

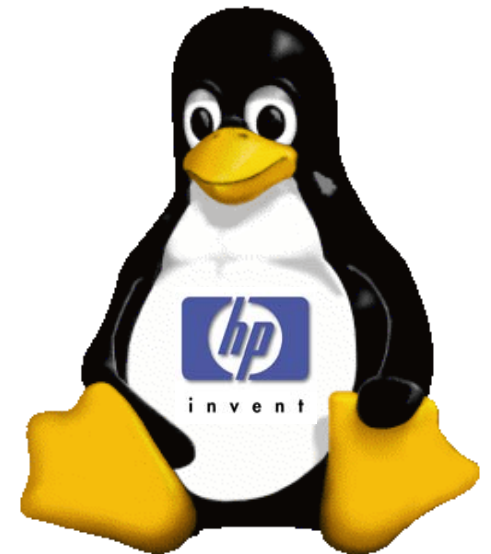


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# HP World/Interex 2002 Linux /proc Process Info Pseudo File System

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*/proc*  
(A view under  
the hood)

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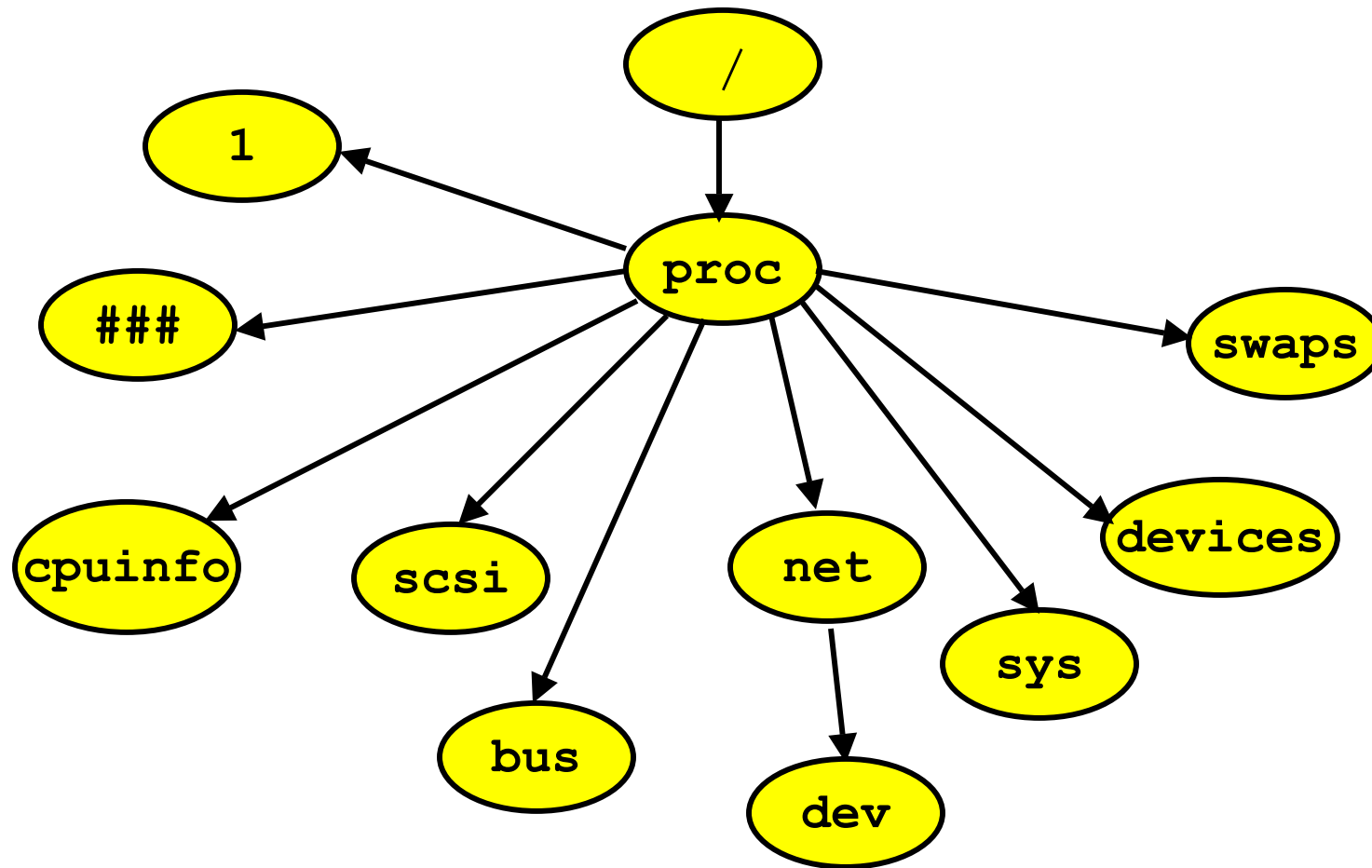
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# `/proc` Directory



- The `/proc` file system is a virtual directory.
- It does not exist on the hard drive.
- The kernel creates it in memory.
- It contains information about what your kernel is doing.
- It serves as a reference when configuring new hardware.

