RED HAT ENTERPRISE LINUX 7

BETA

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March, 2014

Agenda

- Red Hat Enterprise Linux 7
  - Key facts
  - What’s changed?
  - Enhancements
  - Summary

Red Hat Enterprise Linux 7: Enterprise Platform

- One agile distribution for all deployment types

  Physical, Virtual and Cloud
- Preserves customer investment and enables new deployment models
- Fully tested and stable features on Day 1
- Security
- Latest hardware features and support

Red Hat Enterprise Linux 7: Basic Facts

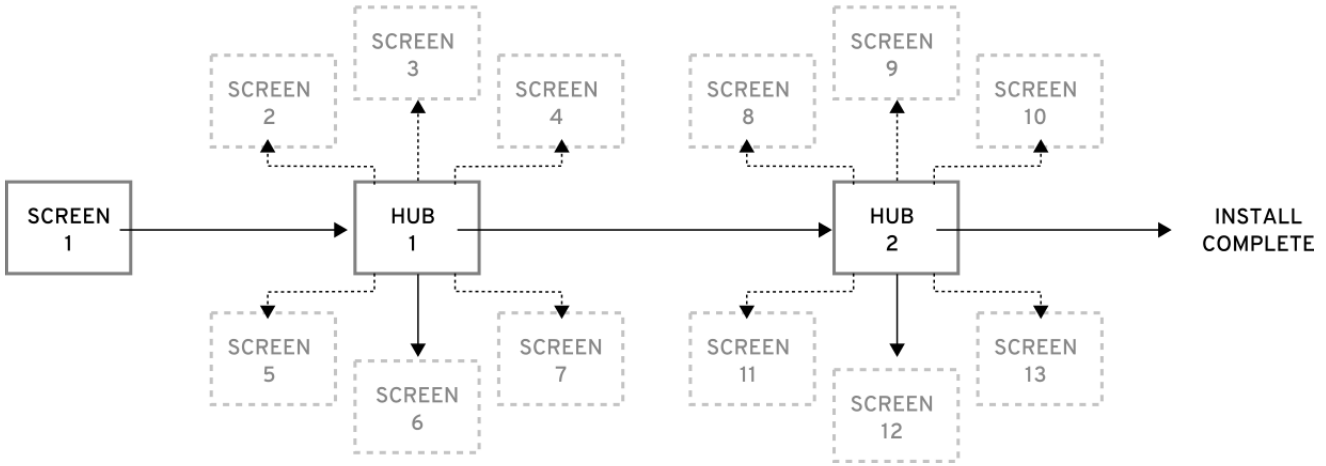
- Based on Fedora 19 and 3.10 kernel
- Supported architectures : x86-64, POWER, System 390
- What about 32-bit?
  - No ISOs. However 32-bit libraries will be made available.
  - Can use multilib toolchain to create (32-and) 64-bit binaries.


What's changed?

Red Hat Enterprise Linux 7: Installer

- The RHEL 7 installation procedure presents a user friendly interface that allows RHEL to be installed using 3, rather than 13 linear, screens
  - Easy to go back to a main page
  - Warnings and errors provided to guide the user

HUB-AND-SPOKE UI / 13 screens total



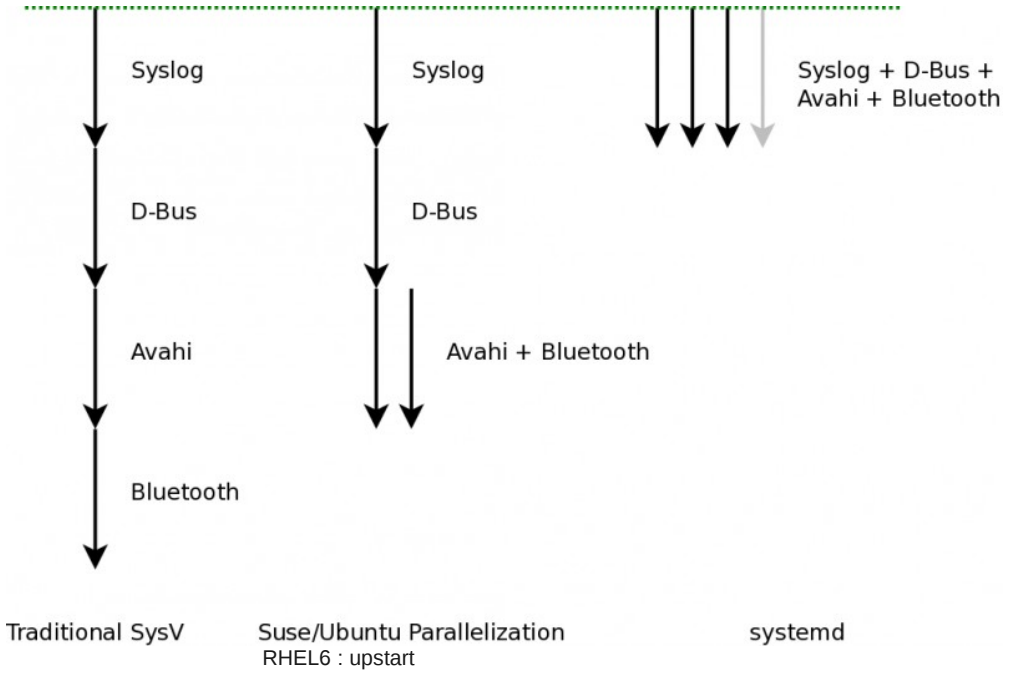
Red Hat Enterprise Linux 7: New Installation Capabilities

- Support for installing to image files [bare metal/virt/cloud]
- Support for installing from image files in addition to yum repositories [bare metal/virt/cloud]

Red Hat Enterprise Linux 7: System Initialization

- RHEL 7 will be based on Systemd, a system and service manager
  - Compatible with SysV and LSB init scripts
  - Allows more work to be done concurrently (possibly in parallel) at system startup. Result: Faster system boot times.
  - Integrates chkconfig + service
  - More than just init!

