Lecture – 11

Section-B

Theoretical concept of Unix Operating System

Reference Books: **(1) UNIX- Concepts & Applications by Sumitabha Das**

(2) Principles of Operating System- Galvin

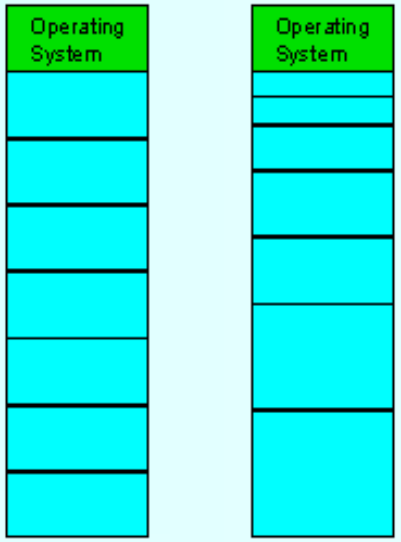
Introduction

- Fragments
- User to user communication

Fragments

Fixed Partitioning

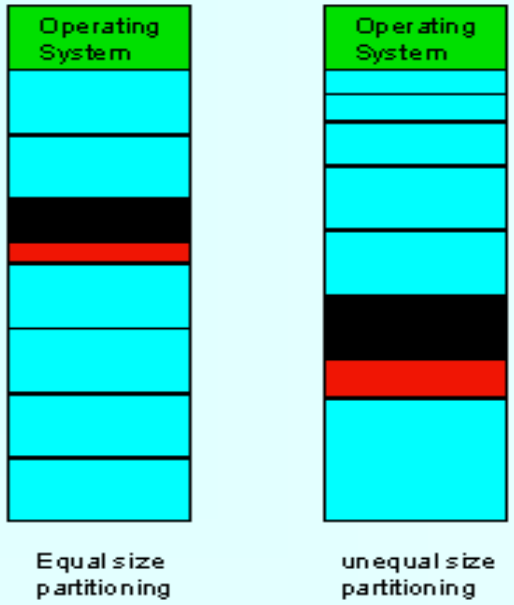
- The main memory is partitioned into a set of non-overlapping blocks.
- Partitions can be of equal or unequal size.
- A process can be loaded into a partition with **higher or equal size**.



Fragments

Internal Fragmentation

- Fixed Partitions suffer from inefficient memory use - any process, no matter how small, occupies an entire partition.
- This waste is called **Internal Fragmentation**.
- Unequal size partitions are **better** in terms of internal fragmentation.



- Most of the file system is taken up by data blocks, which contain whatever the users have put in their files. Let us consider how these data blocks are stored on the disk.
- The hardware disk sector is usually 512 bytes. A block size larger than 512 bytes is desirable for speed. However, because UNIX file systems usually contain a very large number of small files, much larger blocks would cause excessive internal fragmentation.

- The block and fragment sizes are set during file-system creation according to the intended use of the file system: If many small files are expected, the fragment size should be small;
- if repeated transfers of large files are expected, the basic block size should be large,
- Implementation details force a maximum block-to-fragment ratio of 8:1, and a minimum block size of 4K,.

User to User communication

- There are several tools that allow users to communicate with one another through the shell, we'll talk about 3: ***wall*****,** ***write*****,** and ***talk*****,** as well as its friend ***mesg***.

(1). the *wall* command allows a sysadmin as root to message all users on the system. This is used by script such as "shutdown" or "reboot", telling everyone to get off. Use is simple.

- **Here is an example:**

root@quadra ~$ wall

System Maintaince Tonight!

Please be aware that the system is going down in 20 mins.

Please save your work and get off ASAP!

Thank You - SysOps Team

^D

And here is what the users see:

bash-3.2 $ Broadcast Message from root on quadra Wed Nov 15:14:58...

System Maintaince Tonight!

Please be aware that the system is going down in 20 mins.

Please save your work and get off ASAP!

Thank You - SysOps Team

(2) the ***write*** command sends a message directly to a single user. Anyone can use this command.

- To use write, specify the user, (if they have multiple logins). Then type your message and hit [ctrl] D.
- The write command is used to send on-line messages to another user on same machine
- The format of the write command is as follows:

% write username

text of message

[ctrl] D

After typing the command, you enter your message, starting on the next line, terminating with the end-of-file character. The recipient will then hear a beep, then receive your message on screen, with a short header attached

- The following is a typical exchange. User lnp5jb types:

% write lnp8zz

Hi there - want to go to lunch?

^D

%

User lnp8zz will hear a beep and the following will appear on his/her screen:

Message from lnp5jb on sun050 at 12:42

Hi there - want to go to lunch?

