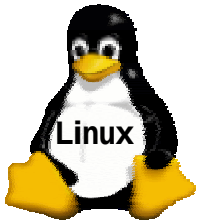
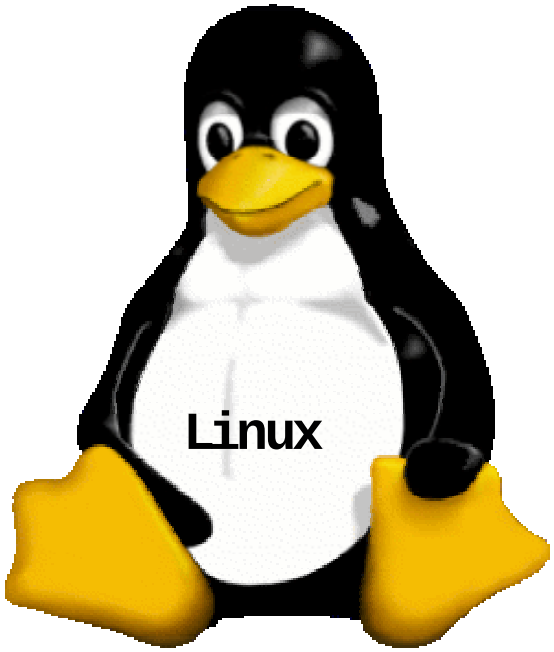


HP-UX and Linux, Friends or Foe?

and



A comparative look for HP-UX System Administrators.

Presented by:

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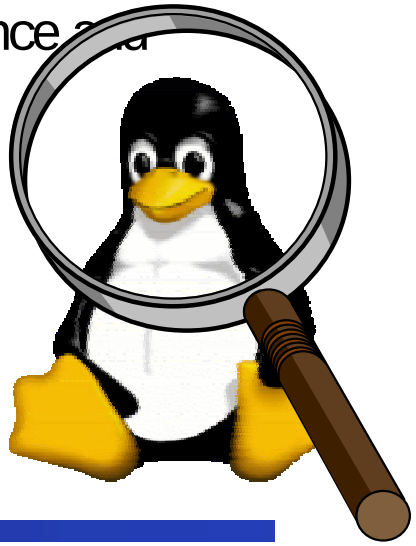
What is Linux?

- Linux is a flavor, or independent implementation, of the UNIX operating systems specification. It was written to have the look and feel of UNIX, but it contains no proprietary code. Linux is available free to anyone who can download it from the World Wide Web under the GNU General Public License, making it "open-source".
- A Linux "bandwagon" effect swept through the computer-system industry in early 1999, helping to propel Linux to prominence and rapid adoption.



What is Linux?

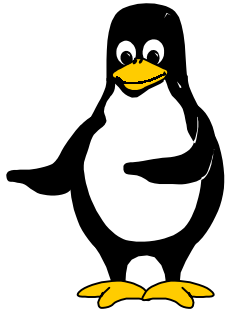
- Linux currently excels in the following application categories which is compelling IS managers to consider implementing Linux in:
  - File and print serving in heterogeneous environments
    - NFS
    - SAMBA
  - Web serving
  - Email and news servers
  - Network security
  - Inexpensive parallel super-computing

How Did It Start?

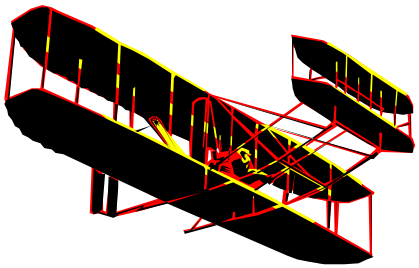
- 1991: A Finnish college student named Linus Torvalds posted a message to an Internet newsgroup.
- Many programmers added new functions to Linus' UNIX®-like operating system kernel.
  - Nearly all GNU (GNU's Not UNIX) software has been ported to Linux, greatly increasing its functionality and usefulness.
  - Nearly all components of most Linux distributions are openly available in source code under the GNU Public License (sometimes called the copyleft).
- Today, Linux is essentially indistinguishable in function from any other full-featured operating system.
  - Well, there are those who claim that it's better than most...

Linux Features

- Runs on a variety of CPUs: Intel, ALPHA, SPARC, PA-RISC
- Essentially all the functionality of a complete UNIX implementation
- Full device and file system management
- Modular kernel
- Support for system administration
- The usual numerous text-editing tools
- GUIs in multiple flavors
- Complete programming development tool suite
- Complete set of networking services



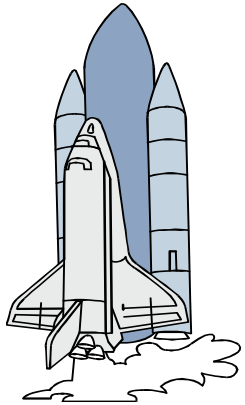
Hardware Requirements (bare bones)



Minimum

- 20 MHz Intel 80386
  - Faster is, of course, better.
- 8 MB RAM
  - less for small kernels and no GUI
  - more for multiuser capability
- ISA bus on motherboard
- 100 MB hard disk drive on an AT-type controller
  - But you will want more…
- VGA video and monitor
  - Although, Linux can be run "headless" from a serial console

Hardware Requirements (more realistic)

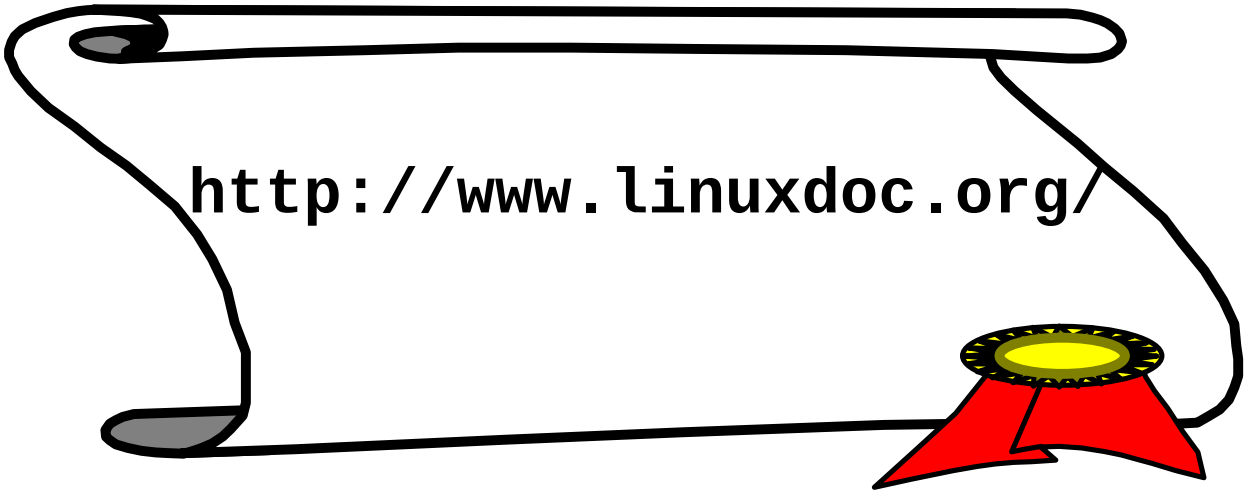


What you will really want

- 200 Mhz Pentium or better
  - Faster is, of course, better.
- 64 MB of **RAM**
  - if you plan on heavy X-window usage you might want 128 MB or more.
- EISA, PCI, AGP bus,
- 4 GB hard disk drive on an AT-type or SCSI controller
  - But you will want more …
- SVGA video and monitor (for X-window use at least a 17" monitor and a graphics card with 4MB or greater of dedicated **RAM**)

Linux Documentation Project

- Standard (and totally *free*) documentation suite for Linux
- Available at :