systemd provides aggressive parallelization capabilities, uses socket and D-Bus activation for starting services, offers **on-demand starting of daemons**, **keeps track of processes using Linux cgroups, supports snapshotting and restoring of the system state, maintains mount and automount points** and implements an elaborate transactional dependency-based service control logic.



https://access.redhat.com/site/videos/403833

http://0pointer.de/blog/projects/why.html

Systemd service type

Unit Type	File Extension	Description
Service unit	`.service`	A system service.
Target unit	`.target`	A group of systemd units.
Autmount unit	`.automount`	A file system automount point.
Device unit	`.device`	A device file recognized by the kernel.
Mount unit	`.mount`	A file system mount point.
Path unit	`.path`	A file or directory in a file system.
Scope unit	`.scope`	An externally created process.
Slice unit	`.slice`	A group of hierarchically organized units that manage system processes.
Snapshot unit	`.snapshot`	A save state of the systemd manager.
Socket unit	`.socket`	An inter-process communication (IPC) socket.
Swap unit	`.swap`	A swap device or a swap file.
Timer unit	`.timer`	A systemd timer.

SYSTEMD CRASH COURSE

- SERVICES

  # service httpd start -> systemctl start httpd.service

  # chkconfig httpd on -> systemctl enable httpd.service

- RUNLEVEL
  - init 3 -> systemctl isolate multi-user.target
  - Init 5 -> systemctl isolate runlevel5.target
- DEFAULT RUNLEVEL
  - /etc/inittab -> systemctl set-default graphical.target

SYSTEMD CRASH COURSE

service sshd status

openssh-daemon (pid 3051) is running...

systemctl status sshd

```
[root@rhel7-mlessard cloud-user]# systemctl status sshd
sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled)
   Active: active (running) since Thu 2014-01-09 12:03:35 EST; 21h ago
  Process: 705 ExecStartPre=/usr/sbin/sshd-keygen (code=exited, status=0/SUCCESS)
 Main PID: 706 (sshd)
   CGroup: /system.slice/sshd.service
           └─706 /usr/sbin/sshd -D

Jan 10 09:12:03 rhel7-mlessard sshd[11023]: error: Could not load host key: /etc/ssh/ssh_host_ecdsa_key
Jan 10 09:12:06 rhel7-mlessard sshd[11023]: Invalid user mlessard from 10.35.201.32
Jan 10 09:12:06 rhel7-mlessard sshd[11023]: input_userauth_request: invalid user mlessard [preauth]
Jan 10 09:12:08 rhel7-mlessard sshd[11023]: Connection closed by 10.35.201.32 [preauth]
Jan 10 09:12:14 rhel7-mlessard sshd[11025]: error: Could not load host key: /etc/ssh/ssh_host_dsa_key
Jan 10 09:12:14 rhel7-mlessard sshd[11025]: error: Could not load host key: /etc/ssh/ssh_host_ecdsa_key
Jan 10 09:12:20 rhel7-mlessard sshd[11025]: Accepted publickey for root from 10.35.201.32 port 55286 ssh2: RSA 65:21:09:12:bb:a1:d
Jan 10 09:12:30 rhel7-mlessard sshd[11033]: error: Could not load host key: /etc/ssh/ssh_host_dsa_key
Jan 10 09:12:30 rhel7-mlessard sshd[11033]: error: Could not load host key: /etc/ssh/ssh_host_ecdsa_key
Jan 10 09:12:35 rhel7-mlessard sshd[11033]: Accepted publickey for cloud-user from 10.35.201.32 port 55287 ssh2: RSA 65:21:09:12:b
Hint: Some lines were ellipsized, use -l to show in full.
```

SYSTEMD CRASH COURSE (systemd.mount)

```
# vi /etc/systemd/system/mnt-backup.mount

[Unit]
Description = USB backup disk

[Mount]
What = LABEL=david-usb-backup
Where = /mnt/backup
Type = ext4

[Install]
WantedBy = multi-user.target


# systemctl daemon-reload
# systemctl start mnt-backup.mount
# systemctl enable mnt.backup.mount
```

Red Hat Enterprise Linux 7: GRUB2

- Meet the new menu.lst : grub.cfg
- Should not be directly edited by human
- Changes are applied with update-grub or new kernels are installed
- To customize Grub2
  - /etc/default/grub (default parameters)
  - /etc/grub.d/ (custom parameters)
- Why ? Non x86 platform, Secure boot (UEFI)


Many enhancements &
expanded choices

Red Hat Enterprise Linux 7: File Systems

- Many Choices
  - Ext4, XFS and btrfs (boot/root & data)
    - Ext4 provides backwards compatibility
      - Ext2/3 will use the Ext4 driver, which is mostly invisible to users
      - 50 TB
    - XFS – New default filesystem
      - Scalability ~500 TB
    - Btrfs: Focus is on stability over scalabilty
  - NFS v4.1 & 3
  - Full support for all pNFS client layout types
    - Add in support for vendors NAS boxes which support the pNFS file, object and block layouts

Red Hat Enterprise Linux 7: Storage

- Storage
  - Upgrade/rollback with btrfs or LVM+xfs/ext4
    - Available with RHEL 6.4
    - Use in conjunction with in-place upgrade
  - Storage system manager provides a unified easy to use CLI for all supported file systems

```
# ssm list filesystems
-----------------------------------------------------------------------------------------------------------------------
Volume                          Volume size  FS     Free      Used     FS size  Type   Mount point
-----------------------------------------------------------------------------------------------------------------------
/dev/device_pool/lvol001         100.00 GB  ext4  93.25 GB  1.75 GB  100.00 GB  linear
/dev/dm-0                         78.12 GB  ext4   2.11 GB  72.11 GB  78.12 GB  crypt  /home
btrfs_loop3                       11.05 TB  btrfs 11.05 TB  36.00 KB  11.05 TB  btrfs  /mnt/test
btrfs_loop3:2011-11-29-T113552    11.05 TB  btrfs 11.05 TB  36.00 KB  11.05 TB  btrfs  /mnt/test/2011-11-29-T113552
btrfs_loop3:new_subvolume         11.05 TB  btrfs 11.05 TB  36.00 KB  11.05 TB  btrfs  /mnt/test/new_subvolume
/dev/sda1                         19.53 GB  ext4  3.79 GB  14.77 GB  19.53 GB  part   /
```

