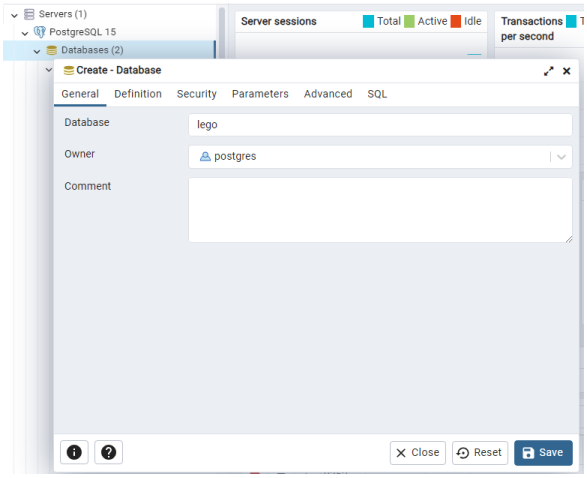
HW1

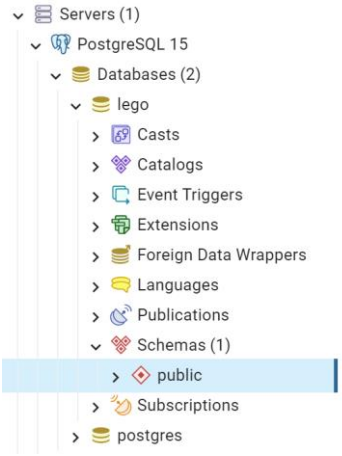
1. The process of creating the “lego” databases (can be screenshot and/or SQL/non-SQL statements with text explanation) (8pts)

   Ans:

   (1) 在 Servers->PostgreSQL->Databases 點擊右鍵，選擇 Create->Database。

   (2) 將 Database 取名為 lego，並按 Save 儲存，如下圖。





2. The process of importing eight required .csv files into lego database (can be screenshot and/or SQL/non-SQL statements with text explanation). Please include/describe the **data type and keys** of the imported table in your screenshot, SQL statements, and explanations (32pts)

   Ans:

   (1) 在 lego 點擊右鍵，選擇 Query Tool，即會顯示一撰寫 SQL 之頁面。

   (2) 創建八個 tables，分別為 colors、themes、sets、inventories、inventory_parts、inventory_sets、part_categories、parts，並個別設置其 column、primary key 及 foreign key，詳細步驟如下圖程式碼。

   (3) 按下執行按鈕後，即可在 lego->Schemas->public->Tables 看到成功創建的 8 個 tables。

   (4) 註 1：要注意創建 table 的順序，會影響 foreign key 的設置。

   (5) 註 2：中途發現計算 avg 的 datatype 應為數字，因此使用 ALTER 更改 sets table 中的 num_parts。

Query Query History

```
1  create table colors
2  (id varchar(4),
3   name varchar(30) not null,
4   rgb char(6),
5   is_trans char(1),
6   primary key(id)
7  );
8
9  create table themes
10 (id varchar(3),
11  name varchar(50),
12  parent_id varchar(3),
13  primary key (id)
14 );
15
16 create table sets
17 (set_num varchar(20),
18  name varchar(100),
19  year numeric(4,0),
20  theme_id varchar(3),
21  num_parts varchar(4),
22  primary key(set_num),
23  foreign key (theme_id) references themes(id)
24 );
25
```

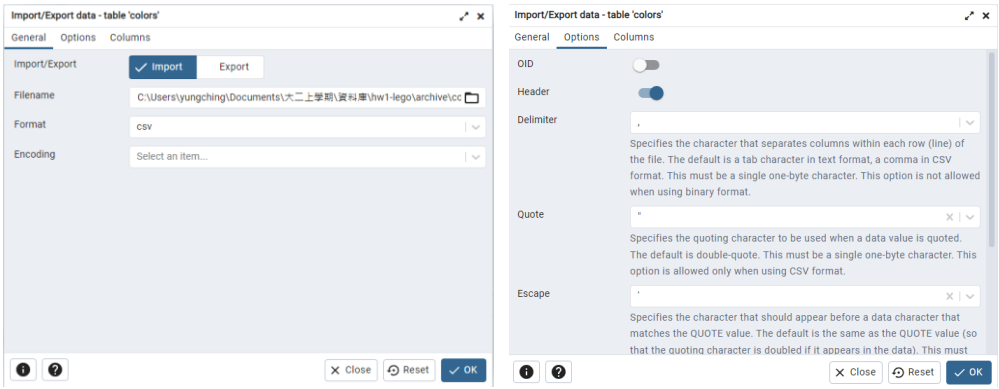
```
ALTER TABLE sets
ALTER COLUMN num_parts TYPE integer USING num_parts::integer;
```

