THE PAST 12 MONTHS WITH RED HAT ENTERPRISE LINUX
# Platform Product / Offering Roadmap*

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*All dates are approximate and subject to change

Production 1  Production 2  Production 3  3-year life cycle  2-year life cycle

# redhat #rhsummit
NEW ADDITIONS TO THE RHEL FAMILY
**RED HAT ENTERPRISE LINUX ATOMIC HOST**

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<th>IT IS RED HAT ENTERPRISE LINUX</th>
<th>OPTIMIZED FOR CONTAINERS</th>
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**MINIMIZED FOOTPRINT**
- Minimized host environment tuned for running Linux containers while maintaining compatibility with Red Hat Enterprise Linux.

**SIMPLIFIED MAINTENANCE**
- Atomic updating and rollback means it's easy to deploy, update, and rollback using imaged-based technology.

**ORCHESTRATION AT SCALE**
- Build composite applications by orchestrating multiple containers as micro-services across multiple hosts.

Inherits the complete hardware ecosystem, military-grade security, stability and reliability for which Red Hat Enterprise Linux is known.
Red Hat Enterprise Linux for Real Time
When determinism really matters

- Red Hat Enterprise Linux Real Time
  - Standard member of the Red Hat Enterprise Linux family
  - Targeted at workloads that favor a consistent response time (deterministic) over throughput
  - Based on the stock RHEL 7 kernel
  - Aligned with RHEL release cadence
  - Available via separate subscription
Red Hat Enterprise Linux for SAP HANA

- RHEL for SAP HANA
  - Jointly engineered to deliver highly **Reliable, Available, Scalable** and secure data warehouse solutions for the most demanding production environments including Cloud deployments
    - High performance in-memory database management systems for fast, high throughput
    - 99.999% uptime
    - >12PB tested to date
  - Supported by Red Hat, SAP and certified hardware partners
  - RHEL 6.5 and later, RHEL7 in progress
  - Complements RHEL for SAP
Red Hat Enterprise Linux for IBM POWER8 little endian

- Support for IBM Power Systems POWER8 little endian mode to Red Hat Enterprise Linux 7
  - POWER8 in big endian mode also supported

- POWER8 offers higher performance
  - especially for big data applications
  - multi-threading, more cache and greater data bandwidth
  - See the STAC results with RHEL 7!
    http://www.hpcwire.com/2015/06/09/ibm-power8-outperforms-x86-on-stac-benchmarks/

- Easier for Power Systems to leverage Red Hat’s ecosystem of certified applications
  - removes the application portability barrier
Red Hat Enterprise Linux
High Availability Support for IBM z Systems

• Customers asked for RHEL HA support for IBM z Systems
  – We're delivering!
  – Watch for this with RHEL 7.2
  – Join the Beta!

• Uses existing RHEL HA and Resilient Storage Add-Ons
  – Customers in the Financial Services Industry working with us to validate using production workloads
Red Hat Enterprise Linux Server for ARM Development Preview 7.1

• Support for open and industry standards for 64bit ARM server hardware
  – Extends RHEL ecosystem of innovation to ARM
  – Take advantage of 64-bit ARM architecture and standardize on RHEL

• Based upon RHEL 7.1 userspace
  – Plus kernel optimized for ARM

• Available via ARM Partner Early Access Program
  – 40 partner companies participating in the program
  – To evaluate, contact your hardware vendor
SOLVING A KEY CUSTOMER REQUEST: PREDICTABLE ERRATA DELIVERY
Predictable Software Updates

- Customers requested improved predictability of RHEL errata delivery

- Batched updates with new consolidated support stream
  - Kernel and userspace errata now released concurrently
    - Coalesced into the existing kernel cadence (every ~6 weeks)
    - Starting with RHEL 6.7 and RHEL 7.1 support streams

- Exceptions:
  - Fixes to urgent security issues
  - Resolution for critical business impacting issues
PATHS TO RHEL 7
Many choices to upgrade existing deployments & optimize your business to run on one of Red Hat's IaaS or PaaS offerings