Red Hat Enterprise Linux 7: Networking

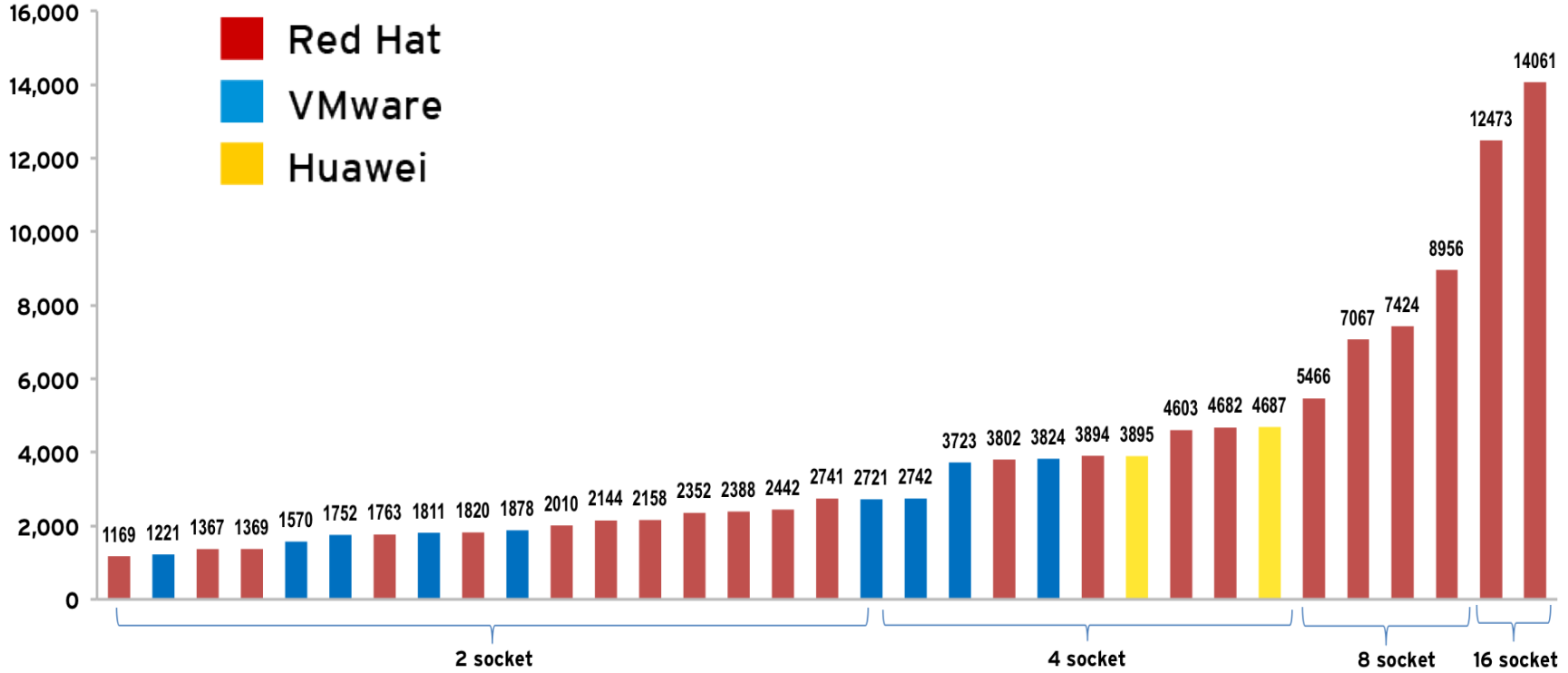
- Network Manager
  - New CLI interface

```
# nmcli g
STATE      CONNECTIVITY  WIFI-HW  WIFI      WWAN-HW  WWAN
connected  full          enabled  disabled  enabled  disable
```

  - Support more configuration options, including Bridging, Bonding, VLANs, IPoIB, FCoE, DCB, DNSEC and Trust Zones
- Team Device
  - Mechanism for bonding multiple network devices into a simple logical interface at the data link layer *(Alternative to the existing Linux Bonding driver)*
- *40 GB ethernet support*

Red Hat Enterprise Linux 7: Virtualization and Cloud

- NUMA capabilities in KVM for better virtualization performance (numabalance)
- VM live migration across RHEL 6 and RHEL 7 hosts



SPECvirt_sc2010: As of November 15, 2013, Red Hat Enterprise Virtualization claims 10 of the top 15 results and the only 8-socket and 16-socket server scores.