# Layout of /proc



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# Contents of `/proc` Directories



- `/proc/<pid #>`
  - Every process has a directory, which contains information about the process.
- `/proc/net`
  - This dynamic directory contains some networking statistics.
- `/proc/sys`
  - This directory has kernel information, memory statistics, and specifications about devices and some network tunable variables.
- `/proc/bus`
  - This directory lists types of buses in the system.

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# Contenta of `/proc` Files



- **`/proc/filesystems`**
  - Lists the type of file systems supported in the kernel.
- **`/proc/mounts`**
  - Lists the file systems that are mounted excluding floppy and swap.
- **`/proc/cpuinfo`**
  - Lists the number of processors, the vendor, model, and cache.
- **`/proc/interrupts`**
  - Identifies IRQs being used.
- **`/proc/partitions`**
  - Shows the sizes of partitions and their device file names.

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# Com m ands



- Many system management commands gather information from **/proc**.
- Examples:
  - procinfo**
  - free**
  - uptime**
  - ifconfig**
  - ps**
  - pstree**
  - netstat**

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# Kernel Variables



- You (as root) can alter the behavior of some kernel variables.  
(Be very cautious with this !)

- Examples:

```
echo "1" > /proc/sys/net/ipv4/ip_forward
```

```
echo "1" > /proc/sys/net/ipv4/tcp_syncookies
```



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# Problem Solving— A Methodology



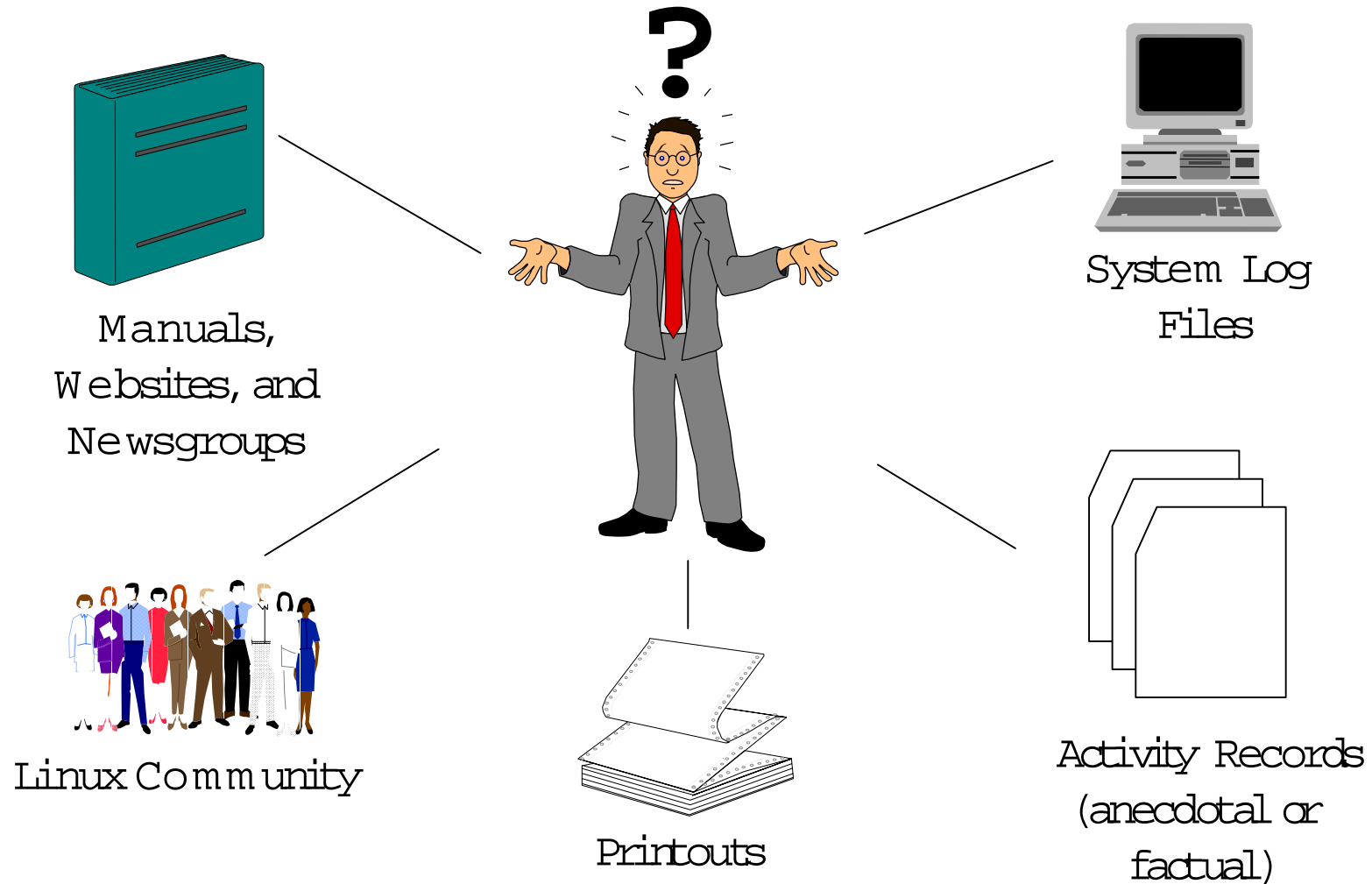
Before you can solve a problem , you must first decide what the problem is. Then:

- Describe the problem's characteristics.
- Suggest possible reasons for the problem to occur.
- Decide on the most likely cause.
- Test it.

What do you do when a problem occurs?

- Check your administration workbook for a solution. If it has happened before, perhaps a solution is already in the log.
- Log the event.
- Try to isolate the problem according to your understanding.
- Define a list of possible causes.
- Check faulty components using designed tools or commands.
- Record the solutions in your administration workbook.

# Your Troubleshooting Resources

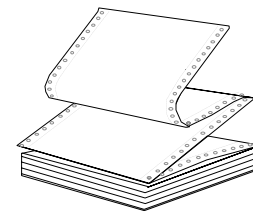


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# A System Log Book



- Keep a hardcopy of information displayed by these commands or files.
  - Commands:
    - `df -k`
  - Files:
    - `/etc/lilo.conf`
    - `/etc/fstab`
    - `/etc/hosts`
    - `/etc/resolv.conf`
    - `/etc/inetd.conf`
    - `/etc/nsswitch.conf`
    - `/etc/inittab`



Printouts

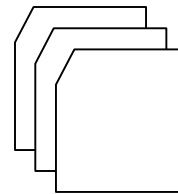
# Records and Log Files



- Record system and application configuration changes.
- Document problems solved.
- Build an error message catalog.
- Familiarity and comfort with log files and their contents is critical to troubleshooting success.
  - Know log file names and locations.
  - View files periodically so that you are familiar with them and can recognize abnormalities.



System Log Files



Activity Records  
(anecdotal  
or factual)

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## Some System Log Files



- `/var/log/boot.log`
- `/var/log/cron` (and `/var/log/cron.n`)
- `/var/log/maillog` (and `/var/log/maillog.n`)
- `/var/log/messages` (and `/var/log/messages.n`)
- `/var/log/netconf.log` (and `/var/log/netconf.log.n`)
- `/var/log/secure` (and `/var/log/secure.n`)
- `/var/log/spooler` (and `/var/log/spooler.n`)
- `/var/log/xferlog` (and `/var/log/xferlog.n`)

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# The **dmesg** Command



- Collects system diagnostic messages to form the system error log
- Reads a small circular system error message buffer.
- You must be superuser to use **dmesg**.