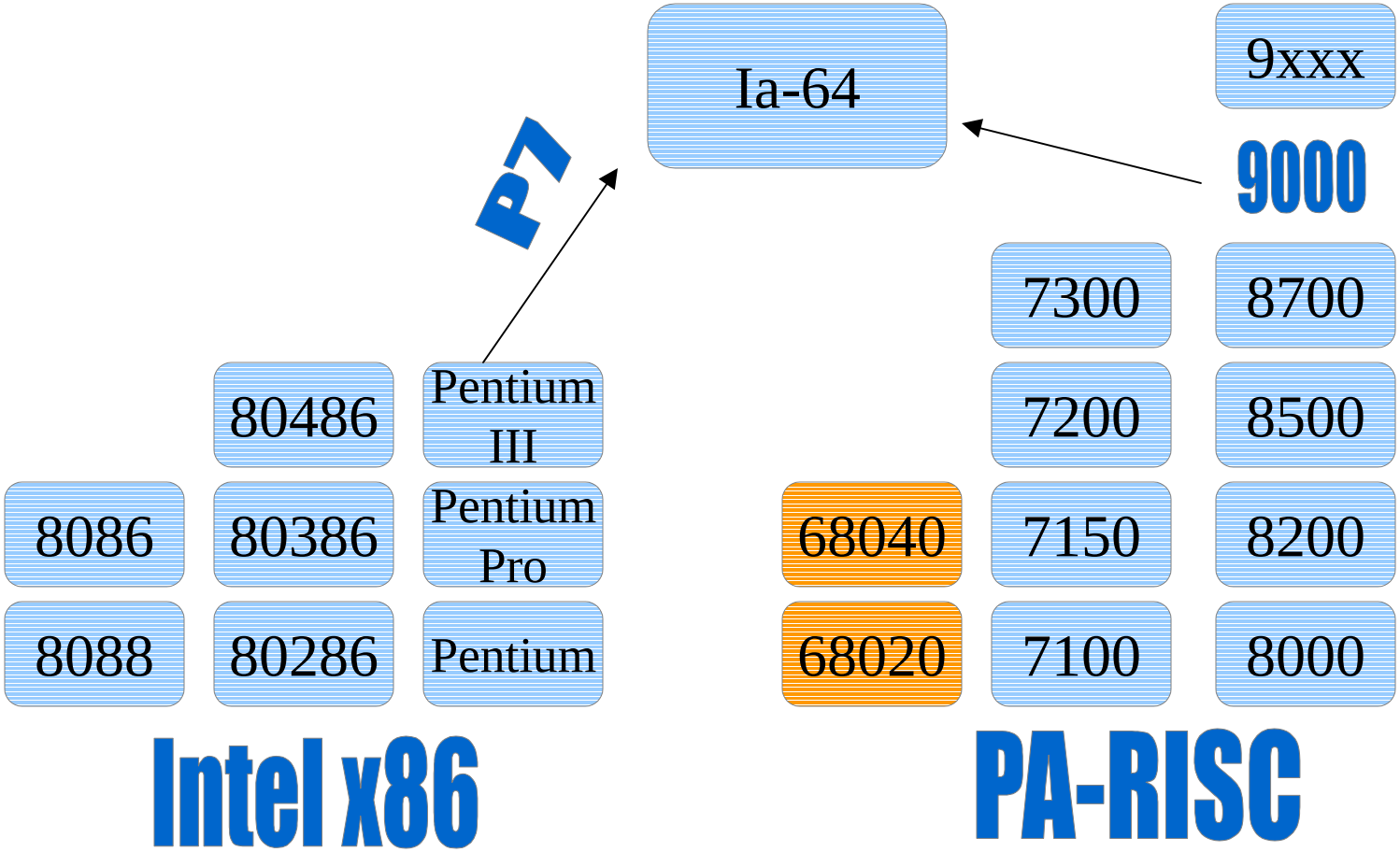


and many mirrored sites

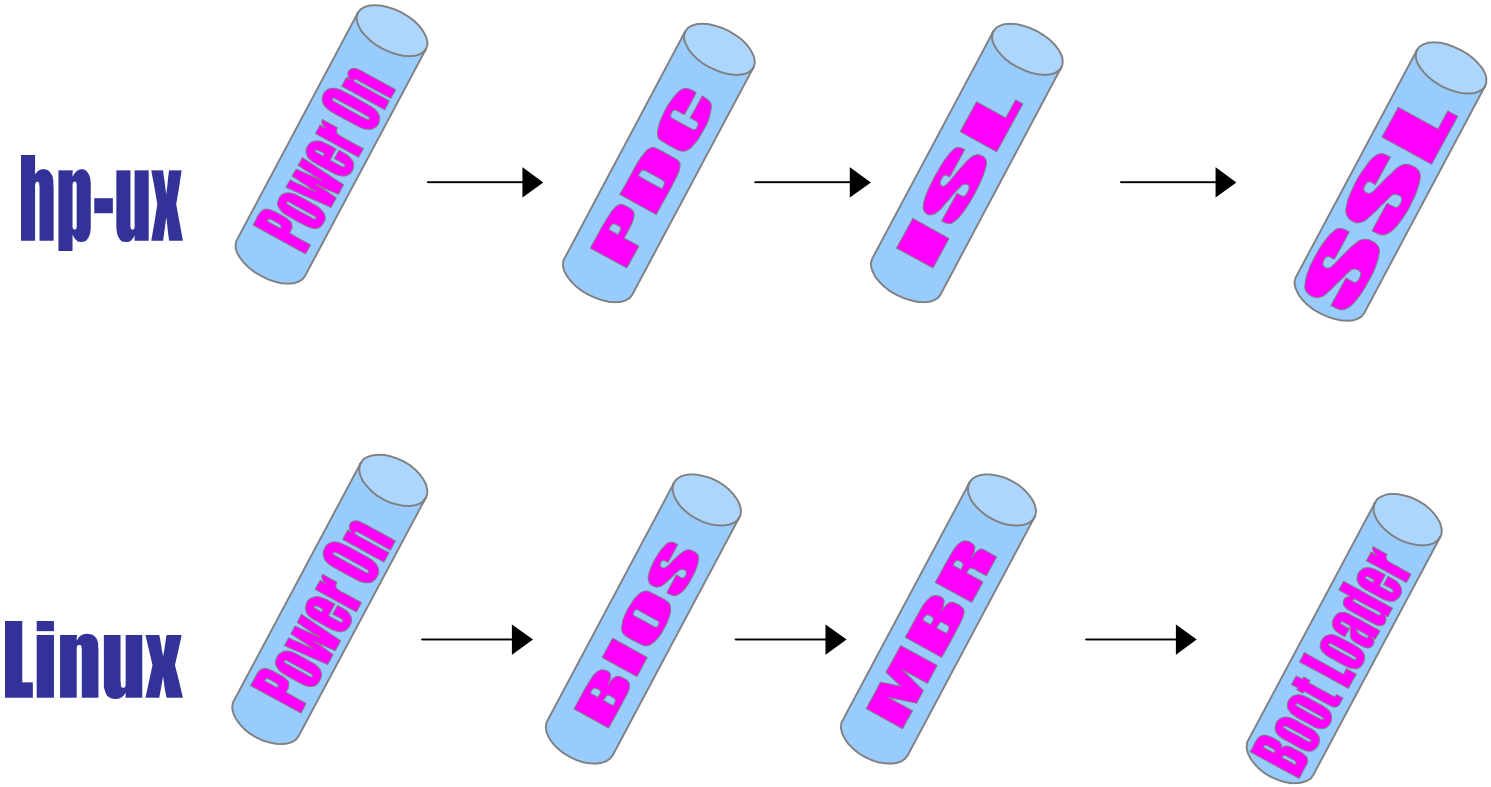
Basic Configuration

	HP/UX	Linux
Minimum	HP PA-RISC 32 MB of RAM 500 MB disk space	Intel 386 CPU 16 MB of RAM 200 MB disk space
Useable	HP PA-RISC 64 MB of RAM 2 GB disk space	Intel P-II CPU 64 MB of RAM 2 GB disk space

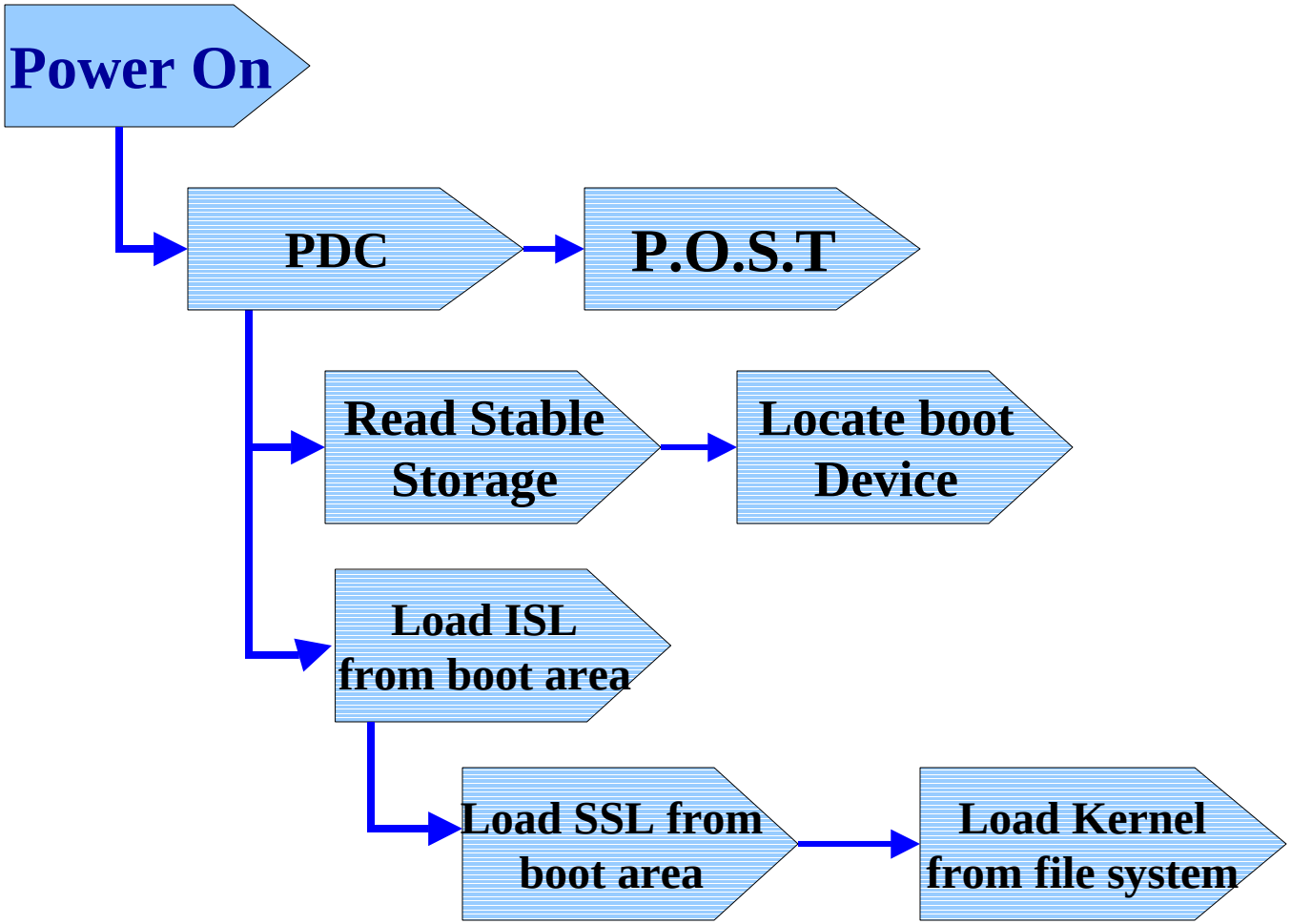
Processor Families



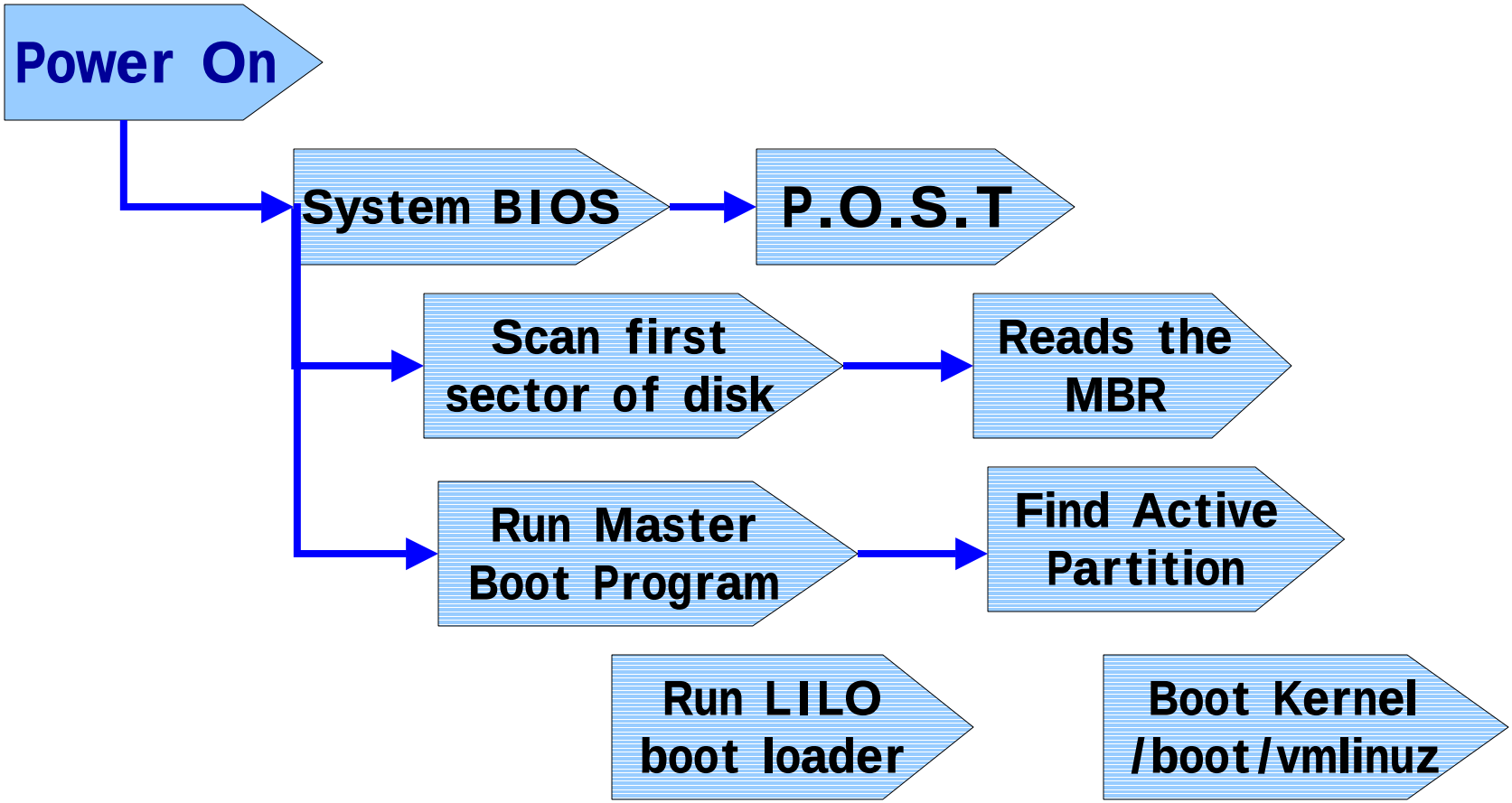
System Boot



System Boot HP-UX (on PA-Risc)

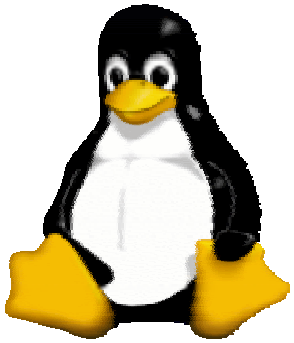


System Boot Linux (on Intel)



System Boot - Menus

- Power On
- Hit ESCape Key
- Main Menu: boot pri
- Interact with IPL? Yes
- ISL> hpux -is

