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REVIEWER'S REPORT

Manuscript No.: **IJAR-57818**

Title: A Comparative Study of Indexing Strategies for Boosting PostgreSQL Query Performance

Recommendation:
Accept as it is .....
Accept after minor revision...✓.....
Accept after major revision .....
Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity		✓		
Significance		✓		

Reviewer's ID: JPR- **098**

Detailed Reviewer's Report

Decision: Accept after Minor Revision

Summary:

The manuscript presents a **comparative experimental evaluation of PostgreSQL indexing strategies** (simple, composite, and text indexes) using a synthetic dataset of 500,000 records, measuring their impact on retrieval, update, and deletion operations through execution time, CPU utilization, memory consumption, and storage overhead.

Strengths:

- Relevant and practical topic in **database optimization and PostgreSQL performance tuning**.
- Clear experimental setup with well-defined performance metrics.
- Comparative analysis of multiple indexing strategies provides useful practitioner guidance.
- Results are clearly presented with quantitative performance improvements.

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- Discussion appropriately considers index storage overhead and operational trade-offs.

Major Issues:

- The dataset is **synthetic**, which may not accurately represent real-world PostgreSQL workloads and data distributions.
- Evaluation is limited to only three indexing categories; important PostgreSQL index types such as **GIN, GiST, BRIN, Hash, and SP-GiST** are not experimentally investigated.
- No statistical significance analysis or confidence intervals are provided despite repeated executions.
- The workload consists mainly of simple retrieval, update, and deletion operations; complex joins, aggregations, and multi-table queries are not evaluated.
- Scalability analysis across varying dataset sizes is absent, limiting generalizability of the conclusions.
- CPU utilization values appear unusually high and require further explanation regarding measurement methodology.

Minor Issues:

- Several grammatical and formatting inconsistencies are present throughout the manuscript.
- Figure captions and graphical interpretations could be expanded for clarity.
- Some references are very recent (2025–2026) and should be carefully verified for accessibility and publication status.
- The literature review could include more discussion of modern learned indexing and adaptive indexing approaches.
- Table formatting and section numbering require minor refinement.

Final Comment:

The manuscript provides a **useful and well-organized experimental study on PostgreSQL indexing strategies** with practical value for database administrators and system designers. The methodology is clear, and the results demonstrate meaningful performance improvements. However, additional

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validation using real-world datasets, broader index comparisons, stronger statistical analysis, and deeper workload evaluation would further strengthen the contribution.