Unix Coursework: Create your own Course Assessment System (CAS)

This coursework will look at using Unix commands and writing Bash scripts to process your own Semester 1 course results ! (Although currently employing fictitious students with fictitious results.)

If you scripts are good … then I might even use them to process the December exam results !

The coursework zip file can be found on Moodle. You can transfer this to Glasgow Anywhere Linux Desktop using a command similar to:

```
scp CAS.zip <GUID_username>@10.224.160.71:
```

(Note the colon at the end of the IP address.)

Once transferred to the Linux Desktop, it can be unzipped using:

```
unzip CAS.zip
```

It will result in a CAS subdirectory containing the following files:

student_list.csv	A list of students GUIDs with first and second names.
progsd_marks.csv	Individual assessment component marks for ProgSD course.
idss_marks.csv	Similar for Introduction to Data Science and Systems course.
rps_marks.csv	Similar for Introduction to Data Science and Systems course.
mlaids_marks.csv	Similar for Machine Learning & AI course.
ecs_marks.csv	Similar for Enterprise Cybersecurity course.

Carry out the following tasks and submit a zip file containing all the requested bash scripts. Marks for each task are given in square brackets. Make sure you comment your scripts appropriately.

Task 1: Getting information about a student or students [4 marks]

An incredibly important Unix utility is called “grep”. Please do “man grep” or “grep --help” (or search the web) to obtain information about this Unix command. (The Unix man pages are comprehensive and authoritative, but are also terse and difficult to read. Most Unix commands also take an argument “--help” which may provide easier to understand help. Sometimes web searching about a Unix command results in easier to understand material but this is less authoritative and reliable.)

A template script has been provided called “get_student_info”

(You may have to carry out the following command to get this to run:
```
chmod +x get_student_info
```
)

You should be able to provide this script with a student first name, surname or GUID and it will

return an information line(s) from the student_list.csv file of students that match. For example:

```
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_info Teng
Teng,Yongming,1234612
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_info 1234617
Dyer,Jami,1234617
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_info Joanne
Charles,Joanne,1234640
Johnston,Joanne,1234667
```

(Commands and output given in **bold** – note that it just needs to return relevant lines of information from the student_list.csv file.)

Write a *single line of shell script code* into the get_student_info script to carry out this functionality.

Task 2: Get student formatted name [4 marks]

Another very useful Unix tool is called “cut”. Investigate this Unix tool and it’s functionality for processing csv files. Also investigate how Unix pipes work when connecting one command to another.

Use the Unix copy command to copy the **get_student_info** file to another file called **get_student_name**. Then edit and extend this file so that it outputs the full name of a student given any of the information above. **Again this should only consist of a single line of code!**

How it should work:

```
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_name Teng
Teng Yongming
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_name 1234617
Dyer Jami
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_name Joanne
Charles Joanne
Johnston Joanne
```

Task 3: Get students marks for a subject [4 marks]

Investigate what the "head" command does. In combination with what you learnt from the previous tasks, implement a **get_student_marks** script that given a GUID and a course name, will produce all the component marks for that student in the following format.

```
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_marks 1234617 progsd
GUID,AE1,AE2,AE3,AE4,tAPP,Lab Exam,Team Project
1234617,92,75,93,38,40,35,75
kb250m@vm-uks-lnx-v-6:~/CAS$
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_student_marks 1234617 idss
GUID,Lab 1,Lab 2,Lab 3,Lab 4,Quizzes,Exam
1234617,84,100,62,100,79,21
```

This now will require a couple of lines of bash script code. You can always experiment how code will work on the command line before writing it into a bash script.

Task 4: Get formatted students marks for a subject [4 marks]

Create a **get_mark_info** script to output the following information given a GUID and subject name.

```
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_mark_info 1234617 progsd
Dyer Jami
AE1 AE2 AE3 AE4 tAPP Lab_Exam Team_Project
92 75 93 38 40 35 75
kb250m@vm-uks-lnx-v-6:~/CAS$
kb250m@vm-uks-lnx-v-6:~/CAS$ ./get_mark_info 1234617 idss
Dyer Jami
Lab1 Lab2 Lab3 Lab4 Quizzes Exam
84 100 62 100 79 21
kb250m@vm-uks-lnx-v-6:~/CAS$
```

This will require you to combine ideas from your previous scripts. Note the list of assessment components does not contain GUID and that these are now separated with spaces rather than commas (investigate the full functionality of the cut command by doing **`cut --help`**).

Task 5: Get formatted students marks for a subject with weights [4 marks]

Let's add in the assessment component weights that are given on line 2.

Investigate the action of the following command to help you get data from line 2:

`head -5 <filename> | tail +5`

(Look up the behaviour of head and tail with **`head --help`** and **`tail --help`** to help understand how this is working.)

Now copy the **get_mark_info** script into **get_mark_info2** script and get it to output the following information.

```
kb250m@vm-uks-lnx-v-4:~/CAS$ ./get_mark_info2 1234617 progsd
Dyer Jami
AE1 AE2 AE3 AE4 tAPP Lab_Exam Team_Project
5 10 10 5 5 40 25
92 75 93 38 40 35 75
kb250m@vm-uks-lnx-v-4:~/CAS$
kb250m@vm-uks-lnx-v-4:~/CAS$ ./get_mark_info2 1234617 idss
Dyer Jami
Lab1 Lab2 Lab3 Lab4 Quizzes Exam
6 6 6 6 6 70
84 100 62 100 79 21
kb250m@vm-uks-lnx-v-4:~/CAS$
```

(This is now showing, in addition to the percentage marks, the weights of each component.)

Task 6: Convert a percentage mark into Glasgow Scale [4 marks]

Write a **convert_percentage** script that converts a percentage into both a Glasgow band and also a 22-point score as given in the table below. You should use either `if` or `case` statements for this.

```
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 98
Band = A1, Score = 22
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 76
Band = A4, Score = 19
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 62
Band = B3, Score = 15
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 51
Band = C3, Score = 12
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 27
Band = F1, Score = 5
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 10
Band = G2, Score = 1
kb250m@vm-uks-lnx-v-4:~/CAS$ ./convert_percentage 1
Band = H, Score = 0
```

Score	Band	Lower Percentage	Upper Percentage
0	H	0	9
1	G2	10	14
2	G1	15	19
3	F3	20	22
4	F2	23	26
5	F1	27	29
6	E3	30	32
7	E2	33	36
8	E1	37	39
9	D3	40	42
10	D2	43	46
11	D1	47	49
12	C3	50	52
13	C2	53	56
14	C1	57	59
15	B3	60	62
16	B2	63	66
17	B1	67	69
18	A5	70	72
19	A4	73	77
20	A3	78	83
21	A2	84	90
22	A1	91	100

Task 7: Get row formatted students marks for a subject [6 marks]

***** These are now challenge stretch tasks and not everyone may be able to do them. *****

Create a **get_mark_info3** script from your **get_mark_info2** script. Read the data into a bash array object and use a loop to output the following formatted information:

```
kb250m@vm-uks-lnx-v-4:~/CAS$ ./get_mark_info3 1234617 progsd
Dyer Jami
---
Name = AE1
Weight = 5
Mark = 92
---
Name = AE2
Weight = 10
Mark = 75
---
Name = AE3
Weight = 10
Mark = 93
---
Name = AE4
Weight = 5
Mark = 38
---
Name = tAPP
Weight = 5
Mark = 40
---
Name = Lab_Exam
Weight = 40
Mark = 35
---
Name = Team_Project
Weight = 25
Mark = 75
---
kb250m@vm-uks-lnx-v-4:~/CAS$
```

Task 8: Get row formatted students bands and scores for a subject [5 marks]

It's time to convert those percentage marks into Glasgow scale ! Create a **get_mark_info4** script based on your previous script. Now add in the code you developed for convert_percentage (ideally wrapped up as a bash function) to create a script that can do this:

kb250m@vm-uks-lnx-v-4:~/CAS$ **./get_mark_info4 1234617 progsd**
Dyer Jami

Name = AE1
Weight = 5
Mark = 92
Band = A1
Score = 22

Name = AE2
Weight = 10
Mark = 75
Band = A4
Score = 19

Name = AE3
Weight = 10
Mark = 93
Band = A1
Score = 22

Name = AE4
Weight = 5
Mark = 38
Band = E1
Score = 8

Name = tAPP
Weight = 5
Mark = 40
Band = D3
Score = 9

Name = Lab_Exam
Weight = 40
Mark = 35
Band = E2
Score = 7

Name = Team_Project
Weight = 25
Mark = 75
Band = A4
Score = 19
---
kb250m@vm-uks-lnx-v-4:~/CAS$

Task 9: Get final score [5 marks]

Finally create a **get_final_mark** script based on your last script which calculates the overall weighted average score for the course. You may need to use the command "bc" (basic calculator) to do the floating point calculation.

kb250m@vm-uks-lnx-v-4:~/CAS$ **./get_final_mark 1234617 progsd**
Dyer Jami

Name = AE1
Weight = 5
Mark = 92
Band = A1
Score = 22

Name = AE2
Weight = 10
Mark = 75
Band = A4
Score = 19

Name = AE3
Weight = 10
Mark = 93
Band = A1
Score = 22

Name = AE4
Weight = 5
Mark = 38
Band = E1
Score = 8

Name = tAPP
Weight = 5
Mark = 40
Band = D3
Score = 9

Name = Lab_Exam
Weight = 40
Mark = 35
Band = E2
Score = 7

Name = Team_Project
Weight = 25
Mark = 75
Band = A4
Score = 19

Average GPA Score = 13.60
kb250m@vm-uks-lnx-v-4:~/CAS$

Please submit a zip file called CAS.zip containing all your scripts to Moodle by the deadline.