Assessment Information/Brief 2023-24

Module title	**Computer Systems Internals and Linux**
CRN	33284
Level	4
Assessment title	**CSIL Assignment Part 1**
Weighting within module	This assessment is worth 50% of the overall module mark.
Submission deadline date and time	**4pm 27th November 2023**

Module Leader/Assessment set by

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How to submit
The deliverable will be handed in using Blackboard in a pdf document.

Assessment task details and instructions
You should answer all the questions in the assignment. There are five tasks. The questions cover work covered in the Linux workshops and CSI tutorials in trimester 1. Write your answers in a Word or similar file and upload as a pdf document. Questions are at the end of this document.

Assessed intended learning outcomes

On successful completion of this assessment, you will be able to:

Knowledge and Understanding
1. A2 - discuss the issues involved in sending data from one computer to another;
2. A3 - discuss issues of computer security and apply different forms of security attack using very simple encryption algorithms.

Transferable Skills and other Attributes
1. B1 - use Unix-like operating systems at command-line level;

2. B4 - express and manipulate numbers using a variety of bases and representations, particularly binary.

Module Aims

Computer-based workshops to cover practical Linux, leading towards assessment of a student's practical ability. Students will be able to replicate the working environment on their own computer and will also be able to access the university system.
To provide detailed low-level coverage of the internal operation of key parts of computers, specifically computer architecture, operating systems, and communications technology;

Performance Descriptors

Percentage Mark	Level of Performance
90-100	Outstanding
80-89	Excellent
70-79	Very Good
60-69	Good
50-59	Fair
40-49	Adequate
30-39	Unsatisfactory
20-29	Poor
10-19	Very Poor
0-9	Extremely Poor

Feedback arrangements

You can expect to receive feedback from three weeks after the submission date with marks posted on Blackboard.

Support arrangements

You can obtain support for this assessment viewing previous tests on Blackboard and the accompanying videos and by emailing me at n.murray@salford.ac.uk

askUS

The University offers a range of support services for students through askUS.

Good Academic Conduct and Academic Misconduct

Students are expected to learn and demonstrate skills associated with good academic conduct (academic integrity). Good academic conduct includes the use of clear and correct referencing of source materials. Here is a link to where you can find out more about the skills which students require http://www.salford.ac.uk/skills-for-learning.
Academic Misconduct is an action which may give you an unfair advantage in your academic work. This includes plagiarism, asking someone else to write your assessment for you or taking notes into an exam. The University takes all forms of academic misconduct seriously. You can find out how to avoid academic misconduct here https://www.salford.ac.uk/skills-for-learning.

Assessment Information

If you have any questions about assessment rules, you can find out more here.

Personal Mitigating Circumstances
If personal mitigating circumstances may have affected your ability to complete this assessment, you can find more information about personal mitigating circumstances procedure here.

Personal Tutor/Student Progression Administrator
If you have any concerns about your studies, contact your Personal Tutor or your Student Progression Administrator.

Assessment Criteria
Explain how students can find information about assessment criteria.

You should look at the assessment criteria to find out what we are specifically looking at during the assessment.

In Year Retrieval Scheme
Your assessment is eligible for in year retrieval. If you are eligible for this scheme, you will be contacted shortly after you obtain your marks.

Reassessment
If you fail your assessment, and are eligible for reassessment, you will need to resubmit in or before July 2024. For students with accepted personal mitigating circumstances for absence/non submission, this will be your replacement assessment attempt.

If you fail the task, you may also resubmit the assignment for in year retrieval, where you can bring your mark up to a pass.

The reassessment task will be the same as the original task.

CSI Task 1.

For all parts of this question, you must show FULL working out in binary.

(a) Choose a number between 51 and 70. This will be numberA. Choose another number between 80 and 120. This will be numberB. Using 2's complement 8-bit binary arithmetic, calculate

numberA – numberB

giving your answer in binary and decimal. ***(5 marks)***

(b) Choose one number from the set { 30, 31, 33, 34, 35, 35, 37, 38, 39 } this is numberC. Choose a number from { 3, 5, 6 } this is numberD. Using 8-bit binary arithmetic, calculate

numberC × numberD

giving your answer in binary and decimal. ***(5 marks)***

(c) Using numberC and numberD from (b), use binary arithmetic to calculate:

numberC.125 + numberD.375

giving your answer in binary and decimal.
Convert numberC.125 into IEEE-754 format.

