

TUGAS BESAR
MANAJEMEN BASIS DATA
TUNNING DATABASE SYSTEM



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BAB I

Studi Literatur

Database tuning adalah sejumlah aktifitas yang dilakukan untuk memperbaiki atau meningkatkan kinerja atau performance sebuah database. Aktifitas tuning ini meliputi banyak aspek dari software hingga hardware, antara lain *I/O Tuning*, *DBMS Tuning*, *Query Tuning*, dan *Database Maintenance*.

1.1 Tuning : Index

Index merupakan objek struktur data tersendiri yang tidak bergantung kepada struktur tabel. Index tuning adalah bagian tuning database untuk memilih dan membuat indeks. Tujuan index tuning adalah untuk mengurangi waktu pemrosesan kueri. Potensi penggunaan indeks di lingkungan dinamis dengan beberapa permintaan ad-hoc sebelumnya adalah tugas yang sulit. Index tuning melibatkan kueri berdasarkan indeks dan indeks dibuat secara otomatis saat itu juga. Tidak diperlukan tindakan eksplisit oleh pengguna basis data untuk index tuning.

1.2 Tuning : Setting Configuration DBMS

Penyetelan sistem manajemen basis data berpusat di sekitar konfigurasi memori dan sumber daya pemrosesan komputer yang menjalankan DBMS. Tujuan dari penyetelan basis data adalah untuk memaksimalkan penerapan sumber daya sistem dalam upaya untuk melakukan transaksi seefisien dan secepat mungkin. Sebagian besar DBMS dirancang dengan mempertimbangkan efisiensi; namun, dimungkinkan untuk meningkatkan kinerja basis data melalui pengaturan dan konfigurasi khusus.

BAB II

Deskripsi Percobaan

2.1 Tuning : Indexing

1. Lakukan Generate Data terlebih dahulu
2. Eksekusi Query Set Profiling = 1;
3. Eksekusi query dibawah ini

Query

- 1) `SELECT * FROM student;`
- 2) `SELECT * FROM student WHERE tot_cred > 30;`
- 3) `SELECT name, dept_name FROM student WHERE tot_cred > 30;`
- 4) `SELECT * FROM takes JOIN student ON takes.ID = student.ID
JOIN section ON takes.course_id = section.course_id;`
- 5) `SELECT student.`name`,student.dept_name,takes.sec_id AS
pengambilan,takes.semester,section.room_number,section.building,cou
rse.cou rse_id,course.dept_name FROM takes JOIN student ON
takes.ID = student.ID JOIN section ON takes.course_id =
section.course_id JOIN course ON section.course_id =
course.course_id;`
4. Setelah selesai melakukan eksekusi query di atas, kemudian lakukan indexing dengan menggunakan query dibawah

Indexing

- 1) `create index student_pk on student(name)`
- 2) `create index section_pk on section(sec_id);`
5. Ulangi kembali tahap (3)
6. Eksekusi query Show Profiles;
7. Catat Waktu eksekusi query sebelum dan sesudah indexing

BAB III

Hasil dan Pembahasan

3.1 Screenshot dari setiap percobaan yang di lakukan

```
MariaDB [dbms1]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.05771030 | SELECT * FROM student |
| 2 | 0.00036780 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00034910 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.09114250 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.05051530 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [dbms1]> _
```

Gambar 1 Data 1 Sebelum Tunning Indexing

```
MariaDB [dbms1]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.05771030 | SELECT * FROM student |
| 2 | 0.00036780 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00034910 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.09114250 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.05051530 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
| 6 | 0.33549980 | create index student_pk on student(name) |
| 7 | 0.27324290 | create index section_pk on section(sec_id) |
| 8 | 0.00041110 | SELECT * FROM student |
| 9 | 0.00034600 | SELECT * FROM student WHERE tot_cred > 30 |
| 10 | 0.00034310 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 11 | 0.00164710 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id=section.course_id |
| 12 | 0.00143110 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building, |
course.course_id,course.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
JOIN course ON section.course_id = course.c |
+-----+-----+-----+
12 rows in set (0.00 sec)

MariaDB [dbms1]>
```

Gambar 2 Data 1 Sesudah Tunning Indexing

```
MariaDB [dbms2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.04076140 | SELECT * FROM student |
| 2 | 0.00044500 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00037820 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.05960990 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.05412320 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [dbms2]> _
```

