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Today
SQL Query Performance Tip
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Yesterday

Performance tuning of sql querys:
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5. Store precomputed sql query
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LInk: https://medium.com/learning-sql/12-tips-for-optimizing-sql-queries-for-faster-performance-8c6c092d7af1

1. Minimize the use of wildcard characters:
ex.SELECT * FROM customers WHERE last_name_city LIKE 'P%';

2. Increase Query Performance with Indexes:
--->To enhance SQL queries, you can create indexes on the columns that are frequently used in the WHERE,
JOIN, and ORDER BY clauses. However, creating too many indexes can slow down data modification operations
such as INSERT, UPDATE, and DELETE.
--->Consider the trade-offs between read performance and write performance when deciding which columns
to index and which types of indexes to use.

ex.
CREATE INDEX idx_orders_customer_number ON orders (customer_id);

3. Use appropriate data types:
--->Using appropriate data types for columns in a database can significantly improve query performance.
For example, using an integer data type for a column that contains numeric values can make queries run
faster than using a text data type. Using the correct data type also ensures data integrity and can prevent
data conversion errors.

4. Avoid subqueries:
--->Subqueries can slow down query performance, especially when used in the WHERE or HAVING clauses.
It is important to avoid subqueries whenever possible and to use JOINs or other techniques instead.

ex.SELECT * FROM customers WHERE customer_id IN (SELECT customer_id FROM orders WHERE order_date >= DATEADD(day, -30, GETDATE()));

5. Use LIMIT or TOP to limit the number of rows returned:
--->The LIMIT or TOP clause must be used to restrict the number of rows returned in SQL queries. There will be fewer data to process and return as a result.

6. Avoid using SELECT *
--->Using the SELECT * statement can slow down query performance because it returns all columns in a table, including those that are not needed for the query. To optimize SQL queries, it is important to only select the columns that are needed for the query.

7. Use EXISTS instead of IN
   --->A value is compared with a list of values returned by a subquery using the IN operator. However, using IN can slow down query performance because it requires the database to perform a full table scan on the subquery. To optimize SQL queries, you can use the EXISTS operator instead of IN.

   don't: SELECT * FROM customers WHERE customer_id IN (SELECT customer_id FROM orders WHERE order_date >= DATEADD(day, -30, GETDATE()));

   do:SELECT * FROM customers c WHERE EXISTS (SELECT 1 FROM orders o WHERE o.customer_id = c.customer_id AND o.order_date >= DATEADD(day, -30, GETDATE()));

8. Use GROUP BY to group data
   --->It is used to group rows based on one or more columns. This can be useful for summarizing data or performing aggregate functions on groups of data. However, using GROUP BY can slow down query performance if it is used unnecessarily. To optimize SQL queries, you should only use GROUP BY when it is necessary.

   don't: SELECT customer_id, COUNT(*) as order_count FROM orders GROUP BY customer_id;
   do: SELECT c.customer_id, c.first_name, c.last_name, o.order_count FROM customers c JOIN (SELECT customer_id, COUNT(*) as order_count FROM orders GROUP BY customer_id) o ON c.customer_id = o.customer_id;

9. Use stored procedures
   --->Stored procedures are precompiled SQL statements that are stored in the database. They can be called from an application or directly from a SQL query. Using stored procedures can improve query performance by reducing the amount of data that is sent between the database and the application, and by reducing the amount of time required to compile and execute the SQL statements.

10. Optimize the database design
   --->Optimizing the database design can also improve query performance. This includes ensuring that tables are properly normalized and that indexes are used effectively. In addition, it is important to ensure that the database is properly tuned for the expected workload and that it is configured for the appropriate level of concurrency.

11. Use query optimization tools
   --->There are a variety of query optimization tools available that can help identify performance issues in SQL queries. These tools can provide recommendations for improving query performance, such as creating indexes, rewriting queries, or optimizing the database design. Some popular query optimization tools include Microsoft SQL Server Query Optimizer, Oracle SQL Developer, and MySQL Query Optimizer.

12. Monitor query performance
   --->Monitoring query performance is an important step in optimizing SQL queries. By monitoring query performance, it is possible to identify performance issues and make appropriate adjustments. This can include optimizing indexes, rewriting queries, or adjusting the database design. For tracking query performance, a number of tools are available, including SQL Server Profiler, Oracle Enterprise Manager, and MySQL Enterprise Monitor.

SQL Performance Tuning Tools
   Here are some tools for SQL Performance Tuning:

   SQL Sentry (SolarWinds)
   SQL Doctor (IDERA)
   Profiler (Microsoft)
   SQL Defrag Manager (IDERA)
   DB Optimizer (IDERA)
   SQL Check (IDERA)
   Foglight for SQL Server (Quest Software)
   SQL Index Manager (Red Gate Software)

Qure Optimizer (DBSophic)
DBArtisan® (IDERA)
dbWatch Control Center (dbWatch)
Plan Explorer (SolarWinds / SentryOne)
SQL Diagnostic Manager (IDERA)
Database Performance Analyzer (SolarWinds)
Applications Manager (ManageEngine)
NaviCat for SQL Server (NaviCat)

rewrite this with examples

Sure! Here is a detailed guide on SQL query performance tuning with examples:

SQL Query Performance Tuning

1. Increase Query Performance with Indexes

Indexes can enhance SQL queries by allowing the database to locate rows more quickly. Create indexes on columns frequently used in the WHERE, JOIN, and ORDER BY clauses.

Example:

```sql
CREATE INDEX idx_orders_customer_id ON orders (customer_id);
```

Note: Creating too many indexes can slow down data modification operations like INSERT, UPDATE, and DELETE. Balance the trade-offs between read and write performance.

