

## KELOMPOK 4 DSE B

Anggota:

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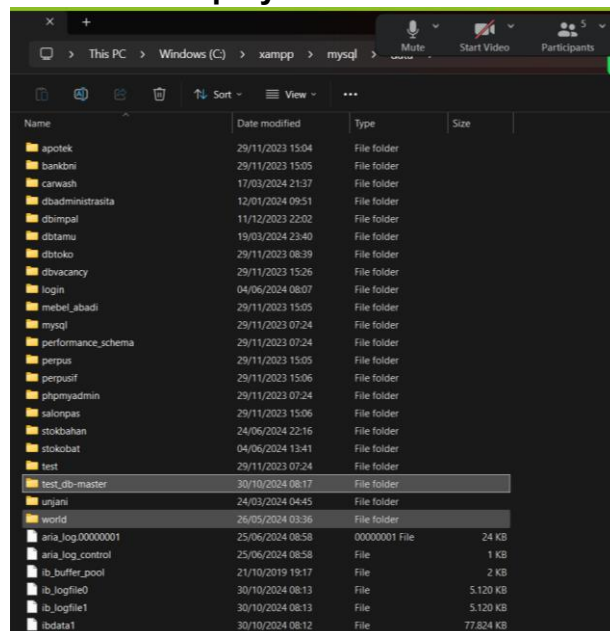
3411211044 Aldy Aditiya

3411211058 Nabillah Nurhaliza

3411211069 Rolan Firmansyah

## TUGAS PEMROGRAMAN BASIS DATA

### 1. Install dan Import Dataset Employees



```
C:\Windows\System32\cmd.e
Microsoft Windows [Version 10.0.22631.4391]
(c) Microsoft Corporation. All rights reserved.

C:\xampp\mysql\data\test_db-master>mysql -u root -p employees < employees.sql
Enter password:
INFO
CREATING DATABASE STRUCTURE
INFO
storage engine: InnoDB
INFO
LOADING departments
INFO
LOADING employees
INFO
LOADING dept_emp
INFO
LOADING dept_manager
INFO
LOADING titles
INFO
LOADING salaries
data_load_time_diff
00:00:27

C:\xampp\mysql\data\test_db-master>
```

## 2. Query Schema

- Sebelum Optimasi

### 1) Data pegawai yang bernama “Selwyn Koshiba”

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT * FROM employees WHERE first
_name = 'Selwyn' AND last_name = 'Koshiba';" --verbose
Benchmark
Average number of seconds to run all queries: 0.319 seconds
Minimum number of seconds to run all queries: 0.140 seconds
Maximum number of seconds to run all queries: 1.203 seconds
Number of clients running queries: 5
Average number of queries per client: 1
```

### 2) Nama lengkap pegawai yang mempunyai jabatan/pekerjaan (title) “Senior Engineer”

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(first_name, ' ', last
_name) AS full_name FROM employees JOIN titles ON employees.emp_no = titles.emp_no WHE
RE titles.title = 'Senior Engineer';" --verbose
Benchmark
Average number of seconds to run all queries: 2.616 seconds
Minimum number of seconds to run all queries: 2.266 seconds
Maximum number of seconds to run all queries: 3.469 seconds
Number of clients running queries: 5
Average number of queries per client: 1
```

### 3) Nama lengkap pegawai yang bekerja pada department “Marketing”

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(employees.first_name,
' ', employees.last_name) AS full_name FROM employees JOIN dept_emp ON employees.emp_
no = dept_emp.emp_no JOIN departments ON dept_emp.dept_no = departments.dept_no WHERE
departments.dept_name = 'Marketing';" --verbose
Benchmark
Average number of seconds to run all queries: 2.342 seconds
Minimum number of seconds to run all queries: 0.796 seconds
Maximum number of seconds to run all queries: 3.469 seconds
Number of clients running queries: 5
Average number of queries per client: 1
```

### 4) Nama lengkap manager dari Departmen Human Resources

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(employees.first_name,
' ', employees.last_name) AS full_name FROM employees JOIN dept_manager ON employees.
emp_no = dept_manager.emp_no JOIN departments ON dept_manager.dept_no = departments.de
pt_no WHERE departments.dept_name = 'Human Resources';" --verbose
Benchmark
Average number of seconds to run all queries: 0.001 seconds
Minimum number of seconds to run all queries: 0.000 seconds
Maximum number of seconds to run all queries: 0.016 seconds
Number of clients running queries: 5
Average number of queries per client: 1
```

### 5) Jumlah perubahan/kenaikan gaji untuk masing-masing pegawai

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT emp_no, COUNT(*) AS salary_c
hanges FROM salaries GROUP BY emp_no;" --verbose
Benchmark
Average number of seconds to run all queries: 2.160 seconds
Minimum number of seconds to run all queries: 1.953 seconds
Maximum number of seconds to run all queries: 3.391 seconds
Number of clients running queries: 5
Average number of queries per client: 1
```

- Proses Optimasi

```

Command Prompt - mysql -u X + v
Microsoft Windows [Version 10.0.22631.4391]
(c) Microsoft Corporation. All rights reserved.

