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LINUX OS & SCRIPTING LAB

M.E – CYBER SECURITY

Topic Name:

The main aim of this lab session is to provide hands-on experience on

Explore file structure

1. **/**** - **Root directory**: The top-level directory of the file system.
2. ***/bin** - **Binary files**: Contains essential command binaries for all users.
3. ***/boot** - **Boot files**: Contains boot loader files and the Linux kernel.
4. ***/dev** - **Device files**: Contains device files for all hardware devices.
5. ***/etc** - **Configuration files**: Contains system-wide configuration files and scripts. *
6. ***/lib** - **Shared libraries**: Essential shared libraries and kernel modules.
7. ***/proc** - **Process information**: Virtual file system for process and system info.
8. ***/sbin** - **System binaries**: Essential binaries for system administration.
9. ***/tmp** - **Temporary files**: Stores temporary files, cleared upon reboot.
10. ***/var** - **Variable files**: Logs, spools, and temporary files for various processes.

File Types

| File Type | Represented by (Hint: ls) | Role | How to create | How to check | Location |
|-----------------|---------------------------|---|----------------|--------------|----------|
| Regular file | - | Store data, text, or binary information. | touch file | ls -l | /home |
| Text file | - | Store plain text. | touch file.txt | ls -l | /home |
| Compressed file | | Store compressed data. | gzip file | file file.gz | /var |
| Image | | Store image data. | convert | file image | /images |
| Directory | d | Organize files. | mkdir dir | ls -ld | / |
| Block file | b | Represent block devices. | mknod | ls -l | /dev |
| Character file | c | Represent character devices. | mknod | ls -l | /dev |
| Socket file | s | Facilitate communication between processes. | socket | ls -l | /run |
| Pipe file | p | Facilitate inter-process communication. | mkfifo | ls -l | /tmp |

1. Globbing

1. List all files starting with file

```
$ ls  
assignment.txt file.txt file1 file2 file3 file4 file5 file{1-5} myfile newfile.txt second.c
```

2. List all files starting with File

```
$ ls file*  
file.txt  
  
file1:  
  
file2:  
  
file3:  
  
file4:  
  
file5:  
  
file{1-5}:
```

3. List all files starting with file and ending in a number

```
$ ls file[1-3]  
file1:  
  
file2:  
  
file3:
```

4. List all files starting with file and ending with a letter

```
$ ls file*[a-zA-Z]  
file.txt
```

5. List all files starting with File and having a digit as fifth character.

```
$ ls File???[0-9]*
```

6. List all files starting with File and having a digit as fifth character and nothing else.

```
$ ~ls File???[0-9]
```

7. List (with ls) all files starting with a letter and ending in a number.

```
$ ~ls File???[0-9]
```

8. List (with ls) all files that have exactly five characters.

```
$ ls ?????
```

9. List (with ls) all files that start with f or F and end with 3 or A.

```
$ ~ls [fF]*[3A]
```

10. List (with ls) all files that start with f have i or R as second character and end in a number.

```
$ ls f[iR]*[0-9]
```

11. List all files that do not start with the letter F.

```
$ ls [^F]*
```

12. Remove all the *.html

```
$ rm *.html
```

13. Rename *.txt to *.json

```
$ for file in *.txt; do mv "$file" "${file%.txt}.json"; done
```

2. Absolute path and relative path

Rm

```
$ rm
```

Mv

```
$ mv ../filename ./newfilename
```

Cp

```
$ cp /home/user/folder/filename /home/user/backup/
```

Ls

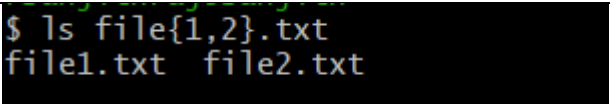
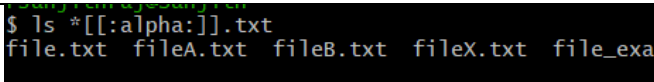
```
$ ls ../folder/
```

