Tutorial5: Redirection

REDIRECTION: STANDARD INPUT / STANDARD OUTPUT / STANDARD ERROR

Main Objectives of this Practice Tutorial

- Understand and use the **cut**, **tr**, and **wc** Linux commands
- Define the terms **Standard Input** (*stdin*), **Standard Output** (*stdout*), and **Standard Error** (*stderr*)
- Understand and use the **>**, **>>**, **2>**, **2>>** symbols with Linux commands
- Understand the purpose of the the **/dev/null** file and the **Here Document**
- Define the term **pipeline command** and explain how a pipeline command functions
- Define the term **filter** and how it relates to pipeline commands
- Use the **semicolon** ";" and **grouping** "( )" symbols to issue multiple Unix / Linux commands on a single line
- Use the **backslash** "\" symbol to spread-out long Unix/Linux commands over multiple lines

Tutorial Reference Material

Course Notes	Linux Command / Shortcut Reference		YouTube Videos
Slides: • Week 5 Lecture 1 Notes: PDF | PPTX • Week 5 Lecture 2 Notes:	**Redirection:** • Standard Input (stdin) • Standard Output (stdout) • Standard Error	**Redirection Filters:** • more , less • head , tail • sort	**Brauer Instructional Videos:** • Reading/Writing to Files (echo, stdin, stdout, stderr, >, >>, 2>, cat, more, less, man, date,

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(stderr)
- Pipeline Commands

Multiple Commands:
- Semicolon
- Grouping ( )

- uniq
- grep
- cut
- tr
- wc
- tee

diff, diff -y, find, wc)

KEY CONCEPTS

Additional File Manipulation Commands

Before proceeding, let's look at some additional commands used to manipulate content of text files.

Refer to the table below regarding these text file manipulation commands:

Command	Description
tr	Used to **translate** characters to different characters. eg. `tr 'a-z' 'A-Z' < filename`
cut	Used to **extract** fields and characters from records. The option **-c** option is used to cut by a character or a range of characters. The **-f** option indicates the field number or field range to display (this may require using the **-d** option to indicate the field separator (delimiter) which is tab by default). eg. `cut -c1-5 filename`, `cut -d":" -f2 filename`
wc	Displays various **counts** of the contents of a file. The **–l** option displays the number of lines, the **–w** option displays the number of words, and the **–c** option displays the number of characters. eg. `wc filename`, `wc -l filename`, `wc -w filename`

Redirection (Standard Input, Standard Output, Standard Error)

Redirection *can be defined as changing the way from where commands read input to where commands sends output.*

You can redirect input and output of a command.

Reference: https://www.javatpoint.com/linux-input-output-redirection

Standard input (**stdin**) is a term which describes from where a command receives **input**.

This would apply only to Unix/Linux commands that accept stdin input

(like *cat*, *more*, *less*, *sort*, *grep*, *head*, *tail*, *tr*, *cut*, *wc*, etc.).

Examples:

```
tr 'a-z' 'A-Z' < words.txt
cat < abc.txt
sort < xyz.txt
```

The **standard input** (**stdin**) symbol that describes where a Unix/Linux command receives **input**

左耳入右耳出

Standard output (**stdout**) describes where a command sends its **output**. In the examples below, output from a command is sent to the **monitor**, unless it

The **standard out** (**stdout**) symbol with one greater than sign **overwrites** existing file content with command output

The **standard output** (**stdout**) symbol with two greater than signs **add** command's output to **bottom** of existing file's contents.

is sent to a **text file**.

Examples:

```
ls -l
ls -l > detailed-listing.txt
ls /bin >> output.txt
```

Standard Error (**stderr**) describes where a command sends it's error messages. In the examples below we issue the pwd in capitals on purpose to generate an error message, which can be redirected to a **text file**.

The **standard error** (**sterr**) symbol with one greater than sign **overwrites** existing file content with command's **error message**.

