



Red Hat for IBM System z Update VM Workshop 2014 Greensboro, NC

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Agenda

- Red Hat Inc. Overview (updated)
- Red Hat & IBM Collaboration (updated)
- Red Hat Lifecycle Roadmap
 - RHEL7 (updated)
- Red Hat Satellite Overview
- High Availability



Red Hat Inc
Overview



6200+
Employees

0\$
Debts

1M +
Red Hat certified IT Specialists

OFFICES WORLDWIDE

MORE THAN

90%

of
FORTUNE
500
COMPANIES
use
RED HAT
PRODUCTS &
SOLUTIONS.

The **FIRST**
\$1.5 BILLION
DOLLAR

OPEN
SOURCE
COMPANY
in the

WORLD

Source: Red Hat Inc.

Fiscal Year 2014 Results:
Red Hat is growing 15% Year-over-Year*

● RED HAT
ENTERPRISE LINUX 2.1
BRINGING LINUX AND
OPEN SOURCE TO THE
ENTERPRISE

● RED HAT
ENTERPRISE LINUX 4
DELIVERING RAS, STORAGE,
MILITARY-GRADE SECURITY

● RED HAT
ENTERPRISE LINUX 6
LINUX BECOMES MAINSTREAM
FOR PHYSICAL, VIRTUAL, AND
CLOUD

02

03

04

05

06

07

08

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13

14

● RED HAT
ENTERPRISE LINUX 3
MULTI-ARCHITECTURE
SUPPORT, MORE CHOICES
WITH A FAMILY OF OFFERINGS

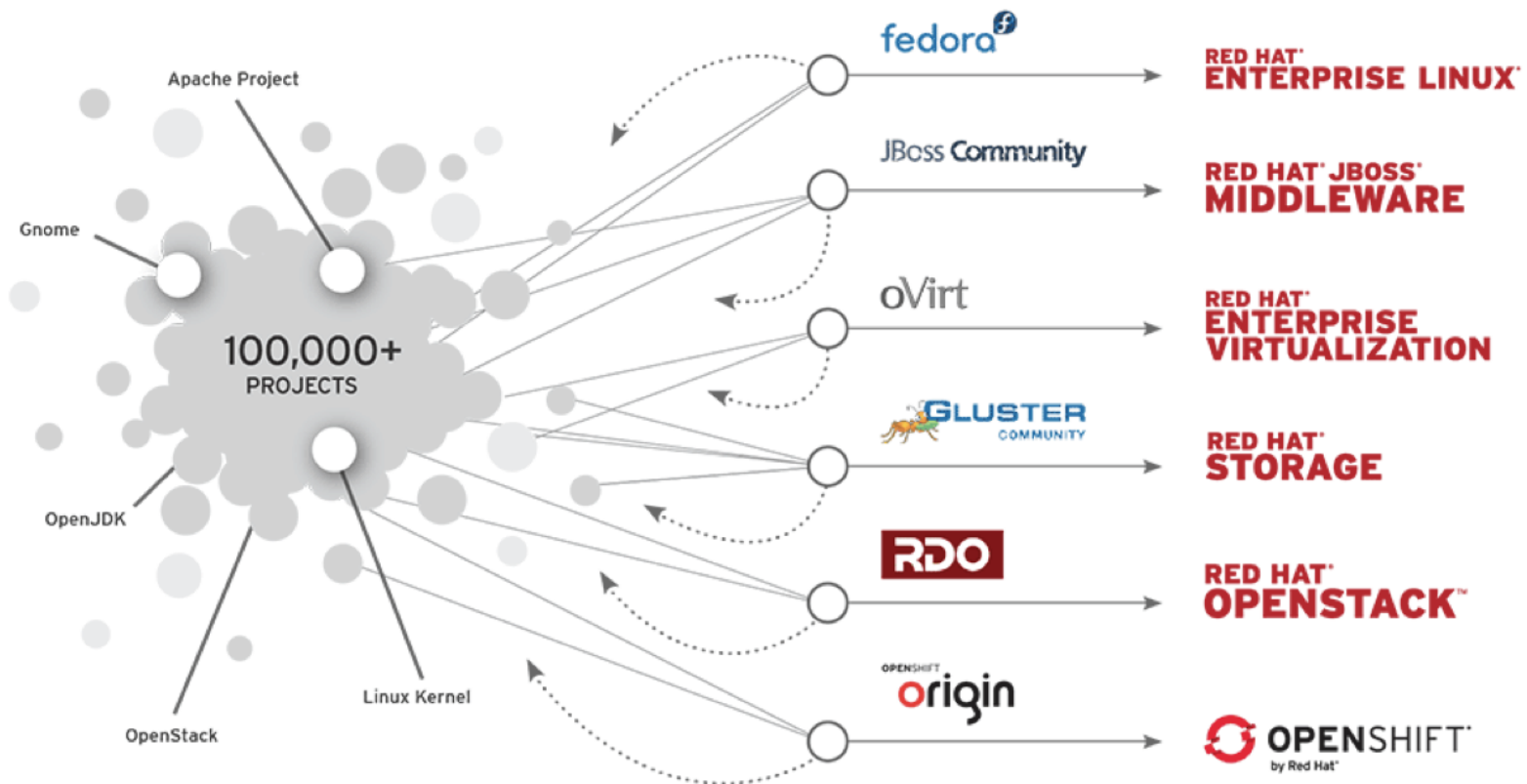
● RED HAT
ENTERPRISE LINUX 5
VIRTUALIZATION, STATELESS
LINUX – ANY APPLICATION,
ANYWHERE, ANYTIME

● RED HAT
ENTERPRISE LINUX 7
THE FOUNDATION FOR AN
OPEN HYBRID CLOUD

* <http://www.redhat.com/about/news/press-archive/2014/3/red-hat-reports-fourth-quarter-and-fiscal-year-2014-results>

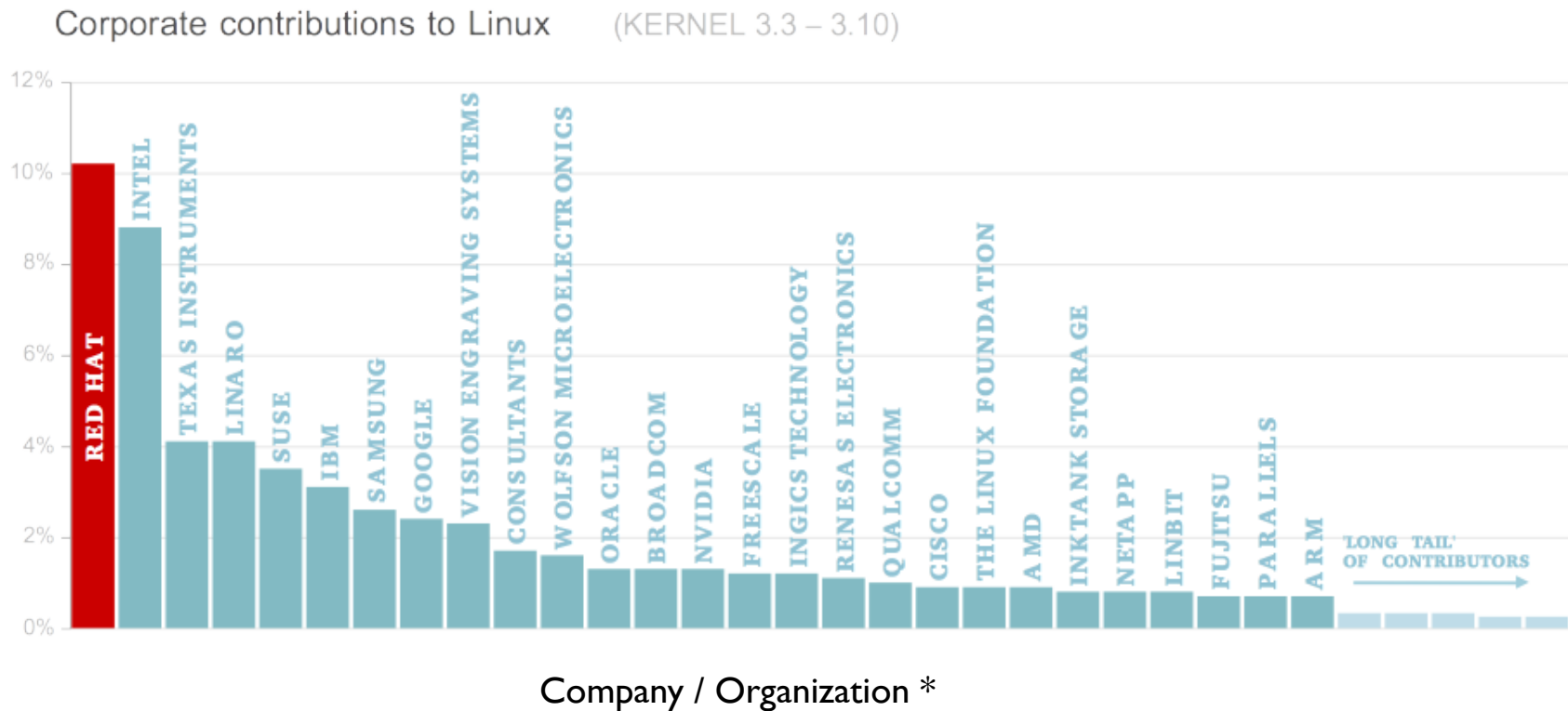
Red Hat Open Source Model

How we do it




Red Hat Development Powerhouse

Corporate Contributions to Linux (Kernel 3.3 - 3.10)



* The developers who are known to be doing this work on their own, with no financial contribution happening from any company' are not grouped together as 'None' and instead are considered part of the 'long tail,' as are contributors of academic or unknown sponsorship.

Source:
The Linux Foundation
Linux Kernel Development
September 2013
(Pages 9)



Red Hat and IBM
Collaboration

13+ years of collaboration between Red Hat and IBM Red Hat

Red Hat Enterprise Linux Certified on all IBM platforms

System x



Power Systems



System z



IBM System z Enterprise Class Servers

Red Hat Enterprise Linux Hardware Certification

z10 EC



z196



zEC12



Hardware

Red Hat
Enterprise
Linux 5

Red Hat
Enterprise
Linux 6

Red Hat
Enterprise
Linux 7

IBM z10 Enterprise Class (2097) Server

5.1

6.0

—

IBM z196 (2817) Server

5.5

6.0

7.0

IBM zEC12 (2827) Server

5.8

6.3

7.0

IBM System z Business Class Servers

Red Hat Enterprise Linux Hardware Certification

z10 BC



z114



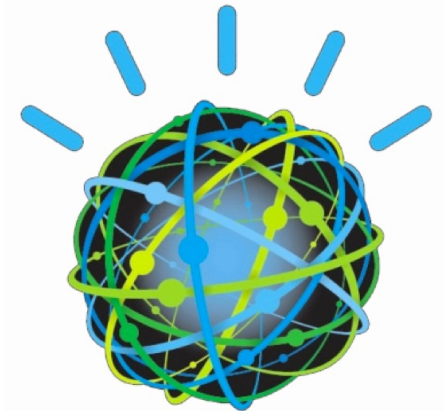
zBC12



Hardware	Red Hat Enterprise Linux 5	Red Hat Enterprise Linux 6	Red Hat Enterprise Linux 7
IBM z10 Business Class (2098) Server	5.2	6.0	—
IBM z114 (2818) Server	5.5	6.0	7.0
IBM zBC12 (2828) Server	5.8	6.3	7.0

