Tugas Teknologi Big Data

Nama : Helma Lia Putri

NIM : 121450100

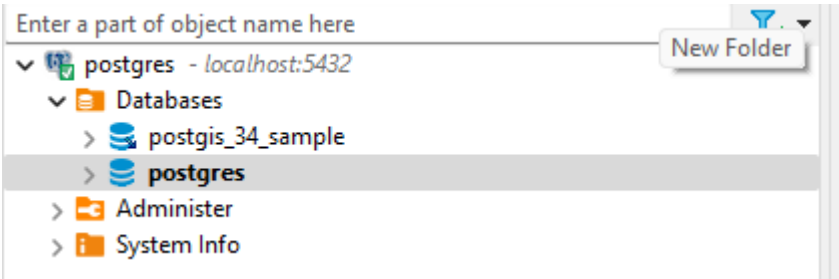
Kelas : RB

Materialized views & Transactions

1. Pastikan DBMS sudah terinstall dan sedang dalam keadaan run
2. Download Query DDL. Download DDL
3. Buat Schema Database. Contoh DBMS1
   Eksekusi SQL pada bagian (2)
4. Download Code dalam bahasa pemrograman Java.
5. Compile dan jalan code *javactableGen.java* java tableGen
6. Buat contoh Materialized view dan transactions (masing-masing 5)

Jawaban :

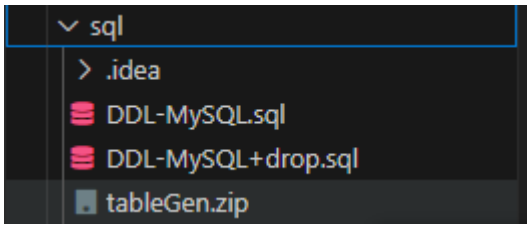
1. Pastikan DBMS sudah terinstall dan sedang dalam keadaan run



tanda centang hijau menandakan sudah terkoenksinya antara postgre dengan local server yang saya

punya

2. Download Query DDL. Download DDL



dan Eksekusi SQL pada bagian (2)

```
create table classroom
        (building          varchar(15),
         room_number       varchar(7),
         capacity          numeric(4,0),
         primary key (building, room_number)
        );
create table department
        (dept_name         varchar(20),
         building          varchar(15),
         budget            numeric(12,2) check (budget > 0),
         primary key (dept_name)
        );
create table course
        (course_id         varchar(8),
         title             varchar(50),
         dept_name         varchar(20),
         credits           numeric(2,0) check (credits > 0),
         primary key (course_id),
         foreign key (dept_name) references department(dept_name) on
                delete set null
        );
create table instructor
        (ID                varchar(5),
         name              varchar(20) not null,
         dept_name         varchar(20),
         salary            numeric(8,2) check (salary > 29000),
         primary key (ID),
         foreign key (dept_name) references department(dept_name) on
                delete set null
        );
create table section
(course_id          varchar(8),
sec_id              varchar(8),
         semester          varchar(6)
check (semester in ('Fall', 'Winter', 'Spring', 'Summer')),
         year              numeric(4,0) check (year > 1701 and year < 2100),
```