Red Hat Enterprise Linux 7: Security

- SELinux
  - New tool suite : sepolicy
  - Labled nfs
  - Secure container (virt-sandbox)
- Firewalld
  - firewalld provides a dynamically managed firewall with support for network/firewall zones to define the trust level of network connections or interfaces.

```
# firewall-cmd --state
# firewall-cmd --get-active-zones
# firewall-cmd --reload
# firewall-cmd --panic-on
# firewall-cmd --zone=home --remove-service=http
# firewall-cmd --permanent --zone=home --add-port=443/tcp
```

Red Hat Enterprise Linux 7: Windows Interoperability – Server

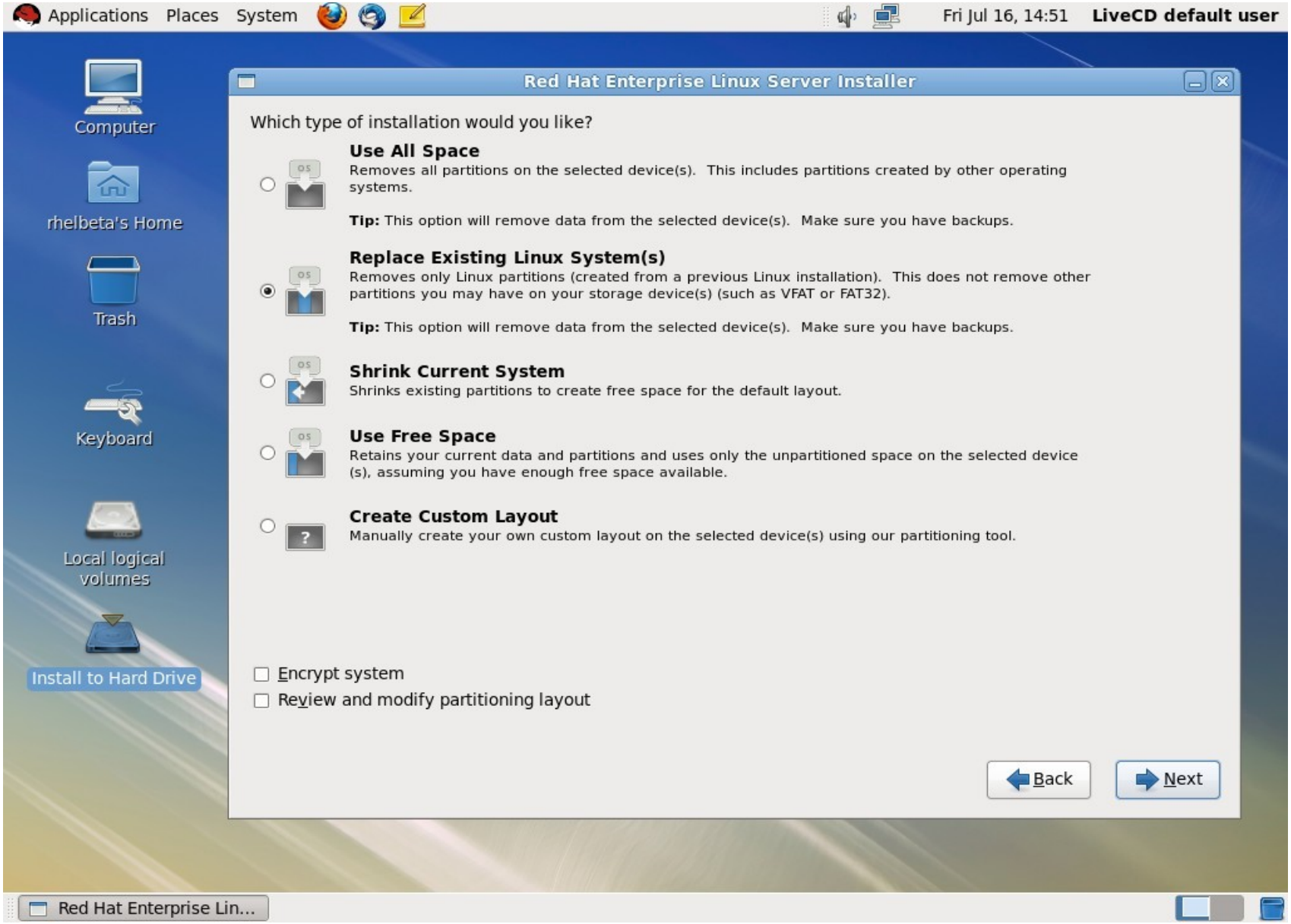
- Cross realm Kerberos trust between Idm and Active Directory
- Out-of-the-box Linux support of direct interoperability with Active Directory
  - Automatic detection of the domain controller to join (AD/IdM)
  - Simple, integrated set-up of the authentication configuration
- Samba file server adds support for the SMB 4.0 file sharing
- Kernel support for SMB 2.1 clients of SMB servers
- IPv6 & Windows 7 domain support

