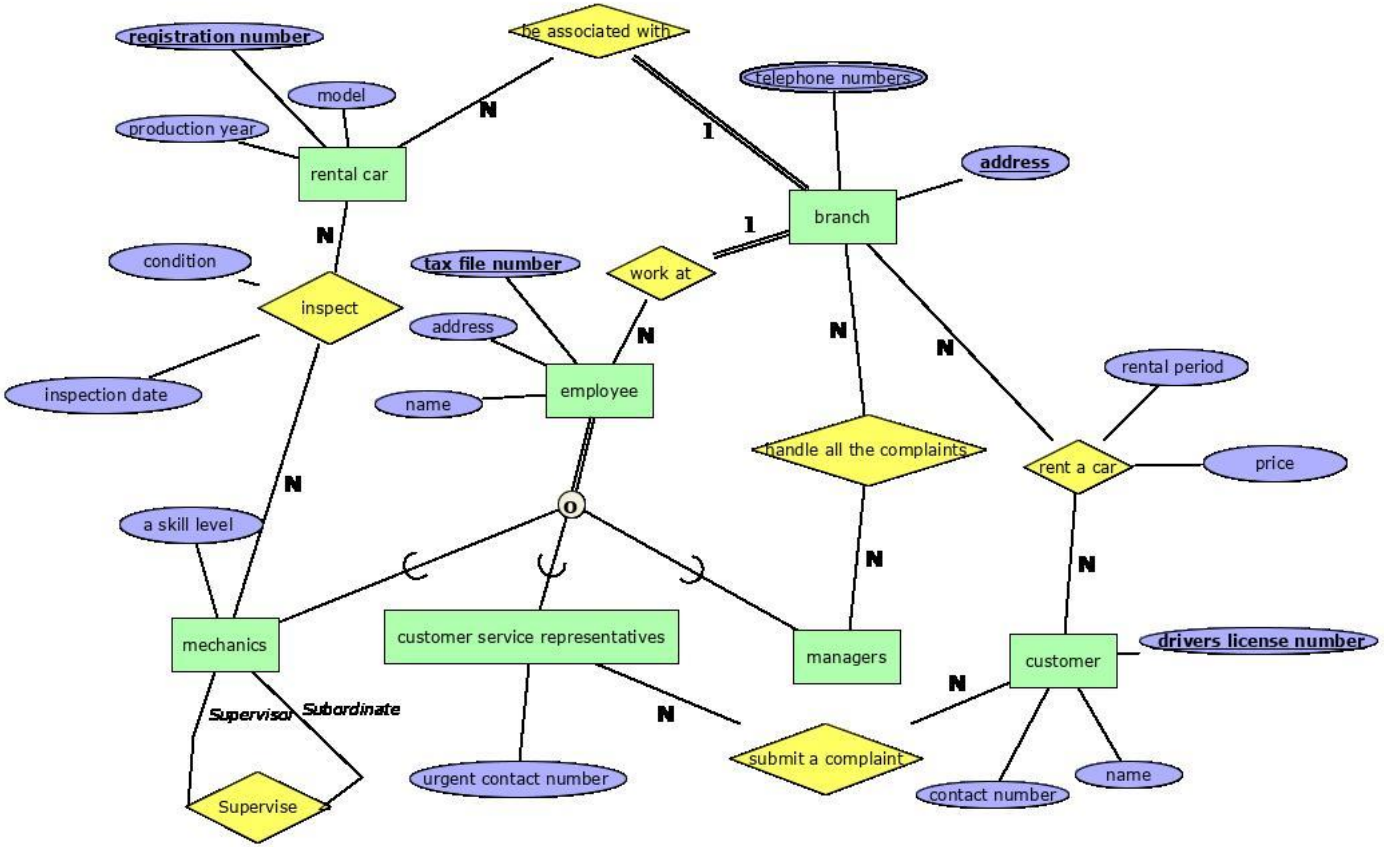
display?keyword=with%20respect%20to&lang=en



Q2

2.1 candidate keys is A, BE, CE

Because $A^+ \supseteq A$ $\supseteq AB$ $\supseteq ABDE$ $\supseteq ABCDE$ A is a key, so A can't be inside in a set

$B^+ \supseteq B$ $C^+ \supseteq CB$ $D^+ \supseteq D$ $E^+ \supseteq E$

$(BC)^+ \supseteq BC$ $BD^+ \supseteq BD$ $BE^+ \supseteq AC$ $\supseteq ABC$ $\supseteq ABCDE$

$CD^+ \supseteq CBD$ $CE^+ \supseteq CBE$ $\supseteq ACBE$ $\supseteq ABCDE$

$(DE)^+ \supseteq DE$ $(BCD)^+ \supseteq BCD$

2.2 $\{A \to B, AB \to DE, C \to B, BE \to AC\}$

start $\Sigma = \{A \to B, AB \to DE, C \to B, BE \to AC\}$

↓ Right hand side

$\Sigma = \{A \to B, AB \to D, AB \to E, C \to B, BE \to A, BE \to C\}$

↓ LHS

$AB \to E$

$\because A^+ \supseteq ABCDE$ so replace $AB \to D$ with $A \to D$, $A \to E$

and $\because$ ~~$(BE)^+ \supseteq BE$~~ $B^+ \supseteq B$, $C^+ \supseteq C$ $\therefore$ remain

$\Sigma = \{A \to B, B \to D, A \to E, C \to B, BE \to A, BE \to C\}$ is minimal cover

Q3 Let {Customer, Date, Staff, Room, Branch} be {C, D, S, R, B}

$\therefore$ FDs be $\{BDS \to R, CD \to S, BDR \to S, BCD \to R\}$

$CD^+ \supseteq CDS$ $BDR^+ \supseteq BDRS$

1. NO!, because $BDS^+ \supseteq BDSR$ Not a super key, and also CD, BDR

2. Let R = {C, D, S, R, B} start = {R} Σ of FDs = {$BDS \to R, CD \to S, BDR \to S, BCD \to R$}

↓ use $BDS \to R$

start = {{B, D, S, R}, {C, D, S, B}}

↓ use $CD \to S$

start = {{B, D, S, R}, {C, D, S}, {C, D, B}}

$\therefore$ BCNF = {{B, D, S, R}, {C, D, S}, {C, D, B}}

3. NO, it is Not dependency preserving, because $BCD \to R$ is Losing.

Q4

4.1

(a) $R_1 = \pi_{EmployeeID}(EMPLOYEE)$

$R_2 = \pi_{EmployeeID}(\sigma_{HNO="west-world"}(BOOKING) \bowtie_{EmployeeID=EID} EMPLOYEE)$

$Result = R_1 - R_2$

(b) $R_\alpha = \sigma_{Date=10-01-2019}(BOOKING)$

$R_\beta = \rho_{(CID)}(\pi_{R_1.CID}(\rho_{R_1}(R_\alpha) \bowtie_{(R_1.HNO \neq R_2.HNO \vee R_1.RNO \neq R_2.RNO) \wedge R_1.CID = R_2.CID} \rho_{R_2}(R_\alpha)))$

$Result = \pi_{Name, CID}((\pi_{CID}(R_\alpha) - R_\beta) \bowtie \rho_{(CID, Name, PHone)}(CUSTOMER))$

4.2

II

$\pi_{customerID, Name, Date, HNO}(\sigma_{(CID = customerID) \wedge (HNO = HotelNO) \wedge (RNO = RoomNO) \wedge (Price > 200)}(BOOKING \times CUSTOMER \times HOTEL))$

use $\sigma_\varphi(R_1 \times R_2) \stackrel{!}{\equiv} \sigma_\varphi(R_1) \times R_2$ φ.AGR,

$\pi_{customerID, Name, Date, HNO}(\sigma_{CID = customerID}(\sigma_{HNO = HotelNO \wedge RNO = RoomNO \wedge price > 200}(BOOKING \times HOTEL) \times CUSTOMER))$

use $\sigma_\varphi(R_1 \times R_2) \equiv R_1 \bowtie_\varphi R_2$

$\pi \ldots (HOTEL \bowtie_{HNO = HotelNO \wedge RNO = RoomNO} \sigma_{price > 200}(BOOKING)) \bowtie_{CID = CustomerID} CUSTOMER$

use $\pi_X(R_1 \bowtie R_2) \equiv \pi_{X_1}(R_1) \bowtie \pi_{X_2}(R_2)$

$\therefore \pi_{CID, Date, HNO}(HOTEL \bowtie_{HNO = HotelNO \wedge RNO = RoomNO} \sigma_{price > 200}(BOOKING)) \bowtie_{CID = CustomerID} \pi_{customerID, Name}(CUSTOMER)$

answer!

Tree on next page!!

After : $\bowtie_{CID=CustomerID}$

$\pi_{CID, Date, HNO}$ | $\pi_{CustomerID, Name}$

$\bowtie_{HNO=HotelNO \wedge RNO=RoomNO}$ | CUSTOMER

$\sigma_{price>200}$ | HOTEL

BOOKING

before: $\pi_{CustomerID, Name, Date, HNO}$

$\sigma_{CID=CustomerID \wedge HNO=HotelNO \wedge RID=RoomID \wedge price>200}$

$\times$

$\times$ | HOTEL

BOOKING | CUSTOMER

Q5. 5 minimal covers

① $\{A \to B, B \to C, C \to A\}$ ② $\{A \to C, B \to A, C \to B\}$

③ $\{A \to B, A \to C, B \to A, C \to A\}$ ④ $\{A \to B, A \to C, B \to C, C \to A\}$

⑤ $\{A \to B, A \to C, B \to A, C \to B\}$