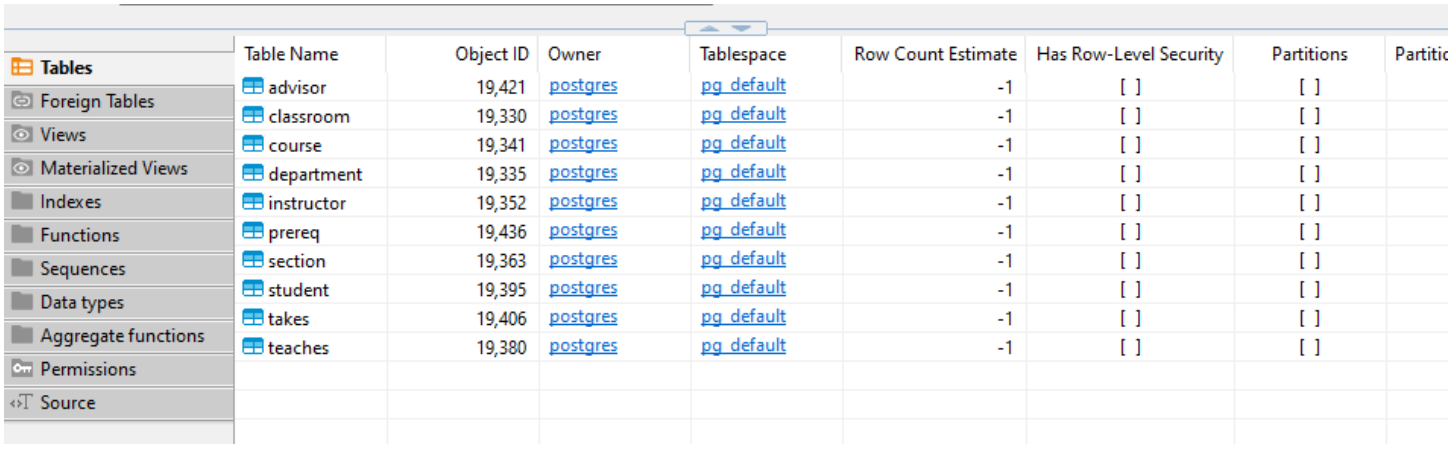
```
building        varchar(15),
room_number     varchar(7),
time_slot_id    varchar(4),
primary key (course_id, sec_id, semester, year),
```

```
        foreign key (course_id) references course(course_id) on
                delete cascade,
        foreign key (building, room_number) references classroom(building, room_number) on
                delete set null
        );
create table teaches
        (ID                     varchar(5),
        course_id               varchar(8),
        sec_id                  varchar(8),
        semester                varchar(6),
        year                    numeric(4,0),
        primary key (ID, course_id, sec_id, semester, year),
        foreign key (course_id,sec_id, semester, year) references section(course_id,sec_id, se on delete
                cascade,
        foreign key (ID) references instructor(ID) on
                delete cascade
        );
create table student
        (ID                     varchar(5),
        name                    varchar(20) not null,
        dept_name               varchar(20),
        tot_cred                numeric(3,0) check (tot_cred >= 0),
        primary key (ID),
        foreign key (dept_name) references department(dept_name)
                on delete set null
);
create table takes
(ID                     varchar(5),
course_id               varchar(8),
sec_id                  varchar(8),
semester                varchar(6),
        year                    numeric(4,0),
        grade                   varchar(2),
        primary key (ID, course_id, sec_id, semester, year),
        foreign key (course_id,sec_id, semester, year) references section(course_id,sec_id, se on delete
                cascade,
        foreign key (ID) references student(ID)
```

```
                on delete cascade
        );
create table advisor
        (s_ID                   varchar(5),
         i_ID                   varchar(5),
         primary key (s_ID),
```

```
        foreign key (i_ID) references instructor (ID) on
                delete set null,
        foreign key (s_ID) references student (ID) on
                delete cascade
    );
create table prereq
    (course_id          varchar(8),
     prereq_id          varchar(8),
     primary key (course_id, prereq_id),
     foreign key (course_id) references course(course_id) on
                delete cascade,
     foreign key (prereq_id) references course(course_id)
    )
```