Red Hat Enterprise Linux 7: Windows Interoperability – Client

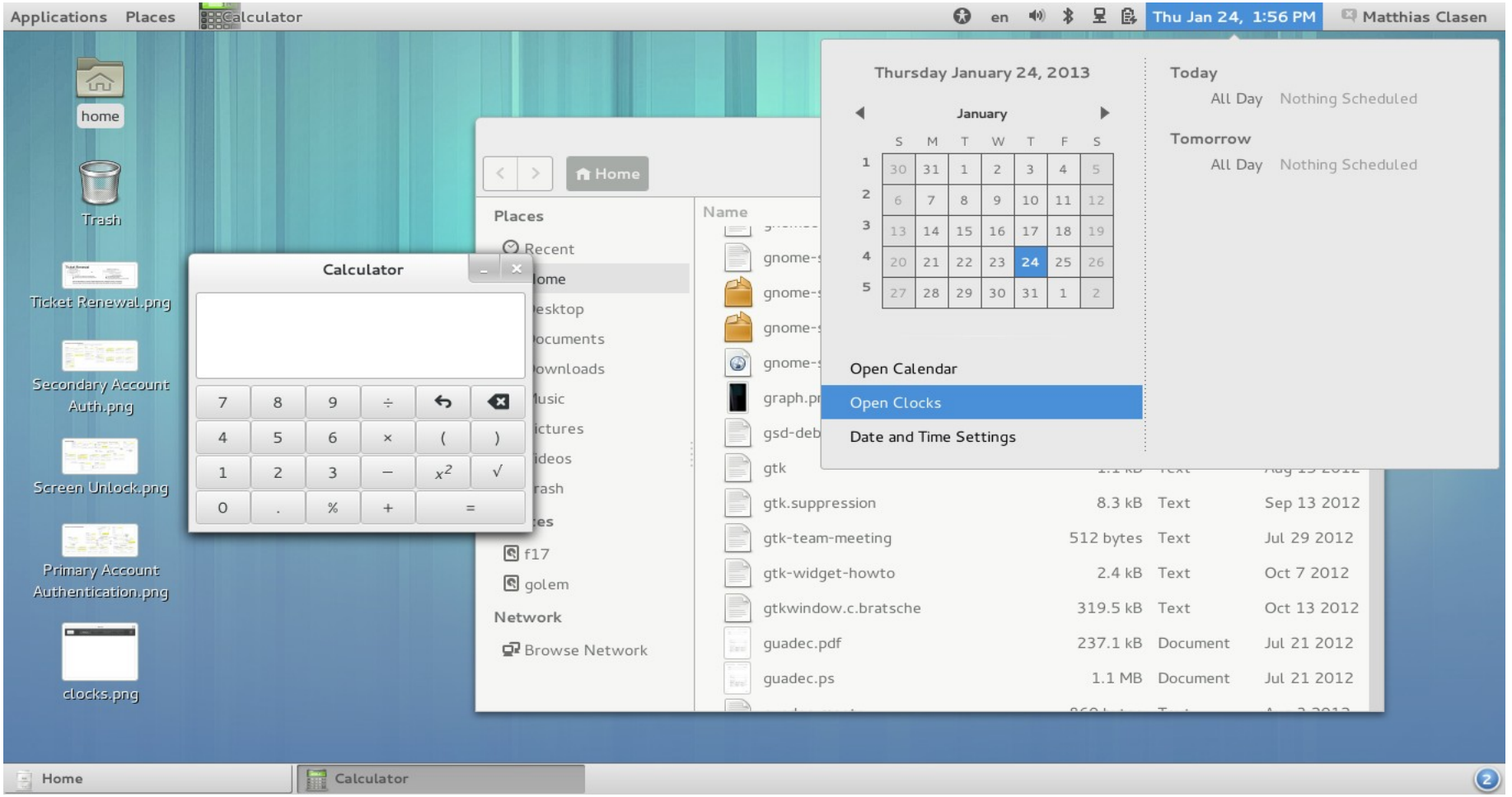
- Active Directory
  - AD enrollment support (Realmd)
- Desktop
  - Exchange integration with Evolution improvements
  - Gnome-Online-Accounts
- LibreOffice 4
  - Visio import
  - CMIS protocol support for documentation management systems (Sharepoint)

Red Hat Enterprise Linux 6: Gnome Desktop

RHEL 6

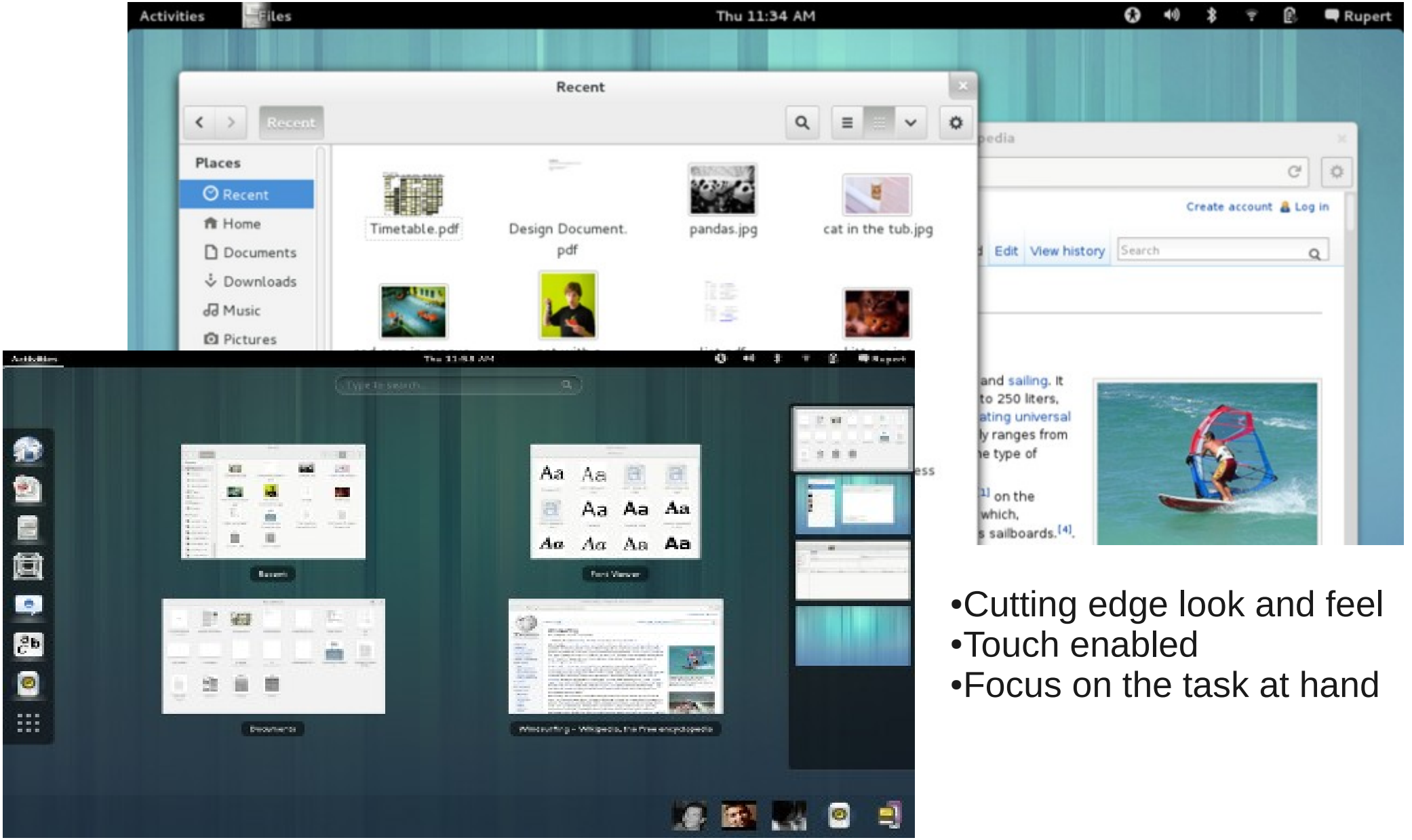


Red Hat Enterprise Linux 7: Gnome3 “Classic” Desktop



Familiar & Intuitive: More traditional look and feel with the benefits of Gnome Shell

