Relational Model

Mothers(mramq, mname, mtel, memail, mDOB, mbloodType, maddress, mprofession)

Fathers(fid, framq, fname, ftel, femail, fDOB, fbloodType, faddress, fprofession)

Couples(cid, mramq, fid)
foreign key mramq references Mothers
foreign key fid references Fathers

Pregnancies(cid, birthym, firstexp, secondexp, finalexp, hcid, interested, ppid, bpid)
foreign key cid references Couples
foreign key hcid references HCInstitutions
foreign key bpid references Midwives
foreign key ppid references Midwives

Invitations(cid, hcid)
foreign key cid references Couples
foreign key hcid references HCInstitutions

Registrations(cid, isid, attended)
foreign key cid references Couples
foreign key isid references InfoSessions

Babies(bid, cid, birthym, bname, gender, bbloodType, bDOB, birthTime)
foreign key cid, birthym references Pregnancies

Appointments(aid, cid, birthym, pid, appdate, apptime)
foreign key cid, birthym references Pregnancies
foreign key pid references Midwives

InfoSessions(isid, hcid, pid, sessiondate, sessiontime, language)
foreign key hcid references HCInstitutions
foreign key pid references Midwives

Midwives(pid, hcid, mwname, mwtel, mwemail)
foreign key hcid references HCInstitutions

HCInstitutions(hcid, hcname, hctel, hcemail, hcaddress, website)

CommunityClinics(hcid)
foreign key hcid references HCInstitutions

BirthingCenters(hcid)
foreign key hcid references HCInstitutions

Notes(nid, aid, notedate, notetime)
foreign key aid references Appointments

Technicians(techid, tname, ttel)

Tests(tid, mramq, bid, aid, techid, type, pscrpDate, testDate, examDate, result)
foreign key mramq references Mothers
foreign key bid references Babies
foreign key aid references Appointments
foreign key techid references Technicians

Pending constraints

1. Some participation constraints cannot be enforced by the database implementation and will have to be ensured during application development.
    a. a mother must be associated with at least 1 couple
    b. a father must be associated with at least 1 couple
    c. a couple must be associated with at least 1 pregnancy
2. The primary and the backup midwives for a pregnancy have to be employed by the same institution. Also, a pregnancy must be assigned a primary midwife before a backup midwife can be assigned. This cannot be enforced by the current database implementation as any midwife can be associated with a pregnancy. Thus, a check should be performed when associating a backup midwife to a pregnancy.
3. A check in the application code is needed to ensure that the email of each father is unique as email is a unique but optional field which cannot be enforced by the database implementation.
4. The current database implementation cannot enforce that a healthcare institution must be either a community clinic or a birthing center. This has to be enforced in the application.
5. In Project 1, it is assumed that an info session can exist without being assigned a midwife as the host (a health institution initiates an info session and then assigns a midwife to host the session at a later point). Based on the assumptions, it would make sense to enforce that the midwife assigned belongs to the health care institution which initiated the info session. This constraint will have to be enforced by the application.
6. The order that a test must be prescribed before it is carried out, carried out before it is examined and only have a result once examined should be enforced by the application. Although it is possible to write a check during database implementation, it would be too tedious and thus, better to be taken care of during the development of the application.

SQL Queries

a)

```
-- all appointments with Marion Girard for March 21-25 in 2022
WITH aptpreg(aid, cid, birthym) AS
(SELECT a1.aid, p.cid, p.birthym
FROM pregnancies p
```

```
JOIN appointments a1 ON p.cid = a1.cid AND p.birthym = a1.birthym AND
a1.pid IN (SELECT mw.pid
FROM midwives mw
WHERE mw.mwname = 'Marion Girard')
AND EXTRACT(YEAR FROM a1.apptdate) = 2022 AND EXTRACT(MONTH FROM a1.apptdate)
= 03
AND EXTRACT(DAY FROM a1.apptdate) >= 21 AND EXTRACT(DAY FROM a1.apptdate) <=
25),
-- all couples involved with the appointments
aptcouple(aid, mramq) AS
(SELECT ap.aid, c.mramq
FROM couples c
JOIN aptpreg ap ON c.cid = ap.cid),
-- all mothers involved with the appointments
aptmother(aid, mramq, manme, mtel) AS
(SELECT ac.aid, m.mramq, m.mname, m.mtel
FROM mothers m
JOIN aptcouple ac ON m.mramq = ac.mramq)
SELECT a.apptdate AS date, a.apptime AS time, am.mramq, am.manme AS name,
am.mtel AS phone
FROM appointments a
JOIN aptmother am ON a.aid = am.aid
;
```

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ont.) => WITH aptpreg(aid, cid, birthym) AS (SELECT a1.aid, p.cid, p.birthym FROM pregnancies p JOIN appointments
a1 ON p.cid = a1.cid AND p.birthym = a1.birthym AND a1.pid IN (SELECT mw.pid FROM midwives mw WHERE mw.mwname = 'M
arion Girard') AND EXTRACT(YEAR FROM a1.apptdate) = 2022 AND EXTRACT(MONTH FROM a1.apptdate) = 03 AND EXTRACT(DAY
FROM a1.apptdate) >= 21 AND EXTRACT(DAY FROM a1.apptdate) <= 25), aptcouple(aid, mramq) AS (SELECT ap.aid, c.mramq
 FROM couples c JOIN aptpreg ap ON c.cid = ap.cid), aptmother(aid, mramq, manme, mtel) AS (SELECT ac.aid, m.mramq,
 m.mname, m.mtel FROM mothers m JOIN aptcouple ac ON m.mramq = ac.mramq) SELECT a.apptdate AS date, a.apptime AS t
ime, am.mramq, am.manme AS name, am.mtel AS phone FROM appointments a JOIN aptmother am ON a.aid = am.aid

DATE       TIME     MRAMQ        NAME                                               PHONE
---------- -------- ------------ -------------------------------------------------- --------------------
03/24/2022 10:30:00 YANC01060003 Claire Yang                                        5140000003
03/25/2022 10:30:00 YANC01060003 Claire Yang                                        5140000003
03/24/2022 15:30:00 NINK83060002 Kazunari Ninomiya                                  5140000002

  3 record(s) selected.
```

b)

```
-- the second pregnancy of Victoria Gutierrez
WITH prg(cid, birthym) AS (
SELECT p.cid, p.birthym
FROM pregnancies p
WHERE p.cid IN (SELECT c.cid
FROM couples c
WHERE c.mramq IN (SELECT m.mramq
FROM mothers m
```

```
WHERE m.mname = 'Victoria Gutierrez')
ORDER BY p.birthym
)
LIMIT 1 OFFSET 1
),
-- all appointments for the second pregnancy
aptpreg(aid) AS
(SELECT a.aid
FROM appointments a
JOIN prg
ON a.cid = prg.cid AND a.birthym = prg.birthym
),
-- all blood iron tests performed
bitest(tid) AS
(SELECT t1.tid
FROM tests t1
JOIN aptpreg ap ON t1.aid = ap.aid AND t1.type = 'blood iron' AND t1.examdate
IS NOT NULL)
SELECT t.examdate AS date, t.result
FROM tests t
JOIN bitest bi ON t.tid = bi.tid
;
```

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nt.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => d
b2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.
) => WITH prg(cid, birthym) AS ( SELECT p.cid, p.birthym FROM pregnancies p WHERE p.cid IN (SELECT c.cid FROM coup
les c WHERE c.mramq IN (SELECT m.mramq FROM mothers m WHERE m.mname = 'Victoria Gutierrez') ORDER BY p.birthym ) L
IMIT 1 OFFSET 1 ), aptpreg(aid) AS (SELECT a.aid FROM appointments a JOIN prg ON a.cid = prg.cid AND a.birthym = p
rg.birthym ), bitest(tid) AS (SELECT t1.tid FROM tests t1 JOIN aptpreg ap ON t1.aid = ap.aid AND t1.type = 'blood
iron' AND t1.examdate IS NOT NULL) SELECT t.examdate AS date, t.result FROM tests t JOIN bitest bi ON t.tid = bi.t
id

DATE       RESULT
---------- ----------------------------------------------------------------------------------------------------
10/11/2021 good bi 2021
09/12/2021 bi 2021
10/12/2021 improved bi 2021

  3 record(s) selected.
```

c)

```
-- all pregnancies
WITH allprg(ppid, duedate) AS
(
SELECT p1.ppid, p1.finalexp
FROM pregnancies p1
WHERE p1.finalexp IS NOT NULL
UNION
SELECT p2.ppid, p2.birthym
FROM pregnancies p2
```

```
WHERE p2.finalexp IS NULL
),
-- all related health care institutions for July 2022
allhc(hcid, hcname, duedate) AS
(SELECT hc.hcid, hc.hcname, ap.duedate
FROM hcinstitutions hc
JOIN allprg ap ON hc.hcid IN (SELECT mw.hcid
             FROM midwives mw
             WHERE mw.pid = ap.ppid) AND
EXTRACT(YEAR FROM ap.duedate) = 2022 AND EXTRACT(MONTH FROM ap.duedate) = 07)
SELECT allhc.hcname, COUNT(*) AS numpregnancies
FROM allhc
GROUP BY allhc.hcid, allhc.hcname
;
```