Red Hat is currently part of IBM's solutions such as:

- Offered in zCloud
- Embedded as “KVM” in:
 - IBM SmartCloud
 - zBX (x86 Blades virtualization)
 - PureFlex Systems
- Embedded in Netezza
- IBM's Watson Cluster
 - Running on Power Systems



IBM's Watson



JBoss adding Value to your solution

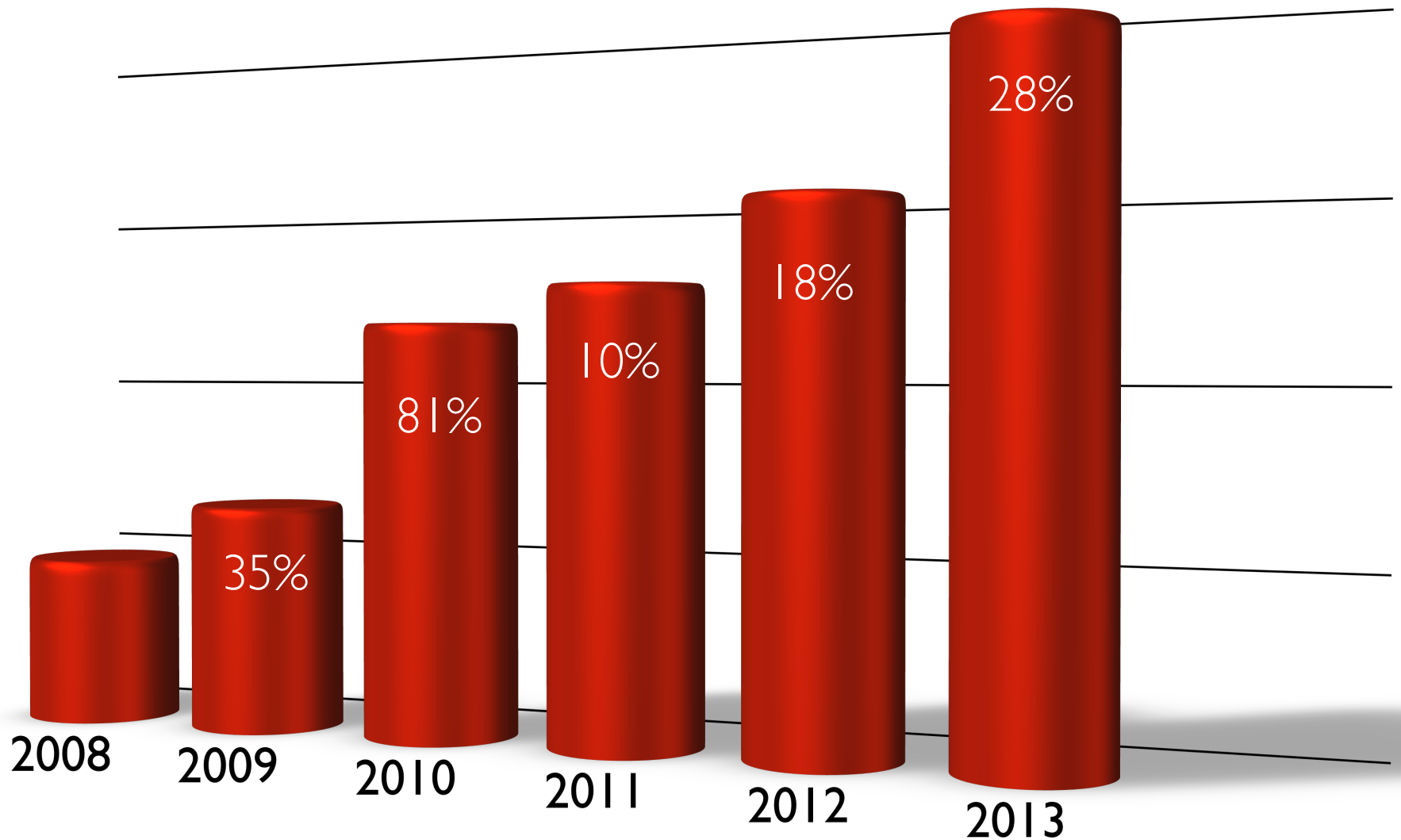
Take advantage of Java on Red Hat Enterprise Linux for IBM System z

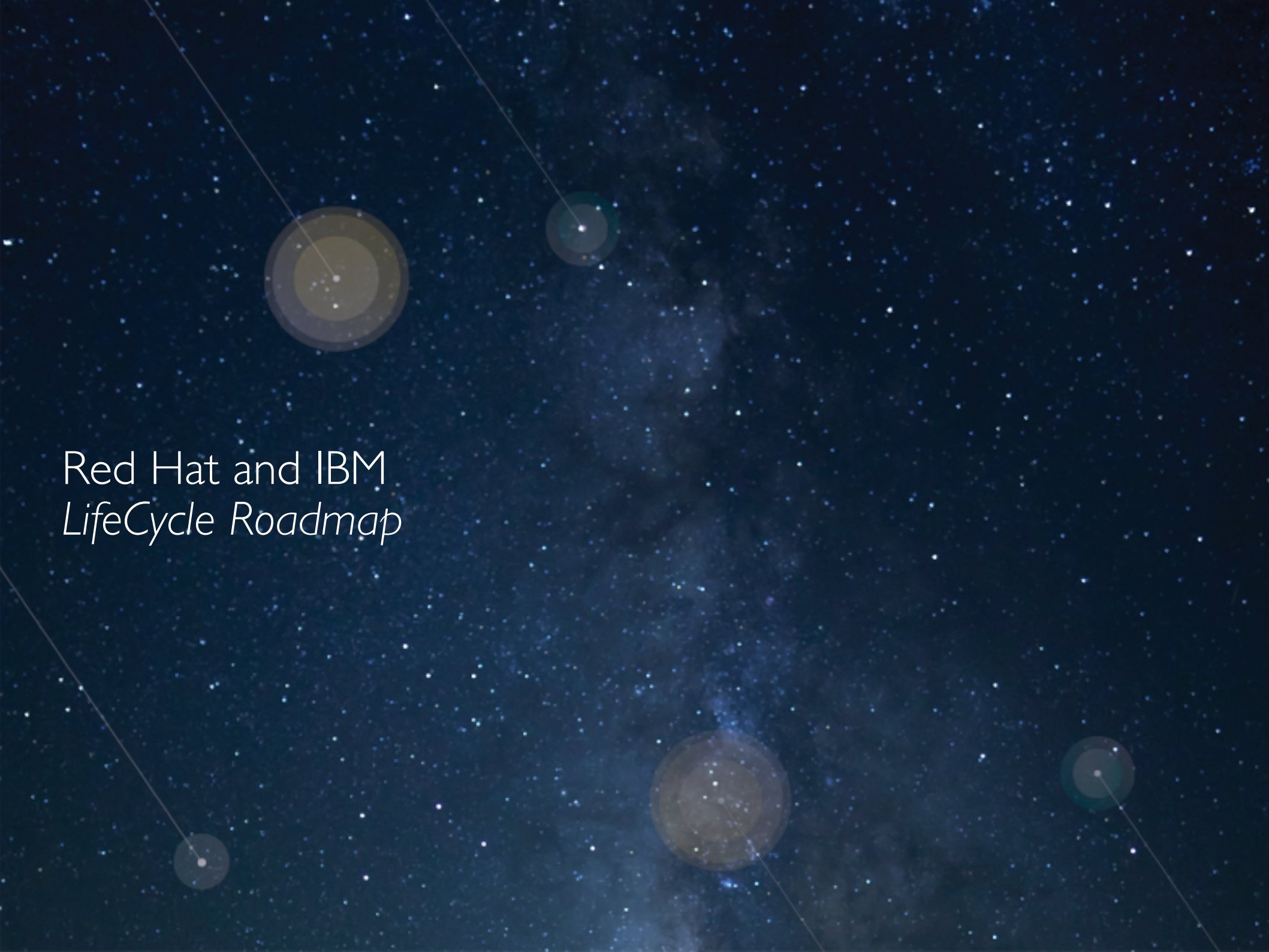


- **JBoss® Enterprise Application Platform (JBoss EAP)** is supported on a variety of market-leading operating systems, Java™ Virtual Machines (JVMs), and database combinations.
- **IBM JDK is supported** ⁽¹⁾ and ready to run on Red Hat Enterprise Linux for IBM System z
- **Red Hat provides both production and development support for supported configurations** and tested integrations according to your subscription agreement in both physical and virtual environments.

(1) <https://access.redhat.com/site/articles/111663>

RHEL for System z revenue growth % - installed base WW





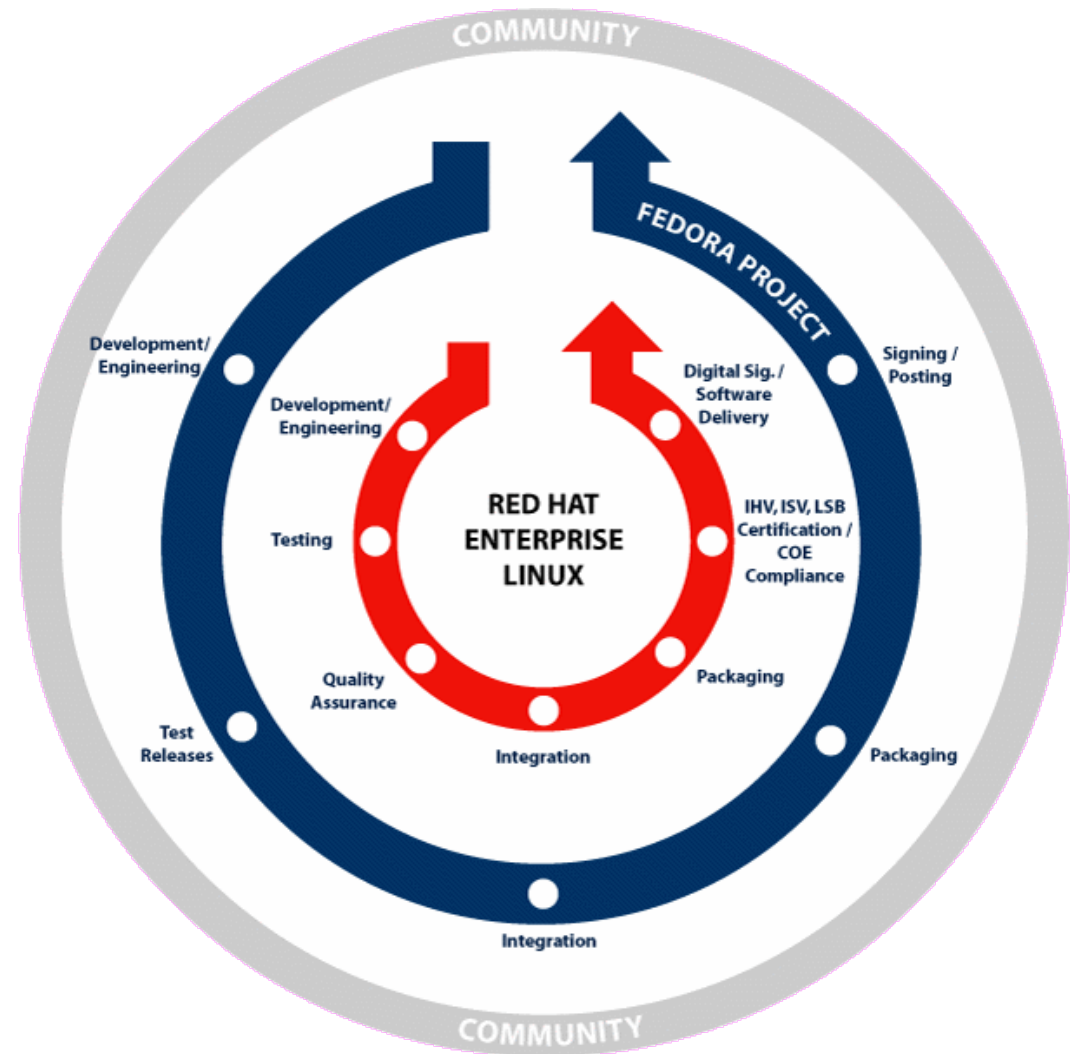
Red Hat and IBM
LifeCycle Roadmap

Red Hat Development Model

The same for all supported architectures, x86_64, PPC64 and s390x

Red Hat Enterprise Linux

- Stable, mature, commercial product
- Extensive Q&A, performance testing
- Hardware & Software Certifications
- 10yr maintenance
- Core ABI compatibility guarantee
- Major releases ~2-3yr cycle
- Minor releases ~8-12 mo cycle




Red Hat Development Model

Benefit from Fedora for s390x!