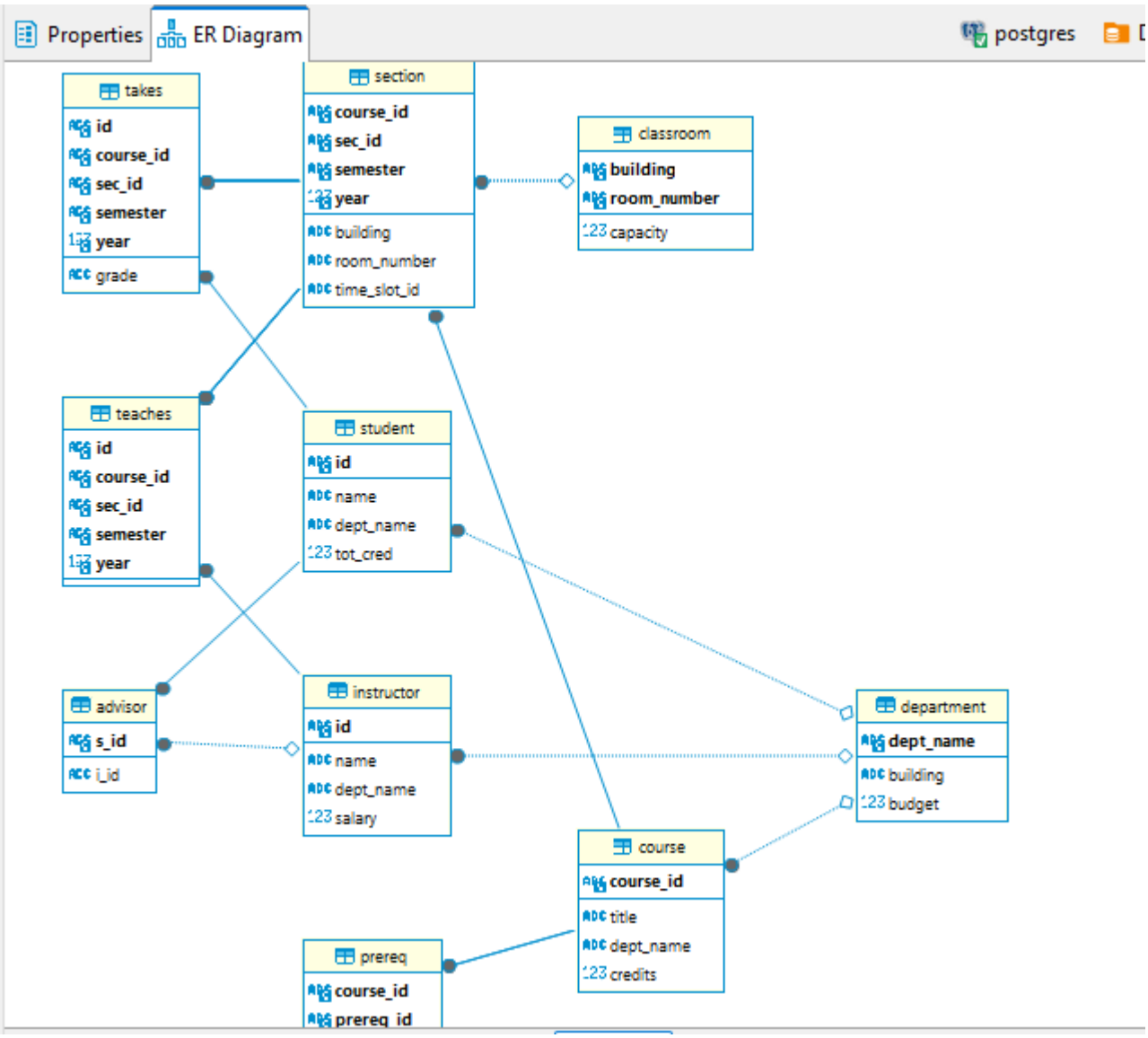
Menampilkan seluruh tabel yang telah ditambahkan melalui query diatas.



Tables
Foreign Tables
Views
Materialized Views
Indexes
Functions
Sequences
Data types
Aggregate functions
Permissions
Source

Table Name	Object ID	Owner	Tablespace	Row Count Estimate	Has Row-Level Security	Partitions	Partitic
advisor	19,421	postgres	pg_default	-1	[ ]	[ ]	
classroom	19,330	postgres	pg_default	-1	[ ]	[ ]	
course	19,341	postgres	pg_default	-1	[ ]	[ ]	
department	19,335	postgres	pg_default	-1	[ ]	[ ]	
instructor	19,352	postgres	pg_default	-1	[ ]	[ ]	
prereq	19,436	postgres	pg_default	-1	[ ]	[ ]	
section	19,363	postgres	pg_default	-1	[ ]	[ ]	
student	19,395	postgres	pg_default	-1	[ ]	[ ]	
takes	19,406	postgres	pg_default	-1	[ ]	[ ]	
teaches	19,380	postgres	pg_default	-1	[ ]	[ ]	

tampilan database relationalnya yang terhubung satu sama lain.



