Enterprise Migration Seminars: Deploying and Managing Red Hat Linux Advanced Server

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Enterprise Migration Overview and Strategies

Agenda

- Overview and Objectives
- Linux Marketplace
- Red Hat Linux Advanced Server
- Migration Strategies
- Management and Administration Strategies
  - Linux Core Build - RPMs
  - Deployment - PXE/Kickstart
  - Management – RHN Satellite
About Red Hat

- 22 locations worldwide
- 600+ employees
- $90M in annual revenues and $300M in cash; no debt
- Profitable and cash flow positive from recurring operations
- Founded: 1995
- HQ: Raleigh, NC
Why Red Hat?

Red Hat provides the technologies, training, and services to **ensure the optimal deployment and management** of Red Hat Linux systems

- Professional Services
- Training
- Engineering Services and Developer Support
- Production System Services
- Managed Services - Red Hat Network
Why Linux?

Today, business survival is determined by degree to which companies can:

- Adapt, learn and nimbly respond to dynamic changes
- Provide products and services to customers “on demand”

Linux and Open Source technology play a key role:

- Flexible, reliable, cost-effective
- Helps companies gain competitive edge

*On demand computing requires open standards and technology*
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?

- Reliability
- Acquisition Costs
- Performance
- Value of Open Source
- Security
- TCO
- Scalability

Note: Includes responses from 500 Linux users.
The Linux Marketplace

**Early Adopters**
*Technology Centric*
- Firewall
- Print/File
- Web Server
- e-mail

**Mainstream**
*Business centric, mainstream users*
- Super Computing Clusters
- SW Development
- Database server
- Embedded devices
- Web Hosting
- Branch Automation
- e-Commerce
- ERP, CRM, SCM
- Vertical Industry Applications
- Enterprise mail/messaging
- High availability
- Server consolidation
- SMB adoption

- Industry Acceptance
- Significant ISV Adoption
- 2.4 Kernel
- Commercial usage in enterprises

Why Linux & IBM?

- Linux adoption is growing
- Industry Wide and Multi-Platform initiative
- IBM is driving adoption with
  - Support on all eServer platforms
  - Commitment to Linux, through investment in
    - Middleware development
    - Linux Technology Center & Open Source contributions
    - Relationships with key ISVs like VERITAS
    - Linux competency and porting centers for application validation
- Education and certification
IBM's Commitment to Linux

- ThinkPad
- NetVista
- IntelliStation
- Network Station
- pSeries
- xSeries
- zSeries
- iSeries
- Storage Systems
- IBM JVM
- WebSphere MQ
- DB2 UDB
- Domino
- VisualAge for Java Pro
- WebSphere Application Server
- WebSphere Commerce Suite
- Point of Sale
- System Installation & Configuration
- Workload Consolidation
- Solaris to Linux Migration
- Linux Cluster
- WebSphere
- Lotus software
- Red Hat
- Enterprise Migration Overview and Strategies
IBM Services for Linux

Grid
- Grid Computing Workshop
- Consulting
- Design/Architecture
- Deployment

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

Clusters
- Support Line
- x1350 Installations
- OEM Procurement
- Hardware Setup
- Software Installation

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

Workload Consolidation
- File/Print, Webserving
- Bynari, Sendmail
- Linux Solution for e-business
- Application Porting
- Solaris to Linux Migration

Training
- Web Hosting
  - "xSeries"
  - zSeries Linux
  - e-Sourcing

Technical Support
- Support Line
- Account advocate
- Advanced Support
- All eServers including clusters
- 24/7
IBM Middleware Ready for Linux

- **DB2** Data Management Software
  - Best performing database for Linux, UNIX and NT/2000
  - Handles multimedia as well as conventional data
  - Optimized for Web applications
  - Delivers enterprise class reliability and availability
  - Attaches to Linux Apache Web servers

- **Lotus** software
  - Rapidly develop and deploy collaborative applications with base eMail, group calendaring and discussion DBs
  - Advanced capabilities for managing work and information flow
  - Integration with database, ERP and transaction systems

- **Tivoli** software
  - e-business infrastructure management
  - Performance and Availability Management
  - Configuration and Operations Management
  - Security Management
  - Storage Management

- **Websphere** software
  - Application Servers
  - Speed transition from publishing to Web-based apps
  - Add dynamic data, business logic transactions, and/or connections
  - Runs on Apache Web Servers
  - Commerce Suite
  - Develop, manage e-commerce site & shopping/checkout experience

All Are Certified to Run Red Hat Linux Advanced Server!
x-Series Linux Value Proposition

Whether it's a small Linux environment, or deployment into a complex heterogeneous environment, IBM has the products, relationships, and skills to help you succeed.

