# System Administration and Networking

AOSS TRAINING

Topics

1. System Administration 1
2. System Administration 2
3. Managing Directories & Files
4. Networking & Integrating Linux with the MS Infrastructure Samba Wireless Connectivity
5. Connecting Printers and Scanners
6. Mail server

# Objectives

Able to

- use vi to edit text files
- Use the command line and Graphical User Interface to manage users and groups

# Outline

- Learning the VI (improved) Editor
- User and Group Administration

# What is vi?

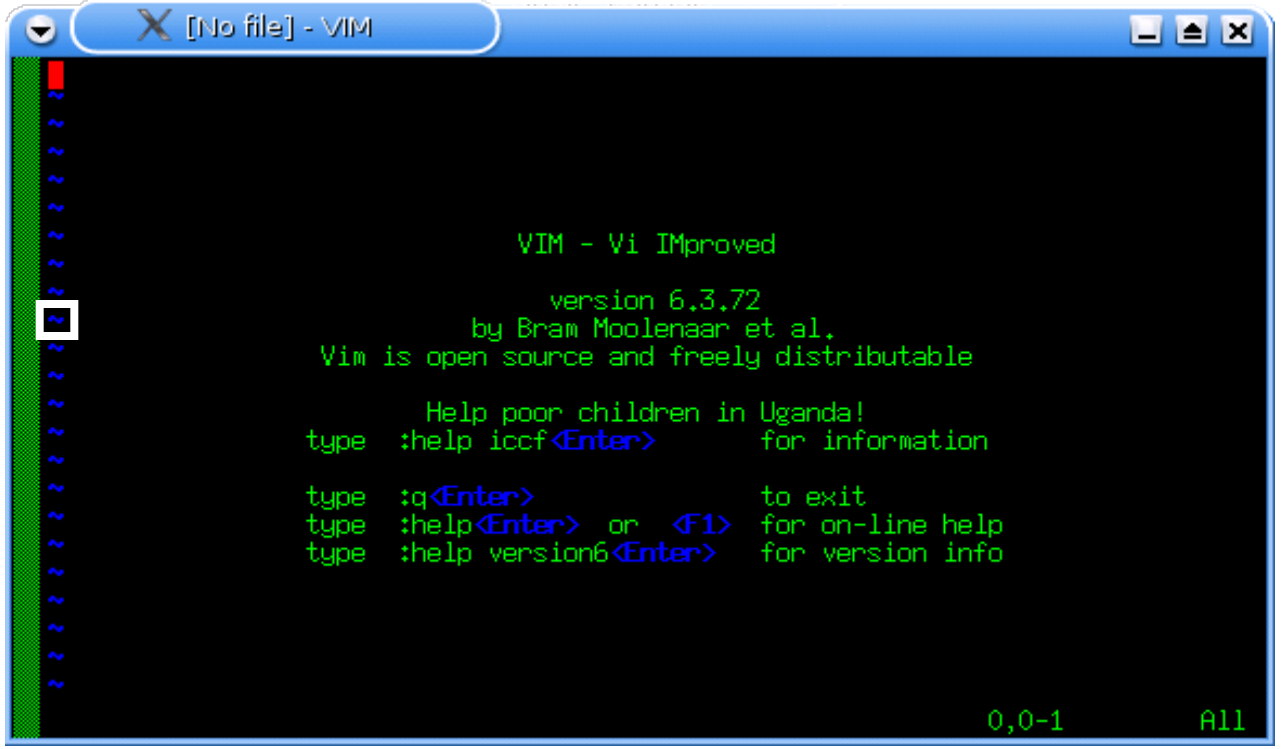
- A screen-based editor used by many Unix users
- Included with ALL Linux distributions

# Motivation of vi

- Necessary when fixing system problems, and your graphical desktop refuses to start.

# Starting vi

- vi
- vi *filename*

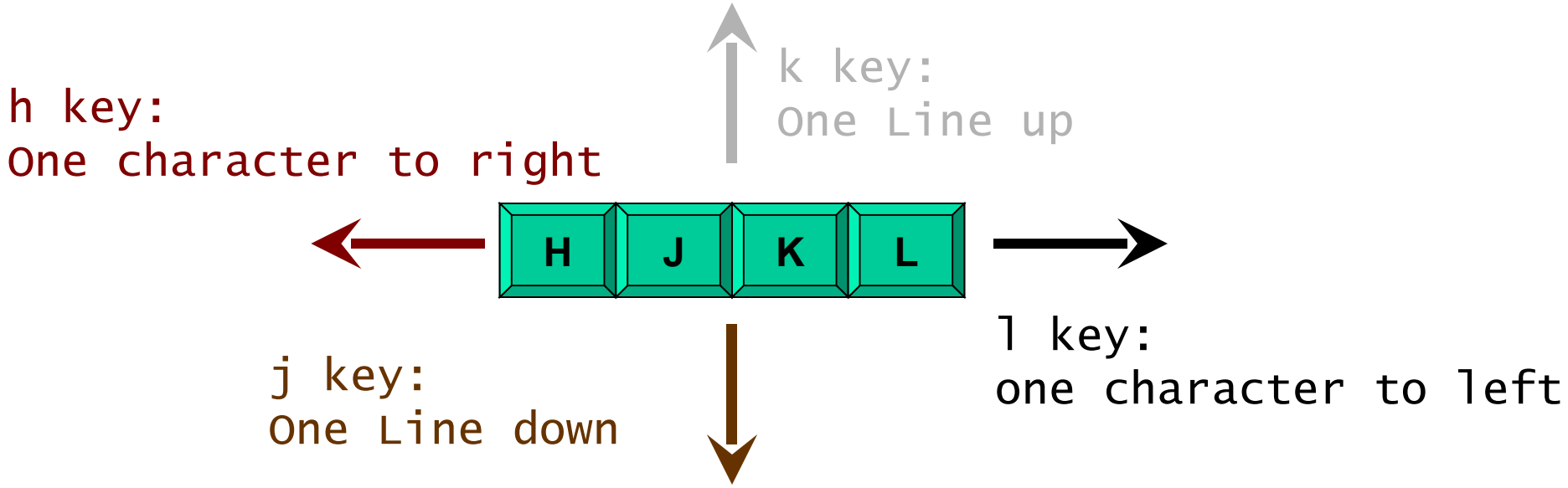



~ indicates lines that are not in file.

# Quitting vi

| Command | Result |
|---|---|
| ZZ | Write file and quit vi |
| :w! | Save/overwrite the file |
| :q | Quit vi only if there is no unsaved edits |
| :q! | Quit without saving, even if there have been changes to the file |
| e! | Return to the last saved version of a file without edits |