2. Avoid using SELECT *

Using `SELECT *` returns all columns in a table, which can slow down query performance. Only select the columns you need.

Example:

```sql
-- Don't
SELECT * FROM customers;

-- Do
SELECT first_name, last_name, email FROM customers;
```

3. Use Stored Procedures

Stored procedures are precompiled SQL statements stored in the database. They reduce data sent between the database and the application and improve query performance.

Example:

```sql
CREATE PROCEDURE GetCustomerOrders
    @CustomerId INT
AS
BEGIN
    SELECT order_id, order_date, amount
    FROM orders
    WHERE customer_id = @CustomerId;
END;
```

4. Use LIMIT or TOP to limit the number of rows returned

Limiting the number of rows returned can significantly improve performance by reducing the amount of data processed.

Example:

```sql
```

```sql
SELECT * FROM orders
ORDER BY order_date DESC
LIMIT 10; -- For MySQL and PostgreSQL

SELECT TOP 10 * FROM orders
ORDER BY order_date DESC; -- For SQL Server
```

5. Store Precomputed SQL Query

Precompute and store results of complex calculations that don't change often. Use these precomputed results in your queries.

6. Optimize the Database Design (Denormalization)

Denormalization can improve performance by reducing the need for complex joins. However, it can lead to data redundancy.

Example:

sql Copy code

```sql
-- Normalized
CREATE TABLE customers (
    customer_id INT PRIMARY KEY,
    first_name VARCHAR(50),
    last_name VARCHAR(50)
);

CREATE TABLE orders (
    order_id INT PRIMARY KEY,
    customer_id INT,
    order_date DATE,
    FOREIGN KEY (customer_id) REFERENCES customers(customer_id)
);

-- Denormalized
CREATE TABLE customer_orders (
    order_id INT PRIMARY KEY,
    customer_id INT,
    first_name VARCHAR(50),
    last_name VARCHAR(50),
    order_date DATE
);
```

7. Use Query Optimization Tools

Tools like SQL Sentry, SQL Doctor, and MySQL Query Optimizer can identify performance issues and suggest improvements.

8. Monitor Query Performance

Use tools like SQL Server Profiler, Oracle Enterprise Manager, or MySQL Enterprise Monitor to track query performance and identify bottlenecks.

9. Minimize the Use of Wildcard Characters

Using wildcard characters, especially at the beginning of a pattern, can lead to full table scans.

Example:

sql Copy code

```sql
-- Don't
SELECT * FROM customers WHERE last_name LIKE '%son';

-- Do
SELECT * FROM customers WHERE last_name LIKE 'P%';
```

10. Use Appropriate Data Types

Use appropriate data types to improve query performance and ensure data integrity.

Example:

sql Copy code

```sql
-- Don't
CREATE TABLE orders (
    order_id VARCHAR(10),
    order_date VARCHAR(10)
);

-- Do
CREATE TABLE orders (
    order_id INT,
    order_date DATE
);
```

11. Avoid Subqueries

Subqueries can slow down performance. Use JOINs or other techniques instead.

Example:

sql Copy code

```sql
-- Don't
SELECT * FROM customers WHERE customer_id IN (SELECT customer_id FROM orders WHERE

-- Do
SELECT c.* FROM customers c
JOIN orders o ON c.customer_id = o.customer_id
WHERE o.order_date >= DATEADD(day, -30, GETDATE());
```

12. Use EXISTS instead of IN

Using EXISTS can be more efficient than IN for checking the existence of rows.

Example:

sql Copy code

```sql
-- Don't
SELECT * FROM customers WHERE customer_id IN (SELECT customer_id FROM orders WHERE

-- Do
SELECT * FROM customers c WHERE EXISTS (
    SELECT 1 FROM orders o
    WHERE o.customer_id = c.customer_id
    AND o.order_date >= DATEADD(day, -30, GETDATE())
);
```

13. Use GROUP BY to Group Data

GROUP BY can be useful but avoid unnecessary use as it can slow down performance.

Example:

sql Copy code

```sql
-- Don't
SELECT customer_id, COUNT(*) as order_count FROM orders GROUP BY customer_id;

-- Do
SELECT c.customer_id, c.first_name, c.last_name, o.order_count
FROM customers c
JOIN (
    SELECT customer_id, COUNT(*) as order_count
    FROM orders
    GROUP BY customer_id
) o ON c.customer_id = o.customer_id;
```

14. Use WHERE Clause Instead of HAVING

Use WHERE to filter rows before grouping to improve performance.

Example:

sql Copy code

```sql
-- Don't
```

```sql
SELECT department, COUNT(*)
FROM employees
GROUP BY department
HAVING department = 'Sales';

-- Do
SELECT department, COUNT(*)
FROM employees
WHERE department = 'Sales'
GROUP BY department;
```

15. Materialized View

Materialized views store the result of a query and can be used to improve performance by avoiding repeated computation.

16. Parallel Execution (PostgreSQL)

PostgreSQL supports parallel query execution to improve performance on large datasets.

Example:

sql Copy code

```sql
SET max_parallel_workers_per_gather = 4;
```

17. Avoid SELECT DISTINCT

Use DISTINCT only when necessary as it can be resource-intensive.

Example:

sql Copy code

```sql
-- Don't
SELECT DISTINCT first_name, last_name FROM employees;

-- Do
SELECT first_name, last_name FROM employees GROUP BY first_name, last_name;
```

18. Run Your Query During Off-Peak Hours

Running heavy queries during off-peak hours can reduce competition for resources and improve performance.

By following these best practices and utilizing examples, you can effectively optimize SQL query performance for faster and more efficient database operations.