

Session: 460145

@server **iSeries**

Basic Linux Administration

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Agenda

- Basic Information
- User Management
- Backup / Recovery
- Printer Setup
- Init Levels

Assumptions

- You already have Linux installed and are somewhat familiar with the Linux shell and basic user commands
- Mostly generic Linux information – information specific to iSeries will be highlighted

/etc

- Almost all Linux configuration files are stored in the /etc directory
- It is a good habit to make a copy of this directory on a regular basis

```
mkdir /backup  
cp -R /etc /backup/etc.Apr-05-2004
```

Linux Commands Naming Conventions ☺

- Linux commands have a terse, sometimes cryptic naming style
- There has been an attempt to apply some level of consistency:
 - Commands to change things often start with “ch”
 - To list, “ls”
 - To remove, “rm”
 - To create something, “mk”

man is your Friend

- `man <cmd>` gives help for a command
- `man -a <cmd>` lists all man pages of that name
- `man 5 <configuration file>` provides information on system configuration files
- `whatis` lists commands matching a word in their man-page descriptions
- `apropos` is even more verbose in listing matches from the man-pages

info

- GNU (Linux) added "info" files
 - Some man pages point to `info` files
 - "man" is usually the best place to start

The /proc file system: Examples

/proc/cpuinfo	Shows information on the processor(s) that Linux is running on. This information includes the clock rate and cpu type.
/proc/filesystems	Shows the file systems that the kernel has support for. This support is either compiled into the kernel or is in a kernel module that has been inserted into the running kernel.
/proc/iSeries	A directory of information in the /proc file-system that is specific to the iSeries implementation
/proc/iSeries/config	Contains information reported to Linux by OS/400 including the partition name that Linux is running on as well as network configuration information such as the domain name, name servers, ip address, etc.

/proc/iSeries/veth

- The `/proc/iSeries/veth` directory contains information for each virtual LAN that the partition has a connection on.
- This information can be used to determine the mapping of virtual LAN to Linux network identifier.
 - ex: `cat /proc/iSeries/veth/veth0` will output, among other data, a line “Net device name:” that indicates the network device name that Linux is using for the device (such as ‘eth0’)
 - This is the device name that would be used to configure networking for this virtual LAN connection.
 - NOTE: Existence of `/proc/iSeries/veth/veth0` is being deprecated (will be removed in 2.6 kernel) – VETH messages reported at boot time can be checked for device mapping

The wall command

- Wall displays the contents of a specified file on all terminals of all currently logged-in users
- Basically, the command writes to all terminals; hence it's name
- Either the super user or root can write to the terminals of those who have chosen to deny messages or are using a program that automatically denies messages:
 - ex: `wall message-file`

User Profile Control/Configuration Files

- Linux makes use of “control files” to configure a user’s login environment and shell environment
- Many of these control files reside in the user’s home directory
 - Typically /home/<user-name>
- The names of most of these files start with ‘.’ which means that they are not displayed in a normal (i.e., ‘ls’ listing)
 - The ‘-a’ option on the ‘ls’ command will display the hidden files

User Management

User Management: What is a User

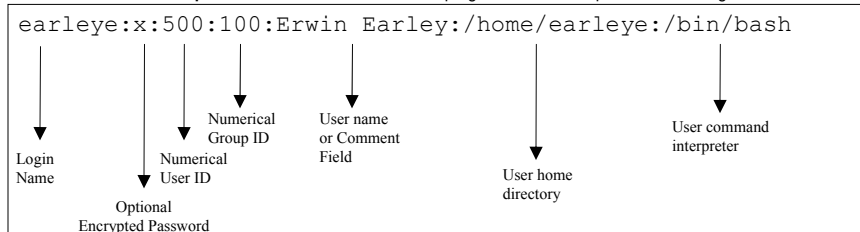
- User-name is a representation of a unique User ID (UID) on the system
- Each user is associated with a primary group and can belong to one or more secondary groups
- A user definition typically consists of the following items
 - User-Name
 - Password definition
 - User ID (UID)
 - Primary Group ID (GID)
 - Full Name or Description
 - Path to home directory
 - Path to shell (used for interactive commands), or first program to execute

