COMP 421 Project 2 - Itai Epstein - 260896705

Relational Model

Note: I adjusted the relational model according to the points I got off from my submission for Project Deliverable 1.

1. Parent(hCardID, pname, birthDate, addr, email, phoneNum, profession, btype)
2. Mother(hCardID)
   - hCardID foreign key references Parent
3. Father(fid, hcardID)
   - hCardID foreign key references Parent
4. Couples(coupleID, hCardID, fid)
   - hCardID foreign key references Mother
   - fid foreign key references Father
5. HealthcareInstitution(phoneNum, hciname, addr, email, website)
6. BirthingCenter(phoneNum)
   - phoneNum foreign key references HealthcareInstitution
7. CommunityClinic(phoneNum)
   - phoneNum foreign key references HealthcareInstitution
8. Midwives(pactID, mwname, email, phoneNum, workplace)
   - workplace foreign key references HealthcareInstitution
9. LabTechnician(ltID, ltname, phoneNum)
10. Pregnancy(pregID, pregNum, origDueDate, menstrDate, ultrasdDate, fnlDueDate, numBabies, coupleID, ppractID, bpractID, birthLocation)
    - ppractID foreign key references Midwives
    - bpractID foreign key references Midwives
    - coupleID foreign key references Couples
    - birthLocation references HealthcareInstituion
11. Babies(pregID, birthTime, birthDate, bname, btype, homeBirth)
    - pregID foreign key references Pregnancy
12. Tests(testID, ttype, prescribedDate, sampleDate, labWorkDate, result)
13. UpdatesTests(testID, ltID)
    - ltID foreign key references LabTechnician
    - testID foreign key references Tests
14. TestTakenDuring(testID, pregID, baby)
    - testID foreign key references Test
    - pregID foreign key references Pregnancy
    - baby foreign key references Babies
15. MotherTests(testID, practID, mother)
    - testID foreign key references Tests
    - practID foreign key references Midwives
    - mother foreign key references Mother

16. InformationSession(sessID, scheldDate, scheldTime, lang)
17. InformationSessionHosts(sessID, practID)
    - sessID foreign key references InformationSession
    - practID foreign key references Midwives
18. Attends(sessID, coupleID)
    - sessID foreign key references InformationSession
    - coupleID foreign key references Couples
19. Appointments(apptID, heldDate, heldTime, practID, pregID)
    - pactID foreign key references Midwives
    - pregID foreign key references Pregnancy
20. Notes(apptID, takenDate, takenTime, observation)
    - apptID foreign key references Appointments

Pending Constraints

1. In the pregnancy relation, checking whether the final agreed upon date is equal to the ultrasound date or menstruation date.
    1. This can be checked with CHECK(fnlDueDate = ultrasdDate OR fnlDueDate = menstrDate) but since these values can be NULL upon starting, I'm not sure how a check restraint would function at initialization.
2. Also in the pregnancy relation, checking whether the backup midwife is not equal to the primary midwife.
    1. This can be checked with CHECK (bpractID != ppractID) but since these values can be NULL upon starting, I'm not sure how a check restraint would function at initialization.
3. Adding a check to see whether a birth location is only in a birthing centre.
4. A healthcare institute's website currently isn't optional. Since a website is unique, it has to have NOT NULL associated with it, meaning the institute has to have a website associated with it upon insertion in the database.

SQL Queries (Q5)