Fedora

- Most current, sets direction for RHEL technologies
- Community Supported
- Released ~6 mo cycles

 fedoraproject.org/en_GB/get-fedora#2nd_arches

s390

Fedora 20 s390

Fedora Release Image based on the s390x architecture.

DVD Image

Download Now!

4.6GB DVD ISO

Fedora for Power Systems Project Page

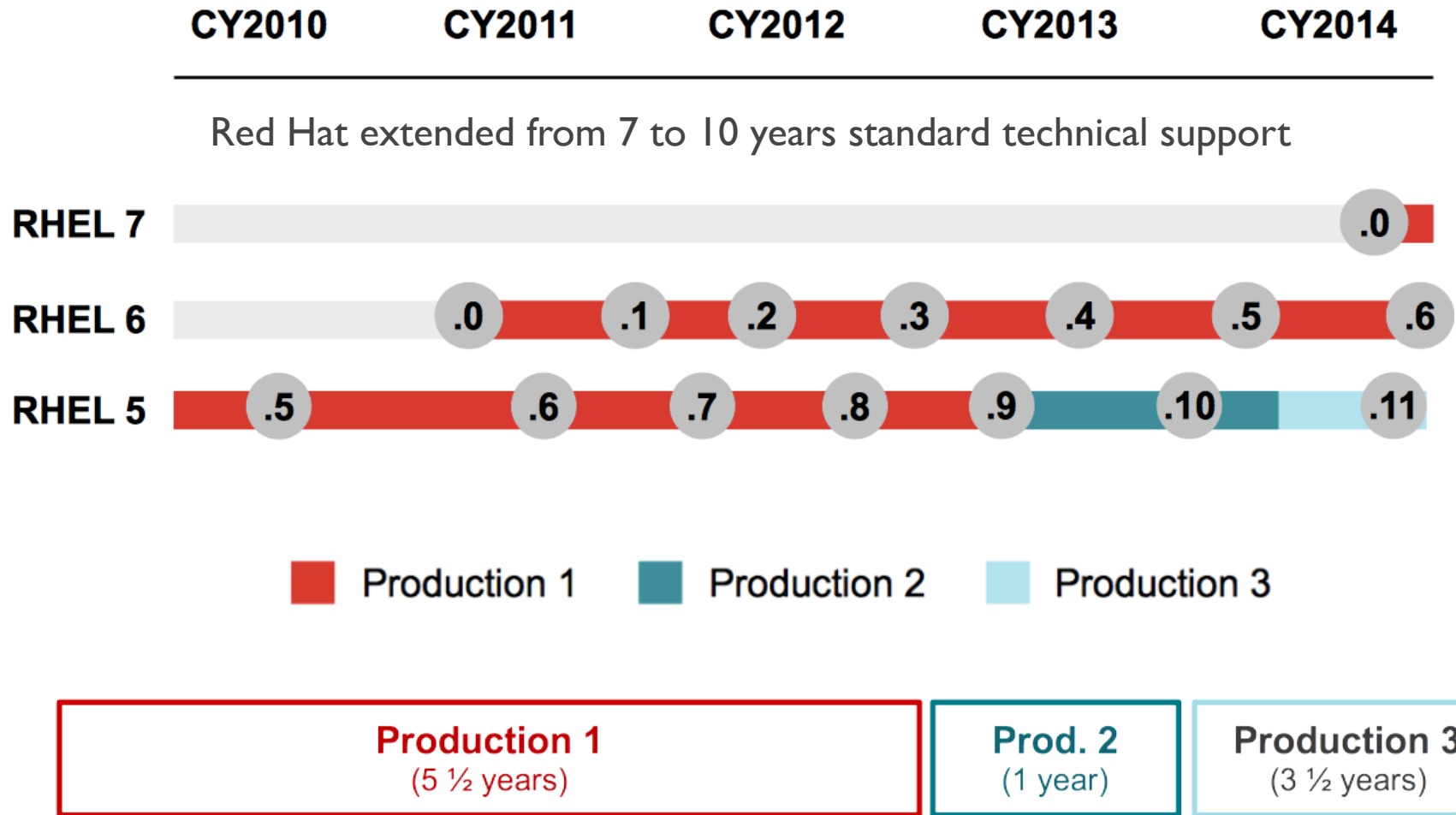
<https://fedoraproject.org/wiki/Architectures/s390x>

Become a contributor, talk to package maintainers

<http://fedoraproject.org/join-fedora>

Current Platform Lifecycle

Red Hat Enterprise Linux

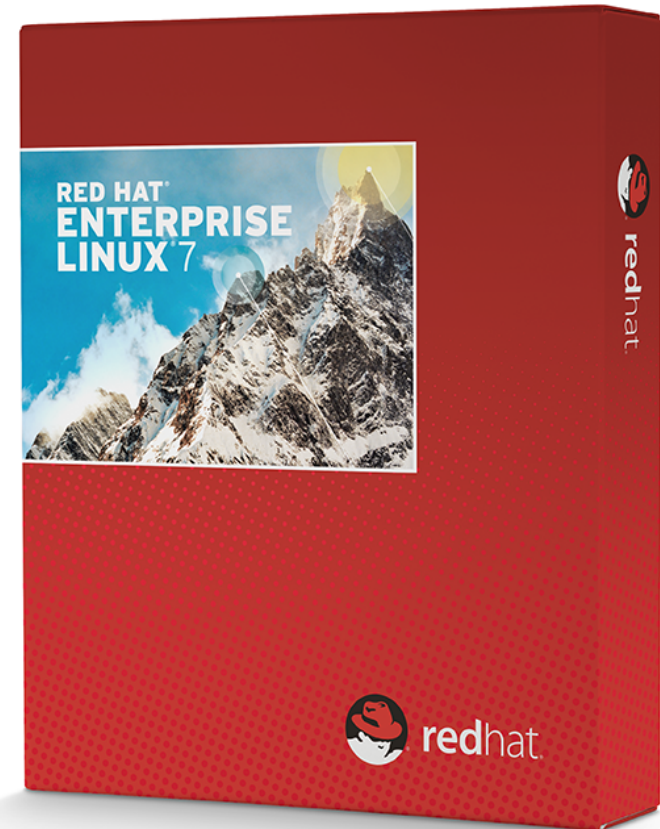


*All dates are approximate and subject to change

Red Hat Enterprise Linux 7.0

Public release Jun 2014

- RHEL7 Basic Facts
- What's changed ?
 - What can we benefit from RHEL 7 on s390x?
- New Enhancements and Expanded Choices
- What's System z specific ?



Red Hat Enterprise Linux 7

Basic Facts

- Based on Fedora 19 and Kernel 3.10
- Supported Architectures: x86_64, IBM Power Systems and System z
- 64bit! 32-bit libraries will be made available



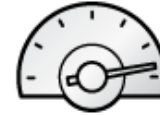
Red Hat Enterprise Linux 7.0

What is new for RHEL 7 on System z?

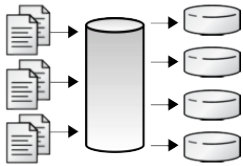
*More easy to Install,
Deploy and Manage*



*Optimal Performance
and Security*



File System Choice



*Application Isolation
with Linux Containers*



*Microsoft Windows
Interoperability*



Red Hat Enterprise Linux 7:

Pre-installation tips on System z

- RHEL6 would usually need:

- Kernel.img
- initrd.img
- **PARM file** (GENERIC.PRM)
- **CONF file**
- redhat.exec file

PARM file for RHEL6

```
root=/dev/ram0 ro ip=off ramdisk_size=40000  
CMSDASD=191 CMSCONFFILE=train6.CONF  
vnc vncpassword=redhat mpath
```

CONF file for RHEL6

```
DASD=100-101  
HOSTNAME=train6.s390.bos.redhat.com  
NETTYPE=geth  
IPADDR=10.16.105.69  
SUBCHANNELS=0.0.0600,0.0.0601,0.0.0602  
NETMASK=255.255.248.0  
SEARCHDNS=s390.bos.redhat.com  
GATEWAY=10.16.111.254  
DNS=10.16.46.224  
PORTNAME=DONTCARE  
PORTNO=0  
LAYER2=0  
VSWITCH=1
```

- RHEL7 will only need, all items from the CONF file were moved to the PARM file and we had a few syntax changes:

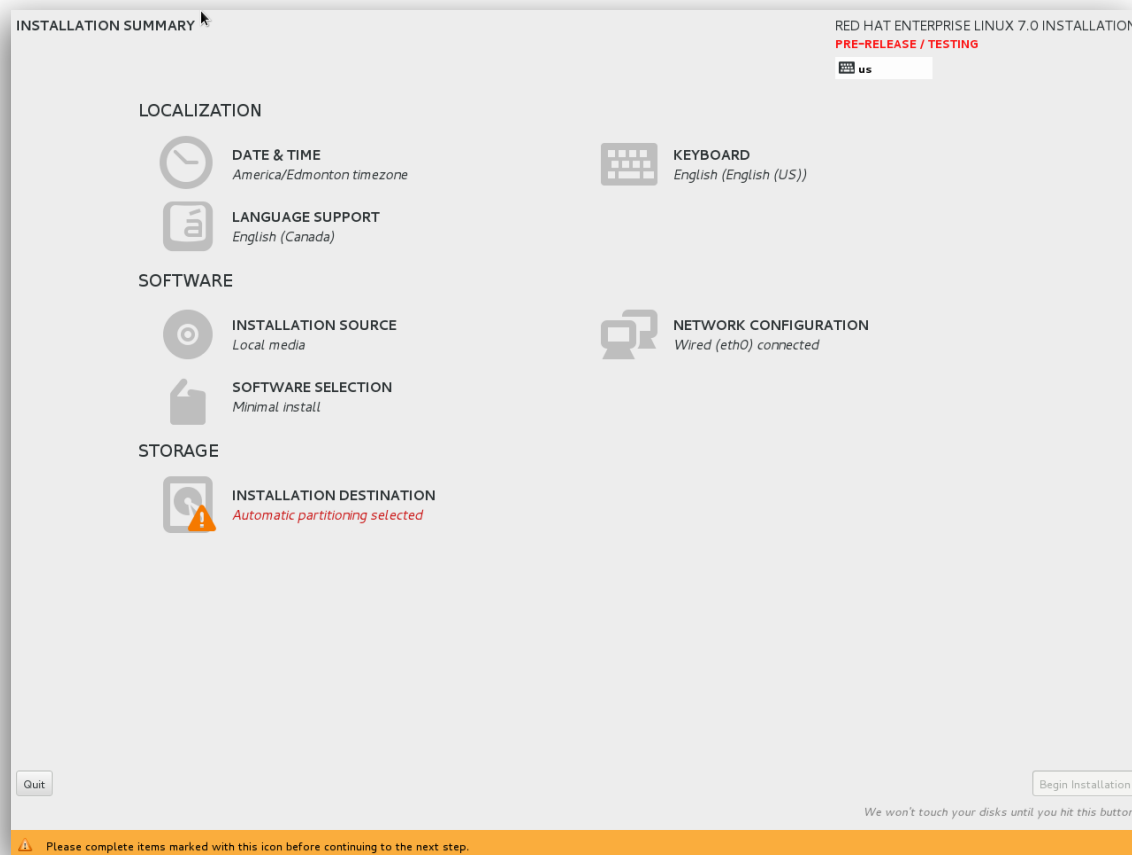
- Kernel.img
- initrd.img
- **PARM file** (GENERIC.PRM)
- redhat.exec file

