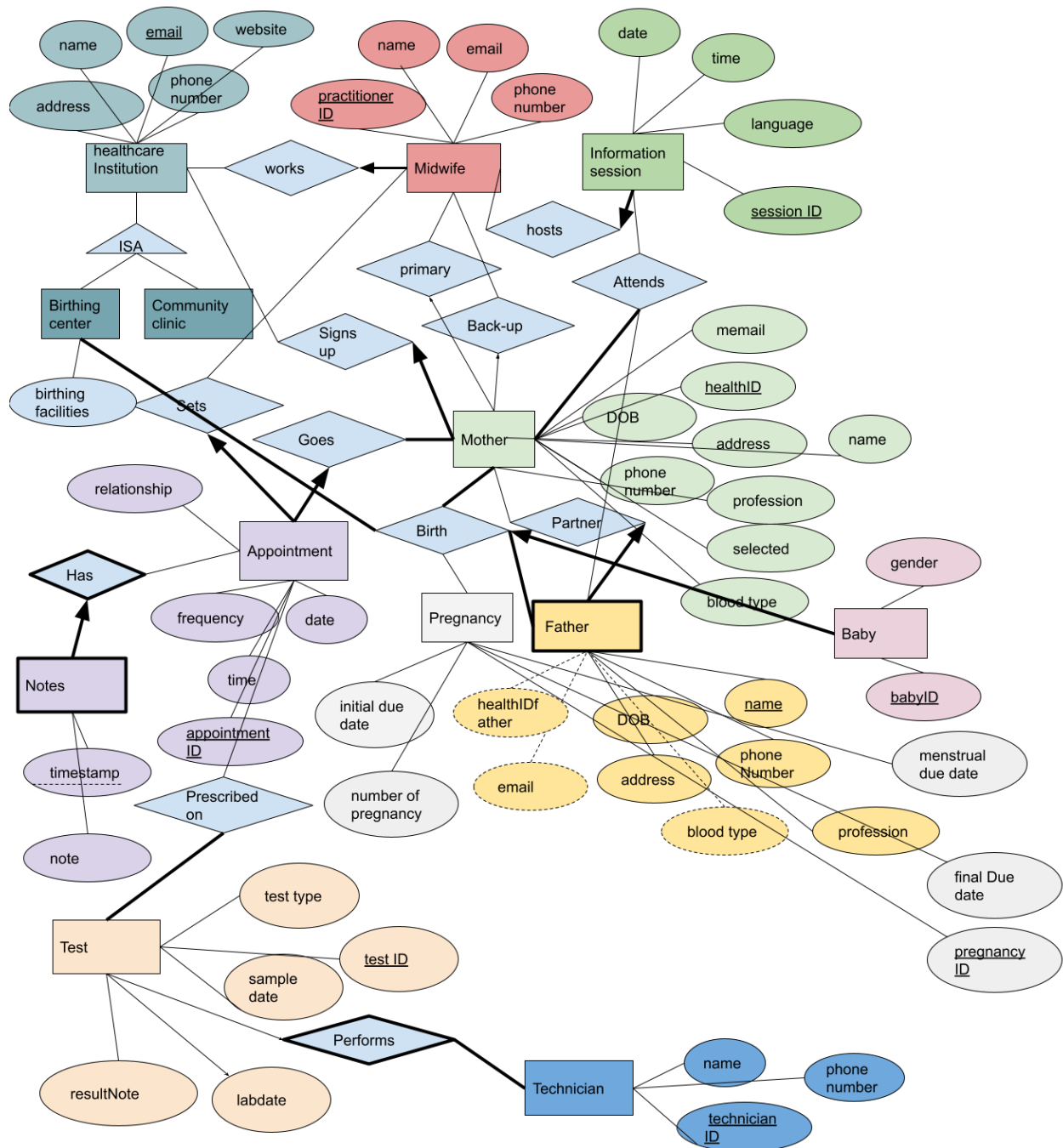


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## MODIFIED E/R MODEL



## Relational Model

### Entity Sets

Midwife (practitionerID, name, memail, phone number, email, email ref Healthcare\_Institution(email))  
Healthcare\_Institution(email))  
Healthcare\_Institution (email, name, website, address, phone number)  
Birthing\_Center (email, birthing\_facilities, email ref Healthcare\_Institution(email))  
Community\_Clinic(email, email ref Healthcare\_Institution(email))  
Information\_Session(session\_ID, date, time, language, practitionerID, practionerID ref Midwife(practitionerID))  
Mother(healthID, name, DOB, memail, phone number, address, profession, selected, blood\_type,email, email ref Healthcare\_Institution(email))  
Appointment(appointmentID, frequency, time, date, practitionerID, healthID, relationship, practitionerID ref Midwife(practitionerID), healthID ref Mother(HealthID))  
Pregnancy (pregnancyID, initial\_due\_date, number\_of\_pregnancy, menstrual\_due\_date, final\_due\_date)  
Baby(babyID, gender, healthID, pregnancyID, healthID ref Mother(HealthID), pregnancyID ref Pregnancy(PregnancyID) )  
Test(test\_ID, test\_type, sample\_date, lab\_date, resultNote)  
Technician(technicianID, name, phone\_number)

### Weak Entities

Father(healthID NOT NULL, name NOT NULL, phone\_number NOT NULL, DOB NOT NULL, profession NOT NULL, address, blood\_type, healthIDfather NOT NULL, email, healthID ref Mother(healthID))  
Notes(appointmentID NOT NULL, notetimestamp NOT NULL, note NOT NULL, apptID ref Appointment(appointmentid))

### Relationships

Primary(practitionerID, healthID)( practitionerID ref Midwife)(healthID ref Mother)  
Back-up(practitionerID, healthID)( practitionerID ref Midwife)(healthID ref Mother)  
Attends(session\_ID, healthID)( session\_ID ref Information\_Session) (healthID ref Mother)  
Birth(healthID, email, pregnancyID)(email ref Birthing\_Center) ) (healthID ref Mother) (pregnancyID ref Pregnancy)  
