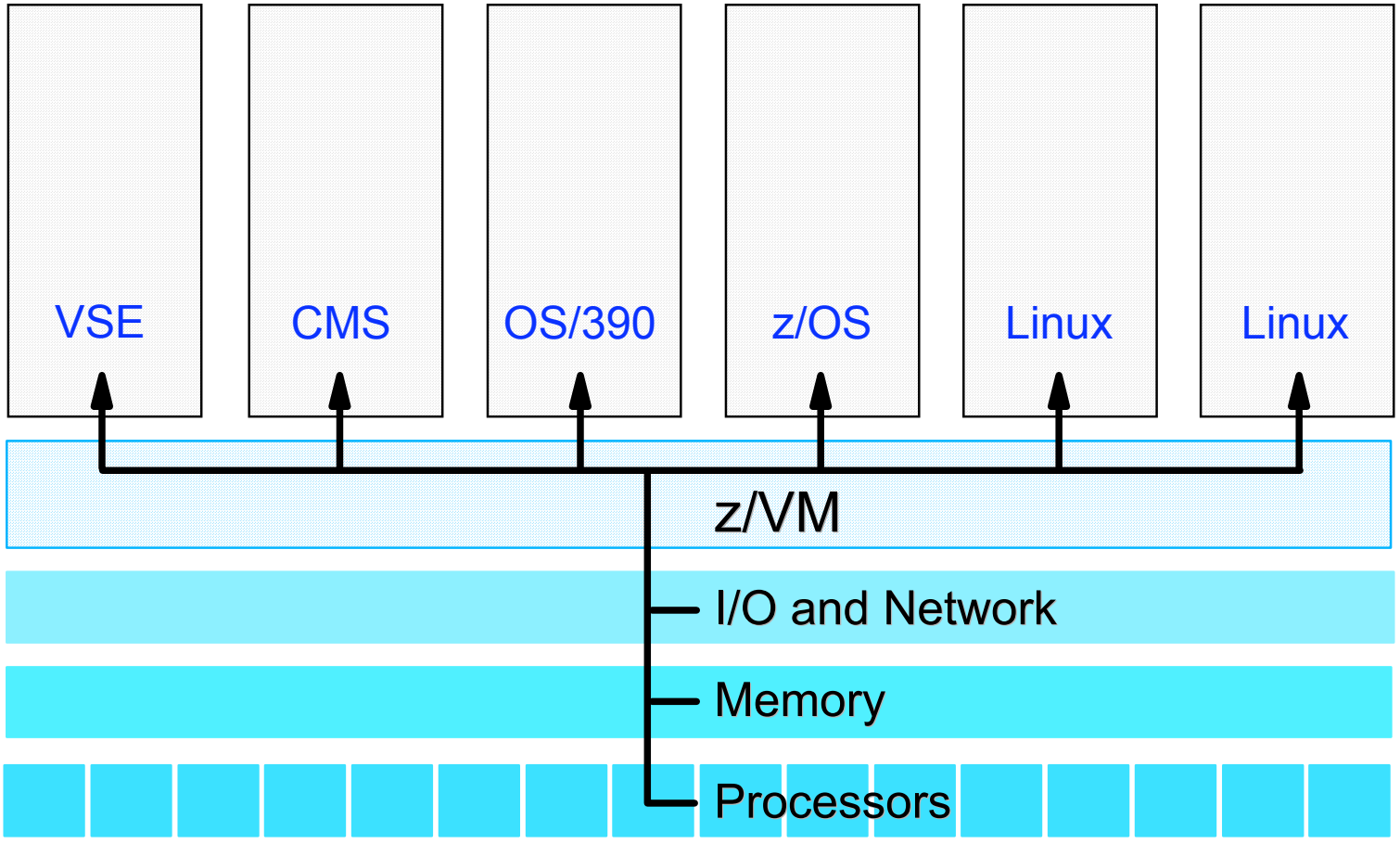
- Floor space
- Power and cooling costs
- UPS - Back up power

***CIOView** can help to build a complete picture!*

Virtual Machine Partitioning

Efficiently Exploiting the Entire Mainframe Complex

A *Virtual Machine* simulates the existence of a dedicated real machine, including processor functions, storage, and input/output resources.



