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COMP 8167: ADVANCED DATABASE TOPICS
PROJECT PRESENTATION

Query Optimization of Employee Performance in Supply Chain Management System

TEAM MEMBERS

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PROJECT OUTLINE

KEY DISCUSSION POINTS

- Problem Statement
- Motivation
- Background Study/Related Work
- Solution Statement
- Project Demo
- Conclusion & Future Scope
- References

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PROBLEM STATEMENT ?

- The management of the flow of goods and services has been largely transformed by automation softwares.
- However, over the years there has been a persisting mismatch between supply and demand globally, leading to an imbalance in a company's inventory management.
- As a result, small-scale businesses need to retreive employee's work record through Query Optimization techniques to enhance overall production rate of resources.

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MOTIVATION 

❖ Entrepreneurship in Canada is considered as one of the driving forces behind innovation productivity, job creation, and economic progress.

❖ As the league of entrepreneurship is challenging, emerging businesses must deal with volatile markets, untested technologies, & inconsistencies in organizational processes.

❖ Small-scale businesses are signficantly affected due to Covid -19 and require an efficient solution to operate at a profitable level.

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BACKGROUND STUDY

The following concepts were briefly examined from the list of research papers

Citation	Concepts
Thalheim, Bernhard. (1993). Database Design Strategies. 267-285. 10.1007/978-3-7091-2704-9_14.	Database Design Strategies
Khan, M., & Khan, M. N. A. (2013). Exploring query optimization techniques in relational databases. International Journal of Database Theory and Application, 6(3), 11-20.	Query Optimization Techniques & Indexing
Zheng, J. G. (2017). Data visualization for business intelligence. Global business intelligence, 67-82.	Data Visualization using BI Tools

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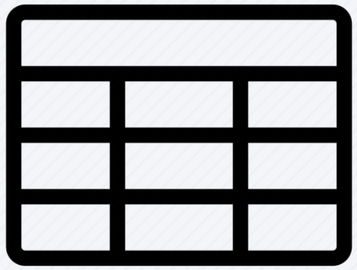
SOLUTION STATEMENT



DATASET

CUSTOM DATASET USING PYTHON SCRIPT

DATABASE

DATABASE CREATION (MS-SQL SERVER) DATABASE OPERATIONS (IMPORT, EXPORT, etc)

QUERY OPTIMIZATION

RETREIVE EMPLOYEE RECORD, ANALYSIS OF SQL EXECUTION PLAN, SQL QUERY TUNING, INDEXING

USER INTERFACE

DISPLAY QUERIED RESULTS & GENERATE REPORT

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PROJECT DEMO 

DATABASE

1. Dataset Creation
2. DB Design
3. Bulk Data Insert
4. View Creation - Work_Efficiency
5. SQL Query Execution Plan
6. SQL Query Tuning - Like Vs Equals

ANALYSIS

1. DB Connection & Relationships
2. Heat Map Analysis - Explain Data
3. Generating Email Report
4. Feedback for each employee - Calculated Field

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PROJECT DEMO

a. Before Index

SELECT

Estimated operator progress: 100%

Actual Number of Rows for All Executions	10
Cached plan size	120 KB
Degree of Parallelism	1
Estimated Operator Cost	0 (0%)
Estimated Subtree Cost	0.326598
Memory Grant	2720 KB
Estimated Number of Rows for All Executions	0
Estimated Number of Rows Per Execution	1

Statement

select * from Employee_Efficiency order by Employee_ID

b. After Index

SELECT

Estimated operator progress: 100%

Actual Number of Rows for All Executions	10
Cached plan size	120 KB
Degree of Parallelism	1
Estimated Operator Cost	0 (0%)
Estimated Subtree Cost	0.118313
Memory Grant	2720 KB
Estimated Number of Rows for All Executions	0
Estimated Number of Rows Per Execution	1

Statement

select * from Employee_Efficiency order by Employee_ID

c. Heat Map Analysis

To: shankarl@uwindsor.ca;

Employee Performance Report for March 2019 - Reg

Hello Mr. Lakshmi Narayanan Shankar,

Hope you are doing well. Please find your performance report below.

Item : Soups
Average Product per hour : 12.343663594469
Average Successful Produced Quantity(Percentage) : 72.9926646758606
Location : Alberta
Comments : Below Average. Needs Improvement!

Feel free to reach out if you have any clarifications. Have a great day!

Regards,
Regional Manager - Alberta

d. Employee Peformance - Email Report

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CONCLUSION & FUTURE WORK

In conclusion,

- The project's goal to demonstrate the impact of query optimization on employee performance in the SCM DB was successfully analyzed.
- Heat maps were utilized to visualize the data, and the employee received autogenerated tailored feedback in the form of an email.

In future,

- Query tuning can be used to optimize queries which will improve the performance of the DB using transformation rules (Relation Algebra, eg: Nested Queries), multi-level indexing on large datasets can be used to fetch faster results, Query Store and Event Sessions can be created to monitor query statistics and performance.
- Supply chain analysis can be conducted on complex industrial datasets collected in real time that may be utilized to provide precise pragmatic outcomes.
- Database design may be made flexible to handle semi-structured and unstructured data (which is more common in the modern era) for query processing.
- Advanced tableau features, such as data blending, predictive analysis, and so on, may be explored in more detail to provide better meaningful insights on the dataset.

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REFERENCES

[1] Small Business Tourism and Marketplace Services. (2021, December 15). Key Small Business Statistics - SME research and statistics. Statistics Canada. https://www.ic.gc.ca/eic/site/061.nsf/eng/h_02689.html

[2] Overview of the food and beverage processing industry - agriculture.canada.ca. (2021, October 28). Agriculture Canada. https://agriculture.canada.ca/en/canadas-agriculture-sectors/food-processing-industry/overview-food-and-beverage-processing-industry

[3] Yevtushenko, A. (2019, April 24). Supercharge Your SQL Queries for Production Databases. Sisense. https://www.sisense.com/blog/8-ways-fine-tune-sql-queries-production-databases

[4] Plinere, Darya & Borisov, Arkady. (2015). Case Study on Inventory Management Improvement. Information Technology and Management Science. 18. 10.1515/itms-2015-0014.

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THANK YOU :)