(5 marks)

(d) Choose a number between 140 and 160 – this is numberE. Convert numberE into hexadecimal. Choose a number between 170 and 255 – this is numberF. Convert numberF into octal. Using 8-bit binary, calculate

numberE OR numberF

Give your answer in binary, octal, decimal and hexadecimal. ***(5 marks)***

CSI Task 2.

(a) Choose a short phrase of between 50-60 characters. You could choose a website headline, song title, etc. Convert this phrase using Caesar shift encryption and a key of 5 to create your ciphertext.

Carry out a cryptanalytic attack to try to work out the decryption key and plaintext.

(10 marks)

(Make sure you show all of your working out and state any assumptions you make. All of the marks are awarded for demonstrating an understanding of the general process of carrying out the attack on Caesar encryption. This means that no marks will be awarded if your security attack is not crytanalytic, even if you get the correct key and the correct plaintext – as you already know them.)

(b) Computer A sends 5 packets of data to computer B using Sliding Windows Flow Control

- The transmission time (time to put on the network) for a packet of data is 1 'time units'
- Transmission time for an acknowledgement is 0 ‘time units’ (they are very small)
- The propagation time (time to travel through network) for any transmission is random (between 3 and 5 ‘time units’, you choose a random time for each packet and acknowledgement sent).
- B's packet processing time is 2. B cannot process multiple packets simultaneously.
- The initial window size is 2

Draw a diagram to show how flow will be controlled while the data is being sent.

(10 marks)

Linux Task 1: Files and Directories (12 marks)

For the following tasks, you need to take images of the screen as you perform the tasks and copy those to your assignment document, e.g.:

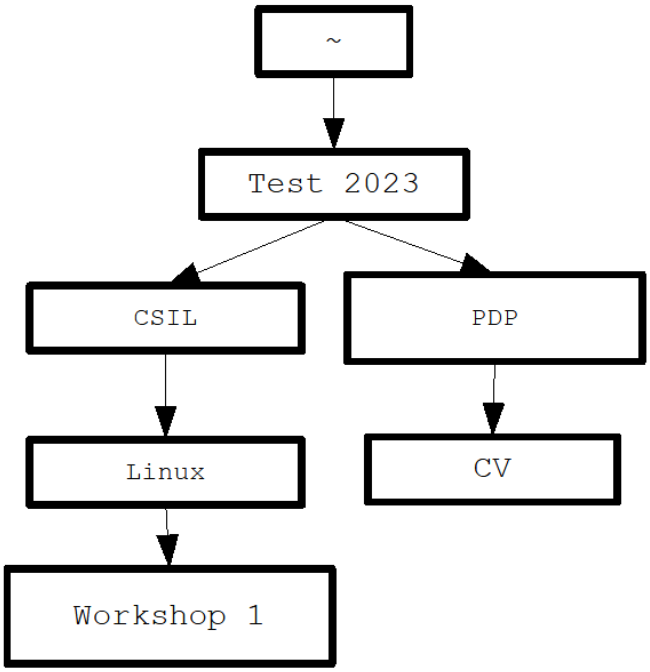
```
norman@asterix:~/example$ mkdir Test
norman@asterix:~/example$ mkdir Test/one
norman@asterix:~/example$ mkdir Test/two
norman@asterix:~/example$ tree
.
└── Test
    ├── one
    └── two

3 directories, 0 files
norman@asterix:~/example$ find
.
./Test
./Test/two
./Test/one
norman@asterix:~/example$
```

Linux users can use the tree command and Mac users can use the find command. (You do not need to do both.)

Create a directory called "`~/Test 2023`" and make it your current working directory.

Task 1.1 (6 marks): Create the following hierarchy of directories/subdirectories and run the tree command to check that all is correct and add images of the commands and tree/find output.



Task 1.2 (3 marks): Use `vi` to make a file called "`grep.txt`" inside the "`CV`" directory. The content of the file should include your full name.

Use `nano` to make a file called "`cv.txt`" inside the "`Linux`" directory. The content of the file should include your favourite module.

Use `cat` to output the contents of your files to the screen and add an image of this to your assignment.

Run the `tree` command to show that your files are in the correct location and add and image of the commands used and the output of tree/find to your assignment output.