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t.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db
2 (cont.) => db2 (cont.) => db2 (cont.) => WITH allprg(ppid, duedate) AS ( SELECT p1.ppid, p1.finalexp FROM pregna
ncies p1 WHERE p1.finalexp IS NOT NULL UNION SELECT p2.ppid, p2.birthym FROM pregnancies p2 WHERE p2.finalexp IS N
ULL ), allhc(hcid, hcname, duedate) AS (SELECT hc.hcid, hc.hcname, ap.duedate FROM hcinstitutions hc JOIN allprg a
p ON hc.hcid IN (SELECT mw.hcid FROM midwives mw WHERE mw.pid = ap.ppid) AND EXTRACT(YEAR FROM ap.duedate) = 2022
AND EXTRACT(MONTH FROM ap.duedate) = 07) SELECT allhc.hcname, COUNT(*) AS numpregnancies FROM allhc GROUP BY allhc
.hcid, allhc.hcname

HCNAME                          NUMPREGNANCIES
------------------------------- --------------
Lac-Saint-Louis                              3
bc001                                        1

  2 record(s) selected.
```

d)

```
-- all pregnancies in progress (no born baby) under the care of a midwife
employed by Lac-Saint-Louis
WITH curpregs(cid) AS
(SELECT p.cid
FROM pregnancies p
JOIN midwives mw ON p.ppid = mw.pid
AND mw.hcid IN (SELECT hc.hcid
FROM hcinstitutions hc
WHERE hc.hcname = 'Lac-Saint-Louis')
AND NOT EXISTS(SELECT b.bid
FROM babies b
WHERE b.cid = p.cid
AND b.birthym = p.birthym
AND b.bdob IS NOT NULL)),
-- all couples with pregnancies in progress
curcouple(mramq) AS
(SELECT c.mramq
FROM couples c
JOIN curpregs cp ON c.cid = cp.cid)
```

```
SELECT m.mramq, m.mname, m.mtel
FROM mothers m
JOIN curcouple cc ON m.mramq = cc.mramq
;
```

```
db2 => db2 => db2 => db2 => db2 => db2 => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.)
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ont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) =>
WITH curpregs(cid) AS (SELECT p.cid FROM pregnancies p JOIN midwives mw ON p.ppid = mw.pid AND mw.hcid IN (SELECT
hc.hcid FROM hcinstitutions hc WHERE hc.hcname = 'Lac-Saint-Louis') AND NOT EXISTS(SELECT b.bid FROM babies b WHER
E b.cid = p.cid AND b.birthym = p.birthym AND b.bdob IS NOT NULL)), curcouple(mramq) AS (SELECT c.mramq FROM coupl
es c JOIN curpregs cp ON c.cid = cp.cid) SELECT m.mramq, m.mname, m.mtel FROM mothers m JOIN curcouple cc ON m.mra
mq = cc.mramq

MRAMQ        MNAME                                              MTEL
------------ -------------------------------------------------- --------------------
BROE94010005 EMMA BROWN                                         5140000005
NINK83060002 Kazunari Ninomiya                                  5140000002
YANC01060003 Claire Yang                                        5140000003
PANA01002004 Alice Pan                                          5140000004

  4 record(s) selected.
```

e)

```
-- all pregnancies with babies
WITH prgbaby(cid, birthmy, bid) AS
(
SELECT p.cid, p.birthym, b.bid
FROM pregnancies p
JOIN babies b ON p.cid = b.cid AND p.birthym = b.birthym
),
-- all multibaby pregnancies
multiprg(cid) AS
(SELECT pb.cid
FROM prgbaby pb
GROUP BY pb.cid
HAVING COUNT(*) > 1),
-- all mothers involved
multimother(mramq) AS
(
SELECT DISTINCT m1.mramq
FROM mothers m1
JOIN couples c ON m1.mramq = c.mramq AND c.cid IN (SELECT mp.cid FROM multiprg
mp)
)
SELECT m.mramq, m.mname
FROM mothers m
JOIN multimother mm ON m.mramq = mm.mramq
;
```