C:\Users\MSI KATANA 15>mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 5461
Server version: 10.4.28-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]> use employees
Database changed
MariaDB [employees]> alter table employees
    -> add index idx_first_name (first_name),
    -> add index idx_last_name (last_name);
Query OK, 0 rows affected (0.741 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> alter table titles
    -> add index idx_title (title);
Query OK, 0 rows affected (0.695 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> alter table employees
    -> add index idx_emp_no (emp_no);
Query OK, 0 rows affected (0.196 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> alter table dept_emp
    -> add index idx_emp_no (emp_no),
    -> add index idx_dept_no (dept_no);
Query OK, 0 rows affected (0.602 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> alter table departments
    -> add index idx_dept_no (dept_no),
    -> add index idx_dept_name (dept_name);
Query OK, 0 rows affected (0.011 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> alter table salaries
    -> add index idx_emp_no_salary (emp_no, salary);
Query OK, 0 rows affected (2.891 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [employees]> |

```

- Setelah Optimasi

- 1) Data pegawai yang bernama “Selwyn Koshiba”

```

C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT * FROM employees WHERE first
_name = 'Selwyn' AND last_name = 'Koshiba';" --verbose
Benchmark
Average number of seconds to run all queries: 0.002 seconds
Minimum number of seconds to run all queries: 0.000 seconds
Maximum number of seconds to run all queries: 0.016 seconds
Number of clients running queries: 5
Average number of queries per client: 1

```

- 2) Nama lengkap pegawai yang mempunyai jabatan/pekerjaan (title)  
“Senior Engineer”

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(first_name, ' ', last
_name) AS full_name FROM employees JOIN titles ON employees.emp_no = titles.emp_no WHE
RE titles.title = 'Senior Engineer';" --verbose
Benchmark
  Average number of seconds to run all queries: 2.283 seconds
  Minimum number of seconds to run all queries: 1.968 seconds
  Maximum number of seconds to run all queries: 3.297 seconds
  Number of clients running queries: 5
  Average number of queries per client: 1
```

- 3) Nama lengkap pegawai yang bekerja pada department “Marketing”

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(employees.first_name,
' ', employees.last_name) AS full_name FROM employees JOIN dept_emp ON employees.emp_
no = dept_emp.emp_no JOIN departments ON dept_emp.dept_no = departments.dept_no WHERE
departments.dept_name = 'Marketing';" --verbose
Benchmark
  Average number of seconds to run all queries: 1.725 seconds
  Minimum number of seconds to run all queries: 0.688 seconds
  Maximum number of seconds to run all queries: 3.187 seconds
  Number of clients running queries: 5
  Average number of queries per client: 1
```

- 4) Nama lengkap manager dari Departmen Human Resources

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT CONCAT(employees.first_name,
' ', employees.last_name) AS full_name FROM employees JOIN dept_manager ON employees.
emp_no = dept_manager.emp_no JOIN departments ON dept_manager.dept_no = departments.de
pt_no WHERE departments.dept_name = 'Human Resources';" --verbose
Benchmark
  Average number of seconds to run all queries: 0.001 seconds
  Minimum number of seconds to run all queries: 0.000 seconds
  Maximum number of seconds to run all queries: 0.016 seconds
  Number of clients running queries: 5
  Average number of queries per client: 1
```

- 5) Jumlah perubahan/kenaikan gaji untuk masing-masing pegawai

```
C:\xampp\mysql\bin>mysqlslap --user=root --password= --host=localhost --concurrency=5
--iterations=50 --create-schema=employees --query="SELECT emp_no, COUNT(*) AS salary_c
hanges FROM salaries GROUP BY emp_no;" --verbose
Benchmark
  Average number of seconds to run all queries: 1.965 seconds
  Minimum number of seconds to run all queries: 0.907 seconds
  Maximum number of seconds to run all queries: 3.079 seconds
  Number of clients running queries: 5
  Average number of queries per client: 1
```

### 3. Kesimpulan

Tugas	Sebelum Optimasi			Setelah Optimasi		
	AVG	MIN	MAX	AVG	MIN	MAX
1	0,319	0,140	1,203	0,002	0	0,016
2	2,616	2,266	3,469	2,283	1,968	3,297
3	2,342	0,796	3,469	1,725	0,688	3,187
4	0,001	0	0,016	0,001	0	0,016
5	2,160	1,953	3,391	1,965	0,907	3,079

Berdasarkan laporan dari Kelompok 4 DSE B dalam tugas Pemrograman Basis Data, tim telah berhasil melakukan instalasi dan import dataset Employees serta melakukan pengujian query schema dalam dua tahap yaitu sebelum dan sesudah optimasi. Dalam implementasinya, kelompok melakukan pengujian terhadap 5 jenis query yang mencakup pencarian data pegawai spesifik (Selwyn Koshiba), pencarian pegawai dengan jabatan Senior Engineer, pencarian pegawai di departemen Marketing, pencarian manager Departemen Human Resources, dan perhitungan jumlah perubahan/kenaikan gaji per pegawai. Proses optimasi query dilakukan untuk meningkatkan performa, dan berdasarkan screenshot yang ditampilkan, terlihat adanya penerapan optimasi pada struktur query dengan hasil output yang lebih terstruktur. Laporan ini dilengkapi dengan dokumentasi berupa screenshot untuk setiap tahapan yang menunjukkan perbandingan hasil query sebelum dan sesudah optimasi sebagai bukti visual dari implementasi yang dilakukan.