EOF

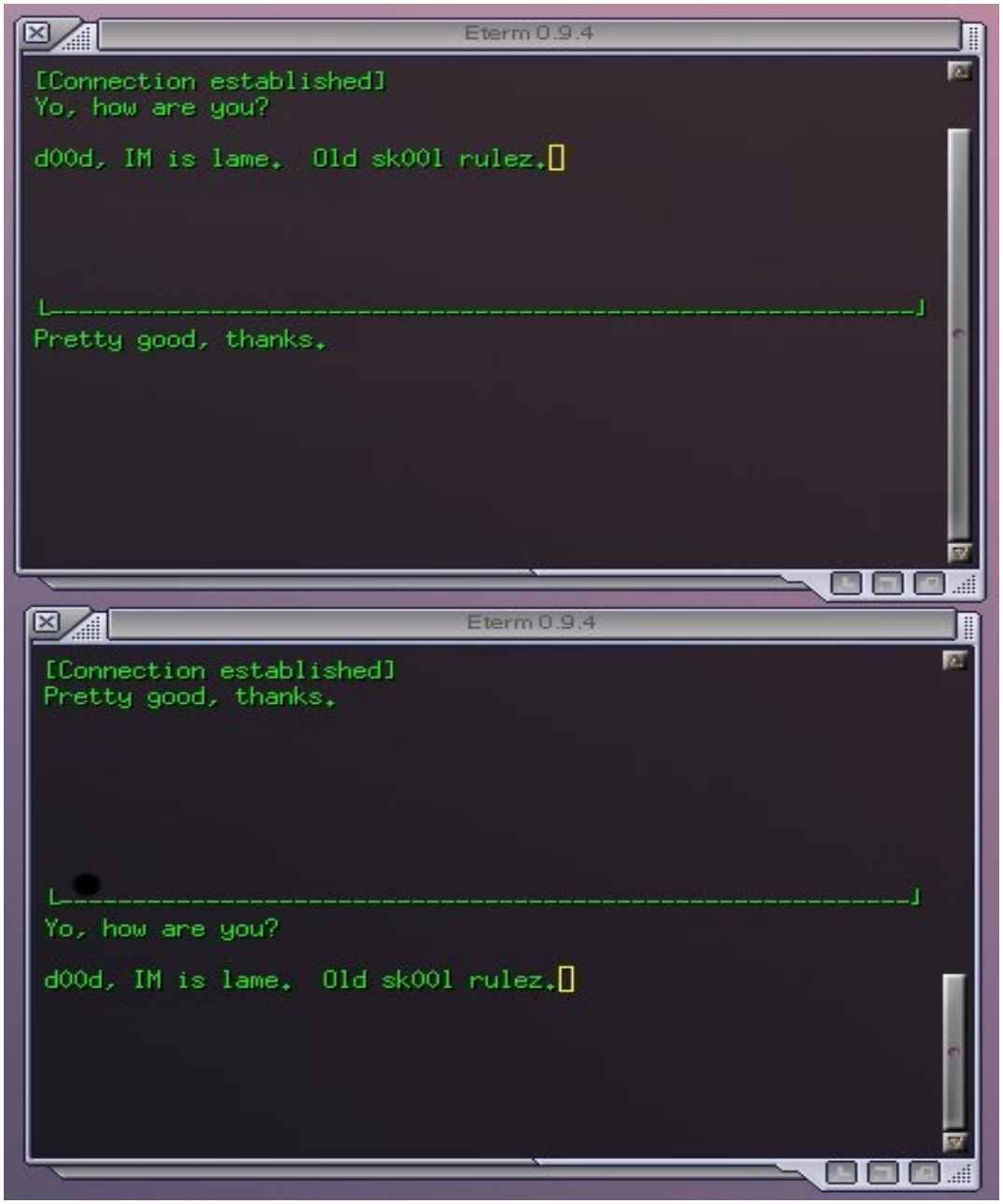
If lnp8zz wasn't logged on, the sender would see the following:

% write lnp8zz

lnp8zz not logged in.

(3) The **third** command is **talk**. Talk was originally developed as a way for two users on a Unix network to converse via typing. It's easy to use.

- Now, initiate a discussion using the form "talk user2". The user will get a message informing them of the request and tell them how to respond, by reciprocating user: "talk user1". When established, a session looks like this:


Eterm 0.9.4
[Connection established]
Yo, how are you?
dOOd, IM is lame. Old skOOl rulez.
Pretty good, thanks.
Eterm 0.9.4
[Connection established]
Pretty good, thanks.
Yo, how are you?
dOOd, IM is lame. Old skOOl rulez.

- This has several advantages over write.
- Firstly, talk can call other machines on a network.
- Secondly, talk provides a clearer interface for the exchange of messages, dividing the screen into two windows
- Type
- talk username@machine
- to start a conversation.

(4)The final command we'll look at is ***mesg***. This command takes the option y or n.

- Try to have an extended on-line conversation with another user.
- You can stop messages being flashed up on your screen if you wish. To turn off direct communications type:

% mesg n

- It will remain off for the remainder of your session, unless you type:

% mesg y

- to turn the facility back on. Typing just mesg lets you know whether it is on or off.

The main reason for this is to avoid messages from annoying users or avoid getting a message while doing something sensitive. For instance, getting a "write" message while editing a file in VI will cause your screen to become a mess and potentially mess up your edits unless you refresh.

Applications

- In computer storage, **fragmentation** is a phenomenon in which storage space is used inefficiently, reducing capacity and often performance.
- Fragmentation leads to storage space being "wasted", and the term also refers to the wasted space itself.

Research

- Security and reliability issues in distributed systems have been investigated for several years at LAAS using a technique called Fragmentation-Redundancy-Scattering (FRS). The aim of FRS is to tolerate both accidental and intentional faults: the core idea consists in fragmenting confidential information in order to produce insignificant fragments and then in scattering the fragments so obtained in a redundant fashion across a distributed system, such as a large network of workstations and servers. Of these workstations, in principle just the user's own workstation needs to be regarded as trusted, whereas from this user's viewpoint the other workstations and servers, which in all probability are under someone else's control, can be untrusted devices.
- According to research conducted by the International Data Corporation, the performance degradation is largely due to external fragmentation; the lifespan of server is shortened by 33% by external fragmentation alone. This leads to a direct increase of 33% in the yearly budget for hardware upgrades. Thus it can be concluded that memory fragmentation has an undesirable effect not only on memory usage and processing speed of the system but also on hardware components and cost of a project.