The **standard error** (**stderr**) symbol with two greater than signs **add** command's error message to **bottom** of existing file's contents.

Examples:

```
PWD
PWD 2> error-message.txt
PWD 2 >> error-messages.txt
PWD 2> /dev/null
```

The /dev/null File

The **/dev/null** file (sometimes called the **bit bucket** or **black hole**) is a special system file that **discard** all data written into it. This is useful to discard unwanted command output.

Examples:

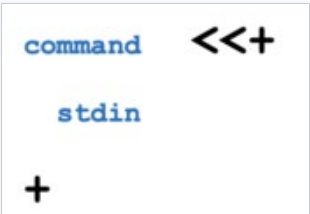
```
LS 2> /dev/null
ls > /dev/null
find / -name "tempfile" 2> /dev/null
```

The Here Document

In Linux, the **Here Document** allows a user to redirect stdin from within the command itself.

Example:

```
cat <<+
Line 1
Line 2
Line 3
+
```



The **Here Document** allows a user to redirect stdin from within the command itself.

Pipeline Commands

Pipeline Command: Having commands send their **standard output** directly to **standard input** of other commands WITHOUT having to use

A **pipeline command** sends a command's **standard output** directly to **standard input** of other command(s) without having to create temporary files.

temporary files.

Pipes that are used in a **pipeline command** are represented by the **pipe** "|" symbol.

A few simple commands can be **combined** to form a more powerful command line.

Commands to the **right** of the pipe symbol are referred to as **filters**. They are referred to as *filters* since those commands are used to **modify** the stdout of the previous command. Many commands can be "piped" together, but these commands (filters) must be chained in a specific order, depending on what you wish to accomplish

Examples: filter

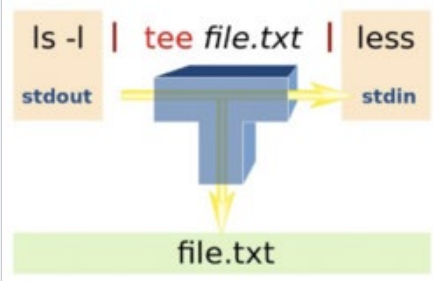
```
ls -al | more
ls | sort -r
ls | sort | more
ls -l | cut -d" " -f2 | tr 'a-z' 'A-z"
ls | grep Linux | head -5
head -7 filename | tail -2
```

The tee Command

The **tee** utility can be used to split the flow of **standard output** between a **text file** and the **terminal screen**.

The **tee** option **-a** can be used to add content to the **bottom** of an existing file
as opposed to *overwriting* the file's previous contents.

The reason for the name "**tee**" is that the splitting of the flow of information resembles a capital T.



The **tee** utility can be used to **split** the flow of information. For example to save in a file as well as display on a screen.
(Image licensed under cc)

Examples:
```
ls | tee unsorted.txt | sort
ls | grep Linux | tee matched.txt | more
ls | head -5 | tee -a listing.txt
```

Multiple Commands Using Semicolon, Grouping, and Backquotes

Besides piping, there are other ways that multiple commands may be placed in one line: commands may be separated by **semi-colons**.

Example:

```
sleep 5; ls
```

Multiple commands can also be **grouped** by using parentheses.

Example:

```
(echo "Who is on:"; w) > whoson
```

(***Note:*** *all command output is sent to a file*)

Commands may also be **spread-out over multiple lines**, making it easier (for humans) to interpret a long command.

The \ symbol "*quotes-out*" the meaning of the **ENTER** key as text
(i.e. *new-line* as instead of *running* the command).

Example:

```
echo "This will be split over multiple \
lines. Note that the shell will realize \
that a pipe requires another command, so \
it will automatically go to the next line" |tr '[a-z]' '[A-Z]'
```

INVESTIGATION 1: BASICS OF REDIRECTION

ATTENTION: This online tutorial will be required to be completed by **Friday in week 6 by midnight** to obtain a grade of **2%** towards this course

In this investigation, you will learn how to redirect **standard input**, **standard output** and **standard error** when issuing Unix / Linux commands.

