

Application Interaction

(a) i. Run a query in the database that demonstrates that there is no person with the health insurance number '2446-076-325-PX'.

```
[db2 => SELECT COUNT(hinsurnum) AS hinsurnumCount from Person WHERE hinsurnum = '2446-076-325-PX';
```

```
HINSURNUMCOUNT
```

```
-----  
0
```

1 record(s) selected.

ii. From your application, add a new person 'Steven Parsons', whose health insurance number is '2446-076-325-PX'.

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 (input a number only):

1

You have requested to register a new vaccine applicant. Please enter your health insurance number:

2446-076-325-PX

Enter your name:

Steven Parsons

Enter your phone number:

416-433-2566

Enter your date of birth:

1938-05-19

Enter your gender:

Male

Enter your postal code:

G3W 2C5

Enter your street address:

45 Parc Avenue

Enter the registration date:

2021-03-16

Enter your category:

Elderly

Enter your priority:

1

You have successfully registered as a vaccine applicant.

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

```
[db2 => SELECT * FROM Person WHERE HINSURNUM = '2446-076-325-PX';
```

HINSURNUM	NAME	PHONE	DATEOFBIRTH	GENDER
2446-076-325-PX	Steven Parsons	416-433-2566	05/19/1938	Male

POSTALCODE	STREETADDRESS	REGISTRATIONDATE	CATEGORY	PRIORITY
G3W 2C5	45 Parc Avenue	03/16/2021	Elderly	1

1 record(s) selected.

iv. From your application, add a new person information ‘Steve Parsons’, whose health insurance number is ‘2446-076-325-PX’. Choose Yes when the application prompts whether the current person’s information must be updated. ‘Steve Parsons’ is just a slight variation of ‘Steven Parsons’, 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 (input a number only):
1
You have requested to register a new vaccine applicant. Please enter your health insurance number:
2446-076-325-PX
Your health insurance number has already been registered. Do you wish to update the existing information? Enter yes or no.
Yes
Enter your name:
Steve Parsons
Enter your phone number:
647-633-2984
Enter your date of birth:
1938-05-19
Enter your gender:
Male
Enter your postal code:
G3W 2C5
Enter your street address:
45 Parc Avenue
Enter the registration date:
2021-03-16
Enter your category:
Elderly
Enter your priority:
1
You have successfully updated your information.
```

v. Run a query in the database that shows that ‘2446-076-325-PX’ is now associated with ‘Steve Parsons’ information.

```
db2 => SELECT * FROM Person WHERE HINSURNUM = '2446-076-325-PX';
```

HINSURNUM	NAME	PHONE	DATEOFBIRTH	GENDER
2446-076-325-PX	Steve Parsons	647-633-2984	05/19/1938	Male

POSTALCODE	STREETADDRESS	REGISTRATIONDATE	CATEGORY	PRIORITY
G3W 2C5	45 Parc Avenue	03/16/2021	Elderly	1

1 record(s) selected.

(b) i. Run a query in the database that shows that a person ‘Connor Murphy’ exists, but has not received any vaccination shots.

```
db2 => SELECT NAME, PERSON.HINSURNUM, COUNT(Slot.HINSURNUM) AS vaccinationsReceived FROM PERSON LEFT OUTER JOIN SLOT ON
PERSON.HINSURNUM = SLOT.HINSURNUM WHERE NAME = 'Connor Murphy' GROUP BY NAME, PERSON.HINSURNUM;
```

NAME	HINSURNUM	VACCINATIONSRECEIVED
Connor Murphy	2224-312-056-SX	0

1 record(s) selected.

ii. From the application, assign the slot on 2021-03-20 at 13:45:00 at the Jewish General Hospital with the slot id 2 to ‘Connor Murphy’ (who has health insurance number ‘2224-312-056-SXX’).

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 (input a number only):

2

You have requested to register for a vaccination slot. Please enter your health insurance number:

2224-312-056-SX

You have yet to be allocated any slot(s). You are eligible to sign up for one.

Slot 1 Slot id: 1 Time: 13:30:00 Date: 2021-03-20 Location: Jewish General

Slot 2 Slot id: 2 Time: 13:45:00 Date: 2021-03-20 Location: Jewish General

Slot 3 Slot id: 3 Time: 14:00:00 Date: 2021-03-20 Location: Jewish General

Which slot would you like to register for? Enter the number:

2

Please enter the current date in the format YYYY-MM-DD:

2021-03-16

You have successfully registered for a slot.

iii. Run a query in the database that shows that ‘Connor Murphy’ is now assigned the slot on 2021-03-20 at 13:45:00 at the Jewish General Hospital with the slot id 2.

