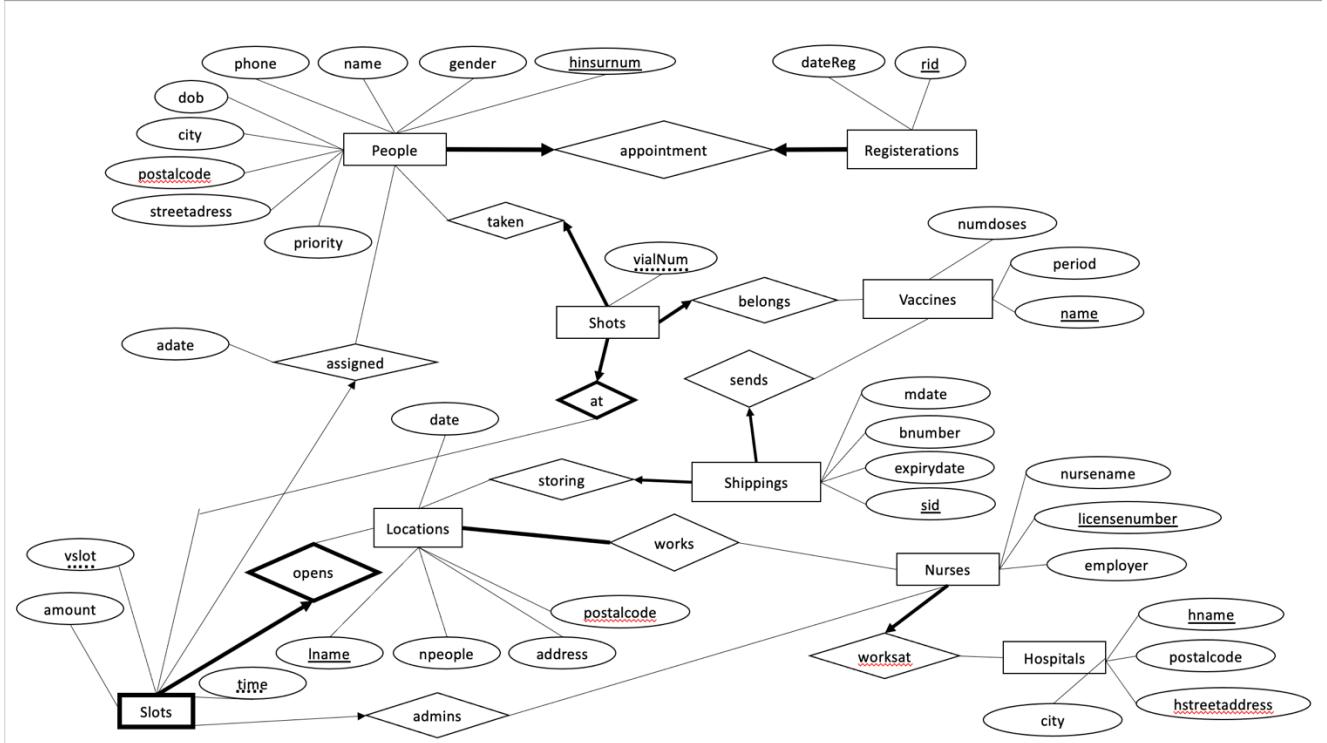


COMP421 – Project 3

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1. Relational model

For this project, I realized that I could not keep tracking a relationship between people and slots. Difference from previous relational model, I added a relation between People and Slots. – Also, I modified relation shots that including Slots instead of Locations.



2. Application interaction

From a)

H = KKKK12345678
P1(name, gender, phone, dob, street, city, postal, priority)
= John, male, 11084058683, 12-25-1999, ex street, montreal, 123456, 2
P2(name, gender, phone, dob, street, city, postal, priority)
= John, male, 11012345678, 12-25-1999, ex street, montreal, 123456, 2

From b)

P3(name, hinsurnum)
= Jane Doe, ABCD93050529
S1(lname, vtime, vslot, amount)
= Special Center, 08:30, 1, 10
P4(name, hinsurnum)
= Donna Mahe, EKQS90032977

From c)

V1(name) = Pfizer, P5(hinsurnum) = ABCD80010212, S2(name) = Jewish General

From d)

N1(licensenumber) = ABCD12345678
W1 = VIAL1234

From e)

P6(hinsurnum) = EFGD19070525
N2(licensenumber) = BOWK15929429
S3(NAME) = TESTER2
V2 = bioNTech

(a)

- i. Run a query in the database that demonstrates that there is no person with the health insurance number H.

```
[db2 => SELECT * FROM PEOPLE WHERE HINSURNUM = 'KKKK12345678';

NAME          GENDER PHONE        DOB      CITY      POSTALCODE STREETADDRESS
  PRIORITY    HINSURNUM
-----
0 record(s) selected.
```