Perform the Following Steps:

1. **Login** to your matrix account and issue a command to **confirm** you are located in your **home** directory.

2. Issue the following Linux command to create the following directory: `mkdir ~/redirect`

3. Change to the **~/redirect** directory and confirm that you changed to that directory.

4. Use a text editor to create a file in your current directory called **data.txt** and enter the following text displayed below:

   ```
   This is line 1
   This is line 2
   This is line 3
   ```

5. **Save** editing changes and **exit** the text editor.

6. Issue the following Linux command: `tr 'a-z' 'A-Z' < data.txt`

   What does this command do?

   THIS IS LINE 1
   THIS IS LINE 2
   THIS IS LINE 3

7. Issue the following Linux command: `tr 'a-z' 'A-Z' < data.txt > output.txt`

   What does this command do? What are the contents of the file *output.txt*?

   redirect the translated output to output.txt without display the result

   THIS IS LINE 1
   THIS IS LINE 2
   THIS IS LINE 3

8. Issue the following Linux command: `tr 'a-z' 'A-Z' > output.txt < data.txt`

   What does this command do? Is there any difference in terms of this command and the previous command issued?

   THIS IS LINE 1
   THIS IS LINE 2
   THIS IS LINE 3

   no difference

9. Issue the following Linux command: **`tr 'a-z' 'A-Z' >> output.txt < data.txt`**

   What happens to the content of the **output.txt** file? Why?

   ```
   THIS IS LINE 1
   THIS IS LINE 2
   THIS IS LINE 3
   >> append the content of output.txt THIS IS LINE 1
   THIS IS LINE 2
   THIS IS LINE 3
   ```

10. Issue the following Linux command: **`tail -2 < data.txt > output.txt`**

    What does this command do? Check the contents of the **output.txt** file to confirm.

    redirect the last two lines of data.txt to output.txt

    This is line 2
    This is line 3

11. Issue the following Linux command: **`tail -2 > output2.txt < data.txt`**

    Why does this command render the same results as the previous command?
    Try explaining how the command works in terms of **stdin** and then **stdout**.

    This is line 2
    This is line 3

12. Issue the following Linux command to create a file: **`cat > output3.txt`**

13. Enter the follow text displayed below:

    `This is the file output3.txt`

14. Press **`ctrl-d`** to exit the command.

15. Issue the **cat** command to view the contents of the file: **output3.txt**

16. Issue the following Linux command: **`cp ~jason.carman/uli101/cars .`**

17. Issue the **cat** command to view the contents of the **cars** file.

Plym	fury	77	73	2500
chevy	nova	79	60	3000
ford	mustang	65	45	10003
volvo	gl	78	102	9850
ford	ltd	83	15	10507
chevy	nova	80	50	3503
fiat	600	65	115	450
honda	accord	81	30	6000
ford	thundbd	84	10	17000
toyota	tercel	82	180	755
chevy	impala	65	85	1553
ford	bronco	83	25	9505

18. Issue the following Linux command: **`cut -c1-10 cars`**

    What did this command do?

Plym	fury
chevy	nova
ford	musta
volvo	gl 7
ford	ltd 8
chevy	nova
fiat	600 6
honda	acco
ford	thund
toyota	ter
chevy	impa
ford	bronc

19. Issue the following Linux command: **`cut -f5 cars > field5.txt`**

    What did this command do?
    Check the contents in the file **field5.txt** to see what happened.

