

Assignment 3a

A.

1. Functional dependencies of the given sample relations:-

$\text{CustomerID} \rightarrow (\text{LastName}, \text{FirstName}, \text{EmailAddress}, \text{EncryptedPassword}, \text{Address}, \text{City}, \text{State}, \text{ZIP}, \text{Phone}, \text{RefferedBy})$

$(\text{SaleID}, \text{CustomerID}) \rightarrow (\text{InvoiceDate}, \text{PreTaxTotal}, \text{Tax}, \text{Total})$

$(\text{PreTaxTotal}, \text{Tax}) \rightarrow \text{Total}$

$(\text{SaleID}, \text{SaleItemID}, \text{PurchaseID}) \rightarrow (\text{SalePrice})$

$(\text{PurchaseID}, \text{VendorID}) \rightarrow (\text{PurchaseItem}, \text{PurchasePrice}, \text{PurchaseDate})$

$\text{VendorID} \rightarrow (\text{Vendor}, \text{Phone})$

Functional dependencies of the given data in figure 3-33 and 3-34:-

$(\text{LastName}, \text{FirstName}) \rightarrow \text{Phone}$

$\text{Phone} \rightarrow (\text{Lastname}, \text{FirstName})$

$\text{LastName} \rightarrow (\text{Firstname}, \text{Phone})$

$\text{FirstName} \rightarrow (\text{Lastname}, \text{Phone})$

$(\text{Price}, \text{Tax}) \rightarrow \text{Total}$

$\text{Vendor} \rightarrow \text{Phone}$

$\text{Phone} \rightarrow \text{Vendor}$

2. In figure 3-33
(LastName, FirstName) $\rightarrow \rightarrow$ InvoiceItem
(LastName, FirstName) $\rightarrow \rightarrow$ InvoiceDate
(LastName, FirstName, InvoiceItem) $\rightarrow \rightarrow$ Price

In figure 3-34

Vendor $\rightarrow \rightarrow$ PurchaseItem
PurchaseItem $\rightarrow \rightarrow$ Vendor
(PurchaseItem, Vendor) $\rightarrow \rightarrow$ PurchasePrice
(PurchaseItem, Vendor) $\rightarrow \rightarrow$ PurchaseDate

3. Candidate keys for the relations: -
CustomerID is a candidate key for the table CUSTOMER.
(SaleID, CustomerID) is the candidate key for table SALE
(SaleID, SaleItemID, PurchaseID) is a candidate key for table SALE_ITEM
(PurchaseID, VendorID) is the candidate key for table PURCHASE
VendorID is the candidate key for the table VENDOR

Candidate keys for the figures: -

Yet there is no candidate key present in figure 3-33 because of a multivalued dependency. There is no candidate key present in figure 3-34 because of a multivalued dependency.

4. CustomerID is the primary key for table CUSTOMER
SaleID is the primary key for table SALE
SaleItemID is the primary key for table SALE_ITEM
PurchaseID is the primary key for table PURCHASE
VendorID is the primary key for table VENDOR

Primary keys for the figures: -

There are no primary keys present in the figures 3-33 and 3-34 because of multivalued dependency.

5. No foreign key present in table CUSTOMER
CustomerID is the foreign key for table SALE
SaleID and PurchaseID are the foreign keys for table SALE_ITEM

VendorID is the foreign key for table PURCHASE

Foreign keys for the figures: -

There are no foreign keys present in the figures 3-33 and 3-34 because of multivalued dependency.

6. Some of the assumptions from figure 3-33:-

- a) LastName \rightarrow (FirstName, Phone)
- b) FirstName \rightarrow (LastName, Phone)
- c) Phone \rightarrow (LastName, FirstName)

Some of the assumptions from figure 3-34:-

- a) Phone \rightarrow Vendor
- b) Vendor \rightarrow Phone

B. Some questions that I would ask the owners of the Queen Anne Curoisity Shop to verify my assumptions: -

- a) Does any of her customers have same FirstName and the same LastName?
If it's the case, then the assumptions a and b of figure 3-33 in last question are incorrect.
- b) Does any of her customers live in the same house?
If it's the case, then the assumption c of figure 3-33 in last question is incorrect.
- c) Does any of the vendors have different phone numbers?
If it's the case, then the assumptions a and b in figure 3-34 are incorrect.

C. To eliminate the multivalued dependencies in figures 3-33 and 3-34 following tables need to be created: -

CUSTOMER(CustomerID, LastName, FirstName, Phone)

INVOICE(CustomerID, InvoiceItem, InvoiceDate)

PRICE(CustomerID, InvoiceItem, Price)

COST(Price, Tax, Total)

PURCHASE(VendorID, PurchaseItem, PurchasePrice, PurchaseDate)

Vendor(VendorID, Vendor, Phone)

- D. These data don't have multivalued, multicolumn problem because none of the columns in the figures have entities of the same type. If it was present, then we would create a second table to store those data.
- E. These data don't have inconsistent data values problem because each of the similar data values in the figures is listed in the same order and none of the data is spelled incorrectly. If it was a problem then we would find all the values using the check for referential integrity constraint or by using GROUP BY clause in the suspected column. After that we have to fix it manually.
- F. These data don't have null value data problem because none of the cell in the figures says NULL. If it was the case, then we would remove the rows with null values from the existing table and move it to a new table. We do this because columns with null values can't be a primary key nor a foreign key and they can't participate in relationships.
- G. These data don't have a general-purpose remarks problem because that column is not listed in any of the figures. If it was the problem then we would identify all the different purposes of the remarks column, create new columns for each of those purposes, and then extract the data and store it in new columns.