New PARM file for RHEL7

```
ro ramdisk_size=40000 cio_ignore=all,!0.0.0009  
ip=10.16.105.69::10.16.111.254:21:train6.redhat.com:enccw0.0.0600:none  
rd.znet=geth,0.0.0600,0.0.0601,0.0.0602,layer2=0,portname=FOOBAR,portno=0  
nameserver=10.16.46.224 nameserver=10.16.36.29  
rd.dasd=0.0.0100 rd.dasd=0.0.0101  
inst.repo=http://10.13.145.5/rhel7_s390/  
vnc vncpassword=redhat
```

Red Hat Enterprise Linux 7: *Installer*

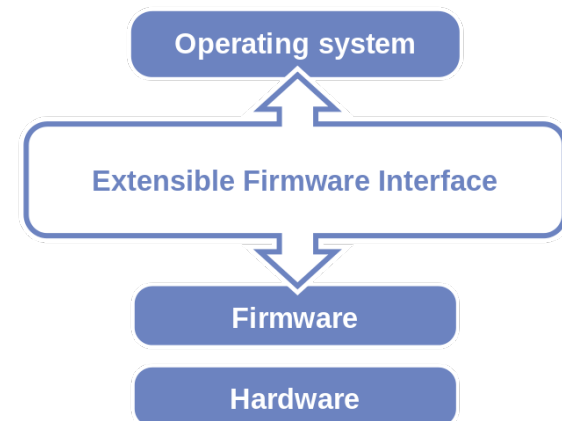
- The RHEL 7 installation procedure presents a user friendly interface that allows RHEL to be installed a more comprehensive installation process rather than having 13 linear screens
- Easy to go back to a main page
- Warnings and errors provided to guide the user



Red Hat Enterprise Linux 7:

GRUB2

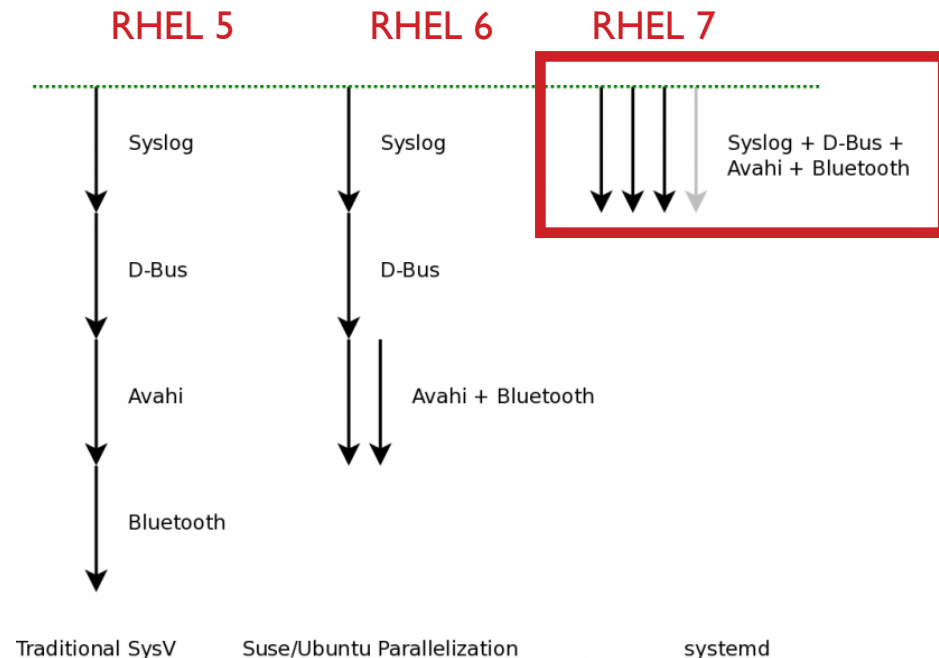
- Meet the new menu.lst : grub.cfg
 - Should not be directly edited by manually.
- Changes are applied with update-grub or when new kernels are installed
- To customize Grub2
 - /etc/default/grub (default parameters)
 - /etc/grub.d/ (custom parameters)
- Secure boot (UEFI)
- Standardize boot loader across x86_64, PPC64 and s390x



Red Hat Enterprise Linux 7:

System Initialization and service manager

- Uses 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 resulting faster system boot times.
- Integrates chkconfig + service



“With systemd we can eliminate so many homegrown in-house monitoring and daemon management tools.”¹

Engineer, small business
computer software company

“Systemd is my favorite feature so far. We deal with lots of init scripts currently; I’m already seeing great improvements by switching most of them to systemd.”¹

IT Architect, medium enterprise media &
entertainment company



Red Hat Enterprise Linux 7:

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 (or) systemctl isolate runlevel3.target
init 5 -> systemctl isolate graphical.target (or) systemctl isolate runlevel5.target

DEFAULT RUNLEVEL

/etc/inittab -> systemctl enable graphical.target --force

Red Hat Enterprise Linux 7:

Systemd Crash Course

RHEL6

```
# service sshd status
```

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

RHEL7

```
# 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:db:1...f:c6:6
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:bb:a...f:c6:6
Hint: Some lines were ellipsized, use -l to show in full.
```

Red Hat Enterprise Linux 7:

Security

- **SELinux** (Provides an extra layer of security, mandatory by Government and Military customers)
 - Simplified tool chain for troubleshooting
 - Improved performance

- **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:

File Systems - Many choices

- Scale file systems to 500TB with new default filesystem XFS
- Scale to 50TB with ext4
- Btrfs also available²
- Parallel NFS v4 provides improved performance and throughput

“The default XFS filesystem is just great!”¹

IT specialist,
US federal government



Type	Supported limit	Root	Boot	Comments
			Single-node	
XFS	500TB	Yes	Yes	System default
ext4	50TB	Yes	Yes	Driver allow access to older versions (ext2, ext3).
btrfs ²	50TB	Yes	Yes	
			Network/Multi-node	
GFS2	2-16 nodes	Yes	No	Shared-storage file system

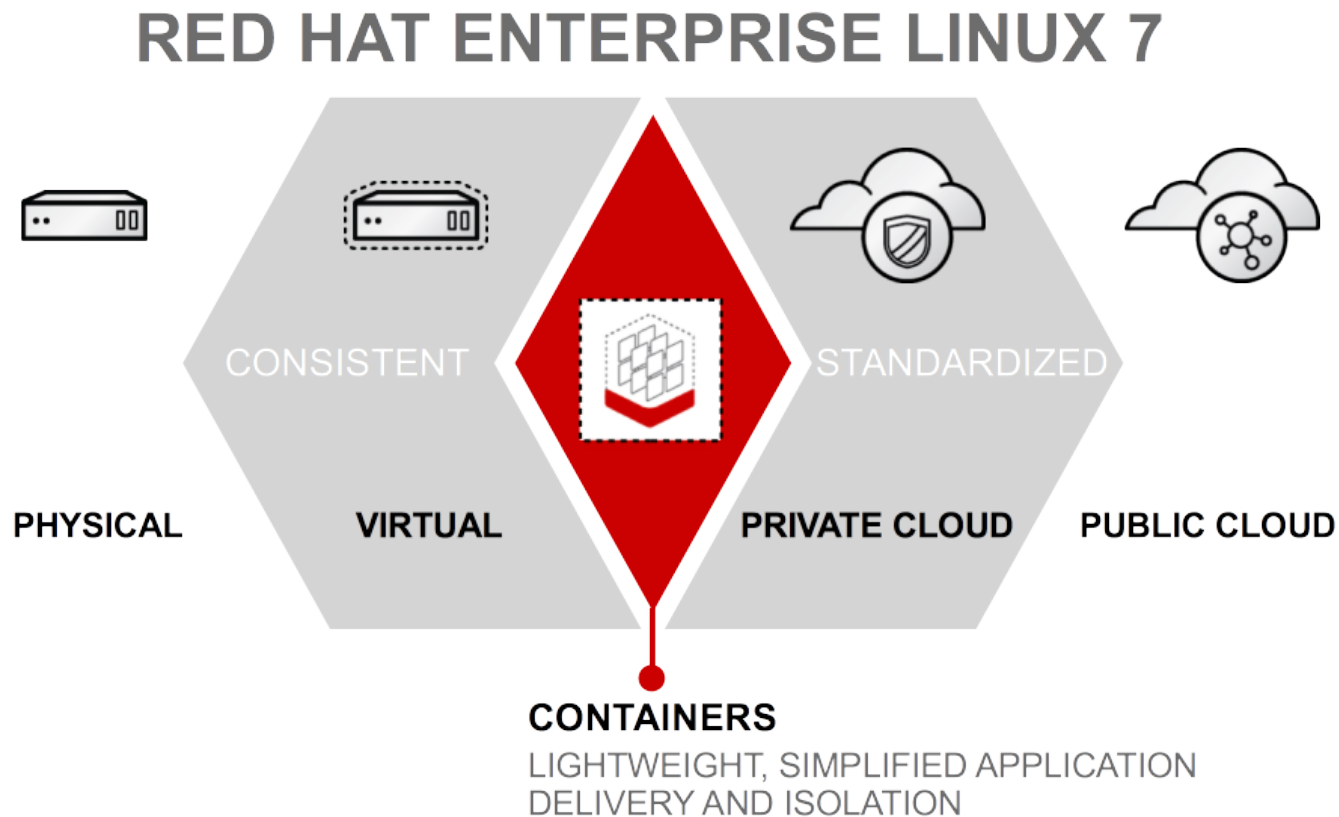
¹ Source: Research by TechValidate: www.techvalidate.com/product-research/red-hat-enterprise-linux TVID: 6D2-C98-90F

² Available as a Technology Preview

Red Hat Enterprise Linux 7:

Linux Containers - Application isolation

Application isolation mechanism for light-weight, multi-tenancy environments with a single underlying OS