    2500
    3000
    10003
    9850
    10507
    3503
    450
    6000
    17000
    755
    1553
    9505

20. Issue the following Linux command: **`cut -f1-3 cars > field123.txt`**

    What did this command do? (check file contents)

Plym	fury	77
chevy	nova	79
ford	mustang	65
volvo	gl	78
ford	ltd	83
chevy	nova	80
fiat	600	65
honda	accord	81
ford	thundbd	84
toyota	tercel	82
chevy	impala	65
ford	bronco	83

21. Issue the following Linux command: **`cut -f1,5 cars > field15.txt`**

    What did this command do? (check file contents)

Plym	2500
chevy	3000
ford	10003
volvo	9850
ford	10507
chevy	3503
fiat	450
honda	6000
ford	17000
toyota	755
chevy	1553
ford	9505

22. Issue the following Linux command: **`wc cars > count.txt`**

    What information does the **count.txt** file contain? `12  60 273 cars`

23. Issue the following Linux command: **`wc -l cars > count1.txt`**

    What information does the **count1.txt** file contain? 12 cars

24. Issue the following Linux command: **`wc -w cars > count2.txt`** `60 cars`

What information does the **count2.txt** file contain?

25. Issue the following Linux command: `ls -l > listing.txt`

    What information does the **listing.txt** file contain?

26. Issue the following Linux command: `pwd > listing.txt`

    What happenned to the original contents of the file called **listing.txt**? Why?

    all the original contents are gone. Because > overwrite the contents of listing.txt

27. Issue the following Linux command (use 2 greater-than signs): `date >> listing.txt`

    What information does the **listing.txt** file contain? Why?

28. Issue the following Linux command: `cat listing.txt cars > combined.txt`

    What information does the **combined.txt** file contain? Why?

    NOTE: The **cat** command stands for "**concatenate**" which means to **combine** contents of multiple files into a single file.
    This is why the command is called "*cat*".

29. Issue the following Linux command: `cat listing.txt cars murray 2> result.txt`

    What is displayed on the monitor? What information does the **result.txt** file contain? Why?

    same as before

    cat: murray: No such file or directory because murray file doesn't exist, 2> store the error message to result.txt

30. Issue the following Linux command: `cat listing.txt cars murray > myoutput.txt 2> /dev/null`

    What is displayed on the monitor? What happened to the error message?

31. Issue the following Linux command: `cat listing.txt cars murray > myoutput.txt 2> result.txt`

    result.txt:
    cat: murray: No such file or directory

    What is displayed on the monitor? what do those files contain? Why?

    The **Here Document** allows you to redirect stdin from with the Linux command itself. Let's get some practice using the Here Document.

32. Issue the following Linux command:

```
cat <<+
line 1
line 2
line 3
+
```

    line 1
    line 2
    line 3

    What do you notice?

33. Issue the following Linux command:

```
grep 2 <<+
line 1
line 2
line 3
```

    line 2

/home/twwong9/redirect
Fri Feb 17 19:45:18 EST 2023

Plym	fury	77	73
chevy	nova	79	60
ford	mustang	65	45
volvo	gl	78	102
ford	ltd	83	15
chevy	nova	80	50
fiat	600	65	115
honda	accord	81	30
ford	thundbd	84	10
toyota	tercel	82	180
chevy	impala	65	85
ford	bronco	83	25

2500
3000
10003
9850
10507
3503
450
6000
17000
755
1553
9505

myoutput.txt:
/home/twwong9/redirect
Fri Feb 17 19:45:18 EST 2023

Plym	fury	77	73
chevy	nova	79	60
ford	mustang	65	45
volvo	gl	78	102
ford	ltd	83	15
chevy	nova	80	50
fiat	600	65	115
honda	accord	81	30
ford	thundbd	84	10
toyota	tercel	82	180
chevy	impala	65	85
ford	bronco	83	25

2500
3000
10003
9850
10507
3503
450
6000
17000
755
1553
9505

myoutput.txt:
/home/twwong9/redirect
Fri Feb 17 19:45:18 EST 2023

Plym	fury	77	73
chevy	nova	79	60
ford	mustang	65	45
volvo	gl	78	102
ford	ltd	83	15
chevy	nova	80	50
fiat	600	65	115
honda	accord	81	30
ford	thundbd	84	10
toyota	tercel	82	180
chevy	impala	65	85
ford	bronco	83	25