User Management: Critical Files

- `/etc/passwd` base user definitions
- `/etc/shadow` encrypted user passwords

Fields in the `/etc/passwd` file:

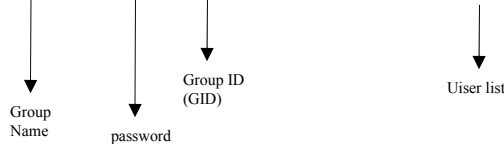
- **Login name:** The name used to login to the system – this name is mapped by Linux to the Numeric user ID (UID)
- **Optional encrypted password:** The password used to access the system – if shadow passwords is enabled (the default behavior) this field will not be used (password will be stored in `/etc/shadow`)
- **Numerical user ID:** The unique integer number used by the system to identify the user. This number is “mapped” by the system to the Login name
- **Numerical group ID:** The unique integer number used by the system to identify the primary group that this user belongs to. This number maps to a group name in the `/etc/group` file
- **User name or comment field:** Used to provide additional information about the user. Can contain optional information such as “pri=” for the initial priority of the user command interpreter, and “umask=” to set the initial value of the file creation mask.
- **User home directory:** Identifies the initial working directory for the active process to be started in upon successful login
- **User command interpreter:** Identifies the shell or initial program to execute upon successful login.



User Management: Critical Files

- `/etc/group` user group file
- Fields in the `/etc/group` file:
 - **group name**: The name used to identify the group – this name is mapped by Linux to the Numeric Group ID (GID)
 - **password**: The encrypted group password. If this field is blank (which is the case for most installations) then no group password is needed.
 - **group ID (GID)**: The unique integer number used by the system to identify the group. This number is mapped to the group name by the system.
 - **user list**: All of the group member's user names, separated by commas. NOTE: membership identified in the `/etc/passwd` file does not need to be redefined in the `/etc/group` file

```
users:x:100:fred,george,mary
```



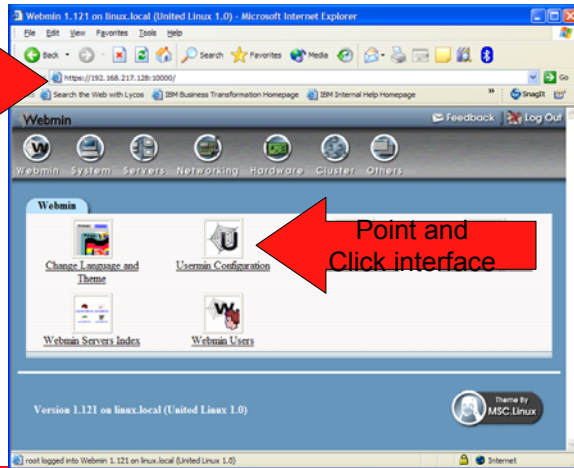
User Management: Graphical Interfaces

- **Linux Generic Tool**: WebMin – Open Source configuration tool that runs on a variety of Linux distributions (including both Red Hat and SuSE) on a variety of platforms (including Intel and PPC!!)
- **SuSE**: YaST2 (Yet Another Setup Tool) – An integrated configuration tool that provides a GUI interface to most system configuration activities.
- **Red Hat**: `redhat-config-*` -- Red Hat provides separate configuration tools for each function, example `redhat-config-packages` for package management and `redhat-config-network` for networking.

System Administration: Graphical Interfaces – WebMin Example

Accessible from
Any web browser

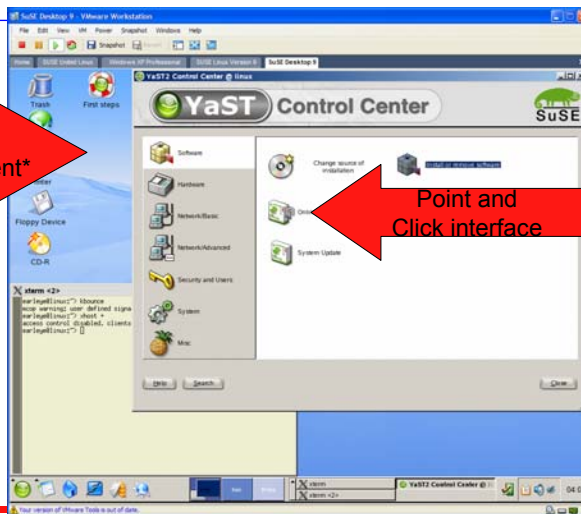
Download available
at
<http://www.webmin.org>