Customers running their business on Linux

Linux is ubiquitous

Financial / Insurance

Aviva
Banco de la Provincia de Beunos Aires
Banco Mercantil
CareFirst Blue Cross Blue Shield
The Credit Index
Credit Union of Central Alberta
Deutsche Bank
E*Trade
GEICO
Guide One Insurance
GAD
Hill House Hammond
HSBC Trinkaus & Brurkhardt
Hub International
Instituto Federal Electoral
Millennium Partners
JPMorganChase
Merrill lynch
Lehman
Morgan Stanley
AIG
NYSE/SIAC
Northern Trust
Salomon Smith Barney
Goldman Sachs
CSFB

Technology

Brookhaven National Lab
Chevron
Comp. Generale de Geophy
Gene Formatics
Jet Propulsion Laboratory
Lineo
Phillips Petroleum
Royal Dutch Shelll
Structural Bioinformatics

Education

Advanced School for Cmptg & Img
Arizona State University
Boston University
Clarkson U
Tufts U
Clemson
Colorado State University
Daito Bunka University
Kyoto Sangyo University
Manchester Inst. of Information Delivery
Marist College
Bejing University
Tamkang University
Trinity College Dublin
University of Nebraska
University of Geneva
University of New Mexico

Public

Consejeria Sanidad Murcia
Consejo Generale del Notariado
City of Orem, UT
City of St. Louis
German Federal Ministry of Int.
Massachusetts Trial Courts
New South Wales Dept of Ag.
Oklamhoma Dept of HS

Service

Akamai
Aso Humaney Center
BizAid Technologies
Cendant Corporation
Weather
Wimbledon
VeriSign
123 Immo

ISPs/ASPs

Aleos
ASP Movers
BRFree
COMSAT Venezuela
CLS ARGOS
Dimension Enterprises
Dreamball
Exxcom
FileFlow
iMobile Computing, Inc.
Infocom Technologies, Inc.
Infocrossing/ACTS
Intelnet
InterServ
Jindal Information Sys.
Mazu Networks
Narmada Commun.
Oni Way
Qnet Infosystem
SERCON
Sonera Entrum
WorldGate Private Networks
Vasnet Comm. Pvt. Ltd.
Verizon
ATT

Health

Wisconsin Physicians Srvcs
CareFirst BCBS
HMA

Federal

DOE
USDA

Transportation

Air New Zealand
Exxon Mobil Travel Guide
Korean Airlines
Thrifty Car

Manufacturing

Elektro-Material AG
DaimlerChrysler
FERMAX Electronica, S.A.E.
Ford Werke
Grede Foundries, Inc.
Hero-Honda Motors, Ltd
Honeywell
Kodak
Motorola
Newell Rubbermaid
POSDATA
R.J. Reynolds
Samsung
Volvo
Winnebago
Yamaha Canada
YKK
GE

Distribution/Retail

FedEx Freight
KB Toys
Konica Business Technology
Lawson Products
NaITO & Co., Ltd.
Petroleo Ipiranga
SUPERVALU
Amazon.com
Boscov's
Burlington Coat Factory
Confirm.com
DeoDeo
Devoto-Grupo Casino
GreetingGifts
Lawson
L.L. Bean
Mosca Hermanos S.A.
Perfumerias San Roque S.A.
Price Chopper
Sherwin-Williams
Tommy Hilfiger

Workload Consolidation Success

Hundreds of Successful Customers

IBM @server. For the next generation of e-business.

Distributed Linux Success

Financial / Insurance Services

Communications

Distribution / Retail

Industrial


GE Interlogix
Ford
DAIMLERCHRYSLER
KEPCO
KOREA ELECTRIC POWER CORPORATION
Honeywell
Phillips Petroleum Company
intel.
VOLVO
AIR NEW ZEALAND
YKK
MOTOROLA
ANAM 아남전자
SAMSUNG
ELECTRONICS

