What's New in RHEL 6 for Linux on System z?

Linux on System z Live Virtual Class - http://www.vm.ibm.com/education/lvc/
December 15, 2010
Many Linux software packages did not require any code change to run on Linux on System z

- 0.28% platform specific code in GCC 4.1
- 0.55% of platform specific code in Glibc 2.5
- 1.81% platform specific code in Linux Kernel 2.6.25
IBM Linux on System z Development

IBM Linux on System z Development contributes in the following areas: Kernel, s390-tools, Open Source Tools (e.g. eclipse, ooprofile), GCC, GLIBC, Binutils

...the code you use is the result of the efforts of an anonymous army of blue penguins involved in developing, testing, documenting, ....
# Linux on System z Development Focus

## Integration
- Application Serving
  - z/OS & z/VSE integration
- Data Hub
  - Database Consolidation

## Virtualization
- Virtualization & Virtualization Management
  - Ease of Use
  - Serviceability
  - Hosting capacity

## Security
- Security
  - Certifications
  - Data security & privacy

## RAS
- Continuous Availability & Data Replication
  - RAS
  - Differentiation for mission critical workloads

## Customer Requirements
- Address customer observed deficiencies

## Base Tasks
- Close competitive gaps
- Differentiation / innovation that matters

## Hardware Support
- Exploitation of new System z HW
- Storage exploitation
- Linux
  - Maintainership & code currency
### IBM Supported Linux Distributions for System z

<table>
<thead>
<tr>
<th>Distribution</th>
<th>zEnterprise 196</th>
<th>System z10</th>
<th>System z9</th>
<th>zSeries</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHEL 6</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
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<tr>
<td>RHEL 5</td>
<td>✓</td>
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<tr>
<td>RHEL 4 (*)</td>
<td>✓ (1)</td>
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<tr>
<td>SLES 11</td>
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<td>SLES 10</td>
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<tr>
<td>SLES 9 (*)</td>
<td>✓ (2)</td>
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</tbody>
</table>

Indicates that the distribution (version) has been tested by IBM on the hardware platform, will run on the system, and is an IBM supported environment. Updates or service packs applied to the distribution are also supported.

1. RHEL 4.8 only. Some functions have changed or are not available with the z196, e.g. the Dual-port OSA cards support to name one of several. Please check with your service provider regarding the end of service.
2. SLES 9 SP4 + latest maintenance updates only. Some functions have changed or are not available with the z196, e.g. the Dual-port OSA cards support to name one of several. Please check with your service provider regarding the end of service.

Indicates that the distribution is not supported by IBM.

Also available as 31-bit distribution.
## Red Hat Enterprise Linux 6
Released November 10th, 2010

<table>
<thead>
<tr>
<th>Fact 1</th>
<th>Fact 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represents more than 600 person years by Red Hat engineers</td>
<td>85% more packages than Red Hat Enterprise Linux 5</td>
</tr>
<tr>
<td>1821 customer/partner requested features included</td>
<td>14,631: resolved issues from partner, customer &amp; community reports</td>
</tr>
<tr>
<td>37GB of content 2,058 SRPMs; 21,957 binary RPMs</td>
<td>847 features &amp; fixes verified by partner QA teams</td>
</tr>
<tr>
<td>Red Hat engineers are based in 26 countries</td>
<td>3900 additional kernel enhancements to 2.6.32</td>
</tr>
</tbody>
</table>

Kernel based on 2.6.32 with many features from .33 & .34

*Red Hat is the lead developer of kernel features*

Red Hat Enterprise Linux design allows smooth integration of future features
Red Hat Development Model

**Red Hat Enterprise Linux**

- Stable, mature, commercial product
- Extensive Q&A, performance testing
- Hardware & Software Certifications
- 7-10 year maintenance
- Core ABI compatibility guarantee
- Major releases 2-3yr cycle

Fedora for System z opens the Linux on System z development to entire Open Source community, not just IBM, Red Hat, and Novell.

http://fedoraproject.org/wiki/Architectures/s390x
Life-cycle

The Life Cycle is broadly divided into four individual phases:

Production 1
(Approximately 4 years)