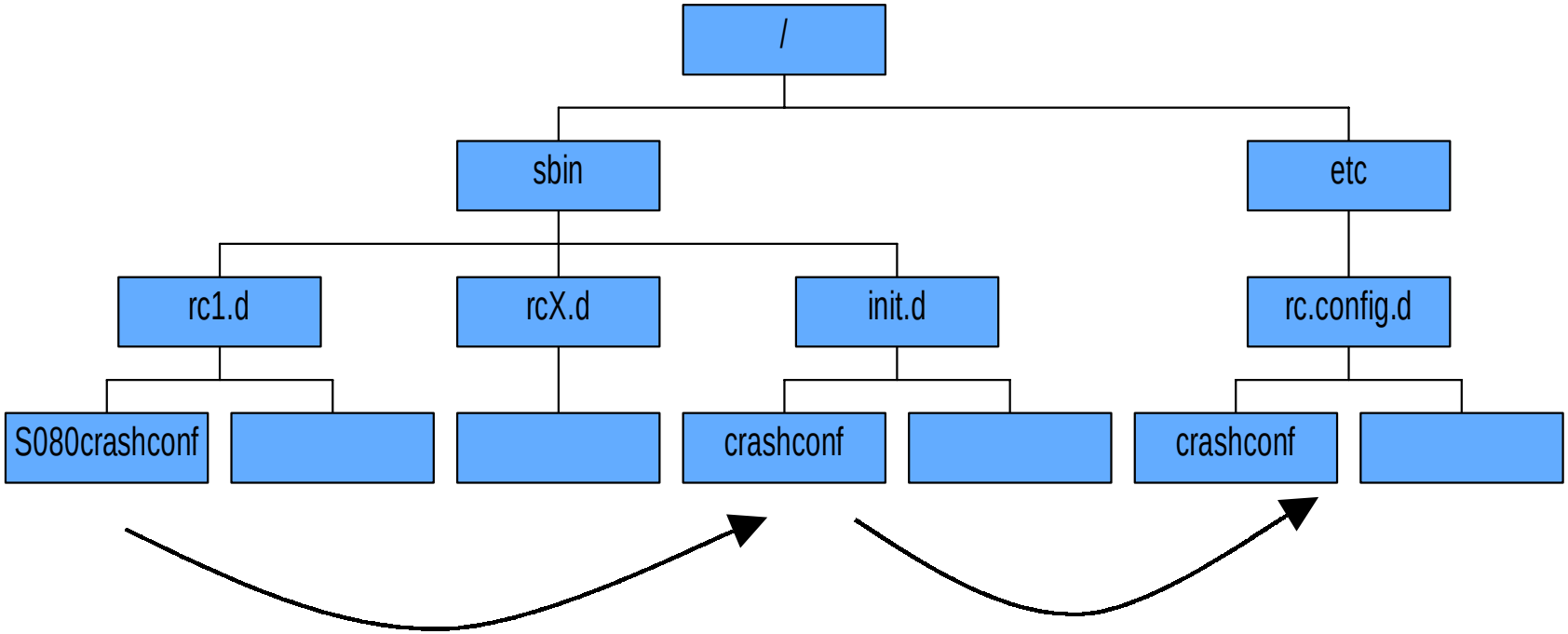


- Power On
- Hit the <TAB> key
- LILO boot: linux single

System Startup
HP-UX

	Directories	Files
Execution Scripts	/sbin/init.d/	/sbin/init.d/*cron*
Link Scripts	/sbin/rc***X***.d	/sbin/rc***2***.d/*S730cron* /sbin/rc***1***.d/*K270cron*
Configuration Scripts	/etc/rc.config.d/	/etc/rc.config.d/cron

System Startup
HP-UX



System Startup Linux

	Directories	Files
Execution Scripts	/etc/rc.d/init.d/	/etc/rc.d/init.d/*crond*
Link Scripts	/etc/rc.d/rc***X***.d	/etc/rc.d/rc***2***.d/*S40crond* /etc/rc.d/rc***1***.d/*K60crond*
Config Scripts	None, but files in the /etc/sysconfig directory supply additional information to the Execution Scripts, e.g. /etc/sysconfig/network	

The Startup and Shutdown Scripts

- Execution scripts

/etc/rc.d/init.d	Contains the execution scripts

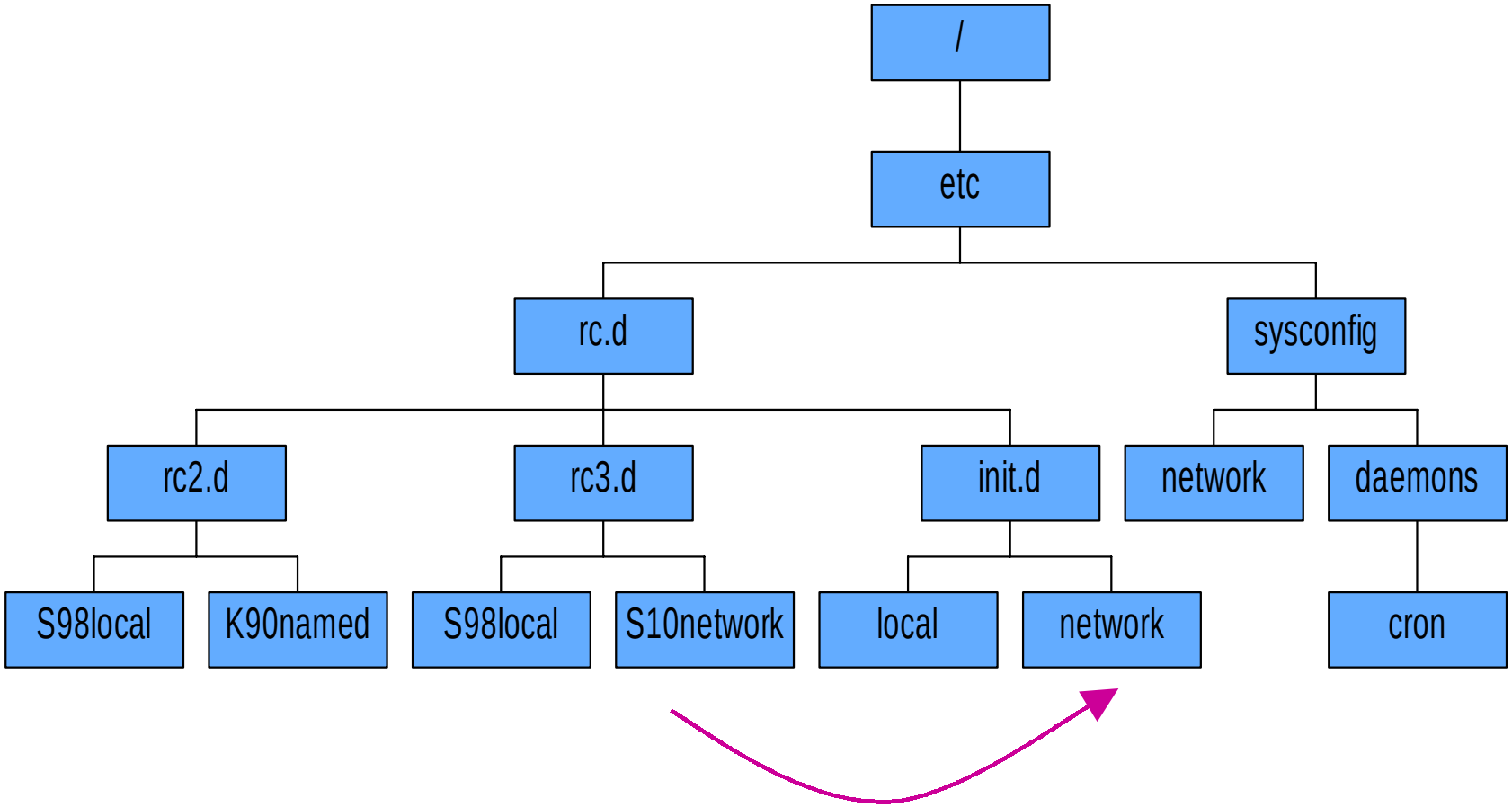
- Link scripts

/etc/rc*n*.d	Contains link scripts
/etc/rc2.d/S40crond	Starts **crond** daemon
/etc/rc1.d/K60crond	Stops **crond** daemon

- Configuration scripts

  /etc/sysconfig directory

System Startup Linux



Run Level

HP/UX	Description	Linux	Description
0	Halt	0	System Halt
Ss	Single User	1	Single User
1	Maintenance; File Systems in /etc/fstab are mounted		
2	Multi-User; Network and NFS client enabled	2	Multi-user; Network and NFS client
3	NFS and X Server enabled	3	NFS Server
4	TBA	4	TBA
5	TBA	5	X Server enabled
6	TBA	6	Reboot

Runlevel Configuration Utility

- Provides a simple interface for configuring the startup and shutdown script symbolic links in each Linux runlevel

- Syntax: **/usr/sbin/ntsysv [--level <levels>]**

  # ntsysv (to configure current runlevel)

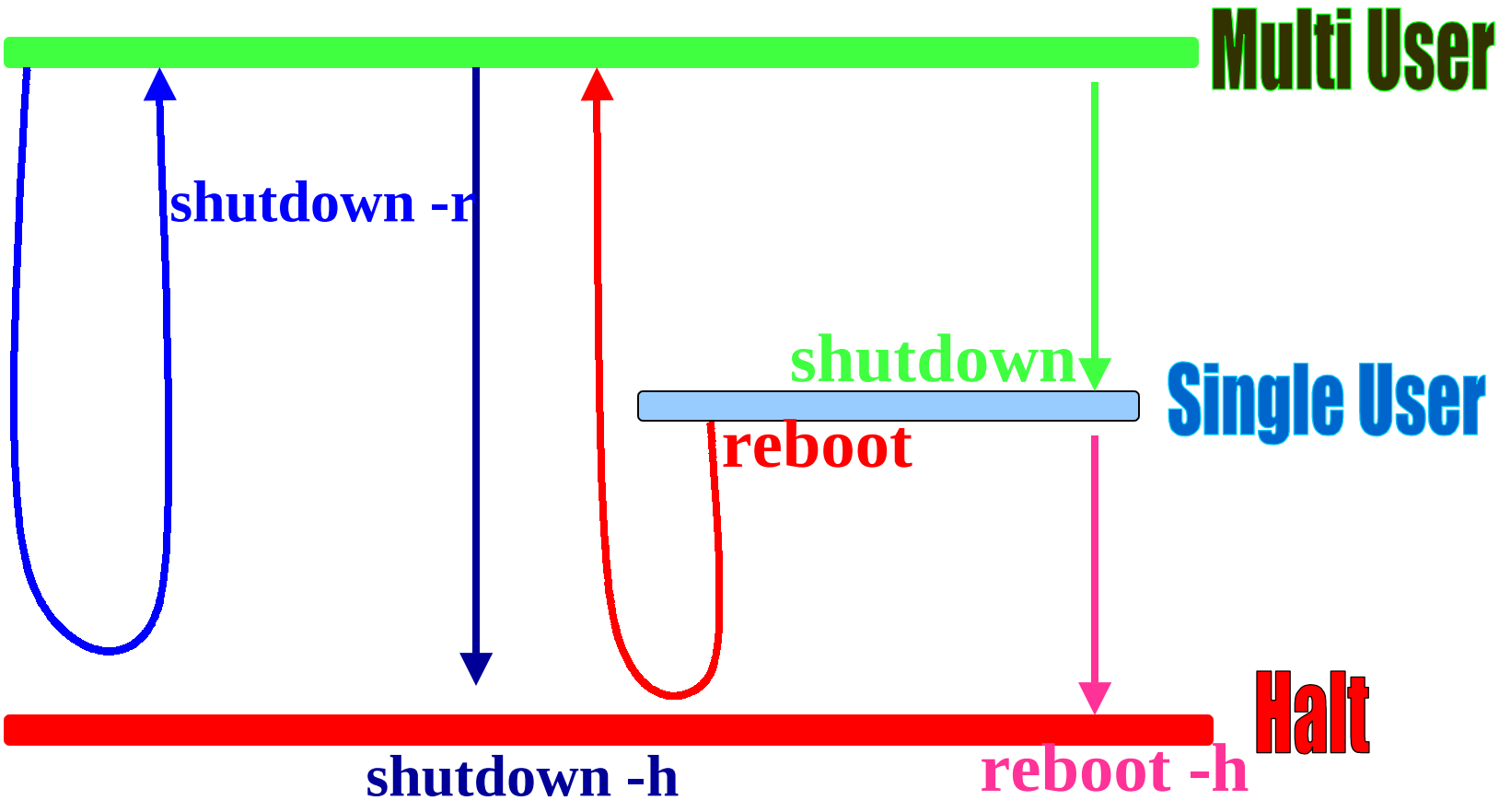
  # ntsysv --level 35

  (to configure runlevels 3 and 5 concurrently)

- Syntax: **/sbin/runlevel**

  (Displays Current and Previous System Runlevel)

System Shutdown



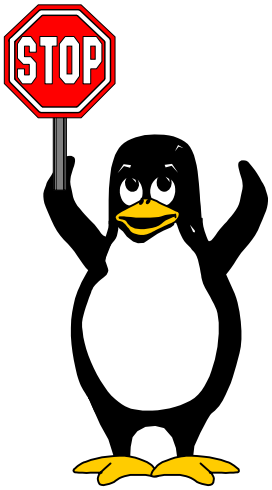
System Shutdown

	HP/UX	Linux
Single User	shutdown *grace_period*	• shutdown *time* ➢ shutdown 17:15
Reboot	shutdown -r *grace_period*	• shutdown -r *time* • Ctrl + Alt + Del • init 6
Halt	• shutdown -h *grace_period* ➢ shutdown -h 360	• shutdown -h *time* ➢ shutdown -h +6

