Experion ILP-Batch 1

Task 1

Normalize the following tables

1. Employee Information

Unnormalized

EmployeeID	EmployeeName	Department	ManagerID	Salary	HireDate
1	John Smith	HR	101	50000	2022-01-15
2	Alice Brown	IT	102	60000	2022-02-20
3	Mark Johnson	Sales	101	55000	2022-03-10

1NF

The table is in 1NF because every cell has atomic value.

2NF

Removing Partial Dependency because ManagerID is only dependent on EmployeeID:

Employee Table:

The EmployeeID is the primary key here.

EmployeeID	EmployeeName	Department	Salary	HireDate
1	John Smith	HR	50000	2022-01-15
2	Alice Brown	IT	60000	2022-02-20
3	Mark Johnson	Sales	55000	2022-03-10

Employee_Manager Table:

EmployeeID	ManagerID
1	101
2	102
3	101

3NF

Removing Transitive Dependency because the Department and Manager can be in transitive dependency. So, we create a department table:

Employee Table:

DeptID is a foreign key referencing the Department table.

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

Employee_Manager Table:

EmployeeID	ManagerID
1	101
2	102
3	101

Department Table:

DeptID is the primary key.

DeptID	Department
D-1	HR
D-2	IT
D-3	Sales

2. Training Programs

Unnormalized Form:

ProgramID	ProgramName	Trainer	Department	EmployeeID	EmployeeName	Date
1	Java Fundamentals	John Smith	IT	101	Alice Brown	2022-03-01
2	Project Management	Sarah White	HR	102	Bob Green	2022-03-10
3	Sales Techniques	Mark Johnson	Sales	103	Charlie Black	2022-03-20

1NF: Table is already in 1NF.

2NF

Removing Partial Dependency:

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

3NF

Removing Transitive Dependency:

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

EmployeeID	EmployeeName
101	Alice Brown
102	Bob Green
103	Charlie Black

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

ProgramID	Department	EmployeeID	Date
1	IT	101	2022-03-01
2	HR	102	2022-03-10
3	Sales	103	2022-03-20

Making it more efficient

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

Program_Employee Mapping:

ProgramID	DepartmentID	EmployeeID	Date
1	D-101	101	2022-03-01
2	D-102	102	2022-03-10
3	D-103	103	2022-03-20

Department Table

DepartmentID	DeptName
D-101	IT
D-102	HR
D-103	Sales

3. Customer orders

Unnormalized Form

OrderID	CustomerName	ProductID	ProductName	Qty	UnitPrice	TotalAmount	OrderDate
1	John Doe	101	Laptop	2	800	1600	2022-01-15
2	Jane Smith	102	Smartphone	1	500	500	2022-02-20
3	John Doe	103	Printer	1	200	200	2022-03-10

1NF: The table is already in 1NF.

2NF

Removing partial dependency:

The ProductName and UnitPrice is dependent on ProductID and thus creates a partial dependency.

Product Table:

ProductID	ProductName	UnitPrice
101	Laptop	800
102	Smartphone	500
103	Printer	200

Order_Details table:

OrderID	CustomerName	ProductID	Qty	TotalAmount	OrderDate

1	John Doe	101	2	1600	2022-01-15
2	Jane Smith	102	1	500	2022-02-20
3	John Doe	103	1	200	2022-03-10

3NF:

There is no transitive dependency in the above table. So now to optimize the table more we can create another table called Order Table:

OrderID	CustomerName	Qty	OrderDate
1	John Doe	2	2022-01-15
2	Jane Smith	1	2022-02-20
3	John Doe	1	2022-03-10

Final Order Details Table:

OrderID	ProductID	TotalAmount
1	101	1600
2	102	500
3	103	200

4. Stress Management

Unnormalized Form:

EmployeeID	FirstName	LastName	StressLevel	HoursOfWork	Breaks Taken	PhysicalActivity	CounselingSessions
101	Sarah	White	Moderate	45	3	Yoga	2
102	Bob	Green	High	50	2	Jogging	1
103	Charlie	Black	Low	40	4	Meditation	3
104	David	Miller	High	48	1	Gym	2
105	Jane	Doe	Moderate	42	3	Walking	1

1NF

This table is already in 1NF since they are all atomic values.

2NF

This table satisfies the requirements for 2NF as there is no partial dependency in the table.

3NF

Removing Transitive dependency:

Employee Table

EmployeeID	FirstName	LastName	HoursOfWork	BreaksTaken
101	Sarah	White	45	3
102	Bob	Green	50	2
103	Charlie	Black	40	4
104	David	Miller	48	1
105	Jane	Doe	42	3

Stress_Management Table:

EmployeeID	StressLevel	PhysicalActivity	CounselingSessions
101	Moderate	Yoga	2
102	High	Jogging	1
103	Low	Meditation	3
104	High	Gym	2
105	Moderate	Walking	1

5. Flee Market

ItemID	Seller Name	ItemName	Category	Price	Quantity	Description	Condition	Location	DateListed
101	John's Treasures	Vintage Chair	Furniture	50.00	2	Beautiful vintage chair, excellent condition	Like New	Booth 15, Section A	2022-01-15
102	Alice's Finds	Antique Clock	Home Decor	80.00	1	Authentic antique clock with Roman numerals	Good	Stall 8, Section B	2022-02-20
103	Mark's Collectibles	Vinyl Records	Music	15.00	10	Various artists and genres, in good condition	Used	Booth 20, Section C	2022-03-10
104	Emma's	Vintage Jewelry	Accessories	35.00	5	Assorted vintage jewelry	Excellent	Stall 12, Section D	2022-04-05

	Treasures					pieces, unique designs			
105	Robert's Finds	Retro Camera	Electronics	60.00	1	Vintage Polaroid camera with original case	Good	Booth 5, Section A	2022-05-15

1NF

The given table is already in 1NF.

