

AKIZE ISRAEL

ID: 25883

Q1.

List some essential system binaries (commands) located in /bin

ls -l /bin | head -10 with all other sub questions:

```
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ # This command takes you to the top of the directory tree.
cd /

HP@DESKTOP-A8P680F MINGW64 /
$ ls -l | grep -E '^(\d).*(bin|etc|var|usr|tmp|opt|boot|home)'
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 bin/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 etc/
drwxr-xr-x 1 HP 197121 0 Sep 30 11:05 tmp/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 usr/
```

```

$ # List some essential system binaries (commands) located in /bin
ls -l /bin | head -10
total 105436
-rwxr-xr-x 1 HP 197121    72418 Feb 13 2025 [.exe*
-rwxr-xr-x 1 HP 197121    3075  Feb 13 2025 addgnupghome*
-rwxr-xr-x 1 HP 197121    2217  Feb 13 2025 applygnupgdefaults*
-rwxr-xr-x 1 HP 197121    35876 Feb 13 2025 arch.exe*
-rwxr-xr-x 1 HP 197121    858   Feb 13 2025 astextplain*
-rwxr-xr-x 1 HP 197121   627466 Feb 13 2025 awk.exe*
-rwxr-xr-x 1 HP 197121   55390 Feb 13 2025 b2sum.exe*
-rwxr-xr-x 1 HP 197121    7339  Feb 13 2025 backup*
-rwxr-xr-x 1 HP 197121   41819 Feb 13 2025 base32.exe*

HP@DESKTOP-A8P680F MINGW64 /
$ # List some critical system configuration files
ls -l /etc | grep -E '(passwd|group|ssh|hosts)' | head -10
-rw-r--r-- 1 HP 197121    826 Sep  3 2024 hosts
drwxr-xr-x 1 HP 197121      0 Feb 25 2025 ssh/

HP@DESKTOP-A8P680F MINGW64 /
$ # Navigate into /var and list its key subdirectories
ls -l /var
ls: cannot access '/var': No such file or directory

HP@DESKTOP-A8P680F MINGW64 /
$ ls -ld /var
ls: cannot access '/var': No such file or directory

HP@DESKTOP-A8P680F MINGW64 /
$ # Let's look at what's inside /usr
ls -l /usr
total 92
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 bin/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 etc/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 lib/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 libexec/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 share/
drwxr-xr-x 1 HP 197121 0 Feb 25 2025 ssl/

$ # Check the detailed permissions of /tmp
ls -ld /tmp
drwxr-xr-x 1 HP 197121 0 Sep 30 11:29 /tmp/

$ # Check if /opt exists
ls -ld /opt
ls: cannot access '/opt': No such file or directory

```

Q2. Explanation of the Command:

- *Mkdir -p: The -p flag creates parent directories as needed and doesn't throw errors if directories already exist*
- *{ }: Brace expansion creates multiple directory paths from a single command.*

```
$ mkdir -p projects/{client_work/{web/{frontend,backend},mobile/{android,ios}},personal/experiments,shared/templates}

HP@DESKTOP-A8P680F MINGW64 /
$ tree projects/
bash: tree: command not found

HP@DESKTOP-A8P680F MINGW64 /
$ find projects/ -type d | sort
projects/
projects/client_work
projects/client_work/mobile
projects/client_work/mobile/android
projects/client_work/mobile/ios
projects/client_work/web
projects/client_work/web/backend
projects/client_work/web/frontend
projects/personal
projects/personal/experiments
projects/shared
projects/shared/templates
```

Q3.

```
$ mkdir -p projects/{client_work/{web/{frontend,backend},mobile/{android,ios}},personal/experiments,shared/templates}

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd projects/client_work/web/frontend

HP@DESKTOP-A8P680F MINGW64 ~/projects/client_work/web/frontend (25883_Akize_Israel_assignment1)
$ pwd
/c/Users/HP/projects/client_work/web/frontend

HP@DESKTOP-A8P680F MINGW64 ~/projects/client_work/web/frontend (25883_Akize_Israel_assignment1)

$ cd projects/client_work/web/frontend

HP@DESKTOP-A8P680F MINGW64 /projects/client_work/web/frontend
$ pwd
/projects/client_work/web/frontend
```

Q4.

```
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ mkdir web_project

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd web_project

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch {index,about,contact,page_{001..012}}.html

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch {main,reset,theme_{light,dark},mobile,tablet,desktop,print}.css

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch {script,util,config}{,.min,.bundle}.js

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch a{1..5}.{bak,backup,old,tmp,save}

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch b{1..5}.{bak,backup,old,tmp,save}

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch c{1..5}.{bak,backup,old,tmp,save}

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ touch d{1..5}.{bak,backup,old,tmp,save}
```

```
HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ # Count files by type
echo "HTML files:" && ls *.html | wc -l
HTML files:
15

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "CSS files:" && ls *.css | wc -l
CSS files:
8

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "JS files:" && ls *.js | wc -l
JS files:
9

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "Backup files:" && ls [a-d]*.* | wc -l
Backup files:
106
```

```

$ # Show all files organized
ls -la
total 88
drwxr-xr-x 1 HP 197121 0 Sep 30 12:10 -/
drwxr-xr-x 1 HP 197121 0 Sep 30 12:08 ../
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 about.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 desktop.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 index.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 main.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 mobile.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_001.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_002.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_003.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_004.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_005.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_006.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_007.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_008.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_009.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_010.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_011.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_012.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 print.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 reset.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.bundle.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.min.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 tablet.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 theme_dark.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 theme_light.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.bundle.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.min.js

```

Q5.

```
HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_
$ cd ~/web_project

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_
$ mkdir archive desktop

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_
$ ls -la
total 88
drwxr-xr-x 1 HP 197121 0 Sep 30 12:21 .
drwxr-xr-x 1 HP 197121 0 Sep 30 12:08 ../
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 about.html
drwxr-xr-x 1 HP 197121 0 Sep 30 12:21 archive/
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.tmp
```

```
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 c5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 config.bundle.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 config.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 config.min.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 contact.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d1.bak
```

```

-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.tmp
drwxr-xr-x 1 HP 197121 0 Sep 30 12:21 desktop/
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 desktop.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 index.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 main.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 mobile.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_001.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_002.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_003.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_004.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_005.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_006.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_007.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_008.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_009.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_010.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_011.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_012.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 print.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 reset.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.bundle.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 script.min.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 tablet.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 theme_dark.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 theme_light.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.bundle.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.js
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 util.min.js