# Moving the cursor



# Moving the cursor: Other commands

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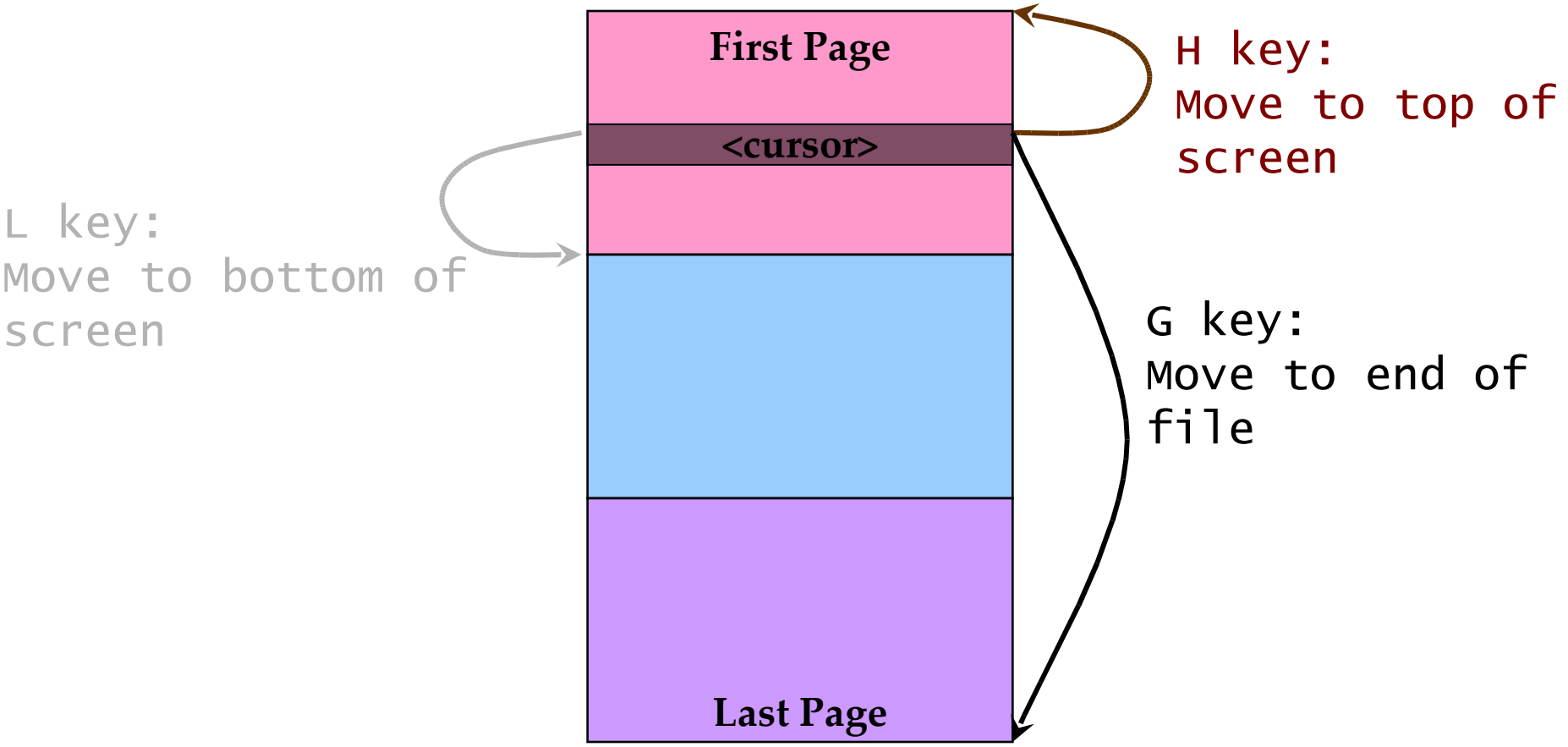
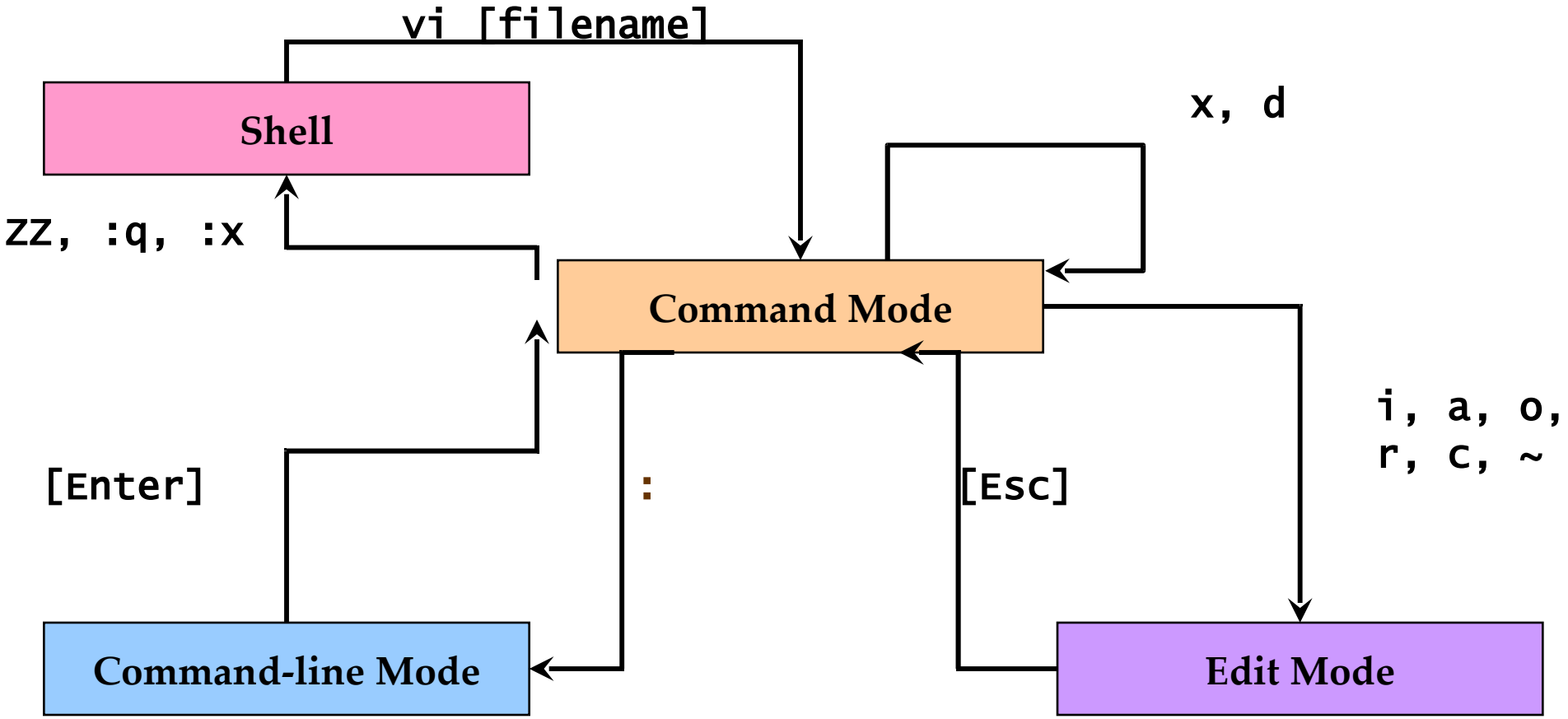


# Working Modes

- Three Modes
  - Command mode
  - Edit mode
  - Last Line mode

# Transition of Working Modes



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# Inserting & Appending Text

| Command | Result |
|---|---|
| append | Place text just after the cursor |
| insert | Place text just before the cursor |
| open | Open a new line below the cursor and begins inserting text there |

# Editing in Command Mode

| Command | Result |
|---|---|
| change | Change from cursor to end of line -- delete and start insert mode |
| replace | Replace a single character with another character |
| ~ | switch a single character from uppercase/lowercase to lowercase/uppercase |

# Deleting in Command Mode

| Command | Result |
|---|---|
| dl | Delete the next character |
| dw | Delete the current word |
| dG | Delete to end-of-file |
| dd | Delete the current line. |
| d$ | Delete to end-of-line |
| x | Delete the character where the cursor is |

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# Copy & Paste in Command Mode

| Command | Result |
|---|---|
| yy | Yank the current line into buffer |
| dw | Delete word. |
| x | Delete the character where the cursor is |