```
db2 => db2 => db2 => db2 => db2 => db2 => db2 (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.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (con
t.) => db2 (cont.) => db2 (cont.) => WITH prgbaby(cid, birthmy, bid) AS ( SELECT p.cid, p.birthym, b.bid FROM preg
nancies p JOIN babies b ON p.cid = b.cid AND p.birthym = b.birthym ), multiprg(cid) AS (SELECT pb.cid FROM prgbaby
 pb GROUP BY pb.cid HAVING COUNT(*) > 1), multimother(mramq) AS ( SELECT DISTINCT m1.mramq FROM mothers m1 JOIN co
uples c ON m1.mramq = c.mramq AND c.cid IN (SELECT mp.cid FROM multiprg mp) ) SELECT m.mramq, m.mname FROM mothers
 m JOIN multimother mm ON m.mramq = mm.mramq

MRAMQ       MNAME
----------- --------------------------------------------------
GUTV92030001 Victoria Gutierrez
NINK83060002 Kazunari Ninomiya
LILZ98010006 Zoe Lilly

  3 record(s) selected.
```

Midwife Information

a)

```
CREATE VIEW midwifeinfo(pid, mwname, mwtel, mwemail, hcname, hcaddress)
AS
SELECT mw.pid, mw.mwname, mwtel, mwemail, hc.hcname, hc.hcaddress
FROM midwives mw
        JOIN hcinstitutions hc on mw.hcid = hc.hcid
;
```

b)

```
db2 => db2 => db2 => db2 => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) => db2 (cont.) =>
 CREATE VIEW midwifeinfo(pid, mwname, mwtel, mwemail, hcname, hcaddress) AS SELECT mw.pid, mw.mwname,
mwtel, mwemail, hc.hcname, hc.hcaddress FROM midwives mw JOIN hcinstitutions hc on mw.hcid = hc.hcid
DB20000I  The SQL command completed successfully.
```

c)

```
db2 => db2 => SELECT * FROM midwifeinfo LIMIT 5

PID         MWNAME                        MWTEL          MWEMAIL                       HCNAME                        HCADDRESS
----------- ----------------------------- -------------- ----------------------------- ----------------------------- ------------------------------------------------------
       4001 Marion Girard                 5140040001     mg@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4003 Karen Obrian                  5140040003     ko@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4002 Abby Lilly                    5140040002     al@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4004 Jade Chin                     5140040004     jc@gamil.com                  bc001                         3228 Scarth Street
       4005 Sophie Marutara               5140040005     sm@gamil.com                  bc001                         3228 Scarth Street

  5 record(s) selected.
```

d)

```
db2 => db2 => db2 => db2 => SELECT * FROM midwifeinfo WHERE hcname = 'Lac-Saint-Louis' LIMIT 5

PID         MWNAME                        MWTEL          MWEMAIL                       HCNAME                        HCADDRESS
----------- ----------------------------- -------------- ----------------------------- ----------------------------- ------------------------------------------------------
       4001 Marion Girard                 5140040001     mg@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4002 Abby Lilly                    5140040002     al@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4003 Karen Obrian                  5140040003     ko@gamil.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4013 Lahm Kiggle                   5140040013     lk@gmail.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3
       4014 Suu Quan                      5140040014     sq@gmail.com                  Lac-Saint-Louis               4993 Sherbrooke Ouest, Montreal, Quebec(QC), H4A 1H3

  5 record(s) selected.
```

e)

```
db2 => db2 => db2 (cont.) => db2 (cont.) => INSERT INTO midwifeinfo VALUES ('9999',
'Nanda Suqqo', '5140000015', 'ns@gmail.com', 'hcnew', '2538 47th Avenue')
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
```

Since it is not possible to insert a record into the view, with only attributes in the view's output, which satisfies all constraints in all tables involved, such insert cannot succeed. For example, given that columns like hcid in the hcinstitutions table is not part of the attributes in the view's output but it is a NOT NULL primary key and cannot be left empty.

Check Constraints

```
db2 => db2 => db2 => db2 (cont.) => ALTER TABLE tests ADD CHECK (examdate IS NULL OR examdate >= pscrpdate)
DB20000I  The SQL command completed successfully.

db2 => db2 => db2 => db2 => db2 => db2 (cont.) => db2 (cont.) => INSERT INTO tests VALUES (1111, 'GUTV92030001'
, null, 7007, NULL, 'blood test', '2022-04-30', '2022-05-01', '2021-04-30', NULL)
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 "LHU26.TESTS.SQL220224021157640".  SQLSTATE=23513
```