Production 2
(Approximately 1 year)

Production 3
(Approximately 2 years)

Further Details are available at:
https://access.redhat.com/support/policy/updates/errata/
RHEL 6: Key Features

Power Management

- Improvements through the application stack to reduce wake ups
- Power consumption measurement by Powertop
- Power Management and adaptive system tuning by Tuned

Next Generation Networking

- Comprehensive IPv6 support (NFS 4, CIFS, ISATAP support)
- Redesigned QETH network driver with support for OSA data connection isolation

Reliability, Availability, and Serviceability

- System level enhancements from industry collaborations to make the most of hardware RAS capabilities.
RHEL 6: Key Features

Fine-grained Control and Management

- Improved scheduler and better resource management in the kernel via Completely Fair Scheduler (CFS) and Control Groups (CG).

Scalable File systems

- New file systems btrfs and ext4 (now the default) offer robustness, scalability, and high-performance.

Disk Storage Subsystem

- FCP automated port discovery and lsluns utility to automatically activate all available target ports
- Support for High Performance FICON to reduce I/O overhead
- Dynamically adjustable queue depth
- I/O configuration support when running in LPAR
RHEL 6: Key Features

Virtualization

- Tighter integration with z/VM for extended functionality like dynamic memory resizing, better CPU utilization, HyperPAV, and suspend/resume support.

Enterprise Security Enhancement

- SELinux includes improved ease of use, application sandboxing, and significantly increased coverage of system services
- SSSD provides unified access to identity and authentication services as well as caching for off-line use.
- Support for the latest Crypto Express3 accelerator and coprocessor for offloading the processing of secure data.

Development and Runtime Support

- SystemTap (allows instrumentation of a running kernel without recompilation) and ABRT (simple collection of bug information)
- Improvements to glibc (version 2.12), GDB (version 7.1), and the GCC compiler (version 4.4), which can lead to greater than 10% performance improvement.
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
Efficiency, Reliability & Scalability

Efficient Scheduling

- CFS (Completely Fair Scheduler) is a new application scheduler which operates with nanosecond granularity
- Optimized for multi-core topologies, CFS maximizes CPU utilization with low power consumption

Reliability

- With support for processor degradation and other machine checks, the system can recover from fatal hardware errors with minimal disruption
- Memory pages with errors can be declared as “poisoned” and will be avoided

Scalability

- Full support for up to 80 IFLs and up to 3 TB memory on z196
- Support for up to 4 million processes per server
Filesystems

Ext4 replaces Ext3 as default filesystem

- Faster, more robust, and scales to 16 TB
- Support for thin provisioning. You can create a 16 TB file system on a single mod-3 DASD! Just add more when needed.

NFS version 4 for network file system

- Clustered file system with support for read/write access from multiple guests simultaneously.
- Use VSWITCH for fast “network” access, or Hipersockets for memory-speed transfers.

Fuse

- Allows filesystems to run in user space, allowing testing and development of fused-based filesystems.
- For example, use Fuse to create a cloud filesystem.
In Depth: Next Generation BTRFS Filesystem

Provides enhanced data integrity, better performance, and ease of use over Ext3/Ext4 filesystems.

Key Features

- Copy-on-write for cloning and snapshots, with filesystem seeding
  - Create a filesystem to seed other BTRFS filesystems. The original filesystem is a read-only starting point, the copy-on-write ensures the original is unchanged.
- Online defragmentation
- Load balancing across device nodes
- Transparent data compression
- In-place conversion (with rollback) from Ext3/Ext4
- Data deduplication (under development)

Principle developer for Ext3/Ext4 stated BTRFS is the way forward, having a number of the same design ideas that Reiser had.
LVM, Storage & Multipath

LVM snapshot improvements

Snapshot can now be merged back into the original logical volume, reverting changes that occurred after the snapshot.

Practical application: “lock” your data with regular snapshots, then if necessary “undo” any changes within the last week/day/hour..

Define LVM hot spare

- Recover seamlessly from device failure of a disk or logical volume

Device Mapper Multipath

- Allows paths to be dynamically selected based on queue size or I/O time data

Performance and Integrity

- Automated I/O alignment and self-tuning
- DIF/DIX provides better integrity checks for application data
UPD Lite tolerates partially corrupted packets to provide better service for multimedia protocols, such as VOIP, where partial packets are better than none.

