



**Note:** This assignment is based on the **pathdisplay** script from Assignment 2. You may choose to modify your code from Assignment 2, or write entirely new code, the choice is yours.

### Assignment 3: Specifications

Write a bash shell script, called **perm**, that satisfies the following requirements:

1. **Usage:** **perm [ dir-name ]**
2. **perm** displays the permissions of a directory and all the directories in the directory's absolute path. **perm** will also show other information about the directories, as the cursor is moved up and down the list of directory names. **perm** will also facilitate changing permissions of the directories, assuming that you are the owner of the appropriate directory or the superuser.
3. **perm** will accept one argument, the name of a directory, including the path if required.
4. If there is no argument specified, then the current directory will be the default.
5. If there is more than one argument specified, there will be an error message and the script terminated (exit status 1) with no full-screen display.
6. If the specified filename is not a valid, existing directory, there will be an error message and the script terminated (exit status 1) with no full-screen display.
7. **Please see the examples for the exact display format, and match this format as closely as possible.** Note that the screen is cleared before full-screen output is displayed. There are 3 spaces between the permission groups, and between the permission groups and the filename. There is one space between the permissions within a permission group.
8. Ignore the situation of a very deep directory structure, which would require a multi-screen display.
9. Do not let output lines wrap to the next line, ensure that all lines are truncated to the width of the screen size.
10. Once your program is running, you do NOT have to take into account changes in screen size. You also do NOT have to take into account changes performed from another process, such as changes in permissions of the displayed directories or changes in the displayed directory structure.
11. On initial display, the cursor will be on the first character of the specified (or default) filename. Information for this directory will also be displayed.
12. There are three lines showing the valid keys accepted during execution of the **perm** command, on the fourth, third, and second lines from the bottom of the terminal window, regardless of the terminal window size used.

13. After the initial display, the valid keys available are the following. Note that there should be no "enter" key required after any of them, and that they are lower case:
- "k" will move the cursor to the line containing the filename above the current line. Also, information for the new directory level will be displayed, instead of the previous directory level. This key will have no affect if the cursor is already on the top-most filename, which will be the root.
  - "j" will move the cursor to the line containing the filename below the current line. Also, information for the new directory level will be displayed, instead of the previous directory level. This key will have no affect if the cursor is already on the bottom-most filename, which will be the specified (or default) directory.
  - "h" will move the cursor to the field immediately to the left of the current field. This key will have no affect if the cursor is already on the "r" permission position for "owner". The fields are the nine permission fields, and the filename.
  - "l" will move the cursor to the field immediately to the right of the current field. This key will have no effect if the cursor is already on the right-most field, which will be the filename.
  - "r" will set read permission to the current filename, for owner, group, or other, depending on which field the cursor is on. If the cursor is on any field other than one of the three "r" fields, then the "r" key will be ignored.
  - "w" will set write permission to the current filename, for owner, group, or other, depending on which field the cursor is on. If the cursor is on any field other than one of the three "w" fields, then the "w" key will be ignored.
  - "x" will set execute permission to the current filename, for owner, group, or other, depending on which field the cursor is on. If the cursor is on any field other than one of the three "x" fields, then the "x" key will be ignored.
  - "-" will remove a permission to the current filename, for owner, group, or other, depending on which field the cursor is on. If the cursor is on any field other than one of the nine permission fields, then the "-" key will be ignored.
  - "q" will terminate the **perm** script. Note that the screen is not cleared, and the command prompt will appear on the bottom line of the terminal window.
  - <Ctrl>-c will have exactly the same effect as "q"
14. Any keys entered, other than the valid keys above, will be ignored.
15. If the user doesn't have authority to change a permission, then the "r", "w", "x", and "-" keystrokes will be ignored. If the permission could be changed, then the output display will reflect the new permission.
16. When moving down or up, the cursor will be on the same field on the new line as on the current one.
17. "Flashing" of the screen, during cursor movement, is OK. For example, when the cursor is moved up or down, you may redraw the entire screen. If you wish to

eliminate the flashing, making the program more pleasant to use, you may do so, but it will slightly increase the complexity of your program.

