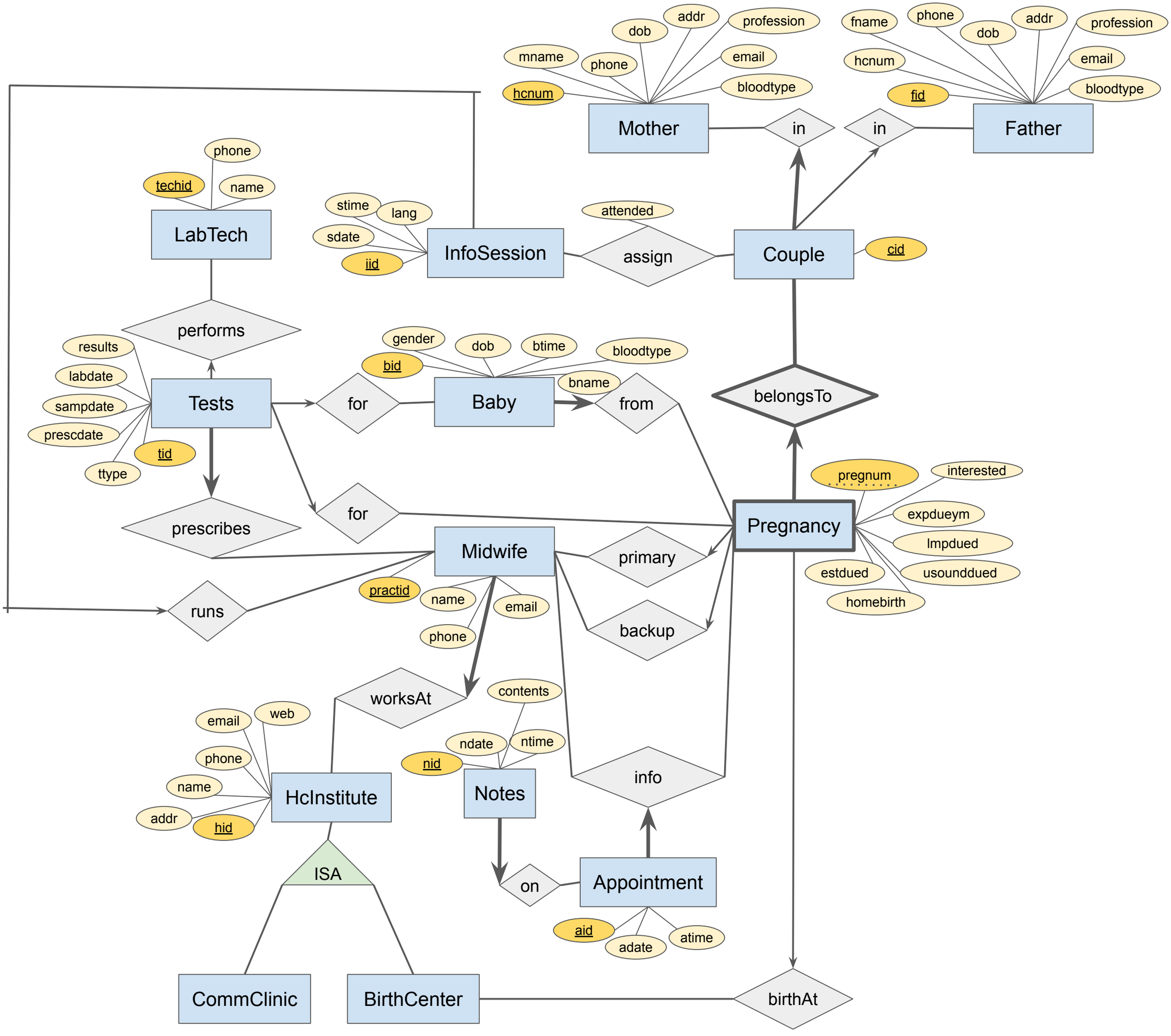

CommClinic and BithCenter
Covers HCInstitute

Assumptions

1. There could be birthing centers or community clinics without any midwives associated with them (otherwise make that a participation constraint).
2. There could be lab techs who have not done any tests (otherwise make that a participation constraint).
3. We assume that only couples with a pregnancy will register in the system (this is the reason for the participation constraint).
4. We also believe minimally the mother will be involved.
5. We are not keeping track of Tests with respect to appointments under the assumption that a tests can be also written outside of that context. If that is required, the prescribes relationship could be associated with appointments instead of midwives (which will also indirectly record the midwife responsible for writing the test).

Note:-

The various “ids” (tid, fid, cid, etc.) that are not the natural attributes in the description are introduced for having unique keys for some entity sets.