Gambar 3 Data 2 Sebelum Tunning Indexin

```

MariaDB [dbms2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00046360 | SELECT * FROM student |
| 2 | 0.00062620 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00361430 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 4 | 0.00307850 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
| 5 | 0.00052360 | SELECT * FROM student WHERE tot_cred > 30 |
| 6 | 0.00036640 | create index student_pk on student(name) |
| 7 | 0.00025330 | create index section_pk on section(sec_id) |
| 8 | 0.00040130 | SELECT * FROM student |
| 9 | 0.00047390 | SELECT * FROM student WHERE tot_cred > 30 |
| 10 | 0.00040840 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 11 | 0.00378430 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id=section.course_id |
| 12 | 0.00294320 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building, |
course.course_id,course.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
JOIN course ON section.course_id = course.c |
+-----+-----+-----+
12 rows in set (0.00 sec)

MariaDB [dbms2]>

```

Gambar 4 Data 2 Sesudah Tunning Indexing

```

MariaDB [dbms3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00245660 | SELECT * FROM student |
| 2 | 0.00092960 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00050060 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.53413700 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.56575640 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [dbms3]>

```

Gambar 5 Data 3 Sebelum Tunning Indexing

```

MariaDB [dbms3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00245660 | SELECT * FROM student |
| 2 | 0.00092960 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00050060 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.53413700 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.56575640 | SELECT student.`name`,student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,course.course_id,cours |
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.cou |
| 6 | 0.67671460 | create index student_pk on student(name) |
| 7 | 0.34407150 | create index section_pk on section(sec_id) |
| 8 | 0.00061360 | SELECT * FROM student |
| 9 | 0.13145350 | SELECT * FROM student WHERE tot_cred > 30 |
| 10 | 0.00050420 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 11 | 0.62759430 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id=section.course_id |
| 12 | 0.33083810 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id=section.course_id |
+-----+-----+-----+
12 rows in set (0.00 sec)

MariaDB [dbms3]>

```

Gambar 6 Data 3 Sesudah Tunning Indexing

```

MariaDB [dbs4]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.04492040 | SELECT * FROM student |
| 2 | 0.00033160 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00036880 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00153850 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.00265480 | SELECT student.name, student.dept_name, takes.sec_id AS pengambilan, takes.semester, section.room_number, section.building, course.course_id, course.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.course_id |
+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [dbs4]>