18. If **perm** produced full-screen output, it must end with an exit status of zero. If there was an error, then there is no full-screen output, and the exit status should be one.
19. Ensure that your script is self-contained in one script file, called **perm**
20. Don't do any argument verification or any processing in **perm** other than that specified above. If you're interested in adding more capabilities, please do so in a different script.

#### NOTE:

1. Ensure that your output format matches the following **exactly** as the screenshots in the next page
2. **Note: The files in the sample outputs are available, please use them for testing your output format. Of course, you won't be able to test changing permissions using my files, you will have to use your own files for that. Your output should duplicate the outputs EXACTLY as shown (though some links, sizes, and date-time stamps might change), or marks will be liberally redirected to /dev/null**

### Assignment 3: perm Sample Screen Shots

- After changing to the sample directory, there is a display of the current path, a listing of the current directory, and samples of the required error messages (file file1 and directory dir1 exist, file2 and dir2 do not exist). No other error messages should be produced, even if they "roll off" the screen. The screen size is 80 columns by 24 rows:

```

. ==> cd ~unx510/sample.dir1/testdir1/this*
. ==> pwd
. /home/unx510/sample.dir1/testdir1/this.is.an.incredi
. bly.long.directory.name.to.s
. ee.what.will.happen.with.incredibly.long.directory.n
. ames
. ==> ls -l
. total 4
. -rw----- 1 unx510 users 445 Mar 13 02:24 cars
. drwxr-xr-x 2 unx510 users 15 Mar 13 02:33 dir1
. -rw----- 1 unx510 users 0 Mar 14 2019 file1
. ==> perm file2
. file2 is not a valid directory name
. ==> perm file1 file2
. Usage: perm [ dir-name ]
. ==> perm dir2
. dir2 is not a valid directory name
. ==> perm dir1 dir2
. Usage: perm [ dir-name ]
. ==>
.
.
.
.
.
.
.

```

- Entering **perm dir1** produced the following. Note that the cursor is over the "d" of "dir1":

Owner	Group	Other	Filename
-----	-----	-----	-----

```

.
.  r - x    r - x    r - x    /
.
.  r w x    r - x    r - x    home
.
.  r w x    - - x    - - x    unx510
.
.  r w x    r - x    r - x    sample.dir1
.
.  r w x    r - x    r - x    testdir1
.
.  r w x    r - x    r - x
  this.is.an.incredibly.long.directory.name.to.see.wha
  t.wi
.
.  r w x    r - x    r - x    dir1
.  Links: 2  Owner: unx510  Group: users  Size: 15
  Modified: Mar 13 02:33
.
.
.
.  Valid keys: k (up), j (down): move between filenames
.                h (left), l (right): move between
  permissions
.                r, w, x, -: change permissions;    q:
  quit
.

```

• Hitting **j** and **x** had no effect. Hitting **k** twice (with no <Enter>) produced the following:

```

.  Owner      Group      Other      Filename
.  - - - - -  - - - - -  - - - - -  - - - - -
.
.  r - x      r - x      r - x      /
.
.  r w x      r - x      r - x      home
.

```

```

. r w x - - x - - x unx510
.
. r w x r - x r - x sample.dir1
.
. r w x r - x r - x testdir1
. Links: 4 Owner: unx510 Group: users Size: 229
  Modified: Feb 22 2015
. r w x r - x r - x
  this.is.an.incredibly.long.directory.name.to.see.wha
  t.wi
.
. r w x r - x r - x dir1
.
.
.
.
. Valid keys: k (up), j (down): move between filenames
.             h (left), l (right): move between
  permissions
.             r, w, x, -: change permissions; q:
  quit
.

```

• Hitting **l** had no effect. Hitting **h** five times produced the following:

```

. Owner      Group      Other      Filename
. -----
.
. r - x      r - x      r - x      /
.
. r w x      r - x      r - x      home
.
. r w x      - - x      - - x      unx510
.
. r w x      r - x      r - x      sample.dir1
.
. r w x      r - x      r - x      testdir1

```

```

.   Links: 4  Owner: unx510  Group: users  Size: 229
   Modified: Feb 22 2015
.   r w x    r - x    r - x
   this.is.an.incredibly.long.directory.name.to.see.wha
   t.wi
.
.   r w x    r - x    r - x    dir1
.
.
.
.
.   Valid keys: k (up), j (down): move between filenames
.               h (left), l (right): move between
   permissions
.               r, w, x, -: change permissions;    q:
   quit
.

```

. Hitting x had no effect. Hitting w produced the following:

```

.   Owner      Group      Other      Filename
.   -----      -----      -----      -
.
.   r - x      r - x      r - x      /
.
.   r w x      r - x      r - x      home
.
.   r w x      - - x      - - x      unx510
.
.   r w x      r - x      r - x      sample.dir1
.
.   r w x      r w x      r - x      testdir1
.   Links: 4  Owner: unx510  Group: users  Size: 229
   Modified: Feb 22 2015
.   r w x      r - x      r - x
   this.is.an.incredibly.long.directory.name.to.see.wha
   t.wi

```

```

.
.  r w x    r - x    r - x    dir1
.
.
.
.
.
.  Valid keys: k (up), j (down): move between filenames
.                h (left), l (right): move between
permissions
.                r, w, x, -: change permissions;    q:
quit
.

```

• Hitting **k** four times produced the following:

```

.  Owner      Group      Other      Filename
.  -----
.
.  r - x    r - x    r - x    /
.  Links: 18  Owner: root  Group: root  Size: 4096
Modified: Aug 21 2019
.  r w x    r - x    r - x    home
.
.  r w x    - - x    - - x    unx510
.
.  r w x    r - x    r - x    sample.dir1
.
.  r w x    r w x    r - x    testdir1
.
.  r w x    r - x    r - x
this.is.an.incredibly.long.directory.name.to.see.wha
t.wi
.
.  r w x    r - x    r - x    dir1
.
.
.
.

```



```

.
. Valid keys: k (up), j (down): move between filenames
.             h (left), l (right): move between
permissions
.             r, w, x, -: change permissions;    q:
quit
.

```

- Hitting **w** and **k** had no effect. Hitting **l** twice, then hitting **j** five times, then hitting **-** produced the following:

```

. Owner      Group      Other      Filename
. -----
.
. r - x      r - x      r - x      /
.
. r w x      r - x      r - x      home
.
. r w x      - - x      - - x      unx510
.
. r w x      r - x      r - x      sample.dir1
.
. r w x      r w x      r - x      testdir1
.
. r w x      r - x      - - x
this.is.an.incredibly.long.directory.name.to.see.wha
t.wi
. Links: 3  Owner: unx510  Group: users  Size: 43
Modified: Mar 22 2015
. r w x      r - x      r - x      dir1
.
.
.
.
. Valid keys: k (up), j (down): move between filenames
.             h (left), l (right): move between
permissions

```

```

•           r, w, x, -: change permissions;    q:
quit
•

```

- Hitting **h** six times produced the following:

```

• Owner      Group      Other      Filename
• -----
•
• r - x      r - x      r - x      /
•
• r w x      r - x      r - x      home
•
• r w x      - - x      - - x      unx510
•
• r w x      r - x      r - x      sample.dir1
•
• r w x      r w x      r - x      testdir1
•
• r w x      r - x      - - x
  this.is.an.incredibly.long.directory.name.to.see.wha
  t.wi
•   Links: 3  Owner: unx510  Group: users  Size: 43
  Modified: Mar 22 2015
• r w x      r - x      r - x      dir1
•
•
•
•
•
• Valid keys: k (up), j (down): move between filenames
•             h (left), l (right): move between
  permissions
•           r, w, x, -: change permissions;    q:
quit
•

