Note: In my ER diagram, rectangles with double outline are used to represent weak entity sets, and the diamonds with double outline are used to represent the relationship between the weak entity set and its owner.

Assumptions

1. I assume that all vials in a batch will be administered at the location where the batch is sent to. For example, if a batch is sent to location A, then all the vials in that batch will be administered at location A.
2. I assume that waiting period is the same within each type of vaccine. That is, if a vaccine need 3 doses, then the waiting period between each dose should be the same.

Restrictions

1. At any time, the number of slots opening at a location can't exceed the vaccine availability, the infrastructure capacity, or the personnel availability of that location. That is, at a give location, slots < min (vaccine availability, infrastructure capacity, personnel availability) .
2. At any time, the number of AllocateTo relationships can't exceed the number of slot entities in the system. That is, the number of allocated slots must be smaller than the number of slots available.
3. The same vaccine is used for all the doses of a person.
4. The waiting period is strictly enforced.
5. The registrants receive the required number of doses.

Relational Translation

Registrant(<u>healthInsuranceNumber</u>, city, postalCode, streetAddr, name, gender, phone, dateOfBirth, category, priority)

Slot(<u>name</u>, <u>slotNo.</u>, <u>date</u>, <u>time</u>, allocationDate, allocationTime, healthInsuranceNumber)
name foreign key referencing relation Location
healthInsuranceNumber foreign key referencing relation Registrant
relation Open is combined into relation Slot
relation AllocateTo is combined into relation Slot
/*
allocationDate is just the date attribute of the allocateTo relationship in my ER diagram. allocationTime is just the time attribute of the allocateTo relationship in my ER diagram. I rename them to distinguish them from the date and time attribute of the Slot entity.
*/

Location(name, city, postalCode, streetAddr)

Nurse(licenseNo., name, employer)

Assignment(licenseNo., name, date)
licenseNo. Foreign key referencing relation Nurse
name foreign key referencing relation Location
relation AssignTo is combined into relation Assignment

Vaccine(vaccineName, waitingPeriod, doese)
/*
I rename the “name” attribute of Vaccine entity set into “vaccineName”, in order to distinguish it from the name attribute of the Location entity set.
*/

Batch(vaccineName, batchNo., manufacturedDate, expireDate, totalNumberOfVials, name)
vaccineName foreign key referencing relation Vaccine
name foreign key referencing relation Location
relation Belong1 is combined into relation Batch
relation SendTo is combined into relation Batch
/*
Belong1 is the relationship between Batch and Vaccine on my ER diagram,
Belong2 is the relationship between Vial and Batch on my ER diagram,
I rename them here to distinguish the two
*/

Vial(vaccineName, batchNo., vialNo., licenseNo., healthInsuranceNumber)
(vaccineName, batchNo.) foreign key referencing relation Batch
licenseNo foreign key referencing relation Nurse
healthInsuranceNumber foreign key referencing relation Registrant
relation Belong2 is combined into relation Vial
relation AdministeredBy is combined into relation Vial
relation AdministeredTo is combined into relation Vial