L04

Linux/390 System Management for the Mainframe Systems Programmer

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IBM

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About me

- Mark Post (mark.post@eds.com)

- Senior Infrastructure Specialist (Systems Programmer, "plus")

- EDS, Auburn Hills, Michigan

- Worked with IBM mainframes since entering college in 1973.

- Supported MVS and VM for GM and EDS

- Linux and Linux/390 Technical Lead since 01/2003

My Linux background

- First installed Slackware Linux on a PC at home in 1998.

- Involved with Linux/390 since May of 2000.

- Co-author of IBM Redbook:"Linux for zSeries and S/390: Distributions," SG24-6264

- Active in the Linux-390 mailing list hosted by Marist College.

- Webmaster for the linuxvm.org web site.

- Ported Slackware® Linux to the mainframe, released as Slack/390 in July of 2004.

Agenda

- Cultural differences & similarities

- Terminology

- How does Linux/390 compare to Unix System Services?

- How does Linux/390 compare to other Linux platforms?

- What is a distribution, and why doesn't IBM have one?

- What hardware does Linux/390 support?

Agenda (2)

- What networking connections does Linux/390 support?

- Where's SYS1.PARMLIB kept?

- Do I *really* have to know all this stuff?

- Linux/390 DASD management

- Questions?

- Additional information resources
  - Web sites, Redbooks/pieces/tips, Usenet (news), O'Reilly Books

- Command comparisons

Cultural differences

- Open Source Community

- Expectations of self-reliance

- Open Source software

- Software quality

- Where and how you get support

- 3270 terminals vs. VTxxx.

- Install Linux on a PC and use it.

- Is rebooting unnecessarily a sin?

Terminology

- IPL
- nucleus
- PLPA / LINKLIST
- TSO / CMS
- OSA
- PTF / APAR
- IEBUPDTE
- IEBUPDTE input
- SuperC / COMPARE
- xedit update mode

- boot
- kernel
- kernel modules
- shell
- NIC
- patch
- patch
- diff
- diff
- diff

Terminology (2)

- paging space

- multi-processor

- systems programmer

- GUI

- pattern matching

- help files

- STC / SVM

- address space

- task (tcb)

- swap partition/volume/file

- SMP

- system administrator

- X / X-Window

- regular expression

- man pages

- daemon

- process

- thread

Terminology (3)

- runlevel

- device driver

- tarball (tar - tape archive)
  - tar -cf backup.tar file1 file2 file3 file4
  - tar -xf backup.tar
  - tar -zcf backup.tar.gz file1 file2 file3 file4
    - Equivalent to tar command followed by gzip command
  - tar -zcf backup.tgz file1 file2 file3 file4
  - tar -zxf backup.tgz
  - tar -jcf backup.tar.bz2 file1 file2 file3 file4
    - Uses bzip2 instead of gzip for compression
  - tar –jxf backup.tar.bz2

How does Linux/390 compare to...

- Unix System Services
  - Linux/390 is "real" UNIX "under the covers." Things that run on most other Unix systems can be run on Linux/390, usually without change (assuming source is available).
  - There is no such thing as SMP/E or SES in UNIX / Linux. (Not that USS really uses it either, per se.)
  - Option "switches" on various commands are different, due to different shells, or compliance to different standards.

How does Linux/390 compare to...

- Unix System Services (cont.)
    - The Linux man pages work without extra effort on OS/390 side.
    - There's no confusion about which TCP/IP parameters are put where.
    - Things that you learn about other UNIX systems are generally easier to apply to Linux than USS.
    - There's no "other side" (OS/390) to help bail you out when things get messed up.
    - Native ASCII. No EBCDIC <=> ASCII conversions.

How does Linux/390 compare to...

- Unix System Services (cont.)
  - Source code is available.
  - Default shell is more often bash than (t)csh.
  - No 3270 interface/limitations to work around. Which also means no real ISPF. (You can buy a clone of it, though.)
  - PL/1, CLISTs are not available.
  - REXX is available, but called Regina.
  - OREXX is available, now in Open Source form.
  - HLASM is now available from Tachyon Software.

- Other Linux Platforms
  - Very similar, but it lacks a lot of common PC-type hardware
  - 3270 support included for consoles in LPAR mode
  - S/390 specific hardware

What are distributions?

- VARs

- System Integrators

- Packagers

- Maintainers

- Developers

- Support

- Why doesn't IBM have one?