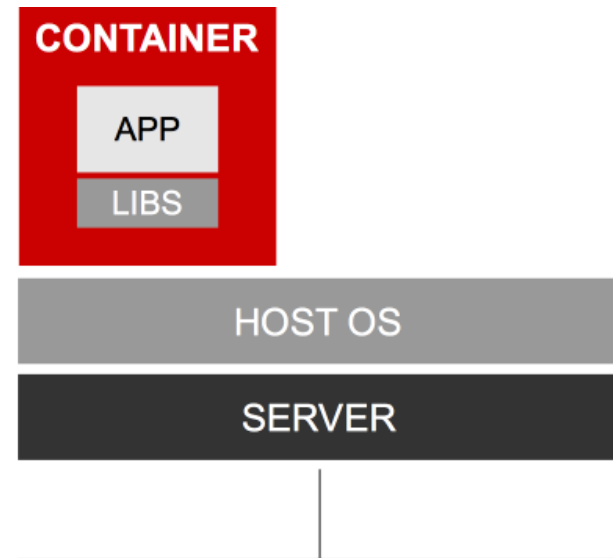


Red Hat Enterprise Linux 7:

Linux Containers - Benefits and Key Elements

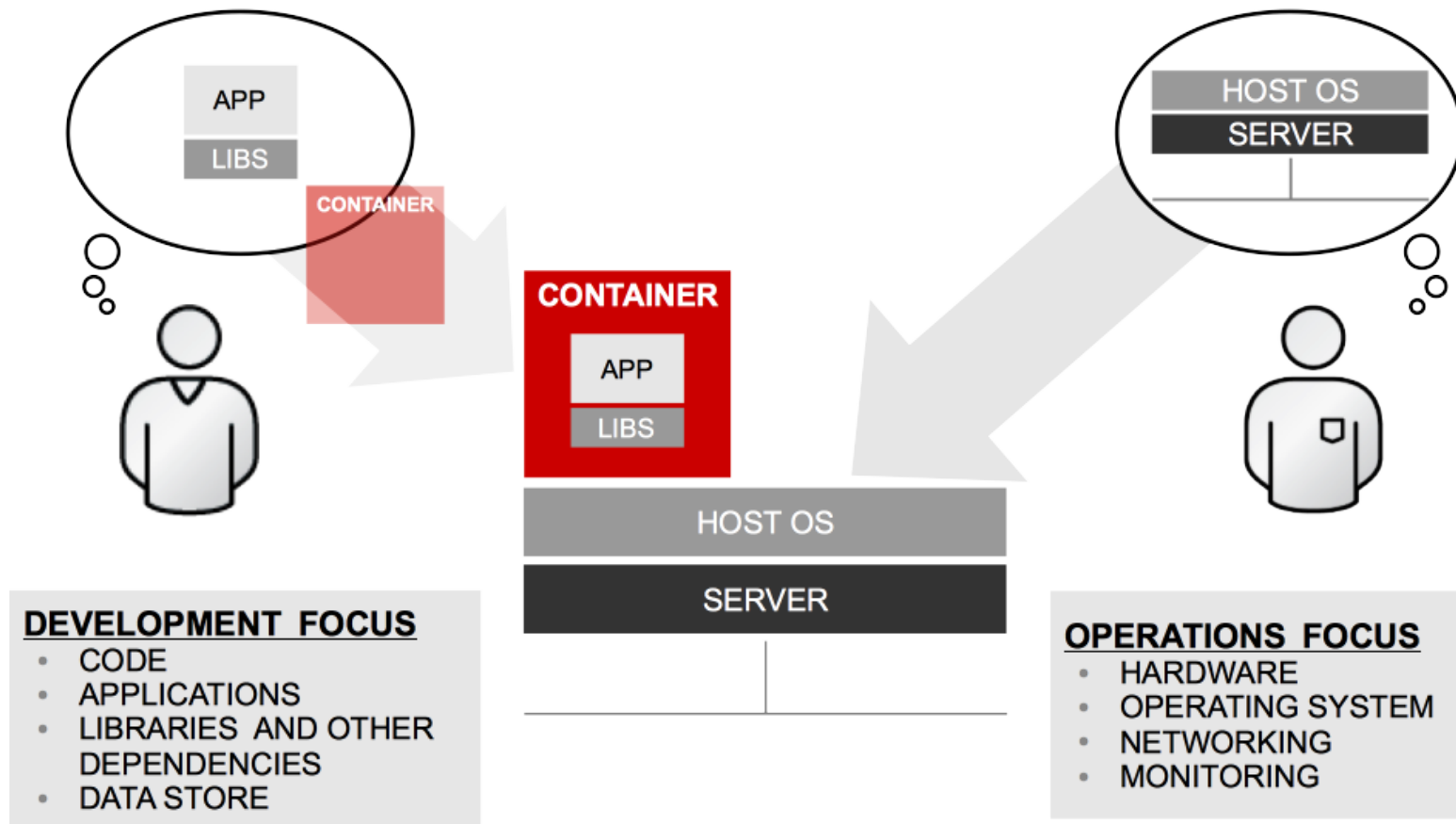
Software packaging concept that typically includes an application and all of its runtime dependencies.

- Easy to deploy and portable across host systems
- Isolates applications on a host operating system.
- In RHEL, this is done through:
 - Control Groups (cgroups)
 - kernel namespaces
 - SELinux, sVirt



Red Hat Enterprise Linux 7:

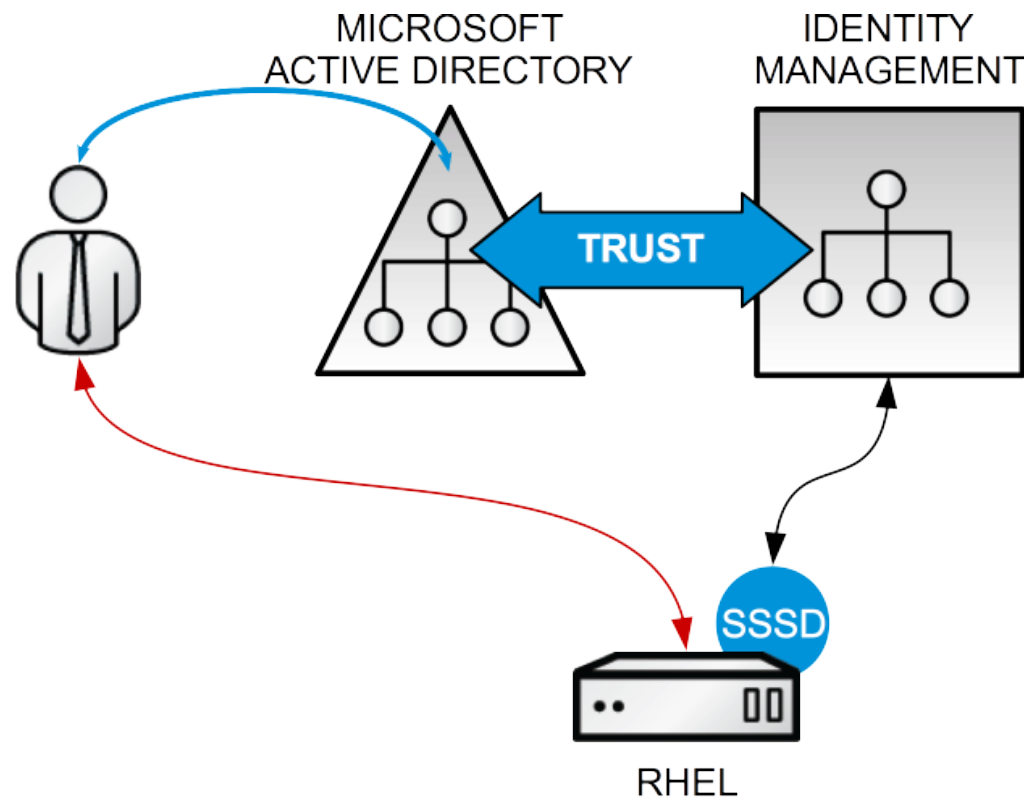
Linux Containers enables continuous delivery



Red Hat Enterprise Linux 7:

Windows Interoperability

- Cross realm Kerberos trust between IDM (Identity Manager) and MS Active Directory

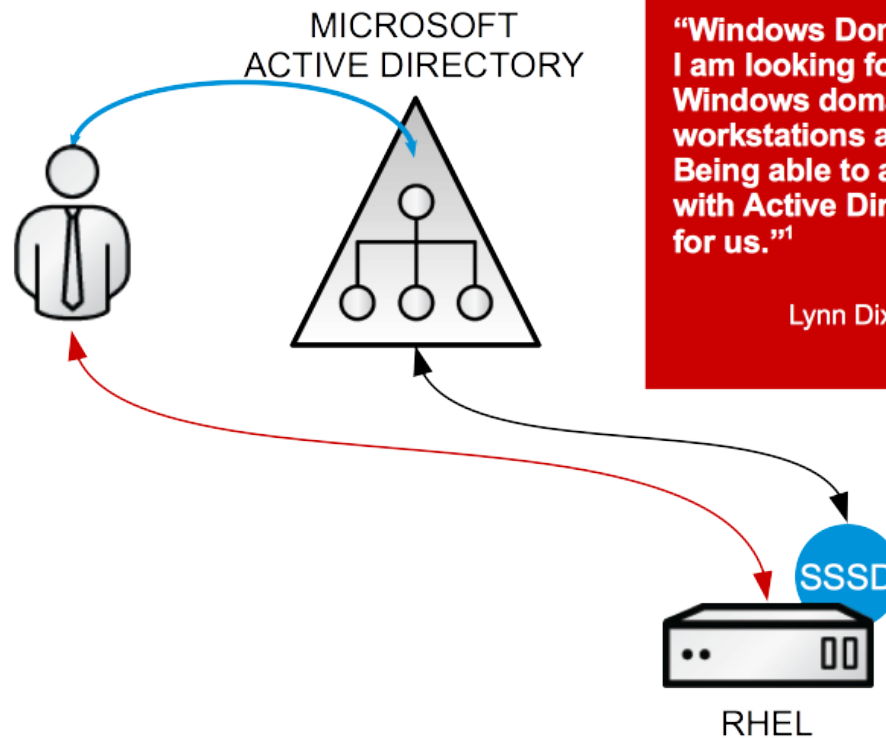


**ALLOWS FOR
EASIER,
CENTRALIZED
NATIVE LINUX
MANAGEMENT
OF MULTIPLE
LINUX CLIENTS**

Red Hat Enterprise Linux 7:

Windows Interoperability

- 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



“Windows Domain interoperability is what I am looking forward to. We have a large Windows domain with 10k Windows workstations and 1300 Windows servers. Being able to authenticate and interact with Active Directory is a very high priority for us.”¹

Lynn Dixon, system administrator, Mohawk Industries

¹ Source: Research by TechValidate: www.techvalidate.com/product-research/red-hat-enterprise-linux

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`

- Subscription-manager only (`rhnc` only registers to RHN Satellite)

- Red Hat Subscription Manager is installed on a local system and it tracks what products are installed, what subscriptions are available for the system, and what subscriptions are actually used by the system. It also tracks subscription expirations and automatically attaches new subscriptions based on the products and hardware.

