

# Logical Modeling

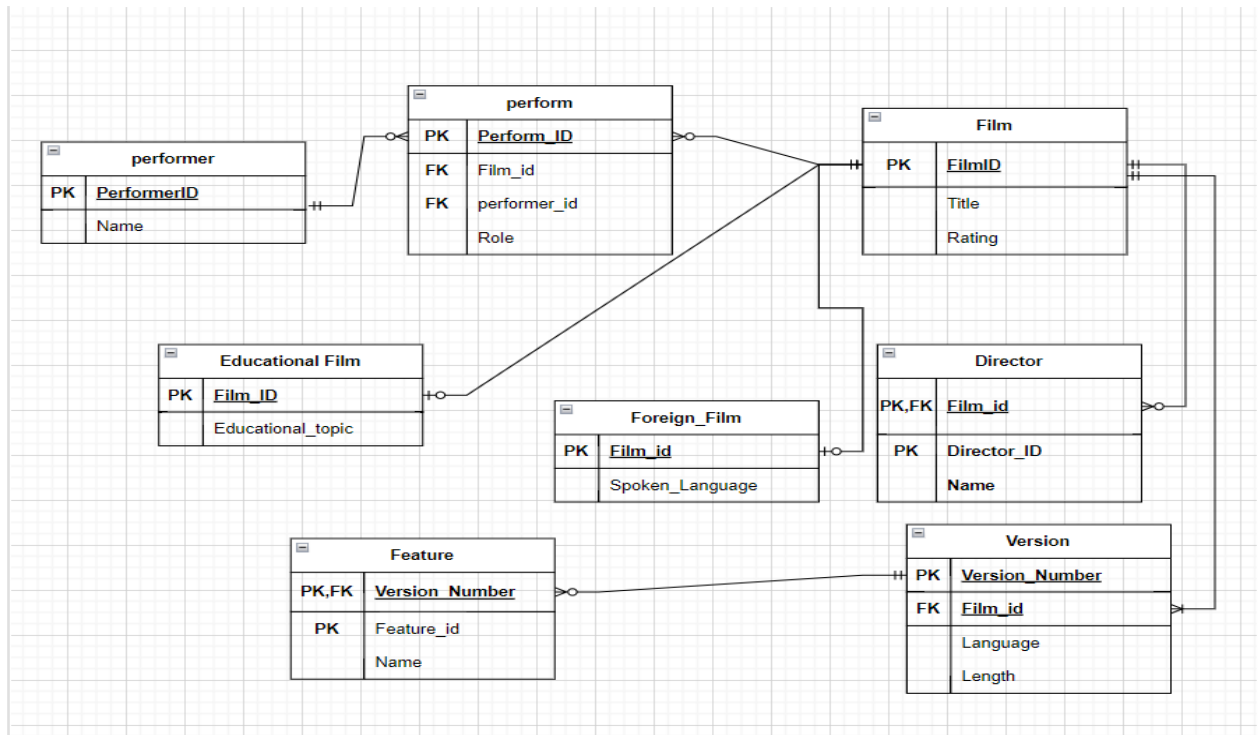
Name: Indla Umesh

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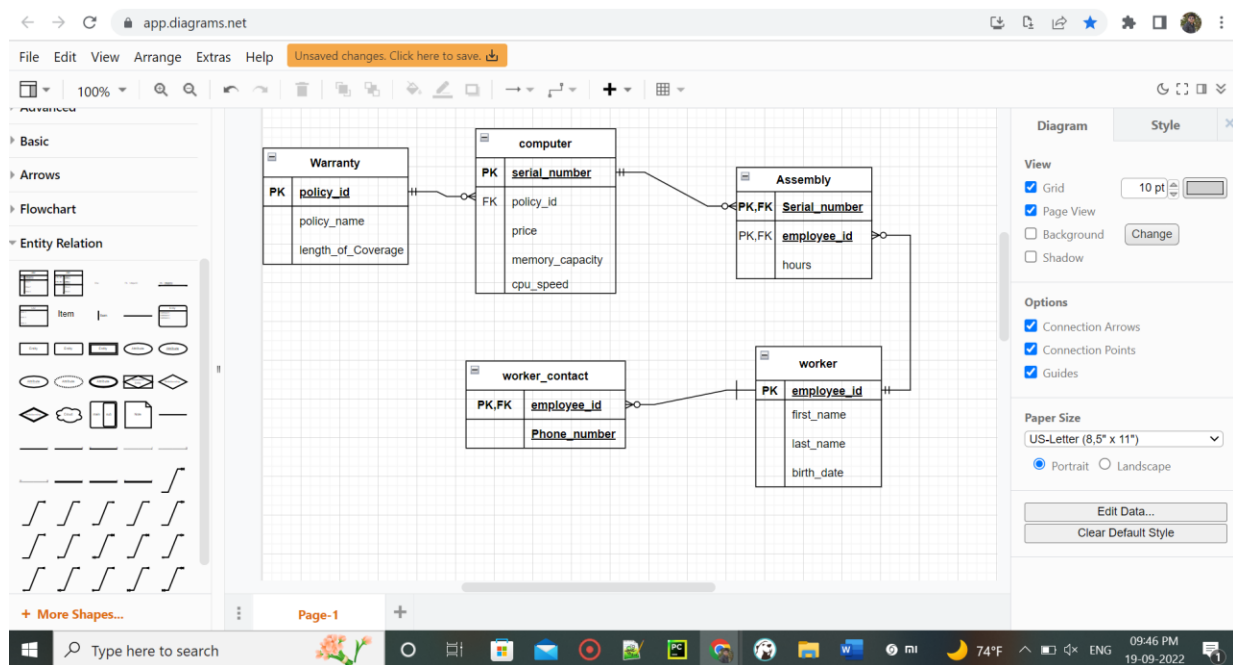
Submission Date: 26-09-2022