- IBM is uniquely positioned to deliver Linux solutions today by offering:
  - Industry-leading line of compelling Linux enabled platforms, differentiated through IBM's X-Architecture innovation.
  - Enterprise software extensions and hardware features delivering high availability.
  - Depth and breadth of a world-class service and support organization, with expertise and experience in Linux.
  - Broad array of strategic alliances with your most critical partners.
  - Affordable, Scalable, Reliable servers to grow with your business, aggressively priced for SMB.
Enterprise Migration Overview and Strategies

Broadest Product Line in the Industry

Innovative Technology
- IA64 4W/n SMP
  - xSeries380
- Scalable Servers 8W to 16W/n SMP
  - xSeries440
- Clusters
  - 1350 Linux Cluster
- Tower Solutions
  - Small business Solutions
- xSeries305
- xSeries345
- xSeries335
- Blade Servers
  - BladeCenter
  - New
- Universal Tower Servers 1U to 4W/n SMP
  - xSeries220
  - xSeries235
  - xSeries255
- xSeries205

New Tools
- Internet Caching Appliance
- xSeries Hosting Appliance
- x343 NEBS Solution
- x05 DC, x835 DC

Application Flexibility

Migration Roadshow
2003 Focus xSeries Linux Solutions

Database Solutions
DB2 UDB, DB2 Everyplace, Oracle, Informix (Retail/Distribution), Sybase (FSS), Rational

File/Print Solutions
Samba

High Availability Solutions
VERITAS

Mail/Messaging Solutions
Bynari, Sendmail, SCO Volution Messaging Server, Lotus Domino, SuSE Openexchange Server

Network/Storage Mgmt Solutions
Legato Systems, VERITAS, Tivoli, Trustix

Security Solutions
Checkpoint, Symantec, CISCO, Trustix, SuSE Firewall, Tivoli

Web Serving Solution
Websphere, Apache

Workload Consolidation
VMware

Retail Solutions
Marcole Entpr
x-Series Linux Delivers!

x335 running Red Hat Linux holds first place in 2-way SPECweb99_SSL benchmark (1)

x342 running Red Hat Linux and Lotus Domino 5.0.10 NotesBench results show an increase in the performance of Lotus Domino on Red Hat Linux, up from 50 concurrent users on the 2.2 Linux kernel to a workload today of 7,000 concurrent users (2)

x343 running Red Hat Linux achieves 58% better performance than a similarly configured Sun Microsystems' Sun Netra 200 in SPECweb99 (1)

x360 holds first place in 2 and 4-way Linux on SPECjbb2000 benchmark (1)

x440 running Red Hat Linux demonstrates leadership performance and scalability for secure web hosting in SPECweb99_SSL benchmark (1)

x440 running Red Hat Linux and Oracle outperforms Sun Microsystems' Sun Fire V880 and HP's ProLiant DL580 in Oracle benchmark (4)

x440 8-way (575 SD users) results are 50% better than 8-way HP Proliant DL760 (382 SD users) on SAP SD 2-tier benchmark (5)

All results are current as of December 2, 2002. Complete list of results available from:
(1) www.spec.org
(2) www.notesbench.org
(3) www.tpc.org
(4) www.oracle.com/benchmark
(5) www.sap.com/benchmark

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Described to deliver enterprise Linux solutions

We give you the confidence and ability to deploy a resilient Linux infrastructure throughout your enterprise.

We provide comprehensive services & support, technology leadership & innovation, and global reach.

Partner with two leaders committed to the long term growth and success of Linux.

- Red Hat is the largest and most recognized provider of Linux and open source technology and solutions.
- IBM’s commitment to Linux ranges from hardware, software and middleware platform enablement to an integrated suite of supporting services.
How Red Hat Enables IBM's Products

Advanced Server works across all IBM server platforms and software products

- Single operating system
- Easy to administrate
- Fully compatible
- Scalable
- Rigorous testing of both S/W and H/W compatibility
- Reduces TCO!
Why Migrate?
Total Cost of Ownership

Linux saves enterprise customers **45%-80%** in TCO over RISC/UNIX

Source: IDC 2001

US dollars per user, per year, based on 1,000 users
By 2005 There Will Be Only Two Operating Systems That Matter in the Enterprise

Worldwide Server OS Shipments, 1994-2004

Source: IDC, 2001

Note: Only paid shipments are included
Benefits of UNIX to Linux Migrations

- Skills transfer for existing UNIX admins
- Ease of code migration
  - average of 3 weeks
  - often less than 10% of the code changes
- Tools and administration
- Low cost of training and support
Enterprise Migration Overview

Platform Focus

- **From – RISC UNIX**
  - Solaris/SPARC the most common proprietary UNIX deployment
  - Intel economies of scale apply to other proprietary UNIX systems
  - Migrations from UNIX to Linux are generally easier and more beneficial than migrations from Windows to Linux

- **To – Linux on Intel IA-32**
  - Intel IA-32 – offers the greatest price/performance
  - Intel IA-64 – new offering, not yet optimized
  - Mainframe – interest is in taking advantage of available capacity rather than purchasing a new mainframe to deploy Linux
Red Hat Linux Advanced Server
Developed to meet the needs of the Open Source movement and early technology adopters

- 4-6 month release cycle
- Based on snapshot of core tree
- Latest open source technology
- ABI/APIs may change
- 5 beta cycles over 10 weeks
- Schedule driven; features may slip
- Red Hat features/enhancements fed back to core open source tree
- Replicate freely
- Limited support
Designed for enterprise-class application deployment

- 12-18 month release cycle
- Extensive 6 month beta cycle
- ISV technology input
- Improved API/ABI stability for broad ISV application support
- Exterprise technology focus
- ISV/OEM/customer-driven schedule
- Red Hat enhancements and features fed back to core tree
- 5+ year version support
ISV Application Support

- Oracle
- Veritas
- BMC Software
- Borland
- BEA
- Novell
- SAP
- Check Point
- IBM WebSphere
- Legato
- CA
- TIBCO
- Synopsys
- Alias Wavefront
- Softimage
Superior Price / Performance

Red Hat now demonstrating World-Record Performance

- **Web Serving.** Zero-copy network stack, tux system call, and Content Acceleration Engine set numerous SPECweb99 records

- **Context Switching.** O(1) scheduler improved performance
  400% on 2-way system and 6000% on 8-way system

- **Threading.** New O(1) thread library can start/stop 100K threads in under 1 second; 1M threads in ~ 20 seconds

- **ecperf.** Oracle 9i on HP delivering 24639.37 Bbops/minat a price of $5.00/Bbop

- **TPC/C.** Oracle, HP, and Red Hat showing 138,362 tpmC at $17.38/tpmC
Migration Strategies and Case Studies
Migration Target Selection Factors

- Application Availability
  - Dependencies must be satisfied

- Business Drivers
  - Reliability, Availability, Security, Manageability
  - Competitive Leverage

- Cost
  - Savings on per-system cost
  - Savings on total number of systems
  - Total on admin/connectivity/management costs

- Project Size
  - Cost savings are dependent on server counts
  - Larger projects allow maximum savings at minimal barrier
Typical Migration Targets

- Infrastructure
- Web Servers
- Java Application Servers
- Messaging Servers
- C/C++ Applications
- Database
Targets: Infrastructure

- File Server
  - NFS, Samba, LDAP, eDirectory, Veritas
- Print Server
  - Samba, lpd
- DNS Server
  - Bind
- Security Server
  - Ipchains, Kerberos, ssl, vpn
- Build Server
  - Gcc, make, CVS
- Custom Utility Server
Targets: Web Servers

- HTTP Servers
  - Apache, Iplanet, Zeus
- Web Caching
  - Squid
- Content Engine
  - Tux
- Server-side Applications
  - CGI, PHP, Perl, Shells
Targets: Java Application Servers

- JSP Servlet Engines
  - Tomcat
- J2EE Application Servers
  - WebSphere, WebLogic, OAS, JBoss
- JDKs/SDKs
  - IBM, Sun, BEA, Blackdown
Java Application Servers- Performance

Http://ecperf.theserverside.com/ecperf/

- BEA WebLogic 7 and Oracle9i RDBMS
  - 25394.60 BBops/min @ $9/BBop †
    - 4 x HP ProLiant ML530-G2 (2 x 2.4 GHz, 2 GB RAM)
  - 16668.47 BBops/min @ $22/BBop ‡
    - 1 x Sun Fire V880 (8 x 900 MHz, 16 GB RAM)

- Oracle9iAS and Oracle9i RDBMS
  - 24639.37 BBops/min @ $5/BBop #
    - 3 x Compaq ProLiant DL360G2 (2 x1.4 GHz, 4 GB RAM)
  - 36122.60 BBops/min @ $12/BBop ‡
    - 3 x Sun Fire V480 (4 x 900 MHz, 16 GB RAM)

† Red Hat Linux Advanced Server 2.1AS and Red Hat Linux 7.2
‡ Solaris 8
# Red Hat Linux Advanced Server 2.1AS
Targets: Messaging

- Custom Messaging Systems
  - Tibco RV
- Financial/Market Data Feeds
  - Reuters RMDS
- Mail Routing
  - Lotus, Sendmail, Ximian, Binari
- Instant Messaging
  - Jabber
Targets: C/C++ Applications

- C Development Environment
  - Gcc, gdb, make, gprof, CVS, Rational
- C Runtime Environment
  - glibc
- 3rd Party APIs
  - Reuters, Tibco, RogueWave
- Runtime Failure Analysis
  - Core/Kernel Dump facilities
- High Availability
  - Red Hat Cluster Manager
C/C++ Performance on Linux

- **Integer Mathematics**
  - Spec99 shows parity with Solaris on a MHz basis

- **Floating Point Mathematics**
  - SpecFP shows a 75% parity with Solaris on a MHz basis

- **GCC 2.96 vs GCC 3.1**
  - Spec numbers show a 10-20% performance gain with 3.1

- **Compiler optimization** can have a significant impact ... but performance is very frequently most dependent on application details rather than GCC optimizations

- **P4 optimizations** may increase performance by 20% or more
Targets: Database

- RDBMS
  - Oracle, DB2, Sybase, Informix, PostgreSQL, MySQL
- DB Application Servers
  - Oracle
Migration Case Studies
Tommy Hilfiger

Tommy Hilfiger selected technologies from IBM, including IBM products such as iSeries and xSeries servers running Red Hat Linux, for Web based transactions, DB2 Universal Database, Java and eOneGroup's suite of software products to expand its presence.

Challenge
Expand presence among retailers and worldwide manufacturing facilities and employees.

Solution
New B2B portal that allows retailers to view available inventory in real time and place, track & ship orders.
Business-to-plant website that links worldwide production facilities.
Virtual employee store that allows employees to shop online.

Benefit
"IBM's server interoperability and application flexibility enabled lower costs and increased revenue..... the manufacturing portal and employee store are expected to produce substantial cost savings and tommyb2b.com has already proved productive and efficient for specialty store retailers with limited travel budgets."
Dan Watson, President of eOneGroup
Case Study – UBS Warburg

- **Before**
  - Sun 420R/280R 2 CPU Systems- 36 Systems/yr avg. $23,000
  - WebSphere on Solaris
- **After**
  - IA-32, 2 CPU Systems- 12 Systems/yr avg. $5,000
  - WebSphere on Linux
- **Bottom Line**
  - 3x performance meant 1/3 systems required at ¼ price
  - $10,000/CPU charge for WebSphere cut by 1/3
  - $150,000/yr admin cost per 30 systems cut significantly
  - 5 year savings of over $5M
- **Red Hat services to support a migration and deployment of this type**
  - **Training**: on-site RHCE classes
  - **Red Hat Network**: Satellite and Proxy
  - **Red Hat Linux Advanced Server**: Premium Subscription
  - **Professional Services**: On-Site Technical Account Manager
Deploying and Managing Red Hat Linux Advanced Server
Goals

- Efficiency
- Standardization
- Scalability
- Speed
- Automation
- Knowledgebase
- Tracking
- Proactive
RPM (RPM Package Manager)

- All software in Red Hat Linux is packaged in RPM format
- Organizes software into packages
- Enables ease of software installation, upgrades, and removal
- Tracks dependencies and conflicts
- Foundation for the Red Hat installer (anaconda) and Red Hat Network
- Binary (RPM) and source (SRPM)
- Software may be broken down into multiple packages
- Packages contain files and triggers
- RPM database located on system stores metadata
  - Used for verification, integrity checks
Anaconda

- Installer for Red Hat Linux
- Used for both manual and automated (Kickstart) installs
- Uses RPM for software installation
- Customizable
  - Add/delete/modify package groups
  - Add/delete/update packages
Kickstart

