DBMS ASSIGNMENT – NORMALIZATION

1. Employee Information

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

Department Table

DepartmentID	DepartmentName
D1	HR
D2	IT
D3	Sales

Manager Table

ManagerID	ManagerName
101	Smith
102	Brown

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

ManagerEmployeeMapping Table

EmployeeID	DepartmentID	ManagerID
1	D1	101
2	D2	102
3	D3	101

Explanation:

- **1NF (First Normal Form):**
  - The table is in 1NF because each cell contains atomic values, and there are no repeating groups.
- **2NF (Second Normal Form):**
  - The table is in 2NF because it's already in 1NF, and there are no partial dependencies. All non-key attributes depend on the entire primary key (EmployeeID).
- **3NF (Third Normal Form):**
  - The table is in 3NF because it's in 2NF, and there are no transitive dependencies. All non-key attributes depend only on the primary key (EmployeeID).

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2. Training Programs

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

Program Table

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

Employee Table

EmployeeID	EmployeeName

101	Alice Brown
102	Bob Green
103	Charlie Black

Department Table

DepartmentID	Department
D1	IT
D2	HR
D3	Sales

ProgramEmployeeMapping Table

ProgramID	DepartmentID	EmployeeID	Date
1	D1	101	2022-03-01
2	D2	102	2022-03-10
3	D3	103	2022-03-20

Explanation

- The table is already in 1NF
- Partial Dependency:
    - ProgramID uniquely determines ProgramName, Trainer. (ProgramID -> ProgramName, Trainer)
- Transitive Dependency:
    - Department and EmployeeID depend on ProgramID. (ProgramID -> Department, EmployeeID)

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3. Customer orders

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

Product Table

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

Customer Table

CustomerID	CustomerName
C1	John Doe
C2	Jane Smith

OrderProductMapping Table

OrderID	ProductID	CustomerID	Qty	TotalAmount	OrderDate
1	101	C1	2	1600	2022-01-15
2	102	C2	1	500	2022-02-20
3	103	C1	1	200	2022-03-10

Explanation

- The table is already in 1NF
- Partial Dependency:
    - ProductID -> productName,UnitPrice
- Transitive Dependency:
    - ProductID -> ProductName
- Made it more efficient by adding Customer table with CustomerID and CustomerName

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4. Stress management

Employee ID	FirstName	LastName	StressLevel	HoursOf Work	Breaks Taken	Physical Activity	Counseling Sessions
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

Employee Table

EmployeeID	FirstName	LastName
101	Sarah	White
102	Bob	Green
103	Charlie	Black
104	David	Miller
105	Jane	Doe

EmployeeWorkAndBreakHours Table

EmployeeID	HoursOfWork	BreaksTaken
101	45	3
102	50	2
103	40	4
104	48	1
105	42	3

WellBeingActivities 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

Explanation

- The table is already in 1NF since ther is no multiple values in a table
- Partial Dependency:
    - EmployeeID -> FirstName, LastName:
    - EmployeeID -> HoursOfWork, BreaksTaken
    - EmployeeID -> StressLevel, PhysicalActivity, CounselingSessions
- No Transitive Dependency:
    - There is no transitive dependency identified in the provided data.

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5. Flee Market

ItemID	Seller Name	Item Name	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	Used	Booth 20,	2022-03-10

						good condition		Section C	
104	Emma's Treasures	Vintage Jewelry	Accessories	35.00	5	Assorted vintage jewelry pieces, unique designs	Excellent	Stall 12, Section D	2022-04-05
105	Robert's Finds	Retro Camera	Electronics	60.00	1	Vintage Polaroid camera with original case	Good	Booth 5, Section A	2022-05-15

Category Table

CategoryID	CategoryName
C1	Furniture
C2	Home Decor
C3	Music
C4	Accessories
C5	Electronics

ItemDetails Table

ItemID	ItemName	Price	Description	Condition	CategoryID
101	Vintage Chair	50.00	Beautiful vintage chair, excellent condition	Like New	C1
102	Antique Clock	80.00	Authentic antique clock with Roman numerals	Good	C2
103	Vinyl Records	15.00	Various artists and genres, in good condition	Used	C3

104	Vintage Jewelry	35.00	Assorted vintage jewelry pieces, unique designs	Excellent	C4
105	Retro Camera	60.00	Vintage Polaroid camera with original case	Good	C5

Seller Table

SellerID	SellerName
S1	John's Treasures
S2	Alice's Finds
S3	Mark's Collectibles
S4	Emma's Treasures
S5	Robert's Finds

ItemSellerMapping Table

ItemID	SellerID	Quantity	Location	DateListed
101	S1	2	Booth 15, Section A	2022-01-15
102	S2	1	Stall 8, Section B	2022-02-20
103	S3	10	Booth 20, Section C	2022-03-10
104	S4	5	Stall 12, Section D	2022-04-05
105	S5	1	Booth 5, Section A	2022-05-15

Explanation

- The table is already in 1NF since there are no multiple values in a table
- Partial Dependency:
    - ItemID uniquely determines SellerName. (ItemID -> SellerName)
- Transitive Dependency:
    - Category depends on ItemID. (ItemID -> Category)

- To make it more efficient seller, category and customer table are made.

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6. Learning Management System

CID	Course Name	Instructor	Department	Credits	Enrolled Students	Start Date	EndDate	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

Course Details Table

CID	CourseName	Credits	DeaprtmentID
101	Introduction to Biology	3	D1
102	Programming in Python	4	D2

103	Financial Accounting	3	D3
104	English Literature	3	D4
105	Web Development Fundamentals	4	D5

Department Table

DeaprtmentID	DepartmentName
D1	Science
D2	Computer Science
D3	Finance
D4	Humanities
D5	IT

Instructor Table

InstructorID	Instructor	DeaprtmentID
I1	Prof. Smith	D1
I2	Prof. Brown	D2
I3	Prof. Green	D3
I4	Prof. White	D4
I5	Prof. Black	D5

CouseSchedule Table

CID	InstructorID	EnrolledStudents	StartDate	EndDate	Location	Availability
101	I1	25	2022-01-15	2022-05-10	Room 101	Open

102	I2	30	2022-02-20	2022-06-15	Lab 3, Building B	Closed
103	I3	20	2022-03-10	2022-07-05	Room 201	Open
104	I4	22	2022-04-05	2022-08-20	Room 301	Open
105	I5	28	2022-05-15	2022-09-25	Lab 2, Building A	Closed

Explanation

- The table is already in 1NF sine there is no multiple values in a row
- Partial Dependency:
    - Removing partial dependency.
    - CID -> CourseName, Credits
- Transitive Dependency:
    - Removing transitive dependency between InstructorID, Department, and CID.
    - CID -> InstructorID
    - InstructorID -> DepartmentID
- To make it more efficient department table is made

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