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Project 3

Relational Translation
- Vaccines(<u>manufacturer</u>, numdoses, waitperiod)
- Batches(<u>batchnum, manufacturer</u>, manufdate, expdate, vname)
  - manufacturer foreign key references Vaccines
  - vname foreign key references VacLocations
- Vial(<u>vialnum, batchnum, manufacturer</u>, sid)
  - (batchnum, manufacturer) foreign keys reference Batches
  - sid foreign key references Slots
- VacLocations(<u>vname</u>, city, postcode, street)
- Employer(<u>ename</u>)
  - Ename foreign key references VacLocations
- Slots(<u>sid</u>, stime, sdate, vname, hin, licensenum, assigndate)
  - vname foreign key references VacLocations
  - hin foreign key references RegIndividuals
  - licensenum foreign key references Nurses
- Nurses(<u>licensenum</u>, nname, ename)
  - ename foreign key references Employer
- NurseAssignment(<u>licensenum, vname</u>, ndate)
  - licensenum foreign key references nurses
  - vname foreign key references VacLocations
- RegIndividuals(<u>HIN</u>, rdate, iname, phonenum, datebirth, gender, city, postcode, street, cname)
  - cname foreign key references Category
- Category(<u>cname</u>, prioritynum)

Application interaction
*Note: SQL statements are printed by the program for visualization and confirmation purposes.

a)
i)
```
[db2 => SELECT hin FROM RegIndividuals WHERE hin = 'P678876'

HIN
--------------------

  0 record(s) selected.
```

ii)

```
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 (number):
1
Please provide Person's information in the order requested:
Health Insurance Number:
P678876
Registered Date (YYYY-MM-DD):
2021-03-13
Name (First Last):
Richard Owens
Phone number (XXX-XXX-XXXX):
514-555-5555
Date of birth (YYYY-MM-DD):
1950-01-01
Gender:
Male
City:
Montreal
Postal Code:
H4C 3H3
Street Address:
Durocher
Priority Category name:
Elderly
INSERT INTO RegIndividuals VALUES ('P678876','2021-03-13','Richard Owens','514-555-5555','19
50-01-01','Male','Montreal','H4C 3H3','Durocher','Elderly')
DONE!
```

iii)

```
db2 => SELECT HIN, iname, cname, phonenum FROM RegIndividuals WHERE hin = 'P678876';

HIN                  INAME                                   CNAME                                             PHONENUM
-------------------- --------------------------------------- ------------------------------------------------- ---------------
P678876              Richard Owens                           Elderly                                           514-555-5555

  1 record(s) selected.
```

iv)

```
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 (number):                                               ]
 1
[Please provide Person's information in the order requested:                      ]
 Health Insurance Number:
[P678876                                                                          ]
 Registered Date (YYYY-MM-DD):
 2021-03-13
 Name (First Last):
 Richard Owens
 Phone number (XXX-XXX-XXXX):
 514-555-5588
 Date of birth (YYYY-MM-DD):
 1950-01-01
 Gender:
 Male
 City:
 Montreal
 Postal Code:
 H4C 3H3
 Street Address:
 Durocher
 Priority Category name:
 Elderly
 INSERT INTO RegIndividuals VALUES ('P678876','2021-03-13','Richard Owens','514-555-5588','19
 50-01-01','Male','Montreal','H4C 3H3','Durocher','Elderly')
 Person with this health insurance number is already registered.
  Do you wish to proceed with updating this Person's information? (Y/N)
 Y
 UPDATE RegIndividuals SET rdate = '2021-03-13',iname = 'Richard Owens',phonenum = '514-555-5
 588',datebirth = '1950-01-01',gender = 'Male',
 city = 'Montreal',postcode = 'H4C 3H3',street = 'Durocher',cname = 'Elderly'WHERE HIN = 'P67
 8876'
 DONE!
```

v.)

```
[db2 => SELECT HIN, iname, cname, phonenum FROM RegIndividuals WHERE hin = 'P678876'

HIN                 INAME                                           CNAME                   PHONENUM
------------------- ----------------------------------------------- ----------------------- ---------------
P678876             Richard Owens                                   Elderly                 514-555-5588

  1 record(s) selected.
```

b)

