PLL LAB 2020 | PROBLEM 2

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Why concurrency is important here?

Role of concurrency in the system is the ability to perform different parts or units of a program to be executed out of order or in partial order without affecting the final outcome.

In case of Problem 2, we do need concurrency in cases like say TA1, TA2 and CC all or any two of them wants to read a file say Stud_Info at the same time. If there is no concurrency only one of them can read the file and the other will have to wait until the first one completes reading. So, concurrency is needed.

What are the shared resources?

The shared resources in this problem is all the three files naming Stud_Info, Sorted_Name, Sorted_Roll.

What may happen if synchronization is not taken care of? Give examples.

Let's assume we do not have synchronization, now say CC wants to change the marks of a certain Roll No – X and at the same time TA1 wants to read the marks of Roll No – X , if they are not synchronized it may happen that CC does the change after and TA1 reads the old value and decision is made on that, which will create issues.

OR

Say two TA's wants to change the marks of the same student at the same time, if there is no synchronization, then this will result in race condition and thus false changes might get done, i.e. suppose marks of Roll No X was 17 and TA1 wants to add 7 marks and TA2 wants to add 4 marks to it. If there is no synchronization and both these instructions come at the same time, both processes will read 17 as the marks of Roll No X, TA1 will then add 7 and want to write 24 as the final marks but TA2 will want to write 21 marks, depending on the operation which occurs last marks can be either 21 or 24, of which none is correct.

How you handled concurrency and synchronization?

In this question concurrency and synchronization is handled by using READ/WRITE locks on the files for process level synchronization.

WRITE: To update the data by any of the TA's or CC we need to have write lock on all the three files as with change in Stud_Info the other files Sorted_Name and Sorted_Roll will change as well. So, after acquiring the write locks on all these files update is done and then write lock is lifted, so as to perform read or write by other processes. During write lock all read/write to the files by any other processes is suspended before the lock is lifted.

READ: To read the data by any of the TA's or CC they need to acquire read lock on to the file they want to read. After the lock is acquired, they can read the contents of the file displayed in the terminal. Multiple processes can read a single or multiple files at the same time. But after a write lock is acquired by a process, no other process can have read lock until the writing process is done.