Pregnancy was modeled as a weak entity set because pregnancy number is a natural partial key.

Restrictions (some very prominent ones)

1. The model does not enforce any restrictions on calendar time overlap - e.g. does not ensure a midwife is not having two appointments at the same time, does not host two info sessions with same schedule, etc.
2. The model also does not enforce the order of time. For example the timestamp associated with a note should not be lower (past) compared to the timestamp of the appointment, etc.
3. We cannot ensure that the same midwife cannot be the primary and backup for a pregnancy.
4. We cannot enforce that only couples who have attended an information session and has shown interest can be assigned a midwife (if we put a participation constraint from couple to info session, we will not be able to store the couple information until an info-session is available, which will break the system)
5. We cannot enforce that a test should belong to at least one of Mother (through Pregnancy) or Baby and ONLY one of them. If we put a participation constraint to both relationships it will be incorrect as the test can be associated only with either the baby or the mother/pregnancy.
6. A pregnancy could be marked for home birth but could still be involved in a relationship with a birthing center - this should be prevented by the application.
7. We cannot enforce that a pair of parents do not form couple twice.
8. The model also does not enforce any consistency on the use of the healthcare institutions. I.e., a midwife from one institution could have hosted an information session, but the couple could be assigned a midwife from another institution, etc.
9. This model allows to have Fathers and Mothers who are not part of a couple - but this can be easily fixed by forcing a participation constraint on those entity sets.
10. The model allows for midwives not associated with a specific pregnancy to have appointments and be involved in tests of that pregnancy.

Relational Translation

1. Mother(**hcnum**, mname, phone, dob, addr, profession, email, bloodtype)
2. Father(**fid**, hcnum, mname, phone, dob, addr, profession, email, bloodtype)
3. Couple(**cid**,hcnum,fid) hcnum ref Mother, fid ref Father
4. HcInstitute(**hid**, addr, name, phone, email, web)
5. CommClinic(**hid**) hid ref HcInstitute
6. BirthCenter(**hid**) hid ref HcInstitute
7. Midwife(**practid**, name, phone, email, hid) hid ref HcInstitute
8. LabTech(**techid**, phone, name)
9. Pregnancy(**cid, num**, expdueym, lmpdued, usounddued, estdued, interested, homebirth, ppractid, bpractid, hid) cid ref Couple, ppractid ref Midwife, bpractid ref Midwife, hid ref BirthCenter
10. Baby(**bid**, gender, dob, btime, bloodtype, bname, pregnum, cid) (pregnum, cid) ref Pregnancy
11. Tests(**tid**, ttype, prescdate, sampdate, labdate, results, practid, pregnum, cid, bid, techid) practid ref Midwife, (cid, pregnum) ref Pregnancy, bid ref Baby, techid ref LabTech
12. InfoSession(**iid**, sdate, stime, lang, practid) practid ref Midwife
13. Appointment(**aid**, adate, atime, pregnum, cid, practid, hid) (pregnum,cid) ref Pregnancy, practid ref Midwife, hid ref BirthCenter
14. InfoSessionRegistration(**iid**, cid, attended)

Notes:

1. The key constraints are merged into respective entities' relations where applicable.
2. The ISA hierarchy is translated into independent relations as it gives better control over enforcing the constraints (birth can be given only on birthing centers).

Limitations

1. We cannot ensure that every Couple has a pregnancy associated with it in the relational translation.
2. The ISA translation does not handle that a birthing center and community clinic should be two distinct (no overlap) concepts. It also does not enforce the covering constraint

Some Alternate modelling approaches (Not Exhaustive)

1. Mother and Father could be in an ISA hierarchy to a Person entity set. This is acceptable, however, it will need an artificial key along with some adjustments to the connecting relationships.
2. An approach that brings Mother, Father, (even Baby), LabTech and Midwife (or just the later two) under an ISA hierarchy is not correct, as you are mixing totally different domains.
3. Similarly, putting Mother's address and Birthing Center together under an ISA hierarchy is a bad approach as they are different domains. These concepts were discussed in class explicitly.
4. It is ok if Baby is a weak entity dependent on the Pregnancy, although it is an overkill. Who even numbers babies?
5. The prescribes relationship could be associated with appointments instead of midwives (which will also indirectly record the midwife responsible for writing the test).
6. In alternate approaches, a Pregnancy entity set by itself might be used instead of a Couple entity (parents have a relationship with pregnancy). These implementations are also acceptable. Here most of the roles taken care of by the Couple entity set in the solution outline will be taken over by the Pregnancy entity set itself.
7. Some might have modelled the tests to be attached to an appointment. This is ok.