Assignment Answer 10

Part 1

Consider the following Functional Dependencies:

CustNo → CustBal, CustDiscount
OrdNo → CustNo, ShipAddr, OrderDate
ItemNo → ItemDesc
ItemNo, PlantNo → ReorderPoint, QtyOnHand
OrderNo, ItemNo → LineNo, QtyOrdered, QtyOutstanding
OrderNo, LineNo → ItemNo, QtyOrdered, QtyOutstanding

A).Using the above Functional Dependencies, derive 2NF tables.

The entity under consideration should already be in the 1NF and all attributes within the entity should depend solely on the entity's unique identifier

First we need to add CustNo → CustBal, CustDiscount and OrdNo → CustNo, ShipAddr, OrderDate.

1) Orderno→ shipaddr orderdate,custno, custbal , custdiscount

Orderno	Shipaddr	Orderdate	Curstno	Crustbal	Custdiscount

2) ItemNo → ItemDesc

Itemno	Itemdesc

3) OrderNo, ItemNo → LineNo, QtyOrdered, QtyOutstanding

Orderno	Itemno	Lineno	QtyOrdered	QtyOutstanding

4) ItemNo, PlantNo → ReorderPoint, QtyOnHand

ItemNo	PlantNo	ReorderPoint	QtyOnHand

B).Using the above Functional Dependencies and your answer to part (a) derive 3NF tables.

"The entity should already be in the 2NF and no column entry should be dependent on any other entry (value) other than the key for the table. If such an entity exists, move it outside into a new table. "

In order to express the same facts without violating 3NF, I split the table into two:

CustNo → CustBal, CustDiscount

CustNo	CustBal,	CustDiscount

OrdNo → CustNo, ShipAddr, OrderDate

OrdNo	CustNo	ShipAddr,	OrderDate

ItemNo → ItemDesc

Itemno	Itemdesc

OrderNo, ItemNo → LineNo, QtyOrdered, QtyOutstanding

Orderno	Itemno	Lineno	QtyOrdered	QtyOutstanding

ItemNo, PlantNo → ReorderPoint, QtyOnHand

ItemNo	PlantNo	ReorderPoint	QtyOnHand

C).Using the above Functional Dependencies and your answer to part (a) & (b) derive BCNF tables.

The database should be in 3NF and all tables can have only one primary key.

The Primary keys I would pick are the following, OrderNo ItemNo.

Part 2

Consider the following relation:

Shipping (ShipName, ShipType, VoyageID, Cargo, Port, Date)

Hint: Date is the date the ship arrives in the given Port

With the functional dependencies:

ShipName -> ShipType

VoyageID -> ShipName, Cargo

ShipName, Date -> VoyageID, Port

A).Identify the candidate keys.

What does *Candidate Key* mean?

"A candidate key is a column, or set of columns, in a table that can uniquely identify any database record without referring to any other data. Each table may have one or more candidate keys, but one candidate key is special, and it is called the primary key."

Answer: Key is ShipName and Date

B).Normalize to 2NF

Starting with the initial relation:
Shipping (ShipName, ShipType, VoyageID, Cargo, Port, Date)

The partial key of ShipName alone can determine ShipType.
So I normalize it to:

SHIPS (ShipName, ShipType)

ShipName	ShipType

VOYAGES (ShipName, VoyageID, Cargo, Port, Date)

ShipName	Date	VoyageID	Port

VoyageID	ShipName	Cargo

C).Normalize to 3NF

As in the last page (2nf), VOYAGES has a transitive dependency:

ShipName, Date → VoyageID

VoyageId → Cargo

So I normalized VOYAGES:

SHIPPORTS (ShipName, VoyageID, Port, Date)

ShipName, Date→VoyageID, Port

ShipName	Date	VoyageID	Port

VoyageID→ShipName

VoyageID	ShipName

CARGO (VoyageID, Cargo)

VoyageId→Cargo

VoyageID	Cargo

SHIPS(ShipName, ShipType)

ShipName → ShipType

ShipName	ShipType

D).Normalize to BCNF

SHIPPORTS is not in BCNF since it has VoyageID as a determinant key but VoyageID is not a candidate key.

SHIPDATES (ShipName, Port, Date)

ShipName, Date→Port

ShipName	Date	Port

SHIPVOYAGE (VoyageID, ShipName)

VoyageID→ShipName

VovageID	ShipName

CARGO (VoyageID, Cargo)

VoyageId→Cargo

VoyageID	Cargo

SHIPS (ShipName, ShipType)

ShipName →ShipType

ShipName	ShypType

Part 3

Given the following relation and example data:

PartNumber	Description	Supplier	SupplierAddress	Price
10010	20 GB Disk	Seagate	Cuppertino, CA	$100
10010	20 GB Disk	IBM	Armonk, NY	$90
10220	256 MB RAM card	Kensington	San Mateo, CA	$220
10220	256 MB RAM card	IBM	Armonk, NY	$290
10220	256 MB RAM card	Sun Microsystems	Palo Alto, CA	$310
10440	17" LCD Monitor	IBM	Armonk, NY	$2,100

List the functional dependencies and normalize this relation into BCNF.

a) PartNumber →Description
b) PartNumber, Supplier →Price
c) Supplier→SupplierAddress

1NF: I picked partNumber, Supplier as the key so I am in 1NF

2NF: We have a partial key dependency in that

Supplier →SupplierAddress

So I normalized:

AB (PartNumber, Description, Supplier, Price)

PartNumber →Description

PartNumber, Supplier→Price

I added tables a and b here

C (Supplier, SupplierAddress)

Supplier→SupplierAddress

B (PartNumber, Supplier, Price)

PartNumber, Supplier→Price

A (PartNumber, Description)

PartNumber → Description

I normalized table AB again

C (Supplier, SupplierAddress)

Supplier → SupplierAddress