Red Hat Enterprise Linux 7.0

Linux on System z specific features

- Enhanced DASD statistics for PAV and HPF
- DASD sanity check to detect path connection error
- **Architecture level set for IBM System z196 and newer**
- Support for zEC12 Flash Express (TP)
- Support for zEC12 Crypto Express4S
- Crypto adapter resiliency
- Support of VEPA (Virtual Ethernet Port Aggregator)
- Cross Memory Attach for System z
- Provide PCHID mapping
- **Fuzzy live dump for System z (Technology Preview)**
- Two Stage Dumper (TP)
- Safe offline interface for DASD devices
- Linux support for concurrent Flash MCL updates (TP)
- **Transactional memory support (for zEC12 and newer)**
- End-To-End data consistency checking for zfc (Technology Preview)
- IPv6 support for qetharp tool
- Exploitation of Data Routing for FCP
- zipl to automatically calculate boot device ramdisk address
- Enhancement in the configuration tool for System z network devices
- libhugetlbfs support for System z
- Optimized compression library zlib for Linux on System z
- Kernel support to improve Java performance for Linux on System z (Technology Preview)
- Support of transparent large pages for System z
- Automated LUN scanning for NPIV only
- Implement write protection based dirty page detection
- Improve performance of dasdfmt (TP)
- Enable LLVM pipe for System z

Fuzzy live dump for System z

This feature provides a tool that can extract the current memory state of the kernel by extracting an elf dump from crash (used on a live system) for filtering with makedumpfile. This dump may not be 100% consistent since the memory recorded may change while being recorded.

This RAS feature allows Service-personel to help customers that cannot afford to take down their system for problem analysis.

Architecture level set for IBM System z196 and newer

Based on the current market and tendency of System z customers, the majority of System z customers will be using a z196 or newer machine. With this expectation, Red Hat set the newer version of the RHEL distribution for System z so that the new instructions with z196 and newer machines are exploited.



Transactional memory support (for zEC12 and newer)

Enhance the gcc to support transactional memory also known as transactional-execution (TX).

This feature implements the gcc support for applications utilizing transactional-execution for simplified concurrency control via shared memory sections removing the limits for lock controlled execution.

Improved performance for applications using transactional memory especially when utilizing many CPUs and high amount of locking.

Transactional memory support is available with zEC12 and newer HW.

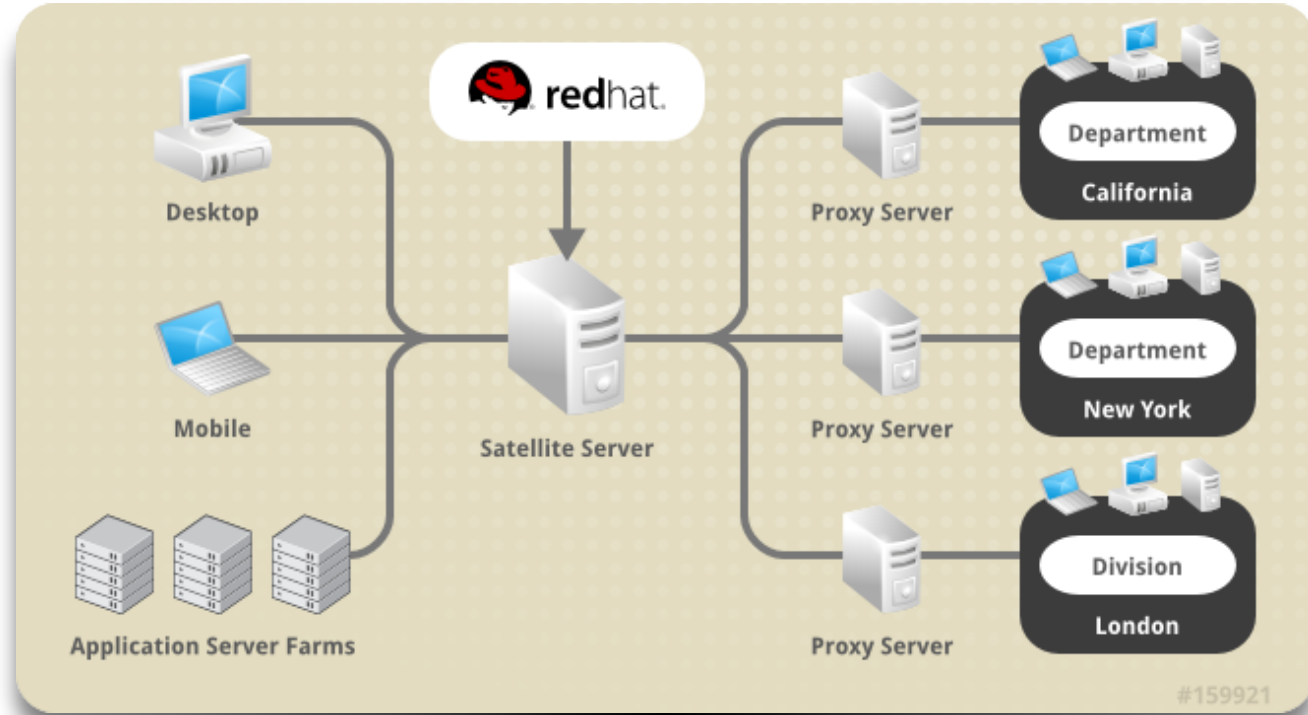


RHN Satellite Overview

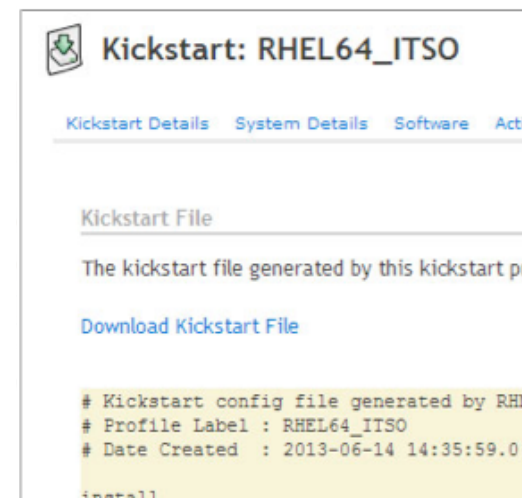
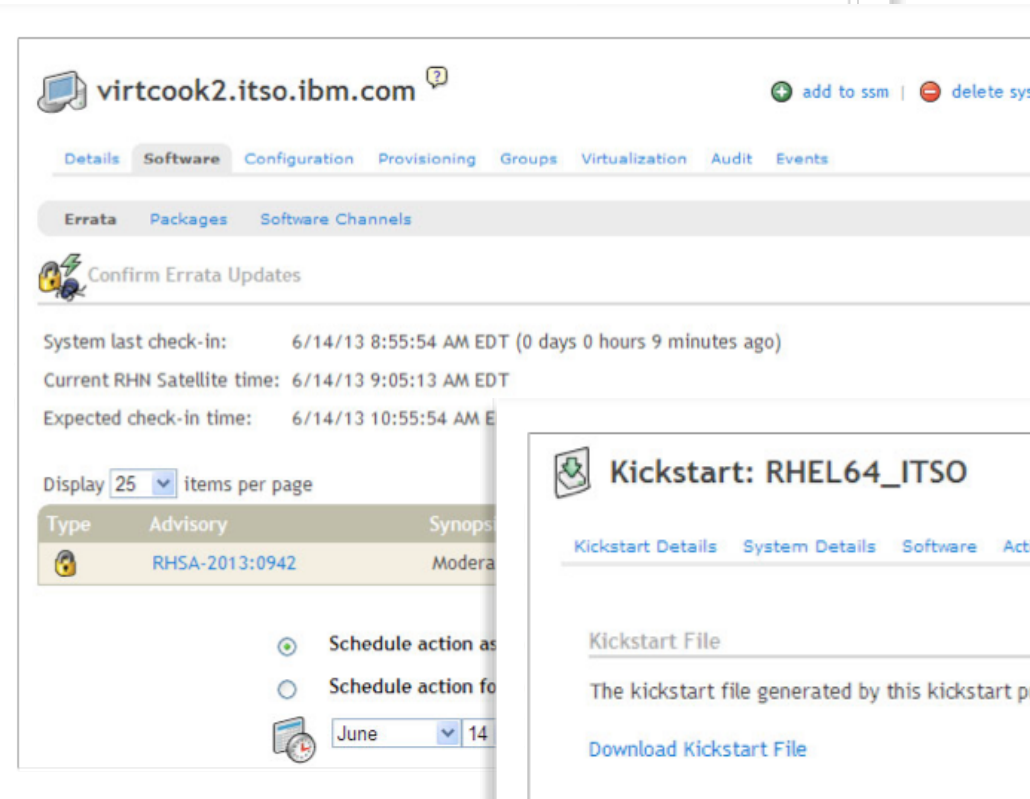
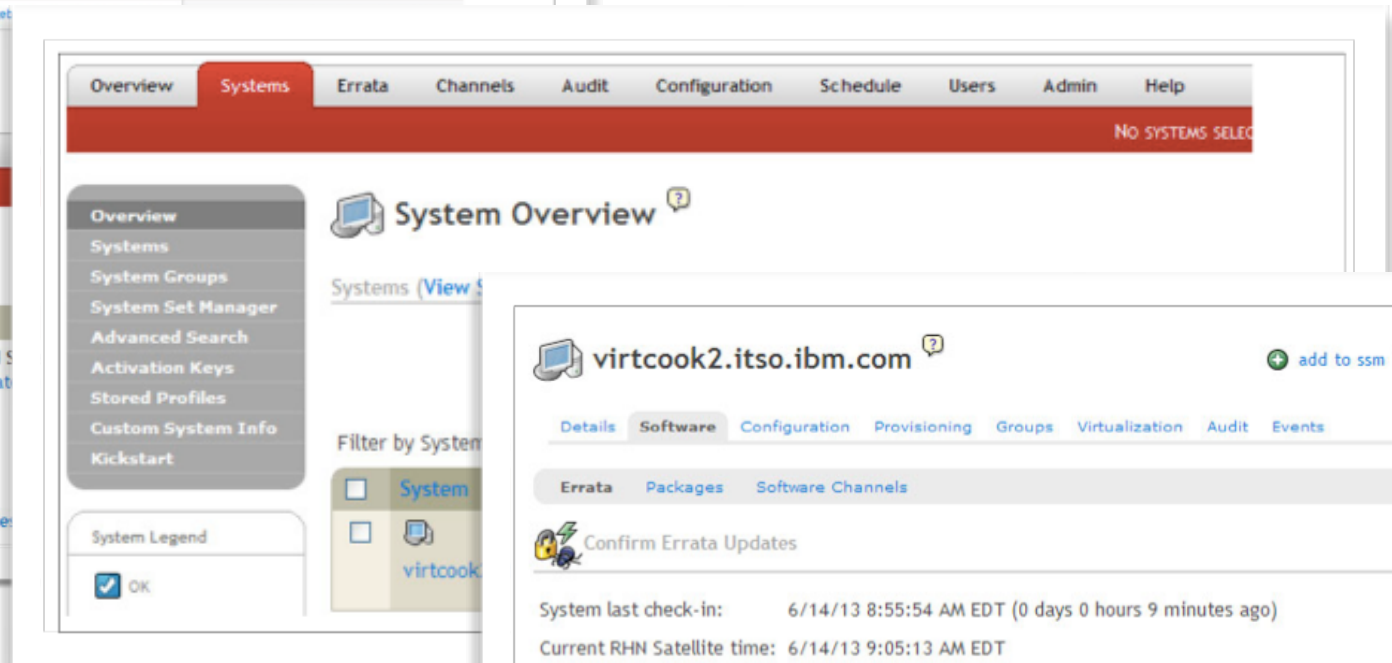
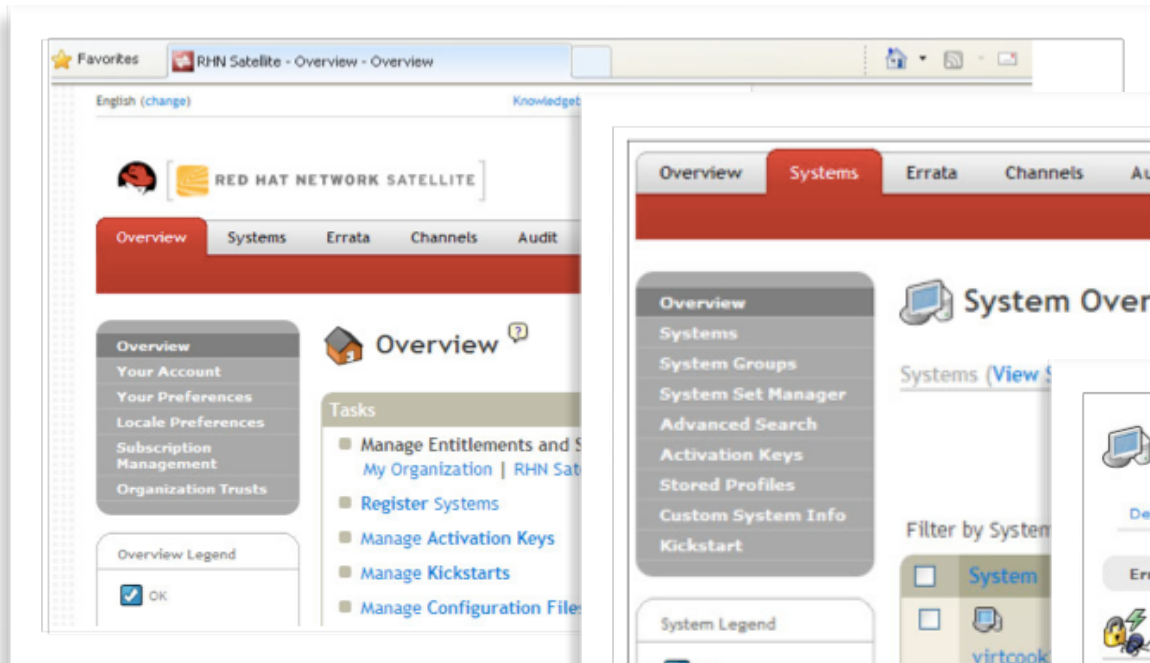
Red Hat Satellite Server