Course Name: Database management design

Submission Title: Assignment#2-Logical Modelling



### 3.Transform ER Model into Relational Model

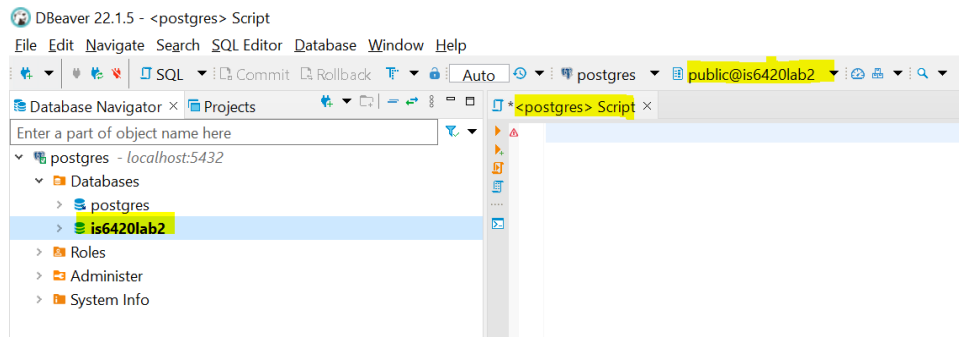


### 4. Implement Physical Model from Relational Model

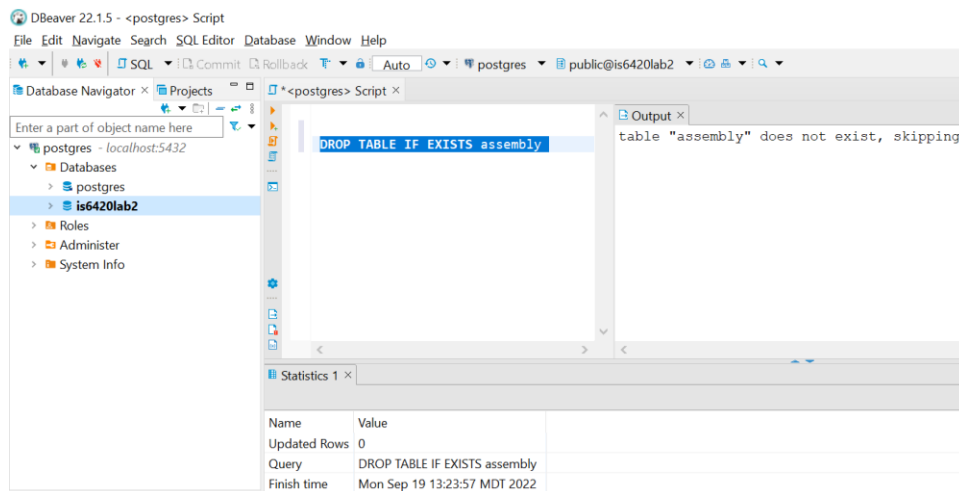
Connect to PostgreSQL database

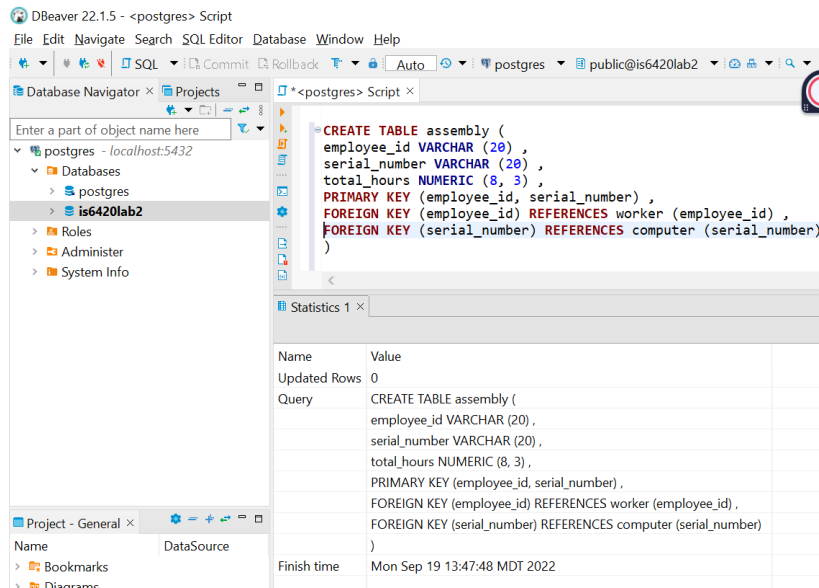
ii. Create a new database called is6420lab2

iii. Set this new database to active

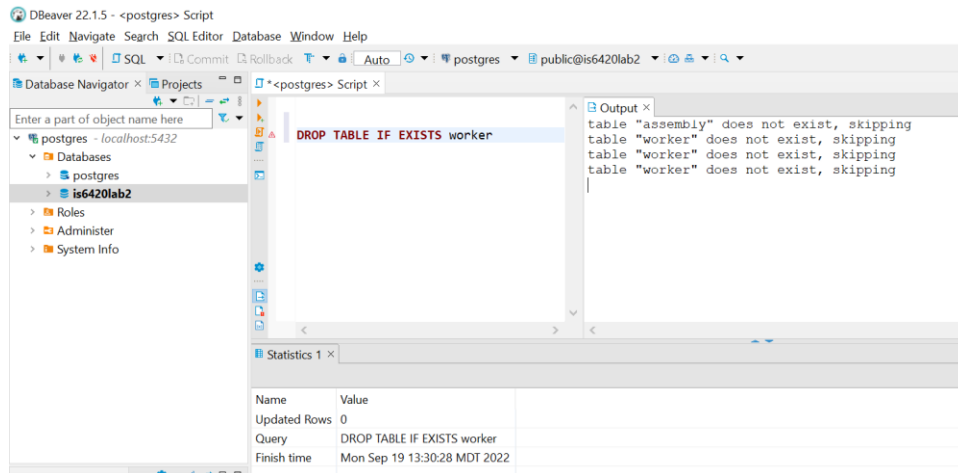


## DROP TABLE IF EXISTS assembly





3



iv. Create tables

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6-

Database Navigator × Projects × \*<postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
    - is6420lab2
  - Roles
  - Administer
  - System Info

```
CREATE TABLE worker (
  employee_id VARCHAR (20) NOT NULL ,
  first_name VARCHAR (50) ,
  last_name VARCHAR (50) ,
  DOB DATE ,
  PRIMARY KEY (employee_id)
)
```

