PHY494 Solution 01

February 5, 2018

(See *assignment_01.pdf* for the detailed break-down of points.)

1.1 Commands and paths (8 points)

a) What is the function of the cd and the pwd command?

- `cd` : change directory
- `pwd` : print the present working directory

b) Show commands for two different ways to change to your home directory, assuming you are currently in the root directory.

Possible solutions:

- `cd`
- `cd $HOME`
- `cd ~`
- `cd ~$USER`
- `cd /home/$USER`
- `cd home/$USER` (works because you are in the root directory `/`)
- 'cd home/../home/../home/../home/../home/../home/$USER (kind of a joke)

c) Given the path `/home/dvader/Documents/../data/bases`:

i) Is this an absolute path or relative path?

- Absolute

ii) If you are located in the home directory of user dvader (`/home/dvader`) then what is the shortest path to bases?

- `data/bases`

d) If you were in a directory `/home/dvader/data` and you executed the command `cd ./../././.././.`, what would be the output of running the pwd command afterwards? [1]

- `/home`

e) Describe two ways by which you could learn more about the function of a Unix command `frbzz` that you don't know anything about.

1. **Manual page**: Looking for a man page entry for the command in question (`man frbzz`)
2. **Help flags**: Try some typical flags for help (`frbzz -h`, `frbzz --help`)
3. **Search on the internet**: Google it... (do not

underestimate how useful this is!)

f) BONUS (+4*)

- Advantages
  - actions are not limited by the design of the user interface
  - fast (once you master it)
  - modular (chaining of many small, well-designed and powerful tools with pipes)
  - shell glob patterns and regular expressions make it easy to work with large numbers of files
  - scripts as libraries of solutions to recurring tasks
  - batch processing of large number of files
  - can be used remotely even over poor connections
  - small resource footprint (available on *anything*)
  - clearer picture of filesystem structure
  - You look flippin' awesome in starbucks [2]
- Disadvantages
  - steep learning curve (unintuitive)
  - unforgiving
  - It is "ugly" [3]

[1] Sorry if you got confused by the comma in the question after the path... lesson: every little detail counts in Unix.

[2] This statement is "in the eye of the beholder..."

[3] This statement is "in the eye of the beholder..."

- Little mouse support
- Little color support
- no support for graphics or working with images
- Coffee shop owners think you are a cyber terrorist (says Ian)

1.2 Copy, rename, delete (4 points)

Show the output of the commands:

```
cd ~
ls -R PHY494/01_shell
```

which will be compared against the expected directory structure and content.

Expected output:

```
|============================================================|
|01_shell/:                                                  |
|         Documents  data                                    |
|                                                            |
|01_shell/Documents:                                         |
|         work                                               |
|                                                            |
|01_shell/Documents/work:                                    |
|         TODO.bak  TODO.txt  hints.txt  lesson.txt          |
|                                                            |
|01_shell/data:                                              |
|         notes                                              |
|                                                            |
|01_shell/data/notes:                                        |
|         TODO.txt                                           |
|============================================================|
```

1.3 Danger Zone (3 points)

Describe what the command `rm -rf /` might do. Should you ever use it? :

```
rm -rf /
^   ^^ ^
|   || +-- root directory / top level directory
|   |+---- force (no prompts)
```

```
|   +----- recursive (until it reaches the end)
+--- Remove command
```

- It will *recursively* (option `-r`) delete *all* directories and all files and directories in these directories, starting from the root directory `/`. With the "force" option (`-f`) it will also *not* prompt for any confirmations.
- I should never use this command (because it will likely leave my computer in a broken state and everything will be gone).

1.4 BONUS: Pipes and Filters (+5* points)

a) How many lines does the file `planets_2.dat` contain?

- Command:

  ```
  wc planets_2.dat
  ```

- Output:

  ```
  |============================|
  | 120  360 5888 planets_2.dat |
  |============================|
  ```

- Answer: 120 lines

b) What are the three biggest planets (by diameter) in the file `planets.dat`?

- Command:

  ```
  sort planets.dat -k2 -nr | head -3
  ```

- Output:

  ```
  |============================================================|
  |Bespin              118000  gasgiant                        |
  |Kamino               19720  ocean                           |
  |Malastare            18880  swamps/deserts/jungles/mountains|
  |============================================================|
  ```

- Answer: Bespin, Kamino, Malastare

c) Which planets contain ice terrain?

- Command:

  ```
  grep ice planets.dat
  ```

- Output (if you also include planets with glacier terrain then that will count, too):

```
|=========================================================|
|Hoth                   7200  tundra/icecaves/mountainranges|
|Mygeeto               10088  glaciers/mountains/icecanyons |
|=========================================================|
```

- Answer: Hoth, Mygeeto

d) What is the most frequent and the least frequent first letter amongst all the planets?

- Command:

```
cut -b 1 planets.dat | sort | uniq -c | sort -r
```

- Output:

```
|=========|
|   7 S   |
|   7 C   |
|   6 T   |
|   6 M   |
|   4 D   |
|   3 K   |
|   2 U   |
|   2 R   |
|   2 O   |
|   2 N   |
|   2 I   |
|   2 H   |
|   2 G   |
|   2 E   |
|   2 B   |
|   2 A   |
|   1 Z   |
|   1 Y   |
|   1 V   |
|   1 Q   |
|   1 P   |
|   1 J   |
|   1 F   |
|=========|
```

- Answer: “S” and “C” are most frequent, “Z”, “Y”, “V”, “Q”. “P”, “J”, “F” are least frequent (but not 0)