i)

```
db2 => SELECT r.HIN, sid, licensenum FROM RegIndividuals r LEFT OUTER JOIN Slots s ON r.HIN = s.HIN WHERE r.HIN = 'P888998'

HIN                 SID        LICENSENUM
------------------- ---------- --------------------
P888998                        - -

  1 record(s) selected.
```

ii)

```
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 (number):
2
Please provide Health Insurance Number of Person to assign a slot for:
P888998
SELECT COUNT(*) AS count FROM Slots s WHERE s.hin = 'P888998' AND s.sdate <= CURRENT DATE AND
s.licensenum IS NOT NULL
SELECT sid, sdate, stime, vname FROM slots s WHERE s.HIN IS NULL AND sdate >= CURRENT DATE ORD
ER BY sdate, stime
Please input slot ID (sid) of selected slot:
901: 2021-03-20, 11:00:00, Jewish General
902: 2021-03-20, 11:00:00, Jean-Coutu
901
UPDATE Slots SET HIN = 'P888998', assigndate = CURRENT DATE WHERE sid = 901
DONE!
```

iii)

```
[db2 => SELECT r.HIN, sid, licensenum FROM RegIndividuals r LEFT OUTER JOIN Slots s ON r.HIN = s.HIN WHERE r.HIN = 'P888998';

HIN                  SID         LICENSENUM
-------------------- ----------- --------------------
P888998                      901 -

  1 record(s) selected.
```

iv)

```
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 (number):
2
Please provide Health Insurance Number of Person to assign a slot for:
[P999000                                                                           ]
SELECT COUNT(*) AS count FROM Slots s WHERE s.hin = 'P999000' AND s.sdate <= CURRENT DATE AND
s.licensenum IS NOT NULL
SELECT sid, sdate, stime, vname FROM slots s WHERE s.HIN IS NULL AND sdate >= CURRENT DATE ORD
ER BY sdate, stime
Please input slot ID (sid) of selected slot:
902: 2021-03-20, 11:00:00, Jean-Coutu
▌
```

- Note that the program does not show slot 901 as an availability.

v)

```
db2 => SELECT r.HIN, sid, licensenum FROM RegIndividuals r LEFT OUTER JOIN Slots s ON r.HIN = s.HIN WHERE r.HIN = 'P888998'
UNION SELECT r.HIN, sid, licensenum FROM RegIndividuals r LEFT OUTER JOIN Slots s ON r.HIN = s.HIN WHERE r.HIN = 'P999000'

HIN                  SID         LICENSENUM
-------------------- ----------- --------------------
P888998                      901 -
P999000                        - -

  2 record(s) selected.
```

c)
i)

```
[db2 => SELECT manufacturer, numdoses FROM Vaccines WHERE manufacturer = 'Pfizer-BioNTech'

MANUFACTURER                                     NUMDOSES
------------------------------------------------ -----------
Pfizer-BioNTech                                        2

  1 record(s) selected.
```

ii)

```
db2 => SELECT COUNT (*) as count FROM Slots, Vial WHERE hin = 'P453563' AND sdate <= CURRENT DATE AND licensenum IS NOT NULL
 AND Vial.sid = Slots.sid;

COUNT
-----------
      2

  1 record(s) selected.
```

iii)

```
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 (number):
2
Please provide Health Insurance Number of Person to assign a slot for:
[P453563                                                                    ]
SELECT COUNT(*) AS count FROM Slots s WHERE s.hin = 'P453563' AND s.sdate <= CURRENT DATE A
ND s.licensenum IS NOT NULL
SELECT numdoses FROM Vaccines vac, Slots s, Vial v WHERE vac.manufacturer = v.manufacturer
AND s.sid = v.sid AND s.sdate <= CURRENT DATE AND s.licensenum IS NOT NULL AND s.hin = 'P45
3563' LIMIT 1
P453563 has already received the required number of doses.
```

- Note that the program does not allow assignment of another slot if the person (hin=P453563) has already received the required number of doses.

iv) See point iii. No slot assignment was permitted.