Statistics 1 ×

Name	Value
Updated Rows	0
Query	CREATE TABLE worker ( employee_id VARCHAR (20) NOT NULL , first_name VARCHAR (50) , last_name VARCHAR (50) , DOB DATE , PRIMARY KEY (employee_id) )
Finish time	Mon Sep 19 13:33:06 MDT 2022

Project - General ×

Name DataSource

- Bookmarks
- Diagrams
- Scripts

4

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator × Projects × \*<postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
    - is6420lab2
  - Roles
  - Administer
  - System Info

```
DROP TABLE IF EXISTS warranty;
```

Output ×

```
table "assembly" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "warranty" does not exist, skipping
```

Create table warranty

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator × Projects × \*<postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
    - is6420lab2**
  - Roles
  - Administer
  - System Info

```
CREATE TABLE warranty (
  policy_id VARCHAR (20) NOT NULL ,
  policy_name VARCHAR (50) ,
  term_months INTEGER ,
  PRIMARY KEY (policy_id)
)
```

Statistics 1 ×

Name	Value
Updated Rows	0
Query	CREATE TABLE warranty (           policy_id VARCHAR (20) NOT NULL ,           policy_name VARCHAR (50) ,           term_months INTEGER ,           PRIMARY KEY (policy_id)         )
Finish time	Mon Sep 19 13:38:50 MDT 2022

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator × Projects × \*<postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
    - is6420lab2**
  - Roles
  - Administer
  - System Info

```
DROP TABLE IF EXISTS computer;
```

Output ×

```
table "assembly" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "warranty" does not exist, skipping
table "computer" does not exist, skipping
```

Statistics 1 ×

Name	Value
Updated Rows	0
Query	DROP TABLE IF EXISTS computer
Finish time	Mon Sep 19 13:40:27 MDT 2022

5

Create table computer

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator × Projects × \* <postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
      - is6420lab2
    - Roles
    - Administer
    - System Info

```

CREATE TABLE computer (
  serial_number VARCHAR (20) NOT NULL
, cpu_speed_ghz NUMERIC (6, 3)
, memory_size_gb NUMERIC (8, 3)
, price MONEY
, dvd_speed_rpm NUMERIC (8, 3)
, policy_id VARCHAR (20)
, PRIMARY KEY (serial_number)
, FOREIGN KEY (policy_id) REFERENCES warranty (policy_id)
)

```

Statistics 1 ×

Name	Value
Updated Rows	0
Query	CREATE TABLE computer ( serial_number VARCHAR (20) NOT NULL , cpu_speed_ghz NUMERIC (6, 3) , memory_size_gb NUMERIC (8, 3) , price MONEY , dvd_speed_rpm NUMERIC (8, 3) , policy_id VARCHAR (20) , PRIMARY KEY (serial_number) , FOREIGN KEY (policy_id) REFERENCES warranty (policy_id) )
Finish time	Mon Sep 19 13:43:14 MDT 2022

Project - General ×

Name DataSource

- Bookmarks
- Diagrams
- Scripts

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator × Projects × \* <postgres> Script ×

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
      - is6420lab2
    - Roles
    - Administer
    - System Info

```

DROP TABLE IF EXISTS assembly

```

Output ×

```

table "assembly" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "worker" does not exist, skipping
table "warranty" does not exist, skipping
table "computer" does not exist, skipping
table "assembly" does not exist, skipping

```

Statistics 1 ×

Name	Value
Updated Rows	0
Query	DROP TABLE IF EXISTS assembly
Finish time	Mon Sep 19 13:45:11 MDT 2022

## Create table assembly

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator Projects

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
      - is6420lab2**
      - Roles
      - Administer
      - System Info

```
CREATE TABLE assembly (  
    employee_id VARCHAR (20) ,  
    serial_number VARCHAR (20) ,  
    total_hours NUMERIC (8, 3) ,  
    PRIMARY KEY (employee_id, serial_number) ,  
    FOREIGN KEY (employee_id) REFERENCES worker (employee_id) ,  
    FOREIGN KEY (serial_number) REFERENCES computer (serial_number)  
)
```

Statistics 1

Name	Value
Updated Rows	0
Query	CREATE TABLE assembly ( employee_id VARCHAR (20) , serial_number VARCHAR (20) , total_hours NUMERIC (8, 3) , PRIMARY KEY (employee_id, serial_number) , FOREIGN KEY (employee_id) REFERENCES worker (employee_id) , FOREIGN KEY (serial_number) REFERENCES computer (serial_number) )
Finish time	Mon Sep 19 13:47:48 MDT 2022

Project - General

Name DataSource

- Bookmarks
- Diagram

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator Projects

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
      - is6420lab2**
      - Roles
      - Administer
      - System Info

```
DROP TABLE IF EXISTS contact
```

Output

table "assembly" does not exist, skipping  
table "worker" does not exist, skipping  
table "worker" does not exist, skipping  
table "warranty" does not exist, skipping  
table "computer" does not exist, skipping  
table "assembly" does not exist, skipping  
table "contact" does not exist, skipping

Statistics 1

Name	Value
Updated Rows	0
Query	DROP TABLE IF EXISTS contact
Finish time	Mon Sep 19 13:53:26 MDT 2022



DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator x Projects x \*<postgres> Script x

Enter a part of object name here

- postgres - localhost:5432
  - Databases
    - postgres
    - is6420lab2**
      - Roles
      - Administer
      - System Info

```
CREATE TABLE contact (
  employee_id VARCHAR (20) NOT NULL
  , phone_number VARCHAR (10) NOT NULL
  , PRIMARY KEY (employee_id, phone_number)
  , FOREIGN KEY (employee_id) REFERENCES worker (employee_id)
)
```

Statistics 1 x

Name	Value
Updated Rows	0
Query	CREATE TABLE contact (           employee_id VARCHAR (20) NOT NULL           , phone_number VARCHAR (10) NOT NULL           , PRIMARY KEY (employee_id, phone_number)           , FOREIGN KEY (employee_id) REFERENCES worker (employee_id)         )
Finish time	Mon Sep 19 13:56:44 MDT 2022