Multiqueue Networking increases processing parallelism for better performance from multiple processors and CPU cores.

Large Receive Offload (LRO) and Generic Receive Offload (GRO) aggregate packets for better performance.

Support for datacenter bridging includes data traffic priorities and flow control for increased quality of service.

iSCSI partitions may be used as either root or boot filesystems.
IPA Client (Identity, Policy, Audit)

IPA Client in Core RHEL for Centralized Security Management

- Kerberos authentication with host based access control
- Provides central storage of extended user attributes
- Enables centralized policy for applications, including SELinux policy
- Audit log aggregation services & search capabilities
Security enhancements

Virtualization Isolation in Conjunction with SELinux

- Labeled NFS for filesystem isolation, guest confinement via SELinux policy enhancements

NSS Crypto

- Broaden the core services which utilize NSS crypto libraries
- Allows cheaper implementation of new features, ie TPM & centralized key store
- Incremental targeted conversion of: Openswan, openldap, glibc
- Add new crypto GUI for key import & establishment of trust

Volume Encryption

- Basic operation already present in RHEL5 – incremental centralized key management for RHEL 6

Sectool

- Compliance checking / intrusion detection utility – validates system admin config: file permissions, valid UIDs, reasonable passwords, etc.
IBM constantly add features and bug fixes to the new kernel releases
Every feature and bugfixed developed prior to kernel 2.6.32 will be automatically contained in RHEL6
Both companies continuously backport features (for minor updates e.g. 6.1 and bugfixes to the existing RHEL6 release. IBM provides those which are platform specific
RHEL 6: System z Specifics - A Bugzilla Query
For a complete list & current status, please visit http://bugzilla.redhat.com/

- Total Bugzilla-Entries: 191
- Closed: 128
- Open Issues: 46
- New Feature: 6
RHEL6 ships version 1.8.2 of the s390-tools/s390-utils package

This package provides the essential tool chain for Linux on System z. It contains everything from the boot loader to dump related tools for a system crash analysis.

New Features include (excerpt):

- cio_ignore: Query and modify the contents of the CIO device driver blacklist.
- znetconf: List and configure network devices for System z network adapters.
- DASD related tools: Add Large Volume Support for ECKD DASDs
- IPL tools: Can be used to change the reipl & shutdown behavior (shutdown actions)
- ziomon tools: Set of tools to collect data for zfcp performance analysis.
- lsluns: List available SCSI LUNs depending on adapter or port.
- lszcrypt/chzcrypt: Show/modify information about zcrypt devices and configuration
- TTY terminal server over IUCV
- Large image dump on DASD
- Extend lstape to support SCSI tapes
**cio_ignore**

When a Linux on System z instance boots, it senses and analyses all available devices. You can use the cio_ignore kernel parameter to specify a list of devices that are to be ignored.

The following applies to ignored devices:

- Ignored devices are not sensed and analyzed. The device cannot be used unless it has been analyzed.
- Ignored devices are not represented in sysfs.
- Ignored devices do not occupy storage in the kernel.
- The subchannel to which an ignored device is attached is treated as if no device were attached.
- cio_ignore might hide essential devices such as the console under z/VM. The console is typically device number 0.0.0009.

This example specifies that all devices in the range 0.0.b100 through 0.0.b1ff, and the device 0.0.a100 are to be ignored.

```
cio_ignore=0.0.b100-0.0.b1ff,0.0.a100
```
Use the `cio_ignore` tool to manage the I/O device exclusion list

Use the `-l` option to display the current exclusion list

```
root@larsson:~> cio_ignore -l
Ignored devices:
==================
0.0.0000-0.0.0008
0.0.000a-0.0.6365
[...]
```

Use the `-L` option to display the devices which are accessible

```
root@larsson:~> cio_ignore -L
Accessible devices:
===================
0.0.0009
0.0.6366
0.0.f5f0-0.0.f5f2
```

Use the `-r` option to remove devices from the exclusion list

```
root@larsson:~> cio_ignore -r 6366
```

The the `-R` option is used to free all devices

Use the `-a` option to add devices to the exclusion list
znetconf network device configuration tool

- Allows to list, add, remove & configure System z network devices
- For example: list all potential network devices:

```
root@larsson:~> znetconf -u
Device Ids                  Type Card Type CHPID Drv.
-------------------------------
0.0.f500,0.0.f501,0.0.f502  1731/01 OSA (QDIO) 00 qeth
0.0.f503,0.0.f504,0.0.f505  1731/01 OSA (QDIO) 01 qeth
```

- Configure device 0.0.f503

```
root@larsson:~> znetconf -a 0.0.f503
```

- Configure device 0.0.f503 in layer2 mode and portname “myport”

```
root@larsson:~> znetconf -a 0.0.f503 -o layer2=1 -o portname=myport
```

- Remove network device 0.0.f503

```
root@larsson:~> znetconf -r 0.0.f503
```
IUCV terminal environment
IUCV terminal applications – examples

**Using the iucvconn program:** To access the first z/VM IUCV HVC terminal on the Linux instance in z/VM guest LNXSYS02

```
root@larsson:~> iucvconn LNXSYS02 lnxhvc0
```

To create a transcript of the terminal session to the Linux instance in z/VM guest LNXSYS99

```
root@larsson:~> iucvconn -s ~/transcripts/lnxsys99 LNXSYS99 lnxhvc0
```

**Using the iucvtty program:** To allow remote logins using the terminal identifier „lnxterm“

```
root@larsson:~> iucvtty lnxterm
```

To access the „lnxterm“ terminal on the Linux instance in z/VM guest LNXSYS01

```
root@larsson:~> iucvconn LNXSYS01 lnxterm
```

To use /sbin/sulogin instead of /bin/login for terminal “suterm”

```
root@larsson:~> iucvtty suterm -- /sbin/sulogin
```
Multi Volume Dump

zipl can now dump to multiple DASDs. It is now possible to dump system images, which are larger than a single DASD. You can specify up to 32 ECKD DASD partitions for a multi-volume dump. We use two DASDs in this example:

```
root@larsson:~> dasdfmt -f /dev/dasdc -b 4096
root@larsson:~> dasdfmt -f /dev/dasdd -b 4096
```

Create the partitions with fdasd. The sum of the partition sizes must be sufficiently large (the memory size + 10 MB):

```
root@larsson:~> fdasd /dev/dasdc
root@larsson:~> fdasd /dev/dasdd
```

Create a file called sample_dump_conf containing the device nodes (e.g. /dev/dasda1) of the two partitions, separated by one or more line feed characters

```
root@larsson:~> zipl -M sample_dump_conf
[...]  
```

Use zgetdump command without any option to copy the dump parts to a file:

```
root@larsson:~> zgetdump /dev/dasdc > mv_dump_file
```
I/O

• **High Performance FICON**
  Adds support for the zHPF protocol to the DASD driver. zHPF provides a much simpler link protocol than FICON: Promises increased I/O bandwidth due to better channel utilization. This feature is available with DS8000 R4.1.

• **FCP - SCSI error recovery hardening**
  Improve error recovery cooperation between SCSI-mid-layer and zFCP by allowing the SCSI error recovery to wait for completion of the zFCP error recovery. This increases the stability and availability in scenarios of error recovery, for example firmware/uCode upgrades.

*Note: this list comprises selected items only*
Virtualization

- **Extra kernel parameter for SCSI IPL**
  Modify the SCSI loader to append extra parameters specified with the z/VM VMPARM option to the kernel command line.

- **TTY terminal server over IUCV**
  Provide central access to the Linux console for the different guests of a z/VM. Fullscreen applications like *vi* are usable on the console. Access Linux instances with no external network because IUCV is independent from TCP/IP.

- **Dynamic memory attach/detach**
  Allows to attach/detach memory for Linux as a guest without needing to reipl.

*Note: this list comprises selected items only*
Virtualization (cont.)

• **Provide service levels of HW & Hypervisor in Linux**
  Improves serviceability by providing uCode and z/VM levels via /proc interface

  
  ```
  root@larsson:~> cat /proc/service_levels
  VM: z/VM Version 5 Release 2.0 service level 0801(64-bit)
  qeth: 0.0.f5f0 firmware level 087d
  ```

• **CMM2 Lite**
  This item, Collaborative Memory Management 2 (dynamic), provides enhanced z/VM memory management in a dynamic way.

• **Kernel vdso support**
  Add vdso support to speed up gettimeofday, clock_getres and clock_gettime system calls. The vdso shared object is a kernel provided shared library that contains the system time offset and the code to do the gettimeofday calculation in user space. Some user space application, for example the Java virtual machine, tend to call gettimeofday very often. By use of a vdso this operation can be accelerated by an factor of 4 thereby increasing the performance of the user space application.

*Note: this list comprises selected items only*
Security

- **Long Random Numbers Generation**
  Provide access to the random number generator feature on the Crypto card (high volume random number generation, compared to a CPU based solution)

- **Crypto Express3 cards enablement**
  Support for Crypto Express3 Accelerator (CEX3A) and Crypto Express3 Coprocessor (CEX3C)

*Note: this list comprises selected items only*
RAS

• **Shutdown Actions Interface**
The shutdown actions interface allows the specification of a certain shutdown action (stop, ipl, reipl, dump, vmcmd) for each shutdown trigger (halt, power off, reboot, panic)
Possible use cases are e.g. to specify that a vmdump should be automatically triggered in case of a kernel panic or the z/VM logoff command should be executed on halt.

• **Automatic IPL after dump**
The new shutdown action dump_reipl introduces a system configurations which allows to create a dump in case of a Linux panic, followed by a re-ipl of the system, once the dump was successfully created.
Allows to configure system to re-ipl after a dump is taken.

*Note: this list comprises selected items only*
RAS

• **Suspend / resume support**
  Add the ability to stop a running Linux system and resume operations later on. The image is stored on the swap device and does not use any system resource while suspended. Only suspend to disk is implemented, suspend to RAM is not supported.
Suspend / resume support

- Ability to stop a running Linux on System z instance and later continue operations
- Memory image is stored on the swap device specified with a kernel parameter: `resume=/dev/dasd<x>`
- Lower the swap device priority for the resume partition

```
root@larsson:~> grep swap /etc/fstab
/dev/dasdb1 swap swap pri=-1 0 0
/dev/dasdc1 swap swap pri=-2 0 0
```

- Suspend operation is started with a simple echo:

```
root@larsson:~> echo disk > /sys/power/state
```

- Resume is done automatically on next IPL
- Use signal quiesce to automatically suspend a guest

```
cash:ctrlaltdel:/bin/sh -c "./bin/echo disk > \
/sys/power/state || /sbin/shutdown -t3 -h now"
```
Networking

• **OSA QDIO Data Connection Isolation (kernel 2.6.33)**
  This feature allows enabling of isolating QDIO data connections on a shared OSA-card, by adding a switch to the qeth driver to switch on/off ability to isolate QDIO data connection communications on a shared OSA port in support of multi-tier security zones. This feature meets network security requirements by ensuring complete network isolation even in case of a shared physical network connection.

• **HiperSockets Network Traffic Analyser (kernel 2.6.34)**
  Trace HiperSockets network traffic for problem isolation and resolution. The feature provides HiperSockets sniffer support for problem analysis. This has been requested by customers who require that also system internal network connections (HiperSockets) can be supervised (by authorized LPARs only!) such that network issues can be traced end to end. (Layer 2 & 3 support).

• **AF_IUCV SOCK_SEQPACKET support**
  Introduce AF_IUCV sockets of type SOCK_SEQPACKET that map read/write operations to a single IUCV operation. This feature helps application developers who write applications using the native IUCV interface, e.g. Linux to z/VSE.

*Note: this list comprises selected items only*
Networking (cont.)

• **Pre-allocated headers for HiperSockets (qeth driver)**
  This feature economize the reallocation of the skb data segment by allocating separate memory for the qdio transport information (qeth header), which in turn will provide a better HiperSocket network performance.

• **Secondary unicast addresses for qeth layer2 devices**
  Enables the adding of secondary MAC addresses for layer2 qeth devices using macvlan, a new driver for MAC address based VLANs. It can run on top of real network devices, if they allow to add secondary unicast MAC addresses. This is the implementation of a OSA-layer2-card hardware feature.

• **HiperSockets Layer3 support for Ipv6**
  This feature allows the transmission of ipv6-traffic to other ipv6-enabled partners using layer3 (for instance z/OS).

Note: this list comprises selected items only
LPAR only features

• **Add Call Home data on halt and panic if running in LPAR**
  This feature uses a new that allows the SE to forward kernel panic data to RETAIN, and automatically creates a PMR. This it improves serviceability, automating the task of reporting an operating system crash.

• **Linux to add Call Home data if running in LPAR**
  Also referred to as Control Program Identification (CPI) or SCLP_CPI
  Allows the user to set information about the LPAR which will be displayed on the HMC/SE

• **I/O dynamic configuration support**
  This feature provides interfaces to change LPAR IOCDS dynamically and persistent using a userspace tool. This way a system administrator does not have to extra install z/VM or z/OS to be able to dynamically change IOCDs in order to avoid an IML

*Note: this list comprises selected items only*
Satellite deployment model

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

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

- **WEB INTERFACE**
  - RHN Proxy

- **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
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
Documentation for Red Hat distributions

This page contains links to IBM documentation applicable to Linux on System z. This documentation is a complement to and in no way replaces the documentation contained in the Red Hat documentation. The "Distribution hints" page may also have useful information.

Red Hat Enterprise Linux 6

The following manuals:

- Device Drivers, Features, and Commands
- Dump Tools

are tailored to RHEL6. The below mentioned "Development streams" are for RHEL6:

- Base documentation

How to documents

- How to use FC-attached SCSI devices with Linux on System z
- How to Improve Performance with PAW - SC33-841

More Information

Installation instructions for Red Hat on System z

Red Hat Enterprise Linux 6
Installation Guide

Installing Red Hat Enterprise Linux 6 for all architectures

Rüdiger Landmann
David Cantrell
Hans De Goede
Jon Masters

Chapter 18.
Planning for Installation on System z

18.1. Pre-Installation

Red Hat Enterprise Linux 6 runs on System z9 or later IBM mainframe systems.

Before you install Red Hat Enterprise Linux 6, the following tasks must be performed:

- Decide whether you want to run a virtual or real system.
- Decide if you need swap space or assign enough memory to z/VM to run Red Hat Linux.
- Decide which version of the installation is appropriate for your case (z/VM, z/OS, etc.).

For more information on planning, see Red Hat Enterprise Linux 6 Planning Guide.

Chapter 20.
Booting (IPL) the Installer

Booting (IPL) the Installer

The steps to perform the initial boot (IPL) of the installer depend on the environment entered: z/VM or Linux. For more information on booting, see the Booting Linux chapter in Linux on System z Device Drivers, Features, and Commands on Red Hat Enterprise Linux 6.

20.1. Installing under z/VM

When installing under z/VM, you can boot from:

- The z/VM virtual reader
- A DASD or an FC-attached SCSI device prepared with the zipl boot loader
- An FC-attached SCSI DVD drive

Boot the z/VM guest virtual machine chosen for the Linux installation. You can use x3270 or eserver x3270 client packages in Red Hat Enterprise Linux to log in to TPF from other IBM systems. Alternatively, use the 5250 terminal emulator on the IBM System z Hardware Management Console (HMC). If you are working with Linux system that has a Linux operating system, Jolly Giant (http://www.jollygiant.com) offers an isu-enabled 5250 emulator. A native zseries session on an eserver x3270 terminal is also supported.

Questions?

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Your Linux on System z Requirements?

Are you missing a certain feature, functionality or tool? **We'd love to hear from you!**

We will evaluate each request and (hopefully) develop the additional functionality you need.

Send your input to hans@de.ibm.com
How to explain the benefits of running Linux on System z in 2:39?
http://www.youtube.com/watch?v=0i7kBnhN3Lg
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