Prescribed\_on (test\_ID, appointmentID) (appointmentID ref Appointment) (test\_ID ref Test)  
Conducted\_by (testID, technicianID) (technicianID ref Technician) (testID ref Test)

## Application interaction

a)

i. Run a query in the database that shows that midwife with practitioner id = '1234567890' does not exist

```
db2 =>
db2 =>
db2 => SELECT * FROM Midwife WHERE practID = '1234567890'

PRACTID      MEMAIL      MNAME      PHONE      EMAIL
-----
0 record(s) selected.

db2 =>
```

ii. Start the application and enter the practitioner id (of the midwife) = '1234567890'

```
Run: GoBabbyApp x
/Library/Java/JavaVirtualMachines/jdk-13.0.2.jdk/Contents/Home/bin/
Please enter your practitioner id [E] to exit:
1234567890
Invalid practitioner id entered
Please enter your practitioner id [E] to exit:
```

b)

i. Run a query in the database that shows that a mother 'Victoria Gutierrez' has had at least two pregnancies

```
db2 => select Mother.mname, Mother.healthID, Pregnancy.pregnancies AS NUMOFPREGNANCIES from Mother IN
NER JOIN Birth ON Birth.healthID = Mother.healthID AND Mother.mname = 'Victoria Gutierrez' INNER JOIN
Pregnancy ON Pregnancy.pregID = Birth.pregID

MNAME      HEALTHID      NUMOFPREGNANCIES
-----
Victoria Gutierrez      GUTI00009000      2

1 record(s) selected.

db2 =>
```

ii. In the application, enter the practitioner id P1 = '0000000002' (must exist in the database).

```
Please enter your practitioner id [E] to exit:
0000000002
Please enter the date for appointment list [E] to exit:
|
```

iii. Enter the date "2022-02-01"

```
Run: GoBabbyApp x
/Library/Java/JavaVirtualMachines/jdk-13.0.2.jdk/Contents/Home/bin/java -javaagent:/Applications/IntelliJ IDE#
Please enter your practitioner id [E] to exit:
0000000002
Please enter the date for appointment list [E] to exit:
2022-02-01
1: 10:30:00 B Maria Alvi ALIM80905151
2: 11:30:00 P Victoria Gutierrez GUTI00009000

Enter the appointment number that you would like to work on. [E] to exit [0] to go back to another date :
|
```