(a)

```
select distinct appointmentTimes.heldDate, appointmentTimes.heldTime,
motherInfo.hCardID, motherInfo.pname, motherInfo.phoneNum from
(select heldDate, heldTime, pregID from appointments a
where a.practID = (select practID from midwives where mwname = 'Marion Girard')
and heldDate <= '2022-03-25' and heldDate >= '2022-03-21')appointmentTimes
inner join
(select p.hCardID, p.pname, p.phoneNum, identifyMothers.pregID from (
   select hCardID, mGirdardCouples.pregID from (
      select coupleID, mGirardPregIDs.pregID from (
         select pregID from
```

```
        appointments where practID = (
            select practID from midwives where mwname = 'Marion Girard')
        )mGirardPregIDs
    inner join pregnancy pg on pg.pregID =
mGirardPregIDs.pregID)mGirdardCouples
  inner join couples c on c.coupleID = mGirdardCouples.coupleID)identifyMothers
inner join parent p on p.hCardID = identifyMothers.hCardID)motherInfo
on appointmentTimes.pregID = motherInfo.pregID
order by appointmentTimes.heldDate
;
```

```
db2 => select distinct appointmentTimes.heldDate, appointmentTimes.heldTime, motherInfo.hCardID, motherInfo.pname, motherInfo.phoneNum from
(select heldDate, heldTime, pregID from appointments a
where a.practID = (select practID from midwives where mwname = 'Marion Girard')
and heldDate <= '2022-03-25' and heldDate >= '2022-03-21')appointmentTimes
inner join
(select p.hCardID, p.pname, p.phoneNum, identifyMothers.pregID from (
    select hCardID, mGirdardCouples.pregID from (
        select coupledb2 (cont.) => ID, mGirardPregIDs.pregID from (
            select pregID from
            appointments where practID = (
                select practID from midwives where mwname = 'Marion Girard')
            )mGirardPregIDs
        inner join pregnancy pg odb2 (cont.) => n pg.pregID = mGirardPregIDs.pregID)mGirdardCouples
    inner join couples c on c.coupleID = mGirdardCouples.coupleID)identifyMothers
inner join parent p on p.hCardID = identifyMothers.hCardID)motherInfo
on appointmentTimes.pregID = motherInfo.pregIDdb2 (cont.) =>
order by appointmentTimes.heldb2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont
.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => dDate
[;db2 (cont.) =>                                                                                                                                        ]

HELDDATE   HELDTIME HCARDID     PNAME                          PHONENUM
---------- -------- ----------- ------------------------------ ----------
03/21/2022 16:00:00         514 Victoria Gutierrez             8404136948
03/22/2022 15:00:00         448 Elaine Lowery                  1234567899
03/23/2022 13:00:00         514 Victoria Gutierrez             8404136948
03/23/2022 10:00:00         519 Jemma Fisher                   6931847608
03/24/2022 12:00:00         514 Victoria Gutierrez             8404136948
03/25/2022 11:00:00         514 Victoria Gutierrez             8404136948

  6 record(s) selected.

db2 =>
```

(b)

```
select t.labWorkDate, t.result from (
   select td.testID from (
      select pg.pregID from (
         select c.coupleID from (
            select m.hCardID from
            parent p inner join mother m
            on p.hCardID = m.hCardID
            where p.pname = 'Victoria Gutierrez'
            )victoria
         inner join couples c on c.hCardID = victoria.hCardID)victoriaCouple
      inner join pregnancy pg on pg.coupleId = victoriaCouple.coupleID
      where pg.pregNum = 2)victoriaSecondPreg
   inner join testsTakenDuring td on td.pregID =
victoriaSecondPreg.pregID)victoriaSecondPregTests
inner join tests t on t.testID = victoriaSecondPregTests.testID
;
```

```
db2 => select t.labWorkDate, t.result from (
    select td.testID from (
        select pg.pregID from (
            select c.coupleID from (
                select m.hCardID from
                parent p inner join mother m
                on p.hCardID = m.hCardID
                where p.pname = 'Victoria Gutierrez'
                )victoria
            inner join couples c on c.hCardID = victoria.hCardID)victoriaCouple
        inner join pregnancy pg on pg.coupleId = victoriaCouple.coupleID
        where pg.pregNum = 2)victoriaSecondPreg
    inner join testsTakenDuring td on td.pregID = victoriaSecondPreg.pregID)victoriaSecondPregTests
inner join tests t on t.testID = victoriaSecondPregTests.testID
;db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (co
nt.) => db2 (cont.) => db2 (cont.) => db2 (cont.) =>

LABWORKDATE RESULT
----------- ----------
02/04/2022  high
03/08/2022  low

  2 record(s) selected.
```

(c)

```
select distinct hciname, count (hciname) as numPreg from (
    select workplace from (
        select ppractID from pregnancy pg
        where case when fnlDueDate=NULL then extract (month from
origDueDate)=07
                else extract (month from fnlDueDate)=07
            end)julyMidwives
    inner join midwives m on m.practID = julyMidwives.ppractID)workplaceIDs
inner join healthcareInstitution hci on hci.phoneNum = workplaceIDs.workplace
group by hci.hciname
;
```

```
db2 => select distinct hciname, count (hciname) as numPreg from (
    select workplace from (
        select ppractID from pregnancy pg
        where case when fnlDueDate=NULL then extract (month from origDueDate)=07
                else extract (month from fnlDueDate)=07
            end)julyMidwives
    inner join midwives m on m.practID = julyMidwives.ppractID)workplaceIDs
inner join healthcareInstitution hci on hci.phoneNum = workplaceIDs.workplace
group by hci.hciname
[;db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) =>

HCINAME                         NUMPREG
------------------------------ -----------
Lac-Saint-Louis                           2
Montreal General                          1

  2 record(s) selected.
```