Red Hat Enterprise Linux 7: Gnome 3 Desktop



- Cutting edge look and feel
- Touch enabled
- Focus on the task at hand

Red Hat Enterprise Linux 7: Gnome 3 & Extensions

Tailor the desktop to your desires!

Is this Gnome 3???

Yes, with extensions!

Some people like the look of other Operating Systems.
Creating the look in RHEL 7 is easy with Gnome Shell.

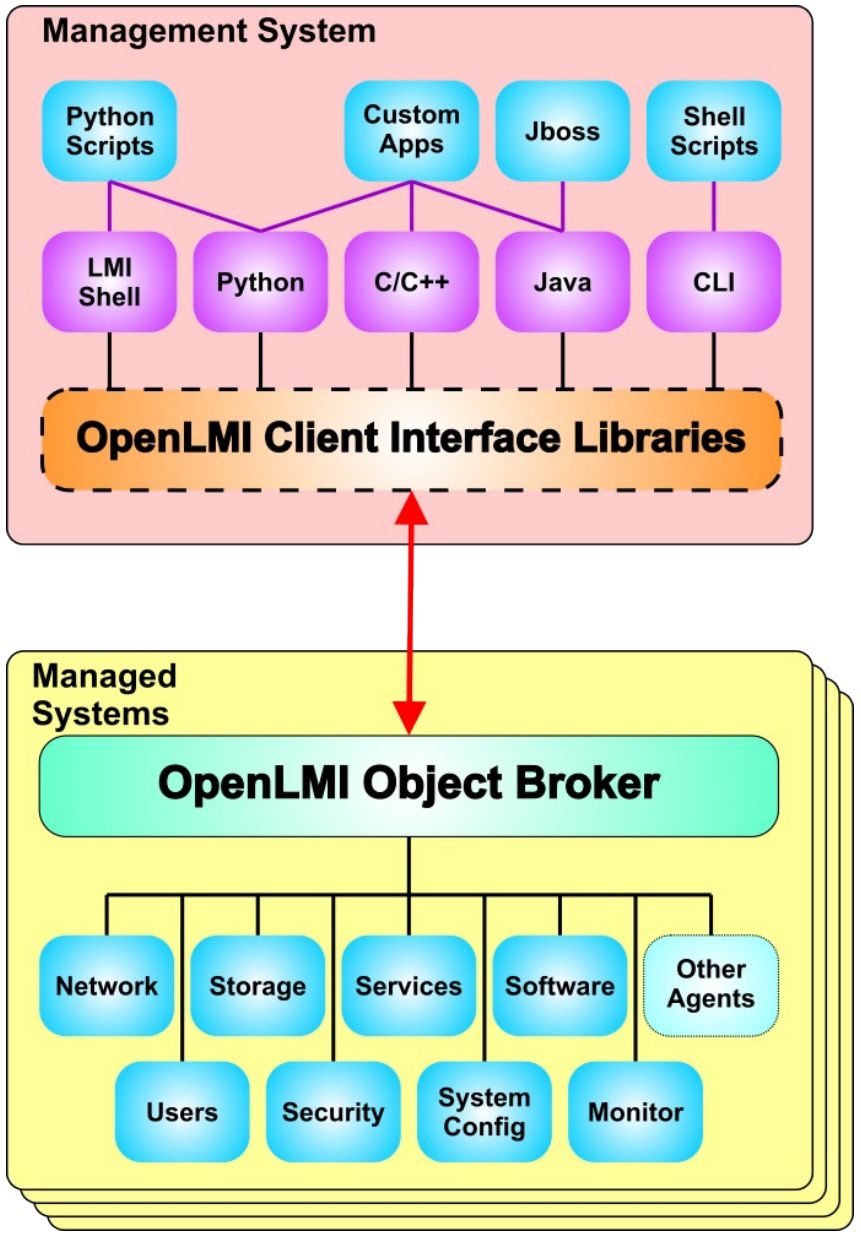
In-place Upgrade: Red Hat Enterprise 6 --> Red Hat Enterprise 7

- Planned support for in-place upgrades from RHEL 6.latest to RHEL 7.latest for well-defined, supported configurations
- Also delivered with RHEL 7:
  - Assessment tool – run on RHEL 6
  - Improved documentation to help customers plan upgrade
- Plugin based architecture to support frequent updates

```
# redhat-upgrade-tool-cli --network 7.0 --instrepo
http://download.devel.redhat.com/nightly/latest-RHEL-
7/compose/Server/x86_64/os/
```

Red Hat Enterprise Linux 7: Manageability

http://rhelblog.redhat.com/2013/12/20/managing-linux-with-openlmi/



- **Goal**

Provide a standardized remote interface to configure, manage, and monitor bare metal production Linux servers.

