Agenda

- RHEL Lifecycle
- Latest Updates
  - RHEL 6.1
  - RHEL 6.2
  - RHEL 5.7: Feature Highlights
- Appendix: Systems Management with RHN Satellite
RHEL Lifecycle
Red Hat Enterprise Linux Life Cycle Overview

- Fully supported through standard life cycle of 7 years from GA plus 3-year optional extension.
- Asynchronous bug fix, enhancement, and security Errata Advisories for critical issues as needed.
- All Errata Advisories and Service Packs are incremental on a single stream.
- ABI stability is guaranteed for the full life cycle.

**Production 1 Phase**
- Non-critical Errata Advisories aggregated in Service Packs (aka Minor Releases), approx. 2 per year, may stretch out later in the life cycle; includes Feature enhancements and new Hardware support. Typically 4 years.

**Production 2 Phase**
- Transition from Production 1 to Production 3, Bug fixes and minor hardware enablement

**Production 3 Phase**
- Time between the final Service Pack and the end of the regular 7-year life cycle.
Red Hat Enterprise Linux High Level Roadmap

**CY 2010**
- RHEL 2.1

**CY 2011**
- RHEL 3
  - EOL
- RHEL 4
  - 4.9
  - EOL
- RHEL 5
  - 5.6
  - 5.7
- RHEL 6
  - 6.1
  - 6.2
  - 6.3

**CY 2012**
- RHEL 6
  - 5.8

**CY 2013**
- RHEL NEXT
  - Planning started based on major Red Hat initiatives.
  - All schedule and details TBD.

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**RHEL 6 GA on Nov 10 2010**
- Major refresh of the RHEL platform with thousands of improvements and new features.
- New Life Cycle model with EUS for every Service Pack.

**RHEL 5.6 on Jan 13**
- Selected backports of new application stacks – e.g. PHP, Bind refresh, IPA client.
- General bug fixing and hardware enablement.
- Target for Common Criteria Virt (KVM) Certification.
- Updated QETH network driver for System z

**RHEL 6 Service Pack 1**
- Released May 19, 2011
- In total ~ 600 enhancements and hardware enablement backports, as well as ~2700 bugfixes planned.
- Target for Common Criteria and IPv6 certifications.

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Note: This is a current planning snapshot. Dates and details subject to change.
Extended Update Support (EUS)

- Optional add-on to regular RHEL Subscription, that provides independent life cycles for the individual Service Packs during Production I phase.

- The overlap is 18 months leading to a ~ 2 year life cycle for each SP.

- Selective backports of fixes into the respective Service Pack
  - Provides Critical Impact security errata independent of customer requests.
  - Selected urgent priority defect fixes to address production blocking problems reported by EUS customers.
  - Does not provide incremental features or hardware enablement

- Inherits support SLA from underlying RHEL subscription (requires Standard or Premium support).
RHEL 6.1: Feature Highlights
Released May 19, 2011
Performance and Application Scheduling

- CPU scheduling algorithms optimized
  - Results in 3 to 5% performance gain.
- Better concurrent processing by making use of RCU locking in the scheduler.
  - Read-Copy Update: Access to shared data without traditional locks. Designed for today's faster CPUs.
    - [http://lse.sourceforge.net/locking/rcupdate.html](http://lse.sourceforge.net/locking/rcupdate.html)
- Improvements to tickless timer algorithm.
- Performance improvements since 6.0
  - Java workload improved from 1% to 3%.
  - Transaction Processing workload improved from 6% to 8%.
File Systems and I/O

- CIFS improvements for access to Windows Shares
  - Multi-user mounts for more secure access
  - Support for Unix-style symbolic links on CIFS (mfsymlink)

- Quota management
  - Consolidation of quota management tools for file systems
File Systems and I/O

- I/O Barriers
  - Implementation reworked for improved disk performance

- LVM
  - Improved recovery times by skipping scans on failed devices.
  - Snapshot of mirrors
  - Support for mirror devices whose constituent devices are striped (RAID 0+1)
Networking

- Significant optimization in the way network traffic is processed in single and multi-CPU environments.

- Reduced latency for re-transmission of lost packets in time sensitive applications.

- Transparent proxy (TProxy) support.

