IC221 Lab: Shell Scripting AY22 Spring

100 points total

See solutions at https://github.com/umbertofontana/systems-programming

Learning Objectives

* Setting up a shell script
* Basic shell scripting with variables and control flows
* Storing the output of execution with sub shells
* Loops and iteration
* Mastering your bash environment

Submission

Submit all shell script files to submit site

* allusers.sh
* getname.sh
* getsize.sh
* getallsizes.sh
* isbiggerthan.sh
* isbiggerthanall.sh (optional extra credit)

Test Program

To help you complete the lab, there is a test program that will run some basic checks against your scripts. It is not designed to be comprehensive, but may help you find errors. Run it as follows:

./test

**Task 1 (15 points)**

The file /etc/passwd contains all the *login information* (not passwords) for users on the system. Each line looks a little like this:

username groupid home dir

| | |

v v v

door:x:35001:10120:W.T. Door {}:/home/scs/door:/bin/bash

^ ^ ^

| | |

uid name default shell

Write a script, allusers.sh, that will parse the /etc/passwd file and print a list of all the common names (not usernames). For example, “MIDN W T Door,” rather than mXXXXXX.   
(Hint: man cut)

Notes: The username should appear in the 5th field. The fields are delimited by colons (:). Some usernames may be blank. This will work on a lab machine or Linux VM, but may not work in WSL.

**Task 2 (20 points)**

Write a script, getname.sh that takes a username as an argument and prints the full name of that user. The full name should be extracted from the /etc/passwd file. Here is a sample output:

$ ./getname.sh door

Door, W. T. USNA Annapolis

Because you want to match precise usernames, you can use something like the following grep regular expression in your script: grep "^USERNAME:"

Where USERNAME is replaced by the username you are searching for as specified in the command line arguments, i.e., $1. If the user is not found, your script should print nothing.

This will work on a lab machine or Linux VM, but may not work in WSL.

**Task 3 (20 points)**

Write a script, getsize.sh, which takes a path as an argument and prints out the size of the file/dir at that path. Your script must do error checking and it must print error messages to STDERR. Here is some sample output:

$ ./getsize.sh file.txt

4000

$ ./getsize.sh file\_does\_not\_exist

ERROR: File file\_does\_not\_exist does not exist

$ ./getsize.sh file\_does\_not\_exist > /dev/null

ERROR: File file\_does\_not\_exist does not exist

$ ./getsize.sh file\_does\_not\_exist 2> /dev/null

You should be able to use cut, ls, and wc to get the information you need. All errors should be written to stderr such that the error normally appears in the terminal output, but does *not* appear if stderr is redirected to /dev/null:

$ ./getsize.sh file\_does\_not\_exist > /dev/null

ERROR: File file\_does\_not\_exist does not exist

$ ./getsize.sh file\_does\_not\_exist 2> /dev/null

Hint: You may find it useful to use the tr command. The option -s, in particular, could be useful to get rid of extra whitespace so that your cut fields are more consistent. For example:

CMD1 | tr -s ' ' | cut -d ' ' -f X

Will reduce two spaces into a single space before sending the data to cut, which makes it easier to parse.

**Task 4 (20 points)**

Create a script called getallsizes.sh which takes in any number of files on the command line and prints their sizes. Here's some sample usage:

$ ls -l

total 12

-rw-r----- 1 door scs 0 Dec 29 14:56 empty.txt

-rwxr-x--- 1 door scs 277 Dec 29 14:56 getallsizes.sh

-rw-r----- 1 door scs 4000 Dec 29 14:56 larger.txt

-rw-r----- 1 door scs 1847 Dec 29 14:56 medium.txt

$ ./getallsizes.sh empty.txt

empty.txt 0

$ ./getallsizes.sh \*.txt

empty.txt 0

larger.txt 4000

medium.txt 1847

$ ./getallsizes.sh empty.txt doesnotexist.txt larger.txt

empty.txt 0

ERROR: File doesnotexist.txt does not exist

larger.txt 4000

$ ./getallsizes.sh empty.txt doesnotexist.txt larger.txt 2> /dev/null

empty.txt 0

larger.txt 4000

$ ./getallsizes.sh empty.txt doesnotexist.txt larger.txt > /dev/null

ERROR: File doesnotexist.txt does not exist

Hint: Check out the man page for echo to print without a trailing new line using the -n option.

**Task 5 (25 points)**

Write a script, isbiggerthan.sh, which takes as arguments a *path* and a *size* and determines if the file or directory is bigger (or equal to) the given size. Usage: ./isbiggerthan.sh size path

Sample output:

$ ./isbiggerthan.sh 10 empty.txt

no

$ ./isbiggerthan.sh 0 empty.txt

yes

$ ./isbiggerthan.sh 10 empty.txt

no

$ ./isbiggerthan.sh 10 medium.txt

yes

$ ./isbiggerthan.sh 2000 medium.txt

no

$ ./isbiggerthan.sh 2000 larger.txt

yes

You must implement error checking. All error output should be printed to stderr. Use the following format:

$ ./isbiggerthan.sh

ERROR: Require path and size

$ ./isbiggerthan.sh num empty.txt

ERROR: Require a number for size

$ ./isbiggerthan.sh -1 empty.txt

ERROR: Require a positive number for size

$ ./isbiggerthan.sh 1 notafile.txt

ERROR: File notafile.txt does not exist

Hint: Checking whether a variable is a number or not is not straightforward. You can adapt your solution from the example below:

if [ "$var" -eq "$var" ] 2> /dev/null # check if it's a number

then

echo "it's a number"

else

echo "it's \*not\* a number"

fi

**Task 6 BONUS (+10 points)** (Skipped)

Create a new script called isbiggerthanall.sh, which outputs a list of all the files, at the specified paths, that are bigger than the specified file size.

The script must exit with different non-zero status codes according to the following error conditions:

• exit 1 : not enough arguments (ERROR: Require a size and at least one file)

• exit 2 : did not receive a number for *size* (ERROR: Require a number for size)

• exit 3 : negative number for *size* (ERROR: Require a positive number for size)

If a specified file does not exist, that should be reported to *standard error* in precisely the following format: ERROR: File /my/example/filename does not exist

Once complete, the script isbiggerthanall.sh should function properly with these arguments:

isbiggerthanall.sh size path [path [...]]

The output is a summary list of all the files, at the specified paths, that are bigger than the specified file size. Sample output :

$ ls -l

total 16

-rw-r----- 1 door scs 0 Dec 29 15:09 empty.txt

-rwxr-x--- 1 door scs 870 Dec 29 15:14 isbiggerthanall.sh

-rwxr-x--- 1 door scs 748 Dec 29 15:09 isbiggerthan.sh

-rw-r----- 1 door scs 4000 Dec 29 15:09 larger.txt

-rw-r----- 1 door scs 1847 Dec 29 15:09 medium.txt

$ ./isbiggerthanall.sh 0 \*.txt

larger.txt

medium.txt

$ ./isbiggerthanall.sh 2000 \*.txt

larger.txt

$ ./isbiggerthanall.sh 9999 \*.txt

$ ./isbiggerthanall.sh num larger.txt

ERROR: Require a number for size

$ ./isbiggerthanall.sh -1 larger.txt

ERROR: Require a positive number for size

$ ./isbiggerthanall.sh

ERROR: Require a size and at least one file

$ ./isbiggerthanall.sh 1 doesnotexist.txt

ERROR: File doesnotexist.txt does not exist