**Linux Programming Assignment 2**

1. **What does the command pwd, whoami, and hostname display?**
   1. pwd prints the current working directory as an absolute path in the shell.
   2. whoami prints the current effective username of the logged-in user session.
   3. hostname prints the system’s host name and can also display or set related host identification details.
2. **Write the command to create a directory named “project” inside the /home/student folder and keep three .txt file into it. Give output snapshot.**
   1. Commands: mkdir -p /home/student/project && touch /home/student/project/notes.txt /home/student/project/todo.txt /home/student/project/readme.txt.
   2. Example check: ls -l /home/student/project shows the three files created under the project directory with their permissions and timestamps.

A screenshot of a computer

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This uses standard coreutils utilities that are available on all mainstream Linux distributions.

1. **Explain the difference between absolute path and relative path with proper examples.**
   1. An absolute path begins with slash and is resolved from the root directory such as /home/student/project or /etc/hosts.
   2. A relative path does not start with slash and is resolved from the current working directory such as docs or ../bin when inside a project tree.
   3. By convention walking above root is not possible so slash dot dot resolves to slash and path resolution behavior is defined in path resolution manuals.
2. **What command will give the already executed command traces in the terminal? Give output snapshot/**
   1. history prints the interactive shell’s command history and fc can list edit and re-execute portions of history in Bash.
   2. The history list is also persisted to the users home at tilde slash dot bash underscore history and is controlled by HISTFILE HISTSIZE and related settings.

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This shows recent commands captured by Bash’s history facilities.

1. **Compare the working functionality of find and locate command. Which one is faster and why?**
   1. find searches the filesystem in real time walking directories and applying rich predicates like name type size mtime user exec and regex which can be slower on large trees.
   2. locate searches a prebuilt database typically updated by updatedb which makes queries very fast but can miss very recent files until the database refreshes.
   3. In practice locate is faster because it reads from an indexed database rather than traversing the live filesystem while find is more flexible and always up to date.
2. **Which command is used to modify file permissions in Linux? Give an example.**
   1. chmod changes file mode bits using symbolic or octal notation and supports recursive operations and special bits like setuid setgid and sticky.
   2. Example symbolic form chmod u plus x script dot sh grants execute permission to the owner and octal form chmod 644 file dot txt sets rw dash r dash dash r dash dash.
   3. GNU Coreutils documents both symbolic and numeric modes as well as behavior with symlinks and recursive options.
3. **A file has permissions -rw-r--r--. What does this mean?**
   1. The leading dash indicates a regular file followed by three triplets for user group and others where rw dash means owner can read and write r dash dash means group can read only and r dash dash means others can read only.
   2. Numerically this corresponds to 0644 which is a common default for text files on Unix-like systems.
4. **Explain the difference between chown and chgrp with an example.**
   1. chown changes the file owner and optionally the group with syntax like chown owner colon group file and can operate recursively with dash R.
   2. chgrp changes only the group ownership which is equivalent to chown colon group file when not changing the owner.
   3. Example chown alice colon devs app dot log sets owner to alice and group to devs while chgrp devs app dot log only changes the group to devs.
5. **A file needs to be accessible by multiple users but only writable by the owner. How will permissions be set.**
   1. For simple read access by everyone and write access only by the owner use chmod 644 file which sets rw dash r dash dash r dash dash.
   2. If only a specific group should read it change group and restrict others with chgrp devs file and chmod 640 file to set rw dash r dash dash dash dash dash and share group read access.
   3. For finer control across named users use POSIX ACLs for example setfacl dash m u colon bob colon r file to grant Bob read access while keeping write restricted to the owner via base mode bits.
6. **How do manual pages for any Linux command get checked?**
   1. Run man command name to open the system manual for that command such as man chmod or man find which displays the installed man page locally.
   2. Many commands also support double dash help for quick usage and full manuals can be read via info for GNU tools for example info parenthesis coreutils parenthesis chmod invocation.
   3. Online mirrors like man7 and Debian manpages host the same content for web access but the canonical workflow on a Linux system is man followed by the command name.