What’s new in Red Hat Enterprise Linux 5

Mark Spencer
Sr. Solutions Architect, System z
Red Hat Canada

Brad Hinson
Sr. Support Engineer Lead, System z
Red Hat, Inc.
Agenda

- Red Hat
- Why Linux & Open Source
- Our Partnerships
- RHEL 4/5
- More Info
- Q & A
Red Hat

- Headquarters: Raleigh, NC
- Founded 1993, IPO 1999
  - > $400M Annual subscription revenue
- Customers
  - 350 of Fortune 500
  - 99% renewal of top 100 customers
What does Red Hat do?

- Makes Linux predictable, deployable, and sustainable

**From an engineering standpoint**

- Works with the community, partners, and customers
- Develops/incorporates new features
- Integrates open source packages, new features, drivers, bug fixes, & security updates
- Tests, certifies, produces, and supports the result

**From a business standpoint**

- Engineers and sustains the platform
- Provides services—training, consulting, support
- Leverages the open source development model
RHEL: Subscription Features

- Red Hat Enterprise Linux is provided on a per-physical-system annual subscription basis

**Benefits:**
- Fully inclusive – no additional or hidden costs
  - Unlimited support incidents
  - No Client Access Licenses
  - No Upgrade costs
- Easy to budget
- Provides a stable, secure, no-risk deployment

**A subscription:**
- Can be moved between systems
- Can be used to run any version
- Applies to any supported architecture

### Red Hat Enterprise Linux subscription

<table>
<thead>
<tr>
<th>Support</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium</td>
<td>24 x 7 phone/web technical support&lt;br&gt;Response: Critical:1 Normal:4 hours</td>
</tr>
<tr>
<td>Standard</td>
<td>Business hour phone/web technical support. 1 &amp; 4 hour response</td>
</tr>
<tr>
<td>Basic</td>
<td>Web support. 2 day response</td>
</tr>
</tbody>
</table>

Security, bug fixes & regular H/W & S/W updates via Red Hat Network

Hardware and Application Certifications

- Stable application interfaces
- Upgrades to new versions
- Product Source, Binaries & Documentation
Linux Subscription Revenue

In $1,000's
Red Hat Subscription Model

- Red Hat software is sold as an annual subscription which includes:
  - **Technology**
    - Product & Documentation
  - **Certifications**
    - The industry's widest choice of certified hardware & software
  - **Maintenance**
    - Red Hat Network delivers updates and errata (e.g. security & bug fixes)
  - **Upgrades**
    - New releases at no extra charge
  - **Support**
    - Basic, Standard, Premium options available
    - Up to 24x7 with 1 hour response
Why open source software?

<table>
<thead>
<tr>
<th>OS Vendor Choice</th>
<th>OSS naturally creates multiple vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPROVED SECURITY</td>
<td>Proven security through better technology &amp; threat response record</td>
</tr>
<tr>
<td>AUDITABILITY</td>
<td>Customers and industry can verify standards adherence, quality &amp; flexibility</td>
</tr>
<tr>
<td>COST REDUCTION IN MULTIPLE DIMENSIONS</td>
<td>Hardware; system administration; compute transactions/watt; license management</td>
</tr>
<tr>
<td>SOLUTION ECOSYSTEM</td>
<td>OEM and ISV suppliers across the IT industry are focusing on delivering OSS solutions</td>
</tr>
<tr>
<td>TECHNOLOGY</td>
<td>All leading software technology development today is being done under the OSS model</td>
</tr>
<tr>
<td>PERFORMANCE - MATURITY - CHOICE</td>
<td>More suppliers than any proprietary offering = more improvements, more testing, greater selection</td>
</tr>
</tbody>
</table>
Value of Open Source To Customers

**Economic Value, Investment Protection, and Risk Reduction**
- Purchasing Safety
- Pay for Real Value
- Customer Choice
- Low Acquisition Costs, Low TCO
- Lower Infrastructure Costs