Education / Government / Health

What's Hot and What's Not

History of use inside of IBM

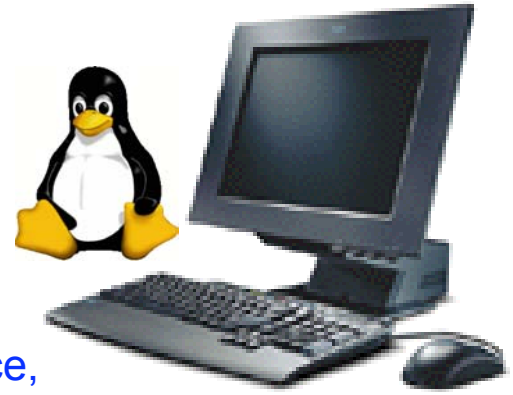
Zero budget effort for 2 years
LTC: Colaborated with Codeweavers on Notes support and started Filter project for SmartSuite files into OpenOffice
Community worked out many Laptop support issues
Built custom Redhat Image and network installed RPM
Now more than 5000 users
All volunteer, technical types, mostly developers
Establishing as mainstream option for "Client for e-buisness"
Piloting Ximian Red Carpet

Linux Client - IGS Partnering with Ximian and CodeWeavers

Overview

Linux Client Offering

- Linux Client Consulting
- Piloting
- Platform Customization
- Application porting, rewriting or re-purposing partnering with CodeWeaver/WINE
- Roll-out, training



CodeWeavers

- Support for running MS Office, Lotus Notes on Linux
- Tools and expertise for re-purposing & testing other packaged applications and custom applications

XIMIAN

- Bundled desktop offering, enhanced GUI
- Includes StarOffice suite
- Red Carpet - Software distribution and system management
- Groupware client - interoperable with MS Exchange

Linux Desktop Example

Sample costs - 10,000 desktops

		Financial Case for Linux on the Desktop (capital expenditures)*			
	Product	MS Windows Client	Product	Linux/Ximian Client	**Total Savings per Client**
OS	Windows XP	$ 175.00	Linux Distro	$ 25.00	**$ 150.00**
Desktop	Windows XP	$ -	Ximian Desktop	$ 45.00	
CAL	n/a	$ 30.00	CAL assuming use of MS servers	$ 30.00	**$ -**
Office Suite	Office XP	$ 255.00	StarOffice 6.0	$ 40.00	**$ 215.00**
Cost/client		$ 460.00		$ 140.00	**$ 320.00**
Totals		$ 4,600,000.00		$ 1,400,000.00	**$ 3,200,000.00**

Savings of 70%, 85% if you use OpenOffice and no MS servers

Two thin Client Linux options

IBM & Neoware Alliance

Neoware has provided award winning thin clients since 1995 and focuses on providing customer investment protection and multi-use devices

Alliance with Neoware Systems, Inc. under which IBM has licensed thin client technology to them, formed a marketing relationship for Neoware's products through Options by IBM, and a services/support agreement for Neoware's customers

Neoware had $20M annual revenue ***before*** the IBM Alliance.

Stock value on NASDAQ "NWRE" is about 4x previous level.

Embedded Red Hat Linux and Thin Client Appliances

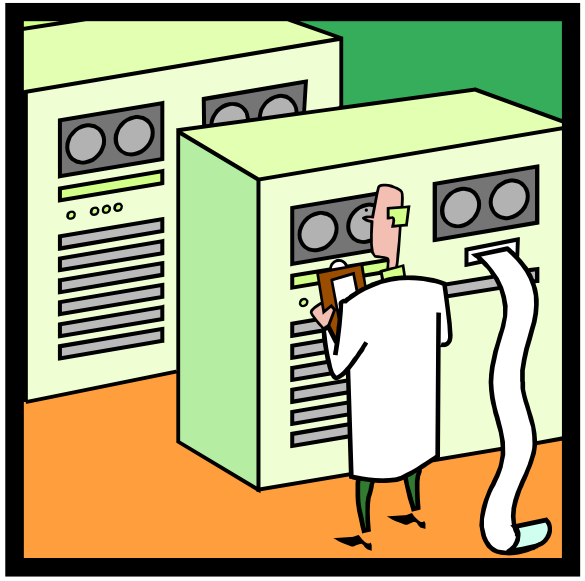
Depopulated PCs using server boot capability.