- **Initial Agents**
  - Storage
  - Network
  - System Services
  - Power Management
  - Local User Management (basic)
  - Software Management
  - System Monitoring (basic)
  - System Configuration & Information

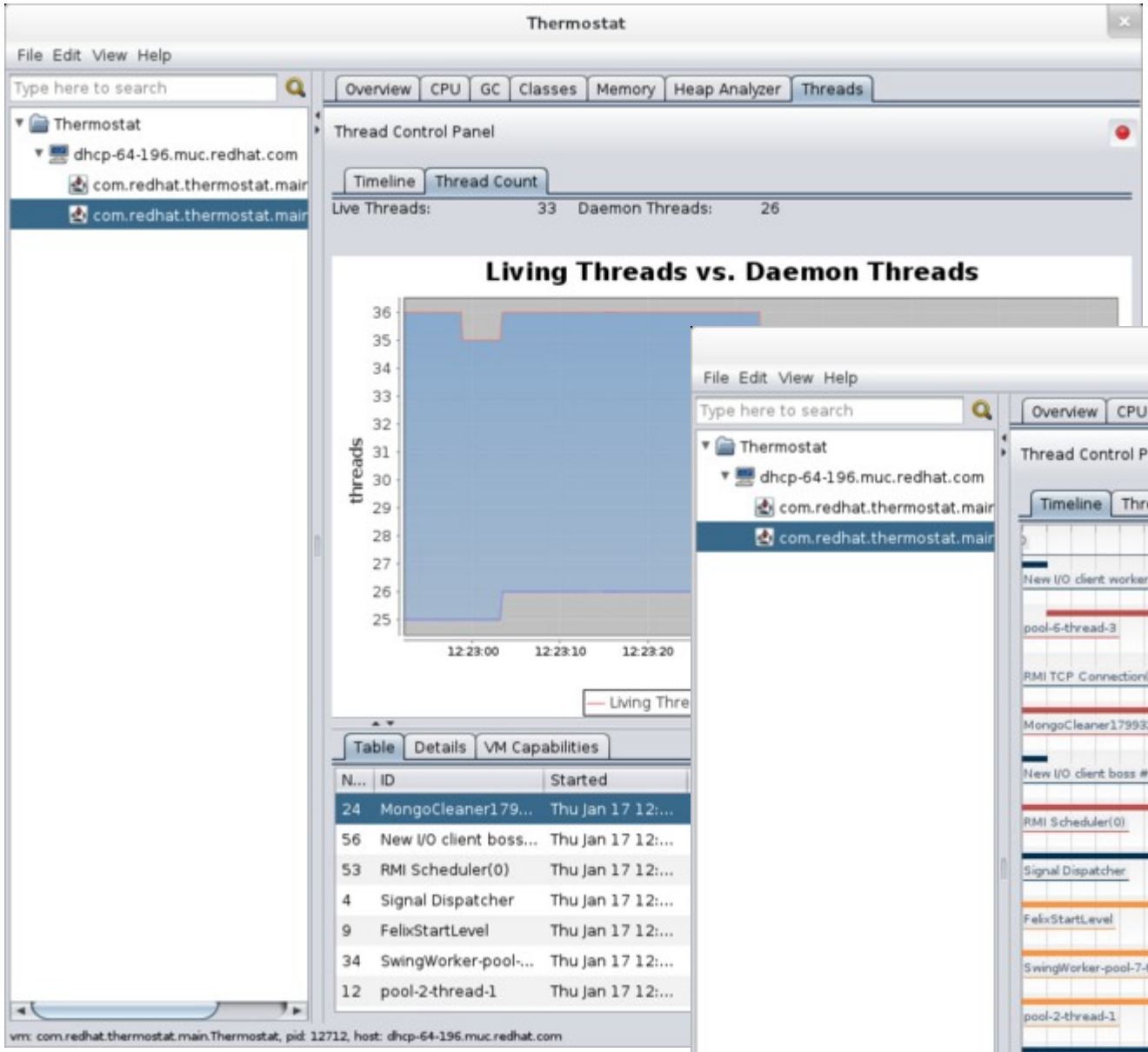
Red Hat Enterprise Linux 7: Performance Management

