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Department of Computer Science and Engineering

Bridge Course

On

Linux Programming and Scripting

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1.0 UNIX

1.1 What Is UNIX?

- UNIX is a computer operating system, a control program that works with users to
 - run programs,
 - manage resources, and
 - Communicate with other computer systems.
- Several people can use a UNIX computer at the same time; hence UNIX is called a multiuser system. Any of these users can also run multiple programs at the same time; hence UNIX is called multitasking.

1.2 Logging on to a UNIX machine

- Because UNIX is a multiuser operating system, you need to start by finding a terminal, computer, or other way to access the system.
- Connect your terminal or PC to the UNIX system until the point where you see a login prompt (login:) on your screen. Use the phone and modem to dial up the computer if you need to.

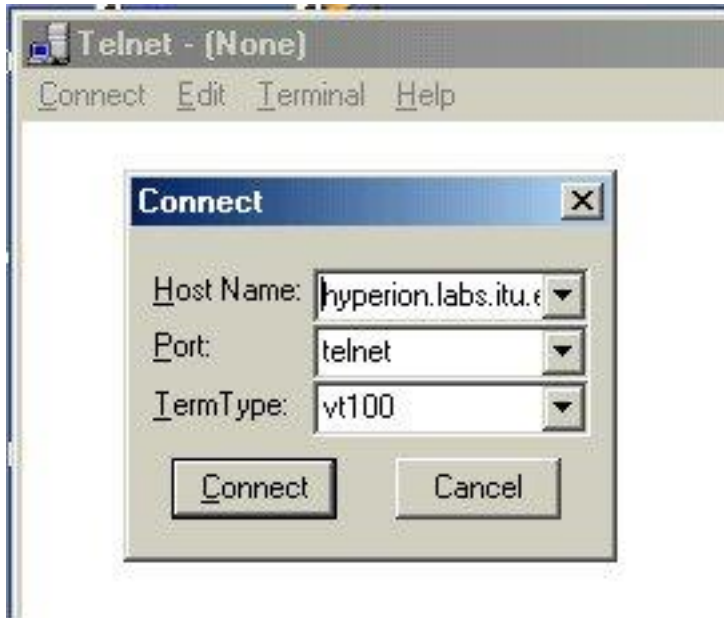
Connecting a PC (MS-Windows) to UNIX System

- The machine that we are going to connect is called “hyperion.labs.itu.edu.tr”
- Select Start → Run and type telnet in the empty box
- This will start the telnet program, in the telnet window

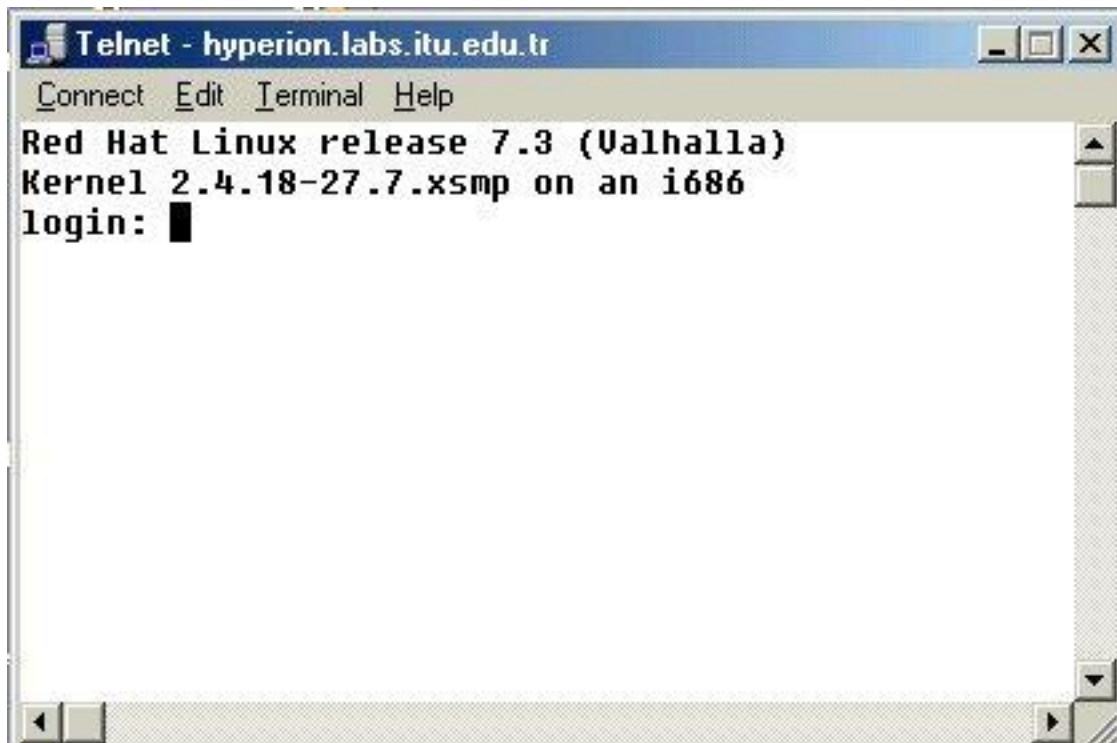


- Choose Connect → Remote System

- A new window will come up to the screen, in the Host Name section, type the above name, leave other parts as their default values



- When you press connect button the login screen will appear as seen on the next slide.