2500
3000
10003
9850
10507
3503
450
6000
17000
755
1553
9505

```
total 44
-rwxr-xr-x 1 twwong9 users 273 Feb 17 19:33
cars
-rw-r--r-- 1 twwong9 users   8 Feb 17 19:40
count1.txt
-rw-r--r-- 1 twwong9 users   8 Feb 17 19:41
count2.txt
-rw-r--r-- 1 twwong9 users  17 Feb 17 19:39
count.txt
-rw-r--r-- 1 twwong9 users  45 Feb 17 18:56
data.txt
-rw-r--r-- 1 twwong9 users 173 Feb 17 19:37
field123.txt
-rw-r--r-- 1 twwong9 users 128 Feb 17 19:38
field15.txt
-rw-r--r-- 1 twwong9 users  61 Feb 17 19:38
field5.txt
-rw-r--r-- 1 twwong9 users   0 Feb 17 19:42
listing.txt
-rw-r--r-- 1 twwong9 users  30 Feb 17 19:27
output2.txt
-rw-r--r-- 1 twwong9 users  29 Feb 17 19:31
output3.txt
-rw-r--r-- 1 twwong9 users  30 Feb 17 19:26
output.txt
```

/home/twwong9/redirect
Fri Feb 17 19:45:18 EST 2023

>> append the content of listing.txt with date

```
+
```

What do you notice? How does this differ from the previous command? Why?

34. Issue the following Linux command:

```
grep 2 > line2.txt <<+
line 1
line 2
line 3
+
```

What do you notice? What is contained in the file **line2.txt**? Why? line 2

NOTE: You will now run a shell script to confirm that you properly issued Linux commands using redirection.

35. Issue the following Linux command to run a checking script:

```
~uli101/week5-check-1
```

36. If you encounter errors, make corrections and **re-run** the checking script until you receive a congratulations message, then you can proceed.

37. Issue the **ls** command to see all of the **temporary files** that were created as a result of redirection.

The problem with using these redirection symbols is that you create **temporary text files** that take up **space** on your file system.

38. Issue a Linux command (using **Filename Expansion**) to **remove** those temporary text files in the current directory.

39. Issue the following Linux command to check that you removed ALL of those temporary text files:

```
~uli101/week5-check-2
```

40. If you encounter errors, make corrections and **re-run** the checking script until you receive a congratulations message, then you can proceed.

In the next investigation, you will be learning how to issue **pipeline Linux commands** which can accomplish tasks without creating temporary files.

INVESTIGATION 2: REDIRECTION USING PIPELINE COMMANDS

In this investigation, you will learn to issue **pipeline commands** to to accomplish tasks without having to generate temporary files.

Perform the Following Steps:

1. Confirm that you are still located in the **~/redirect** directory.

The **problem** with creating temporary files, is that they take up space on your server, and should be removed. You actually did that in the previous investigation.

You will be issuing a **pipeline command** which will use the pipe symbol "|" that will send the stdout from a command as stdin into another command without having to create temporary files.

2. Issue the follow Linux **pipeline command**: `ls /bin | more`

   What happened? Press **q** to exit display.

3. Issue the following Linux **pipeline command**: `ls /bin | who`

   What happened? Although this pipeline command provides output, it **does not work** properly as a pipeline command since the **who** command is **NOT** designed to accept standard input.

NOTE: When issuing pipeline commands, commands to the right of the pipe symbol must be designed to accept **standard input**. Since the *who* command does not, you did NOT see the contents of the **/bin** directory but only information relating to the *who* command. Therefore, the **order** of which you build your pipeline command and the **type of command** that is used as a *filter* is extremely important!