# Outline

- Learning the VI Editor
- User and Group Administration

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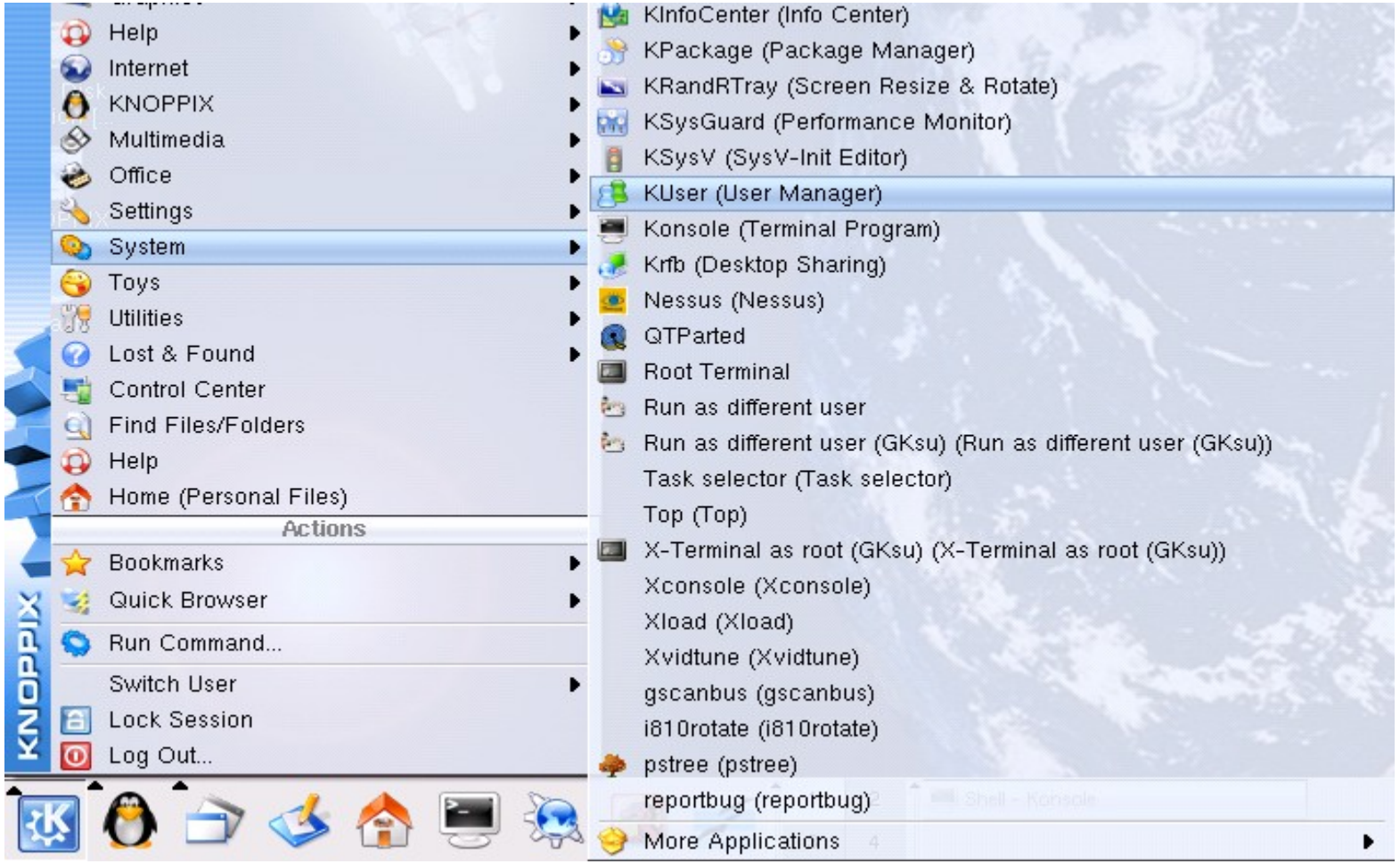
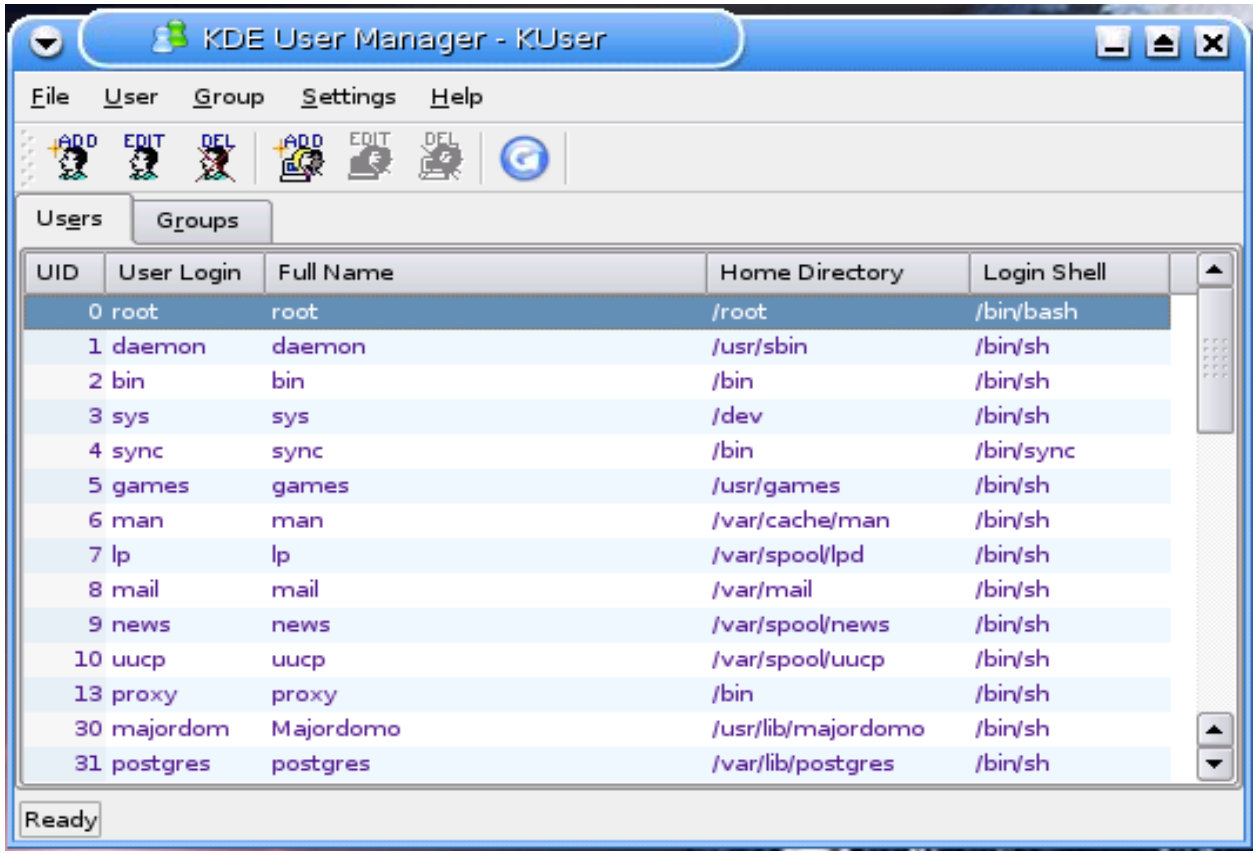
# User Administration: Motivation

- Necessary to differentiate the users using the system
- Allows each user to keep a set of private file
- Allow user customization of the working environment