```

```

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ # Pattern: *[0-9].* - any file with a number before the extension
mv *[0-9].* archive/
HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "Files in archive:" && ls archive/
Files in archive:
a1.backup a4.bak    b2.old     b5.save    c3.tmp      d2.backup  d5.bak
a1.bak   a4.old    b2.save    b5.tmp     c4.backup  d2.bak    d5.old
a1.old   a4.save   b2.tmp     c1.backup  c4.bak    d2.old    d5.save
a1.save  a4.tmp    b3.backup  c1.bak    c4.old    d2.save   d5.tmp
a1.tmp   a5.backup b3.bak    c1.old    c4.save   d2.tmp    page_001.html
a2.backup a5.bak    b3.old    c1.save   c4.tmp    d3.backup  page_002.html
a2.bak   a5.old    b3.save   c1.tmp    c5.backup  d3.bak    page_003.html
a2.old   a5.save   b3.tmp    c2.backup c5.bak    d3.old    page_004.html
a2.save  a5.tmp    b4.backup b2.bak    c5.old    d3.save   page_005.html
a2.tmp   b1.backup b4.old    c2.old    c5.save   d3.tmp    page_006.html
a3.backup b1.bak    b4.old    c2.save   c5.tmp    d4.backup  page_007.html
a3.bak   b1.old    b4.save   c2.tmp    d1.backup  d4.bak    page_008.html
a3.old   b1.save   b4.tmp    c3.backup d1.bak    d4.old    page_009.html
a3.save  b1.tmp    b5.backup b3.bak    d1.old    d4.save   page_010.html
a3.tmp   b2.backup b5.bak    c3.old    d1.save   d4.tmp    page_011.html
a4.backup b2.bak    b5.old    c3.save   d1.tmp    d5.backup  page_012.html

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "Files remaining:" && ls *.html 2>/dev/null | head -10
Files remaining:
about.html
contact.html
index.html

```

```

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ # Copy all CSS files except those with mobile or tablet in name
cp *.css desktop/ 2>/dev/null

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ rm desktop/*mobile* desktop/*tablet* 2>/dev/null

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ # Verify
echo "CSS files in desktop folder:" && ls desktop/
CSS files in desktop folder:
desktop.css  main.css  print.css  reset.css  theme_dark.css  theme_light.css

```

```
HP@DESKTOP-A8P68OF MINGW64 ~/web_project (25883_Akize_israel_assignment1)
$ # Pattern: ???.* - exactly 3 chars then dot then extension
echo "Files with exactly 3 chars before dot:"
ls ???.* 2>/dev/null
Files with exactly 3 chars before dot:
```

```
$ echo "==== ARCHIVE FOLDER ===="
ls -la archive/
==== ARCHIVE FOLDER ====
total 80
drwxr-xr-x 1 HP 197121 0 Sep 30 12:31 .
drwxr-xr-x 1 HP 197121 0 Sep 30 12:31 ../
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a4.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 a5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.old
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.save
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 b4.backup
```

```
-rw-r--r-- 1 HP 197121 0 Sep 30 12:10 d5.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_001.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_002.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_003.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_004.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_005.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_006.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_007.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_008.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_009.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_010.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_011.html
-rw-r--r-- 1 HP 197121 0 Sep 30 12:09 page_012.html
```

```
HP@DESKTOP-A8P68OF MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ echo "===" DESKTOP FOLDER ==="
ls -la desktop/
===
total 44
drwxr-xr-x 1 HP 197121 0 Sep 30 12:41 ../
drwxr-xr-x 1 HP 197121 0 Sep 30 12:31 ../
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 desktop.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 main.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 print.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 reset.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 theme_dark.css
-rw-r--r-- 1 HP 197121 0 Sep 30 12:41 theme_light.css
```

Q6.

```

HP@DESKTOP-A8P680F MINGW64 ~/web_project (25883_Akize_Israel_assignment1)
$ cd ~
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ mkdir question6
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd question6
HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ # Create log files for first quarter 2024
touch log_2024-{01..{01..31}},02-{01..29},03-{01..31}.txt

HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ # Verify some logs were created
echo "First 10 log files:"
ls log_2024*.txt | head -10
First 10 log files:
log_2024-01-01.txt
log_2024-01-02.txt
log_2024-01-03.txt
log_2024-01-04.txt
log_2024-01-05.txt
log_2024-01-06.txt
log_2024-01-07.txt
log_2024-01-08.txt
log_2024-01-09.txt
log_2024-01-10.txt

HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ echo "Total log files created:"
ls log_2024*.txt | wc -l
Total log files created:
91

```

```

HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ # Create test files: {A,B,C}{10,11,12}_{input,output}.test
touch {A,B,C}{10,11,12}_{input,output}.test

```

```

HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ # Verify test files
echo "Test files:"
ls *.test
Test files:
A10_input.test   A12_output.test   B12_input.test   C11_output.test
A10_output.test  B10_input.test   B12_output.test  C12_input.test
A11_input.test   B10_output.test  C10_input.test   C12_output.test
A11_output.test  B11_input.test   C10_output.test 
A12_input.test   B11_output.test  C11_input.test

```

```

$ # Create config files: {web,api,db}_{dev,staging,prod}.conf
touch {web,api,db}_{dev,staging,prod}.conf

```

```

HP@DESKTOP-A8P680F MINGW64 ~/question6 (25883_Akize_Israel_assignment1)
$ # Verify config files
echo "Configuration files:"
ls *.conf
Configuration files:
api_dev.conf    api_staging.conf  db_prod.conf    web_dev.conf   web_staging.conf
api_prod.conf   db_dev.conf      db_staging.conf web_prod.conf

```

Question 7 Analysis

We need to:

1. *Create two configuration files with same content but different line endings (Linux vs Windows)*
2. *Compare those using diff, cmp, and comm tools*

3. *Explain why each tool gives different results*
4. *Discuss cross-platform file compatibility lessons*

```

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ mkdir question7

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd question7

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # Create content with Linux line endings (LF)
cat > config_linux.conf << 'EOF'
server_name=web01
port=8080
debug_mode=true
max_connections=100
timeout=30
EOF

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # We'll use printf to explicitly add CRLF
printf "server_name=web01\r\n" > config_windows.conf
printf "port=8080\r\n" >> config_windows.conf
printf "debug_mode=true\r\n" >> config_windows.conf
printf "max_connections=100\r\n" >> config_windows.conf
printf "timeout=30\r\n" >> config_windows.conf

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # Check file sizes (Windows file will be slightly larger due to CRLF)
echo "File sizes:"
ls -l *.conf
File sizes:
-rw-r--r-- 1 HP 197121 75 Sep 30 13:41 config_linux.conf
-rw-r--r-- 1 HP 197121 80 Sep 30 13:42 config_windows.conf

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # We'll use printf to explicitly add CRLF
printf "server_name=web01\r\n" > config_windows.conf
printf "port=8080\r\n" >> config_windows.conf
printf "debug_mode=true\r\n" >> config_windows.conf
printf "max_connections=100\r\n" >> config_windows.conf
printf "timeout=30\r\n" >> config_windows.conf

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # Check file sizes (Windows file will be slightly larger due to CRLF)
echo "File sizes:"
ls -l *.conf
File sizes:
-rw-r--r-- 1 HP 197121 75 Sep 30 13:41 config_linux.conf
-rw-r--r-- 1 HP 197121 80 Sep 30 13:42 config_windows.conf

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # Show line endings using cat with options
echo "==== Linux file (cat -A shows line endings) ==="
cat -A config_linux.conf
echo "==== Windows file (cat -A shows line endings) ==="
cat -A config_windows.conf
==== Linux file (cat -A shows line endings) ===
server_name=web01$ 
port=8080$ 
debug_mode=true$ 
max_connections=100$ 
timeout=30$ 
==== Windows file (cat -A shows line endings) ===
server_name=web01^M$ 
port=8080^M$ 
debug_mode=true^M$ 
max_connections=100^M$ 
timeout=30^M$ 

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # Count lines in each file
echo "Line counts:"
wc -l *.conf
Line counts:
 5 config_linux.conf
 5 config_windows.conf
 10 total

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # 1. Using diff
echo "==== diff output ==="
diff config_linux.conf config_windows.conf
==== diff output ===
1,5c1,5
< server_name=web01
< port=8080
< debug_mode=true
< max_connections=100
< timeout=30
---
> server_name=web01
> port=8080
> debug_mode=true
> max_connections=100
> timeout=30

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # 2. Using cmp
echo "==== cmp output ==="
cmp config_linux.conf config_windows.conf
==== cmp output ===
config_linux.conf config_windows.conf differ: char 18, line 1

HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ # 3. Using comm (files need to be sorted first)
echo "==== comm output ==="
sort config_linux.conf > linux_sorted.txt
sort config_windows.conf > windows_sorted.txt
comm linux_sorted.txt windows_sorted.txt
==== comm output ===
debug_mode=true
debug_mode=true
max_connections=100
max_connections=100
port=8080
port=8080
server_name=web01
server_name=web01
timeout=30
timeout=30