- DHCP support for IPv6.

- Active-Active bonding for load sharing.
In Depth: Cloud Enablement with Control Groups

Problem: “I want to implement a chargeback model.”
Solution: Control Groups (cgroups)

- Cgroups are “process containers”. Lets you transform groups of applications into workloads
In Depth: Cloud Enablement with Control Groups

- **Resource Limiting**
  Specify limits on CPU, memory, and even file system usage

- **Prioritization**
  Give mission critical workloads higher priority than others

- **Accounting**
  Run report on resource utilization, i.e. for billing purposes

- **Isolation**
  Separate namespaces for groups, so they don't see each other's processes, network connections or files

- **Control**
  Freeze groups for checkpointing or restarting workloads
Resource Management with Control Groups

- **Block I/O throttling**
  - Limit I/O rate for device based on cgroup membership.

- **Balance of throughput and fairness between groups**
  - via new tunable “group_idle”.

- **Reduce latency for interactive tasks running under CPU intensive workloads via autogroup.**
  - Prevents single process from monopolizing the system.
Software Development

- SystemTap
  - Remote scripting capabilities, numerous performance optimizations.
- GDB
  - C++ debugging enhancements and Python support.
- Valgrind
  - Handle CPUs with three levels of cache
- GCC Compiler
  - Bug fixes and optimizations.
- Eclipse
  - Update to the platform (Helios) and plugins
Security and Audit

- Multiple updates to System Security Service Daemon (SSSD)
  - SSSD Integration with identity management services
  - Better DNS-based discovery
  - Auto renewal of Kerberos tickets, plus support for Kerberos FAST protocol
  - Password obfuscation (LDAP)
- Centralized management of SSH keys using LDAP
- Identity Management
  - Password policy management for users and groups
System z Specific Updates

- 49 z-specific features, 56 z-specific bug fixes for RHEL 6.1

- Here are some highlights...
System z Specific Updates

- Fix and recompile openSSH to enable HW Crypto
  - Performance improvement. Enable openSSH to offload secure processing to Crypto card.
- zEnterprise support for 4096-bit RSA FastPath
  - This feature extends the support for current hardware acceleration of RSA encryption and decryption to handle the zEnterprise Crypto Express3 card.
- Installer: /boot partition on LVM
  - zipl bootloader supports device-mapper (LVM & multipath) devices. Installer now allows /boot these devices
- Installer: /boot on ext4 partition
  - zipl bootloader supports ext4 partition. Installer now allows this.
System z Specific Updates

- Dynamic memory resize tools: lsmem/chmem

<table>
<thead>
<tr>
<th>Range</th>
<th>Size (MB)</th>
<th>State</th>
<th>Removable</th>
<th>Device</th>
</tr>
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<tr>
<td>0x0000000000000000-0x0000000000000000</td>
<td>256</td>
<td>online</td>
<td>no</td>
<td>0</td>
</tr>
<tr>
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<td>512</td>
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<tr>
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<tr>
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<td>online</td>
<td>yes</td>
<td>4-6</td>
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<td>0x0000000050000000-0x0000000060000000</td>
<td>2304</td>
<td>offline</td>
<td>-</td>
<td>7-15</td>
</tr>
</tbody>
</table>

Memory device size : 256 MB
Memory block size   : 256 MB
Total online memory : 1792 MB
Total offline memory: 2304 MB
System z Specific Updates

- CMSFS write support
  - Support for writing to CMS file system. You can now your PROFILE EXEC with vi!

- Exploitation of z10 prefetching instructions
  - This is a toolchain enhancement from IBM. Prefetching instructions have been introduced to enhance memory access.