2NF:

The given table also satisfies the condition of 2NF as there is no partial dependency present.

3NF:

SellerName is transitively dependent on the ItemID because one seller can have many items. So, a seller table with Seller ID as primary key is created and this sellerID is used in the main table. Similarly, a single category can have multiple items, so a category table is also created.

Seller Table:

SellerID	SellerName	Location
S-1	John's Treasures	Booth 15, Section A
S-2	Alice's Finds	Stall 8, Section B
S-3	Mark's Collectibles	Booth 20, Section C
S-4	Emma's Treasures	Stall 12, Section D
S-5	Robert's Finds	Booth 5, Section A

Category Table:

CategoryID	Category
C-1	Furniture
C-2	Home Decor
C-3	Music
C-4	Accessories
C-5	Electronics

FleaMarket Table:

ItemID	SellerID	ItemName	CategoryID	Price	Quantity	Description	Condition	Location	DateListed

101	S-1	Vintage Chair	C-1	50.00	2	Beautiful vintage chair, excellent condition	Like New	Booth 15, Section A	2022-01-15
102	S-2	Antique Clock	C-2	80.00	1	Authentic antique clock with Roman numerals	Good	Stall 8, Section B	2022-02-20
103	S-3	Vinyl Records	C-3	15.00	10	Various artists and genres, in good condition	Used	Booth 20, Section C	2022-03-10
104	S-4	Vintage Jewelry	C-4	35.00	5	Assorted vintage jewelry pieces, unique designs	Excellent	Stall 12, Section D	2022-04-05
105	S-5	Retro Camera	C-5	60.00	1	Vintage Polaroid camera with original case	Good	Booth 5, Section A	2022-05-15

6. Learning Management System

Unnormalized Form:

CID	CourseName	Instructor	Department	Credits	Enrolled Students	StartDate	End Date	Location	Availability
101	Introduction to Biology	Prof. Smith	Science	3	25	2022-01-15	2022-05-10	Room 101	Open
102	Programming in Python	Prof. Brown	Computer Science	4	30	2022-02-20	2022-06-15	Lab 3, Building B	Closed
103	Financial Accounting	Prof. Green	Finance	3	20	2022-03-10	2022-07-05	Room 201	Open
104	English Literature	Prof. White	Humanities	3	22	2022-04-05	2022-08-20	Room 301	Open
105	Web Development Fundamentals	Prof. Black	IT	4	28	2022-05-15	2022-09-25	Lab 2, Building A	Closed

1NF:

The given table is already in 1NF.

2NF:

The table is not in 2NF because the instructor and department column are partially dependent on the primary key CID. So, to solve the partial dependency, an instructor table is created with instructor ID as primary key.

Instructor Table:

InstructorID	Instructor	Department
I-1	Prof. Smith	Science
I-2	Prof. Brown	Computer Science
I-3	Prof. Green	Finance
I-4	Prof. White	Humanities
I-5	Prof. Black	IT

Course Table:

CID	CourseName	InstructorID	Credits	Enrolled Students	StartDate	EndDate	Location	Availability
101	Introduction to Biology	I-1	3	25	2022-01-15	2022-05-10	Room 101	Open
102	Programming in Python	I-2	4	30	2022-02-20	2022-06-15	Lab 3, Building B	Closed
103	Financial Accounting	I-3	3	20	2022-03-10	2022-07-05	Room 201	Open
104	English Literature	I-4	3	22	2022-04-05	2022-08-20	Room 301	Open
105	Web Development Fundamentals	I-5	4	28	2022-05-15	2022-09-25	Lab 2, Building A	Closed

3NF:

The StartDate and EndDate depend on CourseName and CourseName depends on CID, so it creates a transitive dependency. To solve it we will divide the table again:

Courses Table:

CID	CourseName	InstructorID	Credits	Enrolled Students	Availability
101	Introduction to Biology	I-1	3	25	Open
102	Programming in Python	I-2	4	30	Closed
103	Financial Accounting	I-3	3	20	Open
104	English Literature	I-4	3	22	Open
105	Web Development Fundamentals	I-5	4	28	Closed

Course_Timing table:

CID	StartDate	EndDate	Location
101	2022-01-15	2022-05-10	Room 101
102	2022-02-20	2022-06-15	Lab 3, Building B
103	2022-03-10	2022-07-05	Room 201
104	2022-04-05	2022-08-20	Room 301
105	2022-05-15	2022-09-25	Lab 2, Building A