

**PRAKTIKUM DATABASE MANAGEMENT SYSTEM
TUNING DATABASE SYSTEM**



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BAB I

PENDAHULUAN

A. Tuning: Indexing

Index tuning adalah bagian dari tuning database untuk memilih dan membuat index. Tujuan tuning index adalah untuk mengurangi waktu pemrosesan *query*. Performa *query* serta serta peningkatan basis data dapat dilakukan menggunakan index. Saat basis data dibuat tanpa menggunakan index, maka kinerja server database dapat menurun secara drastis. Index tuning melibatkan *query* berdasarkan index dan index dibuat secara otomatis secara *realtime*/saat itu juga.

B. Tuning: Setting Configuration DBMS

Database server adalah program komputer yang menyediakan layanan basis data untuk program komputer lain. Database server didefinisikan sebagai client server model. Database Management System (DBMS) menyediakan fungsi-fungsi database server dan beberapa DBMS (seperti mysql) sangat eksklusif untuk client-server model database access. Database server menyediakan fleksibilitas untuk konfigurasi database service yang kita gunakan. Tuning pada seerver basis data dapat membuat kinerja basis data lebih efisien dan juga cepat

BAB II

HASIL DAN PEMBAHASAN

A. Tuning: Indexing

Melakukan indexing pada tabel student pada setiap database, menambahkan index pada tot_cred karena banyak digunakan.

ubah Indeks ✕

Nama indeks: ?

Index choice: ?

+ Advanced Options

Kolom	Ukuran
<input type="text" value="dept_name [varchar(20)]"/>	<input type="text"/>
<input type="text" value="tot_cred [decimal(3,0)]"/>	<input type="text"/>

Tambahkan 1 kolom ke index

Kirim

Pratinjau SQL

Batal

B. Tuning: Setting Configuration DBMS

Untuk tuning pada server basis data kita perlu melakukan perubahan pada file my.ini pada direktori C:\xampp\mysql\bin

Dengan merubah innodb_buffer_pool_size = 16M menjadi innodb_buffer_pool_size = 1G

Innodb_additional_mem_pool_size menjadi 330M

Dan innodb_log_file_size = 5M menjadi innodb_log_file_size = 250M

```
# Comment the following if you are using InnoDB tables
#skip-innodb
innodb_data_home_dir = "C:/Users/User/xampp/mysql/data"
innodb_data_file_path = ibdata1:10M:autoextend
innodb_log_group_home_dir = "C:/Users/User/xampp/mysql/data"
#innodb_log_arch_dir = "C:/Users/User/xampp/mysql/data"
## You can set .._buffer_pool_size up to 50 - 80 %
## of RAM but beware of setting memory usage too high
innodb_buffer_pool_size = 1G
innodb_additional_mem_pool_size = 330M
## Set .._log_file_size to 25 % of buffer pool size
innodb_log_file_size = 250M
innodb_log_buffer_size = 8M
innodb_flush_log_at_trx_commit = 1
innodb_lock_wait_timeout = 50
```

Lalu konfigurasi juga setiap database dengan perintah berikut ini untuk setiap database : set global query_cache_size = 268435456;
set global query_cache_type = 1;
set global query_cache_limit = 1048576;

```
MariaDB [(none)]> use dbms1;
Database changed
MariaDB [dbms1]> set global query_cache_size = 268435456;
Query OK, 0 rows affected (0.46 sec)

MariaDB [dbms1]> set global query_cache_type = 1;
Query OK, 0 rows affected (0.01 sec)

MariaDB [dbms1]> set global query_cache_limit = 1048576;
Query OK, 0 rows affected (0.00 sec)

MariaDB [dbms1]>
```

```
MariaDB [dbms1]> use dbms2;
Database changed
MariaDB [dbms2]> set global query_cache_size = 268435456;
Query OK, 0 rows affected (0.01 sec)

MariaDB [dbms2]> set global query_cache_type = 1;
Query OK, 0 rows affected (0.00 sec)

MariaDB [dbms2]> set global query_cache_limit = 1048576;
Query OK, 0 rows affected (0.00 sec)
```

```

MariaDB [dbms2]> use dbms3;
Database changed
MariaDB [dbms3]> set global query_cache_size = 268435456;
Query OK, 0 rows affected (0.01 sec)

MariaDB [dbms3]> set global query_cache_type = 1;
Query OK, 0 rows affected (0.00 sec)

MariaDB [dbms3]> set global query_cache_limit = 1048576;
Query OK, 0 rows affected (0.00 sec)

