BINOY BARNABAS

ILP BATCH 1

DBMS assignment

1.Employee information

Since all the data is atomic it is in 1NF form.

EmployeeName, Salary, HireDate are fully dependent on employeeID so we split the table into employee table. This removes the partial dependency in the initial table.

Employee table

EmployeeID	EmployeeName	Salary	HireDate
1	John smith	50000	2022-01-15
2	Alice Brown	60000	2022-02-20
3	Mark Johnson	55000	2022-03-10

We can create a department table using departmentID, because otherwise If we delete a data from a table the department data is lost which causes deletion anomaly.

Department table

departmentID	department
d1	HR
d2	IT
d3	Sales

Then we can create a mapping table based on employeeID from employee table and departmentID from department table along with the managerID from this table below. Since the table doesn't have any other data related to manager I'm adding the managerID to the table directly.

EmployeeDepartmentMapping table

employeeID	departmentID	ManagerID
1	d1	101
2	d2	102
3	d3	101

2. Training programs

Removing the partial dependency by creating a new table called programs where programName and trainer are functionally dependent on programID.

programID	programName	Trainer
1	Java Fundamentals	John Smith
2	Project Management	Sarah White

3	Sales Techniques	Mark Johnson

EmployeeID is dependent on programName and programName is dependent on programID which causes the transitive dependency. To remove the transitive dependecy we need to create a new table for employee which has employeeID, department and employeename as fields.

employeeId	department	employeename
101	IT	Alice Brown
102	HR	Bob Green
103	Sales	Charlie Black

programID	employeeID	date
1	101	2022-03-01
2	102	2022-03-10
3	103	2022-03-20

Further optimization: since department data can be lost if we remove any record from the employee table which leads to the deletion anomaly. So it's better to create a new table for department which has departmentID and department. Thus it would results to 2 new changes.

Change in employee table.

employeeId	employeename
101	Alice Brown
102	Bob Green
103	Charlie Black

Program table

programID	programName	Trainer
1	Java Fundamentals	John Smith
2	Project Management	Sarah White
3	Sales Techniques	Mark Johnson

This would be new department table which will help to resolve the deletion anomaly.

departmentID	departmentNmae
d1	IT
d2	HR
d3	Sales

This is the programEmployeeDepartmentMapping table

programID	employeeID	departmentID	date
1	101	d1	2022-03-01
2	102	d2	2022-03-10
3	103	d3	2022-03-20

3. Customer orders

Since the initial table is already in 1NF form because no multivalues attributes are there and all the data are atomic.

Removing the partial dependecy from the table by creating a new table for product using the fields productID, productName, unitPrice. Here the productName and unitPrice are functionally dependent on productID. This new table removes partial dependency from the table.

productID	productName	unitPrice
101	Laptop	800
102	Smartphone	500
103	Printer	200

In the new table which has fields productID, orderID, customerName, qty, totalAmount, orderDate.

productID	orderId	customerName	qty	totalAmount	orderDate

customerName is fully dependent on orderID and orderID is fully dependent on productID which causes the transitive depency to exist. So to remove the transitive dependecy from the table we need to create a new table orders which has orderID, customerName, qty, totalAmount, orderDate. Thus we removes the transitive dependeny by creating orders table given below and made it upto to 3NF.

orderId	customerName	qty	totalAmount	orderDate
1	John Doe	2	1600	2022-01-15
2	Jane Smith	1	500	2022-02-20
3	John Doe	1	200	2022-03-10

The final table called the orderProductMapping where the products are mapped to orders in which the products are purchased.

orderProductMapping table

orderid	productid
1	101
2	102
3	103

4. Stress management

Since the initials table is already in the 1NF form.

We remove the partial dependency from the initial table by removing the firstName, lastName and employeeID as employee table where firstName and lastName are fully dependent on employeeID.

employeeeID	firstName	lastName
101	Sarah	White
102	Bob	Green
103	Charlie	Black
104	David	Miller
105	Jane	Doe

Again hoursOfWork and BreaksTaken are functionally dependent on employeID so we create a new table called workingHours.

employeeID	hoursOfWork	BreaksTaken
101	45	3
102	50	2
103	40	4
104	48	1
105	42	3

StressLevel, PhysicalActivity and counsellingSession are associated with employeeID. So we are again creating a new table called stressManagement.

employeeID	stressLevel	PhysicalActivity	counsellingSesssion
101	moderate	yoga	2
102	high	joggin	1
103	low	meditation	3
104	high	gym	2
105	moderate	walking	1

Now the table is normalized.

5. Flea market

The initial table is already in 1NF. Removing the partial dependency by creating a new table called sellers which has the sellerID, sellerName and also the location. Here the sellerName and location is fullydependent on the key sellerID. Thus remove the partial dependency. Hence the normalized version is given below. One table is for the items and other table is called seller, where the sellerID in the items table in referenced from the seller table using foreign key contraints.

itemID	sellerId	itemName	category	price	quantity	description	condition	dateListed
101	s1	Vintage chair	Furniture	50.00	2	Beautiful vintage	Lik new	2022-01-15

						chair, excellent condition		
102	s2	Antique clock	Home Decor	80.001	1	Authentic antique clock with Roman numerals	good	2022-02-20
103	s3	Vinyl Records	Music	15.00	10	Various artists and genres, in good condition	used	2022-03-10
104	s4	Vintage Jewelery	Accessories	35.00	5	Assorted vintage jewelry pieces, unique designs	excellent	2022-04-05
105	s5	Retro Camera	Electronics	60.00	1	Vintage Polaroid camera with original case	good	2022-05-15

sellerID	sellerName	location
s1	John's Treasure	Booth 15, section A
s2	Alice's Finds	Stall 8, section B
s3	Mark's collectibles	Booth 20, Section C
s4	Emma's Treasure	Stall 12, Section D
s5	Robert's Find	Booth 5, Section A

6. Learning management system

Removing partial dependency. Creating a course table where courseName and credits are fully dependent on CID.

CID	courseName	credits

101	Introduction to biology	3
102	Programming in python	4
103	Financial accounting	3
104	English literature	3
105	Web development fundamentals	4

Removing transitive dependency, that is instructor is functionally dependent on courseName and courseName is fully dependent on CID. So we are creating another table for instructor to remove the transitive dependency. The new table is shown below

InstructorID	instructor
c1	Prof. smith
c2	Prof. brown
c3	Prof. green
c4	Prof. white
c5	Prof. Black

Removing transitive dependency, that is department is functionally dependent on instructorID and instructorID is fully dependent on CID. So we are creating another table for department to remove the partial dependency. The new table is shown below

departmentID	department
d1	science
d2	Computer science
d3	finance
d4	humanities
d5	IT

CID	instructorID	departmentID	Enrolled students	Start date	End date	location	availability
101	c1	d1	25	2022-01-15	2022-05-10	Room 101	open
102	c2	d2	30	2022-02-20	2022-06-15	Lab 3, building B	closed
103	c3	d3	20	2022-03-10	2022-07-05	Room 201	open
104	c4	d4	22	2022-04-05	2022-08-20	Room 301	open
105	c5	d5	28	2022-05-15	2022-09-25	Lab 2, building A	closed