**Virtualize** your apps & run on RHEL-based KVM VMs on RHEL, RHEV, RHEL OpenStack Platform & Certified Cloud Providers

**Containerize** your apps & run on RHEL-based containers on RHEL7, RHEL Atomic Host, Red Hat Atomic Enterprise Platform or OpenShift

**In-Place upgrade** from RHEL 6
RUN RHEL 6 APPLICATIONS ON RHEL 7

- Deploy containerized RHEL 6 applications to RHEL 7 without porting or changing source code
- Make use of innovations in Red Hat Enterprise Linux 7 without compromising the reliability and security of existing Red Hat Enterprise Linux 6 apps
- Available as part of your Red Hat Enterprise Linux subscription
EASIER INSTALLATION AND DEPLOYMENT
IN-PLACE UPGRADES FROM 6.X TO 7.X

1 PRE-UPGRADE ASSISTANT

- Audits current OS state vs RHEL 7 profile and creates:
  - HTML report of potential issues
  - DIRECTORY of config files for modification
  - Understands RHEL 6 and RHEL 5
  - POST-INSTALL script to be run by user after upgrade

2 UPGRADE TOOL

IF REPORT IS ACCEPTABLE

See documentation for validated configurations
LOOKING FORWARD TO RHEL 7.2
Security Certifications and Software Assurance

SCAP

- National Institute of Standards and Technology (NIST) Security Content Automation Protocol (SCAP) 1.2
  - Planned for RHEL 7.2: SCAP integrated with installation, systems can be provisioned into pre-configured security baselines created from SCAP Security Guide or custom SCAP profiles with the SCAP Workbench
  - For RHEL 7: PCI-DSS v3, STIG (draft)

Certifications

- Common Criteria
- FIPS-140-2
- USGv6 - Standard required for IPv6 networking
- US Government Configuration Baseline (USGCB)
Unprecedented Security at Every Level

- Binary Hardening Measures
  - All apps compiled with -fstack-protector-strong and partial RELRO
  - Daemons and setuid apps additionally compiled with PIE and full RELRO

- UEFI Secure Boot

- Protection against Denial of Service (DDOS) attacks enhanced at multiple levels of the network stack

- Crypto enhancements in Libreswan (IKEV2, new ciphers), PT-EAP for Trusted Network Connect, OpenSSL (Curve25519, Ed25519 elliptic-curve signature for user/host keys)

- Containers secured by proven technologies: SELinux & sVirt
  - User Namespaces now available in kernel as Technology Preview
  - Future: OpenSCAP for containers (scan & measure)
Uptime

KPATCH Live Patching for the RHEL Kernel

Critical security fix available but you can't afford the downtime?
- Patch your kernel dynamically with Kernel Live Patch
- Hot patch modules available for RHEL 7
- Delivered via Red Hat support organization
- Ask your TAM or Sales representative to join the Kpatch Special Interest Group
Speed
Enhancing Kernel, Virt and Network Performance

- Core networking path performance **accelerated by 35% for RHEL7.2**
- Control Groups
  - Memcgroup integrated with Unified Hierarchy
  - Future: Swap/file cache cgroup
- Spinlock optimizations
  - added to mutex, epol, futex & scheduler
  - eliminated from futex wakeup code paths
  - added MCS locks, which eliminates inter-node cache-line bouncing on NUMA systems
- Newidle balance support in scheduler
- Per-process transparent huge pages
- HugeTLBFS improvements; allocation at runtime, on specific NUMA nodes, page-fault scalability
- SR-IOV, NUMA, huge pages, vCPU pinning
Getting to Line Rate
Accelerated Packet Processing with DPDK

Data Plane Development Kit (DPDK) 2.0

- Accelerated network packet processing in user space
- Works with bare metal, virtual machines and containers
- Integrates with vhost-user and Open vSwitch 2.4
- Performing at 97% of line rate
  - Application-specific, trusted network
- Available via the RHEL 7 Extras channel
Enabling Network Functions Virtualization