# Starting KUser

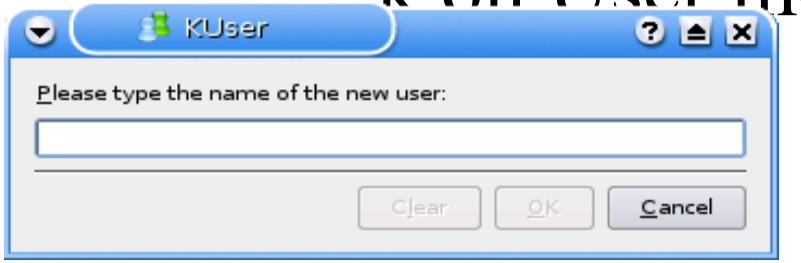


# KUser

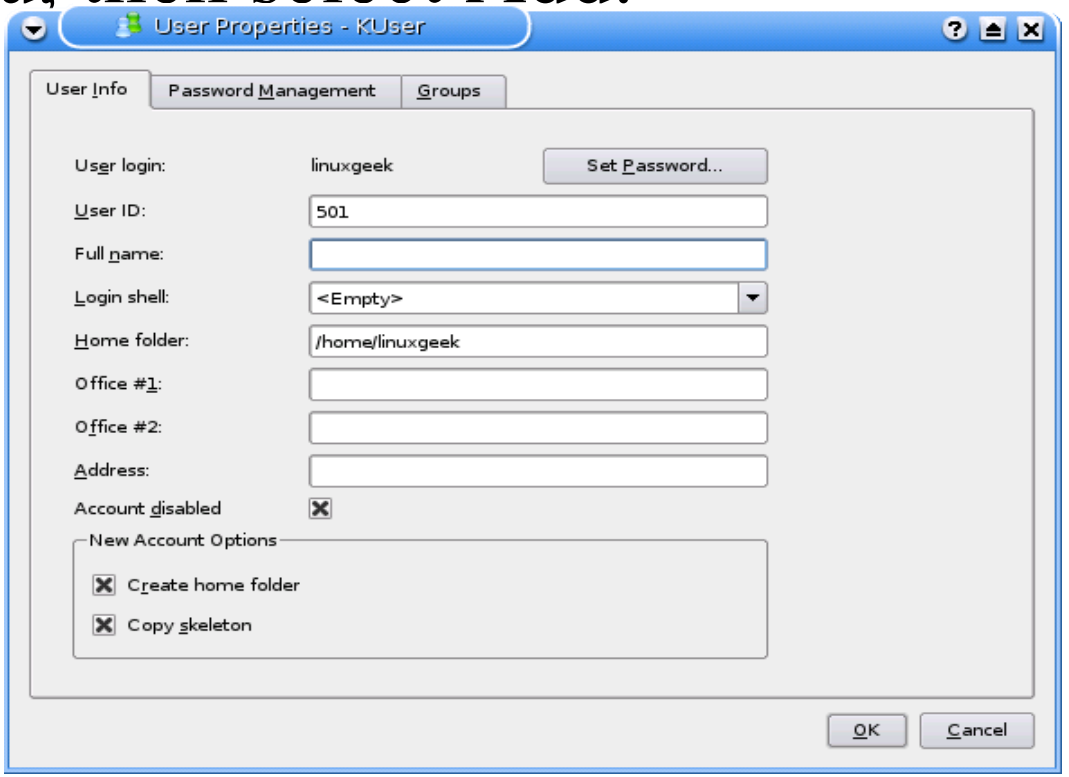

KDE User Manager - KUser
File
User
Group
Settings
Help
ADD
EDIT
DEL
ADD
EDIT
DEL
Users
Groups
UID
User Login
Full Name
Home Directory
Login Shell
0 root root /root /bin/bash
1 daemon daemon /usr/sbin /bin/sh
2 bin bin /bin /bin/sh
3 sys sys /dev /bin/sh
4 sync sync /bin /bin/sync
5 games games /usr/games /bin/sh
6 man man /var/cache/man /bin/sh
7 lp lp /var/spool/lpd /bin/sh
8 mail mail /var/mail /bin/sh
9 news news /var/spool/news /bin/sh
10 uucp uucp /var/spool/uucp /bin/sh
13 proxy proxy /bin /bin/sh
30 majordom Majordomo /usr/lib/majordomo /bin/sh
31 postgres postgres /var/lib/postgres /bin/sh
Ready

# Add User

- Click on User menu, then select Add.

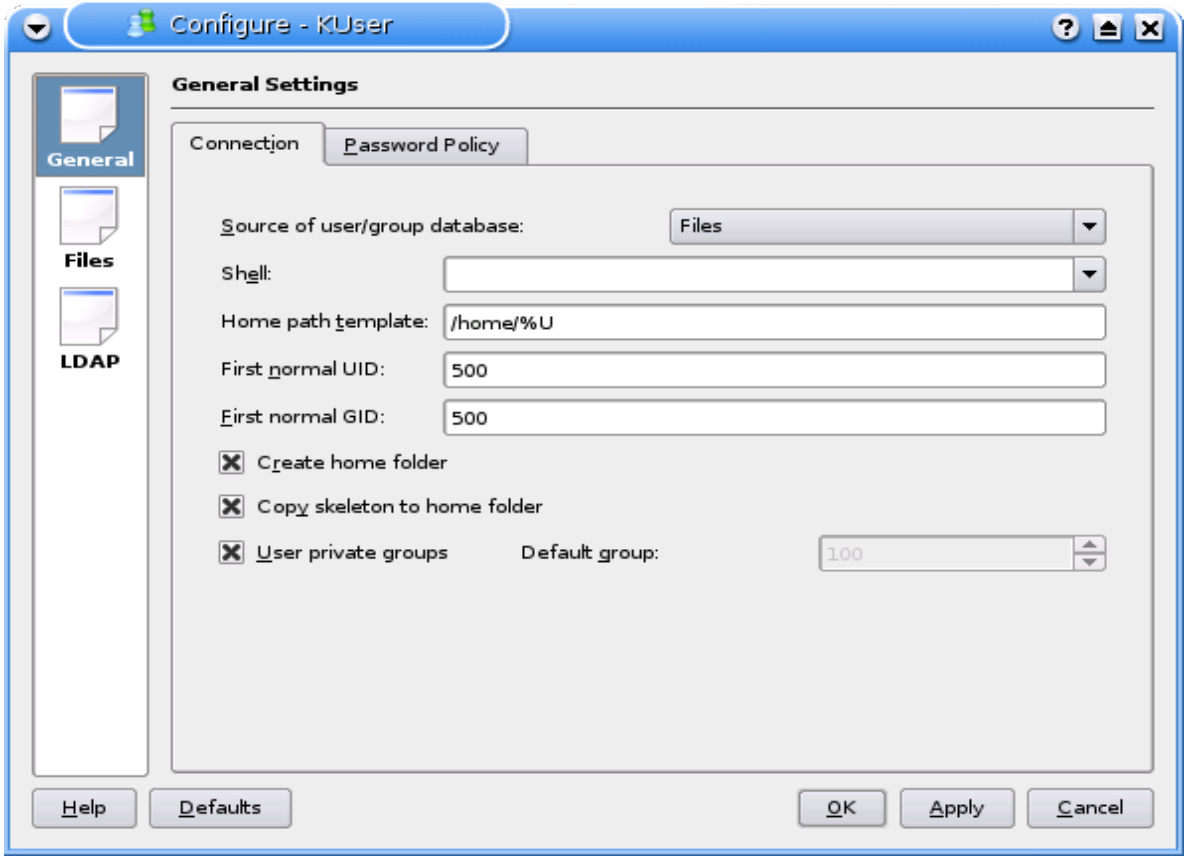



After entering the username



# Customising KUser

- Click the menu Settings->Configure KUser…



# The password file

- Located in /etc

```
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/bin/sh
bin:x:2:2:bin:/bin:/bin/sh
sys:x:3:3:sys:/dev:/bin/sh
sync:x:4:65534:sync:/bin:/bin/sync
games:x:5:60:games:/usr/games:/bin/sh
```

# UID Range

- Varies slightly across distribution

| UID Range | Purpose |
|---|---|
| 0 – 99 | Used for system accounts allocated by the Debian project. The "root" account is UID 0 |
| 100 – 999 | Are for system users which have not been allocated by the Debian project. |
| 1000 – 29999 | are normal user accounts. |
| 65534 | User "nobody", an account with no rights or permissions. |

# User Management via command Line

| Command | Description |
|---|---|
| useradd | To add a new user to the system. |
| userdel | To remove an existing user from the system |
| usermod | To modify the information on a user |
| passwd | Allows a user to change his password. |

# Exercise

- Create the following users each with a home directory /home/<Username>.

| Username | Group Name | | |
|---|---|---|---|
| | apollo | ares | athena |
| joe | X | X | |
| jason | | X | X |
| john | X | X | X |
| jimmy | | X | |

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# System Administration 2

# Motivation

- You wanted to restrict the people that can access your files and what they can do with them.

# Permission Levels

| Permission | Description |
|---|---|
| Read (R) | Allows you to read the content of a file. For a directory, it allows the ls command to list all the file names in the directory. |
| Write (W) | Allows you to modify the file. For a directory, you can create or delete files inside that directory. |
| Execute (X) | Allows you to run the file. This means that the file either have to be an executable Linux commands or a shell script. |

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# Understanding file ownership and permission

- The first character is a hyphen (-) if it is a file or d if it is a directory.
- The 2nd to 10th characters represents the user, group and "other" permission.

```
drwxr-xr-x 2 knoppix knoppix 120 May 31 16:17 .bashrc
```

