

**LAPORAN PRAKTIKUM  
DATABASE TUNING  
MANAJEMEN BASIS DATA - RA**



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# BAB I: Isi

## 1. Studi Literatur

### 1.1. Tuning: Indexing

Database tuning adalah aktivitas untuk membuat aplikasi database berjalan dengan lebih cepat. Lebih cepat artinya nilai throughput lebih besar walaupun response time-nya lebih rendah. Index adalah struktur data yang mendukung akses efisien ke data. Index tuning berarti membuat index yang tepat untuk mempercepat query atau updates. Index tuning melihat ke query dan updates lama lalu merekomendasikan index mana yang paling baik untuk beban kerja.

### 1.2. Tuning: Setting Configuration DBMS

Database tuning menjelaskan sekelompok kegiatan yang digunakan untuk mengoptimalkan dan menyeragamkan kinerja suatu basis data. Biasanya tumpang tindih dengan penyetelan kueri, tetapi merujuk pada desain file basis data, pemilihan aplikasi sistem manajemen basis data (DBMS), dan konfigurasi lingkungan basis data (sistem operasi, CPU, dll.). Penyesuaian basis data bertujuan untuk memaksimalkan penggunaan sumber daya sistem untuk melakukan pekerjaan seefisien dan secepat mungkin. Sebagian besar sistem dirancang untuk mengelola penggunaan sumber daya sistem mereka, tetapi masih ada banyak ruang untuk meningkatkan efisiensinya dengan menyesuaikan pengaturan dan konfigurasi mereka untuk database dan DBMS.

## 2. Deskripsi Percobaan

### 2.1. Sebelum Tuning

Sebelum dilakukan tuning, akan dicatat waktu eksekusi tiap query pada semua data.

a. Data 1

Query_ID	Duration	Query
1	0.09144138	select * from student
2	0.00053956	SELECT * FROM student WHERE tot_cred > 30
3	0.00028319	SELECT 'name', department FROM student WHERE tot_cred > 30
4	0.00065586	show tables
5	0.00035644	SELECT 'name', dept_name FROM student WHERE tot_cred > 30
6	0.00228814	SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id
7	0.00205177	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.cour

*Gambar 1 Data 1 Sebelum Tuning*

b. Data 2

Query_ID	Duration	Query
1	0.00098511	SELECT * FROM student
2	0.00055957	SELECT * FROM student
3	0.00061961	SELECT * FROM student WHERE tot_cred > 30
4	0.00056901	SELECT 'name', dept_name FROM student WHERE tot_cred > 30
5	0.17518652	SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id
6	0.03413330	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.cour

6 rows in set (0.00 sec)

*Gambar 2 Data 2 Sebelum Tuning*

### c. Data 3

```
MariaDB [felia3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00115087 | SELECT * FROM student |
| 2 | 0.00082501 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00061055 | SELECT `name`, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.01515194 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.00948445 | SELECT student.`name`, student.dept_name, takes.sec_id AS pengambilan, takes.semester, section.room_number, section.building, co |
| 6 | 0.00000000 | 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 |
| 7 | 0.00000000 | section.course_id = course.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)
```

*Gambar 3 Data 3 Sebelum Tuning*

## 2.2. Tuning: Indexing

Dalam tuning indexing, langkah pertama yang harus dilakukan adalah membuat index pada field yang dipilih. Field dipilih berdasarkan frekuensi kemunculan paling besar atau field yang sering digunakan pada query untuk menguji data. Pada praktikum ini, field yang dipilih adalah:

- id pada table student
- sec\_id pada table section
- course\_id pada table course

### a. Data 1

```
MariaDB [felia]> create index student_pk on student(id);
Query OK, 0 rows affected, 1 warning (0.52 sec)
Records: 0 Duplicates: 0 Warnings: 1

MariaDB [felia]> create index section_pk on section(sec_id);
Query OK, 0 rows affected (0.36 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia]> create index course_pk on course(course_id);
Query OK, 0 rows affected, 1 warning (0.45 sec)
Records: 0 Duplicates: 0 Warnings: 1
```

*Gambar 4 Penambahan Index pada Data 1*

```

MariaDB [felia]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00047689 | SELECT * FROM student |
| 2 | 0.00044366 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00041609 | SELECT "name", dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00306142 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.00160321 | 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.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)

```

*Gambar 5 Data 1 Setelah Tuning*

b. Data 2

```
MariaDB [felia2]> create index student_pk on student(id);
Query OK, 0 rows affected (0.48 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia2]> create index section_pk on section(sec_id);
Query OK, 0 rows affected (0.48 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia2]> create index course_pk on course(course_id);
Query OK, 0 rows affected (0.44 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia2]>
```

*Gambar 6 Menambahkan Index pada Data 2*

```

MariaDB [felia2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00059054 | SELECT * FROM student |
| 2 | 0.00054221 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00041194 | SELECT `name`, dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.12950341 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.00398990 | 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.cou |
+-----+-----+-----+
5 rows in set (0.00 sec)