System Administration: Graphical Interfaces – YaST2 Example

Must be run within
Linux graphical environment*

Provided with
distribution



* menu-style version provided
for non-graphic environments

System Administration: Graphical Interfaces – redhat-config-* Example

Must be run within Linux graphical environment*

Point and Click interface

Provided with distribution

Separate programs, use command completion to get list (i.e., redhat-config-<TAB><TAB>):

```

redhat-config-date           redhat-config-printer
redhat-config-keyboard      redhat-config-printer-gui
redhat-config-kickstart     redhat-config-printer-tui
redhat-config-language      redhat-config-proc
redhat-config-mouse         redhat-config-rootpassword
redhat-config-network       redhat-config-securitylevel
redhat-config-network-cmd   redhat-config-services
...
    
```

* Some commands supported in non-graphic environments

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Backup and Recovery: Options

- Linux provides capabilities to perform both incremental as well as full backups
 - tar, cpio, find
- Linux can backup to tape devices; however, Linux currently does not have support for tape changers
 - Only mounted tape is available/accessible
- iSeries Considerations
 - When using virtual storage, entire “disk” can be saved as an OS/400 object
 - Associated Network Server must be varied off.
 - Open Source utilities such as DRBD and RSYNC can be used to replicate data to backup server

Backup and Recovery: Commands

Function	Command
Locating files to backup	find
Building a backup set	tar
Compressing files	gzip
Writing out the backup set	tar

Networking in Linux

- Linux supports a wide range of network services – in fact this is one of the key strengths of Linux! Services supported include:
 - ftp file transfer protocol
 - nfs Network File System
 - SAMBA Windows File Sharing
 - ssh Secure Shell
 - scp Secure Copy
- Services listen on tcp & udp ports
 - “netstat -a” shows list of active ports
 - These ports are defined in the /etc/services file

```

ftp          21/tcp      # Trivial File Transfer, ftp use no udp
ni-ftp      47/tcp      # NI FTP
ni-ftp      47/udp      # NI FTP
tftp        69/tcp      # Trivial File Transfer
tftp        69/udp      # Trivial File Transfer
    
```

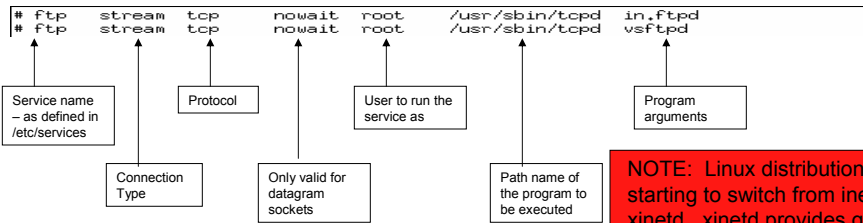
Service name – maps to inetd configuration

Network port that requests come in on

Comment – usually a description of service

The Internet Super server

- Sometimes referred to as the Internet Super server
- Perhaps the most important service process that runs on a UNIX (or Linux) system
- Processes incoming requests and executes program based on port of incoming requests
- Configuration file: `/etc/inetd.conf`



NOTE: Linux distributions are starting to switch from `inetd` to `xinetd`. `xinetd` provides greater control over how/when a service is supported. Configuration file(s) are in `/etc/xinetd.d`

Configuring Support for a Service – An Example

- By convention incoming requests come in on port 21, the port reserved for FTP access
- Check to be sure that the server program is installed:
 - `rpm -qa | grep ftp`
- Check for entry in `/etc/inetd.conf`
 - `ftp stream tcp nowait root /usr/sbi/tcpd vsftpd`
- If an entry needs to be added (or an existing entry needs to be uncommented) make sure to stop/start `inetd`:
 - `killall -SIGHUP inetd`
 - or
 - `/etc/rc.d/inetd restart`