- To log in to your Unix account, enter your login name at the **login:** prompt and press <RETURN>
You will now see the password: prompt:
Enter your password exactly and press <RETURN>. Your password will not be displayed on the screen as you type it. Your login and password are case-sensitive.
- You are now logged into the computer and will have a prompt that reflects the computer's name. For example, if you connect to hyperion machine, the prompt looks like this:
[dag@hyperion dag]\$
- Once you've successfully entered your account name and password, you are shown some information about the system, some news for users, and an indication of whether you have electronic mail. The specifics will vary.
At this point, you're ready to enter your first UNIX command—exit—to sign off from the computer system. entering exit shuts down all my programs
- If you have a direct connection to the computer, logging out causes the system to prompt for another account name, enabling the next person to use the system.

2.0 UNIX COMMANDS

2.1 Shell Commands of UNIX:

Unix Commands:

- When you first log into a unix system, you are presented with something that looks like the following:

```
/home/larry#
```

- That “something” is called a **prompt**. As its name would suggest, it is prompting you to enter a command.
- Every unix command is a sequence of **letters, numbers** and **characters**. But there are no spaces.
- Unix is also case-sensitive. This means that **cat** and **Cat** are different commands.
- The prompt is displayed by a special program called the **shell**.
- **Shells accept** commands, and **run** those commands.
They can also be programmed in their own language. These programs are called “**shell scripts**”.

- There are two major types of shells in **unix**:
 - Bourne shells
 - C shells.
- *Steven Bourne* wrote the original unix shell `sh`, and most shells since then end in the letters `sh` to indicate they are extensions on the original idea
- Linux comes with a Bourne shell called `bash` written by the Free Software Foundation.
- `bash` stands for **B**ourne **A**gain **S**hell and is the default shell to use running linux
- When you first login, the prompt is displayed by `bash`, and you are running your first unix program, the `bash` shell.

As long as you are logged in, the *bash shell* will constantly be running

2.2 Obtaining help:

- The `man` command displays reference pages for the command you specify.
- The UNIX man pages (`man` is short for manual) cover every command available.
- To search for a man page, enter `man` followed by the name of the command to find .
- For example:

```
bagriy@sariyer:~> man ls
```

```
LS(1)                                FSF                                LS(1)

NAME
  ls - list directory contents

SYNOPSIS
  ls [OPTION]... [FILE]...

DESCRIPTION
  List information about the FILES (the current directory by
  default).  Sort entries alphabetically if none of -cftuSUX
  nor --sort.

  -a, --all
        do not hide entries starting with .

  -A, --almost-all
        do not list implied . and ..

  -b, --escape
        print octal escapes for nongraphic characters

lines 1-23
```

2.3 man (*obtaining help*):

- There is also a keyword function in man.
- For example;
 - If you are interested in any commands that deal with Postscript, the printer control language for Adobe
 - Type `man -k ps` or `man -k Postscript`,

you'll get a listing of all commands, system calls, and other documented parts of unix that have the word "ps" (or "Postscript") in their name or short description.

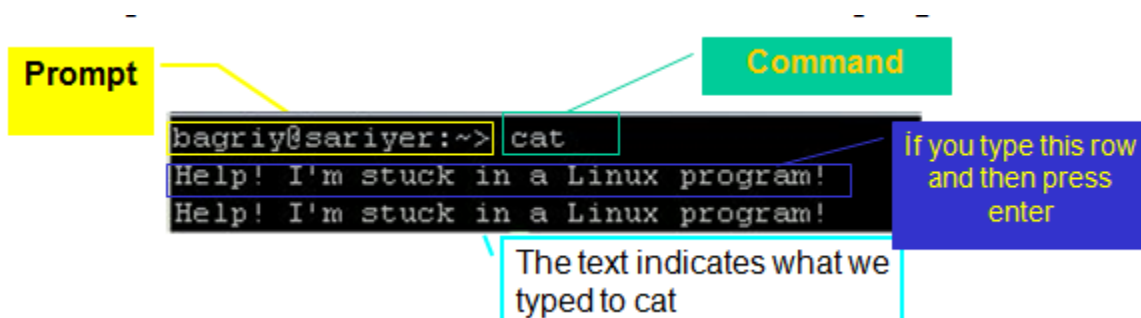
- This can be very useful when you're looking for a tool to do something, but you don't know it's name-or if it even exists!