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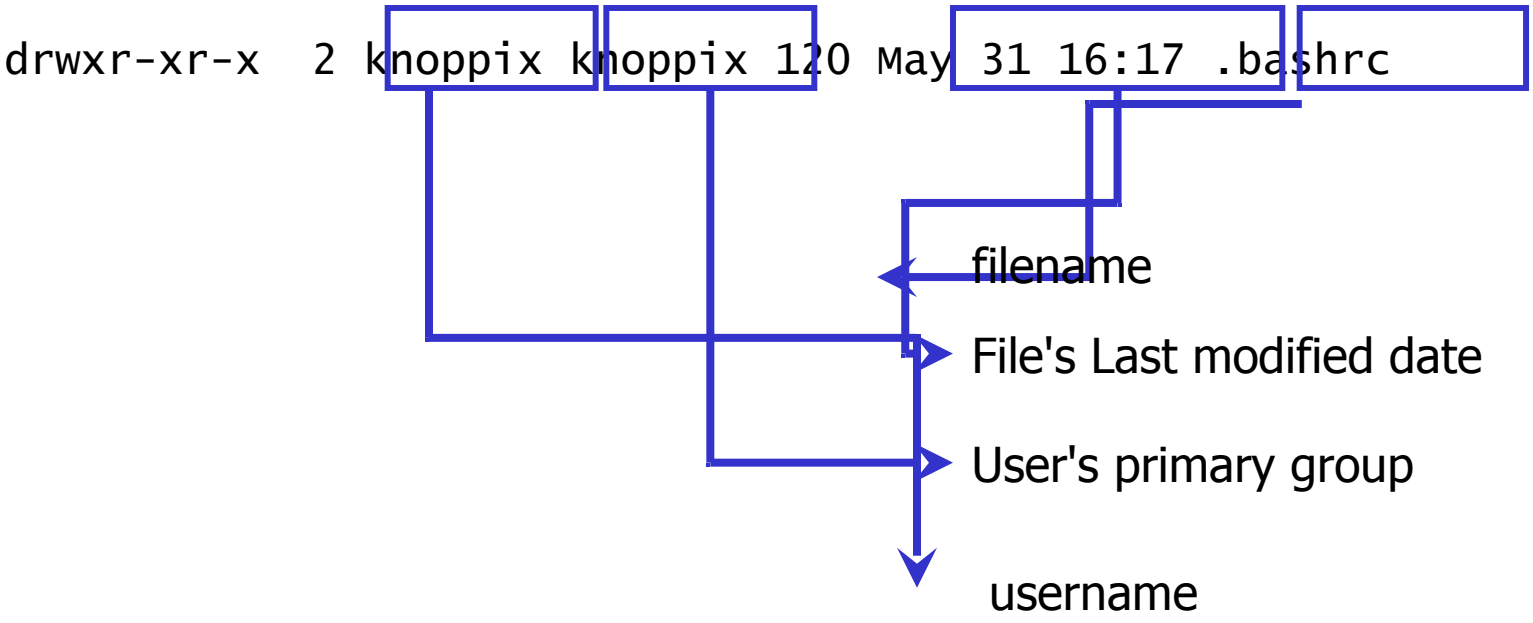
# Other information in the ls command



# Modifying Commands

- chmod [a|u|g|o][+|-]<permission> <file>
- Example

```
chmod g+rwx data.txt
```

# Changing Permission using graphical interface


Click on the Konqueror icon.

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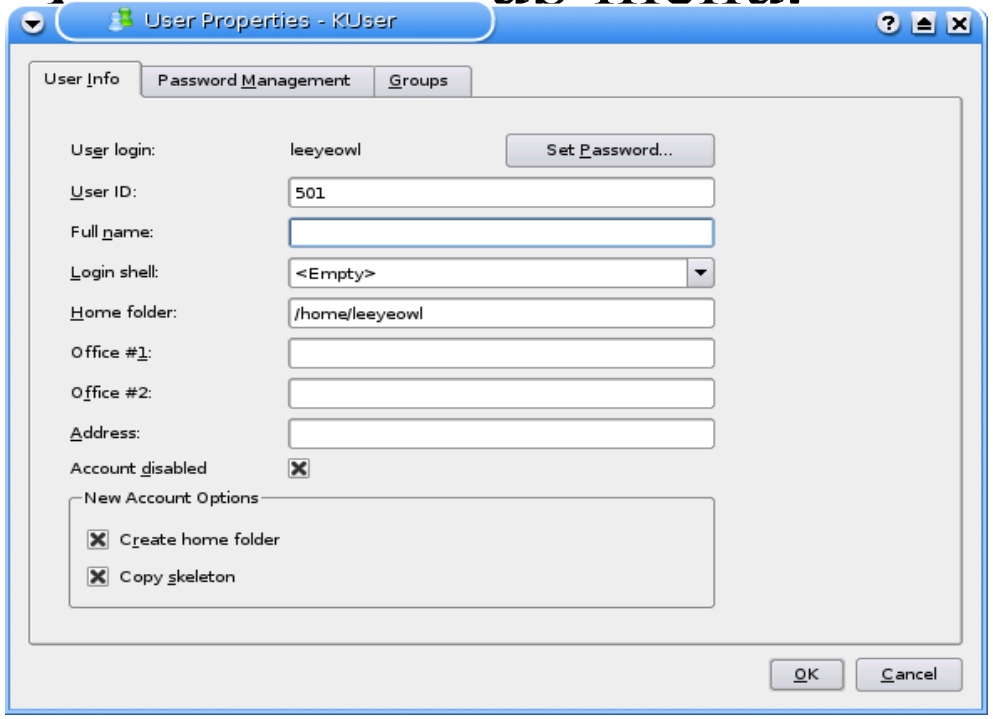
# Managing Software packages: The Graphical Way (2)

- Select any file. Right click, and select properties from the popup menu.



# Exercise

- Create two groups, alpha and beta.
- Create two users, elise and mary. Elise belongs to the group alpha. Mary belong to the group beta.
- Create a file that belongs to elise in her home directory. Change the permission so that mary can view the file.

# Run Level

- Defines the state of the system

| Run Level | Action |
|---|---|
| 1 | System shutdown |
| 2 | Single-user mode |
| 3 | Multi-user mode without network |
| 4 | Multi-user mode with network |
| 5 | Multi-user mode with network and GUI |
| 6 | System Reboot |

# Changing runlevel

- Command

  `init <runlevel>`

- Changing default runlevel.

- **/etc/inittab** -

```
# The default runlevel.
id:5:initdefault:
```

Default runlevel

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# Managing Software packages: Motivation

- Wanted additional programs to work more efficiently
- Upgrade of existing programs when new versions are available