3. Download Code dalam bahasa pemrograman Java. Download Code

code java :

```java
import java.util.Scanner;
import java.io.*;
import java.util.Random;
import java.text.DecimalFormat;

public class tableGen {

    private static int maxClassroom = 100;
    private static int maxStudent = 4000;
    private static int maxDepartment = 50;
    private static int maxRoom = 1000;
    private static int maxCourse = 1000;
    private static int maxSection = 2000;
    private static int maxAdvisor = 4000;
    private static int maxInstructor = 1000;
    private static int maxTeaches = 5000;
    private static int maxTakes= 40000;
    private static int maxPrereq =  1000;
    private static int maxBuilding = 100;
    private static int maxName = 4200;
    private static int maxDept = 100;
    private static int maxTitle = 1000;
    private static double maxSalary = 100000.0;
    private static double maxBudget = 999999.0;
    private static int maxID = 99999;
    private static Random rnd = new Random();
```

4. Compile dan jalan code tersebut pada komputer anda.

maka menghasilkan output pada terminal seperti berikut

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL    PORTS    SQL CONSOLE

'126', 'IF0230', 'DE', 3
'96644', 'Johan', 'BN', 102984.30
'82186', 'Yohan', 'SS', 125350.17
'23365', 'Ahmad', 'GO', 116755.41
'78769', 'Budi', 'IF', 37641.62
'12214', 'rahmat', 'BN', 30824.99
'23971', 'Johan', 'EL', 79277.70
'60585', 'Yohan', 'GO', 37846.98
'30391', 'Adri', 'GF', 94513.98
'71949', 'Adri', 'GF', 122831.57
'44831', 'rahmat', 'BN', 103769.90
'65416', 'Ande', 'DE', 39626.20
'82632', 'Ahmad', 'GO', 123769.39
'2780', 'Yohan', 'GF', 113199.20
'24217', 'Yohan', 'GO', 123178.09
'55652', 'Ahmad', 'MT', 98075.99
'72848', 'rahmat', 'DE', 35151.44
'13557', 'yuyun', 'MT', 49937.52
'46378', 'Ande', 'DE', 76430.32
'9888', 'Ande', 'DE', 122176.07
'75258', 'Adri', 'SS', 128968.89
'47852', 'Ahmad', 'GO', 82113.71
'23279', 'Budi', 'BN', 124551.74
'67582', 'yuyun', 'EL', 52623.57
'1040', 'Ande', 'GO', 35455.05
'9554', 'rahmat', 'GO', 124054.66
'25920', 'Budi', 'DF', 114929.41
'62688', 'Johan', 'FR', 48645.72
'11932', 'yuyun', 'GF', 50129.30
'62330', 'Josu', 'EL', 125024.05
```

File tableGen.class adalah file bytecode yang dihasilkan setelah kompilasi dari kode sumber Java (tableGen.java). File ini tidak dapat dibaca dan diedit secara langsung menggunakan editor teks karena berisi bytecode yang dirancang untuk dijalankan oleh Java Virtual Machine (JVM).

selain itu akan dihasilkan output sql yang menampilkan

tugas tbd riil.md ● | all.sql ×

sql > all.sql

Run on active connection | Select block