- Exploitation of z196 out-of-order instruction scheduling
  - Generate faster code sequences, and use CPU facilities to allow better instruction scheduling.
  - Recompile programs with --march=z196 and/or –mtune=z196

- Apply System z optimized sysctl settings by default
  - Apply kernel tuning settings to /etc/sysctl.conf optimized specifically for System z
### System z Specific Updates

- **hyptop: Hypervisor “top” - Show IFL usage across LPARs**

```bash
# hyptop
14:08:41 | H05LP30 | CPU-T: IFL(18) CP(3) UN(3)

<table>
<thead>
<tr>
<th>cpuid</th>
<th>type</th>
<th>cpu</th>
<th>mgm</th>
<th>visual</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>IFL</td>
<td>96.91</td>
<td>1.96</td>
<td>534.79</td>
</tr>
<tr>
<td>1</td>
<td>IFL</td>
<td>81.82</td>
<td>1.46</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>IFL</td>
<td>88.00</td>
<td>2.43</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>IFL</td>
<td>92.27</td>
<td>1.29</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>IFL</td>
<td>83.32</td>
<td>1.05</td>
<td></td>
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<tr>
<td>5</td>
<td>IFL</td>
<td>92.46</td>
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<td>0.00</td>
<td>0.00</td>
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</tr>
<tr>
<td>7</td>
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<td>0.00</td>
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<tr>
<td>9</td>
<td>IFL</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>
```

? = help

```bash
534.79 10.78
```
RHEL 6.2
GA: December 2011
Focus areas

- Resource management
- Networking
- File system and storage
- Identity management
- Installation and advanced storage
- Security and Standards
- Subscription Management
- Feature & Bug Fix Summary
Resource Management - Control Groups

- Ceiling enforcement via CPU cgroup
  - Guarantee precise processor time. Relevant in multi-tenancy environments that are sensitive to over/under allocation.
- CPU controller scalability improvements
  - Relevant for large SMP systems.
- I/O controller performance improvements
  - More efficient use of locks.
- Reduced memory usage by more efficiently allocating pages within cgroups
Networking

- NetworkManager improvements
  - Backend support for NIC bonding.
    - Note: Useful for LPAR-only environments
- Stream Control Transmission Protocol (SCTP)
  - Robust alternative to TCP allowing for “multistreaming” and “multihoming”.
- Transmit Packet Steering (XPS)
  - Selection of transmit queue based on configuration.
  - Throughput improvement by 20% to 30%.
Transmit Packet Steering (XPS)

Greatly improved message throughput as a result of network packet flow/steering.

Impact of RPS/RFS on total transactions / sec

e1000e driver - (Single queue)

Note little difference when going from 1 to 2 drivers w/o steering

each driver running 100 concurrent netperf TCP_RR tests
File System

• Parallel NFS (pNFS) *(Technology Preview)*
  • Allow for larger data transfer rates.
    • Typically processing metadata is the bottleneck
    • Process metadata separately from actual data
  • Allows client to access storage devices in parallel
  • Limited to client-side functionality for file layout only.
File System

- Parallel NFS (pNFS) (*Technology Preview*)
  - [www.pnfs.com/docs/DMG_Parallel_NFS.pdf](http://www.pnfs.com/docs/DMG_Parallel_NFS.pdf)
File System

- Parallel NFS (pNFS) (*Technology Preview*)
  - www.pnfs.com/docs/DMG_Parallel_NFS.pdf
File System (cont.)

• EXT4
  • Faster creation times by delaying the initialization of the inode tables.
  • New option “-E lazy_itable_init”
    • Delays initialization until first mounted
    • Once mounted, initialization happens in background, so file system is immediately usable
    • Creation time on large file systems reduced as much as 100%

• CIFS
  • Asynchronous write support resulting in significant performance improvement.
  • Performance benefits up to 200%
Storage

- Reduced activation times for LVM devices
  - Relevant in high-density environments (E.g. large number of virtual guests).
- Improved LVM efficiency for solid-state backend devices
Identity Management

- Centralized administration
  - Allow administrators to manage identities of users and servers centrally.
- Interoperability with Active Directory
- Single-Sign On (SSO)
- Based on open standards
  - Integrates Kerberos, LDAP, DNS and x.509 certificates into a unified identity management solution.
Installation

- Support for partitions greater than 2.2 TB
  - Data devices only
- Support for device identification using WWIDs
  - Fiber Channel devices can be now specified by a World Wide Name (WWN) or World Wide Identifier (WWID) for unattended installations.
  - Easier to identify storage devices
Error detection and reporting

• Improved ABRT framework
  • Easier configuration of plugins and settings.
  • More consistent way to store error reports.
  • Switch to using a non-privileged account for most of the processing that results in a more secure environment.
  • Greater plugin stability.
Desktop and Graphics