OpenStack & Cloud Deployments through RHEL

Realtime KVM for OpenStack (planned)

RHEL for Realtime in host and now ...
Run Realtime applications in a KVM virtual machine!
- Virtualized Realtime hardware configurations
Visualize Complex Network Configurations

Easily view a diagram of your host's entire networking setup with plotnetcfg

- Supports all kinds of network interfaces
- Understands VLANs, bridges, virtual Ethernet (veth) pairs and Open vSwitch
- Understands Openstack and containers
- See it integrated into Cockpit GUI in the Demo area
Empowering DevOps

Red Hat Software Collections 2.0
- Latest stable versions of dynamic languages, web servers, and open source databases for users to create modern applications that can be confidently deployed into production
  - Ruby 2.2, Rails 4.1, node.js 0.10.33, Python 3.4, PHP 5.6, Perl 5.20, MySQL 5.6, MariaDB 10, Nginx 1.6, Java Common & more!

Developers Toolset 3.0
- Latest stable versions of GCC with C, C++, and Fortran support as well as debugging and developer performance monitoring tools
  - GCC v4.9, Eclipse V.4.4, ltrace 0.7.91, gdb 7.8, binutils 2.24, elfutils 0.159, Valgrind 3.9.0 & more!

Containers Development Kit
- Collection of tools and resources that enable developers to easily build and maintain containerized applications based on Docker for the Red Hat ecosystem (including RHEL Vagrant Boxes)
  - Part of Red Hat Connect for Technology Partners

“I need to use more recent versions of dynamic languages and databases to support the business as I create and enhance web applications.”
Optimizing Storage Performance for Speed and Efficiency

- Tier your fast and slow storage
- Maximize performance with flash in the top tier with LVM Caching
- Optimize storage by provisioning only as needed with LVM thin provisioning. Alerts and actions selectable when thin volume is becoming full
- Improve performance and efficiency with point-in-time-copy with LVM snapshots; store only a single shared copy of data
Improving Storage Ease-of-Use

- Open source, vendor-agnostic API and CLI to manage external storage
  - LibStorageMgmt lets you provision a LUN, export an NFS mount-point, take a hardware snapshot, monitor status...
- Reduce human errors with improved syntax checking for multipath devices, and world wide IDs for identification
- Snapper utility for managing LVM and Btrfs snapshots
  - create and compare snapshots
  - revert between snapshots
  - automatic snapshots timelines
- Move multiple logical volumes as a unit (pvmove --atomic)
Contemporary Desktop Refreshed in RHEL 7.2

More rapid desktop update cycle

- RHEL 7.2 will update to GNOME 3.14
  - GNOME Software package manager
  - Usability improvements for WACOM tablets
  - Improved touchscreen support, with multi-touch gestures for both the system and applications
  - Shell bug-fixes and improvements for multi-monitors, and better integration with apps-dialogs

- Also planned
  - Improved handling of HiDPI displays
  - Wayland Technology Preview
Further Innovation in Tools and Features

- OverlayFS - persistent stacking filesystem
  - Page cache sharing, fast container startup
  - EXT4 now, XFS next
- NFSoRDMA server in tech preview
  - For workloads with larger I/O sizes
  - Less CPU consumption than Ethernet
- Highly available PTP configuration
  - Failover between multiple PTP domains and NTP sources
- Checkpoint/Restore in Userspace (CRUI)
  - Testing additional enterprise applications
  - Integrated with clustering!
- Java 8 Support for RHEL 6 and 7
  - lambda / functional programming, Nashorn JS engine, new Date/Time API
- SystemTap
  - New sampling profiler, additional thread monitoring information, better multi-user JVM monitoring
- Kexec kdump & Crash
  - Kdump support >16T physical memory system
  - Crash support > 16T core file
  - Kdump integration in Atomic Host
BEYOND RHEL 7
FOR MORE DETAILS ON RHEL TECHNOLOGIES & ENHANCEMENTS
Join us tonight at the 7PM BOF
Visit us at the Demo Pods
LEARN. NETWORK. EXPERIENCE OPEN SOURCE.