```sql
insert into classroom values('A', 335, 60);
insert into classroom values('J', 681, 16);
insert into classroom values('I', 644, 82);
insert into classroom values('F', 474, 81);
insert into classroom values('D', 856, 132);
insert into classroom values('E', 611, 35);
insert into classroom values('J', 379, 111);
insert into classroom values('I', 825, 11);
insert into classroom values('I', 960, 144);
insert into classroom values('J', 403, 24);
insert into department values('SS', 'B', 75227.78);
insert into department values('EL', 'B', 351632.60);
insert into department values('DF', 'A', 6899.35);
insert into department values('BN', 'J', 264738.12);
insert into department values('IF', 'H', 141953.56);
insert into department values('GF', 'A', 348500.80);
insert into department values('FR', 'B', 499749.76);
insert into department values('GO', 'J', 772944.99);
insert into department values('DE', 'B', 370281.92);
insert into department values('MT', 'I', 995168.70);
insert into course values('534', 'IF3333', 'IF', 3);
insert into course values('618', 'IF0230', 'BN', 4);
insert into course values('596', 'IF4041', 'EL', 3);
insert into course values('607', 'IF3031', 'EL', 3);
insert into course values('254', 'IF3022', 'FR', 4);
```

PROBLEMS 9 | OUTPUT | DEBUG CONSOLE | TERMINAL | PORTS | SQL CONSOLE | powershell

versi yang ada di server lokal dengan dbeaver (sama saja)

Statistics 1

Name	Value
Updated Rows	1070
	insert into classroom values('A', 335, 60);
	insert into classroom values('J', 681, 16);
	insert into classroom values('I', 644, 82);
	insert into classroom values('F', 474, 81);
	insert into classroom values('D', 856, 132);
	insert into classroom values('E', 611, 35);
	insert into classroom values('J', 379, 111);
	insert into classroom values('I', 825, 11);
	insert into classroom values('I', 960, 144);
	insert into classroom values('J', 403, 24);
	insert into department values('SS', 'B', 75227.78);
	insert into department values('EL', 'B', 351632.60);
	insert into department values('DF', 'A', 6899.35);
	insert into department values('BN', 'J', 264738.12);
	insert into department values('IF', 'H', 141953.56);
	insert into department values('GF', 'A', 348500.80);
	insert into department values('FR', 'B', 499749.76);
	insert into department values('GO', 'J', 772944.99);
	insert into department values('DE', 'B', 370281.92);
	insert into department values('MT', 'I', 995168.70);

en | Writable | Smart Insert | 1170 : 1 [64527] | Sel: 6...| 1071

a. tampilan tabel classroom setelah diinput

classroom 1

SELECT * FROM classroom | Enter a SQL expression to filter results (use Ctrl+Spa

	building	room_number	capacity
1	A	335	60
2	J	681	16
3	I	644	82
4	F	474	81
5	D	856	132
6	E	611	35
7	J	379	111
8	I	825	11
9	I	960	144
10	J	403	24

b. tampilan tabel departemen setelah diinput

department 1

SELECT * FROM department | Enter a SQL expression to filter results (use C

	dept_name	building	budget
1	SS	B	75,227.78
2	EL	B	351,632.6
3	DF	A	6,899.35
4	BN	J	264,738.12
5	IF	H	141,953.56
6	GF	A	348,500.8
7	FR	B	499,749.76
8	GO	J	772,944.99
9	DE	B	370,281.92
10	MT	I	995,168.7

c. tampilan tabel course setelah diinput

course 1

SELECT * FROM course | Enter a SQL expression to filter results (use Ctrl+Space)

	course_id	title	dept_name	credits
1	534	IF3333	IF	3
2	618	IF0230	BN	4
3	596	IF4041	EL	3
4	607	IF3031	EL	3
5	254	IF3022	FR	4
6	640	IF3022	MT	4
7	626	IF3211	SS	3
8	776	IF3211	DF	3
9	274	IF3031	BN	4
10	362	IF4321	DF	3
11	566	IF3022	MT	4
12	916	IF0230	GF	4
13	298	IF3120	MT	4
14	548	IF4041	MT	3
15	125	IF4041	GF	3
16	820	IF3211	GF	3
17	694	IF3031	MT	4
18	485	IF3120	IF	4
19	681	IF0230	GO	4
20	822	IF4321	GF	4
21	741	IF3022	DE	4
22	941	IF3030	GF	4
23	323	IF5555	SS	4
24	291	IF5555	EL	4

d. tampilan tabel instructor setelah diinput

instructor 1

SELECT * FROM instructor | Enter a SQL expression to filter results (use Ctrl+Space)

	id	name	dept_name	salary
1	96644	Johan	BN	102,984.3
2	82186	Yohan	SS	125,350.17
3	23365	Ahmad	GO	116,755.41
4	78769	Budi	IF	37,641.62
5	12214	rahmat	BN	30,824.99
6	23971	Johan	EL	79,277.7
7	60585	Yohan	GO	37,846.98
8	30391	Adri	GF	94,513.98
9	71949	Adri	GF	122,831.57
10	44831	rahmat	BN	103,769.9
11	65416	Ande	DE	39,626.2
12	82632	Ahmad	GO	123,769.39
13	2780	Yohan	GF	113,199.2
14	24217	Yohan	GO	123,178.09
15	55652	Ahmad	MT	98,075.99
16	72848	rahmat	DE	35,151.44
17	13557	yuyun	MT	49,937.52
18	46378	Ande	DE	76,430.32
19	9888	Ande	DE	122,176.07
20	75258	Adri	SS	128,968.89
21	47852	Ahmad	GO	82,113.71
22	23279	Budi	BN	124,551.74
23	67582	yuyun	EL	52,623.57
24	1040	Ande	GO	35,455.05

e. tampilan tabel section setelah diinput

section 1

SELECT * FROM section | Enter a SQL expression to filter results (use Ctrl+Space)

	course_id	sec_id	semester	year	building	room
1	810	1	Fall	2,004	F	474
2	821	1	Spring	2,006	J	403
3	578	1	Fall	2,002	F	474
4	667	1	Fall	2,009	F	474
5	149	1	Fall	2,002	F	474
6	852	1	Fall	2,010	J	681
7	115	1	Spring	2,010	A	335
8	987	1	Spring	2,005	D	856
9	716	1	Spring	2,010	I	825
10	822	1	Spring	2,010	A	335
11	488	1	Spring	2,004	I	960
12	601	1	Spring	2,006	J	403
13	941	1	Spring	2,008	J	379
14	283	1	Spring	2,004	D	856
15	265	1	Spring	2,001	A	335
16	706	1	Spring	2,010	D	856
17	821	2	Fall	2,004	I	644
18	694	1	Spring	2,005	I	960
19	843	1	Fall	2,010	F	474
20	161	1	Fall	2,010	I	644
21	249	1	Fall	2,004	E	611
22	765	1	Fall	2,010	I	825

f. tampilan tabel teaches setelah diinput

teaches 1

SELECT * FROM teaches | Enter a SQL expression to filter results (use Ctrl+Space)

	id	course_id	sec_id	semester	year
1	62511	149	1	Fall	2,002
2	86632	451	1	Fall	2,004
3	22362	838	1	Spring	2,010
4	62511	861	2	Fall	2,003
5	29078	573	3	Spring	2,002
6	31510	337	1	Fall	2,006
7	53204	490	2	Fall	2,001
8	1249	822	3	Fall	2,010
9	29078	488	1	Spring	2,004
10	62511	763	3	Fall	2,004
11	347	401	1	Fall	2,008
12	22362	339	2	Fall	2,004
13	23254	662	1	Fall	2,006
14	53204	606	1	Spring	2,009
15	53204	987	1	Spring	2,005
16	23254	566	2	Fall	2,007
17	58205	951	1	Spring	2,001
18	62511	672	1	Fall	2,010
19	86632	852	3	Spring	2,010
20	62511	636	1	Spring	2,008
21	62511	697	3	Spring	2,006
22	11932	677	1	Spring	2,002
23	23254	970	1	Spring	2,005
24	1249	806	2	Fall	2,008

g. tampilan tabel student setelah diinput

student 1

SELECT * FROM student | Enter a SQL expression to filter results (use Ctrl+Space)

	id	name	dept_name	tot_cred
1	95633	Johan	GF	10
2	34469	Budi	FR	46
3	873	Josu	GO	35
4	85045	yuyun	BN	7
5	2489	Kiki	MT	128
6	33735	rahmat	IF	94
7	86126	Kiki	SS	92
8	78919	Adri	SS	96
9	3464	Ahmad	SS	52
10	71382	Adri	FR	92
11	89015	Ande	DE	77
12	54533	Adri	EL	38
13	68127	Adri	FR	50
14	44057	Budi	GO	95
15	65108	Yohan	GO	38
16	58057	Ande	DE	95
17	91454	Ahmad	MT	6
18	53179	Budi	DF	124
19	94806	Johan	EL	34
20	63882	Ahmad	BN	9
21	39942	Johan	MT	15
22	89666	yuyun	GF	2

h. tampilan tabel takes setelah diinput

takes 1

SELECT * FROM takes | Enter a SQL expression to filter results (use Ctrl+Space)

	id	course_id	sec_id	semester	year	grade
1	81456	763	3	Fall	2,004	C
2	55906	749	3	Fall	2,007	B+
3	8344	970	1	Spring	2,005	A
4	8326	116	1	Spring	2,001	A
5	11532	942	1	Spring	2,004	B-
6	28340	822	3	Fall	2,010	B-
7	69935	575	1	Fall	2,006	A+
8	86934	467	1	Spring	2,001	B+
9	34469	998	1	Spring	2,008	B
10	32650	606	1	Spring	2,009	C-
11	53246	844	1	Fall	2,009	C-
12	14341	116	1	Spring	2,001	B
13	72326	116	1	Spring	2,001	A
14	81456	404	1	Fall	2,008	B+
15	69935	749	1	Fall	2,001	A
16	89221	293	2	Fall	2,006	B-
17	94806	734	1	Fall	2,002	B
18	93520	617	1	Spring	2,003	C
19	74600	469	1	Fall	2,003	A+
20	53246	490	1	Spring	2,006	A-
21	32650	488	2	Spring	2,008	C-
22	85045	763	1	Fall	2,007	B
23	84963	225	1	Fall	2,003	A-

i. tampilan tabel advisor setelah diinput

advisor 1

SELECT * FROM advisor | Enter a SQL expression to filter results (use C

Grid | Text | Record

	s_id	i_id
1	95633	97758
2	34469	23971
3	873	31510
4	85045	96644
5	2489	60585
6	33735	53204
7	86126	25920
8	78919	44831
9	3464	32765
10	71382	47852
11	89015	1249
12	54533	72848
13	68127	72848
14	44057	9554
15	65108	86316
16	58057	9888
17	91454	62688
18	53179	38668
19	94806	24217
20	63882	22362
21	39942	9888
22	89666	23365
23	87597	2780

j. tampilan tabel prereq setelah diinput

prereq 1

SELECT * FROM prereq | Enter a SQL expression to filter results (use Ctrl+Space)

	course_id	prereq_id
1	648	763
2	136	527
3	135	268
4	860	746
5	298	763
6	716	607
7	144	897
8	548	820
9	392	318
10	528	548
11	263	144
12	500	283
13	268	526
14	604	323
15	328	396
16	534	379
17	749	860
18	533	173
19	829	249
20	163	928
21	987	704
22	533	347

program ini adalah sebuah program untuk menghasilkan data acak dan menyimpannya dalam file SQL yang akan kita lakukan langkah berikutnya untuk aterialized view dan transactions (masing- masing 5)

5. Buat contoh Materialized view dan transactions (masing-masing 5)

contoh Materialized view

a. Total SKS yang Diperoleh Mahasiswa di Tiap Jurusan codenya :

CREATE MATERIALIZED VIEW department_total_credits_mv AS SELECT d.dept_name, SUM(s.tot_cred) AS total_credits FROM department d LEFT JOIN student s ON d.dept_name = s.dept_name GROUP BY d.dept_name;

-- Refresh tampilan materialized secara periodik REFRESH MATERIALIZED VIEW department_total_credits_mv;

output :

Statistics 1

Name	Value
Updated Rows	10
Query	CREATE MATERIALIZED VIEW department_total_credits_mv AS
	SELECT d.dept_name, SUM(s.tot_cred) AS total_credits
	FROM department d
	LEFT JOIN student s ON d.dept_name = s.dept_name
	GROUP BY d.dept_name
Start time	Tue May 28 13:21:32 ICT 2024
Finish time	Tue May 28 13:21:32 ICT 2024

department_total_credits_mv 1

select * from department_total_credits_r | Enter a SQL expressi

	dept_name	total_credits
1	GF	549
2	MT	492
3	DF	316
4	BN	701
5	EL	347
6	DE	531
7	SS	911
8	IF	556
9	GO	570
10	FR	867

disini akan terus di update Total SKS yang Diperoleh Mahasiswa di Tiap Jurusan

b. Gaji Rata-Rata Instruktur di Setiap Departemen codenya :