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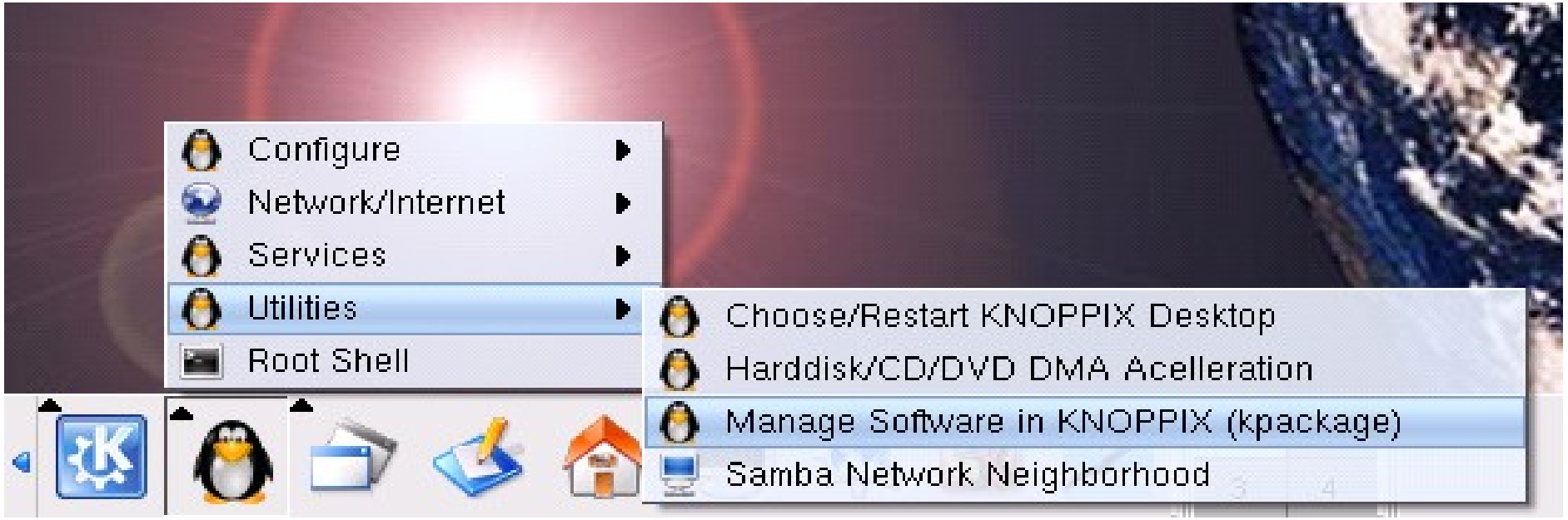
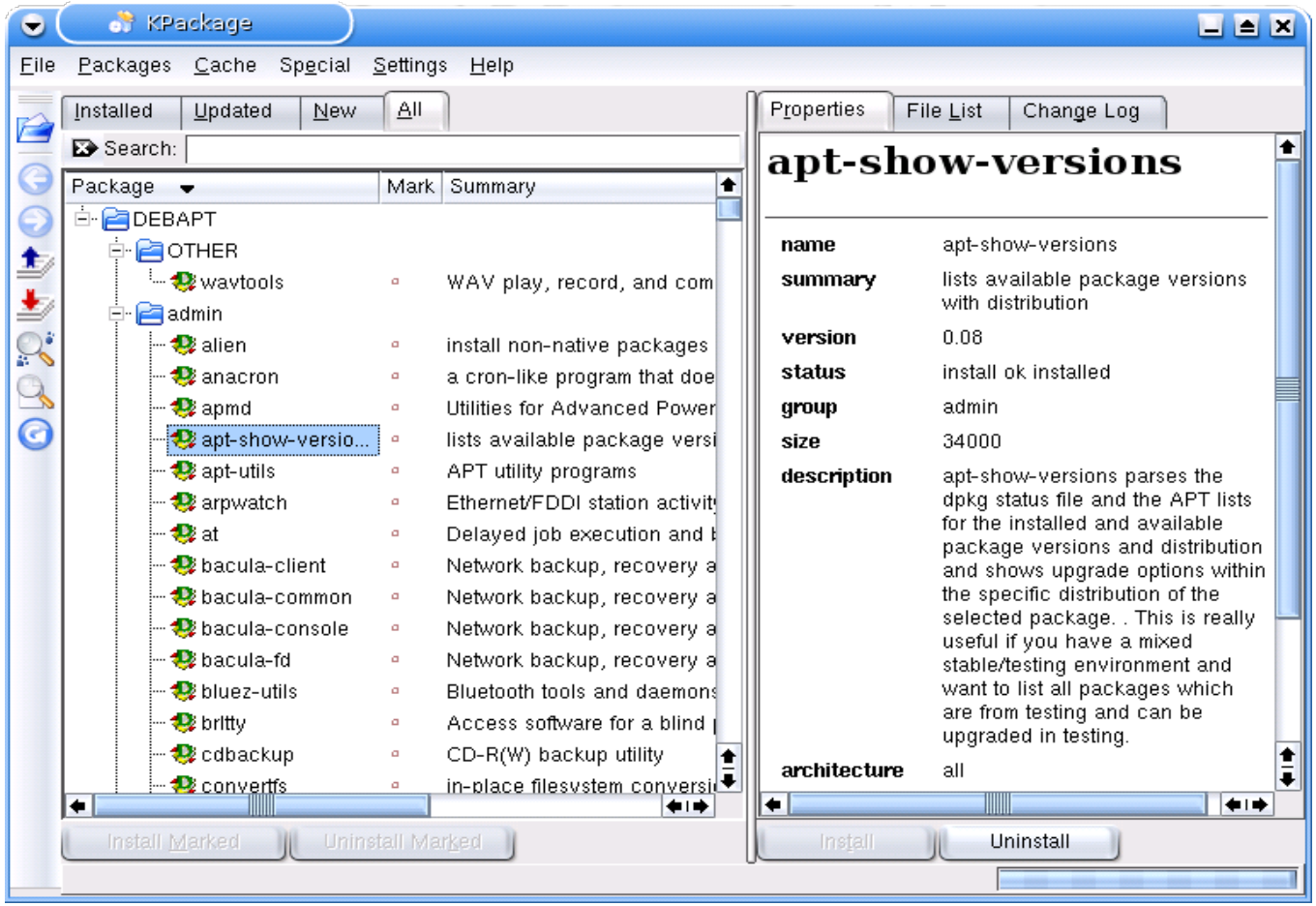
# Managing Software packages: The Graphical Way (1)

- kpackage (available with KDE)



# The KPackage Tool



# Managing Software packages: Installing with kpackage

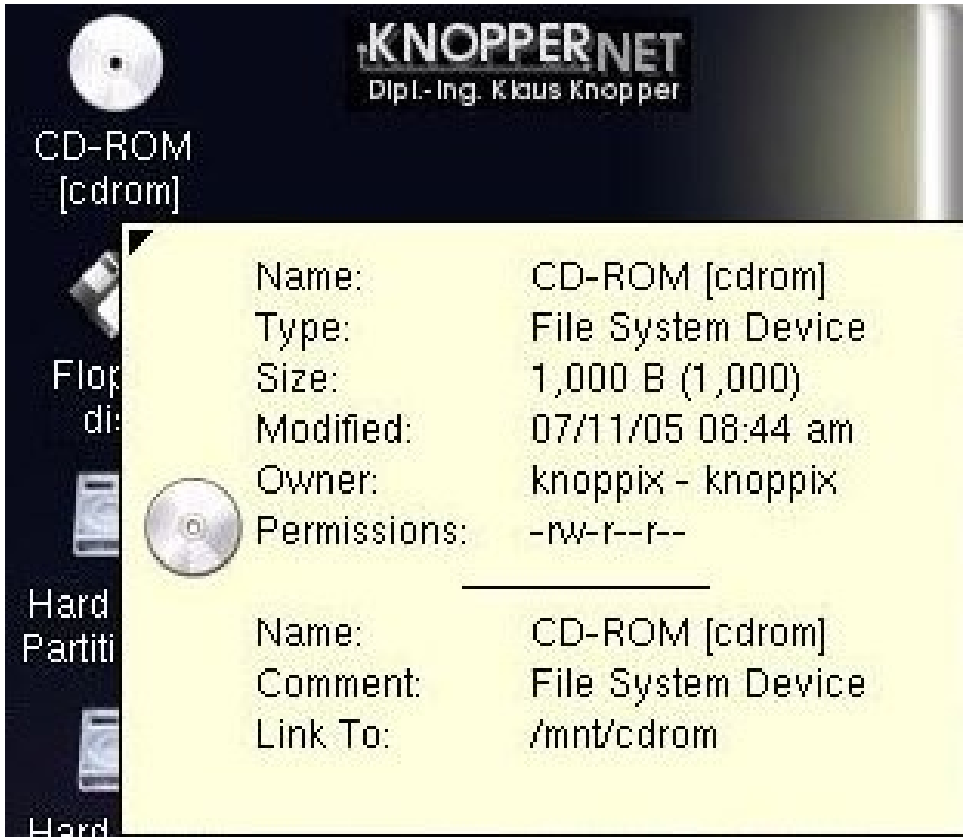
- Download pkg file to hard disk.
- In KPackage, from the File menu, select Open. In the dialog, select the pkg file.

# Exercise

- Find out what nano is.  Using KPackage, install nano.

# Managing Directories & Files - 1

Move the mouse pointer over the first icon on the Knoppix Desktop and hold it for a short while. You should see a pop-up window like this:




Let us now try to understand how Knoppix, or Linux, organizes the directories and files. We also want to understand the ownership and permissions.