d)

i)

```
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 (number):
2
Please provide Health Insurance Number of Person to assign a slot for:
P678876
SELECT COUNT(*) AS count FROM Slots s WHERE s.hin = 'P678876' AND s.sdate <= CURRENT DATE AND s.licensenum IS NOT NULL
SELECT sid, sdate, stime, vname FROM slots s WHERE s.HIN IS NULL AND sdate >= CURRENT DATE ORDER BY sdate, stime
Please input slot ID (sid) of selected slot:
902: 2021-03-13, 11:00:00, Jean-Coutu
902
UPDATE Slots SET HIN = 'P678876', assigndate = CURRENT DATE WHERE sid = 902
DONE!
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 (number):
3
Please input the Health Insurance Number of the individual to be vaccinated:
P678876
SELECT manufacturer FROM Slots s, Vial v WHERE s.sid = v.sid AND s.sdate <= CURRENT DATE AND s.licensenum IS NOT NULL AND s.h
in = 'P678876' LIMIT 1
SELECT sid, vname, stime FROM Slots s WHERE s.hin = 'P678876' AND s.sdate = CURRENT DATE AND licensenum IS NULL
SELECT nname, n.licensenum FROM Nurses n, NurseAssignment na, Slots s WHERE n.licensenum = na.licensenum AND na.ndate = CURRE
NT DATE AND ndate = sdate EXCEPT SELECT nname, n.licensenum FROM Nurses n, NurseAssignment na, Slots s WHERE n.licensenum = n
a.licensenum AND s.licensenum = n.licensenum AND na.vname = s.vname AND sdate = CURRENT DATE AND sdate = ndate AND s.vname =
'Jean-Coutu' AND stime = '11:00:00'
Please assign a nurse (input nurse license number):
Julie O, ID: P318273
Yejin B, ID: P392503
P392503
UPDATE Slots SET licensenum = 'P392503', assigndate = CURRENT DATE WHERE sid = 902
Select an option (number) from the current vaccine availabilities:
SELECT batchnum, manufacturer FROM Batches WHERE vname = 'Jean-Coutu' AND expdate >= CURRENT DATE
1, Batch Number:8, Manufacturer:Pfizer-BioNTech
2, Batch Number:10, Manufacturer:Moderna
2
Please input the vial number of the vaccine:
898
INSERT INTO Vial VALUES (898, 10, 'Moderna', 902)
DONE!
```

ii)

```
db2 => SELECT hin, licensenum, vialnum, s.sid FROM Vial v, Slots s WHERE v.sid = s.sid AND hin = 'P678876';

HIN                  LICENSENUM           VIALNUM     SID
-------------------- -------------------- ----------- -----------
P678876              P392503                      898         902

  1 record(s) selected.
```

e)

i)

```
db2 => SELECT hin, manufacturer, vialnum FROM slots, vial where hin = 'P345321' AND sdate <= CURRENT DATE AND licensenum
IS NOT NULL AND vial.sid = slots.sid

HIN                  MANUFACTURER                                    VIALNUM
-------------------- ----------------------------------------------- -----------
P345321              Pfizer-BioNTech                                          54

  1 record(s) selected.
```

ii)

```
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 (number):
2
Please provide Health Insurance Number of Person to assign a slot for:
[P345321                                                                    ]
SELECT COUNT(*) AS count FROM Slots s WHERE s.hin = 'P345321' AND s.sdate <= CURRENT DATE AND s.licensenum IS NOT NULL
SELECT numdoses FROM Vaccines vac, Slots s, Vial v WHERE vac.manufacturer = v.manufacturer AND s.sid = v.sid AND s.sdate
<= CURRENT DATE AND s.licensenum IS NOT NULL AND s.hin = 'P345321' LIMIT 1
SELECT sid, sdate, stime, vname FROM slots s WHERE s.HIN IS NULL AND sdate >= CURRENT DATE ORDER BY sdate, stime
Please input slot ID (sid) of selected slot:
910: 2021-03-15, 11:00:00, Jean-Coutu
[910                                                                        ]
UPDATE Slots SET HIN = 'P345321', assigndate = CURRENT DATE WHERE sid = 910
DONE!
```