Linux/390 hardware support

- Any processor that supports the "Halfword Immediate and Relative Branch Feature" instructions added with the G2.

- For decent performance, IEEE FPU is needed. (G5 and up, MP3000.)

- ECKD DASD

- FBA DASD

- 3480/3490/3590 Tapes

- SCSI over FCP now available

Linux/390 networking connections

- 3172

- OSA-2 (Token-Ring, Ethernet, Fast Ethernet)

- OSA-Express (Ethernet, Fast Ethernet)

- 2216 (Token Ring, Ethernet)

- QDIO OSA-Express (Gb Ethernet, Fast Ethernet)

- ESCON / CTC (native and under VM)

- IUCV (only under VM)

- HiperSockets (native and under VM)

- Guest LANs (only under VM)

- VSwitch (only under VM, requires an OSA)

- Cisco CLAW (CIP) - driver by UTS Global

Where's SYS1.PARMLIB kept?

- Just about everything you need is kept under /etc (at some level of hierarchy).

- Individual text files (or groups of them), since no concept of a PDS in Linux.

- Some *really* important ones:

  - /etc/passwd
  - /etc/shadow
  - /etc/group
  - /etc/gshadow
  - /etc/inittab

  - /etc/inetd.conf
  - /etc/modules.conf
  - /etc/fstab
  - /etc/hosts
  - /etc/resolv.conf

  - /etc/rc.d/...
  - /etc/httpd/...
  - /etc/sysconfig/…
  - /etc/samba/...
  - /etc/pam.d/...
  - /etc/ssh/…

Do I *really* have to know all this stuff?

- No, but shouldn't you?

- If you really don't want to know what's going on or have a large virtual farm:
  - YaST   (SuSE)
  - Nautilus   (Red Hat)
  - Webmin   (completely perl-based)
  - AdminUX   (Green Light Advantage)
  - linuxconf   (no longer recommended by RH)
  - Others

Linux/390 DASD management

Quick Overview:

- 2 kinds of DASD layouts, cdl and ldl.
- Adding/removing DASD
- Preparing DASD for use
  - Formatting
  - Partitioning (2.4.x & 2.6.x kernels only)
  - Creating file systems and Swap
  - File systems vs. directories
- Backing up your DASD

Adding/Removing DASD

- For 2.4.x kernels, can be dynamic:
    - Adding a device
    - **echo "add device range=*devno-range* " > /proc/dasd/devices**
    - Disabling a device
    - **echo "set device range=*devno-range* off " > /proc/dasd/devices**
    - Enabling a device
    - **echo "set device range=*devno-range* on " > /proc/dasd/devices**
    - Still want to update /boot/parmfile or /etc/zipl.conf and re-run "zipl" to make the change permanent. (mkinitrd may also be required.)

- For 2.2.x kernels, requires updating /boot/parmfile, re-running "silo," and rebooting.

Adding/Removing DASD in 2.6.x

- **/sys/bus/ccw/devices/0.0.0601@**

- **/sys/bus/ccw/drivers/dasd-eckd/0.0.0601@**

- **/sys/bus/css/devices/0.0.0016@**

- **/sys/bus/css/drivers/io_subchannel/0.0.0016@**

- **/sys/devices/css0/0.0.0016/**
    - **0.0.0601/**
      bus@
      chpids
      driver@
      pimpampom

- **/sys/devices/css0/0.0.0016/0.0.0601/**
    - **Availability**
    - **bus@**
    - **cmb_enable**
    - **cutype**
    - **devtype**
    - **discipline**
    - **driver@**
    - **online**
    - **readonly**
    - **use_diag**

Use /sbin/chccwdev instead

chccwdev --online 0.0.0601

chccwdev --e 0.0.0601

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Formatting DASD - 2.4.x, 2.6.x

- dasdfmt -b 4096 [-l volser] [-d layout]
    - -f /dev/dasd?
    - -n 0d18   (only if devfs is in use)
        - dasdfmt -b 4096   -d cdl -f /dev/dasda
        - dasdfmt -b 4096   -d ldl   -n 0cf3
        - dasdfmt -b 4096   -d cdl -n 0d2f

- fdasd /dev/dasd?
    - **Must** create one, two, or three partitions

Formatting DASD - 2.2.x

- dasdfmt -b 4096 [-l volser] -f /dev/dasd?

- dasdfmt -b 4096 [-l volser] -n fc23

Creating file systems and Swap

- ## 2.4.x, 2.6.x Kernels
  - mke2fs -b 4096 /dev/dasd?1,2,3
    - mke2fs -b 4096 /dev/dasda1
    - mke2fs -b 4096 /dev/dasda2
    - mke2fs -b 4096 /dev/dasda3

- ## 2.2.x Kernels
  - mke2fs -b 4096 /dev/dasd?1
    - mke2fs -b 4096 /dev/dasda1
    - mke2fs -b 4096 /dev/dasdb1

- mkswap /dev/dasd?1   (2.2 kernels)

- mkswap /dev/dasd?1,2,3   (2.4, 2.6 kernels)

File systems vs. directories

/   (root)

/bin

/boot *

/dev

/etc

/home

/lib

/mnt

/opt

/proc

/root (not to be confused
                   with / root)

/sbin

/sys

/tmp

/usr

/var

Questions?

Additional information - web sites

- http://linuxvm.org/
        (Largely Linux/390 specific)

- http://www.marist.edu/htbin/wlvindex?linux-390
        (Linux/390 mailing list)

- http://www.slack390.org/

- http://www.kernel.org/

- http://www.linux.org/

- http://www.tldp.org/
        (The Linux Documentation Project)

Additional information - Redbooks

- http://www.redbooks.ibm.com/

- Linux for S/390, SG24-4987

- Linux for zSeries and S/390: Distributions,
  SG24-6264

- Linux on zSeries and S/390: ISP/ASP Solutions,
  SG24-6299

- Linux on zSeries and S/390: Application Development,
  SG24-6807

- Linux on zSeries and S/390: System Management,
  SG24-6820

Additional information – Redbooks (2)

- Linux on zSeries and S/390: Large Scale Linux Deployment, SG24-6824

- Linux on zSeries and S/390: Performance Measurement and Tuning, SG24-6926

- Linux with zSeries and ESS: Essentials, SG24-7025

- Experiences with Oracle for Linux on zSeries, SG24-6552

- SAP on DB2 UDB for OS/390 and z/OS: Implementing Application Servers on Linux for zSeries, SG24-6847

Additional information – Redbooks (3)

- e-Business Intelligence: Leveraging DB2 for Linux on S/390, SG24-5687

- e-Business Intelligence: Data Mart Solutions with DB2 for Linux on zSeries, SG24-6294

Additional information – Redpieces

- Implementing Linux in your Network using Samba, redp0023

- Building Linux Systems Under IBM VM, redp0120

- Linux on zSeries and S/390: High Availability for z/VM and Linux, redp0220

- Linux on zSeries and S/390: Securing Linux for zSeries with a Central z/OS LDAP Server (RACF), redp0221

- Linux on zSeries and S/390: Server Consolidation with Linux for zSeries, redp0222

- Linux on zSeries and S/390: Cloning Linux Images in z/VM, redp0301

Additional information – Redpieces (2)

- Linux on zSeries and S/390: TCP/IP Broadcast on z/VM Guest LAN, redp3596

- Linux on zSeries and S/390: Managing a Samba Server from z/VM, redp3604

- Linux on zSeries and S/390: Porting LEAF to Linux on zSeries, redp3627

- Linux on zSeries and S/390: Virtual Router Redundancy Protocol on VM Guest LANs, redp3657

- Linux on zSeries and S/390: z/VM Configuration for WebSphere Deployments, redp3661

Additional information – Redpieces (3)

- Linux on zSeries and S/390: Building SuSE SLES8 Systems under z/VM, redp3687

- Linux on zSeries and S/390: VSWITCH and VLAN Features of z/VM 4.4, redp3719

- e-commerce Patterns for Linux on zSeries Using WebSphere Commerce Suite V5.1 Patterns for e-business series, redp0411

- Getting Started with zSeries Fibre Channel Protocol, redp0205

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Additional information – Redpieces (4)

- WebSphere Portal Installation on Linux for zSeries, redp3699

- Open Your Windows with Samba on Linux, redp3780

Additional information – Hints & Tips

- Linux on zSeries: Configuring gcc as a cross-compiler, tips0005

- Dynamic management of DASD devices in Linux running on zSeries, tips0023

- Formatting and Labeling a DASD Volume for Linux Guests Running Under z/VM, tips0275

- Partitioning DASD for Linux Guests Running under z/VM, tips0277

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Additional information - Usenet ("news")

- alt.os.linux.dial-up
- alt.os.linux.redhat
- alt.os.linux.slackware
- alt.os.linux.suse
- alt.os.linux.turbolinux
- comp.os.linux.admin
- comp.os.linux.advocacy
- comp.os.linux.announce
- comp.os.linux.development.apps
- comp.os.linux.development.system
- comp.os.linux.hardware
- comp.os.linux.help
- comp.os.linux.misc
- comp.os.linux.networking

- comp.os.linux.questions
- comp.os.linux.redhat
- comp.os.linux.security
- comp.os.linux.setup
- comp.os.linux.x
- comp.protocols.smb (Samba, mainly)
- linux.debian.devel.mentors
- linux.debian.devel.qa
- linux.debian.devel.release
- linux.debian.ports.s390
- linux.debian.project
- linux.debian.project
- linux.debian.security

- linux.dev.c-programming
- linux.dev.kernel
- linux.dev.laptop
- linux.dev.newbie
- linux.help
- linux.kernel
- linux.net.masquerade
- linux.redhat.announce
- linux.redhat.devel
- linux.redhat.install
- linux.redhat.pam
- linux.redhat.rpm
- linux.samba
- linux.sources.kernel

Additional information - O'Reilly books

* Apache: The Definitive Guide, 2nd Edition
   Apache Pocket Reference
* Building Internet Firewalls, 2nd Ed
* DNS and BIND, 4th Edition
* Learning Perl, 3rd Edition
* Learning the bash Shell, 2nd Edition
* Learning the vi Editor, 6th Edition
   MySQL & mSQL
* Perl Cookbook
   Perl for System Administration
   Perl for Web Site Management
   Perl in a Nutshell

Additional information - O'Reilly books (2)

* Practical UNIX & Internet Security, 2nd Edition
* Programming Perl, 3rd Edition
* Running Linux, 3rd Edition
  Samba Pocket Reference
  sed & awk Pocket Reference
* sed & awk, 2nd Edition
* sendmail, 2nd Edition
  sendmail Desktop Reference
* SSH, The Secure Shell: The Definitive Guide
* TCP/IP Network Administration, 2nd Edition
* Using Samba - comes with the software
  vi Editor Pocket Reference

Additional information - O'Reilly books (3)

* Networking CD Bookshelf
    TCP/IP Network Administration, 2nd Edition
    sendmail, 2nd Edition
    sendmail Desktop Reference
    DNS and BIND, 3rd Edition
    Practical UNIX & Internet Security, 2nd Edition
    Building Internet Firewalls
* The Perl CD Bookshelf, Version 2.0
    Programming Perl, 3rd Edition
    Perl for System Administration
    Perl in a Nutshell
    Perl Cookbook
    Advanced Perl Programming

Additional information - O'Reilly books (4)

* The Linux Web Server CD Bookshelf

    Running Linux, 3rd Edition

    Linux in a Nutshell, 3rd Edition

    Apache: The Definitive Guide, 2nd Edition

    MySQL & mSQL

    Programming the Perl DBI

    CGI Programming with Perl, 2nd Edition

Command comparison

<u>MVS</u>	<u>VM</u>	<u>Linux</u>	<u>DOS</u>
• LISTC	• L	• ls / locate	• dir
• LISTD	• L (L	• file	• attrib
• LIST	• TYPE	• cat	• type
• COPY	• COPY	• cp	• copy
• MOVE	• MOVE	• mv	• move
• RENAME	• RENAME	• mv	• ren
• DELETE	• ERASE	• rm	• del
• HELP	• HELP	• man / info	• help
• ICKDSF	• FORMAT	• dasdfmt / mke2fs	• format

Command Comparison (2)

MVS	VM	Linux
• SEND	• TELL / MSG / NOTE	• write / talk / wall
• LISTB		• /etc/motd
• LOGOFF	• LOGOFF	• exit
• PRINTDS	• PRINT	• lpr
• V ONLINE	• ATTACH	• mount
• V OFFLINE	• DETACH	• umount
• D TS	• Q U	• uptime
• D TS,L	• Q N	• users / w
• D A,L	• Q N	• ps -ax

Command comparison (3)

Linux	DOS	Linux	DOS
cd	cd	host	nslookup
mkdir	mkdir	nslookup	nslookup
rmdir	rmdir	netstat	netstat
less / more	more	route	route print
ping	ping	find	find
traceroute	tracert	set	set
		export	set