DATA SYSTEMS PROJECT -3 PART -2

Group - 45

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Video Link -

https://iiitaphyd-my.sharepoint.com/:v:/g/personal/arun_padakanti_students_iiit_ac_in/ERF_ASBPnjFNhQoQaxRIrR0BkdJGNKn019pyPb-K_V72SA

Assumptions -

1. Every table has only one page.
2. After compiling and running the program in two terminals simultaneously, we try to make transactions in each terminal on the same table.

OPERATIONS ON TRANSACTION CONCURRENCY (CONFLICTS)

1. **Simultaneous Read (R-R Operation)**

   No issues will arise in case of simultaneous read as the file configuration does not change while doing simultaneous reads so issues will arise.

2. **First Read Then Write (R-W Conflict)**

   This happens when a transaction is performing read and another transaction is trying to write into the same database. This will raise the problem of the Unrepeatable Read Problem.

3. **First Write Then read (W-R Conflict)**

   This happens when a transaction is performing writes into a database and another transaction is trying to read from the same database simultaneously. Thus the second transaction is unable to get the correct value from the database thus this issue also affects the consistency of the database and is more concerning and popularly known as Dirty Read Problem (W-R Conflict).

4. **Simultaneous Write (W-W Conflict)**

   This happens when a transaction is writing into a database and another transaction also tries to write into the same database. Because two operations of update are done and if not done sequentially the problem of updates loss can occur easily. This problem is popularly known as the Lost Update Problem (WW Conflict).

APPROACH

1. We used a lock system to lock a single file so that there should be no conflicts. There will be a single lock for each different file.
2. A single lock file will be created for each file in the temp folder.
3. The lock stores a single value which can be either a positive integer or negative integer or zero.
    a. Zero - indicates the file is available for anyone to use
    b. Positive integer - indicates the number of transactions which are currently reading this particular file ex- if the value is 2 - itr means that there are two terminals which are reading this file.
    c. Negative integer - it can be only -1, because there can be only one write transaction so whenever it is -1, it indicates that the table is being used for another terminal for writing.
4. We have used different update operations like multiply, add , subtract on columns to show the write operation.
5. We have changed the code in printing the tables and the updates to show that the transactions cannot be made simultaneously. For this we have used sleep operation wherever required in the code.
6. For different operations of read, we are incrementing the value in the lock file as and when required, similarly we are making the value of the lock file as -1 when we are doing a write operation.
7. For performing any operation we first check the lock variable and perform the operation only when the file is available.
8. For read operation it checks for the lock variable and waits until its zero or more, similarly for the write operation, it waits for the lock variable to become zero and then it performs the write operation and updates the lock variable.