```
db2 => SELECT NAME, PERSON.HINSURNUM, SLOTNUMBER, DATE, TIME, LOCATIONNAME, ALLOCATEDATE FROM PERSON LEFT OUTER JOIN SLOT ON PERSON.HINSURNUM
= SLOT.HINSURNUM WHERE NAME = 'Connor Murphy';
```

NAME	HINSURNUM	SLOTNUMBER	DATE	TIME	LOCATIONNAME	ALLOCATEDATE
Connor Murphy	2224-312-056-SX	2	03/20/2021	13:45:00	Jewish General	03/16/2021

1 record(s) selected.

iv. Now, from the application try to assign the slot on 2021-03-20 at 13:45:00 at the Jewish General Hospital with the slot id 2 to another person ‘Bridget Powell’.

```
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 (input a number only):
2
You have requested to register for a vaccination slot. Please enter your health insurance number:
6499-156-223-LM
You have yet to be allocated any slot(s). You are eligible to sign up for one.
Slot 1      Slot id: 1 Time: 13:30:00 Date: 2021-03-20 Location: Jewish General
Slot 2      Slot id: 3 Time: 14:00:00 Date: 2021-03-20 Location: Jewish General
Which slot would you like to register for? Enter the number:
```

In my VaccineApp.java program, the user is only ever presented with available slots. Therefore, as shown in the above picture, the slot on 2021-03-20 at 13:45:00 at the Jewish General Hospital with the slot id 2 no longer appears as an option to Bridget Powell when she attempts to register for a slot as this slot has already been allocated to Connor Murphy.

v. Run a query in the database that shows that ‘Connor Murphy’ is still assigned the slot on 2021-03-20 at 13:45:00 at the Jewish General Hospital with the slot id 2 and no slot is assigned to ‘Bridget Powell’.

```
db2 => SELECT NAME, PERSON.HINSURNUM, SLOTNUMBER, DATE, TIME, LOCATIONNAME FROM PERSON LEFT OUTER JOIN SLOT on PERSON.HINSURNUM = SLOT.HINSURNUM WHERE
NAME = 'Connor Murphy' UNION SELECT NAME, PERSON.HINSURNUM, SLOTNUMBER, DATE, TIME, LOCATIONNAME FROM PERSON LEFT OUTER JOIN SLOT on PERSON.HINSURNUM =
SLOT.HINSURNUM WHERE NAME = 'Bridget Powell';
```

NAME	HINSURNUM	SLOTNUMBER	DATE	TIME	LOCATIONNAME
Connor Murphy	2224-312-056-SX	2	03/20/2021	13:45:00	Jewish General
Bridget Powell	6499-156-223-LM	-	-	-	-

2 record(s) selected.

(c) i. Run a query in the database that shows that the vaccine brand ‘Pfizer-BioNTech’ has 2 recommended doses.

```
db2 => SELECT VACCINENAME, NUMBEROFDOSES FROM VACCINE WHERE VACCINENAME = 'Pfizer-BioNTech';
```

VACCINENAME	NUMBEROFDOSES
Pfizer-BioNTech	2

1 record(s) selected.

ii. Run a query in the database that shows that a person ‘Jenny Jacobs’ has received 2 doses of the vaccine brand ‘Pfizer-BioNTech’ already.

```
db2 => SELECT name, COUNT(slot.HINSURNUM) AS numberOfDoses, VACCINENAME FROM SLOT, Person WHERE VACCINENAME = 'Pfizer-BioNTech' AND name = 'Jenny Jacobs' AND date <= '2021-03-16' GROUP BY slot.HINSURNUM, name, VACCINENAME HAVING COUNT(slot.HINSURNUM) = 2;
```

NAME	NUMBEROFDOSES	VACCINENAME
Jenny Jacobs	2	Pfizer-BioNTech

1 record(s) selected.

Note: I have used the due date of the assignment (2021-03-16) as the “current day”, so to show that Jenny Jacobs has already received her two vaccines, she must have received said vaccinations either on 2021-03-16 or prior.

iii. From the application, try to assign a valid free slot S_2 to ‘Jenny Jacobs’.

My VaccineApp program checks if the user is eligible to register for a slot before displaying any open slots to them. Jenny Jacobs has already received her two vaccinations so she is ineligible to register and is not shown any free slots.

Below is a query showing all slots assigned to Jenny Jacobs before the application is executed (and in question iv. I show the same query after the application is executed):