- ii. From your application, add a new person P1, whose health insurance number is H.

```
VaccineApp Main Menu
    1. Add a Person
    2. Assign a slot to a Person
    3. Enter Vaccination information
    4. Exit Application
Please Enter Your Option:
1
Please enter health insurance number:
|KKKK12345678
Please enter name:
|John
Please enter gender: (m,f)
|m
Please enter phone number: (11 digits with country code)
|11084058683
Please enter dob: (MM-dd-YEAR)
|12-25-1999
Please enter street address:
|ex street
Please enter city:
|montreal
Please enter postal code:
|123456
Please enter priority number:
2
INSERT INTO PEOPLE VALUES ('John', 'm', '11084058683', '12-25-1999', 'montreal', '123456', 'ex street', 2, 'KKKK12345678')
ADD A PERSON COMPLETED
INSERT INTO REGISTRATIONS VALUES ('RID1999KKKK123456782', '03-15-2021')
ADD A REGISTRATION COMPLETED
INSERT INTO APPOINTMENTS VALUES ('RID1999KKKK123456782', 'KKKK12345678')
ADD AN APPOINTMENT COMPLETED
true
```

- iii. Run a query in the database that shows the new information that got added.

```
|db2 => SELECT * FROM PEOPLE WHERE HINSURNUM = 'KKKK12345678';
      NAME          GENDER PHONE        DOB       CITY      POSTALCODE STREETADDRESS
      PRIORITY      HINSURNUM
      -----
      John           m      11084058683      12/25/1999  montreal   123456   ex street
      2  KKKK12345678

      1 record(s) selected.
```

- iv. From your application, add a new person information P2, whose health insurance number is H. Choose Yes when the application prompts whether the current person's information must be updated. P2 could be just a slight variation of P1, such as a different phone number or so (so maybe in reality they are the same individual, and the user is just updating the personal information).

```
VaccineApp Main Menu
    1. Add a Person
    2. Assign a slot to a Person
    3. Enter Vaccination information
    4. Exit Application
Please Enter Your Option:
1
Please enter health insurance number:
KKKK12345678
Please enter name:
John
Please enter gender: (m,f)
m
Please enter phone number: (11 digits with country code)
11012345678
Please enter dob: (MM-dd-YEAR)
12-25-1999
Please enter street address:
ex street
Please enter city:
montreal
Please enter postal code:
123456
Please enter priority number:
2
Do you want to update information? (Y/N)
Y
UPDATE PEOPLE SET (name, gender, phone, dob, city, postalcode, streetaddress, priority) = ('John', 'm', '11012345678', '12-25-1999', 'montreal', '123456', 'ex street', 2) WHERE hinsnum = 'KKKK12345678'
UPDATE INFORMATION COMPLETED
true
```

- v. Run a query in the database that shows that H is now associated with P2's information.

```
[db2 => SELECT * FROM PEOPLE WHERE HINSNUM = 'KKKK12345678';

NAME          GENDER PHONE        DOB      CITY      POSTALCODE STREETADDRESS
-----  -----
John           m      11012345678   12/25/1999 montreal  123456   ex street
2 KKKK12345678

1 record(s) selected.
```

(b)

- i. Run a query in the database that shows that a person P3 exists, but has not received any vaccination shots.

```
[db2 => SELECT PEOPLE.HINSUMER, COUNT(SHOTS.VIALNUM) AS COUNT FROM PEOPLE LEFT OUTER JOIN SHOTS ON PEOPLE.HINSUMER = SHOTS.HINSUMER WHERE PEOPLE.HINSUMER = 'ABCD93050529' GROUP BY PEOPLE.HINSUMER;  
HINSUMER      COUNT  
-----  
ABCD93050529          0  
1 record(s) selected.
```

- ii. From the application, assign a slot S1 (this maybe a combination of date, time, location, etc., depending on your model) to P3.

```
VaccineApp Main Menu  
1. Add a Person  
2. Assign a slot to a Person  
3. Enter Vaccination information  
4. Exit Application  
Please Enter Your Option:  
2  
Please enter health insurance number:  
[ABCD93050529  
Please enter location name:  
[Special Center  
Please enter time:  
[08:30  
Please enter slot number:  
1  
Date: 2021-07-06  
Today: 03-15-2021  
SELECT * FROM ASSIGNED WHERE LNAME = 'Special Center' AND VTIME = '08:30' AND VSLOT = '1'  
SELECT VNAME, COUNT(*) AS COUNT FROM SHOTS WHERE HINSUMER = 'ABCD93050529' GROUP BY VNAME  
Call insert  
INSERT INTO ASSIGNED VALUES ('Special Center', '08:30', 1, 'ABCD93050529', '03-15-2021')  
DONE  
true
```