**Quality & Innovation - Open Code, Participation, Flexibility & Choice; Backed with Proof**
- Unmatched Speed of Development
- Diverse Development
- Incremental Innovation
- Higher Performance
- More Secure Solutions
- Open Source software base
Red Hat Open Source Architecture

“CATALYST” FOR THE SOLUTION ECOSYSTEM

“ON-LINE” SERVICE DELIVERY MODEL

TESTING AND CERTIFICATION

“Stacks”: Customer requested components
Red Hat testing & certification services

END-TO-END MANAGEMENT & SECURITY:

RHN/JBossON; SELinux, Identity/PKI, WS*

JBOSS JEMS SOA MIDDLEWARE

Application deployment infrastructure
Complete platform for SOA
Heterogeneous support

RED HAT INTEGRATED RHEL PLATFORM

Integrated Virtualization
Stateless computing
Mgmt & access to content (RHN)
Open Source in the Enterprise

- **49%**: Already in production
- **18%**: Plan to invest in the next 12 months
- **10%**: Plan to invest in the next 2 years
- **7%**: In pilot stage
- **15%**: No plan to invest at all
- **1%**: Do not know

Source: IDC Emerging Technologies and Services Survey, March 2006
Red Hat - Making Open Source Predictable

Development – Integration – Hardening – QA testing – Delivery – Benchmarking – Certifications

Risk mitigation through long-term maintenance & support
Partnering with the Linux Leader

What organizations are doing the most to advance open source software?

- Red Hat and IBM are the clear leaders

Source: “Open Source Usage is Up, But Concerns Linger”, Forrester Research, June 23, 2005
IBM works jointly with Red Hat through all phases of development from requirement definition throughout a 7-year life cycle support.

Modification to open source components are worked within the community.
Take Your Pick . . .

the same single Single Red Hat Linux code base
works on all eServer Platforms

Software? There are over 250 IBM SWG applications available on Red Hat Enterprise Linux.
Red Hat Enterprise Linux certifications

- The Red Hat Enterprise Linux OEM and ISV certification portfolio
  - The largest is the open source industry
  - Continues to grow rapidly
  - Is unique to Red Hat Enterprise Linux product family
  - Provides unmatched coverage

- Driven by
  - Customer demand
  - Platform consistency
  - Support longevity
  - Product qualities
    - Performance, Security & Scalability

Thousands of certified applications
IBM System z9 and zSeries Servers – Combining Open Computing with the most reliable server platform

- Mainframe qualities of service
- The ability to scale up and out
- The ability to add processing power quickly, when it’s needed
- zSeries virtualization for consolidation and control
- To help reduce the cost of operation
- To help reduce complexity and simplify maintenance tasks
IFL Sales by Market Segment

IFL Customers by Market Segment

Communications
Computer Services
Distribution
Financial Services
Industrial
Public
SMB

'June 2006
Virtualization Solves Business Problems

Fault and error containment. One instance cannot scribble on another

Simulation for testing (large networks, unavailable hardware)

Secure, compartmentalized instances. Easy path to the equivalent of a chroot(1) “jail”

Dynamic migration of workloads made simpler by migrating entire instances

Run legacy applications. Originals are not certified for more recent HW/OS

Consolidate workloads from several under-utilized servers

Packaging “application appliances” and distributing as instances to simplify provisioning, testing and operations
What does RHEL 4 do for IBM zSeries?

- RHEL 4 2.6 Kernel technology
- Updated I/O and memory management for faster throughput and scalability
- Faster, more scalable O(1) scheduler
- Faster, POSIX compliant threading library
- Asynchronous I/O and completion events - a big improvement for Web servers and databases
- Support for disks larger than 2 TB and for SGI's XFS enterprise file system
- ext3 with ACL support
What's new in Version 5?