```

*Gambar 7 Data 2 Setelah Tuning*

c. Data 3

```
MariaDB [felia3]> create index student_pk on student(id);
Query OK, 0 rows affected (0.56 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia3]> create index section_pk on section(sec_id);
Query OK, 0 rows affected (0.53 sec)
Records: 0 Duplicates: 0 Warnings: 0

MariaDB [felia3]> create index course_pk on course(course_id);
Query OK, 0 rows affected (0.62 sec)
Records: 0 Duplicates: 0 Warnings: 0
```

*Gambar 8 Menambahkan Index pada Data 3*

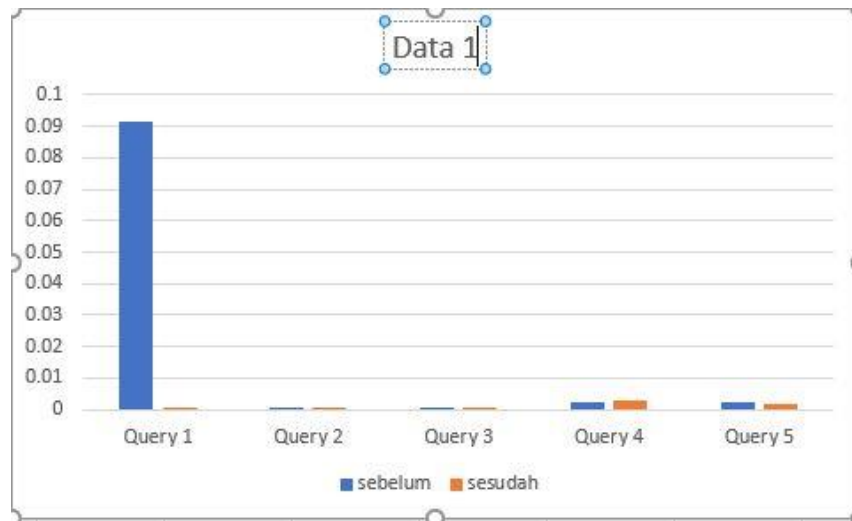
```
MariaDB [felia3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00091941 | SELECT * FROM student |
| 2 | 0.00070608 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00059809 | SELECT "name", dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.18690776 | SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |
| 5 | 0.17137711 | SELECT student."name",student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,co |
| 6 | 0.17137711 | SELECT student."name",student.dept_name,takes.sec_id AS pengambilan,takes.semester,section.room_number,section.building,co |
+-----+-----+-----+
5 rows in set (0.00 sec)
```

*Gambar 9 Data 3 Setelah Tuning*

## 2.3. Tuning: Setting Configuration DBMS

## BAB II: Hasil dan Pembahasan

### 2.1. Hasil dan Pembahasan

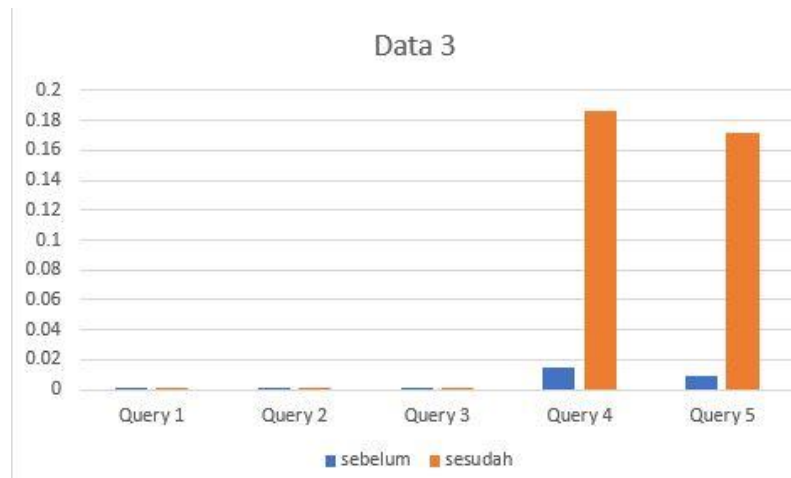


Gambar 10 Grafik Data 1



Gambar 11 Grafik Data 2





*Gambar 12 Grafik Data 3*

Dari hasil tuning dengan indexing pada data-data di atas, didapatkan bahwa rata-rata data mengalami kenaikan tingkat kecepatan dari sebelum dan sesudah indexing. Hal ini sesuai dengan studi literatur yaitu dengan melakukan tuning index dapat meningkatkan kecepatan query.

## Daftar Pustaka

Silberzchatz, Database System Concept, 6<sup>th</sup> Edition

[https://en.wikipedia.org/wiki/Database\\_tuning](https://en.wikipedia.org/wiki/Database_tuning)