This is what Sherwin Williams is using for 5000 POS terminals

Linux Virtual Services - on demand

Customer purchases a managed hosting solution ... in a virtual instead of a physical environment

You get equivalent functionality as a physical environment ... *but* with the unique e-business on demand benefits



Equivalent hosting cage functionality:

- Floor space and power
- Server capacity
- Storage
- Bandwidth
- IGS Managed services
- Backup and recovery
- Monitoring and security services

e-business on demand benefits

- Fast provisioning
- Pay only for capacity needed

Linux Virtual Services - benefits

Feature	IT Benefit	Business Benefit
Pay only for the capacity needed	No need to do capacity planning	Avoid paying for unused capacity
Reduce expenses by consolidating multiple distributed servers	Increase operational efficiency	Reduce the cost of running and maintaining a complex server farm
"Pay as you go"	TCO Benefits over distributed computing environments	Reduce large up front capital expenses
Fast deployment of service	Improves time for application deployment	Reduce time to market from concept to service delivery, first mover advantage or a fast follower capability
Have pool of extra capacity which to tap into when needed	Minimizes the need of detailed long range capacity planning	No need to incur in the costs of over deploying servers to accommodate possible future needs
Migrate to a more efficient and scalable operating system	Have a much more scalable environment which is supported by a wider hardware mix	Reduce the cost dependency on proprietary operating systems

Autonomic Computng

Self-Optimize

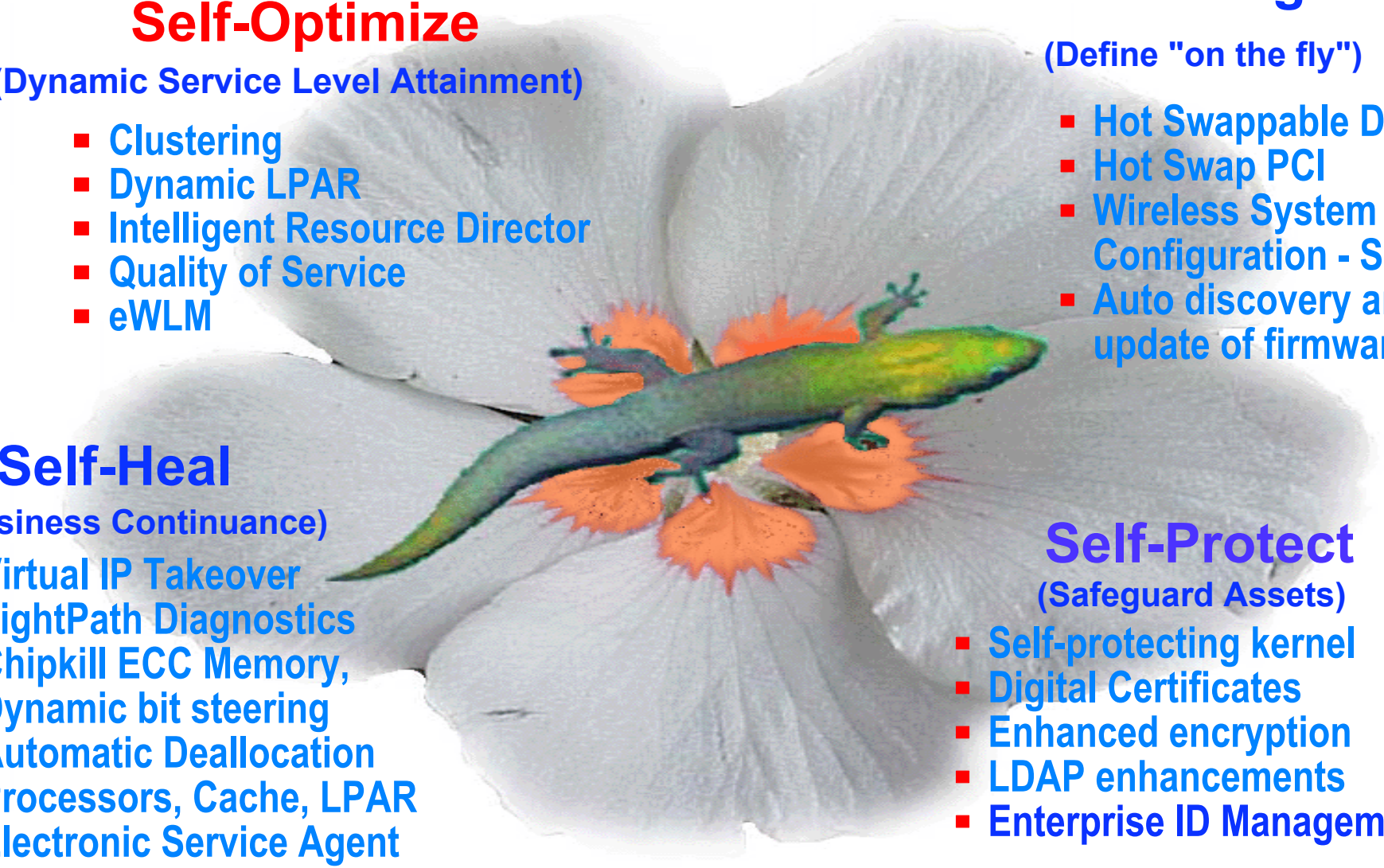
(Dynamic Service Level Attainment)