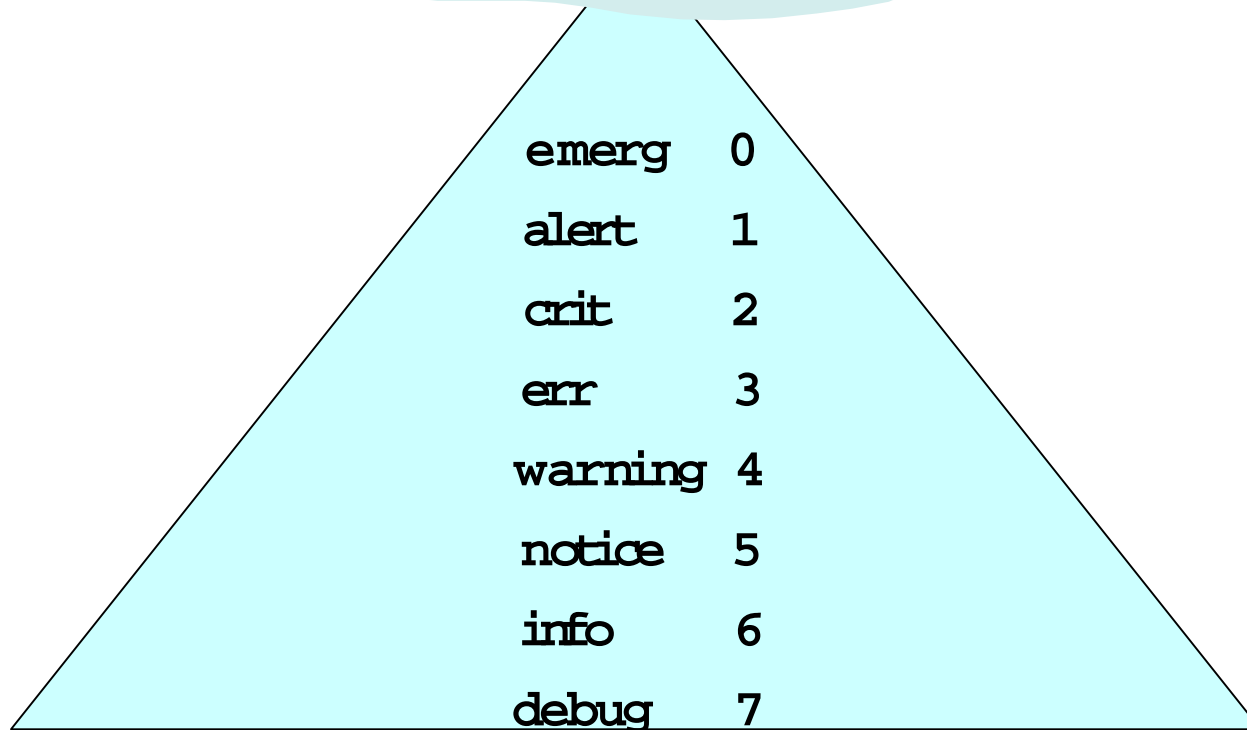
# Footprints in the sand, **sysklogd**



- The Linux **sysklogd** receives messages from many different players: applications, sub systems, daemons, the **klogd** itself.
- The **sysklogd** uses the concept of "facilities" and "levels" to categorize and rank the incoming messages.
- Some of the common facilities are:
  - **mail**
  - **kern**
  - **user**
  - **auth**



# A Sense of Urgency, System Log "Priority"





## Once the Daemon Is Aware, What Next?



The **syslogd** receives all system messages and forwards them to logging locations according to configuration instructions contained in **/etc/syslog.conf**

(If you change the configuration file, you must restart the **syslogd** daemon.)

# `/etc/syslog.conf`



```
# cat /etc/syslog.conf
```

facility

level

action/destination

```
mail.info
```

```
*.info;mail.none
```

```
kern.warning
```

```
*.emerg
```

```
/var/log/maillog
```

```
/var/log/messages
```

```
/var/log/syslog
```

```
/dev/console
```

wildcard

Use only Tabs as  
separation characters in  
this file! (No spaces !)



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# Linux RAID



- Linux supports software RAID.
- You will need kernel 2.2.x or 2.0.x.
- You may require a patch called **raid0145**.
- Install a product called **raidtools** ( 0.90-x ).
- You can use IDE and SCSI drives.

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# RAID Levels



- Linear mode
  - Two or more physical drives combined into one volume
- RAID-0 (Stripe-mode)
  - Parallel read and write access to devices; no redundancy
- RAID-1 (Mirroring)
  - Data mirrored to the other disk
- RAID-4
  - Striping with a parity drive; minimum three drives
- RAID-5
  - Striping with parity distributed evenly among several drives; minimum three drives

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# General Setup for RAID



- Create identical partitions on other drives.
  - For linear mode, partitions do not have to be the same size.
- Mark these partitions as type 0xfd using **fdisk**.
  - Set partition ID to "**Linux raid autodetect**"
- You must also mark primary copy.
  - You have to unmount your file system.
- Edit **/etc/raidtab**.
- You can also set up a spare disk for RAID levels 1, 4, and 5 that will be used if an active disk fails.

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# Directives in `/etc/raidtab`



- `nr-raid-disks` = Number of RAID disk to use
- `nr-spare-disks` = Number of spare disks to use
- `persistent -superblock` = Needed for autodetection
- `chunk-size` = Amount of data to read/write
- `parity-algorithm` = How RAID 5 should use parity

---

# RAID 1 – vi /etc/raidtab



```
raiddev /dev/md0  
raid-level 1  
nr-raid-disks 2  
persistent-superblock 1  
chunk-size 4  
device /dev/sda3  
raid-disk 0  
device /dev/sdb3  
raid-disk 1
```



# RAID 5 – vi /etc/raidtab



```
raiddev /dev/md1
raid-level 5
nr-raid-disks 3
persistent-superblock 1
chunk-size 32
parity - algorithm right - symmetric
device /dev/sda4
raid-disk 0
device /dev/sdb4
raid-disk 1
device /dev/sdc4
raid-disk 2
```

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# Initializing Your Devices



- Use **mkraid** to initialize your devices.
- Use **mke2fs** to format your devices with stripe option.
- Example:

```
mkraid /dev/md0
```

```
mke2fs -b 4096 -R stride=8 /dev/md0
```

- Look at **/proc/mdstat** for information about your RAID setup.