Shutdown Program

- Bring the system down gracefully.
- Syntax: **shutdown [-tkrhfFc]**

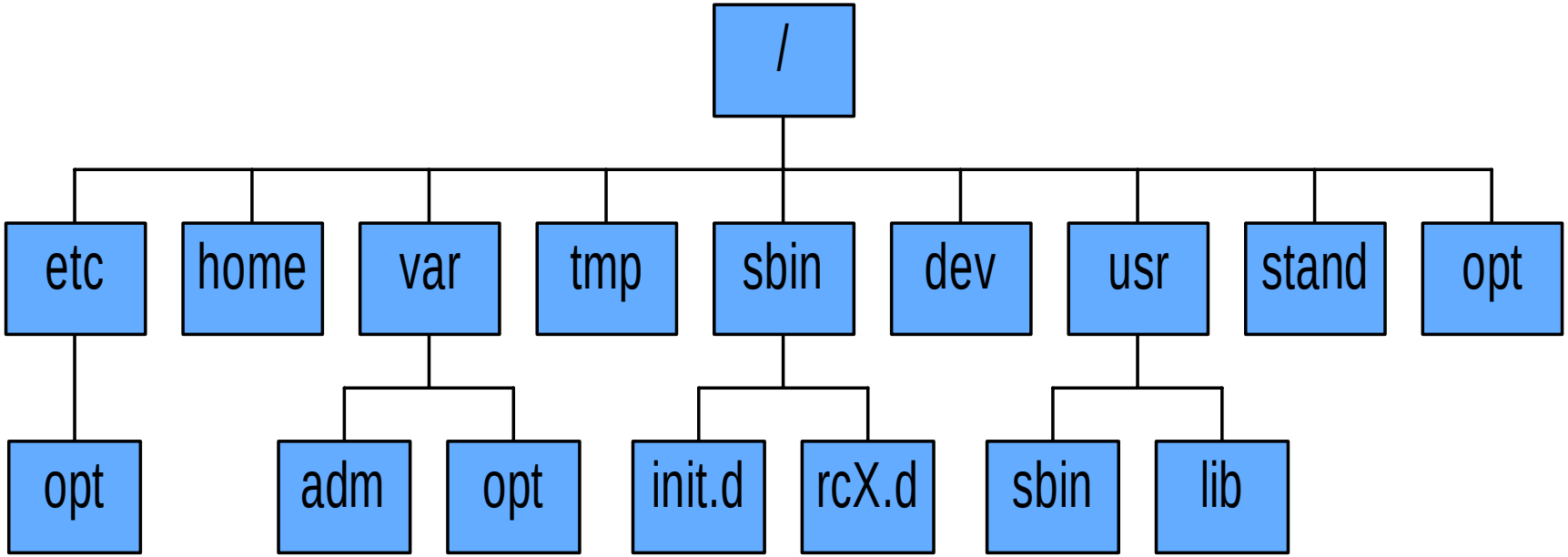
```
# shutdown now
# shutdown -r now
# shutdown -h now

/etc/shutdown.allow
/etc/shutdown.deny
```



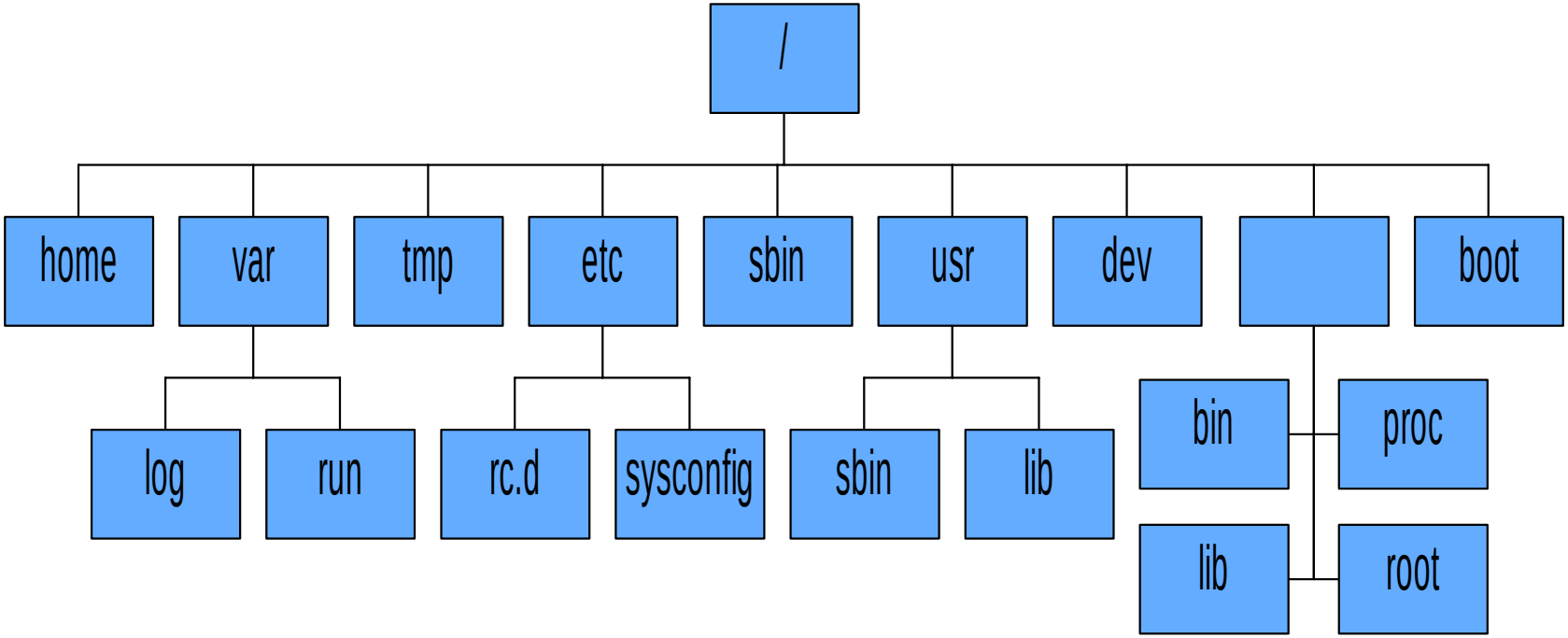
Device Files

	HP/UX	Linux
Disk	/dev/dsk/c*x*t*y*d*z*	/dev/hda /dev/hdb /dev/sda /dev/sdb
Tape	/dev/rmt/c*x*t*y*d*z*OPTION	/dev/tape
CD-ROM	/dev/dsk/c*x*t*y*d*z*	/dev/cdrom
Floppy	/dev/floppy/c*x*t*y*d*z*	/dev/fd*X*
LAN	/dev/lan*X*	/dev/eth*X*

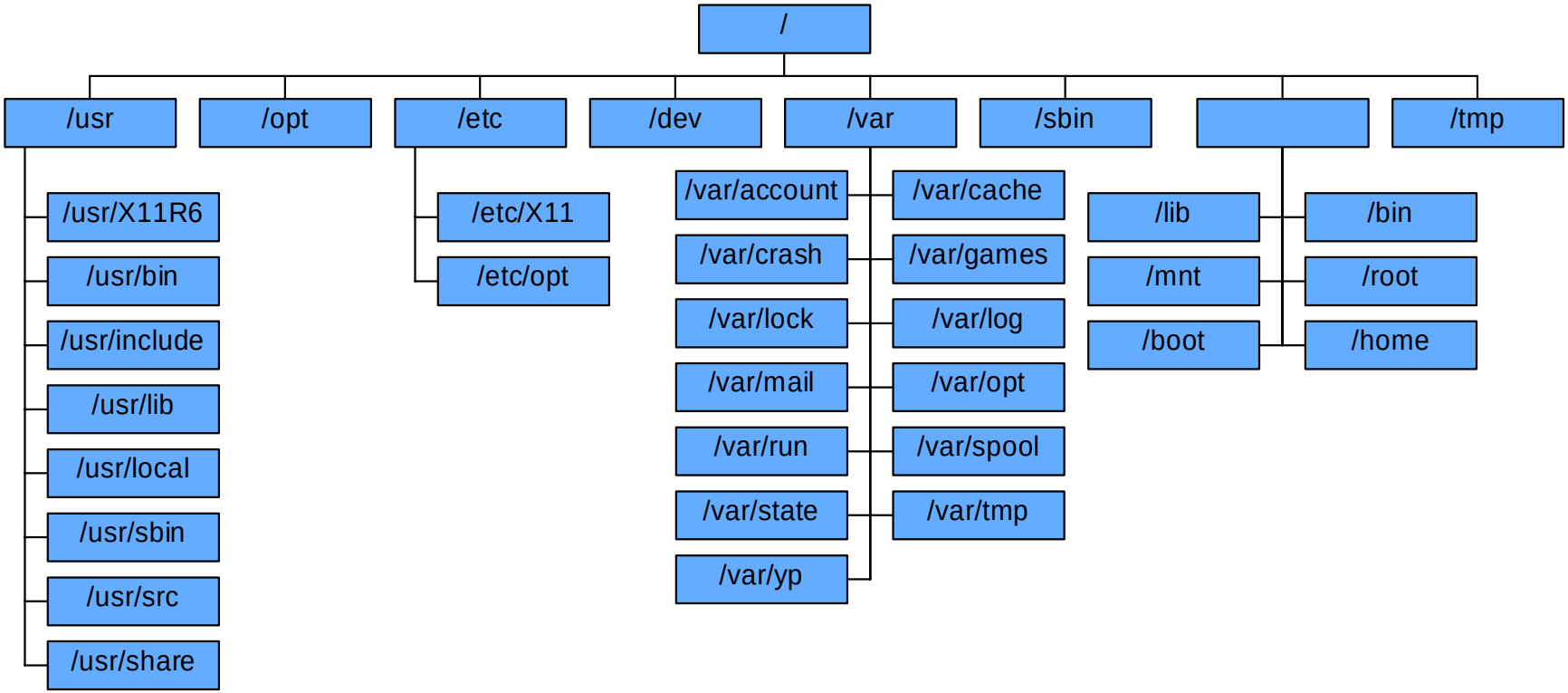
File System
HP-UX



File System Linux



Linux File System Hierarchy v2



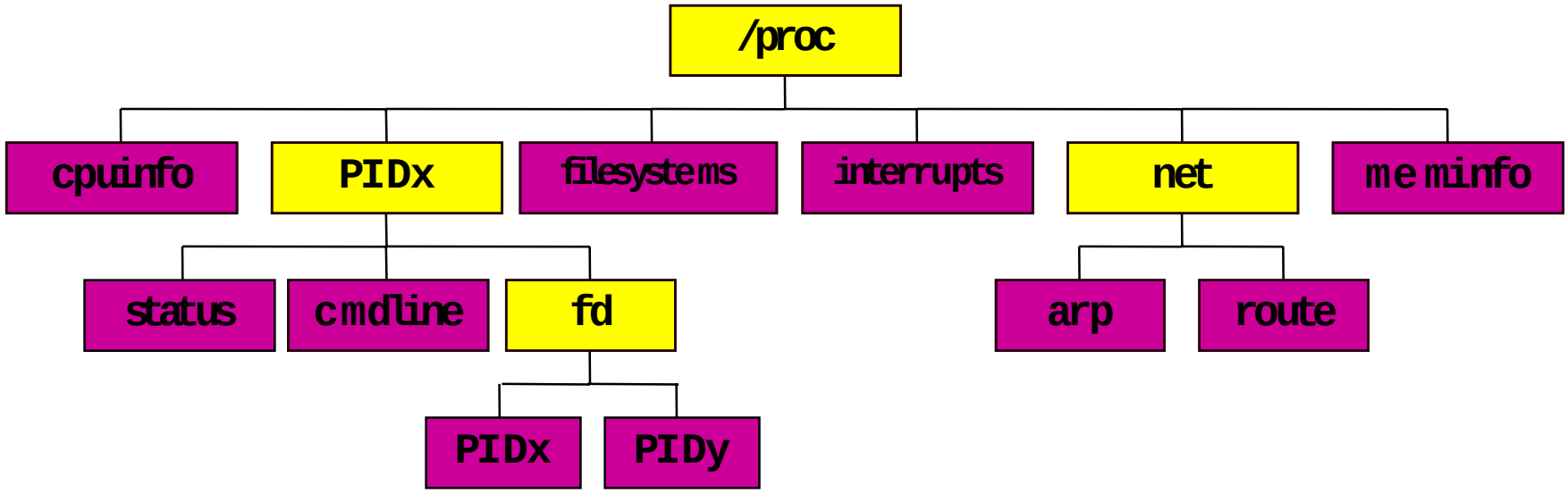
File System Types

	HP/UX	Linux
VxFS	★	
Ext2FS		★
HFS	●	
NFS	●	●
CDFS	●	iso9660
XFS		●

The Linux /proc file system

The /proc filesystem can be used to access information about the kernel, processes and devices. The /proc filesystem is used by the user and applications such as ps and mount.