- Clustering
- Dynamic LPAR
- Intelligent Resource Director
- Quality of Service
- eWLM

Self-Configure

(Define "on the fly")

- Hot Swappable Disks
- Hot Swap PCI
- Wireless System Configuration - SNAP
- Auto discovery and update of firmware



Self-Heal

(Business Continuance)

- Virtual IP Takeover
- LightPath Diagnostics
- Chipkill ECC Memory, Dynamic bit steering
- Automatic Deallocation
- Processors, Cache, LPAR
- Electronic Service Agent

Self-Protect

(Safeguard Assets)

- Self-protecting kernel
- Digital Certificates
- Enhanced encryption
- LDAP enhancements
- Enterprise ID Management(EIM)

http://www.research.ibm.com/autonomic

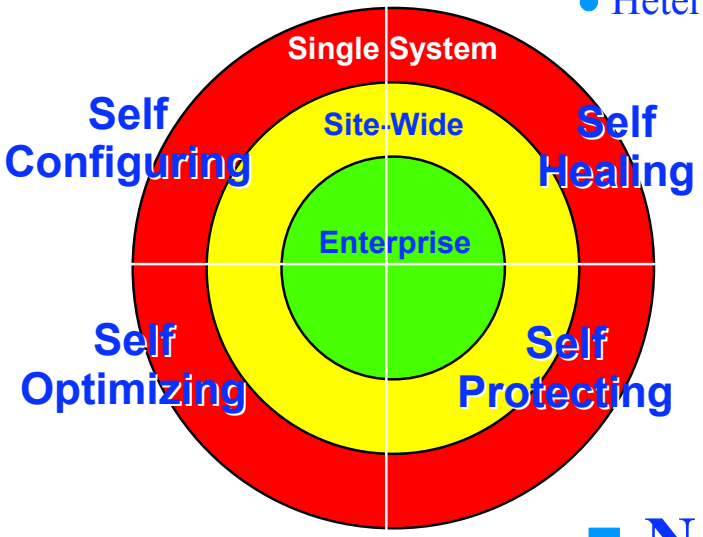
Autonomic Computing Summary

Lower Total Cost of Ownership

- EZSetup Wizards
- Wireless Systems Management
- Comprehensive Management Tools

On Forever - No Downtime

- No Single Point of Failure
- Online Detection, Repair and Recovery
- High Availability Clustering
- Heterogeneous Disaster Recovery



Improved End User Responsiveness

- Partitioning
- Clustering
- Heterogeneous Workload Mgt
- Automated Systems Operations

No Unauthorized Access

- Single Integrated Security Strategy
- Enterprise Identity Mapping
- Credential Services

Grid Computing - The Next Frontier

Coordinates resource sharing and problem solving within or between physically dispersed organizations

Grid middleware is being developed by hardware suppliers, ISVs and the open source community to support more flexible use of IT:

- Resource sharing
- Virtual organizations
- eSourcing
- Collaborative and very large scale computing
- IT resources 'on tap'
- Novel service offerings or business models