3. Wildcards

| Notation | Use | Example | Screenshot |
|----------|--|--|--|
| * | Matches any number of characters | ls file* lists all files starting with "file". | <pre>\$ ls file* file.json file.txt file1.txt file_example.txt file12.txt file1: file2: file3: file4: file5: file{1-5}:</pre> |
| ? | Matches a single character | ls file?.txt lists files like file1.txt, fileA.txt | <pre>\$ touch file1.txt fileA.txt fileB.txt file12.txt</pre> |
| [] | Matches any single character within the brackets | ls file[123].txt lists file1.txt, file2.txt, file3.txt | <pre>\$ ls file[123].txt file1.txt file2.txt file3.txt</pre> |
| [!] | Matches any character that is not a member of the set characters | ls file[!a-c].txt lists files not starting with a, b, or c. | <pre>\$ ls file[!a-c].txt file1.txt file2.txt file3.txt file4.txt fileA.txt fileB.txt</pre> |
| { } | Matches any one of the comma-separated | ls file{1,2}.txt lists file1.txt and | <pre>\$ ls file{1,2}.txt file1.txt file2.txt</pre> |

| | | | |
|--|--------------------------------------|------------|--|
| | separated patterns within the braces | file2.txt. | |
|--|--------------------------------------|------------|--|

More on Character class

| Notation | Use | Example | Screenshot |
|-------------|---|-----------------------|--|
| [[:alnum:]] | Matches any alphanumeric character (letters and digits) | ls *[[[:alnum:]]].txt |  <pre>\$ ls file{1,2}.txt file1.txt file2.txt</pre> |
| [[:alpha:]] | Matches any alphabet | ls *[[[:alpha:]]].txt |  <pre>\$ ls *[[[:alpha:]]].txt file.txt fileA.txt fileB.txt fileX.txt file_exa</pre> |

| | | | |
|-------------|---|--|-------------------------|
| | ic ch ara cte r (let ter s onl y) | | |
| [:digit:] | Ma tch es an y dig it (0- 9) | Is *[[:di git:]].t xt | \$ ls *[[:digit:]].tx |
| [:lower:] | Ma tch es an y lo we rca se lett er | Is *[[:lower:]]. txt | \$ ls *[[:lower:]].tx |

| | | | |
|-----------|------------------------------|-------------------|---------------------------------|
| [:upper:] | Matches any uppercase letter | Is *[:upper:].txt | <pre>\$ ls *[:upper:].txt</pre> |
|-----------|------------------------------|-------------------|---------------------------------|

4. change permission

1. Change the permission set of /work/readme.txt so that only the user (owner) can read,write, and execute it. Use absolute mode.

chmod 700 /work/readme.txt

2. Change the permission set of /work/readme.txt so that any user can read it, the group can read/write to it and the user (owner) can read/write/execute it. Use absolute mode.

chmod 764 /work/readme.txt

3. Change the permission set of /bin/bash so that only the user (owner) can read/write/execute, group, and any user can execute it. However, whenever anyone executes it, it should run with the privileges of the owner user. Use absolute mode.

chmod 4755 /bin/bash

4. Change the permission set of /work/readme.txt so that only the user (owner) can read, write, and execute it. Use relative mode.

```
chmod u+rwx,g-rwx,o-rwx /work/readme.txt
```

5. Change the permission set of /work/readme.txt so that any user can read it, the group can read/write to it and the user (owner) can read/write/execute it. Use relative mode.

```
chmod 700 /work/readme.txt
```

```
chattr +i /work/readme.txt
```

6. Change the permission set of /work/readme.txt so that only the user (owner) can read/write/execute, group, and any user can execute it. However, whenever anyone executes it, it should run with the privileges of the group. Use absolute mode.

```
chmod 2755 /work/readme.txt
```

7. Change the permission set of /work/readme.txt so that only the owner can rename or delete this file while maintaining the existing permissions. Use absolute mode.

```
ls -l
```

8. What are the default permissions for the new file?

```
chmod 444 chmod.exercises
```

9. What was the command to view the file permissions?

```
chmod 640 chmod.exercises
```

10. Change chmod.exercises permissions to -r--r--r--

```
chmod 751 chmod.exercises
```

11. Change the file permissions to Read only for the owner, group and all other users.

```
chmod 444 filename
```

12. What was the command for changing the file permissions to -r--r--r--?

```
chmod 444 filename
```

13. Change chmod.exercises permissions to -rw-r-----

chmod 640 chmod.exercises

14. Change the file permissions to match the following:

- a. owner: Read and Write
- b. group: Read
- c. other: no permissions (None)

chmod 640 filename

15. What was the command for changing the file permissions to -rw-r-----?

chmod 640 filename

16. Change chmod.exercises permissions to -rwxr-x—x

chmod 751 chmod.exercises

17. Change the file permissions to match the following:

- a. owner: Read, Write and Execute
- b. group: Read and Execute
- c. other: Execute

chmod 751 filename

18. What was the command for changing the file permissions to -rwxr-x--x?

chmod 751 filename