COMP 302 System Programming
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Lab Assignment 6

Introduction

In this lab you will explore the storage and archiving commands and regular expressions. Submit your solutions to the questions below in a file you prepared using the vim editor. Name your file in name_surname format. Submit your solutions file to Canvas.

Questions

Run the following command that lists the contents of `/usr/bin` directory in detailed format and redirects the output to a file called `ls-usr-bin.txt`

```
ls -l /usr/bin > ls-usr-bin.txt
```

1. List `ls-usr-bin.txt` and record the size of this file in bytes. Include this size in your report.

2. Compress this file using `gzip` and then run `gzip` with `-l` option. Include your command, the size of the compressed file and compression ratio in your report.

3. View the contents of your compressed file using the `gunzip` with `-c` option and by piping the output to `less`.

4. When you compress a file using `gzip` does it maintain a copy of the original file? If no uncompress the file you produced in question 2 (with `.gz` extension) using `gunzip`.

5. Compress `ls-usr-bin.txt` using `bzip2`. List the compressed file using `ls -l` and include the size of the compressed file as well as the commands you used in your report. Do you get better compression ratio than `gzip`?

6. Compress `ls-usr-bin.txt` using `zip`. List the compressed file using `ls -l` and include the size of the compressed file as well as the commands you used in your report. What is the compression ratio? Write the command you used in your report.

7. Provide a single line of command using `tar` that produces a `.tgz` file starting from `ls-usr-bin.txt` (i.e. a tar archive plus compression using `gzip`). What is the compression ratio? Write the command you used in your report.

8. Provide a single line of command using `tar` that produces a `.tbz` file starting from `ls-usr-bin.txt` (i.e. a tar archive plus compression using `bzip2`). What is the compression ratio? Write the command you used in your report.

9. Provide a single line of command that finds all the files under `/usr/bin/` using `find` command such that the filenames contain `zip` and produces a `tar` archive (with `.tar` extension) for these files.

Run the following commands for questions 10-15:

```
ls /bin > dirlist-bin.txt

ls /usr/bin > dirlist-usr-bin.txt

ls /sbin > dirlist-sbin.txt

ls /usr/sbin > dirlist-usr-sbin.txt
```

10. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and displays files that have matches as well as the matching lines. Precede each line by its line number in the file. Write the command you used in your report.

11. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and displays files that have matches but not the matching lines. Write the command you used in your report.

12. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and displays the matching lines but not files that have matches. Write the command you used in your report.

13. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and displays files that do not have matches as well as the non-matching lines. Write the command you used in your report.

14. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and displays files that do not have matches but not the non-matching lines. Write the command you used in your report.

15. Give a single line of command that searches for the regular expression `zip` in files that start with `dirlist` and lists the number of times the regular expression `zip` occurs in files in which it occurs at least once. Hint: Connect the output of one `grep` command to the input of another `grep` using a pipe; the first `grep` should display the count for all files and the second should get rid of those with a count of 0. Write the command you used in your report.

16. Use `grep` with the `-c` option to display the number of lines that contain the string (i.e. regular expression) `Remote` in the `/etc/services` file. Write this number and the command you used in your report.

17. Use `grep` with the `-c` option to determine how many lines in `/etc/services` contain the string (i.e. regular expression) `send`. Then add the `-w` option to determine how many lines contain the word `send`. Write this number and the command you used in your report.

18. How many lines in `/etc/services` contain the word `send`, ignoring the case of the letters in the word (i.e. upper-case lowercase sensitivity is ignored)? Write this number and the command you used in your report.

19. How many lines in `/etc/services` do not contain the string (i.e. regular expression) `send`? Write this number and the command you used in your report.

20. List a total of 10 files in the `/usr/share` directory hierarchy that contain the word 27 (not 27 embedded in a longer number or phrase) together with the lines that contain the word 27. Your search should consider all subdirectories of `/usr/share`. Write the command you used in your report. Hint: You can use `grep` with `-w` option and `-R` option to specify the `/usr/share` directory as input. You can pipe output of `grep` to `head` to display 10 lines of output.