iv. Choose the appointment number associated with Victoria

```
Please enter the date for appointment list [E] to exit:
2022-02-01
1: 10:30:00 B Maria Alvi ALIM80905151
2: 11:30:00 P Victoria Gutierrez GUTI00009000

Enter the appointment number that you would like to work on. [E] to exit [0] to go back to another date :
2
For Victoria Gutierrez GUTI00009000

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

Enter your choice
|
```

v. Enter 1.

```
Enter your choice
```

```
1
```

```
2022-03-01 12:28:01 Heartbeat OK
```

```
2022-02-01 11:31:00 Baby has movement
```

```
2022-02-01 11:32:01 Blood pressure OK
```

```
For Victoria Gutierrez GUTI00009000
```

```
1. Review notes
```

```
2. Review tests
```

```
3. Add a note
```

```
4. Prescribe a test
```

```
5. Go back to the appointments.
```

```
Enter your choice
```

vi. Enter 2

```
Enter your choice
```

```
2
```

```
2022-03-01 [ultrasound] Bad
```

```
2022-02-01 [blood iron] Good
```

```
For Victoria Gutierrez GUTI00009000
```

```
1. Review notes
```

```
2. Review tests
```

```
3. Add a note
```

```
4. Prescribe a test
```

```
5. Go back to the appointments.
```

```
Enter your choice
```

vii. Enter 3. Add a note N1.

```
..
Enter your choice
3
Please type your observation:
Adding observation N1

For Victoria Gutierrez GUTI00009000

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

Enter your choice
1
```

viii. Run a query in the database that shows all the notes associated with Victoria , include couple information, pregnancy number, etc., as relevant in your model. The actual note text may be truncated to first 50 characters or so to reduce clutter.

Note: For date note was added, used same date entered initially and for timestamp, used a randomly generated value to increment time of the appointment and set that as note timestamp

```
db2 => select Mother.mname, Father.mname, Pregnancy.pregnancies as NUMPREGNANCIES, Appointment.apptdate, Notes.notetimestamp
, Notes.note FROM Notes INNER JOIN Appointment ON Appointment.apptID = Notes.apptID INNER JOIN Mother ON Mother.healthID = A
ppointment.healthID AND Mother.mname = 'Victoria Gutierrez' INNER JOIN Father ON Father.healthID = Mother.healthID INNER JO
IN Birth ON Birth.healthID = Mother.healthID INNER JOIN Pregnancy ON Pregnancy.pregID = Birth.pregID
```

MNAME	MNAME	NUMPREGNANCIES	APPTDATE	NOTETIMESTAMP	NOTE
Victoria Gutierrez	Bill Gutierrez	2	02/01/2022 11:31:00		Baby has movement
Victoria Gutierrez	Bill Gutierrez	2	02/01/2022 11:32:01		Blood pressure OK
Victoria Gutierrez	Bill Gutierrez	2	03/01/2022 12:28:01		Heartbeat OK
Victoria Gutierrez	Bill Gutierrez	2	02/01/2022 11:49:15		Adding observation N1

4 record(s) selected.

ix. Enter 1

Enter your choice

1

2022-03-01 12:28:01 Heartbeat OK

2022-02-01 11:31:00 Baby has movement

2022-02-01 11:32:01 Blood pressure OK

2022-02-01 11:49:15 Adding observation N1

For Victoria Gutierrez GUTI00009000

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

Enter your choice

---

x. Enter 4

Enter your choice

4

Please enter the type of test:

trisomy 21

For Victoria Gutierrez GUTI00009000

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

Enter your choice

xi. Run a query in the database that shows all the tests associated with M1, include couple information, pregnancy number, etc., as relevant in your model. The result attribute of the test maybe truncated to the first 50 characters or so.