Query Query History

```
26 create table inventories
27 (id varchar(5),
28  version numeric(1,0),
29  set_num varchar(20),
30  primary key(id),
31  foreign key (set_num) references sets(set_num) on delete set null
32 );
33
34 create table inventory_parts
35 (inventory_id varchar(5),
36  part_num varchar(20),
37  color_id varchar(4),
38  quantity int,
39  is_spare varchar(1),
40  primary key(inventory_id,part_num,color_id,quantity,is_spare),
41  foreign key (color_id) references colors(id),
42  foreign key (inventory_id) references inventories(id)
43 );
44
45 create table inventory_sets
46 (inventory_id varchar(5),
47  set_num varchar(20),
48  quantity int,
49  primary key(inventory_id,set_num),
50  foreign key (inventory_id) references inventories(id),
51  foreign key (set_num) references sets(set_num)
52 );
53
```

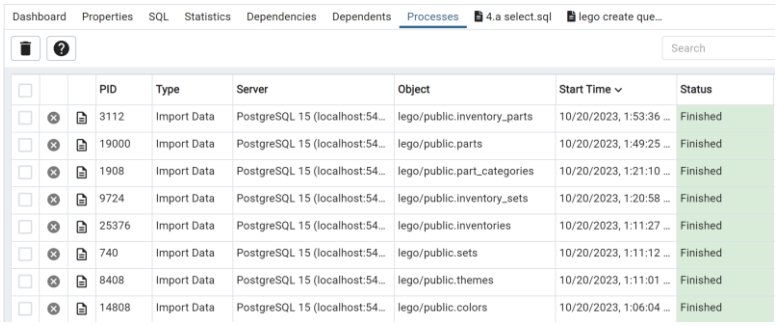
```
54 create table part_categories
55 (id varchar(2),
56  name varchar(50),
57  primary key(id)
58 );
59
60 create table parts
61 (part_num varchar(15),
62  name varchar(300),
63  part_cat_id varchar(2),
64  primary key(part_num),
65  foreign key (part_cat_id) references part_categories(id)
66 );
67
68
```

(6) 右鍵點擊 colors table，選擇 Import/Export Data，在 Filename 選擇要匯入的對應 csv 檔，並在 Options 中將 Header 選項開啟，最後按下 OK 按鈕。

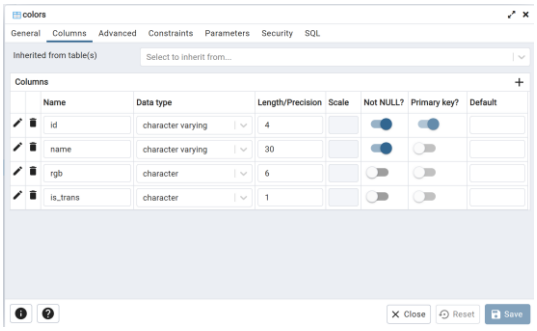


(7) 對於 themes、sets、inventories、inventory_parts、inventory_sets、part_categories、parts 其餘七個 tables，也同步驟(6) import data。

(8) 可在 Processes 檢查，是否所有 table 的 data 都有成功 import，如下圖。



(9) 註 3：可對該 table 點擊右鍵選擇 Properties->Columns，檢查 column 的 datatype 及 primary key 是否正確，如下圖 colors table 的範例。



3. The **SQL statements** and **output results** of 4a (10pts). If the SQL statements or output results are not provided, you will not get the points.