Task 1.3 (3 marks): Using absolute filenames (ones that start with a `/`), move the `grep.txt` file into the "`Workshop 1`" directory

`cd` into the "`PDP`" directory. Using relative filenames (`..` notation ones that *don't* start with a `/`), copy the `cv.txt` file into the "`CV`" directory

`cd` into the "`CSIL`" directory. Using relative filenames ones that *don't* start with a `/`), rename the "`Workshop 1`" directory so it is called "`Tutorial 1`"

Run the `tree` command and include images of the commands and the tree/find output. Your final output should also include your command history.

Linux Task 2 & 3 grep and sed (48 marks):

Download a list of the top selling songs (`consoles.csv`) details from Blackboard where this assignment was located.

You can now apply regular expressions to the `consoles.csv` file. Look carefully at this file to make sure you understand its format (and that you downloaded it correctly.)

For each of the problems below, you need to use `grep` (do not use `cut` or `awk`) to develop the actual regular expression.

For your grep answers you need to include the command and the output of the command when it is run. You can do this by running the query and taking an image. For example:

Question:
2.0 Find lines with occurrences of double 'e'.

```
norman@asterix:~/T1test$ cat top50.txt | grep -E "ee"
3,Bohemian Rhapsody,Queen,EMI,Oct-75,1,2540604
20,Anything Is Possible / Evergreen,Will Young,S,Feb-02,1,1795213
30,Three Lions,Baddiel & Skinner & The Lightning Seeds,Epic,Jun-96,1,1577260
44,I Gotta Feeling,The Black Eyed Peas,Interscope,Sep-09,1,1477778
46,Killing Me Softly,Fugees,Columbia,Jun-96,1,1457641
48,Come On Eileen,Dexys Midnight Runners,Mercury Records,Jun-82,1,1446087
```

For the sed problems below, you need to include the sed command and the first 10 lines of the output of the sed command. For example:

Question:
3.0 Change the first instance of an i to a ?

```
norman@asterix:~/T1test$ cat top50.txt | sed -r "s/i/?/" | head -n 10
S?ngle,Artist,Record label,Released,Chart,Traditional sales peak,
Someth?ng About the Way You Look Tonight / Candle in the Wind 1997,Elton John,Rocket,Sep-97,1,
4935426
Do They Know It's Chr?stmas?,Band Aid,Mercury,Nov-84,1,3802066
Bohem?an Rhapsody,Queen,EMI,Oct-75,1,2540604
Mull of K?ntyre / Girls' School,Wings,Capitol,Nov-77,1,2086183
You're the One That I Want,John Travolta and Ol?via Newton-John,RSO,May-78,1,2072035
Relax,Frank?e Goes to Hollywood,ZTT,Jan-84,1,2066230
R?vers of Babylon / Brown Girl in the Ring,Boney M.,Atlantic/Hansa,Apr-78,1,2032656
...Baby One More T?me,Britney Spears,Jive,Feb-99,1,2000000
Happy,Pharrell W?lliams,Columbia,Nov-13,1,1930000
```

Marking scheme (questions out of 4) Make sure you have a go at all the questions.

- 0 means "No attempt."
- 1 means "I can see what you are trying to do."
- 2 means "A reasonable approach that shows you're on the right lines."
- 3 means "Does (or could) match a couple of lines too many or too few, but nearly there."
- 4 means "Perfect."

Task 2 – These questions needs to be answered using `grep` (32 marks – 4 marks per part):

2.1: Find the "famiclone" consoles?

2.2: Find all lines with words with 4 consecutive consonants.

2.3: How many Hybrid consoles have been released?

2.4: Find all consoles with one word names.

2.5: Find consoles whose name is at least 25 characters.

2.6: What console names end in a number?

2.7: Find the consoles that have sold 100 million or more.

2.8: What year had the most consoles released?

Task 3 – `sed` (16 marks – 4 marks per part):

Please do the questions with 'stream-based editing' (`cat filename | sed -r …`)

Output needs to include the command and the first 10 lines of output.

3.1: Change all occurrences of 'Sony' to 'Better than XBox'.

3.2: Change all commas "," to colons ":".

3.3: Change all consoles years from the 20th century (19xx) to "antique".

3.4: With lines that contain "Hybrid" append the line "Runs better when plugged into a TV."