Note: I assumed test prescription date is the same as one entered initially as per the reply on discussion post: <https://edstem.org/us/courses/17497/discussion/1267366>

```
db2 => select Mother.mname AS Mother, Father.mname as Father, Pregnancy.pregnancies as Numpregnancies, Test.sampledate AS PRESCRIPTIONDATE, Test.testType as TESTTYPE, CAST(Test.resultNote AS VARCHAR(50)) AS Result from Prescription INNER JOIN Appointment ON Appointment.apptID = Prescription.apptID INNER JOIN Test on Test.testID = Prescription.testID INNER JOIN Mother on Mother.healthID = Appointment.healthID AND Mother.mname = 'Victoria Gutierrez' inner join Father ON Father.healthID = Mother.healthID INNER JOIN Birth ON Birth.healthID = Mother.healthID INNER JOIN Pregnancy ON Pregnancy.pregID = Birth.pregID
```

MOTHER	FATHER	NUMPREGNANCIES	PRESCRIPTIONDATE	TESTTYPE	RESULT
Victoria Gutierrez	Bill Gutierrez	2	02/01/2022	blood iron	Good
Victoria Gutierrez	Bill Gutierrez	2	03/01/2022	ultrasound	Bad
Victoria Gutierrez	Bill Gutierrez	2	02/01/2022	trisomy 21	-

3 record(s) selected.

xii. Enter 5

Enter your choice

5

1: 10:30:00 B Maria Alvi ALIM80905151

2: 11:30:00 P Victoria Gutierrez GUTI00009000

Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :

```
db2 => select Mother.mname AS Mother, Father.mname as Father, Pregnancy.pregnancies as Numpregnancies, Test.sampledate AS PRESCRIPTIONDATE, Test.testType as TESTTYPE, CAST(Test.resultNote AS VARCHAR(50)) AS Result from Prescription INNER JOIN Appointment ON Appointment.apptID = Prescription.apptID INNER JOIN Test on Test.testID = Prescription.testID INNER JOIN Mother on Mother.healthID = Appointment.healthID AND Mother.mname = 'Maria Alvi' inner join Father ON Father.healthID = Mother.healthID INNER JOIN Birth ON Birth.healthID = Mother.healthID INNER JOIN Pregnancy ON Pregnancy.pregID = Birth.pregID
```

MOTHER	FATHER	NUMPREGNANCIES	PRESCRIPTIONDATE	TESTTYPE	RESULT
Maria Alvi	Mario Kat	1	03/11/2022	ultrasound	Good

1 record(s) selected.



C)

- i. Run a query in the database that shows all the tests associated with M2 = Maria Alvi, include couple information, pregnancy number, etc., as relevant in your model. The result attribute of the test maybe truncated to the first 50 characters or so.

```
db2 => select Mother.mname AS Mother, Father.mname as Father, Pregnancy.pregnancies as NUMPREGNANCIES, Test.sampledate AS PRESCRIPTIONDATE, Test.testType as TESTTYPE, CAST(Test.resultNote AS VARCHAR(50)) AS Result from Prescription INNER JOIN Appointment ON Appointment.apptID = Prescription.apptID INNER JOIN Test on Test.testID = Prescription.testID INNER JOIN Mother on Mother.healthID = Appointment.healthID AND Mother.mname = 'Maria Alvi' inner join Father ON Father.healthID = Mother.healthID INNER JOIN Birth ON Birth.healthID = Mother.healthID INNER JOIN Pregnancy ON Pregnancy.pregID = Birth.pregID
```

MOTHER	FATHER	NUMPREGNANCIES	PRESCRIPTIONDATE	TESTTYPE	RESULT
Maria Alvi	Mario Kat	1	03/11/2022	ultrasound	Good

1 record(s) selected.

- ii. Choose the appointment associated with mother M2

1: 10:30:00 B Maria Alvi ALIM80905151

2: 11:30:00 P Victoria Gutierrez GUTI00009000

Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :

1

For Maria Alvi ALIM80905151

1. Review notes

2. Review tests

3. Add a note

4. Prescribe a test

5. Go back to the appointments.

Enter your choice

iii. Enter 1 (to see the relevant notes)

```
Enter your choice
1
2022-02-01 10:35:01 Vitals good
2022-02-01 10:40:01 Heartbeat OK
```

```
For Maria Alvi ALIM80905151
```

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

```
Enter your choice
```

iv. Enter 4. Add a test prescription for Group B streptococcus (test type).

```
Enter your choice
4
Please enter the type of test:
Group B streptococcus
```

```
For Maria Alvi ALIM80905151
```