# Managing Directories & Files - 2

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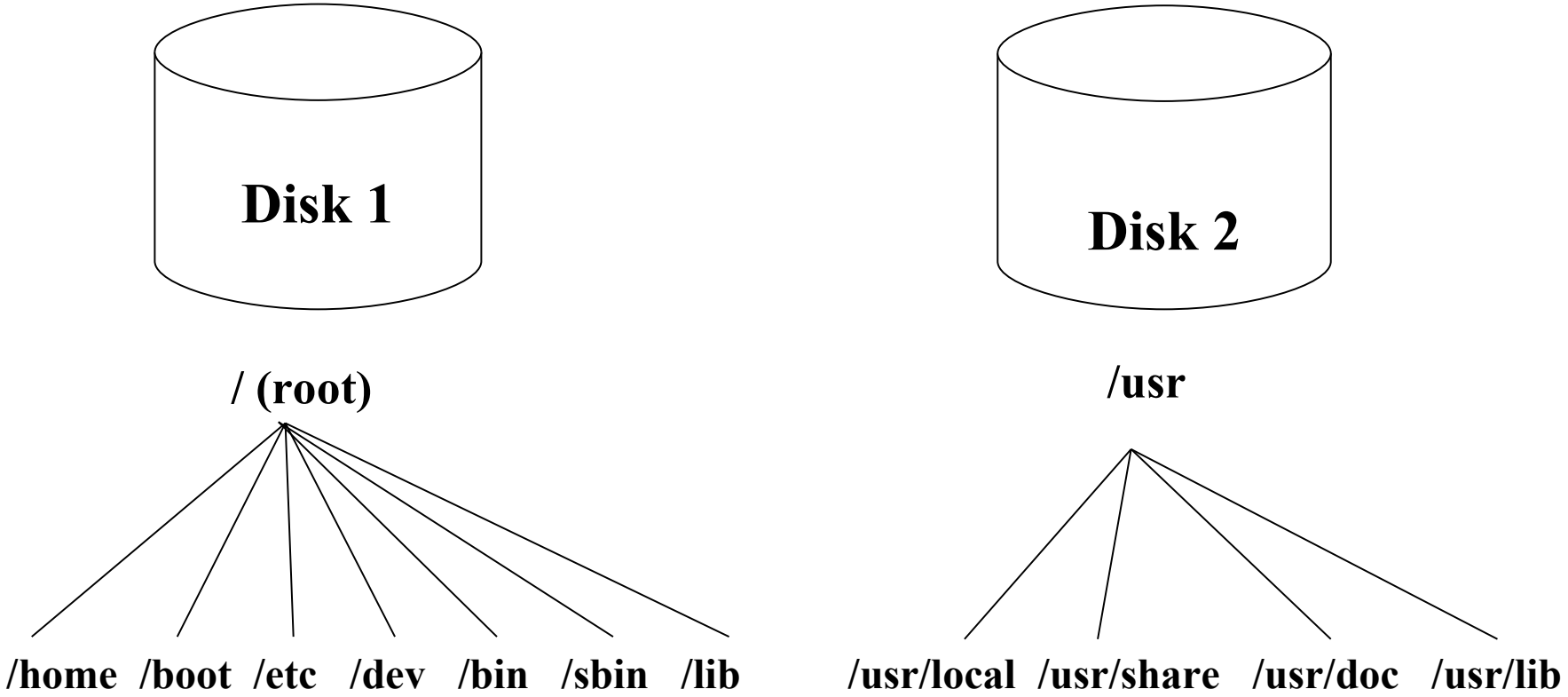
- Linux treats all devices as files and has actual files that represent each device. In Linux, these device files are located in the /dev directory.

| Name | Description |
|---|---|
| /dev/hda | First Integrated Drive Electronics (IDE) hard drive (the C: drive in DOS and Windows) |
| /dev/hdb | Second IDE hard drive (the D: drive in DOS and Windows) |
| /dev/sda | First Small Computer System Interface (SCSI) drive |
| /dev/sdb | Second SCSI drive |
| /dev/fd0 | First floppy drive (the A: drive in DOS) |
| /dev/fd1 | Second floppy drive (the B: drive in DOS) |

# Managing Directories & Files - 3




**An example of mounting the Linux file system on two partitions**

# Managing Directories & Files - 4

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- Click the icon representing the terminal.
- A window will pop up and you will see the black window screen which you can type some commands.
- Type the command: **pwd** and press the Enter key
- This will show you where you are at, in this case, it will be /home/knoppix.
- Please note that forward slashes are used in the Linux file system.

# Managing Directories & Files - 5

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Here are some commands which you can try out:

| MS-DOS command | Linux command |
|---|---|
| cd path | cd path |
| cd \ | cd / |
| cd .. | cd .. |
| cls | clear |
| Ctrl-Alt-Del | Ctrl-Alt-Del or shutdown -r now |
| copy | cp |
| date | date |
| del filename | rm filename |
| del *.* | rm * |
| dir | dir or ls |
| diskcopy | No direct equivalent |
| format | |
| md | mkdir |
| rd | rmdir |
| ren | mv filename new-filename |
| Time | Date |
| type filename | less filename (Ctrl-z to exit) |

# Managing Directories & Files - 6

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| Linux command | Description |
|---|---|
| cal | print a calendar for current month |
| df | show how much disk space is free |
| du | show disk usage information |
| free | display memory information |
| ls | list files and folders |
| ls -a | list all files (including hidden files) |
| ls -s | list files and their size |
| ls -t | list files in time order (newest first) |
| mkdir | make directory |
| mvdir | move a directory |
| passwd | set or change a password |
| pwd | print the name of the current directory |
| rm | remove a file |
| rm -R | remove folder and its contents |
| rmdir | remove a directory |
| umount | unmount a device such as a disk drive |

# Managing Directories & Files - 7

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You can use the following commands to locate files:

| **Linux command** | **Example of usage** | **Example result** |
|---|---|---|
| **find** <*starting directory*> -name <*filename*> | find / -name sound | /usr/src/linux-2.0.34/drivers/sound<br>/etc/rc.d/init.d/sound |
| | find ~/ -ctime 2<br>(search my home directory for files that have been modified in the last two days) | /home/kinchew/getip.c<br>/home/kinchew/a.out |
| | find ~/ -size 1024K | /home/kinchew/bochs/bochs-980513/core<br>/home/kinchew/postgres51/core |
| **locate** | locate sound | /etc/sysconfig/soundcard<br>/home/kinchew/icons/sound1.gif |
| **whereis** | whereis time | time: /usr/bin/time /usr/include/time.h<br>/usr/man/man2/time.2<br>/usr/man/mann/time.n |
| **which** | which time | /usr/bin/time |

# Managing Directories & Files - 8

- Use any text editor (e.g. pico or gvim) to type some text. Save the file with a name like “testfile” and save it on the desktop.
- Go to a terminal window and change its file permission such that the owner has all read, write and execute permissions; the group and the world (i.e. everybody else) have only read and execute permissions.
- Binary bits for Read-Write-Execute: 111 (i.e. full permissions) Decimal value: 7
- Binary bits for Read-Write-No Execute: 110 Decimal value: 6
- Binary bits for Read-No Write-Execute: 101 Decimal value: 5
- In the example above, please set the permission for testfile as: chmod 755 testfile
- Please check the permissions by typing: ls -la

# Managing Directories & Files - 10

## Understanding the file permissions

- One advantage of the Linux system over Microsoft Windows (especially before Windows XP software) is that you can assign different types of permissions on every file or sub-directory.
- Move the mouse pointer over the icon labeled “KNOPPIX” on the desktop.
- After a while you will see the following appearing on the screen:
  - Type: Desktop Config File
  - Size: 190 B
  - Modified: 05/02/0306:17 pm
  - Owner: knoppix - knoppix
  - Permissions: -rw-r--r--
  - Name: KNOPPIX

# Managing Directories & Files - 10

Explanation of the Linux File System:

- Linux file systems have a single root directory (/).
- You don't need to care what drives are where.
- Linux commands and filenames are case-sensitive.
- Files have 3 attributes - read (r), write (w), execute (x)
- Everything belongs to somebody.

```
lrwxr-xr-x 2    root    root      2048    Oct 21    07:46    bin -> /usr/bin
drwxr-xr-x 2    root    root      1024    Oct 15    14:28    boot
-rwxr-xr-x 2    root    root   1382760    Oct 21     07:43   vmlinux
```