```

```

MariaDB [dbms3]> use dbms4;
Database changed
MariaDB [dbms4]> set global query_cache_size = 268435456;
Query OK, 0 rows affected (0.01 sec)

MariaDB [dbms4]> set global query_cache_type = 1;
Query OK, 0 rows affected (0.00 sec)

MariaDB [dbms4]> set global query_cache_limit = 1048576;
Query OK, 0 rows affected (0.00 sec)

```

C. Hasil Tuning

Hasil tuning dapat dilihat dengan melakukan pengujian pada database, pengujian dilakukan dengan memeriksa query-query yang telah disediakan. Query pada tabel sesuai petunjuk pengerjaan :

- SELECT * FROM student
- SELECT * FROM student WHERE tot_cred > 30;
- SELECT `name`, dept_name FROM student WHERE tot_cred > 30;
- SELECT * FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id
- 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

Data Sebelum Tuning :

Data	Waktu Sebelum Tuning (s)				
	QUERY 1	QUERY 2	QUERY 3	QUERY 4	QUERY 5
1	0.00047150	0.00046880	0.00046120	0.00275800	0.00228440
2	0.00059910	0.00079950	0.00054780	0.00629940	0.00457120
3	0.00097510	0.00092270	0.00069950	0.02068930	0.32759700
4	0.00105530	0.00109370	0.00089480	0.06390880	0.15523240

```
MariaDB [dbms1]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00047150 | select * from student |
| 2 | 0.00046880 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00046120 | select dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00275800 | SELECT * FROM takes JOIN student ON takes.ID = student.ID |
| 5 | 0.00228440 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.section_id = section.section_id |
```

```
MariaDB [dbms2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00059910 | SELECT * FROM student |
| 2 | 0.00079950 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00054780 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00629940 | SELECT * FROM takes JOIN student ON takes.ID = student.ID |
| 5 | 0.00457120 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.section_id = section.section_id |
```

```
MariaDB [dbms3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00097510 | SELECT * FROM student |
| 2 | 0.00092270 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00069950 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.02068930 | SELECT * FROM takes JOIN student ON takes.ID = student.ID |
| 5 | 0.32759700 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.section_id = section.section_id |
```

```

MariaDB [dbms4]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query
+-----+-----+-----+
| 1 | 0.00105530 | SELECT * FROM student
| 2 | 0.00109370 | SELECT * FROM student WHERE tot_cred > 30
| 3 | 0.00089480 | SELECT dept_name FROM student WHERE tot_cred > 30
| 4 | 0.06390880 | SELECT * FROM takes JOIN student ON takes.ID = stud
| 5 | 0.15523240 | SELECT student.`name`,student.dept_name,takes.sec_id
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON t

```

Data setelah tuning index :

Data	Waktu Sesudah Tuning Index (s)				
	QUERY 1	QUERY 2	QUERY 3	QUERY 4	QUERY 5
1	0.00058540	0.00059710	0.00055090	0.00249740	0.00128460
2	0.00058470	0.00061840	0.00052830	0.00572250	0.00452240
3	0.00098340	0.00099560	0.00072500	0.01952430	0.01214260
4	0.00115950	0.00117810	0.00087170	0.04792740	0.03568060

```

MariaDB [dbms1]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query
+-----+-----+-----+
| 1 | 0.00058540 | SELECT * FROM student
| 2 | 0.00059710 | SELECT * FROM student WHERE tot_cred > 30
| 3 | 0.00055090 | SELECT dept_name FROM student WHERE tot_cred > 30
| 4 | 0.00249740 | SELECT * FROM takes JOIN student ON takes.ID = stud
| 5 | 0.00128460 | SELECT student.`name`,student.dept_name,takes.sec_id
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON t

```

```

MariaDB [dbms2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query
+-----+-----+-----+
| 1 | 0.00058470 | SELECT * FROM student
| 2 | 0.00061840 | SELECT * FROM student WHERE tot_cred > 30
| 3 | 0.00052830 | SELECT dept_name FROM student WHERE tot_cred > 30
| 4 | 0.00572250 | SELECT * FROM takes JOIN student ON takes.ID = stud
| 5 | 0.00452240 | SELECT student.`name`,student.dept_name,takes.sec_id
e.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON t