4. Issue the following Linux command: `ls /bin/?? > listing.txt`

5. Issue the following Linux command: `sort listing.txt`

6. Issue the following Linux command to remove the listing file: `rm listing.txt`

7. Issue the following Linux **pipeline command**: `ls /bin/?? | sort`

   You should notice that the output from this pipeline command is the same output from the command you issued in **step #5**.

8. Issue the following Linux **pipeline command**: `ls /bin/?? | sort | more`

   What is difference with this pipeline command as opposed to the previous pipeline command? Press **q** to exit display.

   with more command function

9. Issue the **ls** command.

   You should notice that **no files have been created**.
   Let's get practice issuing more pipeline commands using commands (previously learned or new) to be used as **filters**.

10. Issue the following Linux **pipeline command**: `ls /bin/?? | sort | head -5`

    What did you notice?

    ```
    /bin/ab
    /bin/ar
    /bin/as
    /bin/bc
    /bin/bg
    ```

    only display the first 5 lines

11. Issue the following Linux **pipeline command**: `ls /bin/???? | sort | grep r | tail -2`

    ```
    /bin/xdpr
    /bin/xrdb
    ```

    What did you notice? Could you predict the output prior to issuing this pipeline command?

12. Issue the following Linux **pipeline command**: `ls /bin/???? | sort | grep r | cut -c1-6`

```
[twwong9@mtrx-node01pd redirect]$ ls /bin/???? |sort|grep r|cut -c0-6
cut: fields and positions are numbered from 1
```

only display the first 6 characters of sorted 4 characters filename located in /bin that contains r

ls /bin | more:

```
isharif1 pts/0        2023-02-17 20:08 (10.29.1.44)
dpham34  pts/1        2023-02-17 20:20 (10.29.4.138)
sbharun  pts/2        2023-02-17 20:02 (10.248.244.163)
ggumus2  pts/4        2023-02-17 19:37 (10.29.1.118)
nsafak   pts/5        2023-02-17 14:49 (10.29.2.35)
hguo50   pts/6        2023-02-17 17:53 (10.29.0.45)
bturja-nandini-dia pts/7        2023-02-17 20:04 (10.29.0.56)
malizadeh-saadat pts/8        2023-02-17 19:22 (10.29.4.110)
dyermashev pts/9        2023-02-17 19:44 (10.29.0.73)
twwong9  pts/10       2023-02-17 19:32 (10.29.3.61)
rroldan  pts/12       2023-02-17 19:33 (10.29.0.61)
```

who:

```
isharif1 pts/0        2023-02-17 20:08 (10.29.1.44)
dpham34  pts/1        2023-02-17 20:20 (10.29.4.138)
sbharun  pts/2        2023-02-17 20:02 (10.248.244.163)
ggumus2  pts/4        2023-02-17 19:37 (10.29.1.118)
nsafak   pts/5        2023-02-17 14:49 (10.29.2.35)
hguo50   pts/6        2023-02-17 17:53 (10.29.0.45)
bturja-nandini-dia pts/7        2023-02-17 20:04 (10.29.0.56)
malizadeh-saadat pts/8        2023-02-17 19:22 (10.29.4.110)
dyermashev pts/9        2023-02-17 19:44 (10.29.0.73)
twwong9  pts/10       2023-02-17 19:32 (10.29.3.61)
rroldan  pts/12       2023-02-17 19:33 (10.29.0.61)
```

```
/bin/ab
/bin/ar
/bin/as
/bin/bc
/bin/bg
/bin/cc
/bin/cd
/bin/ci
/bin/co
/bin/cp
/bin/dc
/bin/dd
/bin/df
/bin/du
/bin/ef
/bin/ex
/bin/fc
/bin/fg
/bin/gc
/bin/go
/bin/gs
/bin/hg
/bin/id
/bin/ld
/bin/ln
/bin/ls
/bin/m4
/bin/mc
/bin/mf
/bin/mv
/bin/nc
/bin/nl
/bin/nm
/bin/od
/bin/pr
/bin/ps
/bin/ri
/bin/rm
/bin/sg
/bin/sh
/bin/su
/bin/tr
/bin/ul
/bin/vi
/bin/wc
/bin/xz
```

| more: using more command for the output of ls /bin

```
[
411toppm
a2p
ab
abs2rel
aclocal
aclocal-1.13
acyclic
addr2line
afm2tfm
agentxtrap
alias
allcm
allec
allneeded
alpine
alt-java
animate
ansible
ansible-2
ansible-2.7
ansible-config
```

Try to explain step-by-step each process in the pipeline command (including *filters*) to explain the final output from this pipeine command.