Ans:

(1) SQL statements：

```sql
--4.a
select sets.name set_name, themes.name theme_name
from sets, themes
where sets.theme_id=themes.id
and sets.year ='2017'

```

(2) Output results：

完整結果連結 (可直接點擊) 共 296 行

Data Output | Messages | Notifications

	set_name character varying (100)	theme_name character varying (50)
1	Assembly Square	Modular Buildings
2	Carousel	Creator
3	Creative Builder Box	Classic
4	Creative Box	Classic
5	Blue Creative Box	Classic
6	Red Creative Box	Classic
7	Green Creative Box	Classic
8	Orange Creative Box	Classic
9	Demolition Site	Juniors
10	Police Truck Chase	Juniors
11	Anna & Elsa's Frozen Playground	Juniors
12	Batman vs. Mr. Freeze	Juniors
13	Fire Patrol Suitcase	Juniors
14	Mia's Farm Suitcase	Juniors
15	Andrea and Stephanie's Beach Holiday	Juniors
16	Miles' Space Adventures	Duplo
17	My First Number Train	Duplo
18	My First Plane	Duplo
19	My First Bird	Duplo

Total rows: 296 of 296 | Query complete 00:00:00.043

4. The SQL statements and output results of 4b (10pts)

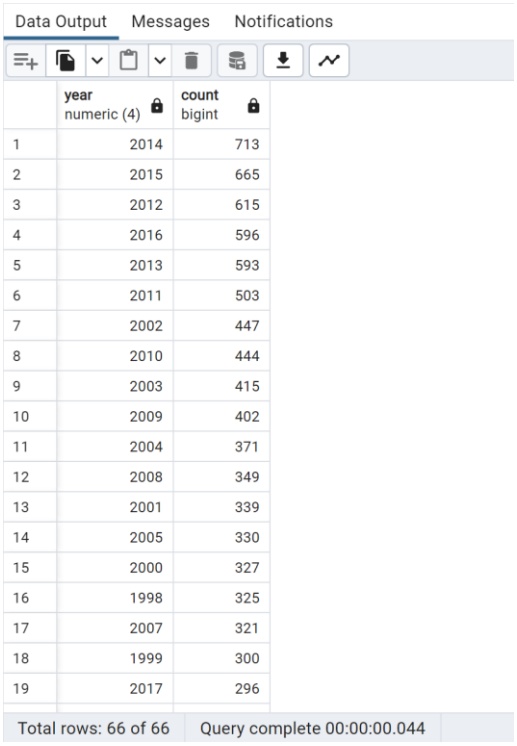
Ans:

(1) SQL statements：

```
7  -- 4.b
8  select year,count (set_num) as count
9  from sets
10 where (year>=1950 and year<=2017)
11 group by year
12 order by count desc
```

(2) Output results：

完整結果連結 (可直接點擊) 共 66 行



Data Output | Messages | Notifications

	year numeric (4)	count bigint
1	2014	713
2	2015	665
3	2012	615
4	2016	596
5	2013	593
6	2011	503
7	2002	447
8	2010	444
9	2003	415
10	2009	402
11	2004	371
12	2008	349
13	2001	339
14	2005	330
15	2000	327
16	1998	325
17	2007	321
18	1999	300
19	2017	296

Total rows: 66 of 66 | Query complete 00:00:00.044

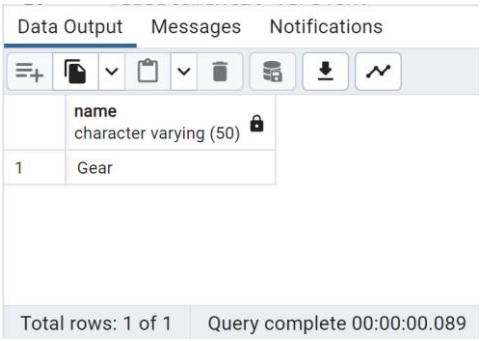
5. The SQL statements and output results of 4c (10pts)

Ans:

(1) SQL statements：

```
-- 4.c
with theme_count(theme_id,value)as
(select theme_id,count(set_num)
 from sets
 group by theme_id
)
select themes.name
from themes,theme_count
where themes.id=theme_count.theme_id
and value=(select max(value) from theme_count)
```