```

- Hitting **h** had no effect. Hitting **q** produced the following (Note that the prompt is displayed after the bottom line of the **perm** display:

```

• Owner      Group      Other      Filename
• -----
•
• r - x      r - x      r - x      /
•
• r w x      r - x      r - x      home
•
• r w x      - - x      - - x      unx510
•
• r w x      r - x      r - x      sample.dir1
•
• r w x      r w x      r - x      testdir1
•
• r w x      r - x      - - x
  this.is.an.incredibly.long.directory.name.to.see.wha
  t.wi
•   Links: 3  Owner: unx510  Group: users  Size: 43
  Modified: Mar 22 2015
• r w x      r - x      r - x      dir1
•
•
•
•
•
• Valid keys: k (up), j (down): move between filenames
•               h (left), l (right): move between
  permissions
•               r, w, x, -: change permissions;   q:
  quit
• ==>

```

- Increasing the screen size to 32 rows by 96 columns, then entering **perm** produced the following:

```

• Owner      Group      Other      Filename
• -----
•
• r - x      r - x      r - x      /

```

```

.
.  r w x    r - x    r - x    home
.
.  r w x    - - x    - - x    unx510
.
.  r w x    r - x    r - x    sample.dir1
.
.  r w x    r w x    r - x    testdir1
.
.  r w x    r - x    - - x
this.is.an.incredibly.long.directory.name.to.see.wha
t.will.happen.with.i
.  Links: 3  Owner: unx510  Group: users  Size: 43
Modified: Mar 22 2015
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
Valid keys: k (up), j (down): move between filenames
.           h (left), l (right): move between
permissions
.           r, w, x, -: change permissions;  q:
quit
.

```

• Hitting the keys **hhhrkhh-** produced the following:

Owner	Group	Other	Filename
-------	-------	-------	----------

```
.  -----
.
.  r - x    r - x    r - x    /
.
.  r w x    r - x    r - x    home
.
.  r w x    - - x    - - x    unx510
.
.  r w x    r - x    r - x    sample.dir1
.
.  r w x    r - x    r - x    testdir1
.  Links: 4  Owner: unx510  Group: users  Size: 229
Modified: Feb 22 2015
.  r w x    r - x    r - x
this.is.an.incredibly.long.directory.name.to.see.wha
t.will.happen.with.i
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
.
Valid keys: k (up), j (down): move between filenames
.             h (left), l (right): move between
permissions
.             r, w, x, -: change permissions;    q:
quit
```



- `h (left), l (right): move between permissions`
- `r, w, x, -: change permissions; q: quit`

`==>`

## Assignment 3: Hints and Tips

**Here are some hints that may help you with this assignment:**

1. Of course, most of the hints for Assignment 1 still apply.
2. When there is a valid request to change a permission, I would suggest that you don't try to determine beforehand if the user has authority to do this. Instead, just go ahead and execute the appropriate "chmod" command, redirecting any error messages to /dev/null

## Assignment 3: Marking Scheme

**The marking scheme for Assignment 2 will be as follows:**

1. If your script can't run with results similar to the examples correctly, with output EXACTLY duplicating the sample output format, or does not allow changing of permissions when the user has the correct authority, then the assignment may be a resubmit.
2. Marks will be deducted for errors in the following areas:
  - a. Comments as specified: course, family name, etc.
  - b. Output format as specified:
    - heading and "Valid commands" lines
    - correct files and directories displayed
    - alignment as specified
    - cursor displayed and moved correctly
    - detailed info displayed and moved correctly
    - handles different window sizes correctly
  - c. Error messages as specified, and redirected properly.
  - d. Proper exit status, terminal characteristics reset to normal.
  - e. Handles pathnames at any directory level, including relative, relative-to-home, and absolute pathnames.
  - f. Handles command keys and "Ctrl-c" properly and ignores other "normal" keys.
  - g. Handles attempts to move up, down, left, or right too far.
  - h. Uses /tmp directory and \$\$ for temporary files, and temporary files deleted (if used).