```

Gambar 7 Data 4 Sebelum Tuning Indexing

```

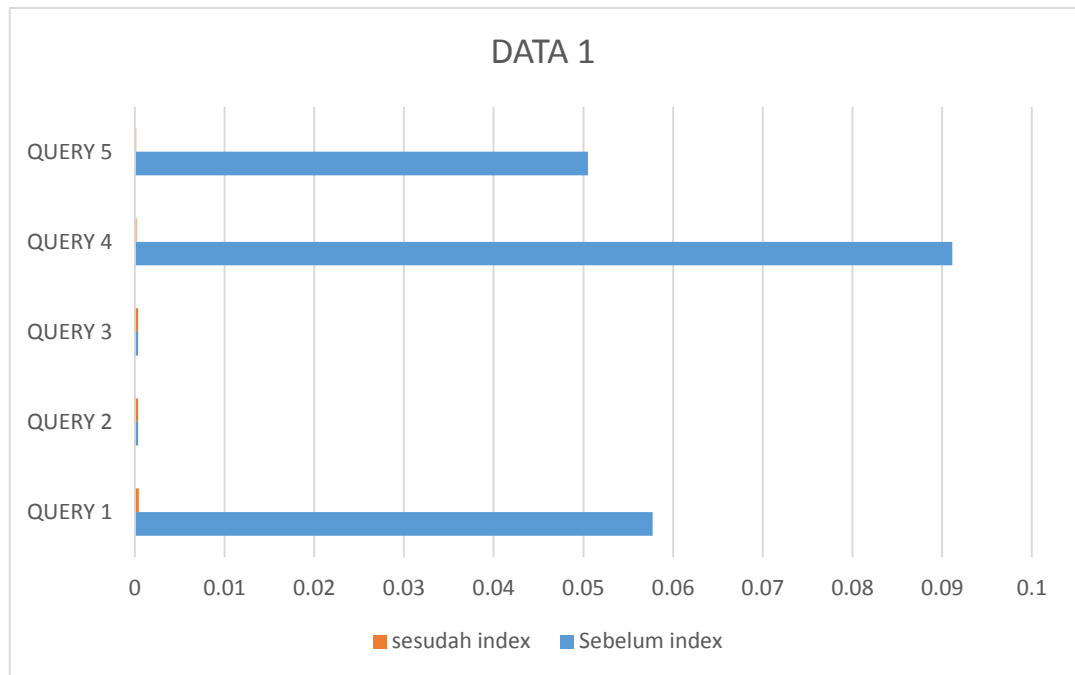
MariaDB [dbs4]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.04492040 | SELECT * FROM student |
| 2 | 0.00033160 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00036880 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00153850 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.00265480 | SELECT student.name, student.dept_name, takes.sec_id AS pengambilan, takes.semester, section.room_number, section.building, course.course_id, course.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.course_id |
| 6 | 0.29068930 | create index student_pk on student(name) |
| 7 | 0.18715610 | create index section_pk on section(sec_id) |
| 8 | 0.00034520 | SELECT * FROM student |
| 9 | 0.00034870 | SELECT * FROM student WHERE tot_cred > 30 |
| 10 | 0.00031630 | SELECT name, dept_name FROM student WHERE tot_cred > 30 |
| 11 | 0.00970510 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id=section.course_id |
| 12 | 0.00140400 | SELECT student.name, student.dept_name, takes.sec_id AS pengambilan, takes.semester, section.room_number, section.building, course.course_id, course.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN course ON section.course_id = course.course_id |
+-----+-----+-----+
12 rows in set (0.00 sec)

MariaDB [dbs4]>

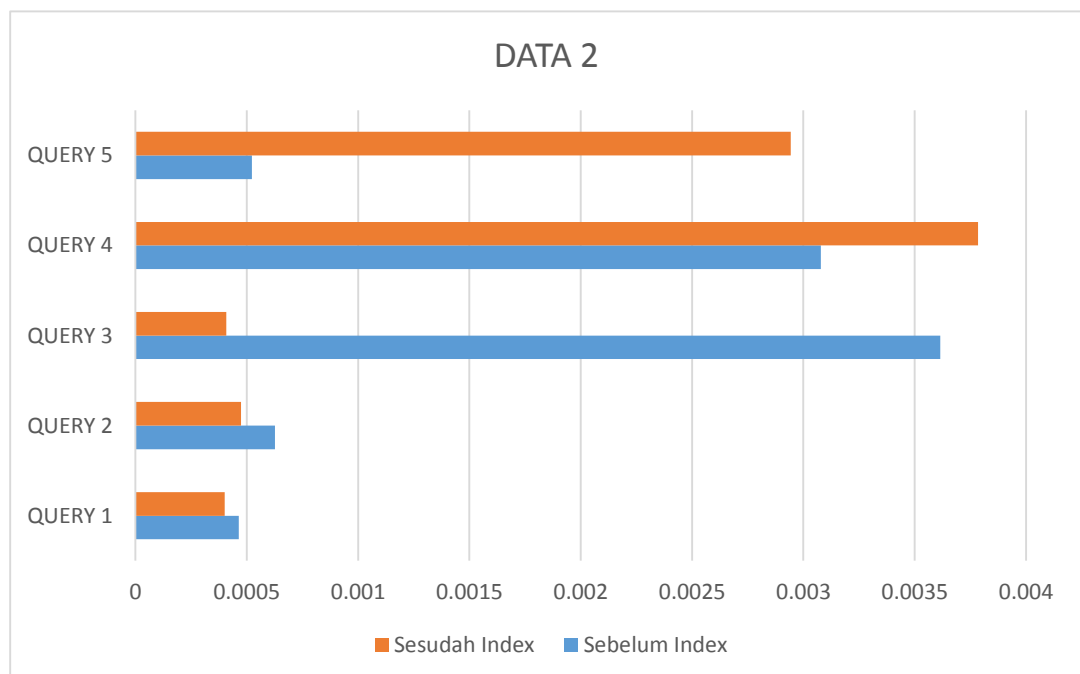
```