```

Q8.

```
HP@DESKTOP-A8P680F MINGW64 ~/question7 (25883_Akize_Israel_assignment1)
$ cd ~

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ mkdir security_audit

HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd security_audit

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Create files with different sizes, ages, and permissions
mkdir -p {app,logs,temp,backup,config,secret,.hidden}

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Create files with different sizes
dd if=/dev/zero of=large_file.dat bs=1M count=5 2>/dev/null
dd if=/dev/zero of=medium_file.dat bs=1K count=100 2>/dev/null
touch small_file.txt

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Create files with different ages (using touch to backdate)
touch -d "2024-09-20" old_file.log
touch -d "2024-09-28" recent_file.conf
touch -d "2024-09-29 12:00" file_72h_ago.txt

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Create files with different permissions
touch world_writable.tmp
chmod 666 world_writable.tmp
touch secret_file.key
chmod 600 secret_file.key
touch executable_script.sh
chmod 755 executable_script.sh

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Create temporary and backup files
touch {/tmp/,.temp_file_{1..3}.tmp 2>/dev/null
touch backup_{2024,old,current}.{bak,bak~,tar.gz}
touch .hidden_config

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "Test environment created!"
ls -la
Test environment created!
total 5276
drwxr-xr-x 1 HP 197121 0 Sep 30 13:56 .
drwxr-xr-x 1 HP 197121 0 Sep 30 13:54 ..
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 .hidden/
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 .hidden_config
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 app/
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 backup/
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_2024.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_2024.bak~
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_2024.tar.gz
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_current.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_current.bak~
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_current.tar.gz
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_old.bak
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_old.bak~
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 backup_old.tar.gz
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 config/
drwxr-xr-x 1 HP 197121 0 Sep 30 13:56 empty_dir/
-rw-r--r-- 1 HP 197121 0 Sep 30 13:55 executable_script.sh
-rw-r--r-- 1 HP 197121 0 Sep 29 2024 file_72h_ago.txt
-rw-r--r-- 1 HP 197121 5242880 Sep 30 13:55 large_file.dat
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 logs/
-rw-r--r-- 1 HP 197121 102400 Sep 30 13:55 medium_file.dat
-rw-r--r-- 1 HP 197121 0 Sep 20 2024 old_file.log
-rw-r--r-- 1 HP 197121 0 Sep 28 2024 recent_file.conf
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 secret/
-rw-r--r-- 1 HP 197121 0 Sep 30 13:55 secret_file.key
-rw-r--r-- 1 HP 197121 0 Sep 30 13:55 small_file.txt
drwxr-xr-x 1 HP 197121 0 Sep 30 13:55 temp/
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 temp_file_1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 temp_file_2.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 13:56 temp_file_3.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 13:55 world_writable.tmp
```

```
|HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ # Calculate average file size and find files larger than average
echo "==== Files larger than average size ===="
find . -type f -size +$(find . -type f -printf "%s\n" | awk '{total+=$1; count++}')
END{if(count>0) print total/count}'c 2>/dev/null
==== Files larger than average size ====
./large_file.dat
```

```

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Files modified 24-72 hours ago ==="
find . -type f -mtime +1 -mtime -3
==== Files modified 24-72 hours ago ===

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ find . -type d -empty

echo "==== Directories with only hidden files ==="
find . -type d -exec sh -c 'ls -A "$1" | grep -q "\.\.\?"[^\.]" || echo "$1"' _ {} \;
./.hidden
./app
./backup
./config
./empty_dir
./logs
./secret
./temp
==== Directories with only hidden files ===
./.hidden
./app
./backup
./config
./empty_dir
./logs
./secret
./temp

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== World-writable files (security risk) ==="
find . -type f -perm /o=w ! -perm /g=w
==== World-writable files (security risk) ===

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Files not owned by current user ==="
find . -type f ! -user $(whoami)
==== Files not owned by current user ===

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Temporary files ==="
find . -type f \(
    -name "*tmp" -o
    -name "*temp" -o
    -name "*~" \
)
==== Temporary files ===
./backup_2024.bak~
./backup_current.bak~
./backup_old.bak~
./temp_file_1.tmp
./temp_file_2.tmp
./temp_file_3.tmp
./world_writable.tmp

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Backup files ==="
find . -type f \(
    -name "*.bak" -o
    -name "*.backup" -o
    -name "*.old" \
)
==== Backup files ===
./backup_2024.bak
./backup_current.bak
./backup_old.bak

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Combined: World-writable temporary files ==="
find . -type f -perm /o=w \(
    -name "*tmp" -o
    -name "*~" \
)
==== Combined: World-writable temporary files ===

HP@DESKTOP-A8P680F MINGW64 ~/security_audit (25883_Akize_Israel_assignment1)
$ echo "==== Combined: Large backup files modified recently ==="
find . -type f -name "*.bak" -size +1M -mtime -7
==== Combined: Large backup files modified recently ===