National Digital Mammography Archive

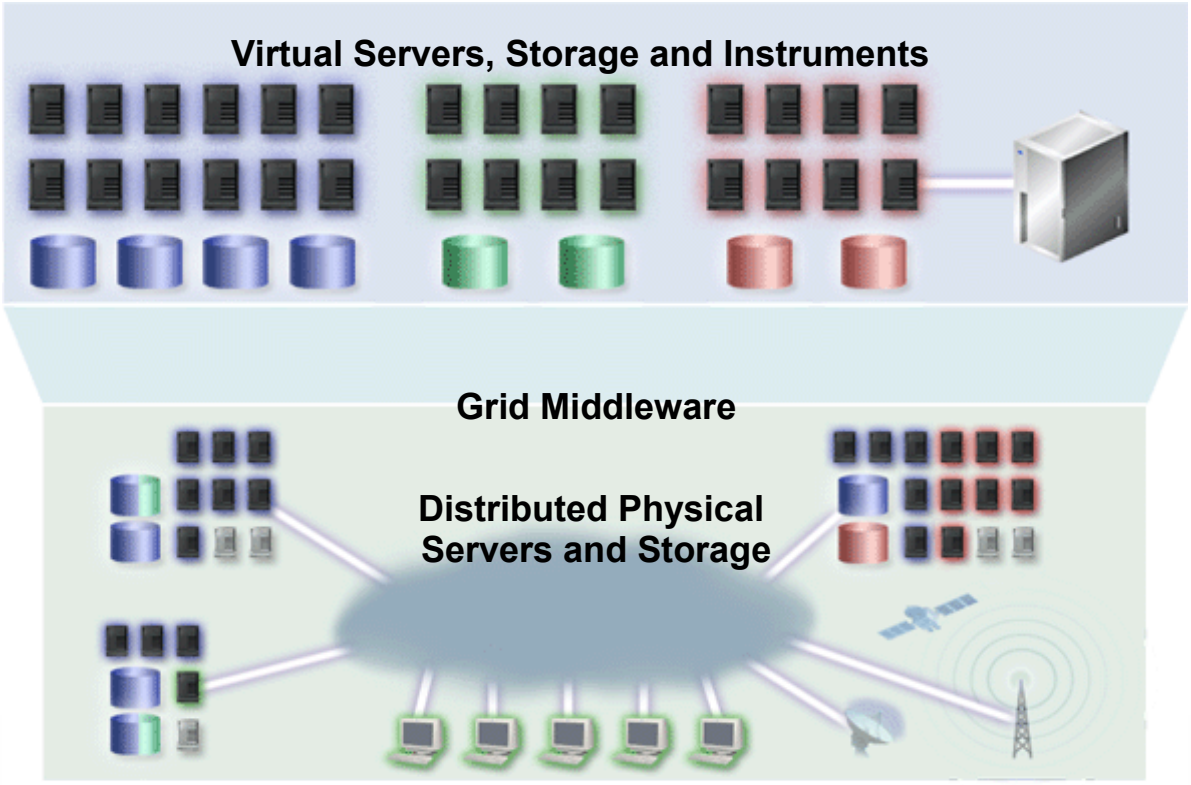
- Archive, Storage and retrieval for use by clinicians
- Training and Teaching for Radiology Departments
- Computer Assisted Diagnostics as a service
- 2000 Hospitals x 7 TB per yr x 2 = 28 PB per yr