DBeaver 22.1.5 - <postgres> Script

File Edit Navigate Search SQL Editor Database Window Help

SQL Commit Rollback Auto postgres public@is6420lab2

Database Navigator x Projects x \*<postgres> Script x

Enter a part of object name here

- postgres
  - is6420lab2**
    - Schemas
      - public**
        - Tables**
          - assembly 8K
          - computer 8K
          - contact 8K
          - warranty 8K
          - worker 8K

```
select * from assembly;
select * from computer;
select * from contact;
select * from warranty;
select * from worker;
```

assembly 1 computer 1 (2) x contact 1 (3) warranty 1 (4) worker 1 (5)

select \* from assembly; select \* from computer; Data filter is not supported

serial_number	cpu_speed_ghz	memory_size_gb	price	dvd_speed_rpm	policy_id

v. Inserted 1 record

vi- verify the data select \* from assembly

The screenshot shows the DBeaver 22.1.5 interface with a PostgreSQL database. The left sidebar displays the database schema, including the 'assembly' table. The main window shows a SQL script with several INSERT statements. The results pane at the bottom displays the output of the 'select \* from assembly;' query, showing one record with employee\_id 'w12343', serial\_number 's1234', and total\_hours 4.75.

```
select * from assembly;
select * from computer;
select * from contact;
select * from warranty;
select * from worker;

INSERT INTO warranty VALUES ('p01', '3-year warranty', 36);

INSERT INTO worker values ('w12343','Sally','Jones','1984-05-24');

INSERT INTO computer VALUES ('s1234', 3.5, 8, 1299.99, 1600, 'p01');

INSERT INTO assembly VALUES ('w12343','s1234', 4.75);

INSERT INTO contact VALUES ('w12343','8015551111');
```

employee_id	serial_number	total_hours
w12343	s1234	4.75

select \* from computer

The screenshot shows the DBeaver 22.1.5 interface with a PostgreSQL database. The left sidebar displays the database schema, including the 'computer' table. The main window shows a SQL script with several INSERT statements. The results pane at the bottom displays the output of the 'select \* from computer;' query, showing one record with serial\_number 's1234', cpu\_speed\_ghz 3.5, memory\_size\_gb 8, price 1,299.99, dvd\_speed\_rpm 1,600, and policy\_id 'p01'.

```
select * from assembly;
select * from computer;
select * from contact;
select * from warranty;
select * from worker;

INSERT INTO warranty VALUES ('p01', '3-year warranty', 36);

INSERT INTO worker values ('w12343','Sally','Jones','1984-05-24');

INSERT INTO computer VALUES ('s1234', 3.5, 8, 1299.99, 1600, 'p01');

INSERT INTO assembly VALUES ('w12343','s1234', 4.75);

INSERT INTO contact VALUES ('w12343','8015551111');
```

serial_number	cpu_speed_ghz	memory_size_gb	price	dvd_speed_rpm	policy_id
s1234	3.5	8	1,299.99	1,600	p01

## Select \* from contact

The screenshot shows the DBeaver 22.1.5 interface. The left sidebar displays the database schema with the 'public' schema selected, showing tables: assembly, computer, contact, warranty, and worker. The main SQL editor contains the following script:

```
select * from assembly;
select * from computer;
select * from contact;
select * from warranty;
select * from worker;

INSERT INTO warranty VALUES ('p01', '3-year warranty', 36);

INSERT INTO worker values ('w12343', 'Sally', 'Jones', '1984-05-24');

INSERT INTO computer VALUES ('s1234', 3.5, 8, 1299.99, 1600, 'p01');

INSERT INTO assembly VALUES ('w12343', 's1234', 4.75);

INSERT INTO contact VALUES ('w12343', '8015551111');
```

The bottom toolbar shows tabs for 'assembly 1', 'computer 1 (2)', 'contact 1 (3)', 'warranty 1 (4)', and 'worker 1 (5)'. The 'contact 1 (3)' tab is active, displaying a data grid with the following data:

employee_id	phone_number
1	w12343 8015551111

## Select \* from warranty

The screenshot shows the DBeaver 22.1.5 interface. The left sidebar displays the database schema with the 'public' schema selected, showing tables: assembly, computer, contact, warranty, and worker. The main SQL editor contains the following script:

```
select * from assembly;
select * from computer;
select * from contact;
select * from warranty;
select * from worker;

INSERT INTO warranty VALUES ('p01', '3-year warranty', 36);

INSERT INTO worker values ('w12343', 'Sally', 'Jones', '1984-05-24');

INSERT INTO computer VALUES ('s1234', 3.5, 8, 1299.99, 1600, 'p01');

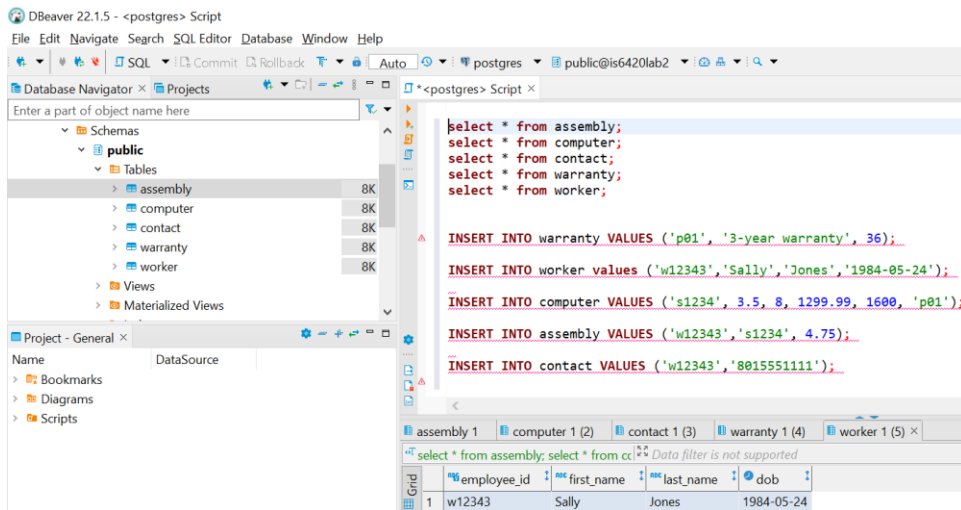
INSERT INTO assembly VALUES ('w12343', 's1234', 4.75);

INSERT INTO contact VALUES ('w12343', '8015551111');
```