# Managing Directories & Files - 11

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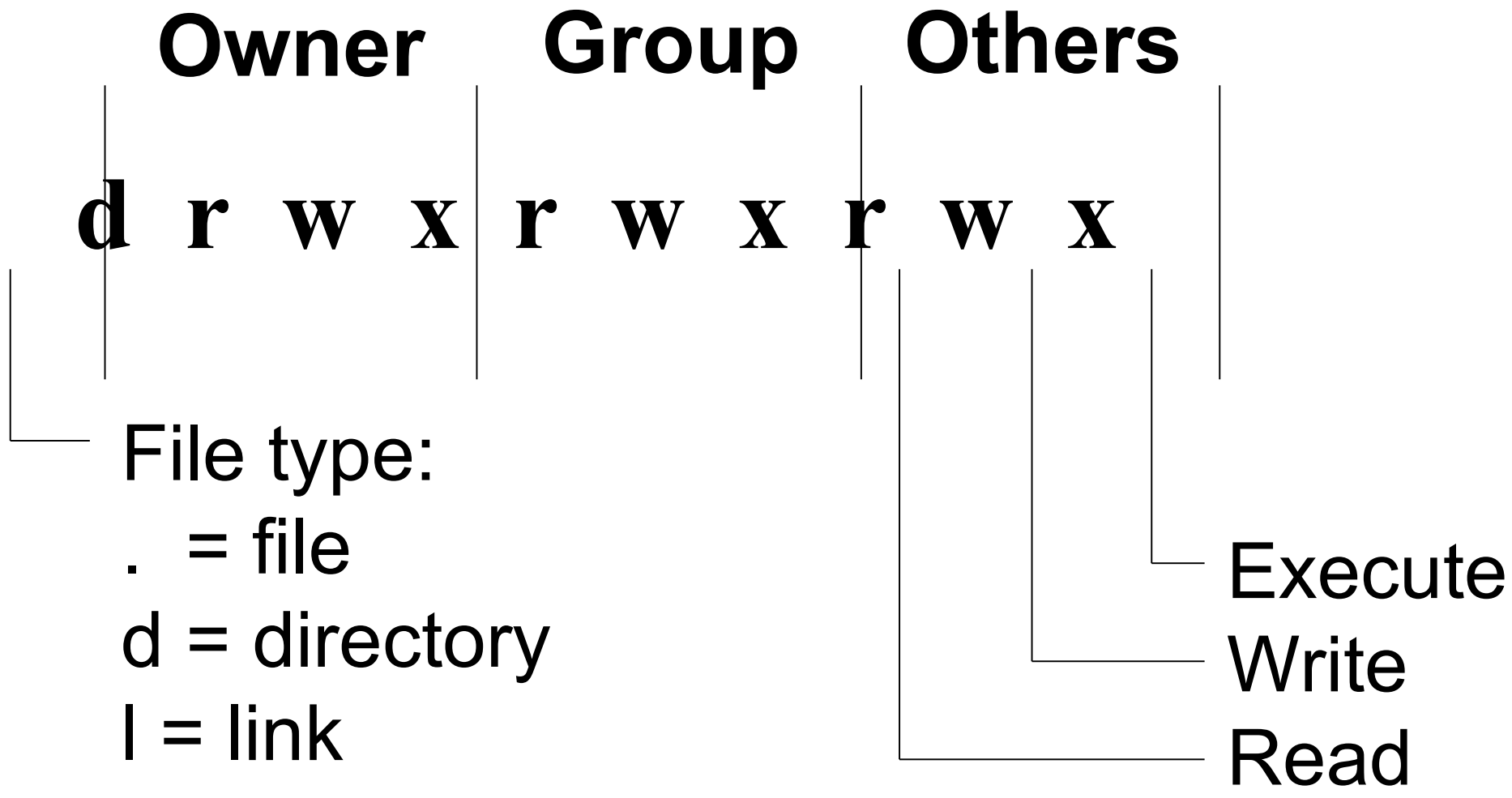
```
lrwxr-xr-x2   root   root     2048  Oct 21   07:46   bin -> /usr/bin
drwxr-xr-x    2      root     root  1024    Oct 15   14:28   boot
-rwxr-xr-x2   root   root  1382760  Oct 21   07:43   vmlinux
```

- First letter - link, directory or normal file (-)
- Next 9 characters - first 3 for file's **owner**; second 3 for file's **group** and last 3 for **everybody else**.
- So, in the above example of KNOPPIX having the permissions "-rw-r--r--", we have the following:
- KNOPPIX is a file.
- The owner has read (r) and write (w) but not execute (x) permissions.
- The group only has read (r) permission.
- Everybody else only has read (r) permission.


Owner
Group
Others
d r w x r w x r w x
File type:
. = file
d = directory
l = link
Execute
Write
Read

# File permissions

| r | w | x |
|---|---|---|
| $2^2$ | $2^1$ | $2^0$ |
| 4 | 2 | 1 |

Example:
chmod 755 filename

Full permission for the owner, read & execute access for group and others.

# Commands - 1

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| | |
|---|---|
| **chmod** – | to change permissions for users, groups and others |
| **chmod** + | to turn on the permission |
| **chmod** - | to turn off the permission |
| **chown** username filename | to change the owner of the file |
| **chown –R** username directoryname | R is for recursive |
| **chgrp** groupname filename | Changing the groupname |
| **chgrp –R** groupname directoryname | Changing the groupname recursively |

# Commands - 2

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| Command | Explanation |
|---|---|
| chmod u+r filename | Turns on read permission for user (i.e. owner) |
| chmod g-w filename | Turns off write permission for group |
| chmod o-rwx filename | Turns off all permissions for non-group users |

# Exercise

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- Complete the following table

| S/No. | Request | Instruction |
|---|---|---|
| 1 | Make a text file, abc, executable by everybody | |
| 2 | Ensure that all files in ../config/includes are writable by everybody | |
| 3 | Change the owner of a file named “asiaoss1.txt” to root | |
| 4 | Activate group write permissions for file named “magical-beans.gz” | |
| 5 | Change group name of “magical-beans.gz” file to “admins” | |

# Networking & Samba

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# Agenda

- Recap <YLLee>
- Networking
  - Setting up network
  - Trouble shooting
- Samba
  - What is samba
  - Why samba and not NFS
  - Sharing files across the network
  - Checking files over the network

# Recap

# Networking

- Setting up Networking in KNOPPIX/Debian
  - Autoconfiguration
  - Manual
- Autoconfiguration
  - Networking should have been configured upon booting the system
- Manual

# Setting up Networking

- Step 01 – Identify the hardware
  - Using Knoppix's KInfoCenter
    - Start the Kmenu -> System -> KInfoCenter
    - Click on “Network Interfaces”
    - Click on “PCI”
  - Using lspci
    - Run the command “lspci” in a terminal window
  - Using dmesg
    - Run the command “dmesg | grep eth” in a terminal window

# Setting up Networking

- Step 02 – load the driver
  - Load the device driver for the appropriate driver
  - <need the machines to list>
  - Check that the driver is not already loaded by running the “lsmod” command
    - lsmod
  - Use the “modprobe” command to load the driver
    - modprobe <driver name>

# Setting up Networking

- Step 03 – Identify the network interface
  - Names to note
    - lo – The loopback interface – always 127.0.0.1
    - eth – The ethernet interface for ethernet devices
    - ppp – The Point 2 Point Protocol interface for dial up modems
    - wlan – The wireless lan interface
  - Identify the name of your network interface with:
    - dmesg | less
    - ip addr

# Setting up Networking

- Step 04 – Bringing the network interface up
  - Click on Kmenu -> KNOPPIX -> Network/Internet -> Network card configuration
  - Ifconfig eth0 192.168.1.1/24 up
  - dhclient eth0
  - dhcpcd -i eth0

# Setting up Networking

- Step 05 – Finding the gateway
  - Using “ip route” to find the gateway
  - Using “route” to find the gateway

# Setting up Networking

- Step 06 – Checking the network
  - Running “ping” to verify that the network is running

# Samba Network File Sharing

- Samba Network File Sharing
  - Network file sharing with Windows machines
  - Allow Windows users to access and share files from a linux server
  - Granular access control
  - Demonstrate simple file sharing with user based authentication

# Setting up Samba

- Step 01 – Samba Control Center
  - Click on Kmenu -> Control Center -> Internet & Network -> Samba
  - Click on the “Administrator Mode” button

# Setting up Samba

- Step 02 – Base Settings
  - Ensure that Security Level -> User
  - Further Options -> Allow guest logins

# Setting up Samba

- Step 03 – Adding a Share
  - Click on the “Shares” tab
  - Click on “Add New Share...” button
    - Type the Directory -> Path
    - Fill in the Identifier -> Name and Identifier -> Comment
    - Click on the Users tab
    - All Unspecified Users -> Allow
      - This allows all users to access this share

# Setting up Samba

- Step 04 – Testing with smbclient
  - Running smbclient -L KNOPPIX

# Setting up Samba

- Test other features to test and optimize samba
- Learn to use Samba in “Domain” mode

# Using the Printer & Scanner

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- Printing under Linux works on the basis of print queues.
- De-queuing is known as spooling.
- Spooler – the process that sends the print jobs from the queue to the printer. Spooler can be one of the many programs.
- CUPS (Common Unix Printing System) – platform-independent printing system – popular in UNIX and Linux world.
- CUPS uses the Internet Printing Protocol (IPP).
- KDE uses CUPS transparently.
- LPD is the second spooler which has been around for a long time.

# Mail Server and Internet Applications

- Connecting to the Internet with a modem
- Instant messaging with GAIM
- Email:
  - KMail
  - Evolution

# Using Internet Applications

- Useful Websites:
  - gaim.sourceforge.net
  - www.jabber.org
  - www.jabberstudio.org/project/?cat=5