13. Confirm that you are still located in the **~/redirect** directory.

14. Issue the following Linux **pipeline command**:
```
ls /bin/???? | tee unsort.txt | sort | tee sort.txt | grep r | tee match.txt | head
```
/bin/arch
/bin/chrt
/bin/curl
/bin/expr
/bin/free
/bin/grep
/bin/gtar
/bin/gvpr
/bin/more
/bin/orbd

15. Issue the **ls** command to view the contents of this redirectory.

    What did you notice? match.txt sort.txt unsort.txt

16. View the contents of the **text files** that were created to see how the **tee** command was used in the previous pipeline command.

    What was the purpose of using the **tee** command for this pipeline command?

    You will now run a shell script to confirm that you properly issued that Linux pipeline command using the **tee** command and redirection.

17. Issue the following Linux command to run a checking script:
```
~uli101/week5-check-3
```
    If you encounter errors, make corrections and **re-run** the checking script until you receive a congratulations message, then you can proceed.

18. Change to your **home** directory.

19. Remove the **~/redirect** directory and its contents.

In the next investigation, you will learn various techniques to issue **multiple Linux commands** on the same line, or issue a **single Linux command over multiple lines**.

INVESTIGATION 3: ISSUING MULTIPLE UNIX/LINUX COMMANDS

In this investigation, you will learn how to issue multiple Unix / Linux commands in a single line or over multiple lines.

Perform the Following Steps:

1. Confirm you are located in your **home** directory in your Matrix account.

2. Issue the following Linux commands (using the *semicolon* character "**;**" to separate each Linux command):
```
cal;pwd;date
```
    Note the output as well as the order of what each Linux command results.

3. Issue the following Linux commands: `(cal;pwd;date)`

February 2023
Su Mo Tu We Th Fr Sa
1 2 3 4
5 6 7 8 9 10 11
12 13 14 15 16 17 18
19 20 21 22 23 24 25
26 27 28

/home/twwong9
Fri Feb 17 20:47:04 EST 2023

Was there any difference in the output of this command as opposed to the previous command?

no difference

Let's see how grouping affects working with redirection.

4. Issue the following Linux commands: `cal;pwd;date > output.txt`

   What happened? Where is the output for the **date** command? output of the date is redirected to output.txt, instead of display

   Why isn't the output for the **cal** and **pwd** commands are NOT contained in that file?

   Because cal, pwd, and date > output.txt are three separate commands that written in a single command line

5. Issue a Linux command to view the contents of the file called **output.txt**

   What do you notice? Fri Feb 17 20:49:37 EST 2023

   Let's use **grouping** to make modification to the previous command

6. Issue the following Linux commands: `(cal;pwd;date) > output.txt`

   What did you notice?

   February 2023
   Su Mo Tu We Th Fr Sa
   1 2 3 4
   5 6 7 8 9 10 11
   12 13 14 15 16 17 18
   19 20 21 22 23 24 25
   26 27 28

   /home/twwong9
   Fri Feb 17 22:16:27 EST 2023

7. Issue a Linux command to view the contents of the file called **output.txt**

   What does *grouping* do when issuing multiple Linux commands (separated by a semi-colon ";") that uses redirection?