```



```

MariaDB [dbms3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00098340 | SELECT * FROM student |
| 2 | 0.00099560 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00072500 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.01952430 | SELECT * FROM takes JOIN student ON takes.ID = student.ID |
| 5 | 0.01214260 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |

```

```

MariaDB [dbms4]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00115950 | SELECT * FROM student |
| 2 | 0.00117810 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00087170 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.04792740 | SELECT * FROM takes JOIN student ON takes.ID = student.ID |
| 5 | 0.03568060 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id |

```

Data setelah tuning DBMS:

Data	Waktu Sesudah Tuning (ms)				
	QUERY 1	QUERY 2	QUERY 3	QUERY 4	QUERY 5
1	0.0001662	0.0000916	0.0001475	0.000147	0.000124
2	0.0001388	0.0001138	0.0001209	0.000156	0.000156
3	0.0001388	0.0000873	0.0001844	0.000546	0.000263
4	0.0001151	0.0001207	0.0000961		

```

0.00016620 | SELECT * FROM student
0.00009160 | SELECT * FROM student WHERE tot_cred > 30
0.00014750 | SELECT dept_name FROM student WHERE tot_cred > 30
0.00014720 | SELECT * FROM takes JOIN student ON takes.ID = student.ID
0.00012410 | SELECT student.`name`,student.dept_name,takes.sec_id,student.dept_name FROM takes JOIN student ON takes.ID = student.ID JOIN section ON takes.course_id = section.course_id

```

```
MariaDB [dbms2]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00013880 | SELECT * FROM student |
| 2 | 0.00011380 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00012090 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00015580 | SELECT * FROM takes JOIN student ON takes.ID = stud |
| 5 | 0.00015610 | SELECT student.`name`,student.dept_name,takes.sec_id |
s.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN cou
```

```
MariaDB [dbms3]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00008870 | SELECT * FROM student |
| 2 | 0.00008730 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00018440 | SELECT dept_name FROM student WHERE tot_cred > 30 |
| 4 | 0.00054600 | SELECT * FROM takes JOIN student ON takes.ID = stu |
| 5 | 0.00026330 | SELECT student.`name`,student.dept_name,takes.sec_id |
s.ID = student.ID JOIN section ON takes.course_id = section.course_id JOIN co
```

```
MariaDB [dbms4]> show profiles;
+-----+-----+-----+
| Query_ID | Duration | Query |
+-----+-----+-----+
| 1 | 0.00011510 | SELECT * FROM student |
| 2 | 0.00012070 | SELECT * FROM student WHERE tot_cred > 30 |
| 3 | 0.00009610 | SELECT dept_name FROM student WHERE tot_cred > 30 |
+-----+-----+-----+
3 rows in set (0.00 sec)
```

D. Pembahasan

Tuning dapat dilakukan dengan beberapa cara, contohnya dengan memberikan index dan tuning konfigurasi DBMS. Perbedaan tuning konfigurasi lebih efektif dikarenakan kita menggunakan cache jika sudah pernah melakukan query maka query akan disimpan dan tidak harus memproses query yang lama. Tuning indexing tidak selalu menghasilkan database yang lebih cepat, terutama untuk data yang sedikit, data yang lebih banyak akan lebih mudah terlihat perbedaannya. Beberapa kasus memperlihatkan data hasil indexing dan sebelum indexing masih terdapat data yang lebih 'cepat' pengaksesannya sebelum di indexing.

BAB III

KESIMPULAN

Dalam melakukan tuning basis data ada banyak faktor yang mempengaruhi keberhasilan tuning basis data. Melakukan indexing dan konfigurasi basis data harus mempunyai komputer yang kuat dan teliti dengan mengonfigurasi basis data, agar basis data dapat menjadi maksimal. Pada saat menjalankan data 5,6, dan 7 yang memiliki jumlah data besar maka spesifikasi hardware juga sangat penting untuk melakukan tuning. Jika hardware tidak memadai dan mungkin juga ada kesalahan software maka proses tuning akan berjalan sangat lama.

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