OPS102 NHH Lab 4 – Week 4
Redirection, Pipes, and Permissions

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Introduction

This lab is based on what we learned in week 4.

You may want to refer to the course notes in ops102_4_1.pdf and ops102_4_2.pdf.

Activity 1: Redirection and Pipes

In this activity, you will create a text file, and experiment with redirection and pipes using that file.

You will need this file on matrix and on your Windows machine, so you will need to remember how to edit and save a text file on matrix (using **"nano"** or **"vim"**), and on Windows (using **"notepad"**).

Create a text file called gpt.txt

Create a file in your current directory called **"gpt.txt"** containing the following text:

```
ChatGPT is an artificial intelligence chatbot developed by
OpenAI and released in November 2022.

The name "ChatGPT" combines "Chat", referring to its chatbot
functionality, and "GPT", which stands for Generative
Pre-trained Transformer, a type of large language model.

Wikipedia

ChatGPT has been trained on huge amount of data scraped
from the internet.

This has enabled us to develp artificial intelligence tools
that can answer questions as humans might.
```

Prepare to Work on Activity 1

In order to do the following tasks, open an SSH connection to matrix, and open a Windows CMD prompt window. (You can do these steps in parallel, or do the matrix tasks first, and then do the Windows tasks.)

On matrix: Start the labtrack command: **/home/john.sellens/tools/labtrack** and select lab 4.

Redirection

Redirection can send input to a command from a file or can send output of a command to a file.

Input redirection is indicated with the less-than symbol < for example
    mycmd < myinputfile

Output redirection is indicated with the greater-than symbol > for example
    mycmd > myoutputfile

You can use both input and output redirection on a single command, for example
    mycmd < myinputfile > myoutputfile

Leaving a space after the **<** or the **>** is optional.

Perform the following steps:

1. On matrix: Run the command: `cat < gpt.txt`
    Think: What output do you observe? Why?

2. On Windows: Run the command: `type < gpt.txt`
    Think: What output do you observe? Why?

3. On matrix: Run the command: `ls -l > list.txt`
    Think: What output do you observe? Why?

4. On Windows: Run the command: `dir > list.txt`
    Think: What output do you observe? Why?

5. On both matrix and Windows: Run the command: `sort < list.txt`
    Think: What output do you observe?

Pipes

Pipes are used to redirect the output of one command into the input of another, without the use of temporary files to pass the data between commands. This makes it easy to combine multiple commands into a more powerful or complex combination.

Pipes are created with the or-bar symbol **|** for example
    `command1 | command2`

Pipes can be used to connect multiple commands in sequence.

You can use input redirection from a file on the first command, and/or output redirection to a file on the second (the last) command.

Perform the following steps:

1. On matrix: Run the command: `ls /bin | more`
    Think: What output do you observe? Why?

2. On Windows: Run the command: `type gpt.txt | find "GPT"`
    Think: What output do you observe? Why?

3. On matrix: Run the command: `cat < gpt.txt | sort > out.txt`
   Think: What output do you observe? Why?
   Think: Was the `cat` command necessary? Was there another way?

Complete Activity 1

On matrix: Exit out of labtrack: Run the command: `exit`

This marks the end of activity 1.

Activity 2: File and Directory Permissions

In this activity, you will work with file and directory permissions. This activity will be performed on matrix.

Consider the following image depicting a directory tree on a Linux system:
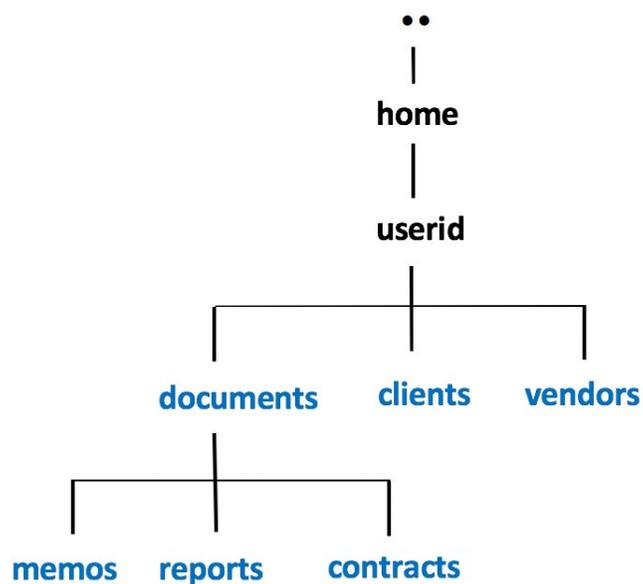
Login to matrix, and create a matching directory hierarchy in your home directory.

After you have created those six directories, create these 11 files in the following directories. You could use a common Linux command to create these as empty files.

- In the **memos** directory create:
  memo1.txt memo2.txt memo3.txt

- In the **reports** directory create:
  report1.txt report2.txt

- In the **contracts** directory create:
  contract1.txt contract2.txt contract3.txt

- In the **clients** directory create:
  linux.txt unix.txt

- In the **vendors** directory create:
  seneca.txt

Perform the following steps:

1. Start the labtrack command: **/home/john.sellens/tools/labtrack** and select lab 4.

2. Run the command: **ls -ld ~/documents ~/clients ~/vendors**

3. Run the command: **ls -lR ~/documents ~/clients ~/vendors**

4. Limit access to the **clients** and **vendors** directories to only yourself, and users who are members of the same group as your directories (typically group "users"). Run the command: **chmod 750 ~/clients ~/vendors**

5. Run the **ls -ld** and **ls -lR** commands again to confirm that the permissions for those directories have been changed.

6. Recall that the **"-R"** option for the **chmod** command changes permissions recursively, for any command arguments that are directories. Run the command: **chmod 750 -R ~/documents**

7. Use the command **ls -ld** command to confirm the permissions on the **~/documents** directory, and the 3 sub-directories it contains.

8. Run the command: **ls -lR ~/documents** Think: What do you notice happened to the permissions for the regular files contained in those directories? Did those regular file permissions change?

9. Now change the permissions for the regular files contained in subdirectories of the **documents** directory to **rw-r-----**
   Run the command: **chmod 640 ~/documents/*/*.txt**

10. Run the **"ls -lR"** command from step 8 again to confirm that the regular file permissions have changed.

11. Ensure write permissions are on for the owner, and off for all others, for all the files in the **memos** directory.
    Run the command: **chmod u+w,go-w ~/documents/memos/***
    Note that that didn't actually change any permissions, since those files already had the desired write permissions.

12. Exit out of labtrack: Run the command: **exit**

This marks the end of activity 2.

Record Your Lab Completion

Complete the lab 4 assignment tasks in Blackboard at learn.senecapolytechnic.ca and submit the lab assignment.