Linux Assignment 5.txt

```txt

## Linux Assignment 5: Shell and File Permissions

### 1. What is a shell in Linux OS? How many categories of shell currently exist in Linux? Why is bash shell very popular in Linux distribution? (CO2)

* **What is a shell?**

In Linux, a shell is a program that acts as a bridge between the user and the operating system. It takes the commands as input and tells the computer what to do. It can be used in command-line mode or through scripts to automate tasks.

* **Categories of Shells:**

There are two types of shell in Linux programming:

1. Command-Line Shells - it allows users to type commands directly (for example, Bash, Zsh, Ksh).

2. Graphical Shells - it provides a graphical interface for users (for example, GNOME Shell, KDE Plasma Shell).

* **Popularity of Bash:**

The bash shell is very popular in Linux distribution because:

1. It is by default in most linux systems, therefore making it widely available.

2. It is easy to use and is powerful.

3. It is compatible with older Bourne shell scripts.

4. It is open-source, free, and regularly updated.

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### 2. What does the ls -Z command display? (CO1)
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The `ls -Z` command in Linux is used to display the security context of files and directories. When we run the `ls -Z` command, it shows extra information about file security labels.

Example (Revised):

Aarit@Aarit:~$ ls -Z

? Desktop ? Documents ? 'Linux Website' ? Pictures ? Templates

? Linux ? name ? snap ? Downloads ? Music ? Public ? Videos ? Website

Aarit@Aarit:~$

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3. Write a command to list all hidden files in the current directory. (CO1)

To list all the hidden files in the current directory, we use the `ls -a` command.

Example (Revised):

Aarit@Aarit:~$ ls -a

Desktop Music .sudo_as_admin_successful Documents name Templates .bash_history DownLoads Pictures Videos .bash_logout .lesshst .profile Website .bashrc Linux Public .cache 'Linux Website' snap .config Local .ssh

Aarit@Aarit:~$

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4. Explain the difference between hard links and soft links (symbolic links) in Linux. (CO1)

| Hard Link | Soft Link |

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| A hard link is a direct reference to the same data on the disk as the original file. | A soft link is a shortcut or pointer to the original file's path. |

| The link remains valid even if the original file is deleted. | The link becomes broken if the original file is deleted or moved. |

| Can only be created for files on the same filesystem. | Can link files across different filesystems or partitions. |

| Both files share the same inode number. | The link has a different inode number from the original file. |

| It is created by using the command `ln original.txt hardlink.txt`. | It is created by using the command `ln -s original.txt softlink.txt`. |

| Used when we want multiple names for the same file data. | Used when you want a shortcut or reference to another file. |

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5. A file has permissions -rwxr-x--x. Explain who can read, write, and execute it. (CO1)

* **-** represents file type.

* **rwx** represents the owner permissions and the **owner can read, write and execute** the file.

* **r-x** represents the group permissions and the **group can read, execute** the file but cannot write the file.

* **--x** represents the others permissions and they can **only execute** the file.

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6. Write the command to change the group ownership of a file data.txt to group staff. (C01)

The command to change the group ownership of the file `data.txt` to group `staff` is:

Aarit@Aarit:~$ sudo chgrp staff data.txt Aarit@Aarit:~$

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7. Why is it dangerous to give 777 permissions to a file? Explain with an example. (CO1)

It is dangerous to give **777 permissions** to a file because if we give the 777 permission, anyone on the system can edit, write and execute the file.

* The term `777` means `7 = 4(read) + 2(write) + 1(execute)` so `777` becomes `rwxrwxrwx` which allows anyone to read, write and execute the file.

* **Example**: For a script `/home/user/start.sh`, if I give the 777 permissions (`chmod 777 /home/user/start.sh`), anyone can read, write and execute it.

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8. What is the difference between apropos (i.e., man -k) and whatis (i.e., man -f)? (CO1)

| whatis or man -f | apropos or man -k |

| :--- | :--- |

| Its purpose is to show a short description of a command. | Its purpose is to search for commands related to a keyword. |

| It looks for an exact match of the command name. | It performs a keyword search in all man page descriptions. |

| `whatis ls` → Displays: `ls (1) list directory contents`. | `apropos copy` → Shows all commands whose descriptions contain "copy" (e.g., cp, scp, rsync). |

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9. Write a command to redirect the error output of a command to a file named error.log. (CO1)

Command to redirect the error output of a command to a file named `error.log` is:

Aarit@Aarit:~$ command 2> error.log Aarit@Aarit:~$

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10. How can you use the tee command to append output to a file instead of overwriting it? (CO4)

We can use the `tee` command to append output to a file instead of overwriting by using the `-a` option.