```
CREATE MATERIALIZED VIEW department_avg_salary_mv AS SELECT d.dept_name, AVG(i.salary) AS avg_salary
FROM department d
LEFT JOIN instructor i ON d.dept_name = i.dept_name
GROUP BY d.dept_name;

-- Refresh the materialized view periodically REFRESH MATERIALIZED VIEW department_avg_salary_mv;
```

outputnya :

Statistics 1

Name	Value
Updated Rows	10
Query	CREATE MATERIALIZED VIEW department_avg_salary_mv AS
	SELECT d.dept_name, AVG(i.salary) AS avg_salary
	FROM department d
	LEFT JOIN instructor i ON d.dept_name = i.dept_name
	GROUP BY d.dept_name
Start time	Tue May 28 13:31:47 ICT 2024
Finish time	Tue May 28 13:31:47 ICT 2024

department_avg_salary_mv 1

select * from department_avg_salary_mv | Enter a SQL expres

	dept_name	avg_salary
1	GF	96,106.84
2	MT	75,044.9775
3	DF	115,404.03
4	BN	79,611.294
5	EL	78,431.0133333333
6	DE	62,001.11
7	SS	117,402.9833333333
8	IF	68,747.135
9	GO	90,424.622
10	FR	78,513.57

disini dapat kita lihat untuk Gaji Rata-Rata Instruktur di Setiap Departemen yang dapat kita lihat secara periodik akan terus terupdate apabila transaksi terus dilakukan.

c. Jumlah Pendaftaran di Setiap Bagian Kursus codenya :