2.4 Cat:

- `cat` command is used to concatenate or displays the contents of a file.
- To use it, type `cat`, and then press enter key:

`/home/larry# cat`

- This produces the correct result and runs the cat program.



- To end many unix command, type end-of-file command (EOF) [*hold down the key labeled "Ctrl" and press "d" (Ctrl+d)*]

- To display the contents of a file, type

cat filename

```
bagriy@sariyer:~/EST_guz_2003/hafta_1> cat program1.c
/* C programlama
ilk program */
#include<stdio.h>
int main()
{
printf("ilk C programimiz \n");
return 0;
}
bagriy@sariyer:~/EST_guz_2003/hafta_1> █
```

2.5 Storing information :

- Unix provides files and directories.
- A directory is like a folder: it contains pieces of paper, or files.
- A large folder can even hold other folders-*directories can be inside directories.*
- In unix, the collection of directories and files is called the file system. Initially, the file system consists of one directory, called the “root” directory
- Inside “root” directory, there are more directories, and inside those directories are files and yet more directories.
- Each file and each directory has a name.
- A short name for a file could be joe,
- while it’s “full name” would be /home/larry/joe. The full name is usually called the path.
- The path can be divide into a sequence of directories.
- For example, here is how /home/larry/joe is read:

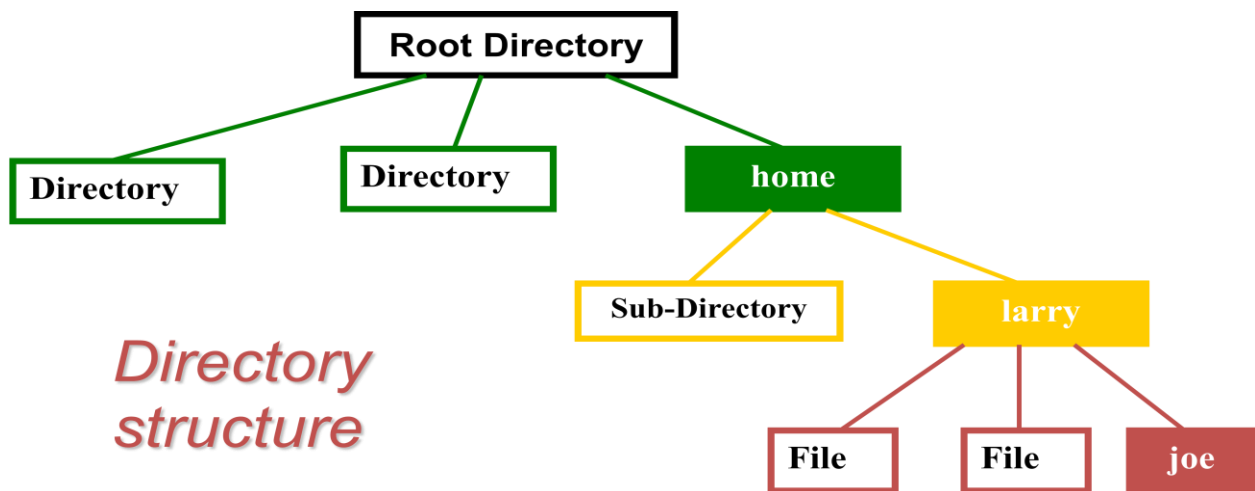
The **initial slash** indicates the **root directory**. This signifies the directory called **home**. It is inside the root directory.

The **second slash** corresponds to the **directory larry**, which is inside home.

joe is inside larry.

`/home/larry/joe`

- A path could refer to either a directory or a filename, so joe could be either.
- All the items before the short name must be directories.



2.6 pwd :

- pwd (present working directory) tells you your current directory.
 - *Most commands act, by default, on the current directory. For instance, ls without any parameters displays the contents of the current directory.*

2.7 Cd:

- cd is used to change directories.
- The format of this command :

cd new-directory (where new-directory is the name of the new directory you want).

2.8 Mkdir:

mkdir (make directory) is used to create a new directory,

- It can take more than one parameter, interpreting each parameter as another directory to create.

2.9 rmdir :

rmdir (remove directory) is used to remove a directory,

- rmdir will refuse to remove a non-existent directory, as well as a directory that has anything in it.

