CSE4510 Operating Systems Lab

Basic Shell Commands & Tools

Salman Shamil

United International University (UIU)

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Lecture Topics

- **Recap Lab-01**
  - Basic commands
  - Practice problem
- **More Shell Tools**
  - Searching for files and contents
  - Practice problem

Some Basic Commands & Flags

```
# date
# echo
# $PATH
# which
# pwd
# cd
# ls (with flags)
# file permissions (rwx)
# --help (& man)
# mkdir
```

```
# touch
# mv
# cp
# rm, rmdir
# I/O redirection: <, >, >>
# piping with |
# sudo
# chmod
# tee
# curl
```

Practice

- Create a new directory `CSE4510`, and a sub-directory named `Lab01Recap` in it.
- Use `touch` command to create a new file `curl_test` in `CSE4510/Lab01Recap`.
- Write the following code into the new file:

```
#!/bin/bash
curl --head --silent https://cse.uiu.ac.bd
```

- Try to execute the file using `$./curl_test`. Why does it fail?
- Try running `$sh curl_test`. It runs fine. Why?

Practice

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- Write the following code into the new file:

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```

- Try to execute the file using `$./curl_test`. Why does it fail?
- Try running `$sh curl_test`. It runs fine. Why?
- Use `chmod` to update permission so that `./curl_test` also runs successfully.
- Use | and > to write *last modified* date into a file `last_modified.txt` in your desktop directory.

Getting Help with Commands

- `man` pages or `--help` output can be overwhelming. Often, all you need are a few common examples.
- That's where tldr.sh helps — it literally stands for "Too long; didn't read!" and provides concise command examples.
- Installation instructions: tldr.sh webpage or GitHub repo.
- Recommended: install before we turn off the internet for a test.

The `find` tool

- Finding files or directories matching some criteria
- Recursively searches for files within the given directory

```
# By name (case-sensitive / insensitive), or path
find . -name '*.txt'
find . -iname '*.Txt'
find . -path '*/archive/*.txt'

# By type (file, directory, symlink...)
find . -type f
find . -type d

# By owner or group
find . -user alice
find . -group staff
```

- You can also filter by file size and/or modification time.
- **TODO**: Use `tldr` or `man` to see how to do it.

More about `find`

- `find` is a really powerful tool. It can do a lot more.

```
# Depth control
find . -maxdepth 2 -type f

# Executing actions
find . -name '*.log' -exec rm {} \;
```

- You can combine multiple criteria.
- List all `.txt` files in your home directory that were modified in the last 7 days and are larger than 1KB. For each such file, show the number of lines in it.

```
find ~/ -name '*.txt' \
    -mtime -7 \
    -size +1k \
    -exec wc -l {} \;
```

- **TODO**: Use `tldr` for more examples.

The grep tool

- Searching based on file conent.

```
# Look for the text "print" in cpu.c
grep print cpu.c
# Case-insensitie (-i), line number (-n)
grep -in linux README.md
# Match whole word
grep -n -w printf cpu.c
# Show count only (-c)
grep -c print cpu.c
# Invert match (-v)
grep -v include common.h
# Using regular expressions
grep -inw 'p[a-z]*t' README.md
# Match either pattern, using Extended Regex
grep -E 'double|int' common.h
```

Here you can find a useful and compact grep cheatsheet.

More about grep

```
# Recursively search files in a directory
grep -rn "common\.h" .
# Combine with find for finer control
find . -name "*.c" -exec grep -nH "common\.h" {} \;
# grep with piping and context (after)
man grep | grep -n -A5 "filename"
# Show context around matches
# 2 lines before, 4 lines after
grep -n -B2 -A4 "main" cpu.c
# 3 lines before & after
grep -n -C3 "main" cpu.c
```

Practice

Task: Secure all C source files that include “common.h”

- Identify all C source files that include the header `common.h`.
  - Use `find` and `grep`
- Remove group-write permission from each of those files.
  - `-exec` can be used multiple times consecutively.
- Combine the search and permission change into a single operation.

Verify that the files with common.h include no longer grant write access to the group.