```
CREATE MATERIALIZED VIEW course_enrollment_count_mv AS
SELECT course_id, sec_id, semester, year, COUNT(ID) AS enrollment_count
FROM takes
GROUP BY course_id, sec_id, semester, year;

-- Refresh the materialized view periodically
REFRESH MATERIALIZED VIEW course_enrollment_count_mv;
```

outputnya :

Statistics 1

Name	Value
Updated Rows	128
Query	CREATE MATERIALIZED VIEW course_enrollment_count_mv AS
	SELECT course_id, sec_id, semester, year, COUNT(ID) AS enrollment_count
	FROM takes
	GROUP BY course_id, sec_id, semester, year
Start time	Tue May 28 13:37:00 ICT 2024
Finish time	Tue May 28 13:37:00 ICT 2024

course_enrollment_count_mv 1

select * from course_enrollment_count_ | Enter a SQL expression to filter results (use Ctrl+Space)

	course_id	sec_id	semester	year	enrollment_count
1	573	2	Spring	2,004	2
2	697	1	Spring	2,001	2
3	686	1	Spring	2,002	2
4	648	1	Spring	2,001	2
5	102	1	Fall	2,006	2
6	806	1	Fall	2,006	1
7	142	2	Fall	2,002	1
8	697	3	Spring	2,006	1
9	224	1	Spring	2,001	1
10	431	1	Spring	2,006	1
11	829	1	Fall	2,008	3
12	249	2	Spring	2,010	2
13	761	1	Spring	2,008	2
14	254	1	Spring	2,001	1
15	942	1	Spring	2,004	1
16	548	1	Fall	2,004	1
17	467	1	Spring	2,001	1
18	573	3	Spring	2,002	1
19	852	1	Fall	2,010	2

dari query diatas kita bisa nemampilkan data pendaftaran di setiap bagian kursus yang nantinya bisa kita lakukan terus secara update untuk menampilkan data yang terbaru dan sesuai dengan data transaksionalnya.

d. Total Alokasi Anggaran Tiap Gedung codenya :

```
CREATE MATERIALIZED VIEW building_total_budget_mv AS SELECT c.building, SUM(d.budget) AS total_budget FROM department d JOIN course c ON d.dept_name = c.dept_name GROUP BY c.building;

-- Refresh the materialized view periodically REFRESH MATERIALIZED VIEW building_total_budget_mv;
```

outputnya :

Statistics 1

Name	Value
Updated Rows	5
Query	CREATE MATERIALIZED VIEW building_total_budget_mv AS
	SELECT d.building, SUM(d.budget) AS total_budget
	FROM department d
	GROUP BY d.building
Start time	Tue May 28 13:42:52 ICT 2024
Finish time	Tue May 28 13:42:52 ICT 2024

building_total_budget_mv 1

select * from building_total_budget_mv | Enter a SQL expres

	building	total_budget
1	B	1,296,892.06
2	J	1,037,683.11
3	H	141,953.56
4	I	995,168.7
5	A	355,400.15

disini dapat kita lihat untuk dana yang dikeluarkan untuk anggaran dari setiap gedung, disini tentunya bisa akan terus terupdate apabila ada perubahan pada data yang inputan terbaru untuk anggaran bangunan tersebut

e. Rata-rata Kapasitas Ruangan Berdasarkan Bangunan codenya :

```
CREATE MATERIALIZED VIEW building_avg_capacity_mv AS SELECT building, AVG(capacity) AS avg_capacity
FROM classroom
GROUP BY
building;

-- Refresh the materialized view periodically REFRESH MATERIALIZED VIEW building_avg_capacity_mv;
```