```

Question 9 Analysis

```

$ cd ~
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ mkdir log_analysis
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)
$ cd log_analysis
HP@DESKTOP-A8P680F MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ # Create a realistic log file with 200+ lines
cat > generate_logs.sh << EOF
>#!/bin/bash
>for i in {1..250}; do
>if (( i % 10 == 0 )); then
>echo "[ERROR] Something went wrong at step $i - check configuration" >> app.log
>elif (( i % 7 == 0 )); then
>echo "[WARN] Performance degradation detected at step $i" >> app.log
>elif (( i % 15 == 0 )); then
>echo "[DEBUG] User login successful - session ID: $(printf "%08x" $RANDOM)" >> app.log
>else
>echo "[INFO] Processing request $i - status: OK" >> app.log
>fi
># Add some variety
>if (( i % 25 == 0 )); then
>echo "[ERROR] Database connection timeout at $i" >> app.log
>echo "[INFO] Retrying connection..." >> app.log
>echo "[INFO] Connection restored" >> app.log
>fi
done
echo "[INFO] Server shutdown completed" >> app.log
EOF

HP@DESKTOP-A8P680F MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ # Make script executable and run it
chmod +x generate_logs.sh
./generate_logs.sh

HP@DESKTOP-A8P680F MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "Log file created with $(wc -l < app.log) lines"
head -5 app.log
Log file created with 281 lines
[INFO] Processing request 1 - status: OK
[INFO] Processing request 2 - status: OK
[INFO] Processing request 3 - status: OK
[INFO] Processing request 4 - status: OK
[INFO] Processing request 5 - status: OK

$ echo "Log file created with $(wc -l < app.log) lines"
head -5 app.log
Log file created with 281 lines
[INFO] Processing request 1 - status: OK
[INFO] Processing request 2 - status: OK
[INFO] Processing request 3 - status: OK
[INFO] Processing request 4 - status: OK
[INFO] Processing request 5 - status: OK

HP@DESKTOP-A8P680F MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "==== Middle 50 lines of the log file ===="
total_lines=$(wc -l < app.log)
middle_start=$(( (total_lines - 50) / 2 + 1 ))
sed -n "${middle_start}+49p" app.log
==== Middle 50 lines of the log file ====
[INFO] Processing request 104 - status: OK
[WARN] Performance degradation detected at step 105
[INFO] Processing request 106 - status: OK
[INFO] Processing request 107 - status: OK
[INFO] Processing request 108 - status: OK
[INFO] Processing request 109 - status: OK
[ERROR] Something went wrong at step 110 - check configuration
[INFO] Processing request 111 - status: OK
[WARN] Performance degradation detected at step 112
[INFO] Processing request 113 - status: OK
[INFO] Processing request 114 - status: OK
[INFO] Processing request 115 - status: OK
[INFO] Processing request 116 - status: OK
[INFO] Processing request 117 - status: OK
[INFO] Processing request 118 - status: OK
[WARN] Performance degradation detected at step 119
[ERROR] Something went wrong at step 120 - check configuration
[INFO] Processing request 121 - status: OK
[INFO] Processing request 122 - status: OK
[INFO] Processing request 123 - status: OK
[INFO] Processing request 124 - status: OK
[INFO] Processing request 125 - status: OK
[ERROR] Database connection timeout at 125
[INFO] Retrying connection...
[INFO] Connection restored
[WARN] Performance degradation detected at step 126
[INFO] Processing request 127 - status: OK
[INFO] Processing request 128 - status: OK
[INFO] Processing request 129 - status: OK
[ERROR] Something went wrong at step 130 - check configuration

```

```

[INFO] Processing request 141 - status: OK
[INFO] Processing request 142 - status: OK
[INFO] Processing request 143 - status: OK
[INFO] Processing request 144 - status: OK
[INFO] Processing request 145 - status: OK
[INFO] Processing request 146 - status: OK
[WARN] Performance degradation detected at step 147
[INFO] Processing request 148 - status: OK
[INFO] Processing request 149 - status: OK
[ERROR] Something went wrong at step 150 - check configuration
HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ cho "===" Last occurrence of ERROR with 5 lines context ==="
tac app.log | grep -n "ERROR" | head -1
echo "--- Detailed context ---"
tac app.log | grep -B 5 -A 5 "ERROR" | head -11 | tac
bash: cho: command not found
4:[ERROR] Database connection timeout at 250
--- Detailed context ---
[INFO] Processing request 244 - status: OK
[WARN] Performance degradation detected at step 245
[INFO] Processing request 246 - status: OK
[INFO] Processing request 247 - status: OK
[INFO] Processing request 248 - status: OK
[INFO] Processing request 249 - status: OK
[ERROR] Something went wrong at step 250 - check configuration
[ERROR] Database connection timeout at 250
[INFO] Retrying connection...
[INFO] Connection restored
[INFO] Server shutdown completed

```

```

HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "===" Timing different file viewing methods ==="
echo "1. Using cat:"
time cat app.log > /dev/null
== Timing different file viewing methods ==
1. Using cat:
real    0m0.060s
user    0m0.000s
sys     0m0.030s

HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "2. Using less (loading time):"
time less app.log > /dev/null
2. Using less (loading time):
real    0m0.229s
user    0m0.000s
sys     0m0.015s

HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "3. Using head (first 100 lines):"
time head -100 app.log > /dev/null
3. Using head (first 100 lines):
real    0m0.063s
user    0m0.015s
sys     0m0.030s

HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "4. Using tail (last 100 lines):"
time tail -100 app.log > /dev/null
4. Using tail (last 100 lines):
real    0m0.105s
user    0m0.000s
sys     0m0.061s

HP@DESKTOP-A8P68OF MINGW64 ~/log_analysis (25883_Akize_Israel_assignment1)
$ echo "5. Using grep (filtered content):"
time grep "ERROR" app.log > /dev/null
5. Using grep (filtered content):
real    0m0.094s
user    0m0.000s
sys     0m0.045s

