

CSC2408 S1 2021 ASSIGNMENT 1

Linux Basics: Commands and Regular Expressions

Due Date: 25/03/2021

Objective

The objective of this first assessment is to assess the understanding of Linux concepts, and knowledge of various command line interface (CLI) utilities, knowledge of regular expressions, and use of the manual pages to find appropriate options for the commands.

Marks

There are **five (5)** questions in Assignment 1, each consisting of multiple parts. There are 60 marks and Assignment 1 comprises 20% of your final mark.

Submission

- You will generate **five (5) files** for submission, or one (1) per question completed, and you should combine them into a single `.tar` file with the filename `userid.tar` where *userid* is your student number. Then, you must compress it using `gzip`. This compressed archive will then be uploaded to the submission link for Assignment 1 on the [Study Desk](#).
- For **Questions 4 and 5**, you should create **text files** with a text editor as indicated.
- For **Questions 1, 2, and 3**, you will use a utility called `asciinema` to create a file that captures your command line input and output.
- A tutorial on how to install the `asciinema` utility and how to use it are included on the Assessment tab for this assignment on the [Study Desk](#). You cannot edit the resulting file, but don't worry about mistakes or typos as long as you then do the correct command. It would be best to map out your answers or try them out first before recording.

Late Submission of Assignments¹

Students can apply for an extension of time to submit an assignment at any time up to the deadline. Students are advised to make a request for an extension as soon as their need becomes apparent.

Delay in making a request involves the risk of losing marks if the request is refused. The Examiner may grant a short extension of the deadline for submission of an assignment. Extensions are usually granted only in cases of [Compassionate and Compelling Circumstances](#) in accordance with the assessment of [Compassionate and Compelling Circumstances Procedure](#). Generally, extensions will be limited to a maximum of five University Business Days. A Student requiring an extension for a period of time in excess of this should consider applying for a Deferred Assessment as per Section 4.4 of the assessment procedure.

Applications for extensions must be made via the [request for extension link](#). An Assignment submitted after the deadline without an approved extension of time will be penalised. The penalty for late submission without a pre-approved extension is a reduction by 5% of the maximum mark applicable for the assignment, for each University business day or part business day that the assignment is late. An assignment submitted more than ten University business days after the deadline will have a mark of zero recorded for that assignment.

The Examiner may refuse to accept assignments for assessment purposes after marked assignments and/or feedback have been released.

Non-submission of Assignments and Passing Grades²

To be assured of receiving a passing grade a student must obtain at least 50% of the total weighted marks available for the course and have satisfied any Secondary Hurdles (if applicable).

Supplementary assessment may be offered where a student has undertaken all of the required summative assessment items and has passed the Primary Hurdle but failed to satisfy the Secondary Hurdle (Supervised), or has satisfied the Secondary Hurdle (Supervised) but failed to achieve a passing Final Grade by 5% or less of the total weighted Marks.

¹The full assessment rules and regulations can be found at <http://policy.usq.edu.au/documents.php?id=14749PL>

²See the University [Assessment Procedure policy document](#)

To be awarded a passing grade for a supplementary assessment item (if applicable), a student must achieve at least 50% of the available marks for the supplementary assessment item as per the [Assessment Procedure](#) (point 4.4.2).

The offer of Supplementary Assessment normally will only be made if the Student has undertaken all possible Summative Assessment Items for the Course (i.e. the assignments).

Student Responsibilities

The [Assessment Procedure](#) Section 4.2.2, also outlines the following student responsibilities:

- If requested, Students must be capable of providing a copy of Assignments submitted. Copies should be dispatched to the University within 24 hours of receipt of a request being made.
- Students are responsible for submitting the correct Assignment.
- Assignment submissions must contain evidence of student effort to address the requirements of the Assignment. In the absence of evidence of Student effort to address the requirements of the assignment, no Mark will be recorded for that Assessment Item.
- A Student may re-submit an Assignment at any time up to the deadline. A request to re-submit after the deadline is dealt with in accordance with section 4.4 'Deferred, Supplementary and Varied Assessment and Special Consideration' of these procedures.

Academic Integrity

Academic misconduct is unacceptable and includes plagiarism, collusion and cheating:

- *plagiarism*: involves the use of another person's work without full and clear referencing and acknowledgement;
- *cheating*: involves presenting another student's work as your own;
- *collusion*: is a specific type of cheating, that occurs when two or more students fail to abide by directions from the examiner regarding the permitted level of collaboration on an assessment.

All are seen by the University as acts of misconduct for which you can be penalised. For further details go to the [Library's site on Plagiarism](#).

Question 1 (10 Marks)

Topic: Directories and files

Submission: Use the asciinema software to record the command line to a filename `userid_a1_q1.cast` where *userid* is your student number.

Tasks: Perform the following tasks, starting in your home directory.

1.1 (1 mark) Set the PS1 shell variable to your student number so that your shell prompt looks like this:

```
u12345678=>
```

(if your student ID was *u12345678*)

1.2 (3 marks) Create the following directory structure, starting in your home directory

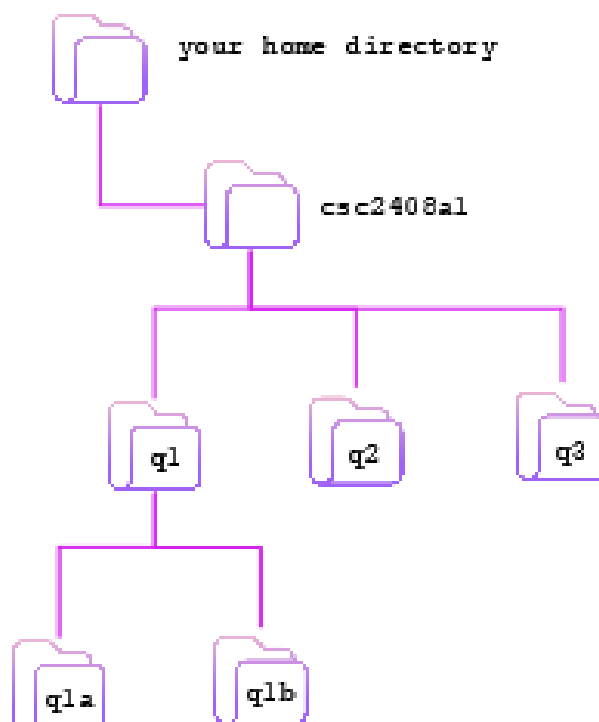


Figure 1: Directory structure for Question 1.2

Verify that the structure is correct using `ls` or other command-line utilities.

1.3 (1 mark) In your home directory, create a file called `welcome.txt` using `vim` containing the following text:

```
This is CSC2408 Software Development Tools
```

1.4 (1 mark) Without changing your current working directory, move the file `welcome.txt` to the `csc2408a1` directory.

1.5 (1 mark) Make a copy of the file `welcome.txt` called `q1b.txt` in the directory `q1b`.

1.6 (1 mark) Set permissions on the file `welcome.txt` so that the owner has only read permissions and the group and everyone else have no permissions.

1.7 (2 marks) Set the permissions on the directory `q1b` so that the owner can read the files in the directory, can read file contents in the directory, but cannot create or delete files in the directory. Set permissions for the group and everyone else have no permission.

End of Question 1

Question 2 (10 Marks)

- Topic:** The Linux `find` command is quite useful and powerful. Examine the manual page for `find`.
- Submission:** Use the `asciinema` software to record the command line to a filename `userid_a1_q2.cast` where *userid* is your student number.
- Tasks:** Perform the following tasks, starting in your home directory.

2.0 (0 marks) Set the `PS1` shell variable to your student number so that your shell prompt looks like this:

```
u12345678=>
```

(if `u12345678` was your student number)

2.1 (3 marks) Use a single `find` command to list all of the subdirectories in the directory structure you created in **Question 1**, starting with `csc2408a1`, redirecting any standard errors to `/dev/null`

2.2 (3 marks) Use a single `find` command to search for all of the programs in the `/usr/bin` directory that have have **SUID** or **SGID** set. From the list produced, use `ls` to do long listings of the filenames to show the SUID or SGID is set.

2.3 (4 marks) Use a single `find` command to search for all files *larger than 1 Mib* in `/usr/bin`, printing the listing in a long format. *Pipe this output* to a `sort` command which will sort the list from *largest to smallest*.

End of Question 2

Question 3 (10 Marks)

Topic: tar, gzip and more file operations.

Submission: Use the asciinema software to record the command line to a filename `userid_a1_q3.cast` where *userid* is your student number.

Tasks: Perform the following tasks, starting in your home directory.

3.0 (0 marks) Set the `PS1` shell variable to your student number so that your shell prompt looks like this:

```
u12345678=>
```

(if u12345678 was your student number)

3.1 (1 mark) Change into the directory containing the `welcome.txt` file created in **Question 1**.

3.2 (1 mark) Using `tar`, create a `.tar` archive containing the just `welcome.txt` file. Compress the resulting archive with `gzip`.

3.3 (1 mark) Move the resulting compressed archive to the `q3` directory in the directory structure created in **Question 1** (see Figure 1).

3.4 (2 marks) Without using `gunzip` (only using `tar`), view the table of contents of the compressed archive *without* extracting the files.

3.5 (2 marks) Extract the file from the compressed archive in the `q3` directory.

3.6 (1 mark) Remove all of the files in the `q3` directory.

3.7 (2 marks) You will be awarded 2 marks for correctly creating the compressed `.tar` archive for submitting this assignment. The tar file should contain 1 file per question you have answered in this assignment (5 files if you have completed all questions). The commands used for this part (3.7) do **NOT** need to be included in your answer file/recording.

End of Question 3

Question 4 (15 Marks)

Topic: Regular expressions

Submission: Place your answers in a text file called `userid_a1_q4.txt` where *userid* is your student number.

Tasks: Below are 5 pairs of regular expressions. For each pair, describe in plain words what each regular expression will match, and highlight their difference by providing examples where one expression will match the example string, but the other will not.

For example, given the pair of regular expressions: `^abc.` and `^abc$` your answer in the text file should be something like:

"Q4.1 a) The first regular expression will match a line that begins with the string of characters 'abc' followed by any single character (and may be followed then by zero or more characters). The second regular expression will match a line consisting of the string 'abc'
b) The first regular expression will match 'abcd', but the second expression will not. The second expression will match the line 'abc' but not 'abcd'."

Note that sometimes you may only need to provide one example in the case that one expression will always match the examples but the other will not.

4.1 (3 marks) `ab.*cd` and `abb*cd`

4.2 (3 marks) `[A-Z][_a-zA-Z0-9]*` and `[A-Z_][a-zA-Z0-9]*`

4.3 (3 marks) `[0-9]{4}-[0-9]{3}-[0-9]{3}` and `[0-9]{4}-[0-9]{3,4}-[0-9]{3,4}`

4.4 (3 marks) `ab?cd` and `ab+cd`

4.5 (3 marks) `[abc]d` and `[^abc]d`

End of Question 4

Question 5 (15 Marks)

Topic: sed and regular expressions

Submission: Place your answers in a text file called `userid_a1_q5.txt` where *userid* is your student number.

Tasks: As we saw in the course, `sed` is used to manipulate text using the matching of regular expressions. Below are 5 `sed` expressions. Assume you have a file called `myfile.txt`. Describe in words what the `sed` expression will do. Use the manual pages for `sed`, and, if necessary, craft a text file with lines which will match the regular expressions, and test the command.

For example, if the `sed` expression is: `sed 's/fox/ox/g' myfile.txt` you see that the `sed` command is looking for the regular expression `fox`, you could create a `myfile.txt` with occurrences of `fox` and test the command.

Your answer in the text file would be something like:

"Q5.1 Expression: sed 's/fox/ox/g' myfile.txt

Answer: The command substitutes line by line all occurrences of 'fox' with 'ox' in myfile.txt"

5.1 (2 marks) `sed '/^$/d' myfile.txt`

5.2 (2 marks) `sed -n '/There/ p' myfile.txt`

5.3 (3 marks) `sed -n 's/[A-Z]/&e/gp' myfile.txt`

5.4 (4 marks) `sed '32,45 s/[()]/g' myfile.txt`

5.5 (4 marks) `sed -E 's/([0-9]+)-([0-9]+)/\2:\1/g' myfile.txt`

End of Question 5

End of Assignment 1

You should have one (1) file per question as indicated.

Combine these into a single .tar file and compress with gzip.

This file should then be uploaded using the Assignment 1 submission link on the [Study Desk](#).

This assignment specification was typeset using \LaTeX