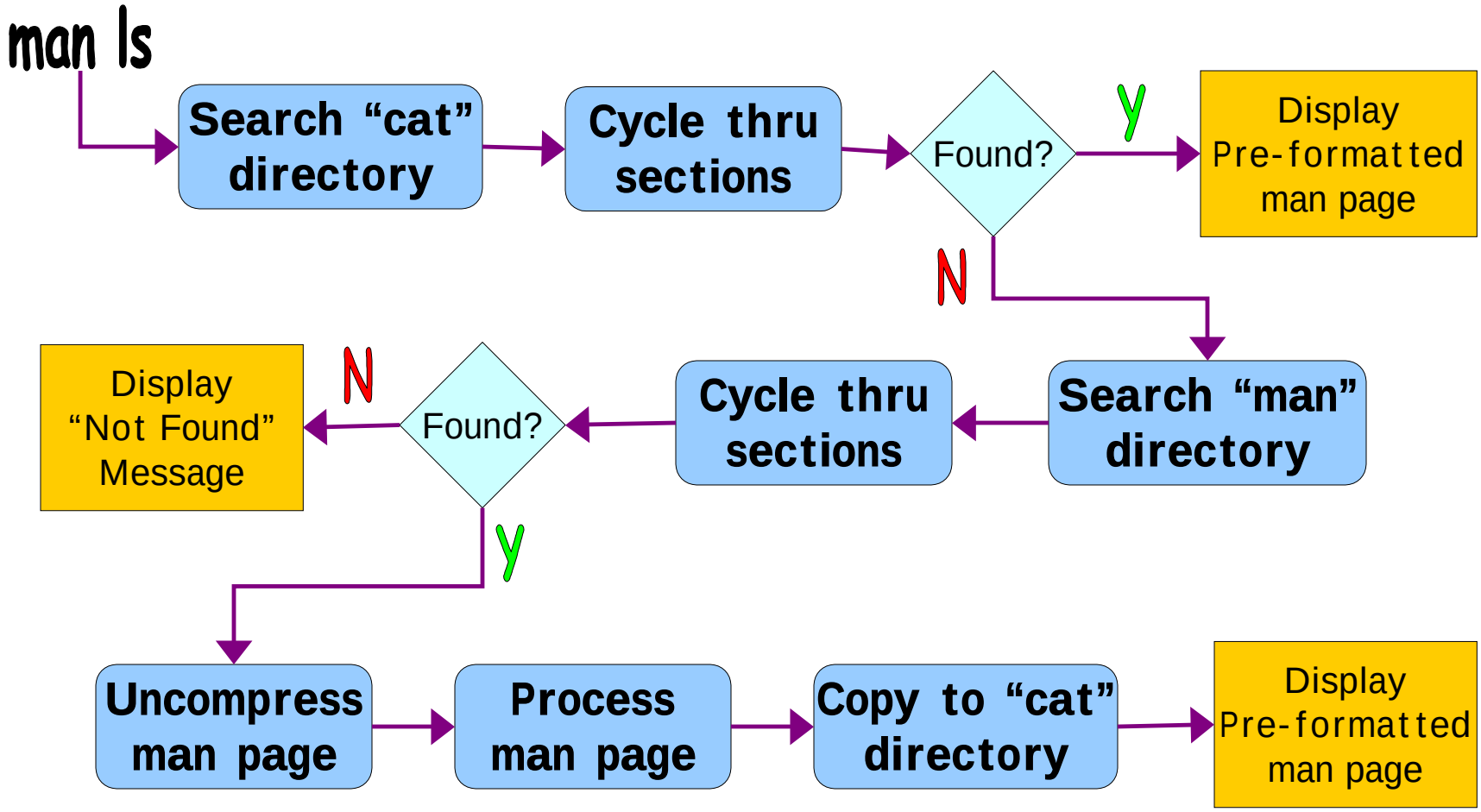
Here is an example of the /proc file system hierarchy:



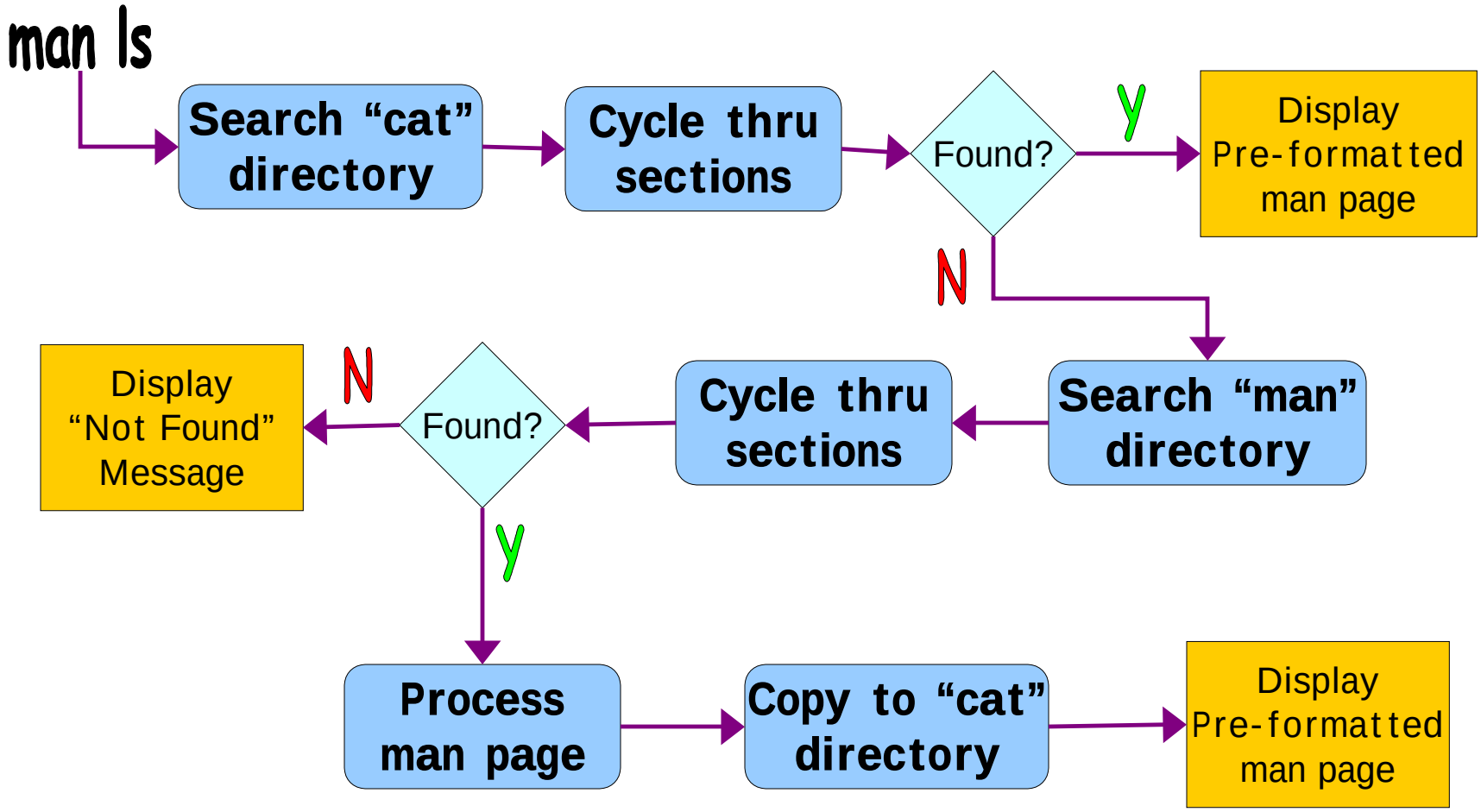
Man Pages

	HP/UX		Linux
1	User Commands	1	User Commands
2	System Calls	2	System Calls
3	Library functions	3	Library functions
4	File Formats	4	Special Files
5	Special Files	5	File Formats
6	Games	6	Games
7	Miscellaneous	7	Macro Packages
1m	System Maintenance	**8**	System Maintenance
9	**Glossary**	**9**	**Kernel Routines**

Man Pages
HP-UX



Man Pages
Linux



Man Pages
Linux

- The **/etc/man.config** file contains information for the Linux man command on search path, default man sections and what programs to use to process the raw man pages
- Every Linux manual section has a man page called intro that provides an introduction to the section. E.g. man 4 intro
- The -a option forces the man command to display all the manual pages of a particular name from each section. For example, **man -a passwd**, displays the passwd man page from section 1 and section 5 in sequence.
- The Linux manual page system contains additional sections such as n (built-in commands), and l (SQL commands)

Process Status

The Linux ps command accepts three types of options:

- BSD — Absolutely no dash preceeding option(s)
- Unix98 — Dash must preceed option(s)
- GNU — Long options preceeded by two dashes

Examples

```
ps aux
ps -ef
ps --user calvin
```

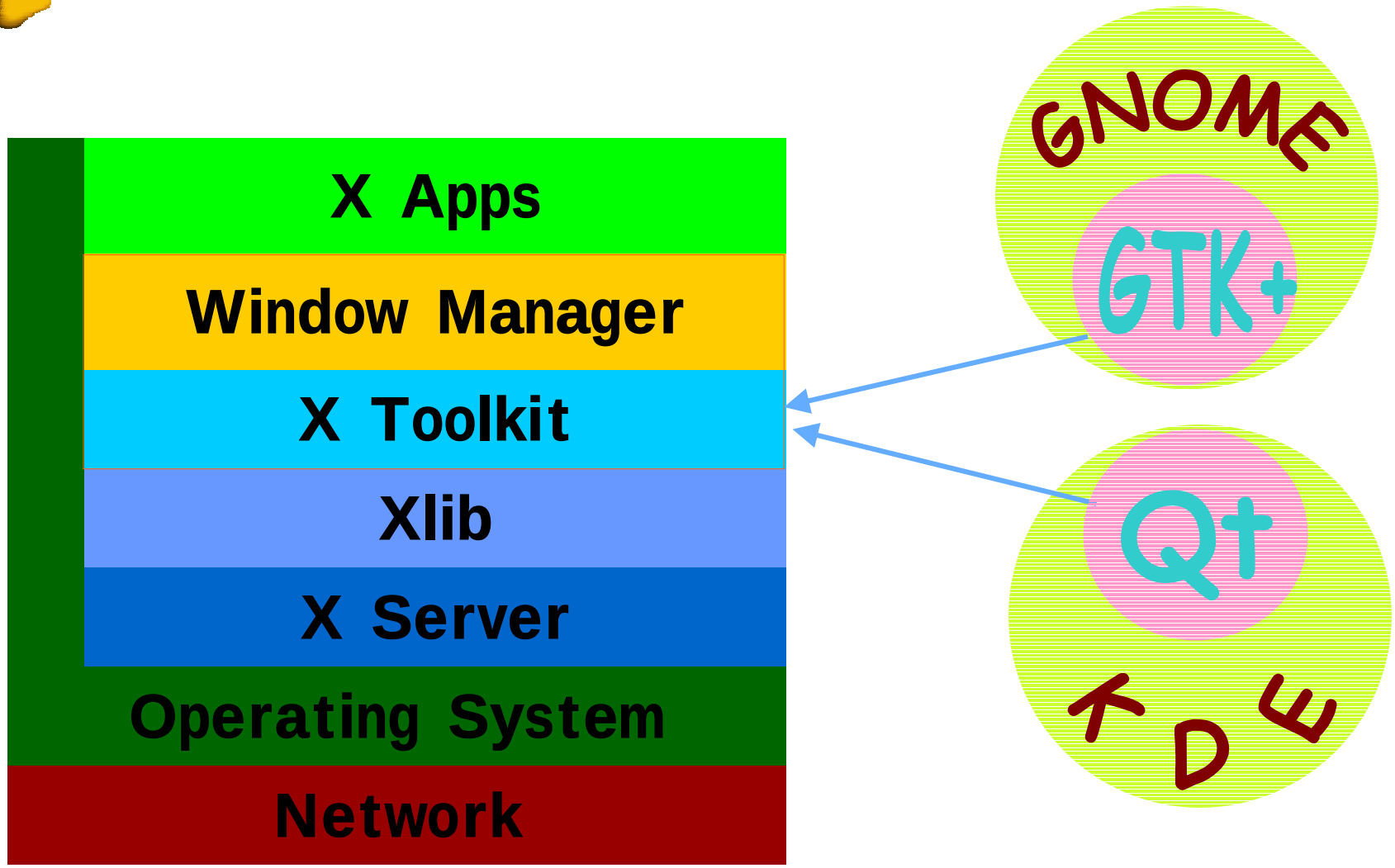
The Linux command **pstree** represents the list of running processes as a tree, showing the hierarchical relationship between processes.