   Grouping make sure all commands are executed first before redirecting to output.txt

8. Issue the following Linux pipeline command (using \ at the end of most lines):

```
echo "This will be split over multiple \
lines. Note that the shell will realize \
that a pipe requires another command, so \
it will automatically go to the next line" |tr '[a-z]' '[A-Z]'
```

   Did the command work? What is the purpose of issuing a Linux command in this way?

9. Complete the Review Questions sections to get additional practice.

'[]' '[]' 之間一定要補留space
tr 後面都要補留space

LINUX PRACTICE QUESTIONS

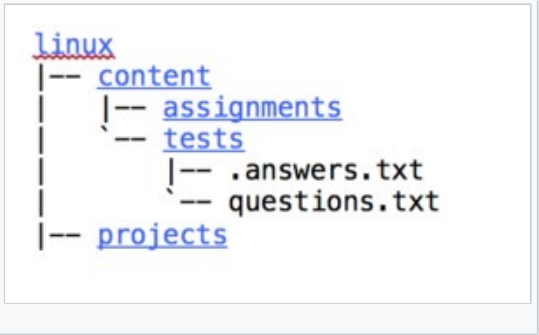
The purpose of this section is to obtain **extra practice** to help with **quizzes**, your **midterm**, and your **final exam**.

Here is a link to the MS Word Document of ALL of the questions displayed below but with extra room to answer on the document to simulate a quiz:

https://github.com/ULI101/labs/raw/main/uli101_week5_practice.docx

Your instructor may take-up these questions during class. It is up to the student to attend classes in order to obtain the answers to the following questions. Your instructor will NOT provide these answers in any other form (eg. e-mail, etc).

When answering Linux command questions, refer to the following Inverted Tree Diagram. The linux directory is contained in your home directory. Assume that you just logged into your Matrix account. Directories are underlined.



Review Questions:

1. Write a single Linux command to provide a detailed listing of all files in the **/bin** directory, sending the output to a file called listing.txt in the "**projects**" directory (append output to existing file and use a relative pathname)
2. Write a single Linux command to redirect the stderr from the command:
   cat a.txt b.txt c.txt to a file called **error.txt** contained in the "**assignments**" directory. (overwrite previous file's contents and use only relative pathnames)
3. Write a single Linux command: **cat ~/a.txt ~/b.txt ~/c.txt** and redirect stdout to a file called "good.txt" to the "tests" directory and stderr to a file called "**bad.txt**" to the "**tests**" directory. (overwrite previous contents for both files and use only relative-to-home pathnames).
4. Write a single Linux command to redirect the stdout from the command:
   cat a.txt b.txt c.txt to a file called wrong.txt contained in the "**projects**" directory and throw-out any standard error messages so they don't appear on the screen (append output to existing file and use only relative pathnames).

5. Write a single Linux **pipeline command** to display a detailed listing of the **projects** directory but pause one screen at a time to view and navigate through all of the directory contents. Use a relative-to-home pathname.
6. Write a single Linux **pipeline command** to display the sorted contents (in reverse alphabetical order) of the "**linux**" directory. Use a relative pathname.
7. Assume that the text file called "**.answers.txt**" contains 10 lines. Write a single Linux pipeline command to only displays lines 5 through 8 for this file. Use only relative pathnames.
8. Write a single Linux **pipeline command** to only display the contents of the "**assignments**" directory whose filenames match the pattern "**murray**" (both upper or lowercase). Use an absolute pathname.
9. Write a single Linux **pipeline command** to display the number of characters contained in the file called "**.answers.txt**". Use a relative-to-home pathname.
10. Write a single Linux **pipeline command** to display the number of lines contained in the file called "**questions.txt**". Use a relative pathname.
11. Write a single Linux **pipeline command** to display only the first 10 characters of each filename contained in your current directory. Also, there is will be a lot of output, so also pause at each screenful so you can navigate throughout the display contents. Use a relative pathname.
12. Create a **table** listing each Linux command, useful options that were mentioned in this tutorial for the following Linux commands: **cut** , **tr** , **wc** , and **tee**.

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Category: ULI101