- iii. Run a query in the database that shows that P3 is now assigned the slot S1.

```
[db2 => SELECT * FROM ASSIGNED WHERE HINSUMER = 'ABCD93050529';  
LNAME          VTIME      VSLOT      HINSUMER      ADATE  
-----  
Special Center          08:30:00      1 ABCD93050529 03/15/2021  
1 record(s) selected.
```

- iv. Now, from the application try to assign the slot S1 to another person P4.

```
VaccineApp Main Menu
 1. Add a Person
 2. Assign a slot to a Person
 3. Enter Vaccination information
 4. Exit Application
Please Enter Your Option:
2
Please enter health insurance number:
[EKQS90032977
Please enter location name:
[Special Center
Please enter time:
[08:30
Please enter slot number:
1
Date: 2021-07-06
Today: 03-15-2021
SELECT * FROM ASSIGNED WHERE LNAME = 'Special Center' AND VTIME = '08:30' AND VSLOT = '1'
ERROR: The slot has been assigned
false
```

- v. Run a query in the database that shows that P3 is still assigned the slot S1 and no slot is assigned to P4.

```
[db2 => SELECT * FROM ASSIGNED WHERE HINSURNUM = 'ABCD93050529';

LNAME          VTIME      VSLOT      HINSURNUM      ADATE
-----  -----  -----  -----
Special Center    08:30:00      1  ABCD93050529  03/15/2021

 1 record(s) selected.
```

(c)

- i. Run a query in the database that shows that the vaccine brand V1 has 2 recommended doses.

```
[db2 => SELECT VNAME, NUMDOSES FROM VACCINES WHERE VNAME='Pfizer';

VNAME          NUMDOSES
-----
Pfizer           2

1 record(s) selected.
```

- ii. Run a query in the database that shows that a person P5 has received 2 doses of the vaccine brand V1 already.

```
[db2 => SELECT * FROM SHOTS WHERE HINSURNUM = 'ABCD80010212';

VIALNUM  LNAME          VTIME      VSLOT      HINSURNUM  VNAME
-----  -----
VIAL0000  HC0            09:00:00    1 ABCD80010212 Pfizer
VIAL0001  HC0            09:30:00    10 ABCD80010212 Pfizer

2 record(s) selected.
```

- iii. From the application, try to assign a valid free slot S2 to P5.

```
VaccineApp Main Menu
1. Add a Person
2. Assign a slot to a Person
3. Enter Vaccination information
4. Exit Application
Please Enter Your Option:
2
Please enter health insurance number:
[ABCD80010212
Please enter location name:
[Jewish General
Please enter time:
[11:30
Please enter slot number:
2
Date: 2021-05-20
Today: 03-15-2021
SELECT * FROM ASSIGNED WHERE LNAME = 'Jewish General' AND VTIME = '11:30' AND VSLOT = '2'
SELECT VNAME, COUNT(*) AS COUNT FROM SHOTS WHERE HINSURNUM = 'ABCD80010212' GROUP BY VNAME
SELECT NUMDOSES FROM VACCINES WHERE VNAME = 'Pfizer'
Number doses: 2
ERROR: No more vaccine is required
false
```

- iv. Run a query in the database that shows that slot S2 is still free.

```
[db2 => SELECT * FROM ASSIGNED WHERE LNAME = 'Jewish General' AND VTIME = '11:30' AND VSLOT = 2;
LNAME          VTIME      VSLOT      HINSURNUM      ADATE
-----
0 record(s) selected.
```

(d)

- i. From the application menu, record that P2 (the person from 2a) is being administered the vaccine V1, by the nurse N1 using the vial W1.

```
VaccineApp Main Menu
1. Add a Person
2. Assign a slot to a Person
3. Enter Vaccination information
4. Exit Application
Please Enter Your Option:
3
Please enter health insurance number:
[KKKK12345678
Please enter vial number:
[VIAL1234
Please enter location name:
[TESTER1
Please enter time:
[09:00
Please enter slot number:
1
Please enter vaccine name:
[Pfizer
INSERT INTO SHOTS VALUES ('VIAL1234', 'TESTER1', '09:00', 1, 'KKKK12345678', 'Pfizer')
DONE
```

- ii. Run a query in the database that shows this information, along with the slot in which this was applied. The output must contain information useful to identify the person, nurse, vial and the slot at a minimum.

```
db2 => SELECT ADMINS.LICENSENUM, SHOTS.HINSURNUM, SHOTS.VIALNUM, SHOTS.VSLOT FROM ADMINS, SHOTS WHERE ADMINS.LNAME = SHOTS.LNAME AND ADMINS.VTIME = SHOTS.VTIME AND ADMINS.VSLOT = SHOTS.VSLOT AND SHOTS.HINSURNUM = 'KKKK12345678';
LICENSENUM      HINSURNUM      VIALNUM      VSLOT
-----
ABCD12345678  KKKK12345678  VIAL1234           1
1 record(s) selected.
```