Manage the lifecycle of all Red Hat Enterprise Linux systems on x86_64, Power Systems and System z from a centralized console.

- Simplify updates, change of configuration files, security alerts, deploy systems, run remote commands, audit systems, and more
- Red Hat Satellite Server is available on x86_64 and System z with supported clientes on all platforms.



Red Hat Satellite Console Screenshots



- Dashboards to facilitate graphical administration of your IT infrastructure
- Dashboard alerts to identify new updates and bugfixes
- Create system profiles (kickstarts)
- Schedule maintenance windows easily



IDC ROI Study* of Red Hat Network Satellite

IDC conducted in-depth interviews with staff members of 10 IT organizations that have deployed RHN Satellite Server.

RED HAT NETWORK SATELLITE SERVER ROI ANALYSIS

CATEGORY	VALUE
Three-year cost of investment	\$274,410
Annual cost savings	\$500,905
Net present value (NPV of three-year savings)	\$927,778
Payback period	4.8 months
Three-year ROI	338%

* IDC White Paper sponsored by Red Hat, Linux Management with Red Hat Network Satellite Server: Measuring Business Impact and ROI, Doc # 220346, October 2009 <https://inquiries.redhat.com/go/redhat/idc-rhn-satellite>



The Virtualization Cookbook for z/VM 6.3, RHEL 6.4 and SLES 11 SP2

Service Linux with the Red Hat Network

"The faster you go, the further you get ahead."
— Albert Einstein

This chapter describes how to use yum to install and update software on virtual servers. You can also use yum to install network services on virtual servers. For more information, see the following link:

<http://access.redhat.com>

The following sections cover network services through RHN:

- ▶ "Register your system with RHN"
- ▶ "Install and update software on virtual servers"
- ▶ "Manage your system with RHN"

Installing Linux with kickstart

"We still don't know one thousandth of one percent of what nature has revealed to us."
--Albert Einstein

Kickstart is an automated installation file that answers all of the questions asked during the installation process.

In the previous chapter, you learned how to clone a virtual server. In this chapter, you learn how to clone a server faster by using kickstart. Kickstart is used as pre-install and post-installation scripts.

The Linux administration team can share the installation tree over the network. The following sections cover:

- ▶ Configure the Linux administration tree
- ▶ "Configure LINUX1 for network installation"
- ▶ "Kickstart the LINUX1 server"

The NEW IBM Virtualization Cookbook features step by step on how to install and use Red Hat Satellite Server.

Install and Service Linux using Red Hat Network Satellite Server

"Insanity: doing the same thing over and over again and expecting different results."
— Albert Einstein

This chapter describes Red Hat Network Satellite Server which is an easy-to-use, advanced systems management platform for your Linux infrastructure. It is built on open standards and uses a web-based graphical interface. Its services are provided through functional modules that allow you to enhance management capabilities for Red Hat Enterprise Linux on virtualized or bare metal deployments.

For more information on Red Hat Network Satellite Server visit:

<http://www.redhat.com/satellite>

SALT RIVER PROJECT MIGRATES TO RED HAT ENTERPRISE LINUX ON IBM MAINFRAMES FOR FLEXIBILITY AND PERFORMANCE

FAST FACTS

Industry:	Utilities, Government
Geography:	Arizona
Challenge:	Searched for a replacement for proprietary software for its IBM mainframe servers that could provide greater flexibility, manageability, and utilization opportunities
Migration Path:	HP-UX to Red Hat® Enterprise Linux®
Software:	Red Hat Enterprise Linux, Red Hat Network Satellite
Hardware:	IBM® System z® mainframe servers
Benefits:	Experienced cost savings, boosted performance, stable and reliable management, consolidation, and valuable technical support after migrating to Red Hat Enterprise Linux on IBM System z





High Availability for Red Hat Enterprise Linux
for IBM System z

High Availability

Fail-over, Clustered FileSystem and Load Balancing

- Based on the same software source code solution offered by Red Hat on x86 but enhanced for the IBM System z.
- Supported by SNA on RHEL 6.2+ and RHEL7.0
- Technical Support available Globally as a third party add-on directly from the developer - SNA - Standard and Premium 24/7, email and telephone support

More Information please contact:

David Boyes

Sine Nomine Associates

+1 703 723 6673

info@sinenomine.net

**Login**

Username

Password

Homebase

Manage Clusters

[SNA_HA](#)[Nodes](#) | [Fence Devices](#) | [Failover Domains](#) | [Resources](#) | [Service Groups](#) | [Configure](#)[+ Add](#) [⚙ Reboot](#) [🔗 Join Cluster](#) [🔗 Leave Cluster](#) [✖ Delete](#)

I	Node Name	Node ID	Votes	Status	Uptime	Hostname
<input type="checkbox"/>	sme7.s390.bos.redhat.com	1	1	Cluster Member	01:13:30:55	sme7.s390.bos.redhat.com
<input type="checkbox"/>	sme8.s390.bos.redhat.com	2	1	Cluster Member	00:13:23:47	sme8.s390.bos.redhat.com

Select an item to view details

Homebase
Manage Clusters

● SNA_HA

Nodes Fence Devices Failover Domains Resources Service Groups Configure

+ Add × Delete

Name	Fence Type	Nodes Using	Hostname
<input type="checkbox"/> fence_zvm	IBM z/VM - SSI	1	
<input type="checkbox"/> fence_zvm_2	IBM z/VM - SSI	1	

fence_zvm

Type IBM z/VM - SSI



Fence Type

IBM z/VM - SSI

Name

fence_zvm

SMAPI Server Virtual Machine Name

VSMREQIU

Apply

Nodes

Node Name	Status
sme7.s390.bos.redhat.com	OK

Homebase
Manage Clusters

● SNA_HA

Nodes Fence Devices Failover Domains **Resources** Service Groups Configure

+ Add × Delete

Name/IP	Type	In Use
<input type="checkbox"/> 10.16.106.20/21	IP Address	✓
<input type="checkbox"/> MyHttpd	Apache Server	✓

10.16.106.20/21 ×**IP Address**

IP Address

Netmask Bits (optional)

Monitor Link

Disable Updates to Static Routes

Number of Seconds to Sleep After Removing an IP Address




```
[root@sme8 ~]# clustat
Cluster Status for SNA_HA @ Mon Mar 11 03:54:09 2013
Member Status: Quorate

Member Name                               ID   Status
-----
sme7.s390.bos.redhat.com                 1 Online, rgmanager
sme8.s390.bos.redhat.com                 2 Online, Local, rgmanager


Service Name                               Owner (Last)           State
-----
service:MyWeb                             sme7.s390.bos.redhat.com started
[root@sme8 ~]#
```

Additional Linux on System z Documentation


IBM Redbooks and DeveloperWorks

Linux on System z 

Device Drivers, Features, and Commands
on Red Hat Enterprise Linux 6.4

Linux on System z 

Using the Dump Tools
on Red Hat Enterprise Linux 6.4

Linux on System z 

How to use FC-attached SCSI devices with
Linux on System z

Development stream (Kernel 2.6.35)

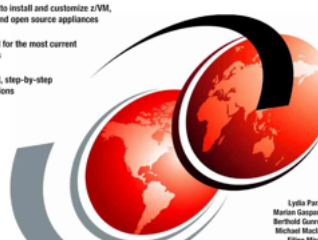
IBM

The Virtualization Cookbook for IBM z/VM 6.3, RHEL 6.4, and SLES 11 SP3

A guide to install and customize z/VM,
Linux, and open source appliances

Updated for the most current
releases

Detailed, step-by-step
instructions



Lydia Parziale
Marian Garganic
Barthel Gorenz
Michael Klacusak
Filipe Miranda
Gerald Raufz

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IBM

Security for Linux on System z

Learn about the new cryptography
functions in the CEX3C

Deploy security-related
technologies in Linux on System z

Understand protected key
cryptography



Lydia Parziale
Jonathan Barney
Vic Cross
William Johnson
Edward Kowalski
Eric Marino
Michael Pridel
Svi Venkatesan

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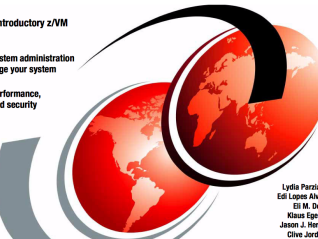
IBM

Introduction to the New Mainframe: z/VM Basics

Understand introductory z/VM
concepts

Learn basic system administration
tasks to manage your system

Study z/VM performance,
networking and security



Lydia Parziale
Edi Lopes Alves
Ed M. Dow
Klaus Egeler
Jason J. Horn
Chris Jordan
Erawimgalath P. Neveen
Hans-J. Pothalbinmann
Kylie Smith

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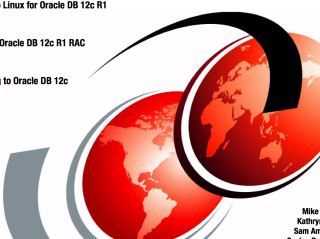
Drill Document for Review February 19, 2014 3:48 pm SC30-0106-00

Experiences with Oracle Database 12c Release 1 on Linux on System z

Setting up Linux for Oracle DB 12c R1

Installing Oracle DB 12c R1 RAC

Upgrading to Oracle DB 12c
R1



Mike Ebbens
Kathryn Arnold
Sam Amasweli
Gaylen Braselton
Terry Elliott
Leon Rich
Baron Robinson
David Simpson

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Danke
Thank you
Grazie
Obrigado
Gracias

Customer References of Red Hat Enterprise Linux on IBM System z

For a complete list of customer success stories please access: http://people.redhat.com/fmiranda/powersystems/customer_references/



The Met Office forecasts a bright outlook for Linux on zEnterprise

Saving software licensing and hardware lifecycle costs by consolidating applications and systems

Overview

The need

The Met Office uses post-processing systems to tailor its weather forecasts for specific clients' needs. Running these systems on a distributed Linux infrastructure was becoming complex and expensive.