http://www.research.ibm.com/autonomic

Grid Computing

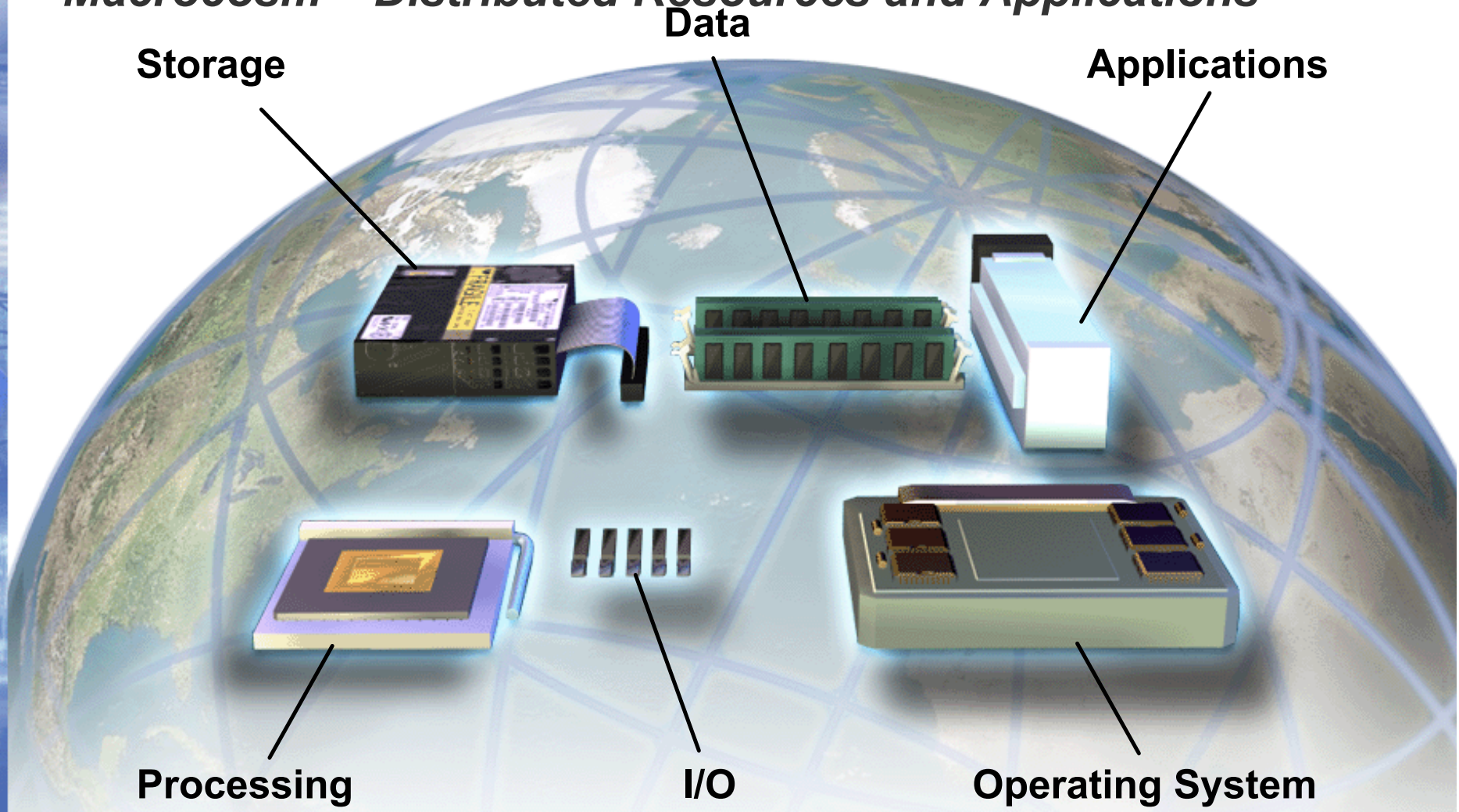
Distributed Computing Over the Internet Using Open Standards

- **Virtual, collaborative organizations sharing applications and data in an open heterogeneous environment**
- **A vast aggregation of geographically dispersed computing resources**



Grid Computing

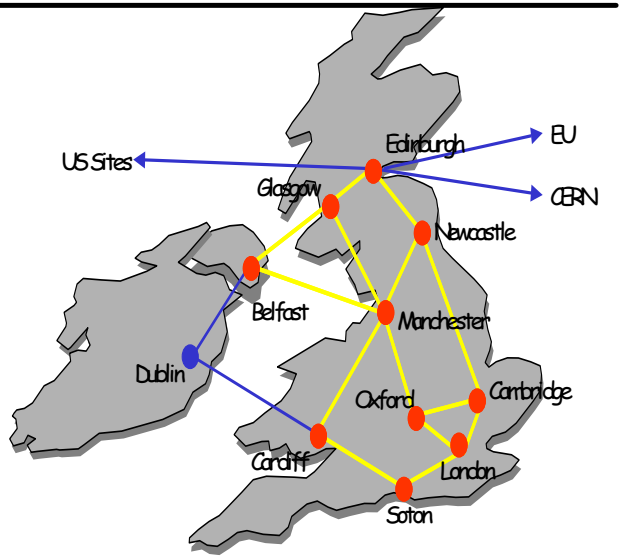
Macrocosm – Distributed Resources and Applications