2.10 Moving Information:

The primary commands for manipulating files under unix are cp, mv, and rm. They stand for copy, move, and remove, respectively

2.11 cp :

- cp is used to copy contents of file1 to file2

cp file1 file2 (*contents of file1 is copied to file2 in the same directory*)

cp folder1/file1 folder2 (*contents of file1 is copied to file1 in the inside of folder2 directory*)

2.12 rm:

- rm is used to remove a file.
 - rm *filename* ---> removes a file named *filename*

2.13 mv:

- mv is used to move a file.
 - rm *filename* ---> removes a file named *filename*

- looks like cp, except that it deletes the original file after copying it.
- mv will rename a file if the second parameter is a file. If the second parameter is a directory, mv will move the file to the new directory, keeping it's shortname the same.

Some Other UNIX Commands

2.14 The Power of Unix

- The power of unix is hidden in small commands that don't seem too useful when used alone, but when combined with other commands produce a system that's much more powerful, and flexible than most other operating systems.
- The commands include sort, grep, more, cat, wc, spell, diff, head, and tail.

3.0 FILE COMMANDS

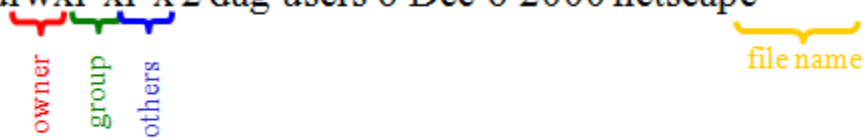
Operating on Files

- In addition to the commands like cd, mv, and rm, you learned in shell section, there are other commands that just operate on files, but not the data in them.
- These include touch, chmod, du, and df.
- All of these files don't care what is in the file.

3.1 Some of the things these commands manipulate:

- **The time stamp:** Each file has three dates associated with it. These are creation time, last modification time and last access time.
- **The owner:** the owner of files
- **The group:** the group of users
- **The permissions:** read, write, execute permissions of files. The permissions tell unix who can access what file, or change it, or, in the case of programs, execute it. Each of these permissions can be toggled separately for the owner, the group, and all the other users.

drwxr-xr-x 2 dag users 6 Dec 6 2000 netscape



read, write, execute
permissions of files

3.2 touch :

- touch will update the time stamps of the files listed on the command line to the current time.
- If a file doesn't exist, touch will create it.

3.3 Chmod:

Chmod (change mode) is used to change the permissions on a file.

(owner) (group) (others)

chmod [number][number][number] file1

Number = (read)4 + (write)2 + (execute)1

- Example: Chmod 754 file1

for owner: read, write and execute permissions (4+2+1)

for group: read and execute permissions (4+0+1)

for others: only read permission (4+0+0)

4.0 Information Commands:

- The commands that will alter a file, perform a certain operation on the file, or display statistics on the file.

4.1 Grep:

- grep is the generalized regular expression parser.

- This is a fancy name for a utility which can only search a text file.

```
grep [-nvwx] [-number] { expression} [file1 file2 ... fileN]
```

4.2 wc:

- wc (word count) simply counts the number of words, lines, and characters in the file(s).

```
wc [-clw] [file1 file2 ... fileN]
```

- The three parameters, clw, stand for character, line, and word respectively, and tell wc which of the three to count.

4.3 Spell:

- spell is very simple unix spelling program, usually for American English. spell is a filter, like most of the other programs we've talked about.

```
spell [file1 file2 ... fileN]
```

4.4 cmp:

- cmp compares two files.
- The first must be listed on command line, while the second is either listed as the second parameter or is read in form standard input.
- cmp is very simple, and merely tells you where the two files first differ.

```
cmp file1 [file2]
```

4.5 diff:

- One of the most complicated standard unix commands is called diff.
- The GNU version of diff has over twenty command line options. It is a much more powerful version of cmp and shows you what the differences are instead of merely telling you where the first one is.

```
diff file1 file2
```

`gzip [-v#] [file1 file2 ... fileN]`

`gunzip [-v] [file1 file2 ... fileN]`

`zcat [{file1 file2 ... fileN}]`

- These three programs are used to compress and decompress data.
- `gzip`, or GNU Zip, is the program that reads in the original file(s) and outputs files that are smaller.
- `gzip` deletes the files specified on the command line and replaces them with files that have an identical name except that they have “.gz” appended to them.

5.0 Editors:

- There are a lot of available editors under linux operating system.
- Amongst these `vi` is the most common one. One can claim that every unix system has `vi`.
- The other famous editor is `emacs` which has some artificial intelligence properties.
- The mailing facility `pine` uses the `pico` editor.
- However, perhaps the simplest one of the editors is `joe`.

`joe` has a lot of flexible features of `emacs` and `pico` beside the user friendliness of the `turbo` type