```
db2 => SELECT NAME, PERSON.HINSURNUM, VACCINENAME, SLOTNUMBER, TIME, DATE, LOCATIONNAME FROM PERSON LEFT OUTER JOIN SLOT ON PERSON.HINSURNUM = SLOT.HINSURNUM WHERE NAME = 'Jenny Jacobs';
```

NAME	HINSURNUM	VACCINENAME	SLOTNUMBER	TIME	DATE	LOCATIONNAME
Jenny Jacobs	2221-599-158-SW	Pfizer-BioNTech	1	13:30:00	01/10/2021	Montreal General
Jenny Jacobs	2221-599-158-SW	Pfizer-BioNTech	1	13:30:00	01/28/2021	Montreal General

2 record(s) selected.

The application being executed:

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 (input a number only):

2

You have requested to register for a vaccination slot. Please enter your health insurance number:

2221-599-158-SW

You have already received the required 2 doses for the Pfizer-BioNTech vaccine.

You are ineligible to register for any slots.

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

Since my program does not show available slots to users who have already received their required number of vaccine doses, Jenny Jacobs does not have the option to register for any slots, let alone a specific S₂ slot. Below is a query showing that the amount of slots allocated to Jenny Jacobs has not increased after the application was executed.

```
db2 => SELECT NAME, PERSON.HINSURNUM, VACCINENAME, SLOTNUMBER, TIME, DATE, LOCATIONNAME FROM PERSON LEFT OUTER JOIN SLOT ON PERSON.HINSURNUM = SLOT.HINSURNUM
WHERE NAME = 'Jenny Jacobs';
```

NAME	HINSURNUM	VACCINENAME	SLOTNUMBER	TIME	DATE	LOCATIONNAME
Jenny Jacobs	2221-599-158-SW	Pfizer-BioNTech	1	13:30:00	01/10/2021	Montreal General
Jenny Jacobs	2221-599-158-SW	Pfizer-BioNTech	1	13:30:00	01/28/2021	Montreal General

2 record(s) selected.

(d)

i. From the application menu, record that ‘Steve Parsons’ (the person from 2a) is being administered the vaccine ‘Pfizer-BioNTech’, by the nurse with license number 15565 using the vial 2 from batch 1.

```
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 (input a number only):
3
You have selected to record your vaccination information. Please enter your health insurance number:
2446-076-325-PX
Enter the nurse's license number:
15565
Enter the vial number:
2
Enter the batch number:
1
Enter the vaccine name:
Pfizer-BioNTech

You have successfully inputted the vaccination information.
```

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 PERSON.HINSURNUM, NAME, SLOTNUMBER, SLOT.LICENSENUMBER, VIALNUMBER, BATCHNUMBER, VACCINENAME FROM PERSON LEFT OUTER JOIN SLOT ON
PERSON.HINSURNUM = SLOT.HINSURNUM WHERE NAME = 'Steve Parsons';
```

HINSURNUM	NAME	SLOTNUMBER	LICENSENUMBER	VIALNUMBER	BATCHNUMBER	VACCINENAME
2446-076-325-PX	Steve Parsons	3	15565	2	1	Pfizer-BioNTech

1 record(s) selected.

(e)

i. Run a query in the database that shows that a person ‘Peter Finnigan’ has received 1 dose of the vaccine brand Pfizer-BioNTech already.

```
db2 => SELECT NAME, PERSON.HINSURNUM, VACCINENAME, COUNT(SLOT.HINSURNUM) AS numTotalDoses, DATE FROM PERSON LEFT OUTER JOIN
      SLOT ON PERSON.HINSURNUM = SLOT.HINSURNUM WHERE NAME = 'Peter Finnigan' AND VACCINENAME = 'Pfizer-BioNTech' GROUP BY NAME,
      PERSON.HINSURNUM, VACCINENAME, DATE;
```

NAME	HINSURNUM	VACCINENAME	NUMTOTALDOSES	DATE
Peter Finnigan	3410-002-792-DE	Pfizer-BioNTech	1	01/15/2021

1 record(s) selected.

ii. From the application, try to assign the valid free slot on 2021-03-20 at 13:30:00 at Jewish General Hospital with slot id 1 to Peter Finnigan.