(d) Note: For (5d) I'm assuming a baby is only recorded in the baby table when it is born.

```
select distinct lacLouisPregMothers.hCardID, p.pname, p.phoneNum from (
    select m.hCardID, lacLouisPregCouples.pregID from (
        select c.hCardID, coupleAndPregIDs.pregID from (
            select pg.coupleID, pg.pregID from (
                select practID from midwives
                where workplace = (select bc.phoneNum from birthingCenter bc inner
join healthcareInstitution hci on bc.phoneNum = hci.phoneNum where
hci.hciname='Lac-Saint-Louis')
```

```
        )lacStLouisMidwives
        inner join pregnancy pg on pg.ppractID =
lacStLouisMidwives.practID)coupleAndPregIDs
    inner join couples c on c.coupleID =
coupleAndPregIDs.coupleID)lacLouisPregCouples
  inner join mother m on
m.hCardID=lacLouisPregCouples.hCardID)lacLouisPregMothers
inner join parent p on p.hCardID = lacLouisPregMothers.hCardID
where lacLouisPregMothers.pregID not in (
  select pregID from babies
)
;
```

```
db2 => select distinct lacLouisPregMothers.hCardID, p.pname, p.phoneNum from (
    select m.hCardID, lacLouisPregCouples.pregID from (
        select c.hCardID, coupleAndPregIDs.pregID from (
            select pg.coupleID, pg.pregID from (
                select practID from midwives
                where workplace = (select bc.phoneNum from birthingCenter bc inner join healthcareInstitution hci on bc.phoneNum = hci.phoneNum where hci.hcin
ame='Lac-Saint-Louis')
            )lacStLouisMidwives
            inner join pregnancy pg on pg.ppractID = lacStLouisMidwives.practID)coupleAndPregIDs
        inner join couples c on c.coupleID = coupleAndPregIDs.coupleID)lacLouisPregCouples
    inner join mother m on m.hCardID=lacLouisPregCouples.hCardID)lacLouisPregdb2 (cont.) => Mothers
inner join parent p on p.hCardID = lacLouisPregMothers.hCardID
where lacLouisPregMothers.pregID not in (
    select pregID from babies
)
;db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (co
nt.) => db2 (cont.) => db2 (cont.) =>

HCARDID     PNAME                          PHONENUM
----------- ------------------------------ ----------
        448 Elaine Lowery                  1234567899
        514 Victoria Gutierrez             8404136948
        519 Jemma Fisher                   6931847608
        863 Sierra Donovan                 1337044749

  4 record(s) selected.
```

(e)

```
select distinct mothersMoreThanOnePregnancy2.hCardID, p.pname from (
  select mothersMoreThanOnePregnancy.hCardID from (
    select c.hCardID from (
      select coupleID from pregnancy where numBabies > 1
    )moreThanOnePregnancy
    inner join couples c on c.coupleID = moreThanOnePregnancy.coupleID
  )mothersMoreThanOnePregnancy
  inner join mother m on m.hCardID = mothersMoreThanOnePregnancy.hCardID
)mothersMoreThanOnePregnancy2
inner join parent p on p.hCardID = mothersMoreThanOnePregnancy2.hCardID
;
```

```
db2 => select distinct mothersMoreThanOnePregnancy2.hCardID, p.pname from (
    select mothersMoreThanOnePregnancy.hCardID from (
        select c.hCardID from (
            select coupleID from pregnancy where numBabies > 1
        )moreThanOnePregnancy
        inner join couples c on c.coupleID = moreThanOnePregnancy.coupleID
    )mothersMoreThanOnePregnancy
    inner join mother m on m.hCardID = mothersMoreThanOnePregnancy.hCardID
)mothersMoreThanOnePregnancy2
inner join parent p on p.hCardIdb2 (cont.) => D = mothersMoreThanOnePregnancy2.hCardID
[;db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) =>

HCARDID     PNAME
----------- ------------------------------
        339 Mary Bobsin
        514 Victoria Gutierrez
        863 Sierra Donovan

  3 record(s) selected.
```

Midwife Information - Q6

(a)

create view midwifeinfo (practID, mwname, phoneNum, email, hciname, addr) as select m.practID, m.mwname, m.phoneNum, m.email, hci.hciname, hci.addr from midwives m inner join healthcareInstitution hci on m.workplace = hci.phoneNum
;