```

```
$ echo "==" ERROR lines with line numbers =="
grep -n "ERROR" app.log
== ERROR lines with line numbers ==
10:[ERROR] Something went wrong at step 10 - check configuration
20:[ERROR] Something went wrong at step 20 - check configuration
26:[ERROR] Database connection timeout at 25
33:[ERROR] Something went wrong at step 30 - check configuration
43:[ERROR] Something went wrong at step 40 - check configuration
53:[ERROR] Something went wrong at step 50 - check configuration
54:[ERROR] Database connection timeout at 50
66:[ERROR] Something went wrong at step 60 - check configuration
76:[ERROR] Something went wrong at step 70 - check configuration
82:[ERROR] Database connection timeout at 75
89:[ERROR] Something went wrong at step 80 - check configuration
99:[ERROR] Something went wrong at step 90 - check configuration
109:[ERROR] Something went wrong at step 100 - check configuration
110:[ERROR] Database connection timeout at 100
122:[ERROR] Something went wrong at step 110 - check configuration
132:[ERROR] Something went wrong at step 120 - check configuration
138:[ERROR] Database connection timeout at 125
145:[ERROR] Something went wrong at step 130 - check configuration
155:[ERROR] Something went wrong at step 140 - check configuration
165:[ERROR] Something went wrong at step 150 - check configuration
166:[ERROR] Database connection timeout at 150
178:[ERROR] Something went wrong at step 160 - check configuration
188:[ERROR] Something went wrong at step 170 - check configuration
194:[ERROR] Database connection timeout at 175
201:[ERROR] Something went wrong at step 180 - check configuration
211:[ERROR] Something went wrong at step 190 - check configuration
221:[ERROR] Something went wrong at step 200 - check configuration
222:[ERROR] Database connection timeout at 200
234:[ERROR] Something went wrong at step 210 - check configuration
244:[ERROR] Something went wrong at step 220 - check configuration
250:[ERROR] Database connection timeout at 225
257:[ERROR] Something went wrong at step 230 - check configuration
267:[ERROR] Something went wrong at step 240 - check configuration
277:[ERROR] Something went wrong at step 250 - check configuration
278:[ERROR] Database connection timeout at 250
```

```
$ echo "==" All log levels with line numbers =="
cat -n app.log | grep -E "[({ERROR|WARN|DEBUG})\]"
== All log levels with line numbers ==
    7 [WARN] Performance degradation detected at step 7
10 [ERROR] Something went wrong at step 10 - check configuration
14 [WARN] Performance degradation detected at step 14
15 [DEBUG] User login successful - session ID: 00005b4c
20 [ERROR] Something went wrong at step 20 - check configuration
21 [WARN] Performance degradation detected at step 21
26 [ERROR] Database connection timeout at 25
31 [WARN] Performance degradation detected at step 28
33 [ERROR] Something went wrong at step 30 - check configuration
38 [WARN] Performance degradation detected at step 35
43 [ERROR] Something went wrong at step 40 - check configuration
45 [WARN] Performance degradation detected at step 42
48 [DEBUG] User login successful - session ID: 000078bd
52 [WARN] Performance degradation detected at step 49
53 [ERROR] Something went wrong at step 50 - check configuration
54 [ERROR] Database connection timeout at 50
62 [WARN] Performance degradation detected at step 56
66 [ERROR] Something went wrong at step 60 - check configuration
69 [WARN] Performance degradation detected at step 63
76 [ERROR] Something went wrong at step 70 - check configuration
81 [DEBUG] User login successful - session ID: 00000067
82 [ERROR] Database connection timeout at 75
86 [WARN] Performance degradation detected at step 77
89 [ERROR] Something went wrong at step 80 - check configuration
93 [WARN] Performance degradation detected at step 84
99 [ERROR] Something went wrong at step 90 - check configuration
100 [WARN] Performance degradation detected at step 91
107 [WARN] Performance degradation detected at step 98
109 [ERROR] Something went wrong at step 100 - check configuration
110 [ERROR] Database connection timeout at 100
117 [WARN] Performance degradation detected at step 105
122 [ERROR] Something went wrong at step 110 - check configuration
124 [WARN] Performance degradation detected at step 112
131 [WARN] Performance degradation detected at step 119
132 [ERROR] Something went wrong at step 120 - check configuration
138 [ERROR] Database connection timeout at 125
141 [WARN] Performance degradation detected at step 126
145 [ERROR] Something went wrong at step 130 - check configuration
```

```
$ echo "==== Demonstrating less vs cat for large files ==="
echo "File size: $(du -h app.log)"

echo "--- Using cat (loads entire file at once) ---"
echo "This would load all $(wc -l < app.log) lines into memory at once"
echo "In SSH with limited bandwidth, this could be slow and unresponsive"

echo "--- Using less (loads file incrementally) ---"
echo "Less only loads what's visible on screen"
echo "Features:"
echo "  - Search with /pattern"
echo "  - Navigate with spacebar (next page) and b (previous page)"
echo "  - Jump to line with :line_number"
echo "  - Real-time monitoring with F (follow mode)"
echo "  - Exit with q"

# Show less in action briefly
echo "Showing first screen with less (will exit automatically):"
timeout 3 less app.log
==== Demonstrating less vs cat for large files ===
File size: 16K app.log
--- Using cat (loads entire file at once) ---
This would load all 281 lines into memory at once
In SSH with limited bandwidth, this could be slow and unresponsive
--- Using less (loads file incrementally) ---
Less only loads what's visible on screen
Features:
  - Search with /pattern
  - Navigate with spacebar (next page) and b (previous page)
  - Jump to line with :line_number
  - Real-time monitoring with F (follow mode)
  - Exit with q
Showing first screen with less (will exit automatically):
```

```
$ echo "==== Additional log analysis techniques ==="

echo "1. Count occurrences of each log level:"
grep -o "\[[[A-Z]*\]" app.log | sort | uniq -c | sort -nr

echo "2. Extract unique error messages:"
grep "ERROR" app.log | sort -u

echo "3. Monitor log file in real-time (simulated):"
tail -5 app.log && echo "... [real-time monitoring with 'tail -f app.log']"

echo "4. Search with context around specific patterns:"
grep -B 2 -A 2 "timeout" app.log | head -10
==== Additional log analysis techniques ===
1. Count occurrences of each log level:
 207 [INFO]
   35 [ERROR]
   32 [WARN]
    7 [DEBUG]
2. Extract unique error messages:
[ERROR] Database connection timeout at 100
[ERROR] Database connection timeout at 125
[ERROR] Database connection timeout at 150
[ERROR] Database connection timeout at 175
[ERROR] Database connection timeout at 200
[ERROR] Database connection timeout at 225
[ERROR] Database connection timeout at 25
[ERROR] Database connection timeout at 250
[ERROR] Database connection timeout at 50
[ERROR] Database connection timeout at 75
[ERROR] Something went wrong at step 10 - check configuration
[ERROR] Something went wrong at step 100 - check configuration
[ERROR] Something went wrong at step 110 - check configuration
[ERROR] Something went wrong at step 120 - check configuration
[ERROR] Something went wrong at step 130 - check configuration
[ERROR] Something went wrong at step 140 - check configuration
[ERROR] Something went wrong at step 150 - check configuration
[ERROR] Something went wrong at step 160 - check configuration
[ERROR] Something went wrong at step 170 - check configuration
[ERROR] Something went wrong at step 180 - check configuration
[ERROR] Something went wrong at step 190 - check configuration
[ERROR] Something went wrong at step 20 - check configuration
[ERROR] Something went wrong at step 200 - check configuration
[ERROR] Something went wrong at step 210 - check configuration
[ERROR] Something went wrong at step 220 - check configuration
[ERROR] Something went wrong at step 230 - check configuration
```

```
[ERROR] Something went wrong at step 180 - check configuration
[ERROR] Something went wrong at step 190 - check configuration
[ERROR] Something went wrong at step 20 - check configuration
[ERROR] Something went wrong at step 200 - check configuration
[ERROR] Something went wrong at step 210 - check configuration
[ERROR] Something went wrong at step 220 - check configuration
[ERROR] Something went wrong at step 230 - check configuration
[ERROR] Something went wrong at step 240 - check configuration
[ERROR] Something went wrong at step 250 - check configuration
[ERROR] Something went wrong at step 30 - check configuration
[ERROR] Something went wrong at step 40 - check configuration
[ERROR] Something went wrong at step 50 - check configuration
[ERROR] Something went wrong at step 60 - check configuration
[ERROR] Something went wrong at step 70 - check configuration
[ERROR] Something went wrong at step 80 - check configuration
[ERROR] Something went wrong at step 90 - check configuration
3. Monitor log file in real-time (simulated):
[ERROR] Something went wrong at step 250 - check configuration
[ERROR] Database connection timeout at 250
[INFO] Retrying connection...
[INFO] Connection restored
[INFO] Server shutdown completed
... [real-time monitoring with 'tail -f app.log']
4. Search with context around specific patterns:
[INFO] Processing request 24 - status: OK
[INFO] Processing request 25 - status: OK
[ERROR] Database connection timeout at 25
[INFO] Retrying connection...
[INFO] Connection restored
-- 
[WARN] Performance degradation detected at step 49
[ERROR] Something went wrong at step 50 - check configuration
[ERROR] Database connection timeout at 50
[INFO] Retrying connection...
```