About the X Window System

Configuring X-Windows

- It is based on a client-server model.
- The client may be running locally or on a remote system.
- The server "listens" to local and remote network sockets.
- X11R6 was developed in 1994.
- XFree86 was developed for i386 systems.
- The X Window System may be configured at the time of installation.

X Windows



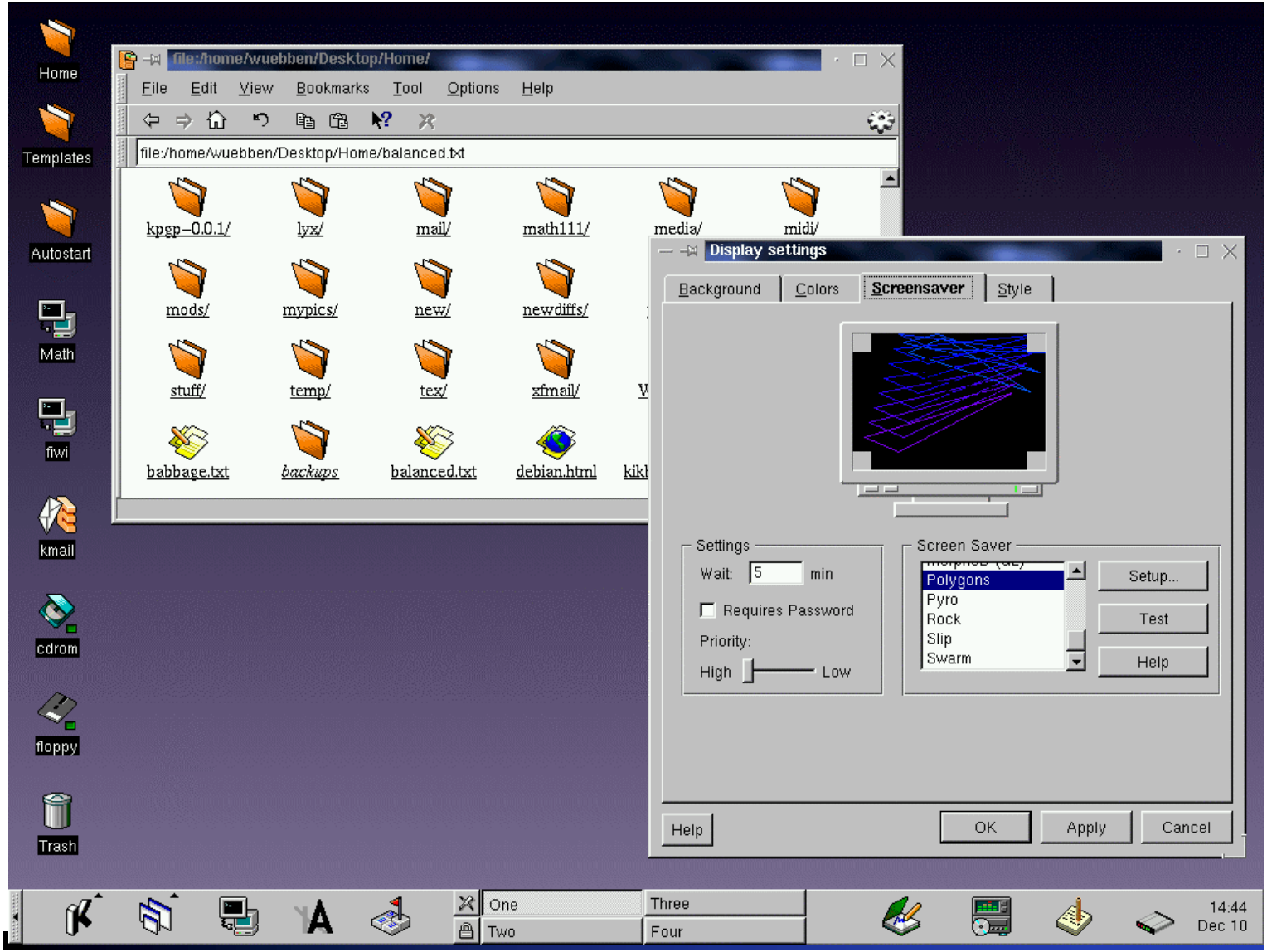
Window Managers and Desktop Environments

Configuring X-Windows

- Linux X-Window managers
  - **xdm**
  - **fvwm**
  - **fvwm2**
  - **fvwn95**
    - The Free Virtual Window Manager series use the **.fvwmrc** configuration file
- Linux desktop environments
  - KDE
  - GNOME

A window manager is a client program that runs under the X Window system.
The desktop environments define the actual GUI seen by the user.

KDE Desktop



The GNOME Desktop

Configuration Programs

Configuring X-Windows

- **`/etc/X11/XF86Config`** is the necessary configuration file.
  - It can be edited by hand, but there are tools to generate it interactively.
- **`xf86config`** generates the file.
- **`xf86config`** is initiated at the time of installation.
- Alternately, you may use **`Xconfigurator`**.
- Provide accurate information!

Starting Up the X Window System

- Running the X Window system automatically
  - Edit the **/etc/inittab** file.
  - Set the **id** to run in run level **5**.

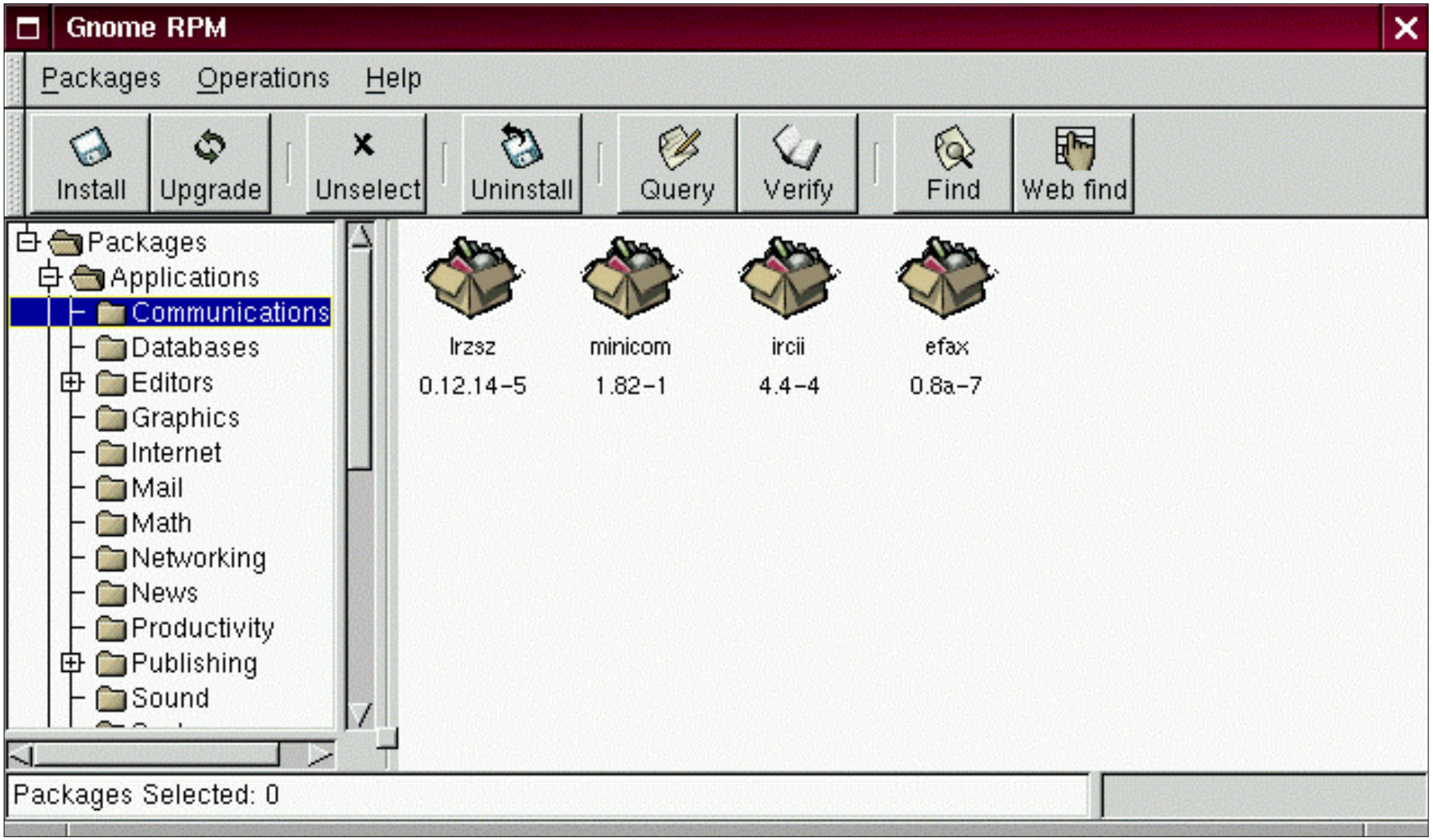
- Running the X Window System manually
  - **# startx**
  - **startx** invokes **xinit**

- The X Window System Display Manager
  - **# xdm**

Package Management

- Simple package install:
  - rpm -iv foobar-1.0-1.i386.rpm
- Install packages via FTP
  - rpm -i ftp://abc.xyz.com/pub/linux/foobar-1.0-1.i386.rpm
- A few other options:
  - rpm -U <-- Upgrade
  - rpm -e <-- Erase/Uninstall
  - rpm -q <-- Query
- GnoRPM is a GNOME-compliant, graphical tool that runs under X

Package Management



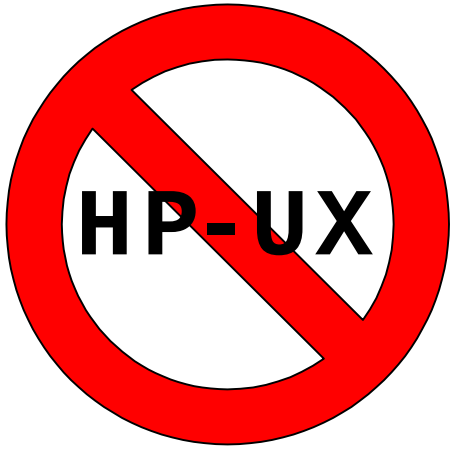
Not On Linux

- Here are a list of familiar HP/UX commands that are not available on Linux:

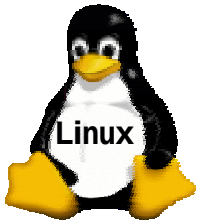
what	iostat	lanscan
chatr	ioscan	inetd -c
bdf	insf/mksf	/var/adm/inetd.sec
lp	linkloop	logingroup
adb	remsh	who -r

Not On HP-UX

- Here are a list of Linux commands that are not available on HP-UX:



intro	lpc	swapoff
tcpd	less	procinfo
mc	dos	linuxconf
zip	less	runlevel



Network Tools

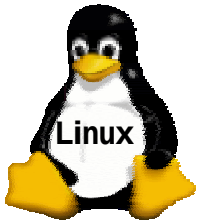
- **netcfg** tool configures and modifies network interface cards.

  hosts, interfaces, routing
- **nslookup** used to query domain name-number resolution services
- **ping** the old standby
- **traceroute** report on name resolution server path(s)
- **route** to add|delete routes to the system's routing table
- **netstat** examine system routing tables and network socket connections

Network Security Files

Network Config.

