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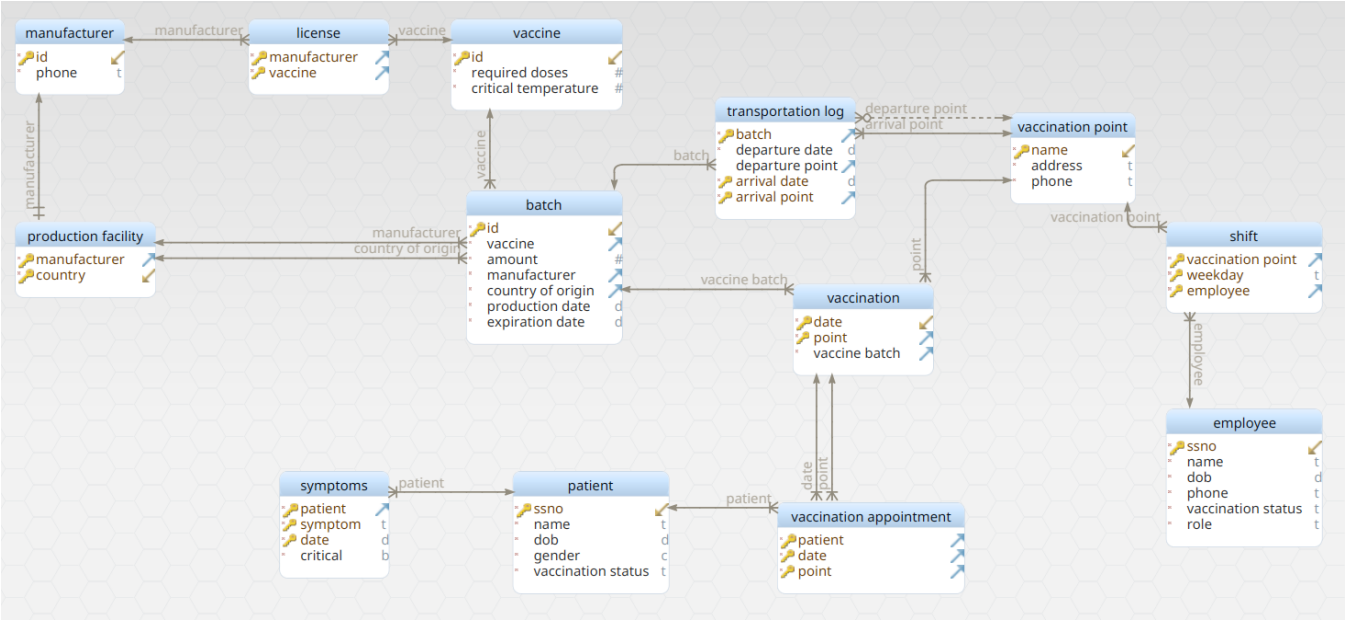
CS-A1153 Databases

Part 1

1. UML Diagram:



We made following assumptions in addition to exercise description and assistants' answers:

- One manufacturer can have only one license for a distinct vaccine type. Licenses don't have a serial number
- One manufacturer can have only one production facility in a distinct country
- Vaccine doesn't depart from a specific place more than once a day and doesn't arrive to a specific place more than once a day (however, it can depart from/arrive to a place several times if it's on different days)
- Employees don't have fixed vaccination points, the only thing linking an employee and specific vaccination point is a shift. An employee can have shifts on multiple vaccination points.

P.s: in DBSchema, due to inability to use capital letters in names of tables/attributes, some of them contain spaces. In relational data model (and later in database) we use capital letters instead (e.g. TransportationLog instead of transportation log)

2. Relational data model:

Manufacturer(id, phone)
ProductionFacility(manufacturer, country)
License(manufacturer, vaccine)
Vaccine(id, requiredDoses, criticalTemperature)
Batch(id, vaccine, amount, manufacturer, countryOfOrigin, productionDate, expirationDate)
TransportationLog(batch, departureDate, departurePoint, arrivalDate, arrivalPoint)
VaccinationPoint(name, address, phone)
Employee(ssNo, name, DOB, phone, vaccinationStatus, role)
Shift(vaccinationPoint, weekday, employee)
Vaccination(date, point, vaccineBatch)
VaccinationAppointment(patient, date, point)
Patient(ssNo, name, DOB, gender, vaccinationStatus)

Symptoms(patient, symptom, date, critical)

3. FDs:
   Manufacturer: {id -> phone} - it's in BCNF
   ProductionFacility: no non-trivial FDs (all attributes are in the key) - it's in BCNF
   License: no non-trivial FDs (all attributes are in the key) - it's in BCNF
   Vaccine: {id -> requiredDoses, criticalTemperature} - it's in BCNF
   Batch: {id -> vaccine, amount, manufacturer, countryOfOrigin, productionDate, expirationDate} - it's in BCNF
   TransportationLog: {batch, arrivalDate, arrivalPoint -> departureDate, departurePoint; batch, departureDate, departurePoint -> arrivalDate, arrivalPoint} - closures of both left sides contain all attributes => it's in BCNF
   VaccinationPoint: {name -> address, phone} - it's in BCNF
   Employee: {ssNo -> name, DOB, phone, vaccinationStatus, role} - it's in BCNF
   Shift: no non-trivial FDs (all attributes are in the key) - it's in BCNF
   Vaccination: {date, point -> vaccineBatch} - it's in BCNF
   VaccinationAppointment: no non-trivial FDs (all attributes are in the key) - it's in BCNF
   Patient: {ssNo -> name, DOB, gender, vaccinationStatus} - it's in BCNF
   Symptoms: {patient, symptom, date -> critical} - it's in BCNF

   All the relations are in BCNF => the database is in BCNF