Telnet and SSH

- Telnet provides network terminal connection support to a Linux server
- Telnet needs to be enabled in inetd.conf
- Telnet does not provide support for a secure terminal session – for this reason, many Linux distributions have telnet disabled by default.
- For Linux Secure Shell is the replacement for telnet (as well as FTP)
- Secure Shell provides the ssh command to establish secure terminal sessions and the scp command for secure copy
- All data passing through the Secure Shell is encrypted
- putty is a very nice windows ssh program

Network Configuration: Commands

Function	Command
Displaying network settings	ifconfig
Display current routes	route
Add routes	route -a
Set network interface parameters	ifconfig
Display network connections	netstat
Work with the system ARP cache	arp
Work with the kernel firewall settings	ipfilter

Package Installation: Concepts

- The Red Hat Package Manager (RPM) has become the defacto standard for package installation and maintenance on a wide range of Linux distributions
- RPM provides facilities for installation, removal, and maintenance of packages
- A database of packages installed on the system is maintained by RPM and can be queried for a wide range of package information
- In addition to RPM, a large number of packages are also available using the Linux standard tools of 'tar' and 'gzip'

Package Installation: Commands

Function	Linux
Installing packages	<code>rpm -i</code>
Removing packages	<code>rpm -e</code>
Upgrading packages	<code>rpm -U</code>
Refresh package installation	<code>rpm -F</code>
Validating package installation	<code>rpm -V</code>
Query package database	<code>rpm -q</code>

Printer Setup/Configuration: Concepts

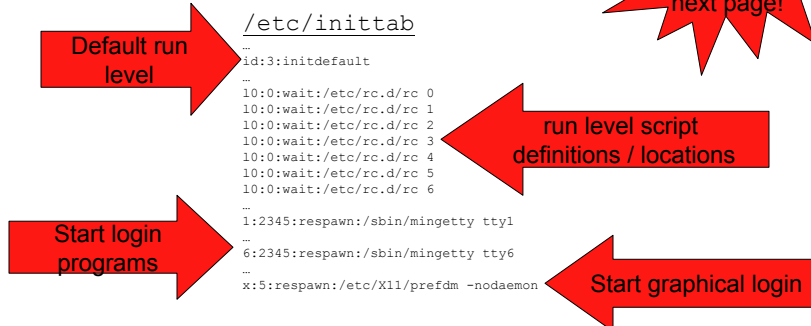
- Linux supports the creation of print queues to manage printer output
- The print queue defines the characteristics of the job output (ex: number of logical pages per physical page, page orientation, etc)
- Linux can be used as a print server for both network and direct-attached printers
 - For Linux on iSeries only network and serial-attached printers can be served from Linux

Printer Setup/Configuration: Commands

Function	Linux
Submitting a print job	lp
Remove a queued print job	lprm
Examine the print queue	lpq
Preprocess print jobs	pr
Control the operation of the printer control program	lpc
System process for processing print requests	lpd
Offline print spooler	lpr

Linux 'init' concept

- In Linux, the 'init' process is the parent process of all programs
- The primary purpose of `init` is to start processes from a script stored in the file `/etc/inittab`
 - Among other things, this configuration file indicates the default run level (or `init`) level



Linux 'init' concept – run levels defined

Run level	Description / usage
0	Halt the system – run all shutdown processes and remove power (if supported by the hardware). NOTE: Do not set the <code>initdefault</code> (in <code>inittab</code>) to this value!!
1	Single user mode – normally used for system maintenance. System will go into run level 1 when recovering from a system crash that resulted in significant file system damage/inconsistencies.
2	Multiuser mode without networking.
3	Full multiuser mode – all network services started
4	Unused – available for custom implementations (hardly ever used).
5	X11 – Start the graphical interface upon start of the system.
6	Reboot the system – execute all shutdown scripts and then execute the startup scripts for the default run level. NOTE: Do not set the <code>initdefault</code> (in <code>inittab</code>) to this value.