iii)

```
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 (number):
3
Please input the Health Insurance Number of the individual to be vaccinated:
[P345321                                                                    ]
SELECT manufacturer FROM Slots s, Vial v WHERE s.sid = v.sid AND s.sdate <= CURRENT DATE AND s.licensenum IS NOT NULL AND
 s.hin = 'P345321' LIMIT 1
SELECT sid, vname, stime FROM Slots s WHERE s.hin = 'P345321' AND s.sdate = CURRENT DATE AND licensenum IS NULL
SELECT nname, n.licensenum FROM Nurses n, NurseAssignment na, Slots s WHERE n.licensenum = na.licensenum AND na.ndate = C
URRENT DATE AND ndate = sdate EXCEPT SELECT nname, n.licensenum FROM Nurses n, NurseAssignment na, Slots s WHERE n.licens
enum = na.licensenum AND s.licensenum = n.licensenum AND na.vname = s.vname AND sdate = CURRENT DATE AND sdate = ndate AN
D s.vname = 'Jean-Coutu' AND stime = '11:00:00'
Please assign a nurse (input nurse license number):
Yejin B, ID: P392503
[P392503                                                                    ]
UPDATE Slots SET licensenum = 'P392503', assigndate = CURRENT DATE WHERE sid = 910
Select an option (number) from the current vaccine availabilities:
SELECT batchnum, manufacturer FROM Batches WHERE vname = 'Jean-Coutu' AND expdate >= CURRENT DATE
1, Batch Number:8, Manufacturer:Pfizer-BioNTech
2, Batch Number:10, Manufacturer:Moderna
2
Vaccine shots must be from the same manufacturer
Previous manufacturer: Pfizer-BioNTech, Manufacturer selected: Moderna
```

- Note that the program does not allow further assignment of a vial when it detects user has selected a second dose from a different manufacturer.

Indexing

```
[db2 => CREATE INDEX pind ON RegIndividuals (phonenum)
DB20000I  The SQL command completed successfully.
```

Assuming that the records of RegIndividuals are sorted by the primary key, which is the health insurance number, then it will be more efficient to index by insurance number of the person. This allows to create a clustered index as well as include the additional address attributes, which makes the data retrieval more efficient, since it no longer needs to jump to the table record. Further, the telephone number is not unique (many family members could share a home phone number), thus it is not possible to include the address attributes.

Data Analytics

Query to get number of vaccinations per day:

```
[db2 => WITH dailyhin AS (SELECT hin FROM Slots s, Vial v WHERE sdate = CURRENT DATE AND s.sid = v.sid AND s.licensenum IS NOT NULL AND v.si]
 d IS NOT NULL EXCEPT SELECT hin FROM Slots s, Vial v WHERE sdate < CURRENT DATE AND s.sid = v.sid AND s.licensenum IS NOT NULL AND v.sid IS
 NOT NULL) SELECT COUNT(*) AS dailyCount FROM dailyhin;

DAILYCOUNT
-----------
         22

  1 record(s) selected.
```

To facilitate the use of pivot tables and charts, the format in which the daily data is actually exported is:

```
[db2 => SELECT hin, sdate FROM Slots s, Vial v WHERE sdate = '2021-03-10' AND s.sid = v.sid AND s.licensenum IS NOT NULL AND v.sid IS NOT NU]
 LL EXCEPT SELECT hin, sdate FROM Slots s, Vial v WHERE sdate < '2021-03-10' AND s.sid = v.sid AND s.licensenum IS NOT NULL AND v.sid IS NOT
 NULL;

HIN                  SDATE
-------------------- ----------
 P112233             03/10/2021
 P223344             03/10/2021
 P336644             03/10/2021
 P448855             03/10/2021
 P887766             03/10/2021

  5 record(s) selected.
```

Exported using the following:

```
db2 => EXPORT TO data_10.csv OF DEL MODIFIED BY NOCHARDEL SELECT hin, sdate FROM Slots s, Vial v WHERE sdate = '2021-03-10' AND s.sid = v.s
id AND s.licensenum IS NOT NULL AND v.sid IS NOT NULL EXCEPT SELECT hin, sdate FROM Slots s, Vial v WHERE sdate < '2021-03-10' AND s.sid =
v.sid AND s.licensenum IS NOT NULL AND v.sid IS NOT NULL;
SQL3104N  The Export utility is beginning to export data to file
"data_10.csv".

SQL3105N  The Export utility has finished exporting "5" rows.


Number of rows exported: 5
```

Chart: