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Course: DataBase Systems  
Assignment: 4

### Question 1

(a) Insert: Suppose a new car parking space is added, but no staff member is assigned to. This will result in a lot of null values, hence insert anomaly.

update: Suppose we change the location of a car parking space. If each location has a fixed capacity and no of floors, that needs to be updated too, hence update anomaly.

Delete: If ~~staff~~ staff is leaving the organization and the corresponding record is deleted from the table this would also delete information of car parking space  
123.

(b) Staff no → name, CarPark Name, spaceno  
spaceno → staffno, location, capacity, no of floors  
location → capacity, no of floors

### assumptions

- A staff member can have only one space and a space is allocated to only one staff member.
- CarPark Name is name of staff member's car. Multiple staff members can have same CarPark name.
- Each location has fixed capacity and is found at a specific floor.

(C)

(staffno, Name, CarParkName, location,  
capacity, noOfFloors, spaceNo)

(location, capacity, noOfFloors)  
PK

(StaffNo, SpaceNo,  
CarParkName, location,  
name)  
AK PK FK

PK : Primary Key  
AK : Alternate key  
FK : Foreign key.

Candidate keys: staffno and  
Space no

d) Staffno → name, CarParkName, space no  
space no → staff no, location, capacity, no of floors

are in 3NF (staffno and space no are  
super keys)

location → capacity, no of floor ~~are~~ <sup>is</sup> not in 3NF

~~are~~ <sup>is</sup> in 2NF (location is not SK, Capacity and no of floors  
are not Prime attribute)

## Question 2

a) insertion: New d centre No is created, can't insert if  
there is not staff member in it.

delete: if there is a staff member in a d centre No information  
of d Centre No also lost. if that staff no deleted.

update: an staffno assigned D001 to D002. also need  
to change dAddress and dTelNo.

(b) Key is Staff No.

(c) fd2, fd3, fd4. Left hand side are not SK.

d) (StaffNo, name, position, salary, dCentreNo, dAddress, dTelNo)

(dCentreNo, dAddress, dTelNo)  
PK

(StaffNo, name, position, salary, dCentreNo)  
PK

e) fd2, fd3, fd4. LHS not SK and RHS not prime attributes.

f) (StaffNo, name, position, salary, dCentreNo, dAddress, dTelNo)

(dCentreNo, dAddress, dTelNo)

(StaffNo, name, position, salary, dCentreNo)

### Question 3

Invoice → Invoice-Date, Account Number, Due Date, patient#  
patient# → Patient Name, Date Admitted, Date Discharged  
Code → Description, total charge



(Invoice, Invoice date, Account Number, Due Date, Patient Name, Patient #, Date Admitted, Date Discharged, Code, Description, Total charge)

(Invoice, Invoice date, Account Number, Due Date, Patient Name, Patient #, Date Admitted, Date Discharged)

(Code, <sup>FK</sup>Invoice, Description, Total charge)

(Patient #, Patient Name, Date Admitted, Date Discharged)

(Code, Description, Total charge) (Code, <sup>FK</sup>Invoice, <sup>FK</sup>Invoice)

(Invoice, Invoice date, Account Number, Due Date, <sup>FK</sup>Patient #)

#### Question 4

a) Character → Voice, Residence, Address

not in BCNF. key is Character, Power.

b)

Character, Voice, Power, Residence, Address

Character → voice, residence, address.

(Character, Voice, Residence, Address)

(Character, Power)  
FK