(2) Output results：



Data Output | Messages | Notifications

	name character varying (50)
1	Gear

Total rows: 1 of 1 | Query complete 00:00:00.089

6. The SQL statements and output results of 4d (10pts)

Ans:

(1) SQL statements：

```sql
-- 4.d
select themes.name, round(avg(num_parts),2) as avg_partnum
from themes, sets
where themes.id = sets.theme_id
group by themes.id
order by avg_partnum
```

(2) Output results：

[完整結果連結 (可直接點擊)](#) 共 575 行

註：在雲端的 csv 檔所顯示的 avg_partnum，整數會自動刪去小數點後數字

Data Output | Messages | Notifications

	name character varying (50)	avg_partnum numeric
1	Wooden Box Set	-1.00
2	Mindstorms	0.00
3	Train	0.00
4	Samsonite	0.00
5	Key Chain	0.18
6	Technic	1.00
7	Imperial Guards	1.00
8	Supplemental	1.80
9	Power Functions	1.88
10	Control Lab	2.00
11	Classic Town	2.40
12	Star Wars	2.50
13	Adventurers	3.00
14	Planet Series 1	3.00
15	Western	3.00
16	Value Packs	3.17
17	Minifig Pack	3.50
18	Train	3.58

Total rows: 575 of 575 Query complete 00:00:00.063

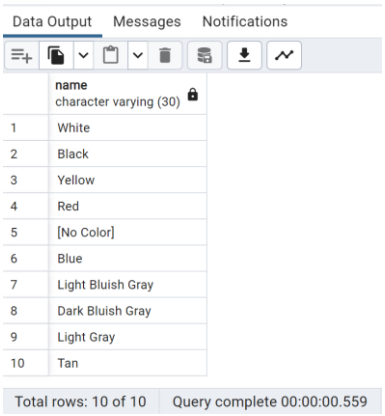
7. The SQL statements and output results of 4e (10pts)

Ans:

(1) SQL statements：

```sql
-- 4.e
with top_ten(color_id,count_part_num)as(
    with part_color(part_num,color_id)as
        (select distinct part_num,color_id
         from inventory_parts
         order by part_num)
    select color_id,count(part_num)
    from part_color
    group by color_id
    order by count desc
    limit 10)
select colors.name
from colors,top_ten
where colors.id=top_ten.color_id
order by count_part_num desc
```

(2) Output results：



Data Output | Messages | Notifications

	name character varying (30)
1	White
2	Black
3	Yellow
4	Red
5	[No Color]
6	Blue
7	Light Bluish Gray
8	Dark Bluish Gray
9	Light Gray
10	Tan

Total rows: 10 of 10 | Query complete 00:00:00.559

8. The SQL statements and output results of 4f (10pts)

Ans:

(1) SQL statements：

```
-- 4.f
with theme_color_count as(
    select t.id theme_id,c.id color_id,sum(ip.quantity) as color_quantity
    from inventory_parts ip,colors c,sets s,inventories i,themes t
    where (ip.inventory_id=i.id)
    and (i.set_num=s.set_num)
    and (s.theme_id=t.id)
    and (ip.color_id=c.id)
    group by t.id,c.id
    order by t.id
)
,top_color as(
    select tcc.theme_id, MAX(tcc.color_quantity) AS max_color_quantity
    from theme_color_count tcc
    group by tcc.theme_id
)
select themes.name theme_name, colors.name color_name
from theme_color_count tcc,top_color,colors,themes
where (tcc.theme_id=top_color.theme_id)
and(tcc.color_quantity=top_color.max_color_quantity)
and (tcc.theme_id=themes.id) and (tcc.color_id=colors.id)
order by themes.name
```

(2) Output results：

完整結果連結 (可直接點擊) 共 568 行

Data Output | Messages | Notifications

	theme_name character varying (50)	color_name character varying (30)
1	12V	Light Gray
2	12V	Black
3	4 Juniors	White
4	4.5V	Black
5	4.5V	Blue
6	9V	Dark Bluish Gray
7	9V	Black
8	Advent	Red
9	Advent Sub-Set	Red
10	Adventurers	Black
11	Agents	Black
12	Agori	Black
13	Airjitzu	Black
14	Airport	White
15	Airport	Red

Total rows: 568 of 568 | Query complete 00:00:00.932