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 (input a number only):

2

You have requested to register for a vaccination slot. Please enter your health insurance number:

3410-002-792-DE

You are eligible to register for a slot as you have only received 1 dose(s) of the required 2 doses for the Pfizer-BioNTech vaccine. Please choose a slot:

Slot 1 Slot id: 1 Time: 13:30:00 Date: 2021-03-20 Location: Jewish General

Which slot would you like to register for? Enter the number:

1

Please enter the current date in the format YYYY-MM-DD:

2021-03-16

You have successfully registered for a slot.

iii. From the application menu, try to record that Peter Finnigan is being administered the vaccine Moderna, by the nurse with license number 12345, using the vial 3 from batch 2.

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 (input a number only):

3

You have selected to record your vaccination information. Please enter your health insurance number:

3410-002-792-DE

Enter the nurse's license number:

12345

Enter the vial number:

3

Enter the batch number:

2

Enter the vaccine name:

Moderna

The Moderna vaccine is different from your previous shot. Please enter the same vaccine as you have already received:

Indexing

Create an index that will help retrieve a person's (here person is defined as someone who registers for vaccination) address, assuming that we only have a phone number to start the search with. Will this index be any more practical/efficient than searching by the insurance number of the person (assuming real-world data and millions of individuals) to retrieve the same information?

```
db2 => CREATE UNIQUE INDEX idx_phone ON PERSON(PHONE) INCLUDE (STREETADDRESS);  
DB20000I The SQL command completed successfully.
```

Assuming that the Person table has to be loaded from the disk into memory for a query, it would be more practical and efficient to use an index for the purpose of retrieving an address using a phone number. If we searched for the street address field with the health insurance number without using an index, the entire Person table would have to be loaded into memory from the secondary storage. If we used the index on the phone number field which includes the streetAddress field as an additional attribute, only that index would have to be loaded into memory and the query would be less costly and would execute faster.

Data Analytics

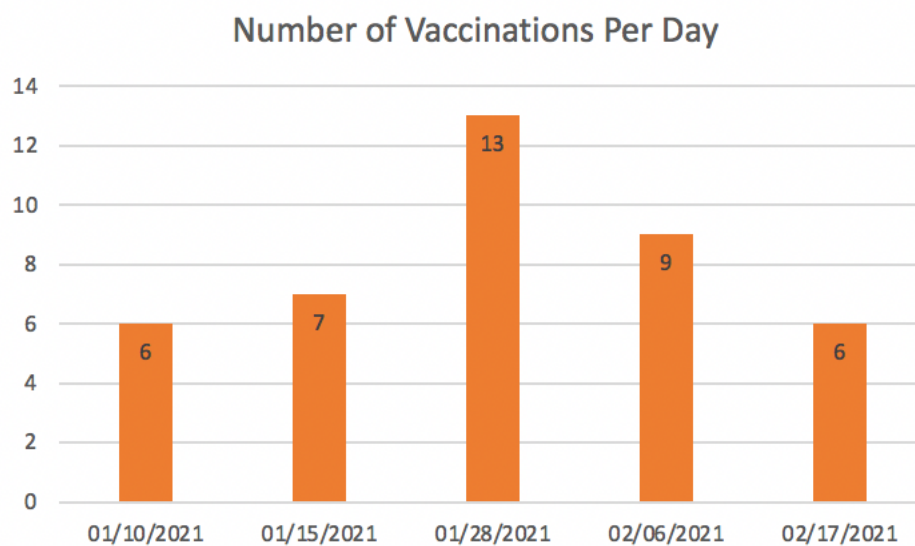
Write a query that will produce the number of persons vaccinated each day (count only if it is their first dose of vaccinations).

```
db2 => SELECT DATE, COUNT(*) AS NUMVACCINATIONS FROM SLOT WHERE DATE < '2021-03-16' AND HINSURNUM IN  
(SELECT HINSURNUM FROM SLOT GROUP BY HINSURNUM HAVING COUNT(HINSURNUM) = 1) GROUP BY DATE LIMIT 5;
```

DATE	NUMVACCINATIONS
01/10/2021	6
01/15/2021	7
01/28/2021	13
02/06/2021	9
02/17/2021	6

5 record(s) selected.

Produce a chart with date on X axis and count on Y axis. Should have at least five days worth of vaccination data and each day should have more than 5 vaccinations - ideally, different number of vaccinations per day.



The raw data can be seen in the attachment data_analytics.xlsx.