The bottom toolbar shows tabs for 'assembly 1', 'computer 1 (2)', 'contact 1 (3)', 'warranty 1 (4)', and 'worker 1 (5)'. The 'warranty 1 (4)' tab is active, displaying a data grid with the following data:

policy_id	policy_name	term_months
1	p01	3-year warranty 36

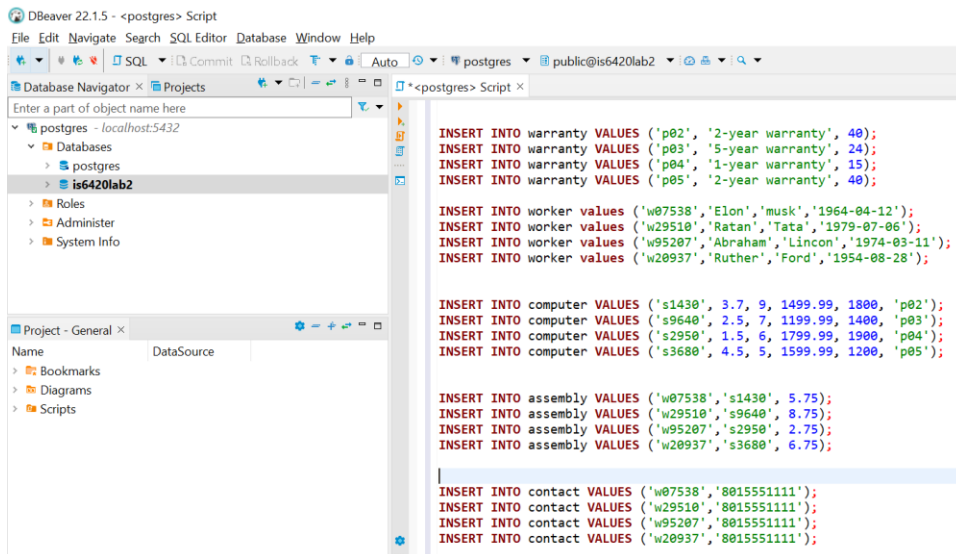
Select \* from worker



## Challenge Exercise – Part 1

### 1. Add more data to the tables

a. Insert 4 more records in all 5 tables



b) verify the inserted data with Select \* from assembly

\*<postgres> Script ×

```
select * from assembly;
```

assembly 1 ×

select \* from assembly Enter a SQL expression to filter results (us

	employee_id	serial_number	total_hours
1	w12343	s1234	4.75
2	w07538	s1430	5.75
3	w29510	s9640	8.75
4	w95207	s2950	2.75
5	w20937	s3680	6.75

Select \* from warranty

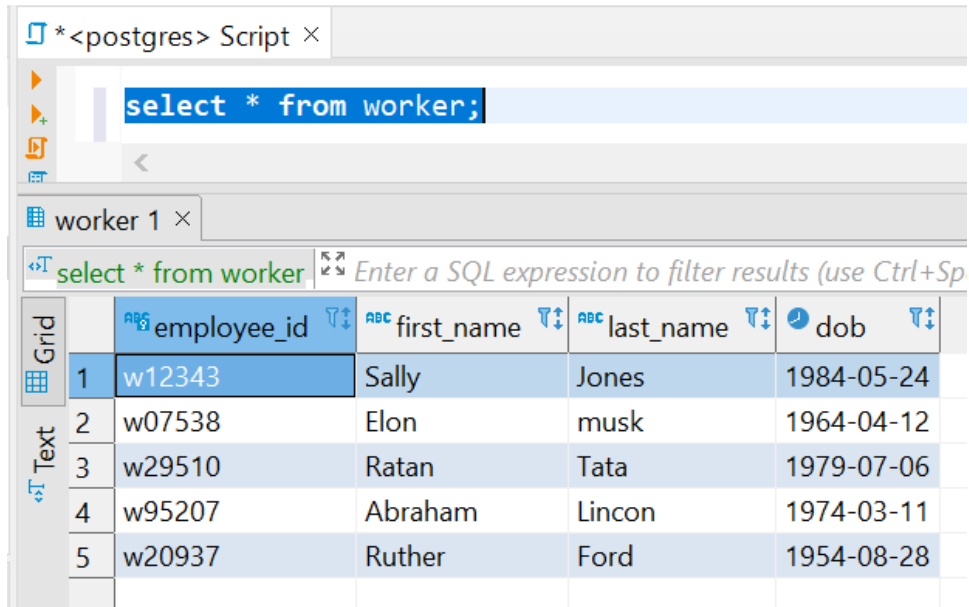
```
select * from warranty;
```

warranty 1 ×

select \* from warranty Enter a SQL expression to filter resul

	policy_id	policy_name	term_months
1	p01	3-year warranty	36
2	p02	2-year warranty	40
3	p03	5-year warranty	24
4	p04	1-year warranty	15
5	p05	2-year warranty	40

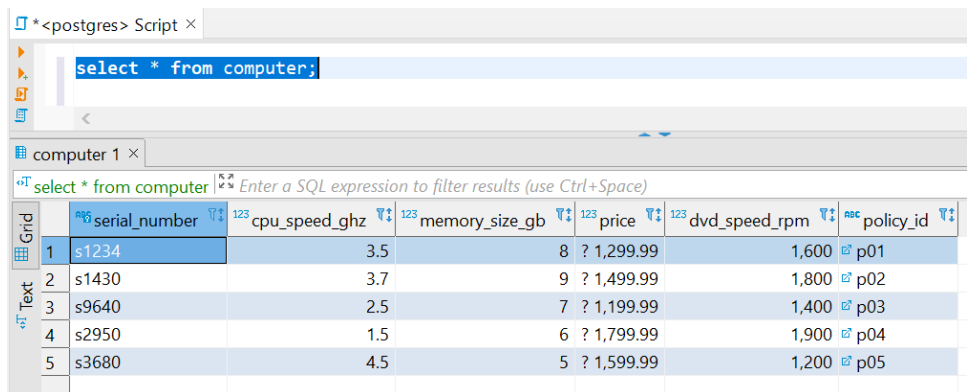
Select \* from worker



The screenshot shows a database application interface. At the top, there is a tab labeled '\*<postgres> Script'. Below it, a text area contains the SQL query 'select \* from worker;'. Below the text area, there is a tab labeled 'worker 1'. Below the tab, there is a text area containing the SQL query 'select \* from worker'. Below the text area, there is a table with the following columns: employee\_id, first\_name, last\_name, and dob. The table contains five rows of data.