- Enterprise Linux Advanced Platform
- Industry leading performance and price/performance
- Enhanced and easy to use security
- Improved networking and interoperability
- Enhanced development tools
- New SLAs
Red Hat Enterprise Linux 5: Product Summary

- Red Hat Enterprise Linux 5 comprises more than 1200 components
- Over two years of development since Red Hat Enterprise Linux 4
- Technology created by:
  - Red Hat
  - Partners
  - Community
- Packaging designed by:
  - Red Hat
  - Customers
  - Partners

| Replacement of previous AS, ES and WS products with a single server and a single client |
| New Options provide additional server and client product capabilities |

**Kernel & Performance**
- Red Hat Enterprise Linux is based on the Linux 2.6.18 kernel
- Support for multi-core processors
- Broad range of new hardware support
- Updated crash dump capability provided by Kexec/Kdump
- Support for Intel network accelerator technology (IOAT)
- Numerous enhancements for large SMP systems
- Enhanced pipe buffering
- IPv4/IPv6 fragmentation offload & buffer management
- Dynamically switchable per-queue I/O schedulers
- Kernel buffer splice capability for improved I/O buffer operations

**Security**
- SELinux enhancements include Multi-Level Security and targeted policies for all services
- SEtroubleshooter GUI simplifies SELinux management

**Integrated directory & security capabilities**
- IPSEC enhancements improve security and performance
- ExecShield enhancements, such as a call frame Canary word, strengthen hacker defenses
- New Audit features provide powerful new search/reporting and realtime monitoring
# Red Hat Enterprise Linux 5: Product Summary

- Features exposed to extensive testing with Fedora Core 4/5/6
  - Ensures high quality
- Application interfaces held stable for life of product

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational Stateless Linux features (X autoconfigure, NetworkManager, etc)</td>
<td></td>
</tr>
<tr>
<td>Improved ACPI support with features such as suspend to disk</td>
<td></td>
</tr>
<tr>
<td>Smart card login - with PKI/Kerberos authentication</td>
<td></td>
</tr>
<tr>
<td>Integrated multi-media support</td>
<td></td>
</tr>
<tr>
<td>Enhanced plug and play hardware support (cameras, printers, scanners, etc)</td>
<td></td>
</tr>
<tr>
<td>Network Manager provides automatic wired and wireless network configuration</td>
<td></td>
</tr>
<tr>
<td>Enhanced graphics using AIGLX/Compiz (with fading, transparency, etc)</td>
<td></td>
</tr>
<tr>
<td><strong>Development Environment</strong></td>
<td></td>
</tr>
<tr>
<td>Enhanced application development tools including SystemTap profiler and Frysk debugger</td>
<td></td>
</tr>
<tr>
<td>GCC 4.1 and glibc 2.4 toolchain</td>
<td></td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td></td>
</tr>
<tr>
<td>Support for root device multipath IO (MPIO) improves availability</td>
<td></td>
</tr>
<tr>
<td>Single system/guest version of Red Hat Global File System included in the base product</td>
<td></td>
</tr>
<tr>
<td>Block device data encryption support</td>
<td></td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td></td>
</tr>
<tr>
<td>Numerous installer improvements make system configuration simpler</td>
<td></td>
</tr>
<tr>
<td>Yum/Pup-based updater for Red Hat Network</td>
<td></td>
</tr>
<tr>
<td>Conga cluster &amp; storage management (with Virtualization Platform)</td>
<td></td>
</tr>
</tbody>
</table>
Security Highlights

- Security Enhanced Linux (SELinux)
  - Enterprise Linux 4 is the first commercial product to deliver SELinux technology
  - Red Hat has worked with the NSA to achieve this since they released code in 2000
- Additional security technology to limit consequences of buffer overflow vulnerabilities
  - Exec Shield and Position Independent Executables
- Improved auditing framework helps IT systems achieve compliance requirements
- EAL4+/CAPP certification enable new government deployments

Red Hat Enterprise Linux 4/5 is the platform of choice for the most secure organizations in the world

Benefits to all customers
Tremendous ability to 'lock down' and secure systems

Specific benefits for government
EAL4+ certification enables a new wave of deployment
Distribution Changes for RHEL 5

- No more AS/ES/WS
  - Server/Client/Workstation and AP (Advanced Platform)
- s390x (64-bit) kernel only
  - Still has s390 (31-bit) compatibility libraries
- Major kernel update
  - 2.6.9 -> 2.6.18
- s390utils update
  - v1.3.2 -> v1.5.3
- up2date -> yum
- Installation number
  - Used to filter packages, but doesn't prevent installation
RHEL 5 Features: Changes

- 64-bit kernel only
  - 31-bit applications still run through compatibility libraries
- Deprecate CTC, NETIUCV (networking)
- GCC 4.1 with z9 instruction support
  - Default GCC options enable performance tuning for System z
- DASD access by VOLSER (label)
- QETH: set IPv4/IPv6 routers separately
- Oprofile call graph
- System z support for HAL
- Net-snmp included
  - Remote hardware monitoring
RHEL 5 Features: Performance & Measurement

- Consolidate guest monitoring data in z/VM
  - Linux-z/VM Monitor Stream
  - Write APPLDATA records
  - Kernel data
  - Application data
- Linux API to access z/VM *MONITOR records
- DCSS: discontinuous saved segment
  - Shared section of memory accessed by multiple guests
  - Allows XIP2 (execute in place) technology
  - XIP2fs integration into ext2
RHEL 5 Features: Performance & Measurement

- Accurate CPU accounting
  - Usage of CPU timer
  - Steal time
- Access to PR/SM LPAR performance data
  - CPU performance
  - hypfs filesystem
- Channel Path Measurement Data
  - Interpretation of data through SBLIM data gatherer
- Reduce virtualization overhead for FCP and networking
  - QDIO pass-thru: no z/VM intervention
- Fast minidisk access on 64-bit guests
  - Diag 250: CP performs actual I/O operations
RHEL 5 Features: PAV/FCP

- PAV: parallel access volumes
  - Redundant paths to data through PAV aliases
  - Reliability: allows for path failover
  - Performance: overcomes channel bottleneck when accessing data

- FCP
  - Better IPL/re-IPL support
  - NPIV: N-port ID virtualization
    - Allows sharing of FCP/SCSI attached disks read/write
  - FCP debugging
    - Tool and logs available
RHEL 5 Features: Device Support

- Device support
  - DS6000: asymmetric multipathing
  - Open source driver for 3590/3592 tape drive
- DASD support for write barriers
  - Data is reliably committed to disk
- Crypto2 Express support
  - CEX2C, CEX2A models
- System z9 SHA & AES instructions
  - In kernel and userspace
RHEL 5 Features: Debugging

- SystemTAP / kprobes
- Dump analysis
  - Support for dump device configuration
  - s390dbf support for crash dump analysis tool
- Network problem analysis
  - Support for GuestLAN network traffic sniffer
- FCP Problem Analysis
  - ZFCP traces & logs
RHEL 5 Features: Debugging

- SystemTAP / kprobes
- Dump analysis
  - Support for dump device configuration
  - s390dbf support for crash dump analysis tool
- Network problem analysis
  - Support for GuestLAN network traffic sniffer
- FCP Problem Analysis
  - zFCP traces & logs
What's new in 5.1

- Support for Layer 2 OSA at install
- Upstream DASD driver updates
- Upstream zFCP driver updates
  - SCSI layer change
- Many more z-specific enhancements
Contact information

- Brad Hinson, Dedicated System z Support Engineer (Raleigh)  
  <bhinson@redhat.com>
- Mark Spencer, Dedicated System z Solutions Architect (Remote)  
  <mspencer@redhat.com>
- Tim Deren, IBM Global Account Director (Westford)  
  <tderen@redhat.com>
Useful Links

- Technical mailing list (linux-390@vm.marist.edu)
  - Subscribe: http://www2.marist.edu/htbin/wlvindex?linux-390
  - Archive: http://www.mail-archive.com/linux-390@vm.marist.edu/
- RHEL 5 Virtualization Cookbook
- RHEL 4 Virtualization Redbook
- Presentations from SHARE user conferences and other links
  - http://www.linuxvm.org/present/
  - http://www.linuxvm.org/