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**Topic title: The comparative study of indexing techniques in different database systems, analyzing their performance for various query types.**

The aim of this project is to conduct a comprehensive comparative analysis of indexing techniques in different database systems. Various indexing methods employed by popular database systems will be analyzed and evaluated, such as B-trees, hash-based indexing, bitmap indexing, and others. The objective is to understand the strengths and weaknesses of each technique, their impact on query performance, and their suitability for different types of data and workloads.

Currently, different database systems implement various indexing techniques based on their design and requirements. While B-trees are widely used and provide efficient range queries, they may suffer from performance issues with skewed data distributions. Hash-based indexing can provide fast equality searches but may struggle with range queries. Bitmap indexing is effective for low-cardinality attributes but can be memory-intensive. Each indexing technique has its own trade-offs and limitations, and selecting the appropriate method requires careful consideration of the dataset characteristics and query patterns.

The idea is to compare the performance and characteristics of different indexing techniques by designing and implementing experiments. By systematically evaluating various indexing methods on different datasets and query workloads, the aim is to provide insights into their strengths and weaknesses. Furthermore, I plan to explore potential improvements and optimizations to existing indexing techniques based on the findings.

The findings of this study will benefit database administrators, software developers, researchers and etc. Database administrators can utilize the insights gained to optimize indexing strategies in their systems and improve overall performance. Software developers can make informed decisions when choosing indexing techniques for their applications, ensuring efficient data retrieval. Furthermore, researchers can use this study as a foundation for further advancements in indexing techniques and database optimization.

Some potential risks include the availability of resources and time constraints. The project requires access to the selected database systems and the necessary hardware infrastructure to conduct experiments. Additionally, completing the project within the 11-week timeframe may pose a challenge, considering the complexity of the analysis and potential unforeseen obstacles.

The project will primarily rely on free versions of PostgreSQL and NoSQL DBMSs. The timeline for the project is set to be completed within 11 weeks, taking into account the research, experimentation, analysis, presentation and report writing phases.

By the midterm, I expect to have completed the literature review, finalized the experimental design, and conducted initial experiments. I will have gathered data on the performance of the indexing techniques for different query types and workloads. This will allow to assess any preliminary trends or observations and make adjustments if necessary.

For the final demonstration, I will present the comprehensive analysis of the indexing techniques based on the experiments conducted. The strengths and weaknesses of each technique will be highlighted, I will provide insights into the performance trade-offs, and discuss the suitability for different data types and workloads. Additionally, I hope to propose potential improvements and optimizations based on the findings. The final demonstration will showcase the value and implications of the study for the field of database systems.