1. Review notes
2. Review tests
3. Add a note
4. Prescribe a test
5. Go back to the appointments.

```
Enter your choice
```

v. Run a query in the database that shows all the tests associated with M2, include couple information, pregnancy number, etc., as relevant in your model. The result attribute of the test maybe truncated to the first 50 characters or so.

```
db2 => select Mother.mname AS Mother, Father.mname as Father, Pregnancy.pregnancies as NUMPREGNANCIES, Test.sampledate AS
PRESCRIPTIONDATE, CAST(Test.testType AS VARCHAR(20)) AS TESTTYPE, CAST(Test.resultNote AS VARCHAR(50)) AS Result from
Prescription INNER JOIN Appointment ON Appointment.apptID = Prescription.apptID INNER JOIN Test on Test.testID = Prescrip
tion.testID INNER JOIN Mother on Mother.healthID = Appointment.healthID AND Mother.mname = 'Maria Alvi' inner join Fathe
r ON Father.healthID = Mother.healthID INNER JOIN Birth ON Birth.healthID = Mother.healthID INNER JOIN Pregnancy ON Prega
ncy.pregID = Birth.pregID
```

MOTHER	FATHER	NUMPREGNANCIES	PRESCRIPTIONDATE	TESTTYPE	RESULT
Maria Alvi	Mario Kat	1	03/11/2022	ultrasound	Good
Maria Alvi	Mario Kat	1	02/01/2022	Group B streptococcu	-

SQL0445W Value "Group B streptococcus" has been truncated. SQLSTATE=01004

2 record(s) selected with 1 warning messages printed.

d)  
i. Choose 5, followed by D

Enter your choice

5

1: 10:30:00 B Maria Alvi ALIM80905151

2: 11:30:00 P Victoria Gutierrez GUTI00009000

Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :

D

Please enter the date for appointment list [E] to exit:

ii. Enter a different date D2

Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :

D

Please enter the date for appointment list [E] to exit:

2022-03-21

1: 11:30:00 P Millie Brown BROW90219000

2: 13:30:00 P Shannon Khan KHA90664431

Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :

iii. It should show at least two appointments for mothers M3, M4, who are not the same as previous examples.

```
Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :  
D
```

```
Please enter the date for appointment list [E] to exit:
```

```
2022-03-21
```

```
1: 11:30:00 P Millie Brown BROW90219000
```

```
2: 13:30:00 P Shannon Khan KHA90664431
```

```
Enter the appointment number that you would like to work on. [E] to exit [D] to go back to another date :
```

## Indexing

```
CREATE UNIQUE INDEX address_idx ON Mother(phone) INCLUDE (maddress)
```

```
db2 => CREATE UNIQUE INDEX address_idx ON Mother(phone) INCLUDE (maddress)  
DB20000I The SQL command completed successfully.  
db2 =>
```

## Data analytics

Note: queries from previous section “Application interaction” will produce different results at this point because loaddata.sql has been modified

Query:

```
EXPORT TO results.csv OF DEL MODIFIED BY NOCHARDEL  
SELECT MONTH(Pregnancy.finaldate) as MONTH , COUNT(Baby.babyID) as  
NUMOFBABIES  
FROM Pregnancy  
      INNER JOIN Baby ON Baby.pregID = Pregnancy.pregID  
GROUP BY MONTH(Pregnancy.finaldate)  
ORDER BY MONTH(Pregnancy.finaldate)
```

```
db2 => EXPORT TO result.csv OF DEL MODIFIED BY NOCHARDEL SELECT MONTH(Pregnancy.finaldate) AS MONTH , COUNT(Baby.babyID) as  
s NUMOFBABIES FROM Pregnancy INNER JOIN Baby ON Baby.pregID = Pregnancy.pregID GROUP BY MONTH(Pregnancy.finaldate) ORDER B  
Y MONTH(Pregnancy.finaldate)  
SQL3104N The Export utility is beginning to export data to file "result.csv".
```

```
SQL3105N The Export utility has finished exporting "3" rows.
```

```
Number of rows exported: 3
```

Workbook used to generate chart can be found under the name monthvsbaby.xlsx  
Chart:

