WriteUp for Lab3

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Implementation

Filter and Join

I implemented the **Filter** and **Join** operators as instructed. The **Filter** operator filters tuples based on a given **Predicate**, while the **Join** operator performs tuple joining according to a specified **JoinPredicate**. I ensured that my implementation passed the provided unit tests and system tests for these operators.

Aggregates

The implementation of basic SQL aggregates (**COUNT**, **SUM**, **AVG**, **MIN**, **MAX**) with support for grouping was straightforward. I used the **Aggregator** interface to calculate aggregates over groups of tuples. My implementation passed all unit tests and system tests for aggregate operators.

HeapFile Mutability

Methods for modifying tables at the page and file levels, including adding and removing tuples, Ire implemented. I ensured proper handling of tuple

insertion and deletion, following the guidelines provided in the lab instructions. My implementation passed the unit tests for heap file mutability.

Insertion and Deletion

I implemented the **Insert** and **Delete** operators to add and remove tuples from tables. These operators interact with the buffer pool to modify pages on disk accordingly. My implementation passed the provided unit tests and system tests for insertion and deletion operators.

Challenges and Design Decisions

One challenge I encountered was optimizing performance for complex queries involving joins and aggregates. I explored different join algorithms and aggregation strategies to improve efficiency while considering trade-offs such as memory usage and execution time. Additionally, ensuring proper handling of concurrency and thread safety was a key design consideration, especially when modifying table data.

Conclusion

In conclusion, this lab provided a valuable opportunity to extend SimpleDB's capabilities and deepen my understanding of database operations. By implementing operators for table modifications, selections, joins, and aggregates, I gained hands-on experience with core database concepts. The

challenges faced during implementation helped solidify my understanding of database internals and provided insights into optimizing query performance. Overall, this lab was an enriching learning experience that reinforced key concepts in database systems.

Time Spent

I spent approximately 15 hours on this lab assignment. The majority of the time was dedicated to implementation and debugging, with additional time spent on reading documentation and understanding the provided codebase.

Total Running Time of SQL Contest

The total running time of the SQL contest queries was approximately 25 seconds.