	employee_id	first_name	last_name	dob
1	w12343	Sally	Jones	1984-05-24
2	w07538	Elon	musk	1964-04-12
3	w29510	Ratan	Tata	1979-07-06
4	w95207	Abraham	Lincon	1974-03-11
5	w20937	Ruther	Ford	1954-08-28

Select \* from computer



The screenshot shows a database application interface. At the top, there is a tab labeled '\*<postgres> Script'. Below it, a text area contains the SQL query 'select \* from computer;'. Below the text area, there is a tab labeled 'computer 1'. Below the tab, there is a text area containing the SQL query 'select \* from computer'. Below the text area, there is a table with the following columns: serial\_number, cpu\_speed\_ghz, memory\_size\_gb, price, dvd\_speed\_rpm, and policy\_id. The table contains five rows of data.

	serial_number	cpu_speed_ghz	memory_size_gb	price	dvd_speed_rpm	policy_id
1	s1234	3.5	8	? 1,299.99	1,600	p01
2	s1430	3.7	9	? 1,499.99	1,800	p02
3	s9640	2.5	7	? 1,199.99	1,400	p03
4	s2950	1.5	6	? 1,799.99	1,900	p04
5	s3680	4.5	5	? 1,599.99	1,200	p05

Select \* from contact

The screenshot shows the DBeaver SQL Editor interface. The top panel displays the query: `select * from contact;`. Below the query editor, the results are shown in a table with two columns: `employee_id` and `phone_number`. The table contains five rows of data.

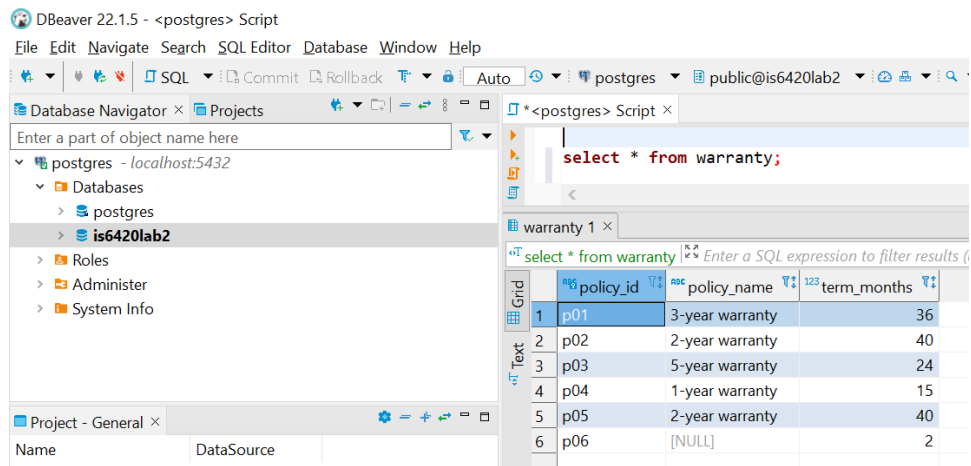
	employee_id	phone_number
1	w12343	8015551111
2	w07538	8015551111
3	w29510	8015551111
4	w95207	8015551111
5	w20937	8015551111

## 2.1 Practice on Null

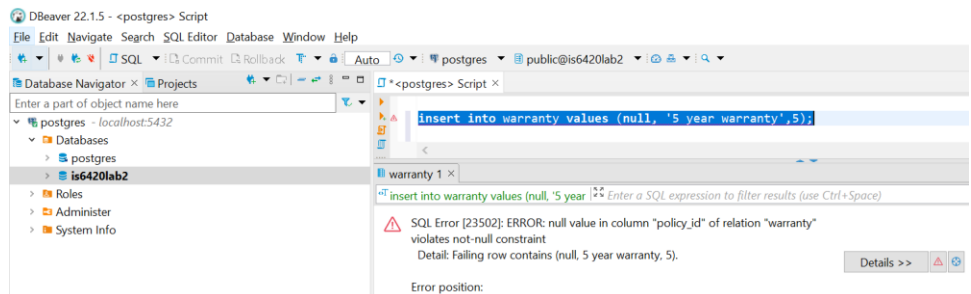
insert into warranty values ('p02', null, 2);

The screenshot shows the DBeaver SQL Editor interface. The top panel displays the query: `insert into warranty values ('p06', null, 2);`. Below the query editor, the results are shown in a table with two columns: `Name` and `Value`. The table contains three rows of data.

Name	Value
Updated Rows	1
Query	insert into warranty values ('p06', null, 2)
Finish time	Mon Sep 19 21:02:56 MDT 2022