Q10.

```
$ cd ~  
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)  
$ mkdir file_maintenance  
  
HP@DESKTOP-A8P680F MINGW64 ~ (25883_Akize_Israel_assignment1)  
$ cd file_maintenance  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Create files with different types, permissions, and ages  
mkdir -p {bin,config,temp,logs}  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ echo "echo 'Hello'" >> bin/script1.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ echo "#!/bin/bash" > bin/script2.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ echo "echo 'World'" >> bin/script2.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ chmod +x bin/*.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Create configuration files  
touch config/{app,database,network,security}.conf  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Create temporary files with different ages  
touch temp/file1.tmp  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ touch temp/file2.tmp  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Use relative date instead of specific date to avoid issues  
touch -t 202408010000 temp/old_file.tmp  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Create regular files  
touch {readme.txt,data.csv,report.pdf}  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ # Set different permissions  
chmod 755 bin/script1.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ chmod 700 bin/script2.sh  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ chmod 600 config/security.conf  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ chmod 666 temp/file1.tmp  
  
HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)  
$ echo "Test environment created:"  
find . -type f -exec ls -1 {} \; | head -10  
Test environment created:  
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script1.sh  
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script2.sh  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./data.csv  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./readme.txt  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./report.pdf  
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file1.tmp  
find: 'ls' terminated by signal 13  
find: 'ls' terminated by signal 13
```

```

$ echo "==== Current permissions ==="
find . -type f -exec ls -l {} \; | head -10
==== Current permissions ===
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script1.sh
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script2.sh
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./data.csv
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./readme.txt
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./report.pdf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file1.tmp
find: 'ls' terminated by signal 13
find: 'ls' terminated by signal 13

```

```

$ echo "==== Changing permissions (644 for non-executables) ==="
# Use -perm test instead of -executable to avoid ! issues
find . -type f ! -perm /111 -exec chmod 644 {} \;

echo "==== Permissions after change ==="
find . -type f -exec ls -l {} \; | head -10
==== Changing permissions (644 for non-executables) ===
==== Permissions after change ===
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script1.sh
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script2.sh
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./data.csv
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./readme.txt
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./report.pdf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file1.tmp
find: 'ls' terminated by signal 13
find: 'ls' terminated by signal 13

```

```

$ echo "==== Changing permissions (644 for non-executables) ==="
# Use -perm test instead of -executable to avoid ! issues
find . -type f ! -perm /111 -exec chmod 644 {} \;

echo "==== Permissions after change ==="
find . -type f -exec ls -l {} \; | head -10
==== Changing permissions (644 for non-executables) ===
==== Permissions after change ===
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script1.sh
-rw-r--r-- 1 HP 197121 24 Sep 30 15:01 ./bin/script2.sh
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./data.csv
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./readme.txt
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./report.pdf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file1.tmp
find: 'ls' terminated by signal 13
find: 'ls' terminated by signal 13

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ echo "==== Disk space used by files older than 30 days ==="
# Create some old files for testing
touch -t 202408150000 old_large_file.dat
dd if=/dev/zero of=old_large_file.dat bs=1M count=1 2>/dev/null
==== Disk space used by files older than 30 days ===

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ # Calculate total space
find . -type f -mtime +30 -exec du -ch {} + | grep total
0      total

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ # Show individual files
echo "==== Files older than 30 days ==="
find . -type f -mtime +30 -exec ls -lh {} \;
==== Files older than 30 days ===
-rw-r--r-- 1 HP 197121 0 Aug 1 2024 ./temp/old_file.tmp

```

```

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ echo "===" Creating backup copies of .conf files ==="
echo "Original .conf files:"
find . -name "*.conf" -exec ls -l {} \;
== Creating backup copies of .conf files ===
Original .conf files:
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ # Preview first (safe approach)
echo "===" PREVIEW: Files that would be backed up ==="
find . -name "*.conf" -exec echo "Would copy: {} to {}.backup" \;
== PREVIEW: Files that would be backed up ===
Would copy: ./config/app.conf to ./config/app.conf.backup
Would copy: ./config/database.conf to ./config/database.conf.backup
Would copy: ./config/network.conf to ./config/network.conf.backup
Would copy: ./config/security.conf to ./config/security.conf.backup

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
#
# Actual backup creation
find . -name "*.conf" -exec cp {} {}.backup \;

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ echo "===" After backup creation ==="
find . -name "*.conf" -exec ls -l {} \;
== After backup creation ===
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/app.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:14 ./config/app.conf.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/database.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:14 ./config/database.conf.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/network.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:14 ./config/network.conf.backup
-rw-r--r-- 1 HP 197121 0 Sep 30 15:01 ./config/security.conf
-rw-r--r-- 1 HP 197121 0 Sep 30 15:14 ./config/security.conf.backup

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ echo "===" Safe removal of temporary files ==="

# First: Preview what would be deleted
echo "===" PREVIEW: Temporary files that would be removed ==="
find . -name "*.tmp" -atime +7 -exec echo "Would remove: {}" \;
== Safe removal of temporary files ===
== PREVIEW: Temporary files that would be removed ===
Would remove: ./temp/old_file.tmp

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ # Show access times for verification
echo "===" Access times of temporary files ==="
find . -name "*.tmp" -exec ls -lu {} \;
== Access times of temporary files ===
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file1.tmp
-rw-r--r-- 1 HP 197121 0 Sep 30 15:02 ./temp/file2.tmp
-rw-r--r-- 1 HP 197121 0 Aug 1 2024 ./temp/old_file.tmp

HP@DESKTOP-A8P680F MINGW64 ~/file_maintenance (25883_Akize_Israel_assignment1)
$ # For demonstration, let's just show the command
echo "To actually remove, run: find . -name \"*.tmp\" -atime +7 -exec rm {} \\;""
To actually remove, run: find . -name "*.tmp" -atime +7 -exec rm {} \;";

```

Q11.

```

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ mkdir compression_test
cd compression_test
mkdir: cannot create directory 'compression_test': File exists

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ # Create test directories
mkdir text_files compressed_files
cd text_files
mkdir: cannot create directory 'text_files': File exists
mkdir: cannot create directory 'compressed_files': File exists

HP@DESKTOP-A8P680F MINGW64 ~/compression_test/text_files (25883_Akize_Israel_assignment1)
$ # Create text files
for i in {1..5}; do
    head -c 1M /dev/urandom | tr -dc 'a-zA-Z0-9' > file$i.txt
done

cd ../compressed_files
# Create already compressed files
cp /mingw64/share/doc/git/*.jpg . 2>/dev/null || touch image{1..3}.jpg
cp /mingw64/share/doc/*.pdf . 2>/dev/null || touch doc{1..2}.pdf
cd ..