- Automated install using a script file
  - Similar in concept to Jumpstart (Solaris) and Ignite-UX (HP-UX)
- Based on anaconda and RPM
  - Not an image copy like Ghost, Drive Image, etc.
  - Same script usable on different types of hardware
- Configuration
  - Authentication / Security
  - Partitioning
  - Package Selection
  - Pre/post-install Configuration
Kickstart

- Common methods
  - PXE / NFS
  - Floppy / NFS
  - CD-ROM

- Advantages:
  - Enables standardization
  - Provides automation
  - Enables rapid provisioning / reprovisioning
Portion of a Sample Kickstart Script

# Kickstart file automatically generated by anaconda.

install
lang en_US
langspport --default en_US en_US
keyboard us
mouse genericps/2 --device psaux --emulthree
skipx
network --device eth0 --bootproto dhcp
rootpw --iscrypted $1$Y9öØaÆäü$0XDfKraLA.M7HLDjOthlg1
firewall --disabled
authconfig --enablesshadow --enablemd5
timezone America/New_York
bootloader
Generating a Kickstart script

- A Kickstart script is a text file
- `/root/anaconda-ks.cfg`
- `ksconfig`

- One method:
  - Do a manual install, according to desired configuration
  - Take the resulting `anaconda-ks.cfg` script and fine-tune
Red Hat Network

Deployment and Management Strategies
Red Hat Network Overview

- 5 nodes
  - Kickstart (PXE, DHCP, NFS) and RHN Satellite server
  - Oracle9i database server (RHN repository)
  - Kickstart-deployed node
  - Kickstart-deployed node (connected to external storage)
  - Kickstart-deployed node (connected to external storage)
Installation Process (using PXE)

1. Client system setup
   a. Hard drive clean
   b. BIOS set to boot from hard drive, then PXE boot

2. Client boots – PXE client contacts DHCP server

3. DHCP server indicates use of PXE server

4. PXE server indicates configuration to be used or presents menu

5. Pxelinux bootstrap tftp'd to client

6. System boots as normal, using Kickstart script indicated by PXE configuration or DHCP configuration

7. System installs and registers with Red Hat Network Satellite

8. System reboots automatically, boots from hard drive
Demonstration : Kickstart/RHN

Deployment Clients

Deployment Server
- Kickstart server
- NFS export
- PXE/DHCP
- RHN Proxy/Satellite
Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Clearly identify the goal: a one-size fits all foundation or a very-highly tuned, application-specific configuration

- Have a detailed understanding of the environment and framework into which the systems using the build must be incorporated. This includes:
  - Authentication / security configuration
  - Network configuration
  - Existing monitoring and management solutions
  - Storage and backup tools and processes
Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Gather the software requirements for this environment. This includes required RPMS found in AS, 3rd party dependencies, and in-house developed software
- Package in RPM format as many applications and utilities as possible
- Gather operating system and application tuning and optimization parameters
- Gather pre- and post-install configuration parameters
Best Practices Methodology for Creating, Deploying, and Managing a Core Build

- Setup RHN Satellite Server
- Define Channels and Groups
- Populate Channels
- Generate activation keys
- Determine Kickstart infrastructure
- Setup Kickstart Server
- Generate KS script
Clustering and Administration
Red Hat Cluster Manager

Two commodity servers
(Local boot/root device)

Shared external SCSI or Fibre Channel storage system
(For application data)

Serial/LAN heartbeat connection(s) between the servers

Shared Disk System: Both servers have redundant connections to disk system(s), but Red Hat Linux Cluster Manager controls access. One server talks to each standard partition at a time.
Putting It All Together
Linux Now Pilot Programs

- Baseline TCO analysis
- Blueprint implementation (up to 120 hours)
- Performance profiling and benchmarking
- Follow-up TCO analysis
- Migration project plan
- Assigned project manager
How Do I Move Forward With Linux?

- Begin considering where Linux makes sense in your environment
- Check out resources at http://www.redhat.com/migration
- Contact your sales rep about the Linux Now pilot program
  1-888-REDHAT1
Please Fill out your surveys!!!

Get Your RED HAT Baseball Cap!!!
Technical Seminar Series

Materials

- Information Package
  - Red Hat Linux Advanced Server Deployment and Management
  - Solaris to Linux Migration Whitepaper
  - Lithonia Lighting Case Study
  - Linux Now Migration Offerings
- Surveys
- The Web Site
  - http://www.redhat.com/migration

Enterprise Migration Overview and Strategies