Systems Software

Continuous Assessment 2 (15%)

Due Date: Friday 10th December 2021 @ 23.59

Introduction:

Following the successful deployment of Phase 1 the owner of the manufacturing company has come back and asked for another solution to be added to their Linux server to control file transfers to manage their department head daily report submission.

The company has a couple of legacy systems that are very specifically linked to the hardware on the production line and is forced to pass operational data and reports over the network each night.

The company has three main departments:

- Manufacturing
- Distribution

Issues seem to be arising as to who has modified or accessed files (operational data) on the server. Every night the 3 departments must transfer their operational data to a shared folder. Issues and inconsistences have arisen with untrackable changes regarding files disappearing etc. A new solution is required to stop departments directly accessing files and directories on the central server. The CTO doesn't want to introduce FTP and wants a custom solution to solve this problem. For security reasons the Server will now site behind a firewall and will not be publically visible. The shared folder approach must go and a new solution is needed. Following a meeting with our lead developer it was decided that a **Multithreaded Client Server Socket program** would a viable solution for this problem. The departments would no longer need direct access to the Server and a client program can be installed on workstations to manage the transfer process. With the client program a department manager can use the client program to **transfer a new data file to the server**. The users id should be used to restrict access to the folders on the Server. Any file transferred from the client to the server must be attributed to the user (ie. The user should be the file owner). Certain users will be part of some groups and not others (ie. Manufacturing_User is in the Manufacturing department and has access to the Manufacturing folder on the Server). For this version files only need to be transferred from the client to the server.

What the CTO wants:

The CTO has offered a list of desired functionality for the updated reporting management model:

1. No direct access to the Server folders.
2. Multiple users must be able to transfer files at the same time.
3. Files transferred must be attributed to the transfer user.
4. A specific user will have access to either the (Manufacturing/Distribution) folders.
5. If synchronisation is an issue use a C Mutex Lock for Linux Thread Synchronization.

Project Requirements:

a. Create a Server Socket program to run on the main Server.
b. Create a Client program to connect to the server socket program.
c. The system must be capable of handling multiple clients and transfers simultaneously.
d. Transfer restrictions should be controlled using Real and Effective ID's functionality.
e. Create 3 user accounts and link these to three groups (Manufacturing / Distribution)
f. The files transferred should be attributed to the transfer user. The file transferred to the server should show the transfer owner as its owner.
g. The client must take a file name and path via console and transfer this to the server to be stored. The following directories are where files can be transferred to:
    - Manufacturing
    - Distribution

   These folders will be associated with the groups described in requirement (e).
h. The server must inform the client if the transfer was successful or not.

General Assumptions:

1. The solution for the problem stated above can be developed on a single machine.
2. The client will only transfer one file at a time.

Deliverables:

20%	Project Report (explaining the approach taken and the operation of the application etc.)
75%	C Program Solution (all code and supporting docs uploaded to Brightspace)
5%	**5 minute** video screen recording verbally describing and **demonstrating** the **operation of your solution**. The video must address all the project requirements listed above. The **primary focus** of the video is to **show the operation** of all functionality contained within the solution

Note: Students may be required to demonstrate their project operating an online video sessions. Non-compliance with this request will result in a zero grade.

Grading Rubric:

	> 70%	60 to 69%	50 to 59%	40 to 49%	< 40%
Client Program 15%	No errors, program operates correctly and meets the functional specification. Solution implemented correctly and fit for purpose in a commercial environment.	Minor details of the program specification are violated, program functions incorrectly in certain aspects.	Minor details of the program specification are violated, program functions incorrectly in certain aspects and/or omissions have occurred	Major details of the program specification are violated, program functions to meet some parts of the problem brief.	The program doesn't function or there are major flaws with the code solution.
Server Program 15%	No errors, program operates correctly and meets the functional specification. Solution implemented correctly and fit for purpose in a commercial environment.	Minor details of the program specification are violated, program functions incorrectly in certain aspects.	Minor details of the program specification are violated, program functions incorrectly in certain aspects and/or omissions have occurred	Major details of the program specification are violated, program functions to meet some parts of the problem brief.	The program doesn't function or there are major flaws with the code solution.
Multithreaded 10%	No errors, program operates correctly and meets the functional specification. Solution implemented correctly and fit for purpose in a commercial environment.	Minor details of the program specification are violated, program functions incorrectly in certain aspects.	Minor details of the program specification are violated, program functions incorrectly in certain aspects and/or omissions have occurred	Major details of the program specification are violated, program functions to meet some parts of the problem brief.	The program doesn't function or there are major flaws with the code solution.
Owners, Permissions and File Transfer 25%	No errors, program operates correctly and meets the functional specification. Solution implemented correctly and fit for purpose in a commercial environment.	Minor details of the program specification are violated, program functions incorrectly in certain aspects.	Minor details of the program specification are violated, program functions incorrectly in certain aspects and/or omissions have occurred	Major details of the program specification are violated, program functions to meet some parts of the problem brief.	The program doesn't function or there are major flaws with the code solution.
Synchronization 10%	No errors, program operates correctly and meets the functional specification. Solution implemented correctly and fit for purpose in a commercial environment.	Minor details of the program specification are violated, program functions incorrectly in certain aspects.	Minor details of the program specification are violated, program functions incorrectly in certain aspects and/or omissions have occurred	Major details of the program specification are violated, program functions to meet some parts of the problem brief.	The program doesn't function or there are major flaws with the code solution.
Documentation (20%)	The documentation is well written and clearly explains all architectural choices and functionality of the system	The documentation is well written. Could have explained the code and the principle in more detail.	The documentation is acceptable. Could have explained the code and the principle in more detail. Omissions of content or misinterpretation of the principle demonstrated.	The documentation is minimal or not focused on the problem description. Could have explained the code and the principle in more detail. Omissions of content or misinterpretation of the principles demonstrated.	The documentation is simply comments embedded in the code and does explain the code or the principle. Minimal attempt in all aspects.
Exemplar Video (5%)	Video is well prepared and shows and describes the exact operation of the solution. Complex aspects of the solution have been described in good detail.	Video is well prepared and shows and describes the exact operation of the solution.	The video is acceptable. Could have explained the code and the solution in more detail. Minor omissions of content or detail in the video demonstration.	The video is minimal or not focused on the problem description. Could have explained the code and the solution offered in more detail. Omissions of content or detail in the video demonstration.	Video doesn't capture the operation of the solution and/or doesn't offer a verbal description of the functionality of the system from a code perspective.