```

```

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ # Create archives with different compression
echo "==== Compression Analysis ==="
==== Compression Analysis ===

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ tar -czf text_files.tar.gz text_files/
tar -cjf text_files.tar.bz2 text_files/
tar -cJf text_files.tar.xz text_files/
zip -r text_files.zip text_files/
updating: text_files/ (164 bytes security) (stored 0%)
updating: text_files/file1.txt (164 bytes security) (deflated 25%)
updating: text_files/file2.txt (164 bytes security) (deflated 25%)
updating: text_files/file3.txt (164 bytes security) (deflated 25%)
updating: text_files/file4.txt (164 bytes security) (deflated 25%)
updating: text_files/file5.txt (164 bytes security) (deflated 25%)

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ tar -czf compressed_files.tar.gz compressed_files/
tar -cjf compressed_files.tar.bz2 compressed_files/
tar -cJf compressed_files.tar.xz compressed_files/
zip -r compressed_files.zip compressed_files/
updating: compressed_files/ (164 bytes security) (stored 0%)
updating: compressed_files/doc1.pdf (164 bytes security) (stored 0%)
updating: compressed_files/doc2.pdf (164 bytes security) (stored 0%)
updating: compressed_files/image1.jpg (164 bytes security) (stored 0%)
updating: compressed_files/image2.jpg (164 bytes security) (stored 0%)
updating: compressed_files/image3.jpg (164 bytes security) (stored 0%)

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ # Analyze results
echo "Text files compression:"
ls -lh text_files.* | awk '{print $5, $9}'
Text files compression:
933K text_files.tar.bz2
934K text_files.tar.gz
945K text_files.tar.xz
935K text_files.zip

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ echo "Compressed files compression:"
ls -lh compressed_files.* | awk '{print $5, $9}'
Compressed files compression:
231 compressed_files.tar.bz2
208 compressed_files.tar.gz
244 compressed_files.tar.xz
2.0K compressed_files.zip

```

```

$ echo "Compressed files compression:"
ls -lh compressed_files.* | awk '{print $5, $9}'
Compressed files compression:
231 compressed_files.tar.bz2
208 compressed_files.tar.gz
244 compressed_files.tar.xz
2.0K compressed_files.zip

HP@DESKTOP-A8P680F MINGW64 ~/compression_test (25883_Akize_Israel_assignment1)
$ echo "Recommendation: Use tar+xz for text, tar+gzip for mixed content"
Recommendation: Use tar+xz for text, tar+gzip for mixed content

```

Q12.

```

> cd ~
mkdir archive_management
cd archive_management
mkdir: cannot create directory 'archive_management': File exists

HP@DESKTOP-A8P680F MINGW64 ~/archive_management (25883_Akize_Israel_assignment1)
$ # Create test archives
tar -czf data1.tar.gz -C /mingw64/share/doc git
tar -cjf data2.tar.bz2 -C /mingw64/share/doc nano
zip -r data3.zip /mingw64/share/doc/openssh
tar: git: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
tar: nano: Cannot stat: No such file or directory
tar: Exiting with failure status due to previous errors
    zip warning: name not matched: F:/Git/mingw64/share/doc/openssh

zip error: Nothing to do! (try: zip -r data3.zip . -i F:/Git/mingw64/share/doc/ope
nssh)

HP@DESKTOP-A8P680F MINGW64 ~/archive_management (25883_Akize_Israel_assignment1)
$ # Examine without extraction
echo "===" Archive Contents ==="
tar -tzf data1.tar.gz | head -5
tar -tjf data2.tar.bz2 | head -5
unzip -l data3.zip | head -5
==> Archive Contents ==
unzip:  cannot find or open data3.zip, data3.zip.zip or data3.zip.ZIP.

HP@DESKTOP-A8P680F MINGW64 ~/archive_management (25883_Akize_Israel_assignment1)
$ # Extract specific patterns
mkdir extracted
tar -xzf data1.tar.gz -C extracted --wildcards "*.*html" --no-anchored
unzip data3.zip "*.txt" -d extracted/ 2>/dev/null

# Merge archives
tar -czf merged_archive.tar.gz extracted/
echo "Merged archive created"
ls -lh *.tar.gz
mkdir: cannot create directory 'extracted': File exists
tar: *.html: Not found in archive
tar: Exiting with failure status due to previous errors
Merged archive created
-rw-r--r-- 1 HP 197121 45 Sep 30 22:53 data1.tar.gz
-rw-r--r-- 1 HP 197121 118 Sep 30 22:54 merged_archive.tar.gz

```

Q13.

```

$ cd ~
mkdir backup_strategy
cd backup_strategy
mkdir: cannot create directory 'backup_strategy': File exists

HP@DESKTOP-A8P680F MINGW64 ~/backup_strategy (25883_Akize_Israel_assignment1)
$ # Create backup script
cat > backup_rotation.sh << 'EOF'
#!/bin/bash
BACKUP_DIR="/c/backups"
DATE=$(date +%Y%m%d)
WEEK=$(date +%V)
MONTH=$(date +%Y%m)
> # Daily incremental
tar -czf $BACKUP_DIR/daily_incr_$DATE.tar.gz --listed-incremental=$BACKUP_DIR/snap
shot.snap ~/important_data

# Weekly full (every Sunday)
if [ $(date +%u) -eq 7 ]; then
    tar -czf $BACKUP_DIR/weekly_full_$WEEK.tar.gz ~/important_data
fi

# Monthly archive
if [ $(date +%d) -eq 01 ]; then
    tar -czf $BACKUP_DIR/monthly_$MONTH.tar.gz --preserve-permissions ~/important_
data
fi

# Cleanup old backups (keep 30 days)
find $BACKUP_DIR -name "daily_incr_*" -mtime +30 -delete
find $BACKUP_DIR -name "weekly_full_*" -mtime +90 -delete

# Verify integrity
tar -tzf $BACKUP_DIR/daily_incr_$DATE.tar.gz > /dev/null && echo "Backup verified
OK"
EOF

echo "Backup strategy implemented with rotation and verification"
Backup strategy implemented with rotation and verification