(e)

- i. Run a query in the database that shows that a person P6 has received 1 dose of the vaccine brand V1 already.

```
db2 => SELECT * FROM SHOTS WHERE HINSUMERNUM = 'EFGD19070525';

VIALNUM    LNAME          VTIME      VSLOT      HINSUMERNUM    VNAME
-----  -----
VIAL1235  TESTER1        14:20:00   1          1 EFGD19070525  Pfizer

1 record(s) selected.
```

- ii. From the application, try to assign a valid free slot S3 to P6.

```
VaccineApp Main Menu
1. Add a Person
2. Assign a slot to a Person
3. Enter Vaccination information
4. Exit Application
Please Enter Your Option:
2
Please enter health insurance number:
EFGD19070525
Please enter location name:
TESTER2
Please enter time:
15:00
Please enter slot number:
1
Date: 2021-03-20
Today: 03-15-2021
SELECT * FROM ASSIGNED WHERE LNAME = 'TESTER2' AND VTIME = '15:00' AND VSLOT = '1'
SELECT VNAME, COUNT(*) AS COUNT FROM SHOTS WHERE HINSUMERNUM = 'EFGD19070525' GROUP BY VNAME
SELECT NUMDOSES FROM VACCINES WHERE VNAME = 'Pfizer'
Number doses: 2
Call insert
INSERT INTO ASSIGNED VALUES ('TESTER2', '15:00', 1, 'EFGD19070525', '03-15-2021')
DONE
true
```

- iii. From the application menu, try to record that P6 is being administered the vaccine V2, by the nurse N2 using the vial W2.

```
VaccineApp Main Menu
    1. Add a Person
    2. Assign a slot to a Person
    3. Enter Vaccination information
    4. Exit Application
Please Enter Your Option:
3
Please enter health insurance number:
EFGD19070525
Please enter vial number:
VIAL2845
Please enter location name:
TESTER2
Please enter time:
15:00
Please enter slot number:
1
Please enter vaccine name:
BioNTech
ERROR: Previous vaccine and current vaccine are not matched!
```

2. Indexing

```
[db2 => CREATE INDEX ind1 ON PEOPLE(STREETADDRESS);
DB20000I  The SQL command completed successfully.
```

Note that if we have to consider both street address and city, we should create index as following creation query:

```
CREATE INDEX ind1 ON PEOPLE(CITY) INCLUDE(STREETADDRESS);
```

Assume there is a lot of people information, and if the system tries to retrieve the same information such as full address, then this index will increase the performance. Since, there are millions of data and if we use only health insurance number, we have to compare all of them using health insurance number to access the address data – need to be fully scanned. However, the index is based on address, and it will be sorted by address, thus it will be more efficient to retrieve it if there's no adding / modifying data when using it.

3. Data Analytics – File name: data_analytics.xlsx

Below screenshot represents the information of shot (date, health insurance number) from my data.

```
db2 => SELECT LOCATIONS.LDATE, SHOTS.HINSURNUM FROM LOCATIONS, SLOTS, SHOTS WHERE LOCATIONS.LNAME = SLOTS.LNAME AND SLOTS.LNAME = SHOTS.LNAME AND SLOTS.VTIME = SHOTS.VTIME AND SLOTS.VSLOT = SHOTS.VSLOT ORDER BY LOCATIONS.LDATE;

LDATE      HINSURNUM
-----
02/06/2021 ABCD80010212
02/06/2021 WESA12345678
02/06/2021 ABCD80010212
02/12/2021 EFGD19070525
02/12/2021 EKQS90032977
02/12/2021 ABCD93050529
02/12/2021 QKEK99050511
02/13/2021 CDSA12345679
02/13/2021 NXRJ12345683
02/13/2021 OWKF12345682
02/13/2021 ASVS12345681
02/13/2021 QWYW12345680
02/14/2021 EUDN12345684
02/22/2021 KKKK12345678
02/22/2021 EFGD19070525

15 record(s) selected.
```

Below screenshot represents the count of the above table

```
db2 => SELECT LOCATIONS.LDATE, COUNT(HINSURNUM) AS COUNT FROM LOCATIONS, SLOTS, SHOTS WHERE LOCATIONS.LNAME = SLOTS.LNAME AND SLOTS.LNAME = SHOTS.LNAME AND SLOTS.VTIME = SHOTS.VTIME AND SLOTS.VSLOT = SHOTS.VSLOT GROUP BY LOCATIONS.LDATE ORDER BY LOCATIONS.LDATE;

LDATE      COUNT
-----
02/06/2021      3
02/12/2021      4
02/13/2021      5
02/14/2021      1
02/22/2021      2

5 record(s) selected.
```

The below screenshot represents the chart from the above.