- TCP wrapper control files:
  - **/etc/hosts.allow**
  - **/etc/hosts.deny**
- Service-specific controls:
  - **/etc/ftpusers**
- IP-Chains, IP-Filters

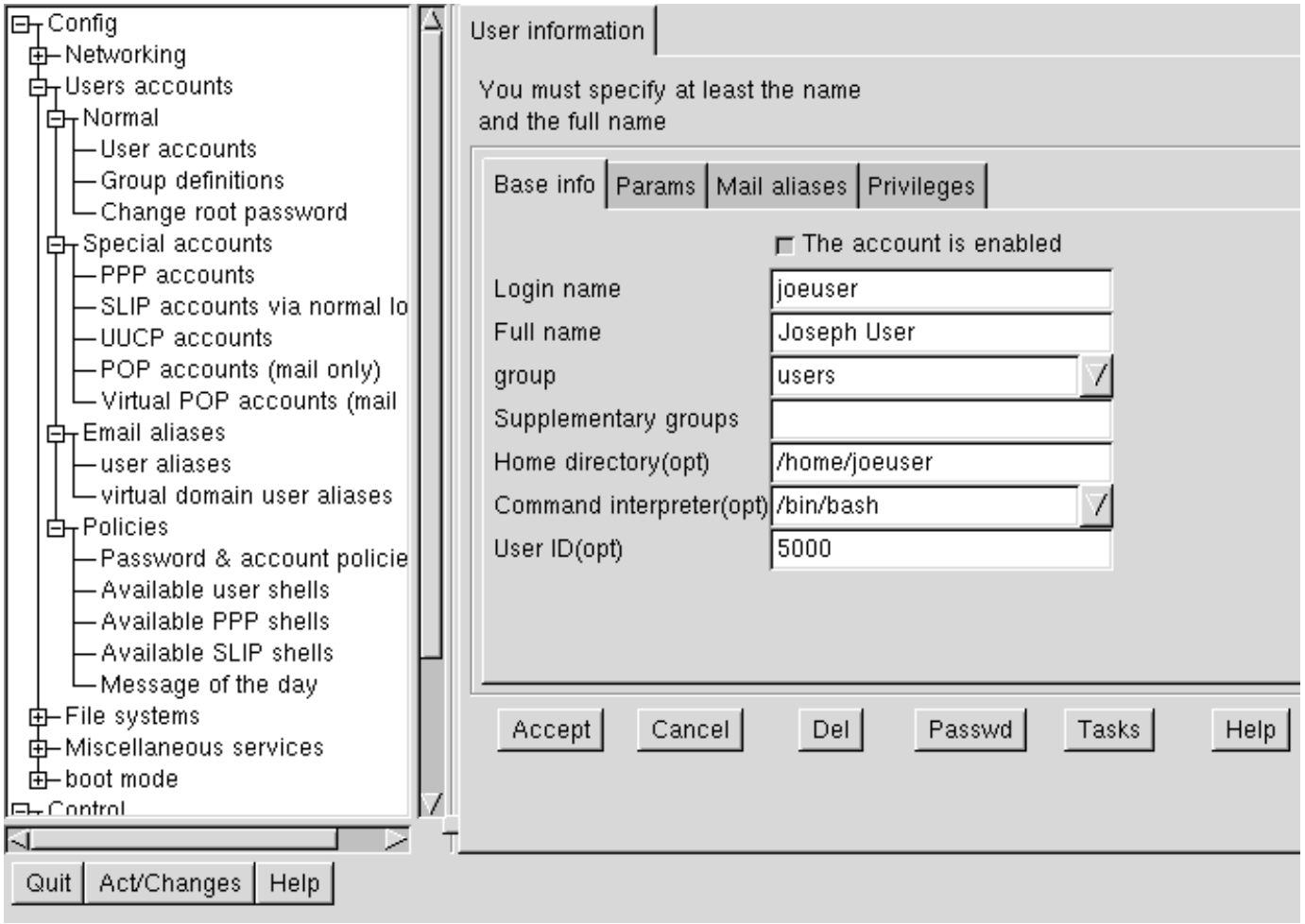


Networking Configuration Files

- /etc/HOSTNAME
- /etc/sysconfig/network
- /etc/sysconfig/network-scripts/ifcfg-*
- /etc/sysconfig/static-routes
- /etc/hosts
- /etc/networks
- /etc/resolv.conf
- /etc/nsswitch.conf
- /etc/services
- /etc/inetd.conf or /etc/xinetd.conf

Logins & Spooling

Using **linuxconf**



Logins & Spooling

Changing Passwords

- Command line
  - # **passwd** ***username***

- Using **linuxconf**
  - # **linuxconf**
  - **Config => User accounts => Normal => User accounts**

Pluggable Authentication Modules

Logins & Spooling

- PAM allows you to configure authentication policy without recompiling the authentication programs.

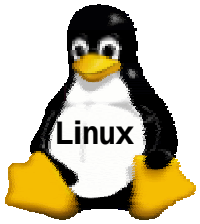
- Four types of modules
  - **auth**
  - **account**
  - **passwd**
  - **session**

- **/etc/pam.d** contains the PAM application's configuration files.

Printer Configuration

Logins & Spooling

- Printer types:
  - Local printer
  - Remote **lpd**
  - LAN Manager
- Use **printtool** to modify the **/etc/printcap** file
- Print commands:
  - **lpr** — Print a file
  - **lpq** — Check print job status
  - **lprm *job-number*** — Cancel a print job
  - **lpc** — Control the printing environment



Kernel Config.

Getting and Unpacking the Source

- Via FTP from:

  ftp://ftp.kernel.org/pub/

  or any mirror site

Via HTTP from:

  ftp://www.kernel.org/pub/

  or any mirror site

For general information on Linux:

  http://www.linux.org

- Move **/usr/src/linux** to

  /usr/src/linux.X.Y.Z

Unpack new source using:

  tar zxpvf linux-X.Y.Z.tar.gz

Read the **README** file.

Kernel Release Model

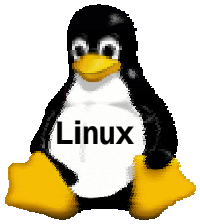
Kernel Config.

2 . 2 . 10

Major Minor Patch

Even # — Stable

Odd # — Develop



Configuring the Kernel

- Change directory to **/usr/src/linux**

  make config (using the **bash** shell), or
  make menuconfig (an **ncurses**-based text interface), or
  make xconfig (using the X Window system)

- Configure and add:

  IDE disk/CD-ROM support
  Networking support
  SCSI support
  Additional file systems (like MS-DOS)
  and other peripherals support as needed.

Modularizing the Kernel

Kernel Config.

- Linux uses a monolithic kernel
  - It's simpler to manage than a micro-kernel.
  - But it can become very large.

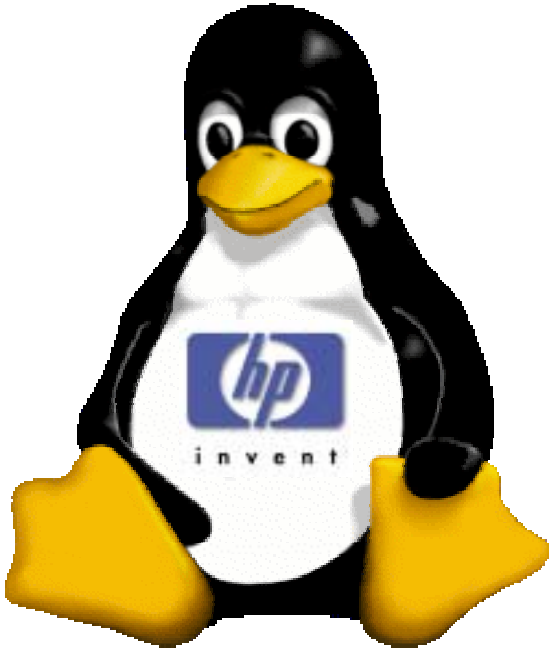
- A modularized kernel can be smaller
  - Only "bare necessities" are included in the base kernel
  - Other functions may be added (by **insmod**) or removed (by **rmmod**) as needed.
  - The **kerneld** daemon can automate additions and removals.

Distributions of Linux

- Red Hat
- SuSE (mainly in Europe)
- Caldera
- Turbo-Linux
- Mandrake
- Corel
- Debian
- Slackware
- FreeBSD
- And many more...

Hewlett Packard Systems and Linux

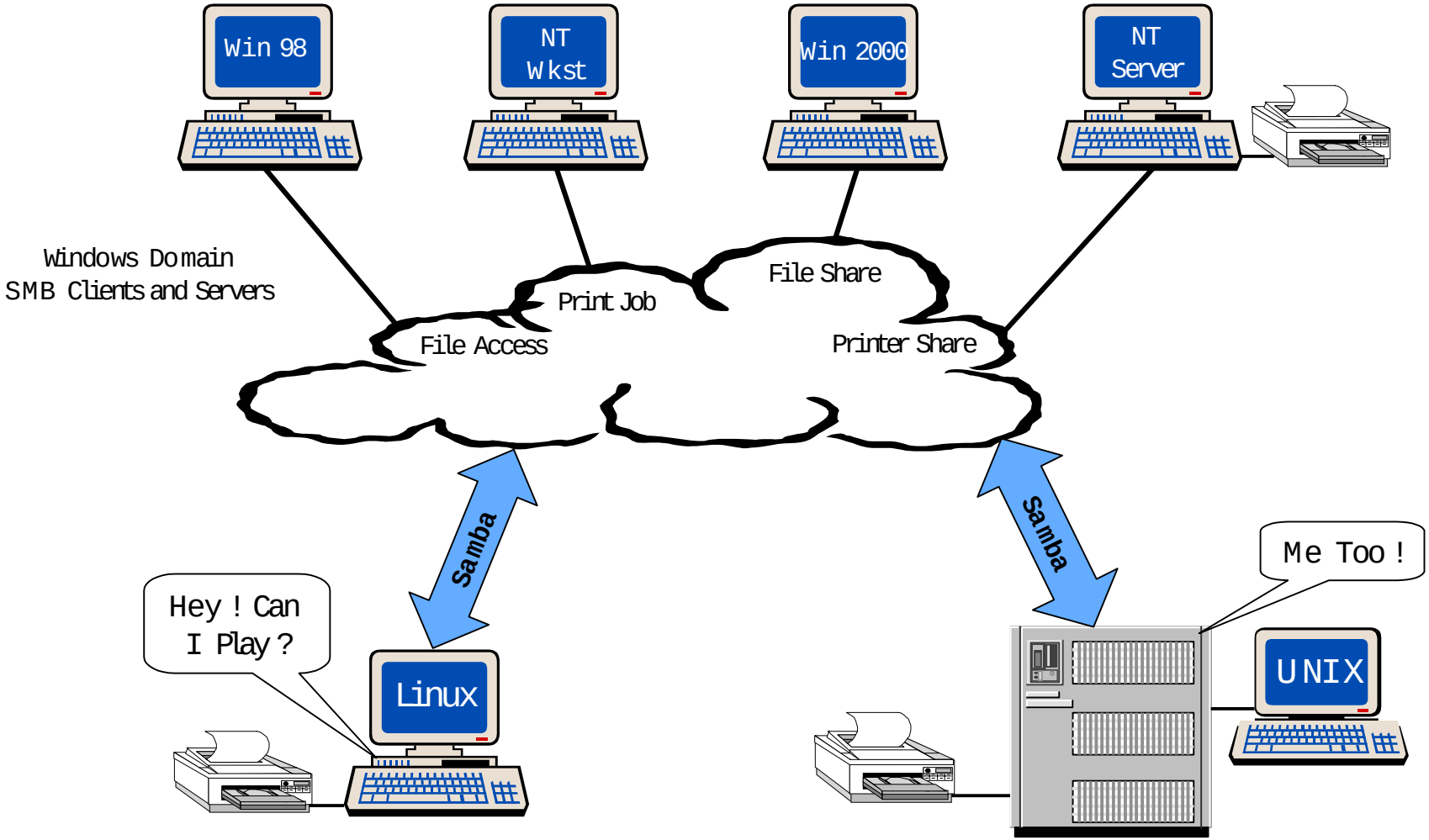
- Several HP systems have already been certified by Red Hat as "Red Hat Linux 6.1 Certified Systems".
- Current certified systems are listed at:
  - **http://www.redhat.com/support/hardware/**