• X Server rebase
  • Easier to maintain X.org and Mesa drivers in future RHEL 6 releases. Increased system stability in the long-run
• Monitoring of larger CPU count in gnome-system-monitor.
Security, Standards and Certification

- Kerberos FTP client improvements
  - Command line limit increase to better handle large message processing environments.
- Common Criteria Certification
  - Target for Evaluation Assurance Level (EAL) 4+
- FIPS-140
- FIPS 201 PIV Smartcard
Subscription Management

• Certificate based RHN for new installations
  • Certificate based access that is highly available with the help of the globally distributed content delivery network (CDN).

• Entitlement certificates for disconnected systems
  • Allow for offline registration of up to 25 systems.

• Auto regeneration of renewal certificates
  • It is now possible to automatically regenerate new entitlement certificates after the renewal of a subscription.
Feature & Bug Fix Summary

- Automatic detection of read-only DASD
  - Useful in read-only root setups
- Access to raw ECKD data from Linux
  - Linux can now see the entire disk, useful for “dd”
- Crypto CPACF improvements for zEnterprise
  - Support for new algorithms
- Optimal qeth network settings
  - Enable checksum and GRO, increase buffers
Feature & Bug Fix Summary

- New HiperSocket communication infrastructure
  - Now supports TCP/IP congestion management
- cpuplugd service updates
  - Updated rules for CMM
  - Now disabled by default

- 88 total z-related features & bug fixes
RHEL 5.7
GA: Q2 2011
New Feature: SCAP

- Security Content Automation Protocol (SCAP)
  - Open source framework for maintaining security of enterprise systems
  - Verify presence of patches, check system security settings, examine system for signs of compromise
- Includes a library and a set of utilities
- Allows security managers to use OVAL and XCCDF to verify security configuration and vulnerability status
- Backported from RHEL 6
New Feature: Developer Tools

- **CMake**
  - Cross-platform build system
  - Generates native makefiles and compiler independent configuration files
  - Supports developers with targets across multiple operating systems.
  - Backported from RHEL6

- **Buildsys-macros**
  - Support for dist tags for developers building RPMs
  - Backported from RHEL6
Feature: Remote Sync (rsync)

- Rsync has been updated to version 3.0.7
  - Improved replication speed
  - Replication starts while file list is still being compiled

- Companies requiring global data set replication should see major benefits
Features: Remote File Systems and Storage

- Updated Automounter (autofs)
  - Support for localityName attribute in LDAP maps
  - Encrypted secret for LDAP authentication

- iSCSI initiator
  - Support for s390x architecture
Documentation Links

- Documentation/Getting Started
  - Redbook, “z/VM and Linux on IBM System z: The Virtualization Cookbook for Red Hat Enterprise Linux 6.0”
    - Covers RHEL 6 and z/VM 6.1
  - DeveloperWorks:
  - Knowledgebase:
    - http://kbase.redhat.com/
    - Search “s390"
  - http://www.redhat.com/z
Thank You
Appendix
Systems Management with RHN Satellite
Satellite deployment model

- **RHN Hosted**
  - Software Distribution
  - Subscription Management

- **RHN Satellite**
  - Software Distribution
  - Account Management
  - Channel Management
  - Monitoring
  - Provisioning

- **WEB INTERFACE**
- **RHN Proxy**
- **MANAGED SYSTEMS**

- **API LAYER**
  - IT Applications
  - Custom Content

- Enterprise management solution – enhanced control
- Local database stores all packages, profiles, and system information
- Syncs content from RHN Hosted
- Custom content distribution
- Can run disconnected from the Internet
RHN Satellite

RHN SATELLITE
Single Satellite Topology Example

INTERNAL NETWORK

RHN SATELLITE

INTERNET

FIREWALL

SSL
RHN Satellite on System z
PXE Deployment on System z

zPXE

- Same configuration/profile on all guests
- Read-write 191 disk not required for each guest
- All changes kept on management server
- Flexibility of kickstart
- Same principles as traditional PXE, adapted to System z
- Fits with configuration management tools (cobbler)
- Easy to update

https://fedorahosted.org/cobbler/wiki/SssThreeNinety