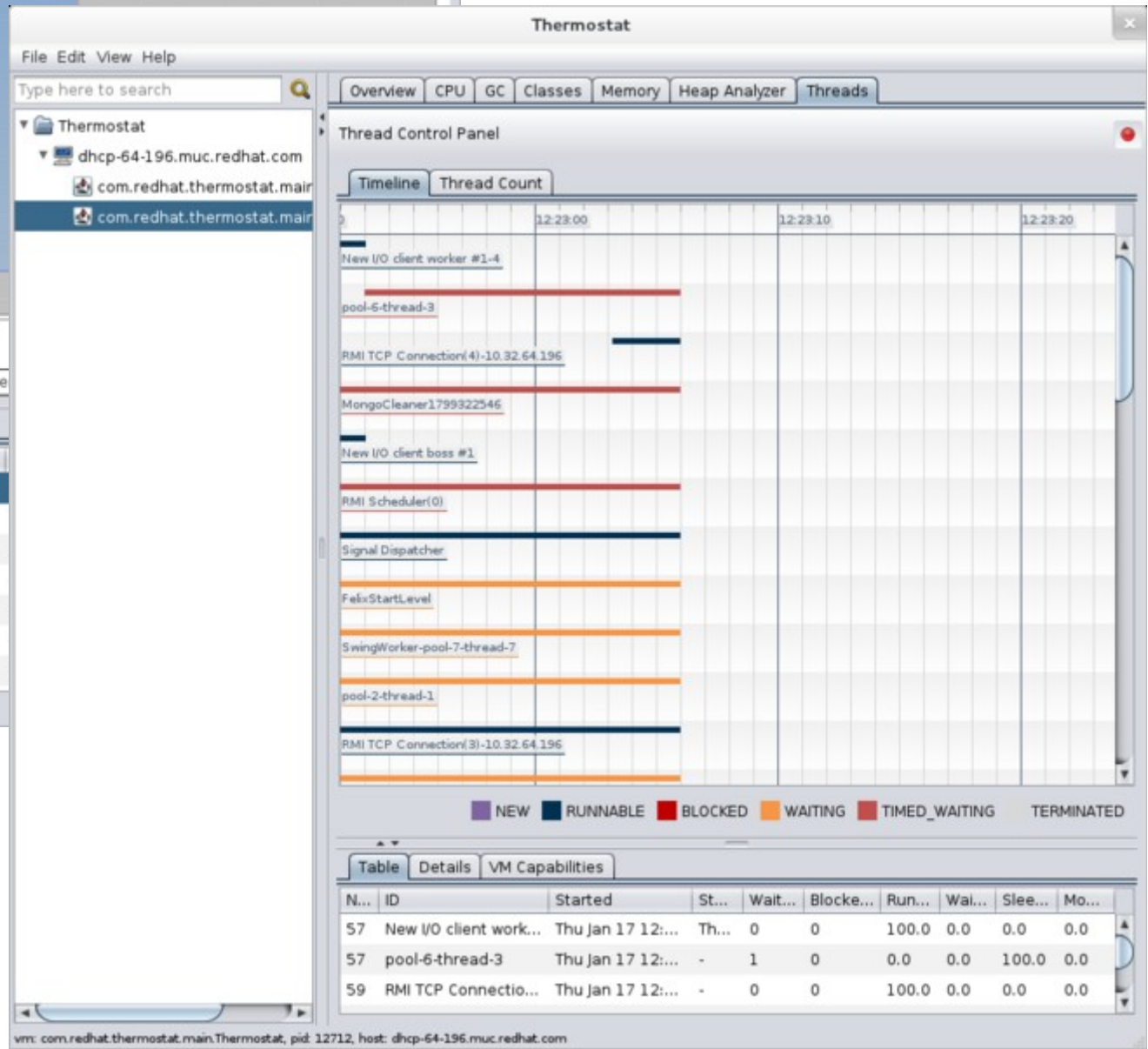
Monitoring and automation

- Performance profiles (ktune and tuned)

```
# tuned adm-list
- balanced
- desktop
- latency-performance
- powersaver
- sap
- throughput-performance
- virtual-guest
- virtual-host
```

- Thermostat
  - Monitoring, profiling, instrumentation and management of java-based applications running in bare metal, virtualization, and cloud deployments (https://fedoraproject.org/wiki/Features/Thermostat1.0)


Thermostat
File Edit View Help
Type here to search
Thermostat
dhcp-64-196.muc.redhat.com
com.redhat.thermostat.main
com.redhat.thermostat.main
Overview CPU GC Classes Memory Heap Analyzer Threads
Thread Control Panel
Timeline Thread Count
Live Threads: 33 Daemon Threads: 26
Living Threads vs. Daemon Threads
threads
36 35 34 33 32 31 30 29 28 27 26 25
12:23:00 12:23:10 12:23:20
Living Thre
Table Details VM Capabilities
N... ID Started
24 MongoCleaner179... Thu Jan 17 12:...
56 New I/O client boss... Thu Jan 17 12:...
53 RMI Scheduler(0) Thu Jan 17 12:...
4 Signal Dispatcher Thu Jan 17 12:...
9 FelixStartLevel Thu Jan 17 12:...
34 SwingWorker-pool-... Thu Jan 17 12:...
12 pool-2-thread-1 Thu Jan 17 12:...
vm: com.redhat.thermostat.main.Thermostat, pid: 12712, host: dhcp-64-196.muc.redhat.com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Overview CPU GC Classes Memory Heap Analyzer Threads
Thread Control Panel
Timeline Thread Count
12:23:00 12:23:10 12:23:20
New I/O client worker #1-4
pool-6-thread-3
RMI TCP Connection(4)-10.32.64.196
MongoCleaner1799322546
New I/O client boss #1
RMI Scheduler(0)
Signal Dispatcher
FelixStartLevel
SwingWorker-pool-7-thread-7
pool-2-thread-1
RMI TCP Connection(3)-10.32.64.196
NEW RUNNABLE BLOCKED WAITING TIMED_WAITING TERMINATED
Table Details VM Capabilities
N... ID Started St... Wait... Blocke... Run... Wai... Slee... Mo...
57 New I/O client work... Thu Jan 17 12:... Th... 0 0 100.0 0.0 0.0 0.0
57 pool-6-thread-3 Thu Jan 17 12:... - 1 0 0.0 0.0 100.0 0.0
59 RMI TCP Connectio... Thu Jan 17 12:... - 0 0 100.0 0.0 0.0 0.0
vm: com.redhat.thermostat.main.Thermostat, pid: 12712, host: dhcp-64-196.muc.redhat.com

Red Hat Enterprise Linux 7: Linux Containers

- Application isolation mechanism for light-weight, multi-tenancy environments with a single underlying OS
  - Benefits
    - Fast Startup and shutdown
    - Easy creation of container environment for isolated application deployment
    - Scale out of applications
    - Manage one RHEL system
  - Key Elements of RHEL Containers
    - Process Isolation – namespaces
    - Resource Management – cgroups
    - Security – SELinux
    - Management - libvirt

Red Hat Enterprise Linux 7: Other new features

- MariaDB replaces MySQL
- Yum - download in parallel
- Journald
  - less /var/log/message -> journalctl
  - tail -f /var/log/message -> journalctl -f
  - journalctl _COMM=sshd
- Chrony : a different implementation of the NTP protocol it can adjust the system clock more rapidly.
- Subscription-manager only (no more rhn_register)

Beyond RHEL 7

Red Hat Linux 7: Summary

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New installation & deployment

- Systemd

Default filesystem : XFS

IDM : Cross Realm Kerberos Trust

In place upgrade

Network Manager CLI

LXC, virt-sandbox, Docker

OpenLMI

Samba 4.1

Gnome 3


RED HAT SUMMIT
SAVE THE DATE
April 14-17, 2014 | San Francisco
EMEA PARTNER SUMMIT
Jim Whitehurst
President and Chief Executive Officer
Red Hat

THANK YOU !