(b)

```
db2 => create view midwifeinfo (practID, mwname, phoneNum, email, hciname, addr) as
select m.practID, m.mwname, m.phoneNum, m.email, hci.hciname, hci.addr from
midwives m inner join healthcareInstitution hci on m.workplace = hci.phoneNum
[;db2 (cont.) => db2 (cont.) => db2 (cont.) =>
DB20000I  The SQL command completed successfully.
```

(c)

```
db2 => select * from midwifeinfo limit 5
[;db2 (cont.) =>                                                                                                   ]

PRACTID     MWNAME                         PHONENUM   EMAIL                          HCINAME                        ADDR

----------- ------------------------------ ---------- ------------------------------ ------------------------------ ----------------------------------------------
--------
          3 Marta Thornton                 2339011689 thorns@mtl-generale.ca         Montreal General               256 Ave Doctor Penfield

          2 May Marbles                    1090880026 marbles@lavalclinic.ca         Laval Community Clinic         23 Rue Laval

         22 Matilda Rubio                  5449883366 mrubio@lavalclinic.ca          Laval Community Clinic         23 Rue Laval

          1 Marion Girard                  8489169950 mgirard@lacstlouis.ca          Lac-Saint-Louis                72 Rue St. Louis

         11 Sanya Arellano                 7412833425 sarellano@lacstlouis.ca        Lac-Saint-Louis                72 Rue St. Louis


  5 record(s) selected.
```

(d)

```
db2 => select * from midwifeinfo
where hciname = 'Lac-Saint-Louis'
limit 5
;db2 (cont.) => db2 (cont.) => db2 (cont.) =>

PRACTID     MWNAME                         PHONENUM   EMAIL                          HCINAME                        ADDR
----------- ------------------------------ ---------- ------------------------------ ------------------------------ ----------------------------------------
--------
          1 Marion Girard                  8489169950 mgirard@lacstlouis.ca          Lac-Saint-Louis                72 Rue St. Louis

         11 Sanya Arellano                 7412833425 sarellano@lacstlouis.ca        Lac-Saint-Louis                72 Rue St. Louis

          5 Dhiane Lowell                  2018338173 dlowell@lacstlouis.ca          Lac-Saint-Louis                72 Rue St. Louis

         55 Lily Allen                     4194099835 lily.alen@lacstlouis.ca        Lac-Saint-Louis                72 Rue St. Louis


  4 record(s) selected.
```

(e)

```
db2 => insert into midwifeinfo (practID, mwname, phoneNum, email, hciname, addr) VALUES
(100, 'Shelly Greene', '2012182142', 'shelly.greene@lacstlouis.ca', 'Lac-Saint-Louis', '72 Rue St. Louis')
;db2 (cont.) => db2 (cont.) =>
DB21034E  The command was processed as an SQL statement because it was not a
valid Command Line Processor command.  During SQL processing it returned:
SQL0150N  The target fullselect, view, typed table, materialized query table,
range-clustered table, or staging table in the INSERT, DELETE, UPDATE, MERGE,
or TRUNCATE statement is a target for which the requested operation is not
permitted.  SQLSTATE=42807
```

What happens is that DB2 gives an error SQLSTATE=42807. We are told that we are not allowed to insert values into a view — it is not permitted.
This occurs because the view is not a "hardwired" table. It doesn't know where to send what values you're trying to insert.
Since the database doesn't really "see" specific columns, the information, if we were allowed to insert it, could be inserted
into columns where it wasn't intended on going. Inserting into views is not permitted as a safety precaution to attempt to ensure
that the database does not break.

Check Constraints - Q7

Tests table definition with the required test constraint, if the constraint was not already added, this command can be run to do so

```
alter table tests add check (labWorkDate >=
prescribedDate)
;
```

```sql
CREATE TABLE tests
(
  testID INT NOT NULL,
  ttype VARCHAR(20) NOT NULL,
  prescribedDate DATE NOT NULL,
  sampleDate DATE NOT NULL,
  labWorkDate DATE,
  result VARCHAR(10) NOT NULL,
  PRIMARY KEY (testID),
  CHECK (labWorkDate ⩾ prescribedDate)
);
```

Attempting to insert values into tests with the constraint applied

```
db2 => insert into tests (testID, ttype, prescribedDate, sampleDate, labWorkDate, result) VALUES
(1000, 'bood type', '2022-01-02', '2022-01-02', '2022-01-01', 'A+')
;db2 (cont.) => db2 (cont.) =>
DB21034E  The command was processed as an SQL statement because it was not a
valid Command Line Processor command.  During SQL processing it returned:
SQL0545N  The requested operation is not allowed because a row does not
satisfy the check constraint "IEPSTE1.TESTS.SQL220224104104900".
SQLSTATE=23513
```