Gambar 8 Data 4 Sebelum tuning Indexing

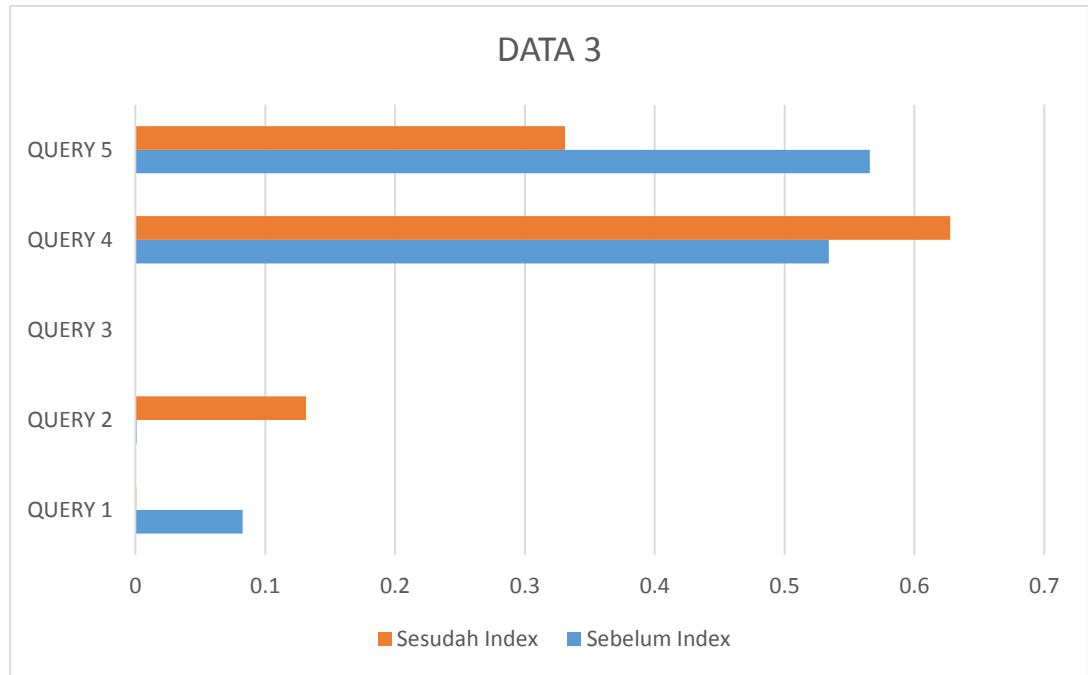
3.2 Grafik Hasil



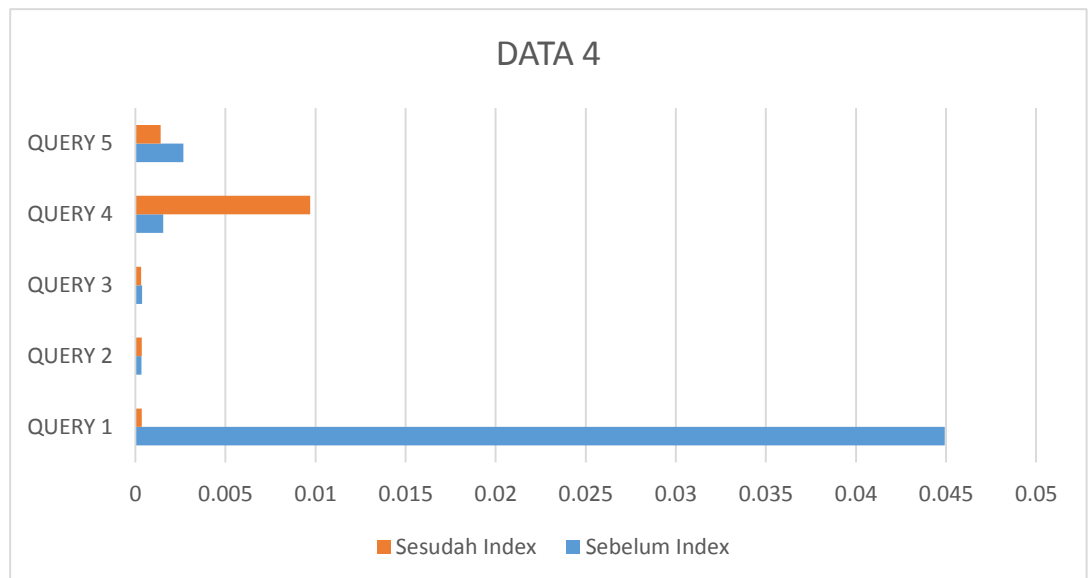
Gambar 9 Grafik Data 1 Perbedaan eksekusi Query sebelum dan sesudah Tunning



Gambar 10 Grafik Data 2 Perbedaan eksekusi Query sebelum dan sesudah Tunning



Gambar 11 Grafik Data 3 Perbedaan eksekusi Query sebelum dan sesudah Tunning



Gambar 12 Grafik Data 4 Perbedaan eksekusi Query sebelum dan sesudah Tunning

3.3 Pembahasan

Pada percobaan diatas merupakan tuning menggunakan teknik indexing. Setelah melakukan indexing dapat dilihat pada gambar dan grafik terdapat perubahan waktu eksekusi dengan sebelum indexing, dimana saat sebelum melakukan tuning index waktu yang dibutuhkan dalam mengeksekusi query rata-rata relative lebih lama dibanding setelah melakukan indexing. Karena dengan indexing DBMS akan lebih mudah untuk mencari dan mengakses ataupun mencari data-data yang ada.

Dikarenakan perangkat yang tidak mendukung menyebabkan data 5-7 tidak dapat dilakukan setelah beberapa kali melakukan percobaan.

DAFTAR PUSTAKA

<https://www.careerride.com/DB-index-tuning.aspx>

<https://www.geeksforgeeks.org/indexing-in-databases-set-1/>