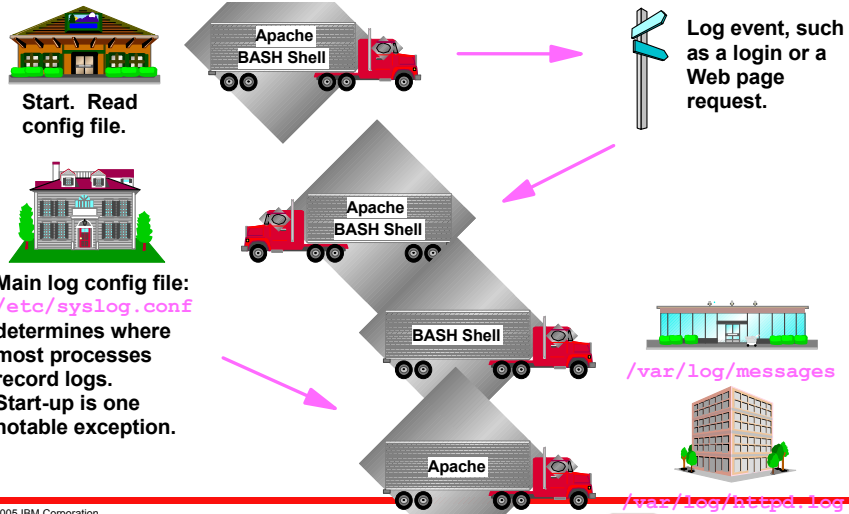
Linux 'init' concept – location of scripts

- Process startup and shutdown scripts are located in the `/etc/rc.d/init.d` directory
 - A single script will normally be written for 'start', 'stop', 'restart', 'reload', and 'status' functions
 - start: run the script and start the processes supported by the script
 - stop: run the script and stop the processes supported by the script
 - restart: restart the processes supported by the script
 - reload: Cause the process to re-read it's configuration file and change the running state of the process
 - status: display a status of the processes supported by the script
 - Scripts can be run after system startup:
 - `/etc/rc.d/init.d/<script> <function>`
- Symbolic links (ln -s) are created in the corresponding run-level directory (i.e., `/etc/rc.d/rc#.d`) to each script to run for that run level
 - Both a startup link (S##scriptname) and a shutdown link (K##scriptname) should be created.
 - On startup all of the S## scripts will be executed
 - On shutdown all of the K## scripts will be executed

Logs in Linux

- In a typical Linux system, most logs are found in `/var/log`
- Security-related logs are often directed by system administrators to `/var/adm/secure`
- The file which defines where logs should be placed is `/etc/syslog.conf`
- `/etc/syslog.conf` allows for extensive customization of system logging
- More information on system logging can be found in the `syslog.conf`, `syslog`, and `syslogd` man pages

Logs in Linux



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Logs in Linux

Facility	Used by	Typically Logs in
auth	login, telnet, ftp	<code>/var/log/secure</code>
authpriv	login, telnet, ftp	<code>/var/log/secure</code>
cron	cron daemon	<code>/var/log/cron</code>
daemon	daemons (telnet, etc.)	<code>/var/log/messages</code>
kern	kernel	<code>/var/log/messages</code>
lpr	printer daemon	<code>/var/log/messages</code>
mail	mail daemon(s)	<code>/var/log/mail</code>
mark	system	<code>/var/log/messages</code>
news	news daemon(s)	<code>/var/log/news</code>
syslog	syslog daemon	<code>/var/log/messages</code>
user	user programs	<code>/var/log/messages</code>
uucp	uucp, others	<code>/var/log/messages</code>
local0	local terminals	<code>/var/log/messages</code>

Some daemons log in more than one file. For example, telnet logs authentication messages in `/var/log/secure`, and other events in `/var/log/messages`

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Forwarding Logs

- Linux can be configured to forward logs to an administrator whenever the log reaches a size threshold. This is done via the log rotation daemon (logrotate.d)
- As an example, to forward the syslog when it reaches it's size threshold, enter the following in the /etc/logrotate.d/syslog file

```

/var/log/messages {
    prerotate
        /bin/sed -f /root/striplog.sed <
            /var/log/messages | /usr/sbin/fastmail -s \
            "messages log" - largepackage@home.com
    endscrip

```

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