B. insert into warranty values (null, '5 year warranty',5);

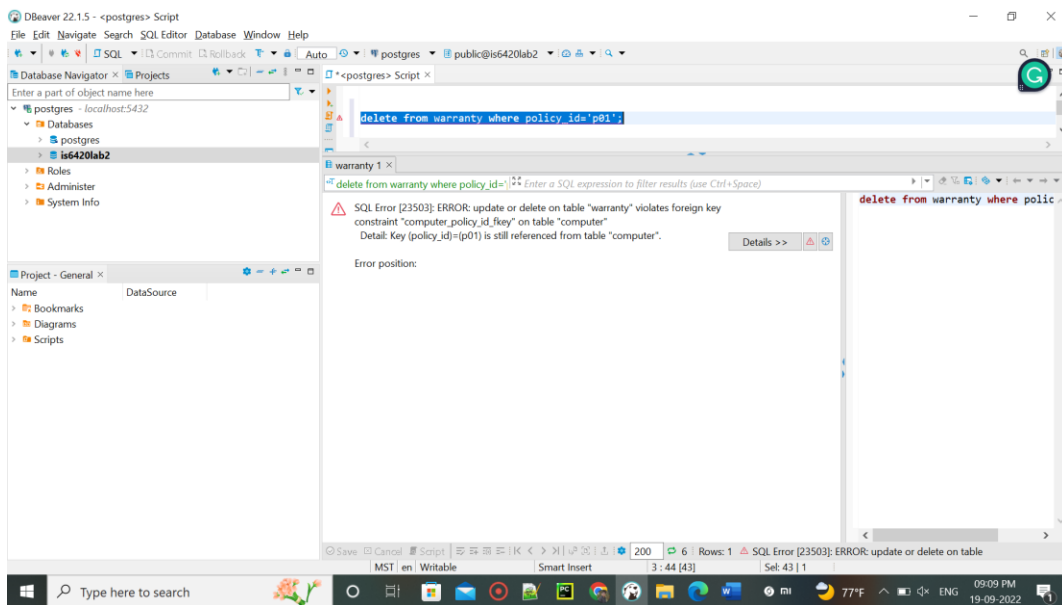




### 3. Practice on referential integrity

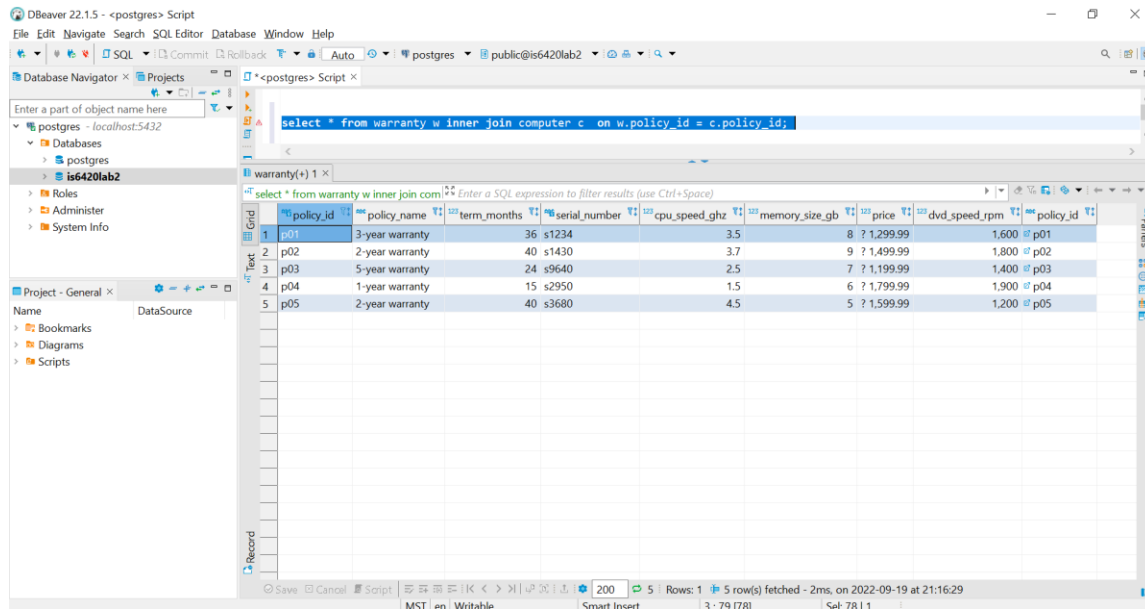
a. Will the following deletion work? <Answer 3a:>

i. delete from warranty where policy\_id='p01';



## Challenge Exercise – Part 2

1. Research how to create queries that: 1) join multiple table; 2) use aggregate functions (e.g., sum ()); and 3) “order by” statements



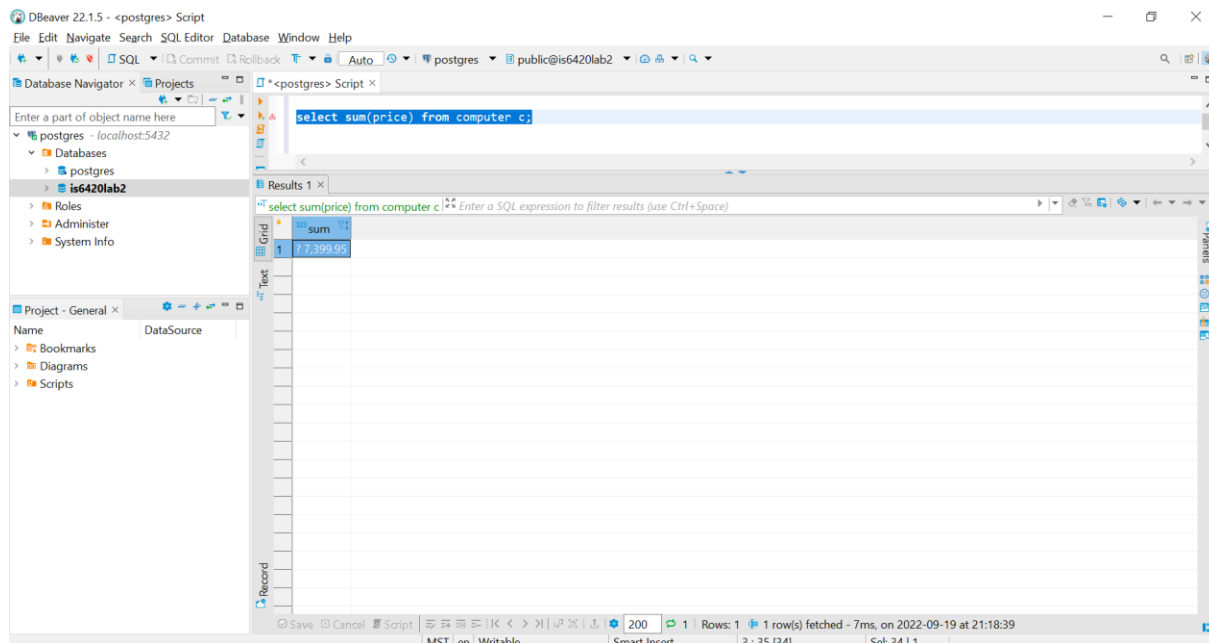
The screenshot shows the DBeaver 22.1.5 interface. The SQL Editor contains the query: `select * from warranty w inner join computer c on w.policy_id = c.policy_id;`. The Results pane displays the following data:

	policy_id	policy_name	term_months	serial_number	cpu_speed_ghz	memory_size_gb	price	dvd_speed_rpm	policy_id
1	p01	3-year warranty	36	s1234	3.5	8	1,299.99	1,600	p01
2	p02	2-year warranty	40	s1430	3.7	9	1,499.99	1,800	p02
3	p03	5-year warranty	24	s9640	2.5	7	1,199.99	1,400	p03
4	p04	1-year warranty	15	s2950	1.5	6	1,799.99	1,900	p04
5	p05	2-year warranty	40	s3680	4.5	5	1,599.99	1,200	p05