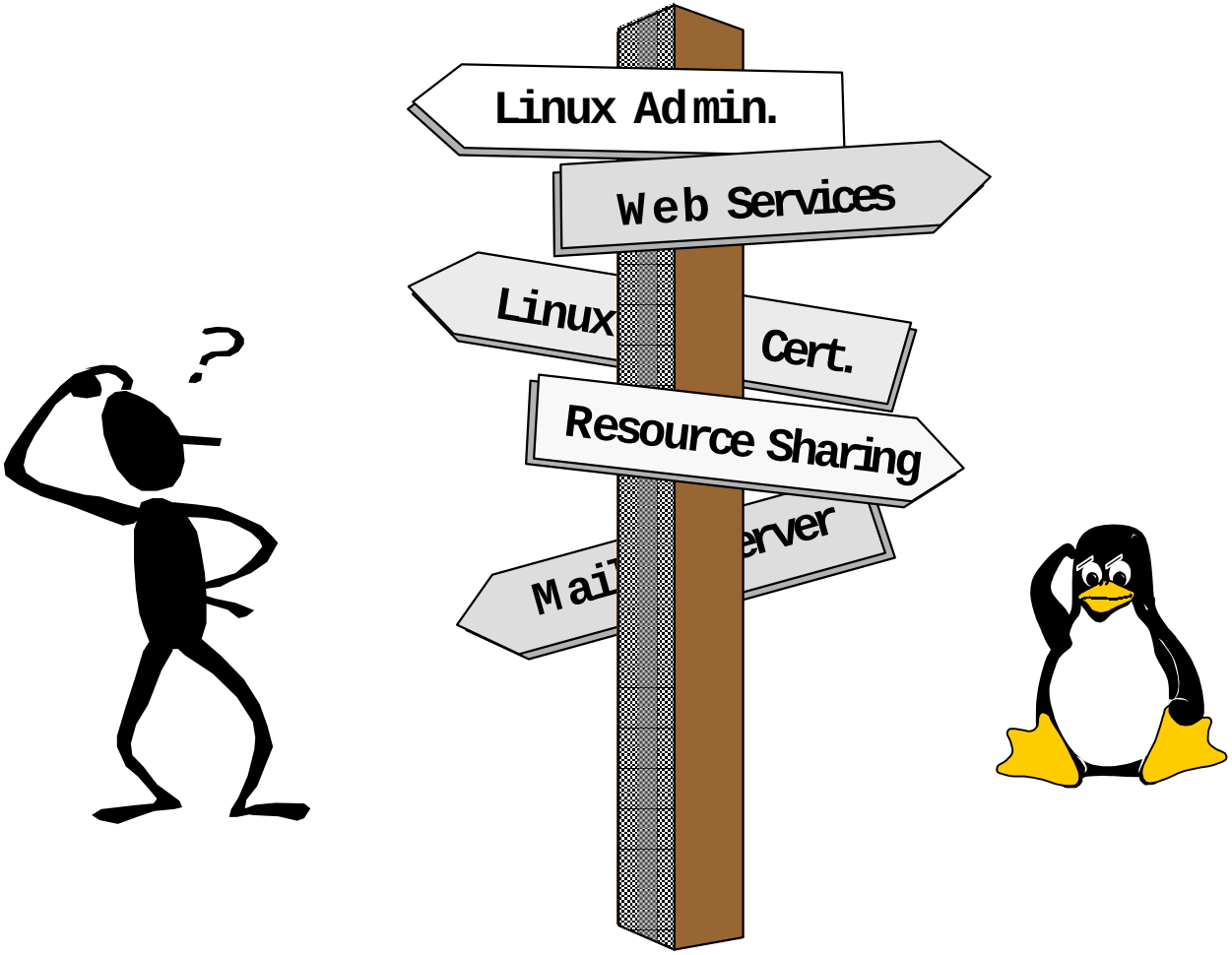
What is **Samba**?

- Share one or more filesystems
- Share printers installed on both the server and its clients
- Assist clients with Network Neighborhood browsing
- Authenticate clients logging onto a Windows domain
- Provide or assist with WINS name server resolution

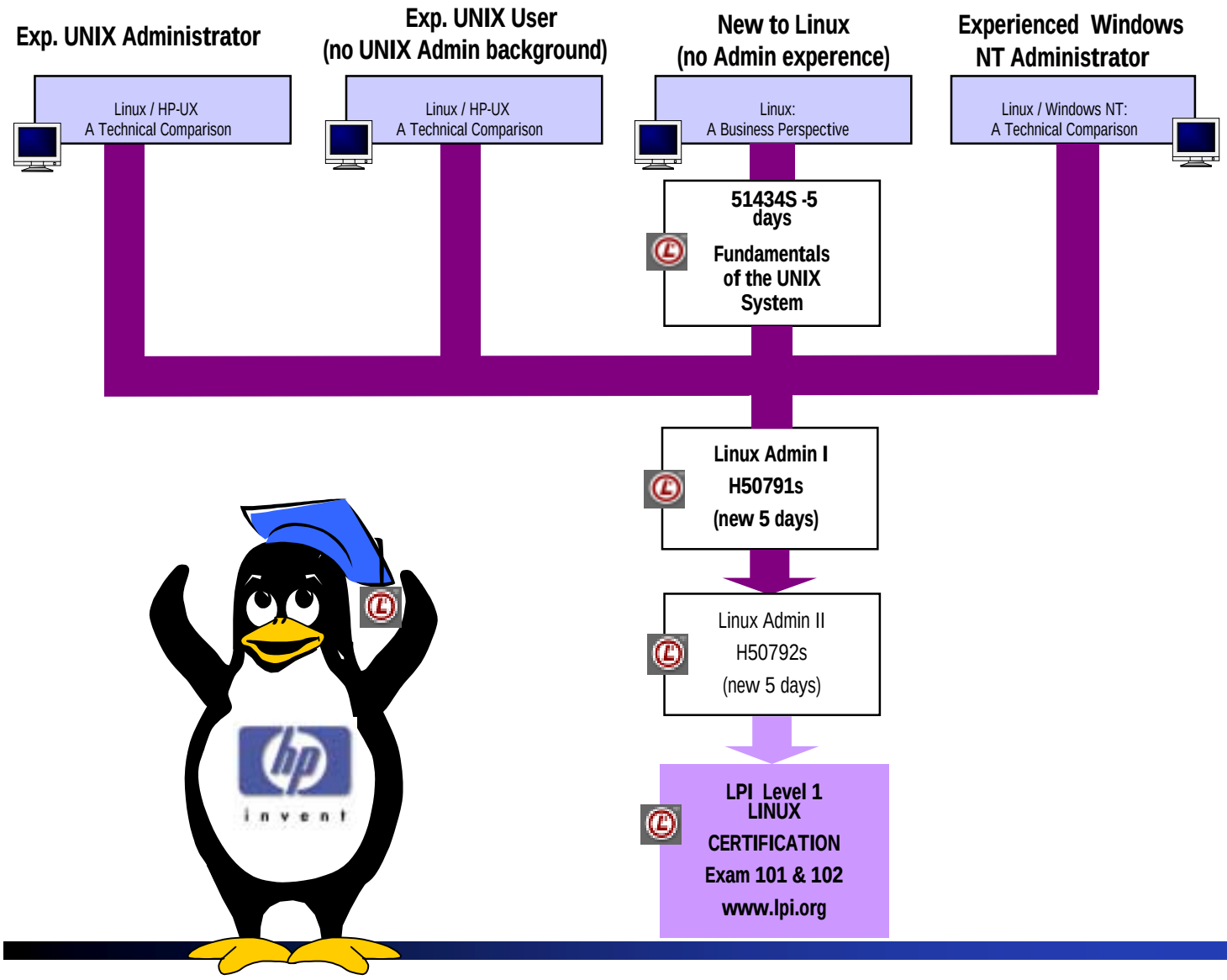
A simple model



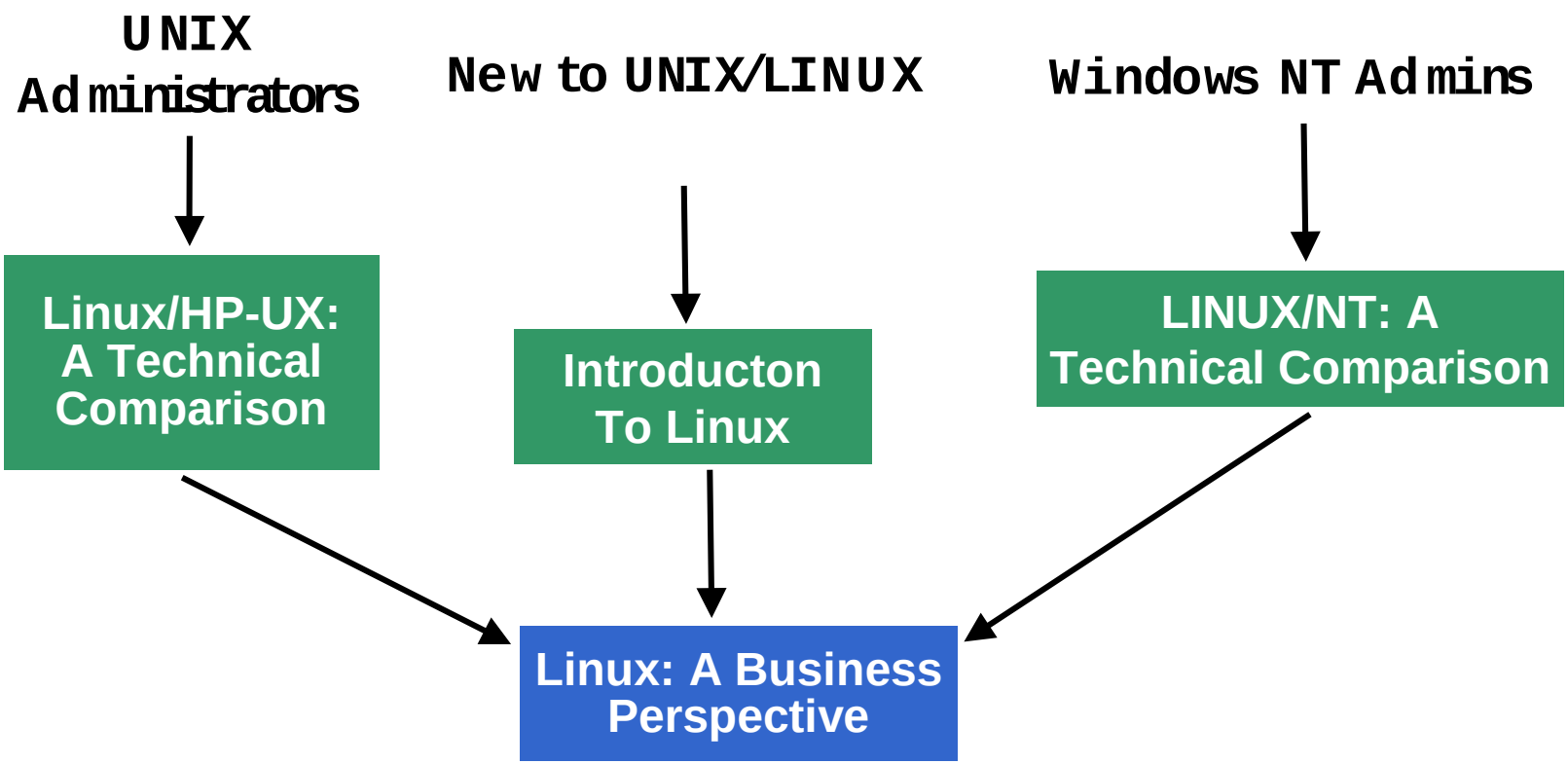
Would you like to learn more?



Linux IT Professional - HP Education Services



IT Resource Center Linux Portfolio



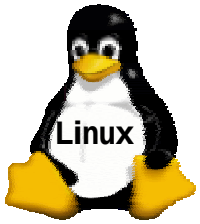
For more info see:
http://ITResourceCenter.hp.com

Some additional resources

- http://www.hp.com/education/
  - Information about classroom courses on topics including Microsoft NT, Linux, UNIX, Network Management, etc.
- http://ITResourceCenter.hp.com
  - Access to technical articles, book reviews, discussions and online seminars on Microsoft, Networking, UNIX, Linux, MPE, and Java topics.
- http://www.hp.com/go/linux
  - HP's Linux home page
- http://www.linux.org
  - One of many Linux information "portals"

(continued)

- http://www.hp.com/go/linux/
  - HP's Linux Page
- http://userweb.interactive.net/~revf2/LPI/
  - Linux Distribution differences
- http://www.linuxdoc.org
  - The Linux documentation project
- http://www.lpi.org
  - The Linux Professional Institute



HP-UX and LINUX

My Friend and
I Thank You
for coming!