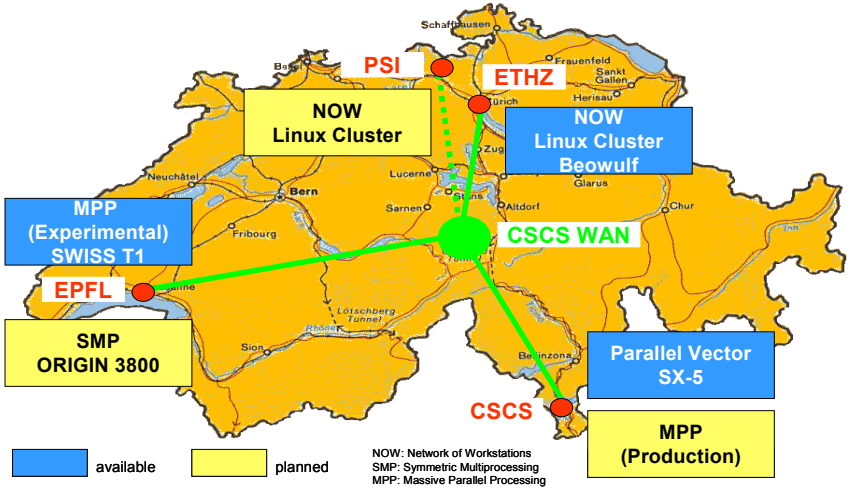


....a single unified image

Customer References (Grid)

- **Research References**
  - UK National Grid
  - Netherlands national Grid
  - Distributed Terascale Facility
  - Blue Grid
- **Data Sharing Grids**
  - North Carolina BioGrid
  - University of Pennsylvania
  - San Diego Super Computer Center
- **Application/Web Services Grids**
  - Galileo
  - Storebrand ASA
  - Hewitt Associates
  - Bekins





INFORMATION POWER GRID
Engineering and Research Site

Wrapup

Enterprise Linux Forum

June 4 - 6 at Santa Clara County Convention Center

- June 4 Pre-Conference Workshop
- June 5 - 6 Conference and Expo

Only event dedicated to Linux in the datacenter

Keynote Presentations

- The evolution of the virtual environment, where does Linux fit? - Dan Kusnetzky - IDC
- Technology Evolves, eBusiness on Demand - Dan Powers, VP Grid Computing Strategy, IBM

www.enterpriselinuxforum.com

Some Important Web Sites and Documents

IBM Linux	www.**ibm.com**/linux
IBM Linux Software	www.ibm.com/linux/software
IBM Linux zSeries	www-1.**ibm.com**/eserver/zseries/os/linux
IBM developerWorks	www.**ibm.com**/developerworks
IBM Linux xSeries	www.pc.ibm.com/ww/eserver/xseries/linux_update/index.html
IBM Linux iSeries	www-1.ibm.com/servers/eserver/iseries/linux/
IBM Linux pSeries	www-1.ibm.com/servers/eserver/pseries/
eserver solutions Linux Community Portal	www.ibm.com/servers/enable/linux/
Red Hat	www.redhat.com
SuSE	www.suse.com
TurboLinux	www.turbolinux.com
Free Software Foundation	www.gnu.org
General Linux	www.linux.org
Linux IBM Services	www-1.ibm.com/services/e-business/linux.html

Getting Started with Linux

The IBM Software Evaluation Kit for Linux

- IBM DB2 Universal Database Enterprise Server Edition (ESE) V8.1 for Linux
- IBM DB2 Migration Toolkit V1.1 for Linux
- IBM Directory Server V5.1 for Linux
- IBM Lotus Domino 6 for Linux (English)
- IBM Tivoli Access Manager Base 4.1 for Linux
- IBM WebSphere Application Server V5 for Linux
- IBM WebSphere Studio Site Developer V5 for Linux
- IBM WebSphere MQ V5.3.1 for Linux
- IBM WebSphere SDK for Web Services for Linux

http://www-3.ibm.com/software/is/mp/linux/sek/

Develop, Deploy and Integrate on Linux

Free 2-day workshop in San Mateo

Course highlights

- Configuring the Linux operating system
- Installation and configuration for the following middleware:
  - DB2 Universal Database Version 8.1
  - Lotus Domino 6 for Linux
  - IBM Directory Server Version 5.1
  - IBM Tivoli Access Manager Base Version 4.1
  - WebSphere Application Server Version 5.0
  - WebSphere MQ Version 5.3
  - WebSphere Studio Site Developer Version 5
  - Web application architecture concepts
  - J2EE overview (Struts)

www.developer.ibm.com/spc/events/ddi_linux.html?ca=dsp-1ql1dwzl

No Value but cute

The Penguinista Has Spoken

Roy Greenwood
IBM Americas Linux Impact Team

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