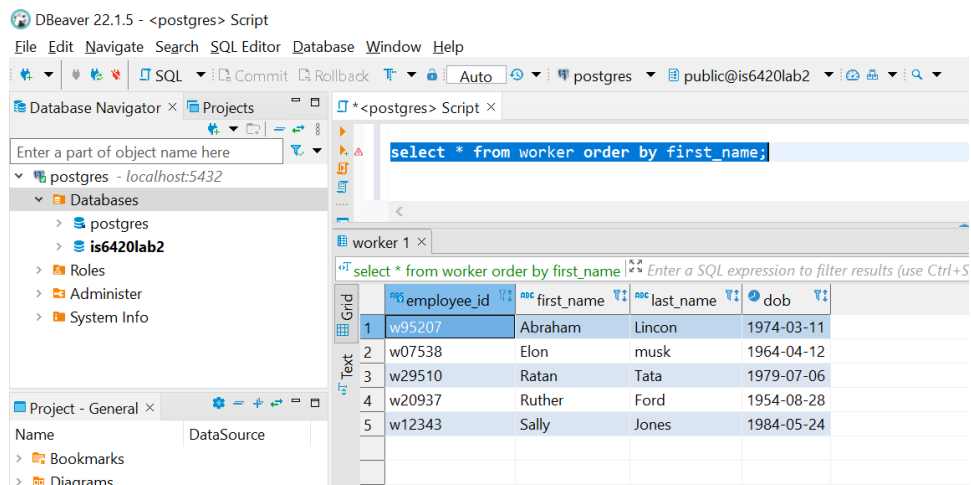
The status bar at the bottom indicates: Rows: 1 | 5 row(s) fetched - 2ms, on 2022-09-19 at 21:16:29.

17

Select sum(price) from computer c;

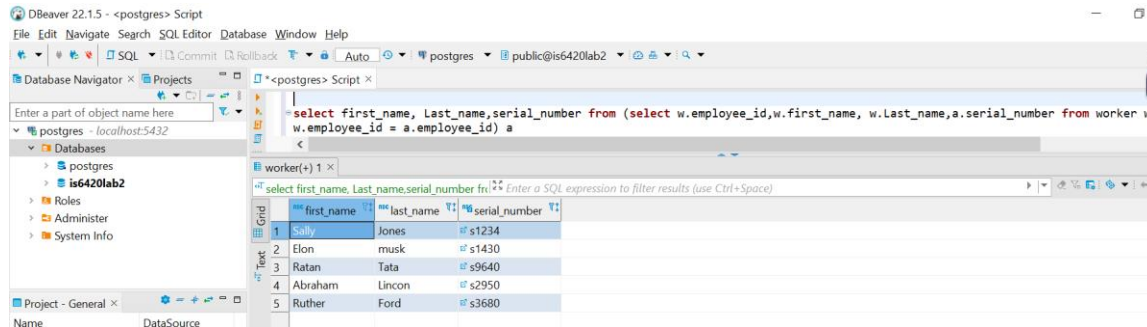


Select \* from worker order by first\_name;

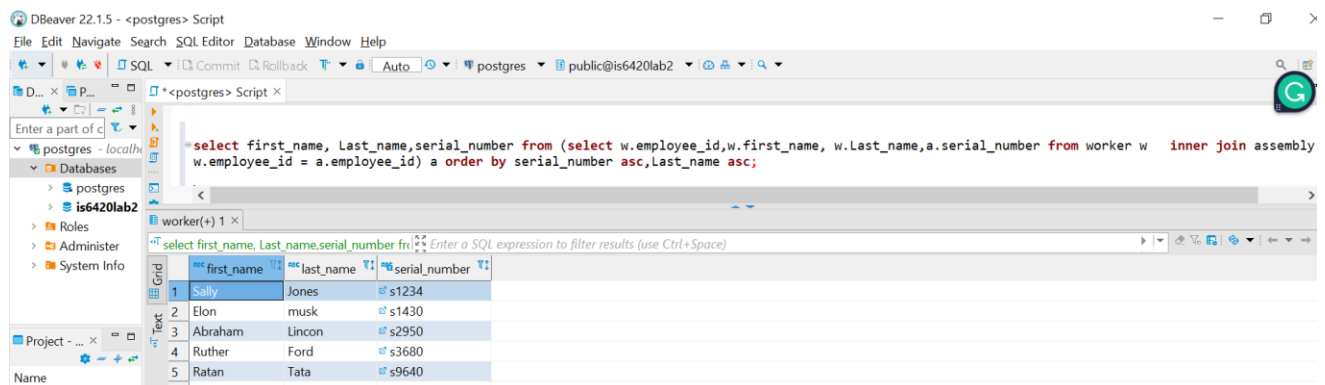


## 2. Create a query that displays all of the employees who worked on a computer

a. Columns should include: computer's serial number, employee's first name, employee's last name



b. should be ordered by the computer's serial number (ascending) and then employee's last name (ascending)



### 3. Create a query that displays the total number of labor hours spent on each computer

- Columns should include: computer's serial number, total hours spent
- Results should be ordered by total hours (descending)

The screenshot shows the DBeaver 22.1.5 interface. The SQL Editor contains the query: `select serial_number, total_hours from assembly order by total_hours desc;`. The Results tab shows a table with 5 rows of data, ordered by total hours in descending order.

	serial_number	total_hours
1	s9640	8.75
2	s3680	6.75
3	s1430	5.75
4	s1234	4.75
5	s2950	2.75