The solution

Following a comprehensive evaluation and benchmarking process, the Met Office decided to migrate suitable candidates from its distributed Linux landscape onto a pair of IBM® zEnterprise® 196 servers.

The benefit

Consolidating from 204 x86 processor cores to 17 IFLs cuts Oracle licensing costs by a factor of 12. Fewer physical servers means a more manageable Linux landscape and lower hardware lifecycle costs.

The Met Office is the UK's national weather service, providing weather forecasts for the public, for government, and for businesses in a wide variety of sectors. It employs 1,800 people at 60 locations around the world, and creates more than 3,000 tailored forecasts and briefings each day, as well as conducting weather- and climate-related research.

Martyn Catlow, Met Office portfolio lead for centralised IT infrastructure, comments: "We forecast for the public and a wide range of commercial sectors, and have a strong history of forecasting for the marine and aviation sectors. We also produce weather products for defence and a wide range of retail and infrastructure customers, such as national road and utility services."

Making the case for Oracle on Linux on zEnterprise

Because Oracle software licensing is currently calculated on a per-core basis, running Oracle databases in virtualised Linux partitions on IBM zEnterprise Integrated Facility for Linux (IFL) specialty engines can often lead to significant cost savings.

Richard Cains, technical lead with Met Office's mainframe team, explains: "We already had a few Oracle databases running under Linux on the mainframe, as part of a pilot program we had undertaken a couple of years ago. It proved so successful that it actually set a technical foundation for consolidating more Oracle on System z. I think that was part of our mind-set when it came down to conducting the overall technology refresh. It then came down to the cost-benefits of Linux on the mainframe platform."

Solution components

Hardware

- IBM® zEnterprise® 196

Software

- IBM z/VM®
- Oracle 11g
- Red Hat Enterprise Linux

"By consolidating distributed commodity servers you can save a great deal of money. When we looked at all of the parameters, it just made sense to move the workload to the mainframe."

— Martyn Catlow, portfolio lead for centralised IT infrastructure, the Met Office



Overview

The need

To meet increased demand from a growing customer base, Algar Telecom needs strong, flexible IT systems that deliver high availability and reliability for a diverse range of telecommunications services.

The solution

Algar Telecom consolidated more than 90 standalone servers to Linux virtual servers running on IBM® z/VM® on a single IBM zEnterprise® 196 server, featuring the IBM zEnterprise BladeCenter® Extension.

The benefit

Provides a reliable, flexible platform for core business systems that has cut data center costs by 70 percent, reduced maintenance effort by 65 percent and boosted operational efficiency by 30 percent.

Algar Telecom gives its growing business a signal boost

With a reliable, secure IBM platform that supports growth and better service delivery

Algar Telecom is a telecommunications company headquartered in Uberlândia, Brazil. A division of the Algar Group, Algar Telecom operates the CTBC brand and maintains a strong presence in 87 municipalities. The company provides more than 800,000 customers with mobile and fixed voice telephone and broadband, as well as corporate communication and pay-tv services.

Simplified management and greater flexibility

To further simplify and reduce its hardware infrastructure's complexity, Algar Telecom deployed 24 Integrated Facility for Linux (IFL) engines on its z196 to run virtualized Red Hat Enterprise Linux servers on IBM z/VM® technology.

Solution components

Hardware

- IBM® zEnterprise® 196
- IBM zEnterprise BladeCenter® Extension
- IBM zEnterprise Unified Resource Manager
- IBM BladeCenter HX5
- IBM Power® 780
- IBM Storwize® V7000

Software

- IBM AIX® 6.1
- IBM z/VM® 6.2
- Red Hat Enterprise Linux

Services

- IBM STG Lab Services
-





“The creation of a private cloud built around the z196 servers supports our business transformation goals by enabling the rapid, seamless deployment of new computing resources to meet emerging requirements.”

— Jim Tussing, Chief Technology Officer for infrastructure and operations, Nationwide



Nationwide cuts costs in the cloud

With smart workload consolidation from IBM

In the last 80 years, Nationwide has grown from a small mutual auto insurer owned by policyholders to one of the largest insurance and financial services companies in the United States, with more than 38,000 employees. Headquartered in Columbus, Ohio, this Fortune 500-listed company is the number one provider of public-sector retirement plans and the seventh largest auto insurer in the United States.

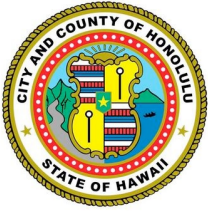
The need for consolidation

To retain its position as a leader in a competitive industry, Nationwide wanted to increase its agility and ability to innovate, but its IT infrastructure was holding it back.

First steps

Following a rigorous analysis of various options, Nationwide decided to consolidate its distributed environment to Linux virtual servers hosted by IBM z/VM® on the IBM System z platform. In combination with IBM WebSphere® Application Server and IBM DB2®, z/VM offered significant cost advantages over other possible platforms.

With IBM z/VM, the virtualized servers are able to use the fast I/O of the mainframe and share its resources, while simultaneously taking advantage of the traditional mainframe strengths of reliability and high availability.



The City and County of Honolulu creates a customized cloud

Using IBM System z and reducing licensing costs by up to 68 percent

A city that evokes the image of a high-rise skyline in the middle of paradise, Honolulu, Hawaii has recently been undergoing a technological transformation. In November 2011, the Center for Digital Government recognized Honolulu as the top digital city in the US in the large-city category. This recognition is impressive, considering that in November 2004, the city evaluated its IT and network systems as being underfunded and out of date.

Increasing citizen involvement with a customized cloud

Another goal made possible by the city's new IBM deployment was an increase in citizen involvement. Using Linux and IBM z/VM® operating systems on the z10 EC system, the city created a customized cloud environment. This provided a scalable self-service platform on which city employees could develop open source applications, and it empowered the general public to create and deploy citizen-centric applications.

One of the more innovative applications supporting citizen involvement is CitySourced Honolulu 311, an application created by IBM Business Partner CitySourced that enables citizens to photograph and pinpoint the location of problems—such as broken street or traffic lights or abandoned cars—and report them to the city.

Overview

The need

The City and County of Honolulu needed to increase transparency to support citizen access to government information. The city's goals were to improve community involvement, services and efficiency.

The solution

Honolulu deployed an Integrated Facility for Linux (IFL) engine running Linux on IBM System z®, an IBM XIV® Storage System, and IBM Maximo® Asset Management and IBM Tivoli® software.

The benefit

The city's new platform helped to reduce database licensing costs by 68 percent, reduce time to deploy applications from one week to a few hours and increase property tax revenue by USD\$1.4 million.



CUSTOMER CASE STUDY



RED HAT AND IBM FORM THE FOUNDATION FOR ENERGY-EFFICIENT MALAGA SMART CITY PROJECT

SOFTWARE


Red Hat Enterprise Linux for System z

HARDWARE

IBM system z10 2097-E12 servers with four IFLs and 48GB of memory

MIGRATION

New infrastructure based on IBM System z



Malaga, Spain

EUROPE
+ GLOBAL

“Thanks to the blend of Red Hat and IBM solutions, the Smart City infrastructure is the most reliable on the market, resulting in the best availability-to-cost ratio. It also ensures data security and safe access to the various components of systems.

ANGEL MOREU GALUP
MAINFRAME EXECUTIVE, IBM

The Smart City project, Europe's largest eco-efficient city initiative, comprises 11 companies headed by Endesa, and aims to rationalise users' energy consumption and cut CO₂ emissions using new technologies. Red Hat® Enterprise Linux® is at the heart of the project ensuring reliability, availability, and serviceability (RAS) for IBM's IT systems and infrastructure.

BANK OF NEW ZEALAND REDUCES CARBON FOOTPRINT WITH RED HAT ON THE MAINFRAME

FAST FACTS

Industry	Financial Services
Geography	New Zealand
Business Challenge	Address environmental and space issues in the datacentre and achieve the corporate goal of becoming carbon neutral by 2010
Migration Path	From distributed Intel and SUN SPARC servers to Red Hat Enterprise Linux 5 running under z/VM on IBM z9 and z10 mainframes
Solution	Software: Red Hat Enterprise Linux 5, Red Hat Network (RHN) Satellite, Oracle database, WebSphere Application Server, ESB, Process Server, TX and MQ Hardware: 1x IBM z9 and 1x IBM z10 mainframe (with 3 x IFL engines in each)
Benefits	<ul style="list-style-type: none">• Recovered 30 percent of datacenter floor space• Reduced power consumption by 38 percent• 20 percent return on investment (ROI) over the life of the platform• Simplified, more efficient deployment



Citigroup: Red Hat Innovation Award Winner



June 17, 2010

Customer: Citigroup Global Markets, Inc.

Industry: [Financial Services \(/solutions/industry/financial/\)](/solutions/industry/financial/)

Geography: North America

Country: United States

Business Challenge:

Reconciling two independently developed and supported Linux platforms to run mission-critical applications for Citi's globally distributed business units

Software:

Red Hat Enterprise Linux

Hardware:

x86 servers, IBM System z mainframes

Benefits:

By delivering a common global Linux build across the enterprise that can be leveraged across both x86 and IBM mainframe platforms, Citi has been able to retire a number of one-off infrastructure software products and their associated costs.

Overview

Challenge

With the growth of both Internet banking and core banking systems, Svenska Handelsbanken wanted to consolidate as many systems as possible to a simple centralized infrastructure.

Solution

By running Linux®, Java™ and database workload alongside core banking systems on an IBM System z10®, Handelsbanken benefits from a single easy-to-manage platform with rapid disaster recovery capabilities.

Benefits

- Runs hundreds of systems on a single physical machine
 - Cuts Java workload costs by 15 percent per year
 - Enables disaster recovery within seconds
-

Svenska Handelsbanken puts IBM System z at the heart of operations

Building a modern data center on mainframe technology

The growth of Linux

“We are currently running two main Red Hat Enterprise Linux systems on System z—StreamServe for printing, and Todos for online authentication,” says Rydberg. “This has been very successful, and we are now considering moving some of our other applications onto the

System z as well, particularly if they use Oracle or IBM DB2® databases. The licensing for these databases on Linux on System z is much more cost effective than on Microsoft Windows servers, so it would be a sensible move. I expect the Linux on z environment to grow very rapidly in the next few years.”

For more information

Contact your IBM sales representative or IBM Business Partner, or visit us at: ibm.com/systems/z/