```

Q14.

```

$ cd ~
mkdir user_analysis
cd user_analysis
mkdir: cannot create directory 'user_analysis': File exists

HP@DESKTOP-A8P680F MINGW64 ~/user_analysis (25883_Akize_Israel_assignment1)
$ # Analyze current user
echo "===" Current User Context ==="
whoami
id
groups
==== Current User Context ====
HP
uid=197609(HP) gid=197121 groups=197121
groups: cannot find name for group ID 197121
197121

HP@DESKTOP-A8P680F MINGW64 ~/user_analysis (25883_Akize_Israel_assignment1)
$ # Create test user scenario
echo "===" User Comparison ==="
echo "Current user $(whoami) groups:"
groups $(whoami)
==== User Comparison ===
Current user HP groups:
HP : groups: cannot find name for group ID 197121
197121

HP@DESKTOP-A8P680F MINGW64 ~/user_analysis (25883_Akize_Israel_assignment1)
$ echo "System users in /etc/passwd:"
grep -E ":/bin/(false|nologin)" /etc/passwd | head -5 | cut -d: -f1,3,7
System users in /etc/passwd:
grep: /etc/passwd: No such file or directory

HP@DESKTOP-A8P680F MINGW64 ~/user_analysis (25883_Akize_Israel_assignment1)
$ echo "Regular users:"
grep -E ":/bin/(bash|sh)" /etc/passwd | head -5 | cut -d: -f1,3,7
Regular users:
grep: /etc/passwd: No such file or directory

HP@DESKTOP-A8P680F MINGW64 ~/user_analysis (25883_Akize_Israel_assignment1)
$ echo "Security risk: Regular user with system groups could access sensitive syst
em files"
Security risk: Regular user with system groups could access sensitive system files

```

Q15.

```
$ cd ~
mkdir group_investigation
cd group_investigation
mkdir: cannot create directory 'group_investigation': File exists

HP@DESKTOP-A8P680F MINGW64 ~/group_investigation (25883_Akize_Israel_assignment1)
$ echo "==" Group Membership Propagation ==
echo "Current effective groups:"
id -Gn
echo "Current effective group ID:"
id -g
== Group Membership Propagation ==
Current effective groups:
id: cannot find name for group ID 197121
197121
Current effective group ID:
197121

HP@DESKTOP-A8P680F MINGW64 ~/group_investigation (25883_Akize_Israel_assignment1)
$ echo "Group changes require re-login or 'newgrp groupname'"
Group changes require re-login or 'newgrp groupname'

HP@DESKTOP-A8P680F MINGW64 ~/group_investigation (25883_Akize_Israel_assignment1)
$ echo "==" Access Groups ==
echo "System logs: adm, wheel (varies by distro)"
echo "Web files: www-data, apache, nginx"
echo "Admin functions: wheel, sudo, root"
== Access Groups ==
System logs: adm, wheel (varies by distro)
Web files: www-data, apache, nginx
Admin functions: wheel, sudo, root

HP@DESKTOP-A8P680F MINGW64 ~/group_investigation (25883_Akize_Israel_assignment1)
$ echo "==" Least Privilege Principle ==
echo "Users should only have groups necessary for their specific tasks"
echo "Example: Web developer needs www-data, NOT sudo"
== Least Privilege Principle ==
Users should only have groups necessary for their specific tasks
Example: Web developer needs www-data, NOT sudo
```

Q16.

```
$ cd ~
mkdir sudo_audit
cd sudo_audit

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "==== Sudo Permissions ==="
sudo -l 2>/dev/null || echo "No sudo access or password required"
==== Sudo Permissions ===
No sudo access or password required

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "==== Privilege Escalation Methods ==="
==== Privilege Escalation Methods ===

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "sudo -i: Login shell with root environment"
sudo -i: Login shell with root environment

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "sudo su: Switch to root but keep user environment"
sudo su: Switch to root but keep user environment

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "su -: Full root login shell"
su -: Full root login shell

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "==== Security Concerns ==="
==== Security Concerns ===

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "Overly permissive sudo:"
Overly permissive sudo:

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- ALL=(ALL) ALL - too broad"
- ALL=(ALL) ALL - too broad

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- NOPASSWD - no authentication"
- NOPASSWD - no authentication

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "Recommendations:"
```

```
HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- NOPASSWD - no authentication"
- NOPASSWD - no authentication

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "Recommendations:"
Recommendations:

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- Specific commands only"
- Specific commands only

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- Require passwords"
- Require passwords

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- Use groups instead of individual users"
- Use groups instead of individual users

HP@DESKTOP-A8P680F MINGW64 ~/sudo_audit (25883_Akize_Israel_assignment1)
$ echo "- Regular audits of sudoers file"
- Regular audits of sudoers file
```

17.

```
$ cd ~
mkdir forensic_analysis
cd forensic_analysis

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis (25883_Akize_Israel_assignment1)
$ # Create diverse file types
mkdir -p {evidence,logs,binaries,home}
cd evidence

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ # Regular files
touch {file1,document,data}.txt

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ # Directories
mkdir {normal_dir,setuid_dir,setgid_dir,sticky_dir}

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ # Special permissions
chmod 4755 binaries/ 2>/dev/null || echo "setuid not supported"
setuid not supported

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ chmod 2755 setgid_dir/

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ chmod 1755 sticky_dir/

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ # Symbolic and hard links
ln -s /etc/passwd symlink_passwd
ln: failed to create symbolic link 'symlink_passwd': No such file or directory

HP@DESKTOP-A8P680F MINGW64 ~/forensic_analysis/evidence (25883_Akize_Israel_assignment1)
$ ln file1.txt hardlink_file1
```

```
$ # Different ownership (simulated)
touch owned_by_root.txt
echo "Would need root to change ownership"
Would need root to change ownership

HP@DESKTOP-A8P68OF MINGW64 ~/forensic_analysis/evidence (25883_Akiz
ment1)
$ # Archives with different compression
tar -czf text_archive.tar.gz *.txt
tar -cjf data_archive.tar.bz2 *.txt
zip -r files.zip *.txt
    adding: data.txt (164 bytes security) (stored 0%)
    adding: document.txt (164 bytes security) (stored 0%)
    adding: file1.txt (164 bytes security) (stored 0%)
    adding: owned_by_root.txt (164 bytes security) (stored 0%)

HP@DESKTOP-A8P68OF MINGW64 ~/forensic_analysis/evidence (25883_Akiz
ment1)
$ echo "==== Forensic Analysis Setup Complete ==="
echo "Commands for analysis:"
echo "find . -type f -exec ls -l {} \;" 
echo "find . -type l -exec ls -l {} \;" 
echo "find . -perm /6000 -ls # setuid/setgid"
echo "file * # file types"
echo "md5sum * # hashes"
echo "stat * # metadata"
==== Forensic Analysis Setup Complete ===
Commands for analysis:
find . -type f -exec ls -l {} \;
find . -type l -exec ls -l {} \;
find . -perm /6000 -ls # setuid/setgid
file * # file types
md5sum * # hashes
stat * # metadata

HP@DESKTOP-A8P68OF MINGW64 ~/forensic_analysis/evidence (25883_Akiz
ment1)
$ echo "==== Investigation Indicators ==="
echo "- Unusual setuid/setgid binaries"
echo "- Hidden files/directories"
echo "- Recent timestamp alterations"
echo "- Unknown file hashes"
echo "- Suspicious symbolic links"
==== Investigation Indicators ===
- Unusual setuid/setgid binaries
- Hidden files/directories
- Recent timestamp alterations
```

Thank you sir !!!!!!!